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

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

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

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

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

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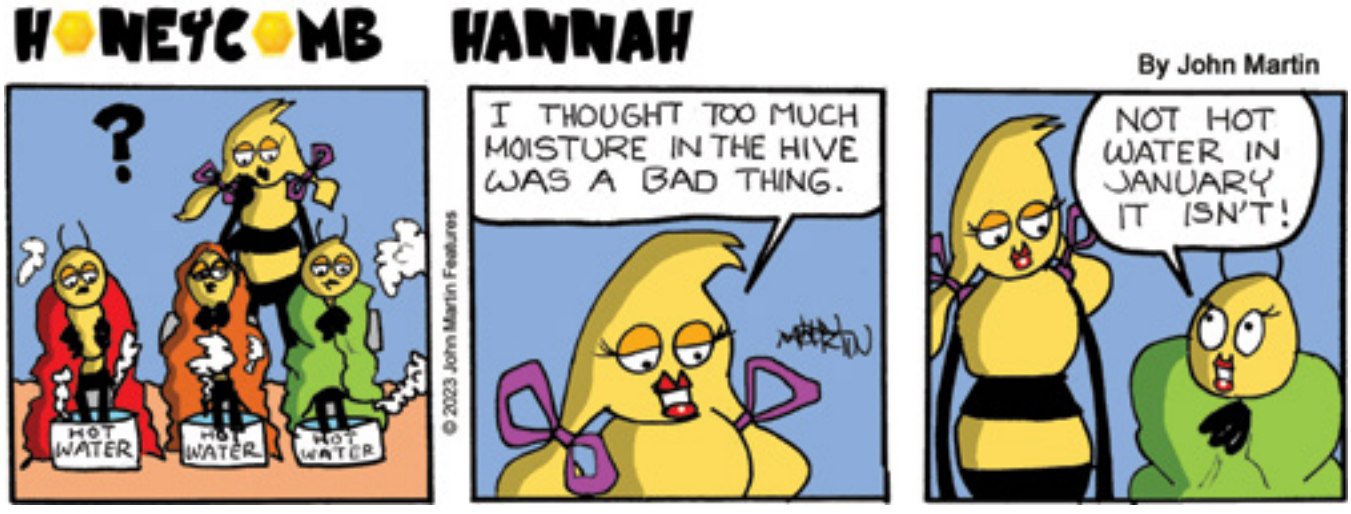
We would like to sincerely apologize for a misspelled name on the cover of the December 2022 issue. Instead of Stuart Roth, it should have said Stuart Roweth. Our deepest apologies to the author of the article, Tina Sebestyen and Stuart Roweth.

Cover Photo by
Denise Roesler-Cunningham
Submitted as part of our
monthly Image Gallery
Image Contest.

Contents



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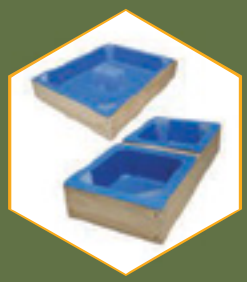

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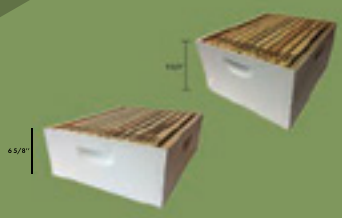

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Association Members

Jerry and John,

Here are a few answers and some comments on the *Only 5% of Beekeepers Belong to Associations* article by John Miller in the September 2022 issue of *Bee Culture*.

Within the numerous questions/comments in John's article there are four questions that stand out in my mind as needing some diligent examination and honest answers. If the intent with the page full of questions/comments was to show the confusion, information overload and many opinions beekeepers are subjected to at association meetings, it is an admirable job. Now imagine what someone interested in beekeeping, but knowing nothing, is thinking as they leave the meeting.

Some of my answers originate from the research paper generated by myself and my fellow students, Shena Bonnell of New Brunswick, Canada and Sadie Swieca of Denver, Colorado, in completing the Master Beekeeping program offered by the University of Montana. Specifically, information derived from the surveys we conducted in our geographic regions. Although prepared for the results from my area, I was disappointed to see similar results in both Canada and Colorado. Although sampling size is a fault of our survey, if the results are indicative of the U.S. and Canada in general, they do not bode well for beekeeping. As a contrast, and to be fair, beekeeping associations do accomplish good, beneficial and constructive work and actions for bees, beekeepers, beekeeping and the public. Allowing youth membership and helping to eliminate unnecessary regulations on small honey producers are two excellent examples within my region. And so it should be. I agree whole-heartedly with Dr. Larry Connor who made a statement in a 2010 *ABJ* article to the effect that "beekeeping associations are in the best position to bring about positive, beneficial change, benefiting both bees and beekeepers and make a big difference for the beekeeping world." Unfortunately, associations are also in a position to do much harm and damage.

Having been both member and officer in a handful of beekeeping organizations, and a non-member for 40+ of my 56 years as a beekeeper, I've viewed these organizations from all sides, and I've seen the good, the bad and, unfortunately, the ugly. From those viewpoints here are the questions that I feel are of an elevated level of concern and importance and need to be addressed:

1. What motivates young beekeepers to attend (or avoid) bee meetings?
2. Why do bee associations currently represent only about 5% of beekeepers?
3. Are the clubs and associations offering enough value to attract some of the 95% who are not members?
4. Can we do better?

Answers:

1. *What motivates young beekeepers to attend (or avoid) bee meetings?* Youthful INTEREST. And not just an interest – a special one that can ignite a lifetime passion! They come with a desire to learn. Associations much provide the proper learning environment and a competent, qualified mentor. Young people represent a special educational opportunity needing the investment and respect worthy of such an opportunity. These youthful mentees need to be made aware of your association and its educational opportunities along with where and when meetings are held. In attracting these young candidates, it may be necessary to seek them out by offering programs to schools, 4H, FFA and other organizations, and events such as the Earth Day and Natural Resource programs offered in my area by the Army Corps of Engineers and county Farm Bureau respectively. Entomological clubs and the Boy Scouts/Girl Scouts are other potential sources of possible young beekeepers (would make a good project for the Insect Study merit badge). They may be few, and difficult to find, but I would rather have only one enthusiastic mentee who may become the next Marla Spivak or Tom Seeley or just a good lifelong beekeeper than a dozen retirees destined to be merely bee-havers for a while. (The survey we conducted consisted of an age range from 36 to 73; no real young people.)
As to why young people, and others, avoid association meetings; along with being unaware of the organization, young people are often ignored or trivialized at meetings. Some have a fear of the natural world as it represents a disconnect from the technological world they live within. Confusion and conflict are two large turn-offs along with a lack of qualified mentors and proper mentoring such as in-hive experience prior to taking possession of a hive of bees. Mixed messaging (ask 10 beekeepers a question and get 12 answers only confuses and does not educate) and information overload, especially if involving conflict, does no one any good. Worst of all is the exploitation and profiteering that has nothing to do with education and can turn away even the most enthusiastic mentee.

2. *Why do bee associations currently represent only about 5% of beekeepers?* Questions 2 and 3 are tied together, but the reasons for only 5% of beekeepers belonging to associations are many. Again, lack of knowledge about the organization can be one. Then there is human nature – people don't think being a member of an association is needed, they can do this on their own. Also, the confusion and conflict, mixed messaging and info overload are big turn-offs. Another reason is turnover (our survey showed a 75% turnover in seven years for one association and our research found a reported 70% loss over two years in a recent *BC* article) very often due to discouragement resulting from a lack of success. Another problem with beekeeping success is that placing bee colonies into the hands of anyone/everyone too soon will eventually reveal those who should have been identified as not ready or needing further education. This, along with other issues, can lead to

a bad reputation which does not help generate, or keep, members.

3. *Are the clubs and associations offering enough value to attract some of the 95% who are not members?* NO. Especially when there is little to no success with new members and that reputation gets around. Lack of proper education is undoubtedly a major driver in this lack of success. A couple key questions in our survey revealed very telling results. When asked if a new beekeeper had a mentor, 77% of respondents answered "no." When asked how much time was spent in a beehive before taking possession of one, over half of the respondents answered "none."
   My most recent encounter with a bee association refugee serves as an excellent example of why I do not recommend all associations as the best place to obtain a solid education in beekeeping. Early in 2019, as I was recovering from a major surgery, I realized that the restrictions the doctors had placed on me would necessitate an assistant in apiary management that year. I solicited help from a local association and received a call from a new beekeeper who, as we became acquainted, let me know that he had been a member for three years but had yet to have a hive of bees make it through the Winter or produce any kind of a honey crop. My initial answer was to ask "why?" He later told me that he knew he was in for something different from the (lack) of education he had received in the past. He had followed all their advice on feeding (although never told why, when to or when not to), treat (again – no specifics) and whatever else was suggested – all to no avail. He had watched all the videos, listened to presentations and purchased what he was told was required again without success. All he was asked in the Spring when relaying that his colonies were dead was "how many nucs do you want to purchase this year to try again?" No one in three years had ever been inside a hive with him or questioned why he wasn't succeeding.
   My assistant proved to be not lacking desire, intellect or ability as we worked together that Spring. When generating new colonies for the year, I sat aside two nucs that I gifted to my new mentee. He learned and labored with me, and I at his new apiary and by the season's end, he had two colonies with plenty of healthy bees and honey for the Winter. He attended a Fall meeting of the association where he decided he was done with them after he was told by one member that he was a fool for not selling the honey and making up candy boards to feed in the Winter. He is now in his fourth year of beekeeping with yearly honey crops and only a couple of losses while overall increasing his apiary. He is not the only victim of inadequate/no education by any means. And I am so grateful for the mentor and the educational program that was offered by the Boy Scouts Beekeeping Merit Badge in my youth.

4. *Can we do better?*
   Short and to the point: YES! Young people with an interest in bees and beekeeping are an urgent need both currently and in the future. Do everything you can to find and retain them.
   Educational programs need to recognize that "one size does not fit all" when it comes to beekeeping. They do need to understand that mentorship, especially in the hive, is a necessity in learning the unique skill sets needed for beekeeping. An organization must disallow any practice which merely profits an individual or organization while exploiting someone wanting an education. Be most cautious of the person who sells bees and equipment and starts his own beekeeping club/association.

Questions I have for club/associations that you should pose to yourselves:

1. Who do you place in charge of your organization? Is that person qualified for such responsibility? Properly educated and experienced?
2. Who oversees marketing, promoting, membership and running the business considerations for your organization? Is that person qualified, educated and experienced in such matters?
3. When attracting/recruiting members do you make accommodations/allowances for young people? (May need special programs at special times) Older folks? Middle-aged?
4. Who oversees beekeeper education? Qualified? Experienced? Trained? Where and how do you educate beekeepers? Is there any hands-on in-hive experience/training BEFORE a new beekeeper receives their first hive(s)? Do you make allowances/accommodations for different individual beekeeping goals? Different ages? The British Beekeepers Organization adopted a certification process (at first disliked by the members until the benefit and advantages became apparent) much like traditional education where passing one level leads to another. You need to know if new beekeeping candidates are absorbing the information. Is there any oversight, review, evaluation, revision, tracking or follow-up on any of these programs? It's an awesome responsibility – especially with young people.

Here's a few more comments in response to others in John's article:

1. I'm certain many of our older researchers would like to have seen their research leveraged and used, especially when they were younger; we might not have some of our current problems.
2. As to the "heavy lifting" and work ethic of the 5%, I defer to the footnote L.L. Langstroth used that "my experience does not enable me to speak with absolute confidence as to the character of all the beekeepers who I have known."
3. "I think it is going to be hobbyists who lead the discovery/development of naturally resistant bees. They can take risks that the commercial folks cannot. Sometimes, I feel sorry for the commercial folks. Not often, because of how badly they treat colonies, but sometimes." Part of a conversation from Tom Seeley that was forwarded to me.
4. Beekeeping is not what it was 56 years ago, nor is this beekeeper.
5. 10% losses and how to get back there? Addressed previously by many. It is up to individual beekeepers to implement.
6. See me at a meeting? Very doubtful currently – I'm still reeling from past ones.

Terry Combs BC

NEXT MONTH

Region 1
- Emergency feeding
- Add sugar blocks
- Check brood nest on a warm day
- Add hive body with feed on singles
- Assemble new equipment
- Order bee supplies
- Be sure hives are still wrapped
- Too cold to do anything
- Clean snow away from entrances
- Clean dead bees away from blocking entrance

Region 2
- Check food supply, lift back of hive
- Repair equipment
- Check colonies for queen on warm day
- Have mite treatments ordered for Spring
- Order queens and packages
- Feed pollen sub
- Check for mice in colony
- Make splits of Spring sales
- Paint supers

Region 3
- Feed if needed
- Do alcohol mite check
- Combine queenless colonies
- Repair AND paint equipment
- Feed quarts of sugar syrup
- Sample and treat for *Varroa*
- Equalize colonies
- In South Florida, check for swarm cells
- Check for deadouts

Region 4
- 'Heft' hives for weight
- Add candy boards if needed
- It's Winter in Iowa, nothing to do
- Order nucs or packages
- Check stored super for wax moths
- Clear entrances of snow and dead bees
- Go to bee meetings
- Read *Bee Culture*
- Repair equipment
- Oxalic dribble *Varroa* control
- Upper ventilation needed

Region 5
- Move bees to Texas
- Feed, feed, feed
- Do they have enough food to get to Spring?
- Are hive wraps still secure?
- Start prepping honey supers
- Sample for *Varroa*
- On warm day, are they queenright?

Region 6
- It's always sunny in Arizona
- Maples starting to bloom, is pollen coming in?
- Cross your fingers for no drought this year
- Is queen laying?
- Prepare for and/or make splits
- Repair equipment
- Check for deadouts
- Feed if needed
- Check for swarm cells

Region 7
- Check hive weights / feed if needed
- Combine weak colonies
- Go over last season's records
- Feed candy boards
- Are they queenright?
- Move to almonds, if not already there
- Be sure they have upper ventilation
- Spring mite sampling and treatment
- Prepare for splitting

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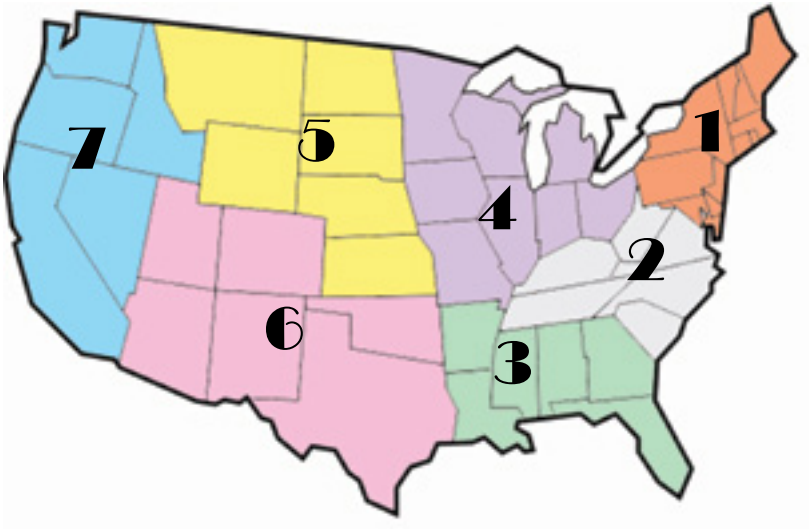

JANUARY – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**	**Last Month**	**Last Year**
55 Gal. Drum, Light	2.58	2.16	3.19	2.94	2.75	2.75	3.40	1.95-4.25	2.88	2.88	2.86	3.23
55 Gal. Drum, Ambr	2.49	2.20	2.64	2.90	2.65	2.70	3.23	1.80-4.25	2.76	2.76	2.64	3.17
60# Light (retail)	234.29	240.00	228.80	212.22	210.00	203.24	281.25	120.00-350.00	230.62	3.84	229.14	212.15
60# Amber (retail)	235.00	232.50	233.50	201.67	240.00	195.24	236.67	120.00-315.00	227.21	3.79	227.60	208.63
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	105.61	115.00	88.82	83.17	111.72	-	240.00	64.80-240.00	104.95	8.75	97.55	102.53
1# 24/case	165.99	168.40	139.88	139.12	160.06	118.00	264.00	90.00-384.00	157.21	6.55	149.34	143.50
2# 12/case	154.92	192.00	128.01	117.80	123.84	-	156.00	84.00-300.00	143.53	5.98	146.59	136.79
12.oz. Plas. 24/cs	125.67	154.50	109.81	101.57	98.08	120.00	117.60	72.00-240.00	117.74	6.54	118.00	111.98
5# 6/case	170.40	239.40	123.36	128.89	126.87	118.80	-	96.00-330.00	160.17	5.34	152.23	162.73
Quarts 12/case	216.33	209.67	160.20	160.22	171.24	120.00	200.00	108.00-330.00	183.86	5.11	189.89	186.81
Pints 12/case	113.75	142.67	93.00	122.72	111.50	-	127.44	60.00-252.00	118.97	6.61	109.69	96.12
RETAIL SHELF PRICES												
1/2#	6.41	6.90	5.91	4.75	5.40	5.33	11.75	3.00-15.00	6.27	12.54	5.86	5.57
12 oz. Plastic	8.17	7.90	7.26	6.51	5.26	8.16	7.13	4.00-12.50	7.38	9.84	7.52	7.03
1# Glass/Plastic	10.61	10.78	9.95	8.35	8.18	9.60	11.40	5.69-18.00	9.98	9.98	9.42	9.22
2# Glass/Plastic	17.70	18.66	17.32	14.55	12.46	13.50	15.50	5.50-30.00	16.78	8.39	16.43	15.23
Pint	14.31	12.33	10.85	12.14	10.55	13.50	12.86	5.00-42.00	12.31	8.21	11.49	11.69
Quart	22.71	22.40	19.86	20.86	18.10	30.75	22.18	10.00-55.00	21.69	7.23	21.29	20.31
5# Glass/Plastic	37.67	39.20	36.29	28.78	35.88	37.66	75.00	17.97-75.00	36.68	7.34	34.59	31.66
1# Cream	11.89	12.18	9.79	10.35	10.07	-	17.33	7.29-24.00	11.62	11.62	11.86	10.35
1# Cut Comb	15.08	13.62	13.67	13.45	8.00	-	16.00	6.00-25.00	14.04	14.04	14.49	14.70
Ross Round	12.81	13.46	18.50	11.50	5.00	-	20.13	5.00-35.00	14.09	18.79	13.16	11.22
Wholesale Wax (Lt)	10.31	9.32	7.53	7.65	7.25	5.50	8.05	3.00-18.00	8.62	-	8.28	7.42
Wholesale Wax (Dk)	7.89	6.39	7.50	6.50	8.00	4.00	4.00	3.00-16.00	7.01	-	7.03	6.58
Pollination Fee/Col.	93.75	76.17	97.50	129.00	200.00	-	101.29	49.00-225.00	100.94	-	103.15	94.55

Please note: anywhere within each region that there is a '-' it is because no information was sent to us for that specific item in that region.

2023 Calendar Update: We are excited to announce that the calendar is available to purchase online! Please be aware that it is only in a digital, PDF format. No physical product will be shipped. We will be offering it for the entire year with discounts as the year goes on. Go to **www.Store.BeeCulture.com/Magazines/** to get your digital calendar today!

The digital calendar in our store is the exact same as the print calendar that came for free with this issue. We want to make sure we provide everyone with the opportunity to get more and/or get it in a way that works best for your life! This PDF is meant for personal use and cannot be distributed, sold or shared. If you are interested in printing or sharing copies with association/club members, classes or another type of event, please email **Emma@BeeCulture.com** directly so we can help make that possible.

2024 Calendar Update: Due to continuing increasing in printing costs, paper costs and postage as well as a massive paper shortage and a worldwide switch to digital calendars as the dominant need, *Bee Culture* is unlikely to produce the 2024 calendar in the same way as years past. We are trying our absolute best to make sure a 2024 calendar does happen, but it will be a bit different from before. Keep an eye out in future issues of this magazine, Catch the Buzz and our social media pages for more information. As soon as we know what we're doing, we will let you know!

STUDY HALL

BEEING DIVERSE

I have waited until now to acknowledge, share and tell you about our unique BEEing Diverse: Inspiring Leaders in Beekeeping event we held a few months ago because we now have all of the amazing speakers talks available online. Recordings are available to purchase at **Store.BeeCulture.com/Events/** which will get you links to the speakers' talks to listen to online. I want you to go to them and listen because each and every one is insightful and inspiring.

To back up a bit, when I started as Editor a few years ago, I wanted to keep the tradition of the October special event held here at *Bee Culture*/A.I. Root Co. in Medina, Ohio going. But COVID hit and we had to cancel a few times. I have been in the beekeeping industry world for a very long time because I love honey bees and am amazed at what they do, how they do it and the keepers of bees with their commitment to this same love I have. I have learned from many smart, active and incredible partners in this family of beekeeping. I wouldn't be here today if people smarter than I am had not researched, managed and worked hard to help us all understand our significant place in beekeeping. They continuously motivated me, intrigued me and caused me to ask more questions. So many of these motivators were part of this event. They have had to work harder, be more resolute and push for acknowledgment and awareness of their place in their organization, business and political world. I have always been impressed with those who "Stick to your task 'til it sticks to you; beginners are many, enders are few." And this group of speakers have exemplified those words of the poem.

They all shared their journey with us to where they are today. Sometimes it was super hard, but they didn't give up. Sometimes it was easy and great data was produced but it was hard getting noticed. And sometimes it was only possible with connected and resilient mentors who walked with them through the swamp.

We had a good 'in person' audience for the two days along with a worldwide Zoom audience. We could listen, absorb and understand and then share with each other over meals. It was a family affair where we all got to know each other better and could grow to appreciate each other in a way you can't in a conference with 300 people.

Without this group of outstanding speakers, none of this would have been possible. To have so many agree and contribute, coming from all over the U.S., Canada and the UK to Medina, Ohio is confirming as well.

And, without Emma Wadel and Jen Manis, who are KEY members of our compact and effective *Bee Culture* 'family', none of this would have happened as well. They deserve a big pat on the back.

We received significant support from American Honey Producers Association; BASF; Greenlight Biosciences; Bayer; Ohio Queen Bee Improvement Project; Canadian Honey Council; Bee Informed Partnership; Wicwas Press; Levin Family Foundation; Brad Root, President of A.I. Root; Miguel de Gracia, CEO of A.I. Root and many others here who helped pull this extravaganza off.

That is my message, but the real message is from this cadre of movers and shakers in our honey bee world. I would encourage you to go to **Store.BeeCulture.com/Events/** to purchase the recordings, listen, then listen again because it will be inspiring to you for a very long time.

MOUSE DROPPINGS

QUESTION

I'm a sideliner beekeeper. We had our apiaries inspected – all good. My concern is that a couple of days after we harvested honey last month, we discovered mouse droppings on one of the honey supers in our honey shop (two mice were subsequently eliminated from our shop in short order). Unfortunately, without stopping there, we went ahead and processed the honey in the usual way (uncapping, spinning, straining, bottling). We didn't think much of the situation.

That changed when the neighbor's dog passed away due to Leptospirosis, which I'm told can be caused by wild animal urine.

We want to make sure what we have bottled is safe for human consumption. In your experience, have you heard of instances where honey was infected with dangerous bacteria by mice? Do you recommend we have our honey tested? And if so, by whom?

Thanks so much,
Marcel

From the Editor, Jerry Hayes

ANSWER From Dr. Tracy Farone, Author of the Bee Vet Column

This is an interesting question! But yep it's up my veterinarian alley... science anyway...

Leptospirosis is a spirochete bacteria spread through urine, not feces. It can also come from contaminated water or soil exposure. So technically, like most diseases, lepto could be all around us in small quantities. So, it can be hard to place "blame" as to where it "came from"... it's everywhere. Leptospirosis is a zoonotic disease, which means it is a disease that both animals and humans can get. Rats and mice are the primary vector to humans in most of the world but in the U.S., dogs are the primary vector to humans. Meaning most zoonotic transmission of leptospirosis in our country occurs from dogs (obviously rats and mice are possible, too). As far as I know, there is no known transmission of Leptospirosis in honey, and as a matter a fact, if the spirochete tried to move through the honey, the high sugar content would osmotically destroy it. So while "throw it out", I suppose, is always a good go to legal answer – it's probably not scientifically valid. In reality, our honey is contaminated with all kinds of soil and all kinds of things that reside in the soil, all the time, everywhere... So, following that logic we'd have to throw it all out. But magically honey is antimicrobial for most things that don't form spores. The biggest concern I would have would be for the people who owned the dog with the positive diagnosis. Hopefully their veterinarian explained the risk to them from their dog and how to avoid exposure to the dogs' urine both to themselves and the environment. Good rodent control is helpful as well. Veterinarians' routinely vaccinate canines against Leptospirosis (there are several different serovars or types) to protect canines from this disease as well as their owners.

Cool question! Hope this helps.

Best,

Tracy Farone / Bee Vet

WHERE'S THE QUEEN?

QUESTION

Hi,

I have a hive that I have been unable to locate the queen in after several inspections. What can I do, to make sure the hive survives the Winter? Will the colony survive the Winter without a queen? The colony has not started a peanut to make a new queen. It's too late to find a local queen in North Carolina. What to do!

Thank you,

Alex

ANSWER

Good morning Alex,

The key question is do you or did you have eggs, larvae, pupae over the last several months in the brood comb when you sampled your colonies for *Varroa*? If you are looking for the queen specifically, look in the comb for eggs in the brood area. That means the queen, generally, was there a day or two ago. So, she should be on that frame or the one on either side.

I think ultimately you need a helper. If you belong to a local association get one of the members to come over and help you take a look. If you are not a member of a local association here is the website for the North Carolina Beekeepers Association, **https://www.ncbeekeepers.org/** At the top is a link to 'Chapters'. Find the one closest to you and contact them for some mentoring help.

CELL COLORS?

QUESTION

Loved the very informative article by Tim Martin on the wax moth among other "guests" to our hives in the November *Bee Culture*. One question for Tim or anyone else: in Figure 1, the linear paths of A. grisella can be easily seen as uncapped cells with white, intact "bald brood", but what are the black cells next to it that are also in a line but also scattered about the rest of the comb? Are these cells where brood has been removed by hygienic behavior? And why are they black? I often see these black cells in my hive checks and wonder why they are black in color. Thanks for the always informative and interesting material!!

Dan

ANSWER from Tim Martin

The answer to this question is: it's a combination of things. First, brood leave part of their cocoon behind when they emerge. Second, bee foot traffic brings in bits of materials that darken brood. The honey storage comb gets less traffic but it too will darken a bit over time. Third, bees varnish over the comb surfaces with propolis to strengthen and seal the combs. These things in combination darken comb pretty quickly within the hive.

COLLECTIVE VOICES

COMMENT

First, I want to compliment Bill on his letter about queens in the September *Bee Culture*. It was a lesson in beekeeping all in itself! He drove the nail squarely into the rabbet joint concerning the stress the bees experience with the combination of mites and contaminants in the hive. However, beekeepers in the U.S. as a whole seem to want to keep their bees in glass hive bodies while throwing rocks at the other areas of agriculture for the chemicals they use. We complain about their insecticides and fungicides that wind up in our colonies, while we beekeepers put in high concentrations of insecticides ourselves. Yes, no matter what substance is used to control mites, if the purpose is to kill mites, itself an insect, then it is an insecticide. Study after study has shown that the highest parts per million of the residues in wax, pollen and honey are the insecticides we beekeepers put there ourselves controlling mites. Other studies have shown that some of our insecticides interact with some of those other agricultural insecticides and fungicides to increase the negative impacts that Bill describes. We beekeepers, from commercial to hobbyist, collectively need to literally "put the money where our mouth is", and find a way to deal with mites without adding to the synergistic mix of residues in our hives. Instead of throwing rocks whilst standing amongst our glass hives; can we show the rest of agriculture how it can be done without contaminating the rest of the planet? If we can successfully do that, then our collective voices regarding all those 'other' contaminants will hold more weight than our hive stands. Humanity has messed this up, and the bees are telling us. If we cluster together to set the example, and strive to bring in the rest, maybe, just maybe...

Ron Bolton

Ashland, VA BC

FOUND IN TRANSLATION

Save the Males

Jay Evans, USDA Beltsville Bee Lab

Listen along here!

Male honey bees are not afforded much respect. If a male bee had the mojo to write a memoir it would be entitled "Eat, Mate, Die: One bee's journey toward the audible pop". No movie options there, despite the sadists just waiting for the dramatic ending. Nevertheless, these droning lives are critical for the generational success of honey bee colonies. Recent research has explored how male bees, fragile though they might be, contribute to colony health and the longevity of laying queens. There are also new insights into how biological and environmental threats impact males and thereby colony success.

First, male bees truly do have a smaller behavioral repertoire than females. Males are also sheltered from many of the stresses faced by worker bees and long-lived queens. The typical male bee, following a leisurely 24-day development time, emerges from his roomy honeycomb cell and simply 'lives' for more than a week before taking his first flight from the colony. No glands to produce wax, no glands to provide buttery food for developing bees, no grooming, no feeding of others, no defending the colony. During this time, the male's energy is funneled into massive flight muscles and impressively large testes. When scientists look at male performance, they look at these two factors; can the boys fly and can they make viable sperm?

For the first question, it is important to determine if stressed males even live long enough to fly. Recent work by Alison McAfee and colleagues from the University of British Columbia and North Carolina State University showed that drones are more sensitive than worker bees to both cold temperatures and one pesticide (imidacloprid) under high lab exposure rates (*Drone honey bees are disproportionately sensitive to abiotic stressors despite expressing high levels of stress response proteins.* 2021. *Communications biology* 5,141, **https://www.nature.com/articles/s42003-022-03092-7**). Specifically, most drones simply can't endure four hours at temperatures just above freezing, while their female counterparts survive fine. In this same study, drones died at two-fold higher rates than their sisters after exposure to 100 ppm imidacloprid. When exposed to a cocktail of field-expected pesticide doses, both drones and worker bees survived fine in these trials, but the evidence that drones were disproportionately sensitive overall prevailed.

What about sperm? Much has been written about the impacts of drone sperm quality on colony health, using techniques mastered by retired

USDA scientist Anita Collins (i.e., Collins, A.M. *Relationship between semen quality and performance of instrumentally inseminated honey bee queens*. 2000. *Apidologie*, 31, 421–429, **https://www.apidologie.org/articles/apido/abs/2000/03/m0307/m0307.html**). But what is it, outside of the lab, that leads to inviable drone sperm? Like most traits, both genes and the environment play a role. In a recent colony-level study, Lars Straub and colleagues measured the impacts of pesticide stress on "all the things drones are asked to do" (*Negative effects of neonicotinoids on male honey bee survival, behaviour and physiology in the field.* 2021. *Journal of Applied Ecology*, 58, 2515–2528. **https://doi.org/10.1111/1365-2664.14000**). Drones exposed to field-realistic chemical doses via pollen patties fed to their colonies died at twice the rate of controls. When they survived, exposed drones took longer than controls to take their first flight, drifted more often to the wrong colony and produced a higher ratio of defective sperm.

Does that defective sperm translate into poor colony health? Jeffery Pettis and co-authors showed that queens heading failing colonies in commercial beekeeping operations carry a higher proportion of damaged sperm (Pettis JS, Rice N, Joselow K, vanEngelsdorp D, Chaimanee V. *Colony failure linked to low sperm viability in honey bee* (Apis mellifera) *queens and an exploration of potential causative factors.* 2016. *PLOS ONE* 11(5): 0155833. **https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0147220**). Sixty percent of the sperm stored by queens in fail-

ing colonies was dead, while only 30 percent was dead in healthy colonies. This need not reflect a history of dysfunctional dads in that poor sperm health might reflect the abilities of queens to keep sperm viable rather than damaged goods from the start. In fact, the researchers found higher levels of dead sperm after queens were subjected to temperature stress, passing the blame for sperm health to queens or (more likely) queen transport and management. While it is tough to measure the longterm effects of inadequate males on colony health, headway was made with data and a model generated by Bradley Metz and David Tarpy from North Carolina State University (*Reproductive and morphological quality of commercial honey bee (Hymenoptera: Apidae) drones in the United States*. 2021. *Journal of Insect Science*, 21: 2, **https://doi.org/10.1093/jisesa/ieab048)**. Observationally, colonies produce a range of smaller and larger drones, with six to 10% of drones being below a threshold size mimicking that seen when drones are raised mistakenly in worker cells. These smaller drones differed in their abilities to pass on adequate sperm in both quantity and quality (sperm viability), and the authors use that fact to argue that less fit males can have a strong impact on queen longevity and the health of managed bee colonies.

Weirdness in male bee genetics play some role in their fragility. Male bees, like male ants and wasps, and males found in a handful of less prosperous insect groups, are generally 'haploid' from birth to death. They are born of unfertilized eggs that simply start dividing into tissues and eventually organs, forming a viable insect that has no genetic father. Being haploid comes with its own set of challenges. Most life forms outside of the bacteria and 'archaea' have a genetic father and mother. This means we have two copies of genes that encode most of the proteins in our bodies. This redundancy can be good as organisms develop, behave and prosper. For example, many survivable genetic diseases in humans and other organisms are survivable simply because one of two viable proteins in such cases can suffice for a critical life task. As scientists have noted, honey bee drones are thus uniquely vulnerable to dysfunctional proteins encoded by their exposed genomes. The work previously mentioned, by Dr. McAfee and colleagues, for example, contrasted males and their sisters specifically to see if males were the weaker sex because they are haploid or because of other biological differences. Their study suggests the latter. Nevertheless, there are surely impacts from having half a set of chromosomes in terms of breeding and bee evolution. Garett Slater and colleagues, in *Haploid and sexual selection shape the rate of evolution of genes across the honey bee* (Apis mellifera *L.*) *genome* (2022. *Genome Biology and Evolution*. 14(6) **https://doi.org/10.1093/gbe/evac063**) showed that genes that were especially active in male bees were evolving differently than genes equally active in both sexes, although it is not clear that this reflects playing with half a deck. The genetic impacts of being haploid, and the potential for this phenomenon to be exploited in bee breeding, are good topics for next month. Thanks to a handful of female and male scientists who have looked past the limited behavioral range of male bees, we now have critical information on the colony and environmental factors that conspire against drones, and the impacts of drone health on colony offspring borne from their brief and dramatic lives. BC

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A Closer LOOK

Characteristics of Honey Bee Races

Clarence Collison

The native range of the honey bee includes the varied habitats of Europe, Africa and the Middle East, where they diverged into 25 morphologically distinguishable subspecies or geographic races. Eight of these subspecies were introduced to North America between the early 1600's and 1922, at which time the U.S. Bee Act was implemented to restrict new importations that might introduce diseases or debilitating mites (Sheppard, 1989). The first race to be introduced, *Apis mellifera mellifera* L., the "dark bee" of northern Europe, was the only race present in North America for >200 years. Subsequently, at least seven additional subspecies were imported between 1859 and 1922. Three of these, *Apis mellifera ligustica* Spinola from Italy (Italians), *Apis mellifera carnica* Pollman (Carniolans) from "Carniolia" (Dadant [1877]: Hungary, Bulgaria, Romania and former Yugoslavia), and *Apis mellifera caucasica* Gorbatschev (Caucasians) from the Caucasus Mountains region, formed the primary basis of present day commercial honey bee populations. Several additional subspecies from the Middle East and North Africa were tried briefly by beekeepers but lost favor (Sheppard, 1989). In the mid 1950's a ninth subspecies *Apis mellifera scutellata* Lepeletier was introduced to Brazil to bolster honey production (Kerr, 1967). Their descendants commonly called Africanized honey bees thrived in Brazil and their range expanded both southward to Argentina and northward to the southern United States (Schiff et al., 1994).

Honey bees are Old World insects that were introduced into North and South America by European settlers. The most well-known races of honey bees in the New World are Italians, Carniolans, Caucasions, Africanized and Black German bees.

Italian Bees – originally from Italy, this is by far the most popular honey bee. Italian bees are yellow in color, prolific, reasonably gentle and can handle most of the climatic diversity present in the U.S. Brood rearing begins slowly in the Spring, peaks in the Summer and lasts late into the Fall, regardless of nectar flow. Overall, brood rearing is relatively unaffected by a lack of nectar or pollen sources (dearths). Because of the extended brood rearing period, consumption of Winter stores may be increased and supplemental feeding may be necessary in late Winter or early Spring to prevent starvation if there is an extended period of confinement due to bad weather. They are easily provoked to rob weaker neighboring colonies and drifting can be a problem in apiaries where all the hives are the same color. Use of propolis is relatively modest and compared to other races their tendency to swarm is low.

Carniolan Bees – These bees originated in the Austrian Alps, northern Yugoslavia and the Danube valley. Gray/brown in color, they are extremely gentle, conserve Winter food stores well and build up quickly in Spring. Carniolan bees construct new comb slowly and swarm frequently. Carniolans have a somewhat prolonged broodless period, lasting from October to February or March. They Winter well, even in hard Winters. They Winter with a smaller cluster than Italians and consequently tend to use fewer Winter stores. This race tends to produce little in the way of propolis, burr comb or brace comb. They will forage under conditions that will keep other races confined to the hive, including earlier and later in the day, as well as in cool, rainy weather. Carniolans are particularly adept at matching the worker population to the availability of nectar and can rapidly expand or cut off brood production in response to nectar flows.

Caucasian Bees – These bees originated in the Caucasus mountains between the Black and Caspian Seas. This is not a popular race in the United States. They are lead-gray in color, and very gentle. However, when agitated they have a reputation of being quick to sting and slow to settle back down again. They also have an increased tendency to drift and rob. Caucasian bees overwinter poorly, build up slowly in Spring, are susceptible to Nosema disease and gum up their hives with propolis (tree resins and beeswax). Caucasians have a low tendency to swarm, due at least in part to a slow early Spring build-up. The slow build-up minimizes space limitations within the hive that can serve to trigger the swarming impulse. Caucasians have the longest tongue of any of the bee races, allowing them to exploit floral sources other races bypass. They fly in cooler and wetter weather than other bees. Drones are large with dark hair on their thorax, a feature different from all other races.

German Black Bees – Originally from throughout northern Europe, this was the first honey bee brought to the New World. Escaped swarms readily adapted to the North American climate and spread quickly. German black bees are nervous on the comb, defensive and build up slowly in Spring. When disturbed, they would spill out of the hive in large numbers. They were extremely susceptible to European foulbrood. They are brown/black in color and overwinter well. They are judicious in their use of stores, and as a result can produce good surplus crops even in poor years. Despite these positive traits, beginning in the mid 1800's this race was largely replaced in this country by Italian bees for two main reasons: temperament and disease susceptibility. Although it was the first race of honey bees in the New World, it no longer exists in its pure form in this country.

Africanized Honey Bee (*Apis mellifera scutellata* and its hybrids) – These honey bees originated throughout east Africa. In the 1950s, this race was imported to Brazil and began migrating northward. Compared to European races, this bee and its hybrids are extremely defensive, have smaller nests and swarm more frequently. Africanized honey bees colonized certain regions of the United States in the 1990s (Delaplane, 2010).

The honey bee, *Apis mellifera*, exists as distinct races occupying habitats as dissimilar as the temperate climates of North America and Europe and tropical Africa (Ruttner, 1988). Temperate and tropical subspecies exhibit numerous behavioral differences, many of which are associated with the duration and predictability of forage abundance in the contrasting environments (Winston et al., 1981, 1983; Schneider and Blyther, 1988). Temperate races experience a brief, predictable foraging season, during which large food stores must be amassed for Winter survival. In contrast, African subspecies do not experience a Winter and may forage virtually all the year round (Schneider and Blyther, 1988; Schneider and McNally, 1992). However, food availability in tropical Africa is often temporally and spatially unpredictable, owing to unpredictable rain patterns. As a result, African races frequently respond to unfavorable periods by undergoing "seasonal absconding" or migration, which consists of a colony abandoning a nest site, presumably to move into an area of greater resource abundance (Fletcher, 1978, 1991; Winston et al., 1979; Schneider, 1990; McNally and Schneider, 1992). Migration is unique to tropical honey bee races (Winston, 1987) (Schneider and McNally, 1992).

Absconding behavior of the Africanized honey bee in French Guiana, South America, is described. Two types of absconding were recognized: disturbance-induced (i.e., predation, manipulation, etc.) and resource-related or seasonal absconding, probably induced by a dearth of resources during the wet season or by overheating during the dry season. In pre-absconding colonies where disturbance was not involved, brood rearing decreased dramatically, with few or no larvae present in colonies about ten days before absconding. Egg-laying continued at a low level until nearly all of the sealed worker brood emerged; colonies absconded within a day of the end of the sealed brood emergence. Patterns of nectar and pollen storage prior to absconding were highly variable. Inspection of colonies immediately after absconding showed that there was little (<100 cm^2) or no eggs, larvae, sealed brood or stored pollen, nectar or honey. Comparison of pre-absconding and persisting colonies prior to the absconding season revealed no characteristics useful for predicting absconding, although the distributions of the last swarming dates before the absconding season were different for the two groups of colonies. Colonies that had swarmed just prior to the absconding season and that had low numbers of workers, particularly young workers, had a relatively high probability (0.45) of absconding during the wet season (Winston et al., 1979).

The Caucasian honey bee is one of the important gene resources in Anatolia (also named as Asia Minor) and mountain type is the significant variant. This honey bee race is black colored and similar to the Carniolan bees regarding shape, size and hair cover. Body is moderate structured, slim and long as abdomen is thin. Chitin is dark. Hair cover is black and short (0.335 ± 0.031 mm). Hair color of worker bees is livid gray as chest hair color of drones is black. All abdominal rings are black colored. It also has the longest tongue (7.046 ± 0.189 mm) among all honey bee races. Caucasian bees form strong colonies but their colonial development is slow. They swarm only very little and are good tempered. They are good pollinators for alfalfa, clover and similar plants with deep tube flowers and can work under unfavorable conditions (Kara et al., 2012).

In Europe and North America, honey bees cannot be kept without chemical treatments against *Varroa destructor* (*Varroa* Mites). Nevertheless, in Brazil an isolated population of Italian honey bees has been kept on an island since 1984 without treatment against this mite. The infestation rates in these colonies have decreased over the years. The researchers looked for possible *varroa*-tolerance factors in six Italian honey bee colonies prepared with queens from this Brazilian island population, compared to six Carniolan colonies, both tested at the same site in Germany. One such factor was the percentage of damaged mites in the colony debris, which has been reported as an indicator of colony tolerance to

Italian Queen

Caucasian Queen

varroa. A mean of 35.8% of the *varroa* mites collected from the bottoms of the Italian bee colonies were found damaged, among which 19.1% were still alive. A significantly greater proportion of damaged mites were found in the Carniolan bees (42.3%) and 22.5% were collected alive. The most frequent kind of damage found was damaged legs alone, affecting 47.4% of the mites collected from debris in Italian bees, which was similar to the amount found in Carniolan colonies (46%). The mean infestation rate by the *varroa* mite in the worker brood cells in the Italian bee colonies was 3.9% in June and 3.5% in July, and in drone brood cells it was 19.3% in June. In the Carniolan honey bee colonies the mean infestation rates in worker brood cells were 3.0 and 6.7%, respectively in the months of June and July and 19.7% in drone brood cells in June. In conclusion, the '*Varroa*-tolerant' Italian honey bees introduced from Brazil produced lower percentages of damaged mites (*Varroa destructor*) in hive debris and had similar brood infestation rates when compared to 'susceptible' Carniolan bees in Germany. In spite of the apparent adaptation of this population of Italian bees in Brazil, they found no indication of superiority of these bees when they examined the proportions of damaged mites and the *varroa*-infestation rates, compared to Carniolan bees kept in the same apiary in Germany (Corrêa-Marques et al., 2002).

The Carniolan honey bee is an indigenous subspecies of the Western honey bee in Central Europe. Croatia represents a large part of its native range. Hybridization and introgression is a realistic possibility due to unmonitored imports by beekeepers. In this study, they focused on honey bee colonies managed by beekeepers from all over Croatia and Slovenia. The identification of the subspecies was based on wing geometric morphometrics. The similarity of all investigated colonies to *A. mellifera carnica* was substantial, which indicates that the native subspecies continues to be present in the study area. However, some of the colonies differed markedly from the currently available reference of this subspecies. The low similarity with reference samples can be related both to hybridization with non-native subspecies and to natural geographical variation within *A. m. carnica* (Puškadija et al., 2021).

Intra-colony demography and life history characteristics of neotropical Africanized and temperate European honey bee races were compared under simulated feral conditions. Major differences in colony demography were found which nevertheless resulted in some similar reproductive characteristics. European colonies were larger than Africanized colonies, had more rapid initial growth rates of worker populations, showed better survivorship of brood and adult workers and differed in patterns of worker age distribution. However, both races were similar in the brood and adult populations when colonies swarmed, the frequency and timing of swarming and the number of workers in prime swarms. The factors most important in determining these colony growth and reproductive patterns were likely worker mortality rates, climate and resource availability (Winston et al., 1981). BC

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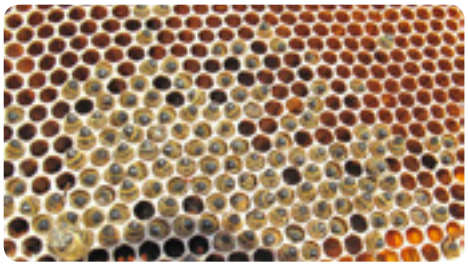
Food, nutrition and making sure your bees come out strong this spring

Everyone knows that to stay healthy, we need to eat well and of course it is the same for our bees. We take care of them, we make sure we give them shelter, space, a good place to forage, protect them from disease and of course we feed them.
But are we feeding the best for our bees and what can we do better? Here are some suggestions to help ensure you have strong colonies this year.

Right now it's winter. Hopefully your bees have plenty of honey or sugar syrup stored and are tucked in happily waiting for the first signs of spring and the year's first nectar flow. But what if they don't?! No matter how strong the colony is in the fall, during the winter the colony will naturally contract as the bees that die out won't be replaced until closer to springtime. The more they contract, the further they will get from their food. If they end up too far away from their food or if they haven't stored enough, they won't break the cluster to go get it and can starve.



Bees dead in cells, Image from honeybeesuite.com

There is nothing more depressing than finding a dead colony with the bees heads stuck in the cells looking for the last bit of food. This can be prevented with fondant. When placed right over the center of the colony, either directly over a hole on the cover board or underneath the cover board, the fondant can be right where the cluster is meaning they can access food immediately. The best fondants won't dry out so they can be left in the hive all winter, ready for when the bees need it. It's a small investment that could save you a colony.

Once it starts to warm up a little you can start feeding protein to help build up your colonies and give your bees a head start. Timing is critical here. Once you start feeding you don't want to stop until there is plenty of pollen freely available. If you start feeding too early and then stop before there is pollen available, the colony

Fondant on crown board, Image from hivealivebees.com

will have no food to feed their brood. Studies consistently show that feeding protein that has real pollen is always best for the bees. Artificial pollen just isn't as beneficial, making it poor value when feeding bees. Some pollen patties only have a small, sometimes insignificant amount of real pollen in them. Be sure to check to see what percentage of pollen the patties have, higher the better, ideally in the teens. Some pollen protein patties come with additional beneficial ingredients like HiveAlive and other nutrients. These also help keep the colonies strong and make the patties more attractive for the bees, so they consume them quicker.
The larvae that need the protein will also need carbohydrates and if you are feeding because there isn't any pollen available yet

Dara Scott, Creator of HiveAlive

Dara has been keeping bees for nearly 25 years and developed HiveAlive over 10 years ago. Since then, it has become the #1 feed supplement for bees worldwide. With the addition of the new HiveAlive Fondant and Pollen Patties to the range, he is delighted to have a complete package of products to support the nutritional requirements of bees worldwide.

then there probably isn't any nectar, the bees carbohydrate source. This means you need to feed syrup at the same time. Syrup, especially a light syrup, can encourage the colony to think there is a flow and get the colony building up early too. A light syrup is equal weight of sugar to water and is easily mixed in. Despite the data to show that colonies grow stronger and are more productive when a light syrup is used, it can quickly ferment, making the bees sick and your gear all mouldy. Adding a feed supplement like HiveAlive to syrup will prevent this from happening as well as providing other proven nutritional benefits.

For more info on HiveAlive liquid, HiveAlive Fondant Patties and HiveAlive Pollen Patties go to www.usa.hivealivebees.com

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From the University of Florida Honey

January: Overview of the HBREL at UF

Hello everyone. My name is Jamie Ellis (Figure 1) and I work at the University of Florida (UF – Figure 2) Honey Bee Research and Extension Laboratory (HBREL). I have worked for UF since August 2006. When I was hired, Jerry Hayes (editor of this distinguished journal) was the head of the Apiary Inspection Section for the Florida Department of Agriculture and Consumer Services, Division of Plant Industry. He managed Florida's Apiary Inspection Program at the time. Those were good years. Jerry and I worked on a number of different research and extension initiatives and became quite good friends during the process. In early 2022, Jerry reached out to me to see if I would be willing to write a monthly series in 2023 dedicated to what my team and I do at the HBREL. He was hoping that this would jumpstart a yearly series in which he would be able to highlight different bee labs around the U.S. I was humbled that he would ask us to be first, and I was incredibly excited about the prospect of sharing with *Bee Culture*'s readers what really happens at honey bee laboratories at a state university. I saw this as a wonderful opportunity to peel back the cover and let beekeepers peek into the everyday work of a bee lab.

I discussed the opportunity with members of my team and everyone jumped at the chance to share what they do in the lab. We instantly started to work trying to develop an outline for the year, i.e. what topics we would discuss and the appropriate order to introduce the topics to you, the reader. You see, honey bee laboratories are complicated places, with diverse teams, target audiences, responsibilities and infrastructure. If my team and I do our job well, you will have a good understanding of how bee labs work, how we measure success and how team members fill their time.

Before getting too far into the process, I stress that *no two laboratories are created equally*. We all have different infrastructure, expertise, funding streams, team members, responsibilities, etc. Recognizing this, we will do our best to tell you how we do things at UF, while emphasizing that our way is not the only way to manage a bee lab. Now, on to the schedule of articles for 2023…

January: Overview of the HBREL at UF (the current article)
February: Honey bee/beekeeping teaching programs
March: Research on honey bees
April: Apiculture extension (part 1)
May: Apiculture extension (part 2)
June: Roles in a typical honey bee lab
July: How labs are funded
August: The lab's physical infrastructure
September: What it takes to run a laboratory effectively
October: Professional development in the lab
November: Members of the HBREL team and what they do
December: The HBREL's most notable successes/contributions to the beekeeping industry

Of course, we are using this series of articles to share a bit about who we are and what we do at the HBREL. More importantly though, we are using this opportunity to demystify how bee labs generally function when striving to

Figure 1. The author (Jamie) and his family.

Bee Research and Extension Laboratory

Overview of the HBREL at UF

Jamie Ellis

provide services to beekeepers everywhere. So, let me start from the top…

What institutions host honey bee laboratories?

Any number of institutions can host honey bee laboratories. The federal government, state governments, private companies and state institutes of higher learning (colleges and universities) can manage these labs. For example, the U.S. government manages honey bee laboratories housed in its United States Department of Agriculture (USDA), Agricultural Research Service (ARS). These are the USDA-ARS honey bee research laboratories. They include laboratories in (1) Baton Rouge, LA (Honey Bee Breeding, Genetics and Physiology Research Laboratory); (2) Stoneville, MS (Pollinator Health in Southern Crop Ecosystems Research Laboratory); (3) Tucson, AZ (Carl Hayden Bee Research Center); (4) Davis, CA (Invasive Species and Pollinator Health Research Laboratory); and (5) Beltsville, MD (Bee Research Laboratory). Staff at each of these laboratories specialize in certain areas of honey bee research. For example, the bee lab in Baton Rouge is known for breeding honey bee stock. The bee lab in Beltsville is the primary laboratory whose members study honey bee pests and pathogens. The research scientists at these labs manage teams of individuals dedicated to honey bee health and the sustainability of beekeeping. The scientists usually have no obligation to teach students or provide extension programming. Instead, they are employed mainly to conduct research on honey bees.

State governments also can manage honey bee laboratories, usually within the auspices of the state's apiary inspection program (Figure 3). Even still, not many state inspection programs house honey bee research laboratories. If they do, it is usually to provide disease/pest diagnostic services for resident beekeepers of that state.

There are a few commercial entities that manage honey bee laboratories of some sort. Many of these are research and development laboratories for companies that include a focus on honey bee health. The list also includes companies that create and sell pesticides, companies such as Bayer or Syngenta. In this case, the lab's scientists usually investigate the impact of pesticides on honey bees and other pollinators through ecotoxicology divisions within the companies. There are also private contract laboratories that provide pesticide screening services for the pesticide manufacturers.

The vast majority of honey bee laboratories in the U.S. are housed in the nation's many state colleges and universities, both private and public. Any college or university throughout the U.S. can host a honey bee laboratory. Prospective faculty who specialize in honey bees can be hired into many types of college and university departments. These include departments of entomology (insect science), biology, neurobiology, zoology, mathematics and agriculture, among many others. These departments will typically advertise for a professor with qualifications in a specific discipline (ecology, physiology, behavior, molecular genetics, etc.) that would permit one to study honey bees in the discipline being advertised. For example, a department may advertise

Figure 2. The University of Florida. Photo: Chris Oster, University of Florida.

Figure 3. Amy E. Lohman Apiculture Center: home of the Apiary Inspection Section of the Florida Department of Agriculture and Consumer Services, Division of Plant Industry. Photo: Chris Oster, University of Florida.

for a molecular geneticist whose job it will be to teach courses and conduct research on topics related to molecular genetics. The department may not care what the study organism of the prospective candidate is; rather, they are hiring a particular discipline specialist. Thus, you can find professors of many disciplines scattered across multiple departments types, all using honey bees as the study model in their discipline. There are probably many more scientists studying honey bees than most beekeepers are aware exist, largely because most of these scientists are not mandated to work with beekeepers directly. Enter the Land Grant University…

What is so special about Land Grant Universities?

As noted, I work for UF. UF is a large university (55,000+ students) with a main campus in Gainesville, Florida and satellite campuses around the state. UF is a special type of university called a Land Grant University (LGU). LGUs differ in function and structure from those of other colleges/universities scattered throughout the U.S. They were created through the Morrill Acts of 1862 and 1890, and additionally through an Act of Congress in 1994. Through these acts, the federal government ceded federally controlled lands to each state to establish public universities. The 1862 LGUs were the first such universities established. The 1890 LGUs are historically black colleges and universities (HBCUs), while the 1994 LGUs are Native American tribally controlled colleges and universities.

Why create LGUs at all? Think about the early years they were established. At the time, advanced education was available only to a privileged few. Yes, there were wonderful universities such as Harvard, Yale, Princeton, etc. However, most people could not afford or qualify to attend those universities. Furthermore, folks living in rural areas or from minority backgrounds had little-to-no access to colleges or universities of any type. Thus, the LGU system represented a partnership between the federal and various state governments to provide education to and for the masses.

How can you spot a LGU? Every U.S. state and territory has at least one LGU. Many have more. They are often the universities with the name "University of *Something*," "*Something* State University," or "*Something* A&M University." For example: University of Florida, University of Georgia, University of Minnesota, University of Puerto Rico, The Ohio State University, Pennsylvania State University, Texas A&M, Florida A&M, Oregon State University, etc. This is not a hard and fast rule as not all LGUs follow this pattern, for example: Auburn University is Alabama's 1862 LGU, Clemson University is South Carolina's and Cornell University is New York's. There are wonderful maps online that show the 1862, 1890 and 1994 LGUs in each state. Just Google "map of U.S. Land Grant Institutions" and you will see the LGUs nearest to you. This is a helpful cheat as university honey bee programs are often nestled in the nation's LGUs.

What makes LGUs different from other colleges and universities? I do not have enough space in this article to answer that question. Instead, I will provide a general overview of the differences. While what I write is generally true, there will be some exceptions. Generality #1: *Most* faculty at colleges, both public and private, have teaching responsibilities. This is especially true for faculty at community colleges. These faculty often have 100% teaching appointments, with little or no research expectations. Generality #2: *Some* faculty at universities will have research responsibilities, in addition to their teaching responsibilities. Most of the faculty in this case will have teaching appointments, but a large percentage of them will also conduct research. Generality #3: Most faculty at LGUs will have responsibilities in one or more of the disciplines of teaching, research and extension. In fact, faculty hired at most LGUs will be assigned what is called a two-way appointment, i.e. they have teaching and research responsibilities. What makes LGUs unique is that extension is mandated at an LGU, and mostly absent at non-LGUs. The practice of extension is one of the key things that separates LGUs from all other institutions of higher education.

Given that LGUs represent a state/federal partnership, their programs, infrastructure, employee salaries, etc. are heavily subsidized by state and federal taxes, this in addition to tuition, grants and endowments. Tax support is why LGUs are among the cheapest educational options for students in a state, and why it is more expensive to attend an LGU in a state that is not your home state (after all, you do not pay taxes in that state). Private colleges/universities, on the other hand, get most of their operational budget through tuition, grants and endowments. They do not get state and federal support. This typically makes them more expensive institutes of higher learning for students to attend than are the LGUs.

Research, teaching and extension?

Folks always ask me what I do for a living when I meet them for the first time. I usually reply that I am a professor at the University of Florida. Guess what question they ***always*** ask me when I tell them I am a professor. What question would you ask me? That is right! I am always asked, "What do you teach?" You see, the public thinks that the only thing professors do is teach. They think this because that is how they interacted with professors at one point. They sat in a class and listened to a professor talk about his/her topic of interest. For most people, that is their only point of reference for understanding what professors do; so, they assume that professors teach and teach and teach, for years on end. I only have a 10% teaching appointment at UF and this appointment does not require me to teach in a classroom setting. I always enjoy responding to folks' question with the answer "nothing" and then watching their head spin as they tried to process that I was a professor who did not teach.

Why relate this story? Because it gets right at the heart of what makes an LGU different from other institutes of higher learning. Faculty at LGUs engage in formal education (teaching students) ***and*** informal education (teaching everyone else). The latter is called extension. I teach the concept of extension this way. Faculty with teaching appointments teach credit-paying individuals (students, or folks seeking a degree). Faculty with extension appointments teach everyone else (folks who are not seeking a degree). Teaching is what you think it is. It includes undergraduate courses such as Honey Bee Biology or Beekeeping 101. Undergraduate and graduate (masters and PhD students) students take these courses to satisfy some of the requirements of their de-

grees. Furthermore, a professor with teaching responsibilities often has to mentor masters and PhD students. These individuals are all seeking a degree, usually in a field related to that in which their professor is engaged.

Most beekeepers will not interact with their local honey bee lab leader through the teaching component of what the leader does. Instead, they will interact with their local honey bee lab leader through the extension component of what they do. Extension is the most difficult of my job responsibilities to explain to individuals outside of the university setting. Fundamentally, extension is a university's greatest opportunity to make a real, lasting impact in the communities it supports. It is education and support for all in that it is not encumbered by its clients' financial standing, race, gender, identity, educational background, culture or personal beliefs. Extension is administered through "programs" that are reinforced by "teaching tools or activities." This includes programs/teaching tools/activities such as Master Beekeeper Programs, training documents/videos posted online, active social media accounts, speaking at local bee clubs, answering email/phone call questions, etc. Extension lies at the core of the LGU mission. Think back to the comment I made about why LGUs were created; they were created to provide education to the citizens of the state. This is not just education in the hallowed halls of the institution, but also in the hay fields, cattle pastures, youth classrooms and even the apiary.

Extension was born during a time that the U.S. was considerably more rural and agriculture-based. Thus, early extension programs were agriculture focused. In fact, you find the state's main college of agriculture housed in the state's LGU. Extension education is not education of opinion or experience. It is rooted in science, applied science at that. In fact, extension is the method through which we try to change lives of our target partners/audiences using science-based information. That science-based information has to come from somewhere. Much of it comes from the various states' LGU research laboratories. Ultimately, the applied research informs the teaching and extension programs managed out of the nation's LGUs. Applied research is research designed and conducted to solve a specific problem encountered by someone. For example, testing the impact of a new acaricide on *Varroa* survival is applied research. Deciphering the honey bee dance language is not. Creating and testing a new pollen substitute in honey bee colonies is applied research. Discovering how honey bee hemolymph transports nutrients to other tissues in a bee's body is not. Essentially, scientists at the nation's LGUs are challenged to emphasize applied research on behalf of the state's citizens. This is not a requirement at most private colleges and universities.

Hang around an LGU employee long enough and you will hear them reference the three co-equal missions of the LGU: research, teaching, extension. They often refer to this idea collectively as the three legged stool, with each leg of the stool (research, teaching, extension) being equally important to the success and function of the stool. You will learn a lot more about these three missions in upcoming articles in this series, as my team and I will share with you how they function independently, yet ultimately work together to help the beekeeping industry.

Organizational structure of an LGU, from university to lab

I could write a book on this topic, but I will spare you the details. I will simply tell you how UF is organized so that you can make sense of all of the articles that follow throughout the rest of 2023. Most LGUs are structured similarly, even if they use different names when they refer to different levels in the hierarchy. Regardless, understanding UF's structure will help you understand the general structure of an LGU and then appreciate how the state's honey bee lab plays an important role in the LGU mission.

UF is managed by a President, Board of Trustees, Provost and many other administrators in the leadership flowchart. UF is organized into schools or colleges. For example, we have a medical school, a business school, a vet school, a pharmacy school, etc. The HBREL is housed in UF's Institute of Food and Agricultural Sciences (IFAS). Though it has "institute" in the name, it is essentially a college/school within UF. Most schools/colleges call their primary leader a "dean". We call ours a "Senior Vice President" (again, a dean at any other institution). This individual is the college's chief administrator. We have three deans in IFAS (these might be called associate deans elsewhere). You might guess that we have a dean of research (administers the "agriculture experiment station"), a dean of extension (administers the "cooperative extension service"), and a dean of instruction (administers the

Figure 4. Steinmetz Hall: home of the Entomology and Nematology Department of Florida. Photo: Chris Oster, University of Florida

"college of agriculture and life sciences"). I will not go much further down the administration tree than this. However, it is important to know that beekeepers often find themselves interacting with the state LGU dean(s) if they are trying to get funding for the honey bee program, hire a new faculty member in the program, etc.

The "college" (in my example: IFAS) is composed of many departments. The UF HBREL is housed in the Entomology and Nematology Department (Figure 4). We have ~70 professors and over 150 graduate students in our department, making it the largest entomology department in the U.S. IFAS has other departments as well: Animal Science, Food and Resource Economics, etc. The point is that most "colleges of agriculture" will be the home of a department where most of the state's entomologists reside. Unfortunately, there are not many standalone departments of entomology in the U.S., or not as many as there once was. Most of these departments have been combined with one or more departments in an effort to cut costs. For example, you often seen departments with long names, perhaps like the Department of Horticulture, Fisheries and Entomology. I suspect you can guess which three departments were lost to make that one department. The important point here is that a given state's bee lab is often housed in the LGUs Department of Entomology, or whatever mega-department includes the entomology faculty.

Figure 7. Current and former members of the Honey Bee Research and Extension Laboratory. Photo: University of Florida

A department, then, is composed of many labs. The labs are managed by single faculty members. As noted, our Entomology and Nematology Department is home to about 70 faculty. Each (me included) manages his/her own lab (Figures 5 (below) and 6 (next page)). We have labs that focus on termites, mosquitos, bed bugs, crop pests, insect physiology, etc. I work in the lab that focuses on honey bees. I know that this can get confusing but here is a good way to think about the flowchart from university to bee lab: university > college/school > department > honey bee lab. As noted, there are multiple colleges, multiple departments, and multiple laboratories at UF. It may help to think about it this way. The University is the entire body. The college is an arm (i.e. one among many appendages/colleges). A department is a hand (one part of one appendage/college). A laboratory is a finger, and an important one at that.

Figure 5. The University of Florida Honey Bee Research and Extension Laboratory. The new facility formally opened in August 2018. Photo: Chris Oster, University of Florida.

Figure 6. One of the Honey Bee Research and Extension Laboratory's research apiaries. Photo: Chris Oster, University of Florida.

The UF HBREL

When hired, I was assigned appointment percentages in research (20%), teaching (10%) and extension (70%), given I work at an LGU. Most of my colleagues (in fact, most faculty at UF) only have a two-way appointment (i.e. two-way appointments are far more common than three-way appointments), usually in teaching and research. Because of my appointment, my team and I are required to conduct research on honey bees, teach students about honey bees and conduct extension programs on beekeeping. We actually weave all three appointments into our lab's mission statement:

"The mission of the [HBREL] is to advance our understanding of managed honey bees in Florida, the U.S. and globally, with a goal of improving the health and productivity of honey bees everywhere. We address this goal by conducting basic and applied research projects on honey bees, communicating our findings to assorted clientele groups through diverse extension programming, and training future generations of bee educators, researchers, conservationists and more."

In the articles that follow, we will share our strategy for accomplishing our mission. We will introduce you to the types of jobs in the lab. We will tell you how bee research labs are funded, how we decide what to study, and how we educate the world about honey bees.

When hired, I was the sole manager of the HBREL. Then, something amazing happened. The Florida State Beekeepers Association led a charge to acquire funding to build a new research, teaching and extension facility dedicated to honey bees at UF. That allowed my program to grow immensely. As a result, UF invested in two additional faculty positions at the HBREL. We hired Dr. Cameron Jack (Assistant Professor, 30% research, 70% teaching) and Amy Vu (100% extension) in the last two years. Together, Amy, Cameron and I administer the lab's research, teaching and extension programs focused on honey bee health and beekeeping sustainability. We get along fabulously and are fortunate to work with amazing staff, students, postdocs and volunteers (Figure 7, previous page).

I know that this article may not have taught you much about how to manage bees. However, I hope it laid the groundwork for the next 11 articles in the series. I really cannot wait to share with you how it all works (in the words of Ronald Reagan: "How the sausage is made."), and make you an honorary member of the HBREL in the process. Thanks for being willing to take the journey with us, as we work to improve the health and productivity of honey bees everywhere. BC

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A Letter to the Editor

If *Varroa* Mites Could Write

Stephen Bishop

Mr. Jerry Hayes
Editor, *Bee Culture*
623 West Liberty Street
Medina, Ohio 44256

Dear Mr. Hayes,

Please be advised this is official correspondence from the duly-elected leadership of the supreme species DELSS (the duly-elected leadership of our supreme species), known in your human parlance as *Varroa destructor*—a.k.a. *varroa*, the mite, the little red pinprick of horror, the scourge of hives and destroyer of beekeepers' souls.

Let it be known that, upon publication in your prestigious periodical *Bee Culture*, this letter serves as official notice to all beekeepers that we will not stop our conquest for world domination. We have now invaded Australia in our quest to colonize every bee hive on planet Earth. Our spread knows no bounds; wherever bees go, we will follow, even if it takes us to the ice cliffs of Antarctica or the cold craters of the moon. We will not relent.

As the last four decades have proven, your efforts to eradicate us are futile. Although we do admire and respect the ferocity with which some humans have fought against the proliferation of our superior species, we now demand that you lay down your primitive oxalic acid wands and chemical concoctions and surrender your bees to us.

The time of human domination of *Apis mellifera* is over. No more will humans plunder bee hives and rob honey. No more will bees be under the subjugation of a species with merely two legs. How foolish you were for resisting—you pitiful soft-bodied species with no exoskeleton! (That said, we did appreciate the powdered sugar dusting fad that happened about ten years ago—hey, we mites like sweets as much as the next species.)

All beekeepers who lay down smokers now and give up will face no further consequences. All who resist will meet heartbreak and despair, as we are now immune to your once most lethal concoction, Amitraz. Indeed, it is now impossible for you to withstand the rate of our proliferation. Before long there will be more *varroa* mites on Earth than all bipeds combined. You would be wise to give up your efforts to breed mite-resistant bees, which are doomed to failure, and instead use your oversized craniums to surrender now.

If you do wisely decide to wave the white bee glove of surrender, our leadership will gladly accept it, on behalf of our great arachnid species, with all the formal protocol that such a momentous occasion deserves, namely that of your leadership, Mr. Jerry Hayes, bowing down and presenting his ceremonial hive tool.

On behalf of all worldwide members of *Varroa destructor*, we await your prompt response.

Sincerely,

The Supreme Senate of *Varroa* Mite Mothers BC

Apiary Inspection Connecticut

Mark H. Creighton
Apiary Inspector and
Master Beekeeper

The **Connecticut Agricultural Experiment Station** (**CAES**), established in 1875, is the first agricultural experiment station in the United States. The main mission of the **CAES** is research. Programs also exist to educate the public and to transfer new findings to people trying to solve agricultural, public health and environmental problems.

The apiary program is located within the Office of the State Entomologist and the Deputy State Entomologist in our Plant Regulatory Office. Our apiary program is administered by Mark H. Creighton, our state Apiary Inspector and Master Beekeeper.

Apiary Inspections

In 2020, Connecticut had over 700 registered beekeepers maintaining over 9,000 hives, During the 2020 season, 909 hives were inspected at 98 apiaries. Unofficial estimates indicate that over 7,000 packages of honey bees were imported into Connecticut for new beekeepers and to replace Winter losses. *Varroa* mite infestation and the viral complex associated with *varroa* mite infestation was the primary reason for colony mortality.

Outreach

Our state Bee Inspector is a regular speaker at Connecticut's three Beekeeping Associations, annual Bee Schools, Garden Clubs and provides bee education seminars at our annual Plant Science Day that attracts over one thousand visitors. Our apiary program also supports The Hives for Heroes project for empowering veterans through beekeeping, and is working towards establishing an apiary at the local Veterans Hospital complex.

David Papke

How are the Bees?

An interesting social phenomenon occurs when you become a beekeeper. You may be young or old, a man or woman, live in the city or out in the country, maybe a teacher or minister or work in the trades, who knows you might be a bank president – but once you become a beekeeper whoever you are in life becomes secondary in the eyes of everyone else. You are now 'a beekeeper' and the general public tends to view a beekeeper as somewhat peculiar, certainly out of the ordinary. When someone meets a beekeeper for the first time they may react with mild wonder or wide-eyed disbelief. Their next impulse is often to start asking questions.

Being an old-timer, I remember the days when the first question was invariably, "Do you ever get stung?" (or worse – bit!). For a beekeeper the answer seems obvious; it's like asking a carpenter if he ever hits his thumb with a hammer. Still, it took me years to come up with a worthy reply, "Well, not as often as you'd think." Then I'd go into how gentle honey bees are to work with and if stung what to do. I'd try to describe some of the natural wonders of a honey bee colony without over-stating the role of the beekeeper or making drones the brunt of jokes. It became an opportunity to correct misconceptions, arouse curiosity or occasionally plant a seed.

Nowadays things have changed. The first question most commonly asked is "How are the bees?" And it's not only asked when meeting a beekeeper for the first time; people I've known for years, people who know me primarily as a beekeeper wonder how the bees are doing. They are not only curious, they are concerned. People want to understand what's going on and who better to ask but the local beekeeper.

Most long-time beekeepers would agree that the shift in the public's perception, indeed in the question itself, began in 2006 with the response to what became known as colony collapse disorder. CCD became the perfect disaster scenario the mass media thrives on and in no time, wild speculation and fantastic theories drowned out the methodical scientific investigations and ongoing response. It seemed ironic to beekeepers who had been struggling for years with the effects of *varroa* mites on their colonies that suddenly the honey bee should become the poster child for everything wrong with the environment.

It might be counter-intuitive, but just when things looked like they couldn't get any worse there came a sudden surge of interest in beekeeping. Beekeeping clubs and associations experienced unprecedented growth, short courses long dormant were overwhelmed and beekeeping publications and manufacturers saw demand climb so dramatically that the beekeeping industry was transformed seemingly overnight in the cities, in the suburbs, in my own backyard – five acres in southern York County, PA. Whereas once I was the only beekeeper around now there are three beekeepers within a mile of my home apiary (and more beyond). Is that a good thing? I don't know.

"What we need is not more beekeepers but better beekeepers", wrote Ed Colby in *Bee Culture* a few years ago. True enough I'd say, but better how so? I tend to think that better is more than merely checking off a list of standard colony management; i.e., feeding, swarm control, harvesting, mite treatments, requeening, feeding, repeat. Better is not just tweaking your regimen. Better is not simply buying the latest piece of equipment, supplement or queen. Better is not only for newbees. Better begins with a recognition that both beekeeping and the environment have fundamentally changed. Better begins when we become more than honey bee keepers and become stewards of all bees, promoting healthy environments where both wild and managed colonies can thrive. A better beekeeper is non-intrusive and manages colonies much as they would live in the wild with minimal inputs, harvesting only surplus honey without the need to feed sugar or artificial supplements. Lastly, a better beekeeper is a mentor to other beekeepers with the understanding that all of us are facing a new day, that we are all in this together not for just our own sake but primarily for the bees.

Transformation needs to be at the heart of beekeeping today. The good old days are gone, the days when colonies thrived in spite of our demands and assumptions. The return to colony health and vitality rests with the bees and those individuals willing to change their mindset, to explore alternatives to both how and why we keep bees. We simply cannot continue on the path that has led us to where we are today.

As I said, I'm an old-timer. I no longer keep bees as a business and only sell honey "out of the house." I like the arrangement. People call me up and bring their own jars. I get to know them, they're regulars. We talk. They understand my supply of honey is limited. They only buy what they need. They know my beekeeping has changed and the bees come first. They're OK with that. We all need to adapt and respond to some very hard questions. BC

Off the Wahl Beekeeping

WINTER PROJECTS

Richard Wahl

As we ease into the Winter months here in SE Michigan, the bees are tucked away for the Winter, perhaps with a bit of insulation on the hives and thoughts of adding additional food stores as we get past the holiday season. Until the temperatures continuously remain below freezing at night, a two parts to one part sugar syrup (sugar to water by volume) can be fed to the bees if hives seem a bit light on honey stores. I find that when using queen excluders the bees tended to backfill brood supers with the Fall nectar flow a bit faster than when there is no excluder and there is easier access to a honey super above. Whether or not one feeds syrup in the Fall is up to the beekeeper. During some Falls, I have fed no hives while during others I have only fed syrup to those hives that seemed light. Lifting a hive in the back and getting a feel for the heft of the hive goes a long way in my decision whether or not the hive needs to be fed. In either event, I do make it a practice to put additional granulated sugar on top of the hive supers around the Christmas holidays or later, on one of those mild Winter days. Since the bees need to dissolve the sugar in order to ingest it, there is a greater likelihood of dysentery in the hive if granulated sugar is added too early in the Fall and the bees are relying on it as their primary food source. Honey bee dysentery is caused by *a diet high in solids* and can become particularly noticeable when the bees cannot get out for cleansing flights during the Winter. But, it is still better to have a spare food source in the hive for bees to rely on it if their own honey stores are exhausted. They may also use it if they have moved upward in the hive, even if stores were still available at a lower location. In either event, we hope for those every three to four week warmer days when the bees can get out on cleansing flights and we might quickly peek in the hive to see if additional food stores are needed.

Aside from that, there are numerous other tasks that can be accomplished over the Winter months to remove some of the preparation and lighten the load as the next Spring and Summer season gets underway.

Moving Hives

Fall or early Winter is a great time to move a hive with the only drawback being that it is a bit heavier. An old adage in beekeeping states that you can move a hive a few feet or a distance exceeding three miles without bees becoming disoriented. When bees become foragers, they take a few orientation flights before leaving the hive area and come back to that same location. Theory states that if a hive is moved a distance less than three miles but a bit more than three feet, bees will return to the same original missing hive area and become lost. An example of this is a suburban friend of mine had a swarm move into an overhanging eave. At the time I did not have vacuum equipment to remove them. He found another beekeeper with a vacuum system, captured most of the bees and hived them to take away. Unfortunately, not thinking this through, the beekeeper lived a mile or so away from my friend's home and the next morning all the bees returned into the eave of my friend's house. With a second try, the captured hive was moved about twenty miles away and remained at their new location.

Moving a hive

Early in my beekeeping years, I was not able to move a hived swarm immediately, so I carefully placed the hive on a two wheel dolly and moved it a few feet closer to my hive area every other day or so for about a month, letting the bees orient to the few feet of move each time. It worked, but was a tedious process. Several years ago, I used an easier method. If time constraints require me to leave a swarm hive at the catch location, I leave it there raised eight to 12 inches off the ground on a few cement blocks until a few cold Fall or warm early Winter days are forecast. Knowing the bees will not be out and about during those days, when I am ready to move it, I screen off the lower entrance and inner cover hole and cover any upper front entrance with a piece of duct tape. I place straps around the hive to keep it stable. I then slide the hive onto one of those low green garden center four wheel product purchase pull wagons and pull it to the new location where I can slide it onto the new stand on cement blocks.

Bees will not normally be out during those colder late Fall days so I leave the entrance screening in place for a day or two before removing it. Since bees are no longer in a foraging mode, they seem to orient to the new

Painted hives

location for cleansing flights with no noticeable loss of bees returning to the swarm capture location even if nearby.

Paint and Repair Equipment

One obvious chore is to paint and repair any supers that are not being used or purchased new and planned for next season's use. I often find the upper narrower brood super ridge bar outside the place where the frames rest is splayed out a bit and needs to be reseated and glued or nailed. I try to remove those supers that need the most repair when I am doing splits in the Spring. They often sit waiting through the busier Summer season. New hives will keep much longer if a good coat of primer and paint is applied. Use a water based paint, since oil based often continue to give off fumes that we can't smell, but research shows bees are a bit less tolerant of. Although you see most beehives in white, if you have other colors, they work just fine. Research has shown bees are more partial to the typical flower shades of yellow, purple and blue.

My nucs are this variety of colors and all my newly mated queens normally find their way back to their own nuc to start laying eggs without fail, even though nucs were set side by side. Since only the outside of the super gets painted, there are ways to enhance the inside. Some beekeepers suggest roughing the inside with any kind of abrasive that will leave small gouges or a non-sanded roughness. In theory, the bees fill in the rougher spots with propolis which serves an immunomodulatory effect in the hive. It has been stated, bees that produce a heavier propolis coating on frames and super parts have a greater tendency to fight off any microbial viruses or diseases that get in the hive. Personally, I have never bothered with this inside step, but do often find deposits of propolis on the inner surfaces of many supers.

Remove Propolis From Honey Supers

Frames removed from honey supers for extraction usually have a build-up of propolis on the top outer edges of the frames where they sit on the super. Once I have extracted the honey, I scrape the excess burr comb wax and propolis off the tops and bottoms of frames. Before or after the scraping off of propolis, I place the honey supers with frames for a night or two in a chest freezer which kills off any wax moth or hive beetle eggs if they were present. I also scrape the super's notch where frames sit to clean off that propolis. This makes spacing of the frames much easier when it comes time to use them next year.

Propolis on Frames and Hive Edge. Photo by Susan Brackney

The propolis can be processed and used in various balms, ointments or tinctures with a variety of recipes found on the internet. Caution is advised if preparing any of these for personal use to be sure there are no allergic reactions or potentially negative effects. In addition to the frames and super notches, propolis can be collected from queen excluders if they are used. If they are plastic excluders, you can put them in the freezer overnight and then flex them gently as most of the propolis will be released. If they are metal excluders, scraping them with a hive tool works well after they have spent a night in the freezer. Some beekeepers will also use a heat gun on metal excluders to remove excess comb, although it takes a bit more heat to remove propolis. For obvious reasons, a heat gun is not a good idea on a plastic queen excluder. In addition to propolis, much more value added hive product information can be found in the *Food and Agricultural (FAO) Services Bulletin No. 124* found at the website: **www.fao.org/docrep/w0076e/w0076e00.htm**

Clean Tools

Cleaning hive tools can be a bit of a challenge if there is a build-up of propolis or wax. I find that boiling water poured on the hive implement will remove most of the propolis and wax. If the propolis is older from years past, it may take several boiling water washes to get most of it off hive tools. Using a blow torch on a low setting to heat metal hive tools followed by a wipe with a clean rag will also remove propolis and wax. Care needs to be taken – wear thick gloves while handling any heated hive tool so as not to get a nasty skin burn. I find that running boiling water over my metal honey filtration screens removes the bits of wax and debris that remains in the screen. It may take two or three boiling water pours to get all the wax off the filtration screens. I also use boiling water to rinse out my metal honey centrifuge extractor before storing it for the Winter. I would not suggest using a blow torch on the metal filtration screens as they are more fragile than hive tools and may rust or disintegrate.

Several years ago, I was invited to teach a beginner class and wanted to display some of the common tools that beekeepers use. My smoker had not been cleaned since purchase and had quite a build-up of creosote from the wood chips I was using as fuel. I needed a way to clean it and preparing for the class provided

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the impetus to do so. After scraping as much creosote out with a hive tool and an old kitchen steak knife as I could, I soaked the smoker metal part in a mix of one cup distilled white vinegar to one gallon of water overnight (do not get the baffle wet for obvious reasons). The next day a stiff brush and bit of steel wool was used to clean the remaining soot off to almost make the smoker look like new. Always use a heavy pair of rubber gloves to save the hands when doing any type of cleaning work.

Bleach Moldy Woodenware

When I first started my beekeeping experience thirteen years ago, I was just using the standard Langstroth hive and overwintering with two deeps and the inner and outer covers with no additional insulation or Vivaldi boards. Over the course of a few years, I ended up with quite a bit of mold and discoloration on the inside of outer covers, some frame tops and inner super sides where moisture had built up. This was especially prevalent if a moisture laden cover, frame or super were set in storage for a period of time. After removing the plastic foundation from the frames, I placed the frames in a ten percent bleach water solution and let them soak for about thirty minutes. About five frames will fit in a half filled five gallon bucket reversing the submerged ends for another thirty minutes. In most cases the woodenware comes out looking almost like new. Let the soaked parts dry out well in a sunny location before reuse or storage. The larger outer covers or supers can be submerged one side at a time in one of those large plastic totes sold at big box stores.

Render Wax

I covered my suggested techniques and cautions about wax renderings in a previous month's issue, so I will not repeat those ideas here. Suffice it to say that the Winter months are a great time to render wax. I am fortunate to have an enclosed out building that has power and can keep the entire process out of the house since the wax filtered debris and splatters are not endearing to the wife's kitchen.

Store or Recondition Old Comb Foundation

I find that most new beekeepers are of the frugal nature and like to reuse as much of their previously purchased equipment as possible, particularly if only maintaining one or two hives. If wax moths have gotten into the foundation comb it can be a real chore to clean up. One way to avoid this is to stack three to four supers with drawn comb and set a paper pie plate on top with a few para-moth crystals on the plate. It is important to use para-moth (paradichlorobenzene) crystals sold by most of the bee product catalogs rather than standard moth balls (naphthalene) as the naphthalene will also kill the bees. If there are more than three to four supers, continue to stack them over the previous one with the para-moth paper plate and add a second plate over the next few. When I first started beekeeping, I found that if I placed the empty honey super in a chest freezer overnight it killed any wax moth or hive beetle eggs. I then stored the supers in a large plastic garbage bag tucked tightly around the super and frames.

These sat in an unheated out building through the Winter and Spring with no moth crystals of either type. Only once did I have wax moths get into a bag, most likely as I had been careless and skipped the freezer step. Thereafter, I set a few plastic cups with moth balls (naphthalene) near, but outside my garbage bag wrapped supers. I have had no further wax moth problems while not using the para-moth crystals.

After a few years, the comb in the brood foundation gets very dark and brittle. It is a good idea to replace some of the oldest brood comb every year, once past the four to five year use point, since it has accumulated medication and pesticide residue as well as the thin papery cocoons used by multiple generations of new bee pupae. If the comb has been built on plastic foundation, the foundation can be cleaned and reused. The very thin cocoon around each larva, after brood cell capping, does build up making each brood cell just micro-millimeters smaller after each use. Above 80°F (a bit warmer is better), a scraper will peel nearly all of the wax cell and old cocoon residue away.

Scraping Old Comb off Plastic Foundation

What doesn't come off can be removed with a good power washer. Remove the foundation from the frames before power washing. Keep the power washer nozzle nearly touching the foundation on a flat surface and most of the cell residue will be removed as well as any old pollen build up in cells. Let the foundation completely dry, pop back into the frames and rewax the foundation. I use a 1750 psi power washer which works fine, but I think a bit stronger psi would work even better. Each of my frames gets a permanent marker number (year's last digit) on top to indicate the first year of use. That way I know when the frame is older than four to five years. The foundation can then be coated with melted beeswax using a foam brush. The bees are more likely to draw out comb on pre-waxed foundation.

Hopefully using any of these suggestions can help you be better prepared for next season's beekeeping. Additionally there are plenty of tips on the internet for any of the foregoing topics with often more unique or creative methods. These are simply things that I have found work well for me. Your equipment cleaning results could vary based on your conditions, environment, experience or state of your hive tools. Happy new bee keeping year. BC

Let's Make '23 Better

John Miller

Happy New Year!

I have a lot to be thankful for. My former company, Miller's Honey Farms, Inc. keeps me occasionally employed. This morning, as I took my youngest son to the airport we chatted about retirement. I'm sort of retired. I work in January and February placing and caring for bees in almond orchards. It's hard work, but I love it because I get bees. I understand bees. The more I know about bees, I've learned – the less I know about bees. But every Spring, which comes early in California, I re-learn the fundamentals of good beekeeping. It's a joy. I'm thankful to be employed during January and February – and thankful quite a bit to have March off. I also help with the queen work in April, because there is never enough help during queen-rearing season. And if you've ever stuck 15,000 cells in 25 days – you know how good it feels to be finished with those cells.

A moment to reflect. Beekeeping has a large number of small institutions working on hive health. The Bee Informed Partnership (BIP) does some of the finest hive-health work on earth. I'm mystified why more beekeepers do not participate and benefit from BIP work. Project Apis m. (PAm) leads the industry, having invested over $10 million in over 100 published research papers available to everyone on their website. The Honey Bee Health Coalition is another standout group. Lots of other groups deserve mention, but I can't list them all.

Non-profits depend on benefactors and donors. In this industry, it is a big lift to achieve the $10 million threshold. Part of that success is board participation. Recently, PAm, for instance, held a match challenge funded by the board members. For the hobbyist or the commercial beekeepers, PAm's board put up $34,000 to match donation from others. It's grass-roots efforts by those invested in beekeeping that add up to more research. I'm thankful for the benefactors. We need more benefactors, because we have more challenges and opportunities ahead.

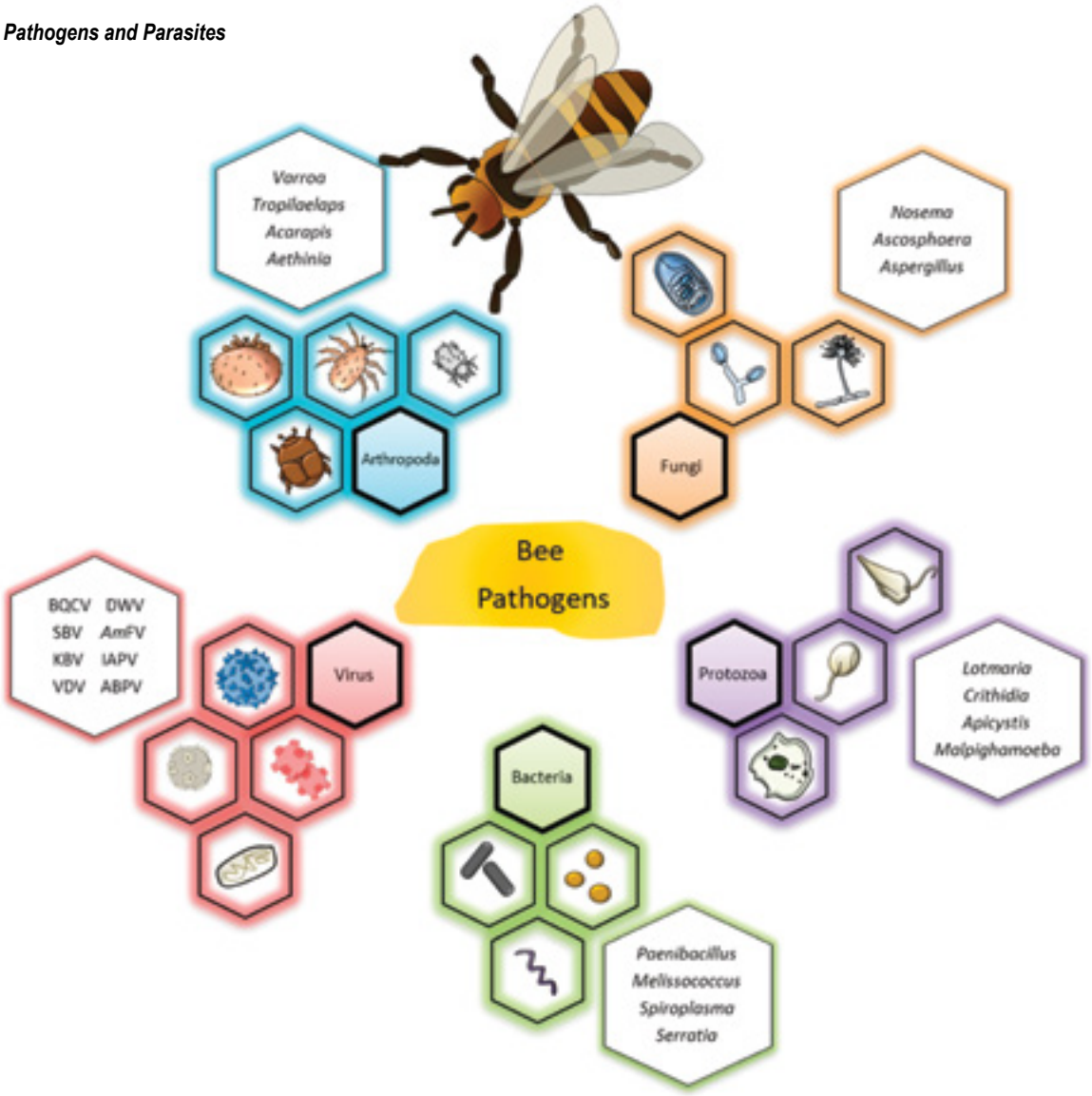
Let's look at 2023.

Look for breakthroughs in 2023 in honey bee genetics. We have bright, young scientists probing honey bee genetics. There is huge potential to improve honey bee genetics from machines and the skilled operators of those machines that simply did not exist ten years ago.

The Three P's are still with us: Pathogens, Parasites and Pastures; but things are changing.

Vaccines in 2023 are in development for American Foul Brood and *Nosema*. Spend a moment on the *Nosema* vaccine. Soon, bee breeders will be able to vaccinate cell-builders rearing queens against *Nosema*. Many beekeepers large and small

Pathogens and Parasites



Pollinator Pasture

treat beehives for *Nosema* with treatments some researchers view as doing as much harm as good. A *Nosema* treatment scours the digestive tract of the infected bee. A bee lives about 35 days. If the treatment occurs on the 17th day of a honey bee's life – scant time remains for the honey bee to repopulate its gut with the bifidobacterial populations enabling digestion. By vaccinating cell-builders against *Nosema*, the pathogen never achieves economic threshold. Millions of newly emerged virgin queens will get a better start. Now apply the same vaccine to the drone mother hives placed in queen rearing yards. With this soon to be available vaccine – bees will live healthier, longer lives (It was not so long ago that most honey bees lived to a ripe old age of 42 days). If the worker bee populations live 8.5% longer lives – a cascade of benefits accrue to the hive – notably, queens won't burn themselves out laying 8.5% more eggs, just to keep up with unvaccinated worker bee mortality.

In 2023, beekeepers will again have no control over markets. Prime example: Cost of Feed.

Increased costs will weigh on commercial operations grappling with labor, freight and feed; the top three cost centers. If a vaccine exists for *Nosema,* savings in feed costs may be found in more efficient hive operation. Maybe 8.5% lower feed costs described in the previous paragraph. If your feed budget for 2023 is $1 million – and say 8.5% of the cost can be saved by more efficient hive feed use due to longer-lived honey bees – that's $85,000.

In 2023, beekeepers will have no control over inflation. Inflation erodes balance sheets. If inflation abates, the eroding value of cash will slow. Inflation won't end, but the 8%+ haircut every operation experienced in 2022 may not be a 2023 buzzcut.

In 2023 a new Farm Bill will be written. Creating the Farm Bill is not a pretty process. Food security is historically a national priority. Many a regime has perished over the availability and price of food. A lot of food depends on insect pollination. An unwelcomed pest from Asia, native to the Asian honey bee is expanding its range, and now devastates *Mellifera* honey bee populations across a wide swath of Asia. It is *Tropilaelaps mercedesae.* Check it out. Beekeepers who know their elected Congressional representatives should support provisions in the Farm Bill to fund **preventative** measures. The Animal Plant Health Inspection Service should have an active prevention plan in place. It does not.

If you hate the past 35-year experience with *Varroa* – the next 35-year experience with Tropi may cure you from beekeeping; but will not eliminate the threat of Tropi to global food production. Call me an alarmist. I hope I'm wrong.

Please remember to plant more flowers. In 2023, for example, watch for big things from the Bee and Butterfly Habitat Fund (BBHF) in the 13 mid-western states it now operates in. Monarch butterflies, honey bees and native Bees all benefit from nutrition islands. These projects, are now catching critical mass in forage programs. Significantly, solar farms need to control vegetation. The BBHF program has specific seed mixes for specific applications. Check it out.

Lastly, if you enjoyed *The Mind of a Bee* by Lars Chittka in 2022; you'll probably also enjoy *Bee Club* a novel by M.E.A. McNeil, coming in 2023. McNeil is a gifted writer and keen observer.

Have a wonderful 2023.
JRM BC

HONEY BEE GENETICIST ROBERT E. PAGE JR. HONORED

Kathy Keatley Garvey

It was like coming home when acclaimed honey bee geneticist Robert E. Page Jr. stepped forward to accept the Exceptional Emeriti Faculty Award from Helene Dillard, dean of the College of Agricultural and Environmental Sciences (CA&ES) at the University of California, Davis.

The occasion: the college's Award of Distinction dinner and ceremony, held November 3, 2022 in the Activities and Recreation Center Ballroom.

Page, considered by his peers as the world's leading honey bee geneticist, traces his "bee biology roots" to UC Davis. He drew a standing ovation.

Page received his doctorate in entomology in 1980 from UC Davis, studying with Harry H. Laidlaw Jr., and went on to join the UC Davis Department of Entomology faculty in 1989 and chair the department from 1999 to 2004. He then transitioned to emeritus and was recruited by Arizona State University (ASU) to be the founding director of its School of Life Sciences. His career at ASU led to a series of top-level administrative roles: from founding director of the School of Life Sciences (2004-2010) to vice provost and dean, College of Liberal Arts and Sciences (2011-2013) and then to university provost, 2014-2015.

"Rob is a pioneering researcher in the field of evolutionary genetics and social behavior of honey bees, and a highly respected and quoted author, teacher and former administrator," wrote nominator Steve Nadler, professor and chair of the UC Davis Department of Entomology and Nematology.

"One of Dr. Page's most salient contributions to science was to construct the first genomic map of the honey bee, which sparked a variety of pioneering contributions not only to insect biology but to genetics at large," Nadler pointed out. "It was the first genetic map of any social insect. He was the first to demonstrate that a significant amount of observed behavioral variation among honey bee workers is due to genotypic variation. In the 1990s, he and his students and colleagues isolated, characterized and validated the complementary sex determination gene of the honey bee; considered the most important paper yet published about the genetics of Hymenoptera. The journal *Cell* featured their work on its cover. In subsequent studies, he and his team published further research into the regulation of honey bee foraging, defensive and alarm behavior."

While at UC Davis, Page worked closely with Laidlaw, "the father of honey bee genetics." Together they published many significant research papers and the landmark book, ***Queen Rearing and Bee Breeding*** (Wicwas Press, 1998), considered the most important resource book for honey bee genetics, breeding and queen rearing.

For 24 years, from 1989 to 2015, Page maintained a UC Davis honey bee-breeding program, managed by bee breeder-geneticist Kim Fondrk. Their contributions include discovering a link between social behavior and maternal traits in bees. Their work was featured in a cover story in the journal *Nature*. In all, *Nature* featured his work on four covers from work mostly done at UC Davis.

Since his retirement from UC Davis, Page has published 65 research papers, eight major reviews and two scholarly books, many using his UC Davis affiliation. He authored ***The Spirit of the Hive: The Mechanisms of Social Evolution*** (Harvard University Press, 2013) and the ***Art of the Bee: Shaping the Environment from Landscapes to Societies*** (Oxford University Press, 2020).

Now residing near Davis, Page continues to focus his research on honey bee behavior and population genetics, particularly the evolution of complex social behavior. His continuing academic activities bring credit to bee biology and UC Davis. Nadler said, "His large number of publications and citations continue to be an important component of the high national rating of our entomology department."

To date, Page has published more than 250 research papers and articles, edited or authored five books and is

Robert E. Page Jr., as a doctoral student at UC Davis, worked closely with his major professor and mentor Harry H. Laidlaw Jr.

listed as a "highly-cited author" by the ISI Web of Knowledge, representing the top ½ of one percent of publishing scientists.

Page continues to work closely with UC Davis professors and students, offering advice, helping them with grants and editing manuscripts. A few years ago, he held an international workshop at the Laidlaw facility. He teaches courses (including "The Social Contract: from Rousseau to the Honey Bee," and "The Song of the Queen: Thrilling Tales of Honey Bee Mating Behavior") for the UC Davis Osher Lifelong Learning Institute (OLLI).

"Not surprisingly, Dr. Page humbly considers his most far-reaching and important accomplishment, the success of his mentees, including at least 25 graduate students and postdocs who are now faculty members at leading research institutions around the world," Nadler wrote. "He also built two modern apicultural labs (in Ohio and Arizona), major legacies that are centers of honey bee research and training. He has trained many hundreds of beekeepers. His public service now extends to working as a Fellow with the California Academy of Sciences."

Among Page's many honors:

- Fellow of the American Association for the Advancement of Science
- Awardee of the Alexander von Humboldt Senior Scientist Award (the Humboldt Prize – the highest honor given by the German government to foreign scientists)
- Foreign Member of the Brazilian Academy of Sciences
- Fellow of the American Academy of Arts and Sciences
- Elected to the Leopoldina, the German National Academy of Sciences (the longest continuing academy in the world)
- Fellow of the Wissenschaftskolleg zu Berlin
- Fellow of the Entomological Society of America
- Awardee of the Carl Friedrich von Siemens Fellowship
- Fellow of the California Academy of Sciences
- Fellow, Carl Friedrich von Siemens Foundation, Munich, Germany, September 2017-August 2018
- Thomas and Nina Leigh Distinguished Alumni Award from UC Davis Department of Entomology and Nematology
- James Creasman Award of Excellence (ASU Alumni Association)
- Regents Professor, Arizona State University
- UC Davis Distinguished Emeritus Professor BC

Helene Dillard, dean of the College of Agricultural and Environmental Sciences, University of California, Davis, hands the Exceptional Emeriti Faculty Award to Robert E. Page Jr. (Photo by Kathy Keatley Garvey)

Robert E. Page Jr. thanks the UC Davis College of Agricultural and Environmental Sciences for his award and talks about his bee research. (Photo by Kathy Keatley Garvey)

From left are Helene Dilard, dean of the UC Davis College of Agricultural and Environmental Sciences; Exceptional Emeriti Faculty Award recipient Robert E. Page Jr. and his wife Michelle; and their great-niece Emily Redmond, a UC Davis Student, and their niece Suzi Redman. (Photo by Kathy Keatley Garvey)

Honey bee geneticist Robert E. Page Jr. with swarm.

Minding Your Bees And Cues

Drive Your Club Membership

Becky Masterman & Bridget Mendel

Beekeeping sure isn't the same as it used to be. We've all heard that sentiment and even brand-new beekeepers are nostalgic for the good old days before mites arrived and landscapes diminished their floweriness. Let's face it, mites, increased costs of beekeeping and a global pandemic have impacted the membership rolls of beekeeping organizations. Club membership is paralleling bee management to the point that intervention is necessary to keep it healthy.

Beekeeping has changed, but beekeepers have not. We are people drawn in and fascinated by this incredible animal, all of us with a deep love for our bees no matter what else we do or don't have in common. For both this constancy, and for all the complicated changes, we need each other. That's why bee clubs still exist.

They exist, but how? Are our beekeeping clubs as robust, exciting and useful as they could be? Are memberships and meeting attendance up? If you think your club is thriving, send us a note, and meanwhile, we'll tell you about ours, and how we are thinking about possible ways to increase their popularity.

Take a look at your club mission statement. Does it reflect the current issues facing beekeepers today? Know where you have been, currently are and are going? Do beekeepers possibly need different things than they did when your organization was founded 100 years ago? Can you revisit the goals of your organization while celebrating its history instead of embracing traditions that no longer serve members? Has your organization found a way to support backyard, sideliner and commercial beekeepers so that your membership supports the diverse industry needs, thus allowing for everyone to work together to support bee health?

We* have reported the work of the Minnesota Honey Producers Association (MHPA) in past *Bee Culture* articles as they have made some important changes that address the changing needs of beekeepers and bees. The MHPA ended their Queen Program in favor of an Ambassador Program that encourages broad participation of people skilled in bee education and promotion. They also started a Habitat Program where promotion of habitat for honey bees and other pollinators addresses a critical need for the industry and environment. Check out this recent Beekeeping Today Podcast Episode where these two programs are discussed: **https://www.beekeepingtodaypodcast.com/minnesota-honey-producers-ambassador-program-and-more-s5-e16/**

Looking for opportunities to expand membership by bringing in new and lost members is a task best brainstormed by both club leadership and interested members. You might be surprised at how easy it can be to generate renewed enthusiasm for your club. Here are some ideas to get you started:

Driving club membership, like beekeeping, is best done when you make the membership experience a priority. Photo credit: Alpha Stock Images http://alphastockimages.com/

Engage Your Current Membership

- Thank and acknowledge your current members. The Texas Beekeepers Association (**https://texasbeekeepers.org/**), as reported by MHPA past president, Dan Whitney, has an excellent system for recognizing member contributions. Invest time in making sure that your members know you appreciate them.
- Offer your lapsed or renewing members a deal that they can't refuse.
- Consider a 'benefits package' for members who serve on your board or volunteer for your club. A free membership, cool swag or a comped convention fee might go a long way in incentivizing membership and participation. Before you start complaining about how service to your club should not be compensated, know that for some, even a low membership fee payment might be a significant part of the week's grocery bill.
- Send a survey to current and former members and ask the tough questions about your club. What are you doing right, what can you do better and where did you go wrong?
- Engage your board in membership development. Build a strong membership committee. Consider a hospitality committee. Are you making all members feel welcomed? Make sure that you encourage your leadership and members to introduce themselves to anyone they don't recognize. Keep contact lists updated. Circulate the list of lapsed members at your next board meeting. Is there anyone your leadership could personally reach out to and ask why they decided to leave the group and ask them to return?
- Speakers. Nothing is better than a great speaker at your meeting to draw a crowd. Make a list of current issues that face your bees and beekeepers and then brainstorm guest speaker ideas. Plan ahead to book speakers and if they aren't available, offer them another time slot.

In demand guests often book out their calendars a year in advance. Take advantage of this opportunity and line up your speakers into the future!

Encourage New Memberships

- Make a list of why someone would want to join your group and then add to it. Once you have this list, advertise it.
- Estimate how much you spend per member or ask what is your carrying cost per member. Add up postage, facility rental, coffee, etc. and divide it by your membership. Look to this number when making decisions about membership promotions as they likely will provide a great return.
- Keep underserved community members in mind. Consider offering the first year's membership free to these groups and provide an ongoing discounted membership.
- Don't be shy about inviting new members to serve on committees. Let people know that the strength of your club depends on their participation.
- Check your website and social media channels and make sure you have up to date information. Is the information easy to access? Are there other language options that might help you reach out to local beekeepers? Make sure your contact information is current and works. Eliminate dead links.
- Have a calendar that current and potential members can visit to learn about the opportunities you offer and keep it up to date. Use social media (we find that Facebook Events are a great way to advertise offerings) and find someone to monitor it.
- Evaluate your resources and education. Are you offering support to beekeepers who need help? Do you offer monthly management at meetings, a time for new beekeepers to ask questions (the Southeast Minnesota Beekeepers Association (**https://semnbeekeeping.com/**) offers an early meeting start time to new beekeepers to discuss management and issues), demonstration hives, a library of beekeeping books, resources for planting bee habitat, classes for new and advanced beekeepers, etc.
- Check out other beekeeping groups for ideas (and always credit them when used).

If you made it this far and aren't a member of a beekeeping club, we ask you to reconsider your choice. Joining a beekeeping club is a proven way to become a better beekeeper and network with other bee enthusiasts. Many successful beekeepers are members of multiple local, regional and national beekeeping organizations. While members benefit from club education and community, it is also an excellent opportunity for you to give back to the colony of beekeepers who are supporting the industry.

*Bridget and Becky are both members of the Minnesota Honey Producers Association.

Acknowledgment

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Becky Masterman led the UMN Bee Squad from 2013-2019. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. Photos of Becky (left) and Bridget (right) looking for their respective hives. If you would like to contact the authors with your own bee club storied or other thoughts, please send an email to mindingyourbeesandcues@gmail.com

Joshua Muñoz, the first Minnesota Honey Producers Association Ambassador, speaking at the 2022 MHPA Summer Convention. Photo credit: Rebecca Masterman

Beekeeping Critical Thoughts – Master Insights on Splitting a Hive

Earl Hoffman

The art of beekeeping is all about timing, so it may come as no surprise that there is a critical two-week window when splitting a hive. Starting too early – before nectar and pollen is flowing – puts the hive at risk for chilled brood and starvation. Starting too late – when the bees are feeling they have outgrown their home – puts the hive at risk for a swarm. Master beekeepers Earl and Carol Hoffman have the following ideas to consider on your beekeeping quest.

Signs it is Time to Split

You can have your timing down but accomplishing the tasks will depend on the weather. Sometimes, a late frost or weeks of cold rain will delay the opportunity to split your hives. Earl and Carol use the Spring bloom of dandelion flowers as a marker for making splits.

If a hive is strong in the Spring, it is a great candidate for pulling brood frames to help in the splitting process. During a Spring hive inspection, if you see queen cells located on the bottom of the brood frames, it could be an indication the hive is preparing to swarm. Hives that are on the verge of swarming should be split. When bees feel they have outgrown their hive, they will leave in an attempt to establish a new one themselves.

Split Sizes

Splits can be many sizes, from large double-deep supers and five-frame nucleus hives, all the way down to the Summer two-frame deep split. The size of the split will be dependent on the amount of nurse bees in the hive – they are needed to keep the brood warm.

The size of the split will also depend on timing and weather. In Spring, when overnight temperatures are above freezing, splits need to be large and full of bees, pollen and honey. In early Summer, when overnight temperatures remain above 50°F, splits can be as small as two frames of deep comb: one frame of pollen and honey, one frame of capped brood and lots of nurse bees to keep it warm.

The Art of Splitting

Earl and Carol have said before that beekeeping has one thousand inputs and one thousand outputs. When working within the critical two-week window available to split a hive, consider the following practices to increase your chances of success:

- Drawn comb is the beekeeper's golden treasure. Guard the wax comb and use it to make your splits and nucleus (nuc).
- There needs to be similar amounts of bees, brood and food in each super between the original hive and the split hive.
- Take extra care when moving frames with queen cells so they are not damaged. Queen cells should be used to your advantage – they are a gift from the bees.
- Frames of honey normally would be on the outside positions of the hive, and the pollen frame next to the brood in the center of the super.
- Nucs consist of a smaller size super with five deep or medium frames. Nuc boxes are easy to make. You can use scrap wood to make a bottom, four sides and a lid cut to size, and glue and nails for lap joints. Cut a ¾ inch hole for the hive entrance.
- If you are overwintering double deep supers, the task is simple: separate the two deep supers and install the new queen or queen cell into the queenless split.
- Use entrance reducers with each split and give bees access to a feeder for thin bee syrup, one to one is fine.
- Earl and Carol do not recommend the use of plastic or wax foundation frames with new splits. Let the bees focus on caring for the young and not creating wax comb. These frames are best to be drawn out by a strong hive brimming with bees during a nectar flow.

In Case of Swarm

If you miss the window to split a strong hive and it swarms, you can act fast to bring the bees back. An excellent way to attract swarm scout bees is to place bait comb boxes in trees and other accessible areas. Older dark comb will help most in capturing the swarm. Lemon grass oils or swarm capture attractants can also be effective. If swarms are at the ground level, supers with drawn comb can capture them if access to the comb is given.

Earl and Carol do not recommend using plastic or wax foundation frames to attract a swarm. However, plastic or wax foundation frames are effective with a captured swarm that did not find a bait hive. Place the swarm in the super with foundation. The workers will have no brood to feed, so all the swarm energy will go into comb creation.

Approach hive splitting like everything else in beekeeping. Leverage every tool in your toolbox – from your tried-and-true practices to new ideas. All learnings play a role in helping you achieve your desired results. It is a grand endeavor indeed. BC

READY FOR WINTER – MAYBE?

James Masucci

I've been a scientist my entire adult life, which means I always experiment. The question that interests me the most is "how". How does it work AND how do I make it work? So, it makes sense that I am trying to figure out the "hows" of beekeeping. This Winter is no different. How do I successfully Winter MY bees. I know the answer… plenty of healthy bees with plenty of Winter stores. Lately, I haven't been very good at achieving that.

Before I expanded my operation, my track record was pretty good. My overwintering success rate was 15/30, 33/35, and 84/89. Then I doubled my size again and it all fell apart. The next year, I blamed COVID and the sugar shortage. I needed thousands of pounds of sugar and was limited to a single bag. That didn't work and experienced >30% losses that I attributed mainly to starvation. The following year, it was laziness on my part. I couldn't fit enough sugar in my truck so I fed less than I needed to and again experienced >30% losses. This year, my wife had major surgery so I couldn't feed as much as I needed to (though better than last year). It seems like there is always an excuse, though I needn't look any further than the mirror when assigning blame. The point is, we as beekeepers are not perfect and we always make mistakes. Are there things that we can do to minimize the impact of our mistakes?

I'm going to talk about two strategies that I am trying this year to help my bees get through the Winter. The first one will relate to my colonies that are in 10 frame boxes. I will refer to these as my production hives. The second one will relate to my over wintering nucs. These are in four frame boxes stacked two high (eight frames total). You may be asking why I am writing this now, and not this Spring when I know if any of the strategies work. Scientists know that only a small percentage of their experiments "work". We fail more often than not. Usually, no one hears about the failures, making it likely that someone else will make the same mistake. So, I am putting it out there. My actions and the logic behind my actions, forcing me to report later on how my bees fared. This gives you time to think about my logic and take bets on whether I am an idiot or a genius.

My production hives

What I am doing to my production hives is pretty straightforward, but there are a few lessons to be learned. My first change relates to Winter feeding. For years, I have been putting dry sugar on top of my hives as an "insurance" policy. Typically, half the colonies eat the sugar. The set-up is simple. A sheet of newspaper, a spacer and several pounds of sugar. The sugar absorbs excess moisture and acts as insulation. The problem is this can be messy. The newspaper breaks, the sugar falls to the bottom and you have a mess to clean up in the Spring. So a couple years ago, I found pre-cut parchment paper to use instead of newspaper. It made the set up simple and the bees don't chew through parchment paper so there is no mess in the Spring.

Ahh, but here lies the rub. Is it coincidence that I experienced my first heavy losses the same year I switched to parchment paper? I still had colonies eating the sugar. Here's my thinking. When bees chew through the newspaper, the sugar is directly above the cluster. They have easy access to the sugar as they need it. With parchment paper, the bees must go around the paper to reach the sugar. That limits their access. During cold spells, when the bees are clustered, they have a pile of food right above their heads but can't get to it. Hence, the strong colonies survived because they could wait for some warmer weather, but the weaker colonies starved. I am going back to newspaper. I have a pile of newspapers and I bought some pre-cut newsprint. I will see if one works better than the other.

The second "experiment" on my production hives is to add some reflective insulation above the hive. I have argued for years that strong colonies don't need extra insulation, especially in Missouri. I know beekeepers in Northern climates wrap their hives, and that makes sense. But I'm not in a northern climate. Besides, I have successfully overwintered 84/89 colonies, right? I already had starvation on my mind when I heard a first-year beekeeper speak at our club. She had an internal hive thermometer in her hive and showed what happened when she put two inches of foam insulation inside the outer cover of her hive. The internal temperature rose 20 degrees! If you think about the energy required for the bees to heat that space, imagine the Winter stores saved by raising the inside of the box 20 degrees. Being on our clubs program committee, I found Ashley St Clair from U of I to talk about her experiments with insulating hives. Same thing, insulated hives used less honey stores. If I am worried about my bees starving, then I should insulate my hives.

I make my own hives. My inner covers are made of ⅜ inch plywood and my outer covers are either ⅜ or ½ inch plywood. Pine has an R-value of one per inch thickness which means my hives have very little insulation on them. Even with a ¾ inch lid, you have an R value of less than one. Strong, well-fed hives can deal with this. But less than perfect hives struggle. Ian Steppler, out of Manitoba, uses some reflective bubble wrap insulation on his hives. I found some at the local building supply store (see image 1). It has an R-value of 3.7. This is the equivalent of a 3.7 inch

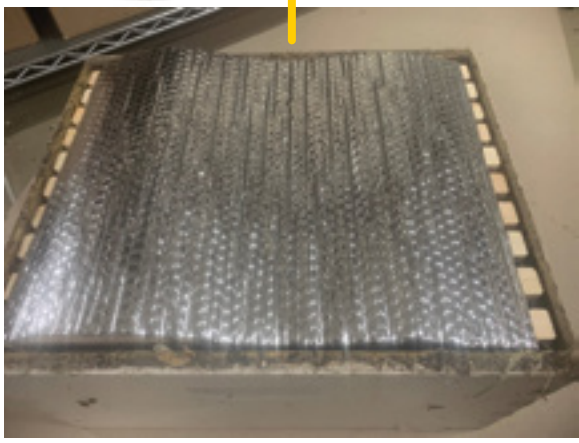


Image 1: This reflective insulation is only ⅛ inch thick and has an R-value of 3.7. It's easy to cut to size and should help keep heat within the hive. Below is how it looks when insulated.

Image 2: My overwintering nuc facility. An 8x16 shed that holds 20 nucs per row, two rows per side. I used 1¼ inch holes as entrances to each hive and painted patterns on the side to allow the bees to orient to their home.

lid yet is only ⅛ of an inch thick. All my hives now have this insulation on them. Hopefully, between the newsprint and the insulation, I will see a better outcome this Spring.

My Overwintering Nuc Facility

Each year, I overwinter several smaller colonies in four frame boxes stacked two high. This set-up is more robust than you might expect, especially when the colonies are side by side. These colonies are typically left over mating nucs or splits that I made after running out of 10 frame equipment. My business model is evolving to sell more overwintered nucs in the Spring and I'm trying to do that without selling off my production colonies. How can I efficiently overwinter more nucs?

Several years ago, I built a six frame observation hive that I had in my spare bedroom. I never failed to overwinter a colony in that hive, regardless of size. I learned a lot from that hive. The bees would loosely cluster all Winter long even though it was 68°F in the bedroom. I couldn't feed them when it was cold outside. But, when they were flying, I could. My thinking is the warm surroundings made the Winter less stressful for the bees. They behaved as they should during Winter, conserving energy, but didn't need large amounts of stored honey because they didn't have to struggle to keep warm.

Enter the idea of my overwintering nuc facility. When I visited Germany for work a few years ago, I got to see a working bee house. The colonies are kept indoors, with holes cut into the side of the building allowing bees free flight. The beekeeper worked the bees indoors and had overlapping window panes to allow bees that flew out of the hive to escape the building. This set-up mimicked my observation hive. My idea was to build a shed that allowed bees free flight to the outdoors, allowed me to work and feed the bees indoors and allowed me to "control" the temperature throughout the Winter. Before I invested in such a shed, I contacted both John Miller, a commercial beekeeper out of North Dakota, and Brandon Hopkins at Washington State University. Both thought it was worth trying.

The shed is 8x16 with eight foot walls and can hold 80 nucs (see image 2). The studs are at 18-inch centers so there is 16.5 inches between them. That is enough for one 10 frame box or two four frame boxes. There are two rows per side (see image 3). I set the floors up as commercial beekeepers set up pallets. Permanent spacers and a permanent opening that leads to the outside (see image 4). I had to place a spacer on the wall of the shed to allow room for the handles I have on my nuc boxes. To add a colony to the shed, I just remove it from the bottom board and slide it against the wall into its space. There are holes cut into the lids so I can easily feed using plastic quart containers (see image 3). For lighting, I have both white light and red light. The idea behind the red light is so I can work the bees without having them attracted to the light. Unfortunately, I must have the wrong type of red light because they still fly to it. I also found it necessary to "plug" all the holes except the escape route. I found many dead bees near the door, until I went in and saw all the light coming through the edges of the door. After weather stripping all the cracks, that problem went away.

The big question for me was temperature. The controlled environment facilities commercial beekeepers use to overwinter thousands of colonies would overheat if they didn't have a means to lower the temperature. Each hive produces the equivalent

Image 3: The overwintering nuc facility has two rows of hives on each side allowing room for 80 nucs. There is sufficient space between the bottom and top hives for me to remove frames if necessary. Holes in the lids allow easy feeding as seen by the quart-sized food containers on each colony. The picture on the right shows the house after insulating. Reflective insulation was used on the walls and traditional fiberglass insulation was used on the roof.

heat of a 60-watt light bulb. In my bee house, though, the bees have access to the outside. They should be able to control temperatures using their own air circulation. This has the added benefit of controlling CO_2 levels as well. I put the bees in the shed without insulating to see what would happen. After having the bees in the shed for a few weeks the highest temperature I recorded was 78°F (it was 80°F outside) and the low temperatures were typically 10 degrees higher than the low outside. My plan is to keep the internal temperature around 45-50 degrees, and it can get below zero here in the Winter. So, I decided to insulate. I had some left over R13 insulation from my honey house project that I used to insulate the roof. And I used the reflective bubble wrap R=3.7 (image 1, previous page) on the walls (see image 3). I couldn't use thicker insulation on the walls because the hives needed to butt up against the spacers. The insulation helped. But it was clear the bees weren't putting out a lot of heat.

In addition to the insulation, I purchased a small baseboard heater that I could set to 50°F as a source of supplemental heat. We had our first cold spell of the season and the low got down to 25 degrees. The temperature in the bee house was 42 degrees (my unheated honey house was 32). On normal nights, I can maintain about 20 above the outside temperature. Not bad, but I still worried about our zero-degree weather that is coming. I purchased an oil-filled radiant heater that has a thermostat and also made the decision to insulate the tops of my nucs. In this case, I used Styrofoam insulation (R-4) with a small hole cut into it to allow feeding (Missouri gets warm spells where it is feasible to feed). The morning I put the insulation on was 15 degrees and the baseboard heater said 32 degrees on the floor. I hooked up the new heater and within a couple hours, the baseboard heater said 50 degrees. It was actually too warm and I had to adjust the thermostats. I found my set-up.

Image 4: Spacers act as bottom boards. By simply placing the boxes on the spacers, they have instant access to the outside. The 2x4 spacers on the wall allow for room for the handles I have on my nuc boxes. I use corks to plug any holes that aren't being used.

I currently have 70 colonies in the bee house. Their sizes range from two to six frames of bees. I don't have a lot of hope for smallest ones, but I am hopeful for most of the colonies in there. Between the warmer ambient temperatures and the insulated tops, they should have an easier time surviving. Similarly, I have close to 200 "production" colonies outside that now have insulated tops and will soon have a supply of dry sugar. Hopefully, these steps make up for any mistakes that I made preparing them for Winter. We will know in the Spring. BC

BEE VET

The Conundrum of Feral Honey Bees

Dr. Tracy Farone

I live out in the middle of the woods, in what most people would think of as the "boonies." I love the gift of nature so much I became a biologist, a veterinarian and a self-proclaimed tree herder. I tend to enjoy "natural" remedies and prefer to use medications very judiciously for myself, my family and my patients. My husband and I built much of the home we live in. I like to forage through the woods, and he hunts. It is all very romantic hunter-gatherer stuff and I love it. Especially when I can come back to a house with running warm water, electricity and sometimes decent internet. Above all, I am a realist. Truth be told, Mother Nature can be a real bitch. Fortunately, we have been given gifts of knowledge to manage the throws of this lovely lady.

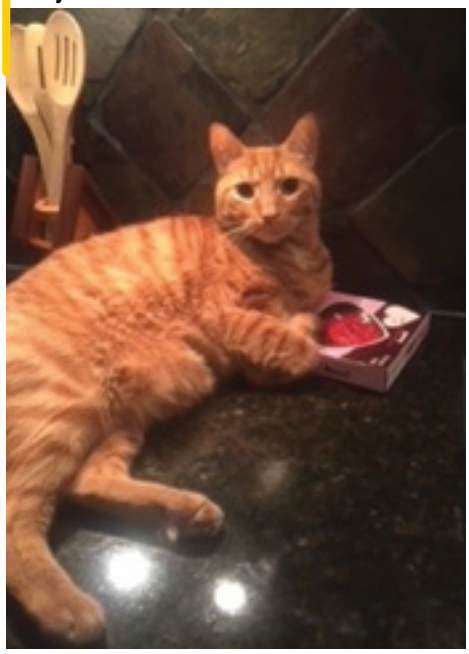
Feral is a word we may use in veterinary medicine to describe various animals, like cats, hogs and dogs. Even horses have gone wild from time to time. Merriam-Webster definitions for "feral" include references to "wild beasts" or "not domesticated", and/or "having escaped from domestication…" something that ***became*** wild. These definitions imply that we are referring to an animal that was intended to be domesticated. True wild animals have never been domesticated or are not described as feral. Origin of the word, "feral" use dates to the early 1600's, which I find interesting since (domesticated) honey bees were being first introduced into the American colonies at that time (1). Agriculture and the domestication of animals dates back at least 10,000 years, **so we have been here a long time.** Honey bee domestication is thought to not be far behind canines and ruminants at about 9,000 years ago (2,3).

"Sylvatic" (meaning woods) is another term we use often in biology and veterinary medicine to describe things (often diseases) that occur, affect or are transmitted by wild animals (4). One of our many goals in veterinary medicine is to keep as much of the "wilds of the woods" (i.e., disease) away from our domestic animals ***and*** human populations as possible.

One benefit domestic animals have enjoyed by teaming up with humans is a great increase in population and diversity. What was once a small population of the African/Middle Eastern wildcat, *Felis sylvestris*, which means "cat of the woods" (and the inspiration for Tweety Bird's Looney Tune friend) became our domestic cat, *Felis catus or domesticus*, one of the most populous animals on Earth (5).

Along with cattle, pigs, sheep, goats, horses, donkeys and dogs, honey bees have also followed this trend. Tens of millions of hives are managed all over the globe with the U.S.'s 2.7 million colonies barely making the top ten of countries reporting colony numbers. India boasts about 12.2 million hives. China and Turkey rank second and third with 9.2 and 8.1 million hives, respectively (6, 7).

Felis domesticus *or Josiah, King of the Jungle in my house.*



Why do our domestic animals do so well compared to feral or actual wild animals? Because we care for them. We feed them. We shelter them. We prevent and treat them for diseases. Admittedly, there have been and are poor management practices that can be a detriment to our animals. I believe evaluating and reevaluating methods from multiple management perspectives to combine best practices is well worth pursuing.

Domestic honey bees naturally swarm; this is when colonies could become feral. It is like my house cat running out the door. If I do not catch them, they will be gone. Unfortunately, in this situation my bees and cat will be subject to a higher risk of disease, injury, shelter and nutritional issues outside of my care.

As a veterinarian, I have recovered many feral animals, mostly cats. They are often infested with parasites, fleas, ticks and intestinal worms. Some have bacterial and viral diseases. Many have injuries, stunted growth and weight, and skin conditions. Cats (and some other feral species) are particularly good at "surviving" in the wild, but I can tell you they do it with suffering. A few targeted treatments, healthy food and a safe place can turn these very sick patients around in a week.

Feral animal populations create threats for both domestic and wild animals and sometimes human populations by acting as "reservoirs" for various diseases. Wild dogs and wild hogs pose a threat as a reservoir of diseases and also a safety threat to other animals and humans. For these reasons in public health, we try to create physical and/or medical boundaries to separate wild and domestic animals. Feral animals often walk this line and may vector diseases from one realm to another. Feral and wild animal reservoirs are one reason we may never be able to eliminate a particular disease from an area. Rabies is a good example of this. Rabies has the highest mortality rate of any virus, nearly 100%. Luckily, rabies is not contagious through air-

These feral bees did not survive the Winter.

borne means and many wild or feral animals that do contract it die quickly before further transmission is possible. In many states, rabies remains endemic in our wild and feral animal populations but limited in domestic animal **and** human populations due to education, avoidance and highly effective vaccines.

Pathological relationship outcomes between various disease agents and animal populations are not at all equal. Outcomes often depend on the type of disease agent, ex. virus vs. parasite, the virulence and mortality rate of a disease, and the overall health of the host. Terms like resistance, adaptation, tolerance, immunity, parasitic relationships, symbiotic relationships, subclinical infections/infestations are all thrown around in the literature. They all have different meanings and applications; they are not the same (perhaps fodder for another article).

For example, domestic grazing animals are still exposed to an environment contaminated with intestinal parasites, (yes, the dirt is loaded with a wide variety of parasite eggs and larvae that animals and humans can ingest). Parasites do not typically want to kill their host. Since eliminating them in the environment is an impossibility, we satisfy this threat by strategic deworming programs in cattle, horses, sheep, etc. We know that all these animals will have some parasites, but we control parasitic levels with periodic medications to a level that does not cause clinical disease in our animals. The same is true for flea treatments we use on dogs and cats. We know that our animals will be exposed, so we treat and hopefully prevent these parasites from infesting our pets. In neither of these scenarios, have we considered breeding flea or intestinal parasite resistant animals.

Breeding for certain traits (color, size, speed, strength, temperature adaptation, etc.) are possible in animals over several generations. But parasitic relationships can be some of the most complicated processes in nature. Some parasite lifecycles involve multiple hosts' interactions and years to complete their lifecycle! Evolutionary time needed for resistance or tolerance to develop in a host-parasite relationship takes hundreds of thousands to millions of years.

Why is *Varroa destructor* so bad in *Apis mellifera*? Because in this bee species, ***Varroa destructor* is like fleas combined with rabies.** A pervasive parasite with a nearly 100% mortality rate (without prevention and treatment). Incredible!

At the 2019 Apimondia in Montreal, I went to see a lecture by Tom Seely. Perhaps you have heard of him. He is a beloved man that about every beekeeper wishes would be their grandpa. He writes and tells of wonderful stories and experiments involving honey bees in a Winnie the Pooh like woods in upstate New York. He advocates for Darwinian beekeeping, with a plethora of insightful management techniques but one caveat involves killing any colony with high *Varroa* mite counts with no treatment for *Varroa*. The idea is that beekeepers would select for colonies that are resistant to *Varroa* mites without treatments and therefore self-control mites in their area. What Seely also says at the beginning of his talk (I was there) is that this method would not be practical or effective for commercial beekeepers or urban/suburban beekeepers.

So, let us do the math. To use some recent (2021) USDA estimates, there are about 2.7 million honey bee colonies in the U.S., of which 2.2 million are owned by commercial beekeepers (6). That leaves only 0.5 million, a small 18.5% of the total. How many of these colonies do not encounter other bees? Hmmm… Well that is hard-to-find exact data on, but we know all urban and suburban beekeepers would be out, and any "rural" beekeepers that live within a two to three mile radius of other beekeepers **or** any possible known or **unknown** feral hives should also be out. Who would be left in this ideal scenario?

As a biologist, I have a lot of respect for Darwin and his theories. (He is really an interesting guy and not really what many have made him out to be… also a topic for another time.) But going "full Darwin" without the benefit of modern medicine and technologies, I would not be writing this article because I would be dead. I would have died of pneumonia in early childhood, and if not then, from a dozen other ailments since. Most of you would not be reading this for similar reasons. Life expectancy in the U.S. in just 1900 was 48 years for women and 46 years for men (8). Again, if I were living back in the "good ole days"… on average, my time would be up. Look at Africa for another example. Human life expectancies in many "developing" African countries have been in the 40's well into the 2000's but recent increases to life expectancies in the 60's are largely due to increased access to medical health services (9).

Australia is now targeting, baiting and poisoning **feral** bees due to *Varroa* mite infestation in their efforts to eliminate the disease from the island continent (10). Whether you agree or disagree with this approach, their reasoning is because feral colonies can act as a reservoir to spread the disease with no practical way to test, control, treat or eliminate the parasite from these colonies.

Yes, we did this, we created a huge agricultural landscape on Earth to support eight billion and counting human souls. Domesticated, managed honey bees are not

A bee tree

Swarm catching

Honey bees attempting to go feral

going anywhere. They are vital to the preservation of public health as honey bees are needed in the creation of much of the food we and our animals require to survive. This has been a great accomplishment but not without negative sequelae. Loss of habitat for wild animals and plants and globalization of trade leading to a globalization of diseases exposing naïve populations to originally isolated diseases are our main challenges. We work hard to prevent and remedy as many of these negative sequelae as possible.

Questions we should all ask ourselves is: Have we increased the quality and quantity of life for us and our animals and how can we improve our current stewardship? But going back 10,000 years to hunter gatherer days and actual wild honey bees is not a realistic possibility or a solution to any modern challenge. BC

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The Elusive *Varroa* Resistant European Honey Bee

Listen along here!

Varroa destructor has been parasitizing honey bees throughout the United States for over 35 years and to date, efforts to breed permanent mite resistance into the honey bee have largely failed. The incredibly robust nature of the honey bees mating process helps ensure wide genetic diversity, a diversity that enables the honey bee to survive on six of the seven continents of the globe across the vast majority of latitudinal parallels. So far, the mating process of the European honey bee has precluded the ability for beekeepers to be successful in their attempts to raise, disseminate and maintain a truly mite resistant bee.

An abundance of suitors

Honey bees mate in places where the drones from colonies in the surrounding area congregate and wait for virgin queens to fly by. Mating takes place on the wing approximately 20-80 feet (six to 24 meters) up in the air, and it is the fittest and fastest drones that get to pass on their genes to future generations. Studies suggest that these drone congregation areas (DCA) stay consistent decade after decade unless a building is erected on the site.

DCAs attract male bees from quite a wide area. Researchers in Denmark and the United Kingdom found that while 50% of bees studied mated within about 1.5 miles (2.5 km) of their hive, a full 90% of the bees were observed to mate within a distance of 4.5 miles (7.5 km) (Jensen et. al., 2005). While the maximum distance the European researchers observed matings to occur was 9.3 miles (15 km), other studies have documented matings covering distances between 10.1 and 12.4 miles (16.25-20 km) (Peer, 2012; Szabo, 1986). As a rule, drones tend to seek DCAs near their hives, while queens will seek DCAs farther away. This behavior helps to reduce instances of inbreeding between brothers and sisters.

Queens typically mate within six to 10 days after emergence and on average, most queens will mate with somewhere around 15-20 drones over the course of one or two days (Koeniger et. al., 2014). Drones become sexually mature when they are around 12 days old. Mating flights of the queen and drones is highly dependent upon the weather conditions. Leaving the safety of the hive to participate in the mating process is a dangerous time for both drones and queens. Their relatively large size and slow flight speed make them vulnerable targets for a host of predators from birds to dragonflies.

Males designed for the job

While workers are extremely attentive to the queen within the hive, drones and queens pay little-to-no attention to each other inside the hive. Outside the hive however, the drone's keen sensory organs allow them to identify queen bees easily. It is believed that the primary drone attractant that a queen exudes is a mating pheromone known as 9-oxo-2-decenoic acid (9 ODA) (No the x's and o's don't represent hugs and kisses). Male bees are endowed with many more scent receptors on their antennae than workers or queens, and are reportedly able to smell very small quantities of 9 ODA, and detect this queen substance from up to 200 feet (60 m) away (Caron and Connor, 2013).

The drone is also equipped with large compound eyes that contain many more tiny lenses (facets) than the worker and queen. This allows the male bees to easily spot the queen after they have used her scent to navigate near the queen's vicinity.

Typically, healthy colonies will produce the most drones, and colonies in the process of replacing their queen will tend to exhibit higher drone production than usual. In an apparent last desperate attempt to pass on their genetic heritage, the workers in queen-less colonies will start laying unfertile eggs and raising numerous drones in the hope that some of their sons may successfully mate with a virgin queen.

The challenge of maintaining genetic traits

As described previously, the honey bees mating process makes it extremely difficult to maintain genetic purity without isolating the queens from the drones of colonies that do not carry the preferred genetic traits. This is why reports of truly mite resistant honey bees primarily come from colonies that have been kept in isolated locations such as on islands. Some queen breeders will flood areas with drones from selected colonies in an effort to overcome the likelihood that their selected stock will mate with local unselected bees. While this often works well for queen breeders, the average beekeeper that purchases these queens typically does not work to maintain the genetic purity of the bee strain, and the beneficial aspects that have been bred into the honey bee tends to get lost quickly through

What will it take to permanently establish a truly mite tolerant honey bee in the general managed honey bee population?

inter-breeding and hybridization of subsequent generations of queens.

This cycle of breeders working hard to improve their stocks and the loss of many, if not most, of the beneficial traits bred into the bees once they are in the general beekeeping community's care will continue unless beekeepers make serious changes. Beekeepers would have to work to limit the opportunity for hybridization by either isolating their bees, or working to replace all the bees in an area with selected stock. Even then, there is always the significant likelihood that feral colonies in the area will inter-breed with managed colonies and dilute the gene pool with non-selected traits. The difficulty in maintaining specific genetic traits appears to be the reason why after more than three decades, the beekeeping industry is still not able to take full advantage of the mite tolerant and resistant strains of bees that bee breeders have had some measure of success raising to date.

The Africanized solution

I have come to believe a possible solution to this apparently insolvable problem is the Africanized honey bee (AHB). The AHB is a hard working bee with superior competitive foraging behavior and exhibits resistance to mites and many diseases. This bee also has unique mating characteristics that suggest that they may provide the answer to the hybridization challenges that the beekeeping industry faces in its efforts to breed and maintain specific genetic characteristics in the general managed honey bee population.

South America's experience with direct competition between the European honey bee (EHB) and African bees resulted in the quick elimination of EHB in the tropics. Although a low level of hybridization has occurred, Africanized genetic traits predominate in the South American honey bee population (Schneider et. al., 2004) making them a challenge to work with due to their highly developed defensive behavior. Several factors are suggested to help explain the domination of AHBs over EHBs when it comes to mating.

Overwhelming numbers

Africanized bees have an extremely high swarming rate, with colonies being documented to swarm an average of three to four times a year and as much as every 50 days (Michener, 1975; Taylor, 1977; Winston, 1979). This means that under normal circumstances, new AHB queens are produced at a much faster rate than EHB queens. AHB queens also reach sexual maturity faster giving them a biological edge over EHB queens born at the same time. Even in colonies headed by an EHB queen that has mated with both EHB and Africanized drones, faster development of queens with Africanized genetics favor AHB queens. Virgin Africanized queens tend to emerge earlier, pipe more frequently and kill more rival queens than those with EHB genetics (DeGrandi-Hoffman et. al., 1998; Hepburn and Radloff, 1998; Schneider and DeGrandi-Hoffman, 2003; Schneider et al., 2004).

On the other side of the mating equation, AHB drones out compete their EHB counterparts when it comes to the mating process. First, Africanized bees raise proportionally more drones than EHB colonies. They also raise drones earlier in their population buildup cycle, and they have more drones present in their colonies throughout a greater portion of the season (Rinderer et al., 1987). This results in more drones being present in Africanized hives than in European hives. Since AHB drones use the same DCAs that EHBs do, they simply outnumber them and the odds that a virgin queen will mate with an AHB drone rather than an EHB drone increase dramatically.

Parasitism

AHB drones are known to regularly drift into EHB colonies where they are readily accepted in a behavior that is called drone parasitism, but the opposite is not true (Rinderer et al., 1987). Africanized bees rarely allow drones of other races, or of mixed race to enter their hives. Africanized colonies then raise more drones to replace those lost to drifting, while EHB colonies raise fewer drones due to the influx of AHB drones. This significantly decreases EHB drones in an area essentially flooding the area with AHB drones.

Africanized swarms are also known to take over EHB colonies through usurpation (queen parasitism). Swarming AHBs will land near the entrance of an EHB colony and the AHB workers will gradually make their way into the colony, kill off the EHB queen and replace her with their AHB queen. The opposite, usurpation of AHB colonies by EHB colonies is not known to occur.

Unique behaviors

Several special behaviors of the Africanized bee endow it with additional advantages over the European honey bee when it comes to species survival. African bees are more widely

The genetic make-up of a honey bee colony changes whenever a colony swarms and replaces their old queen with a new one. This is the primary reason efforts to breed resistant bees, or just let bees naturally evolve to become resistant to mites, have failed so far.

Working with traditional breeding techniques to try to produce and maintain queens with specific genetic traits has proven elusive, but perhaps nature can succeed where beekeepers and scientists have mostly failed.

adapted to utilize a diversity of cavities for nesting and can successfully nest outside if nesting cavities are sparse. AHBs are known to migrate readily and abscond, abandoning sites with few resources or heavy predator activity in preference of more favorable locations. Africanized bee swarms also combine with each other more readily than EHB swarms, providing a greater chance of swarm survival.

The AHBs biological advantages, ability to parasitize EHB colonies and unique behaviors all appear to contribute to the success of the AHB in displacing the EHB in both tropical and subtropical environments. Under the open mating conditions prevalent through most of the world, the mating characteristics of the AHB suggest that it could succeed in anchoring mite resistant traits into managed bee populations where efforts to do so working with European honey bees alone have largely failed. The key to this approach would be in finding an Africanized bee that is gentle to work with but has retained the majority of its mating characteristics so that eventually most, if not all managed bees would carry the beneficial Africanized genetic traits of resistance to mites and disease.BC

Ross Conrad is coauthor of the *Land of Milk and Honey: A history of beekeeping in Vermont.*

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Master Beekeeper Program Adds Ground-breaking Spanish-Language Track as it Celebrates 10th Year

Kym Pokorny,
Oregon State University Extension Service

Elva Webster draws honey from a hive during a Spanish-language Master Beekeeping class. Credit: Carolyn Breece

Two years ago, Elva Webster knew nothing about bees. Now she's on her way to tending her own hives as she progresses through a ground-breaking Spanish-language version of a Master Beekeepers program.

The Oregon State University Extension Service's **Master Beekeeper Program (https://extension.oregonstate.edu/mb)**, which celebrates its 10th anniversary this year, added the **Spanish track (https://extension.oregonstate.edu/mb/omb-en-espanol)** in 2020. It offers the same classes, which teach science-based beekeeping techniques to participants who start out at the apprentice level with a mentor, work through a journey level and progress to the prestigious level of Master Beekeeper.

Carolyn Breece, faculty research assistant and coordinator of the Spanish-language version of Master Beekeepers, said it's the first program of its kind in the United States. The need for such a program became clear during an OSU beekeeping workshop for commercial beekeepers and crews. As the day went on, she noticed Latino crew members bunched together talking in their first language.

"When trying to translate information in your head to a different language it's a lot more work," Breece said. "The benefit of having the class in their native language is that they can relax and talk to each other. It's a much better experience and the response has been really positive. Participants are engaged. They are very happy to be there learning about bees."

Participants join for multiple reasons – to join a crew, make their own honey or just for the fascination of bees. But there was no formal training for Spanish-speakers interested in beekeeping. That's why Breece stepped in, aided by a team of colleagues and supported by Jen Larsen, who coordinates Oregon's Master Beekeepers.

"One of the areas in which the Master Beekeeper program shines is our mission to provide an in-depth, beginner-level educational experience to beekeepers all around our region," Larsen said. "Now, with our ability to transmit this information to Spanish-speaking beekeepers, we have filled a gap in our reach that was badly needed. I am so excited to see where this goes, and how we can grow the number of offerings we can provide in Spanish."

Hives in mind

Webster, who has worked through the first level, is the garden and community engagement coordinator at Huerto de la Familia. The Family Garden, a Lane County non-profit that provides opportunities and training in organic agriculture and business creation to Spanish-speaking families.

She helps manage the organization's six community gardens and looks forward to the time she will be managing the volunteer-tended hives. Webster will be passing on the knowledge she learns to gardeners who long for space and gardening education so they can grow the food they ate in their home countries.

"A lot of our Spanish-speaking people are from different countries," said Webster, who is from Morelia,

Michoacan, Mexico. "Some are from Guatemala, El Salvador or Mexico, from small communities and love to grow their own vegetables. They eat different foods and need information in the language they are most familiar with."

Webster and 13 others took part in three hands-on workshops in the apiary at the OSU Honey Bee Lab. The first of three workshops needed to complete the course was held on a gorgeous day in May, Breece said. Participants suited up to learn the basics of Spring beekeeping – how to spot a queen, how to handle a frame and how to inspect for health and well-being.

The ins and outs of Summer management and honey production, a favorite of the class, came second while overwintering colonies and honey bee diseases rounded out the program. Next up is the journey level where participants are expected to do community service like teaching a class and complete independent learning assignments. Moving up to Master Beekeeper takes a lot of initiative. Participants must review a research paper and give a presentation.

It's a rigorous program. Out of 2,319 students enrolled since 2012, only seven have reached Certified Master Level Student.

Breece plans to continue the Spanish-language training in 2023 with the addition of a commercial beekeeper workshop in Spanish. The training is supported by a grant from the U.S. Department of Agriculture's Specialty Crop Block Grant Program.

Ramesh Sagili, professor of apiculture and honey bee Extension specialist in the College of Agricultural Sciences, said that Spanish-speaking clientele interested in beekeeping has steadily increased and the Latino workforce is playing a vital role in the success of commercial beekeeping operations.

"Until now there had been no formal training programs to meet the needs of this critical group," Sagili said. "With our new Spanish version of Oregon Master Beekeeper program, we envision meeting this growing demand with the goal of promoting honey bee health and fostering inclusivity and diversity in the beekeeping community and industry."

'Amazing opportunity'

Webster is thrilled to be learning about beekeeping. At one of Huerto de la Familia's community gardens, a participant donated three beehives. Webster, who grows her own vegetables and helps other gardeners, became enamored and wanted to help maintain the hive. Someday she'd like to have her own colony.

"The bee class is an amazing opportunity," said Webster, who has two degrees in fashion design but decided she was done sitting in an office. "I'm just so happy out there. I learn new things all the time. The more I go to class and learn about them, it's just fascinating."

Webster said the program has opened her eyes to the importance of bees. If there aren't bees, there aren't humans, she said.

"If they die, we die," Webster said. "If they can't pollinate, we don't harvest anything. More important, this has opened my mind and eyes to change the way I plant things in my garden. Now I'm motivated to choose plants that are good for bees, butterflies and hummingbirds." BC

Trainees in the Spanish-language OSU Extension Master Beekeeper track open a beehive. Credit: Carolyn Breece

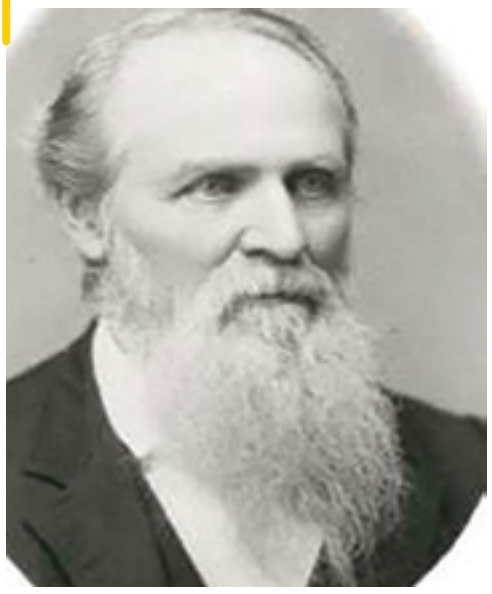
Bees and Women
Lodemia Charlotte Bennett

Nina Bagley

Lodemia (Dema) Charlotte Bennett was born in 1845 in Clairidon, Geauga County, Ohio.

Her mother, Charlotte Parantha Humphrey Bennett, died November 23, 1857 – she was thirty-seven years old, leaving Lodemia at only twelve years of age. She had an older brother, Rollen, who was fourteen, another brother Elmer, who was thirteen, and a younger sister, Emma, who was seven years old. Her father, Daniel Bennett, born in New York in 1818, kept and cared for the children the best he could, but when the Civil War started, he had to go to war and could no longer care for them. It was not uncommon for mothers to die young, leaving the husband to care for the children, nor was it unusual for the father to send them away because he couldn't afford to care for them. Most men were farmers, and Daniel was listed as a carpenter. Men did not seem to be cut out for this sort of work directed for the women to feed, clothe and school the children. When the Civil War called for all men to enlist, life became even more challenging for Lodemia and her siblings. They were sent to live with friends and relatives. Lodemia's father placed an ad in the Clairidon Newspaper: "Wanted – a place for some respectable family for my daughter, eight years old until she shall become of age. Or, if preferred, I will reward any such family for keeping her for one year only Clairidon, November 23, 1860." All the children attended school and could read and write.

J. B. Hains



Daniel served in the Civil War from 1862 to 1865. He was wounded in the left thigh in the battle near Lost Mountain. He was listed as a prisoner in the Cuyahoga County Jail around 1875 (not sure why he was there), and then remarried a woman named Anna. In the Census of 1880, Daniel's listed as living in a Veterans home in Dayton, Ohio. In 1860, Lodemia was listed as living with a relative, Caroline W. Collins Eames. She was forty-six, and Lodemia was fourteen years old. Caroline's children had passed away in 1847, and her husband, Marshal Hosmer Eames, had passed away in 1848. He was thirty-six. Her cousin's two children, a brother and sister with the last name of Taylor, were about the same age as Lodemia. Caroline also had her elderly father living in the home. Caroline is listed as "keeping house." A lady that managed a home with an elderly parent and three children without the help of servants would need to be fit and energetic and expect a lot of assistance from the children! The children are listed as attending school.

Lodemia spent the next seven years living with Caroline. Interestingly, Lodemia moved to Michigan at some point. Her younger sister Emma was married and living in Michigan. This is probably one reason why she left Ohio. I don't know the connection between how she met and married Andrew Shults (Shultz) in Tuscola, Michigan. Andrew was married before to Lucia Sweat, who shortly died after they were married in 1867. He then married Lodemia in 1868. Andrew was sixty years old, beaten up from life and the war. Lodemia was young – only twenty-two. The marriage didn't last as Lodemia divorced Andrew and lived with Henry Pentingill's family in 1870. Henry had a wife and three kids. Lodemia is listed as a domestic servant. Her ex-husband Andrew died in 1872 in Tuscola, Michigan. After his death, she returned to using the name Miss Lodemia Bennett, and it appears she moved back to Ohio and lived with her cousin Harriet Bennett.

Harriet Bennett (Hattie) was born in 1837 and was twelve years older than Lodemia. Hattie married Joseph B. Hains in 1871 when she was 34 years old. They had a daughter who died at birth. He was married before and had a son Edson J. Hains. Joseph was born and lived in the house his father built. It was a 120-year-old home in which five generations had lived all or part of their lives. His father, Nathaniel Hains, was the first Methodist preacher in Ohio. He built the house at 602 Broadway Bedford in Cuyahoga, Ohio. His son Joseph B. Hains occupied the place after the Civil War, where Hattie and her cousin Lodemia learned beekeeping working together as apiarists. And this is how Lodemia's introduction to beekeeping started.

Joseph described his apiary as follows: "Welcome Apiary is located in the village of Bedford, Cuyahoga Co, Ohio, on the Cleveland and Pittsburg and Cleveland and Canton Railroads, both of which run through it, dividing it about equally. It may have been said to be established on July 4, 1844, when a fugitive swarm of bees clustered on a tree where the house apiary now stands. Being eleven years of age, I assisted in hiving and caring for them. From then, they received box hive attention – sometimes

numbering a score or more, at others only two or three colonies, but never becoming entirely extinct. In the Spring of 1870, there being but three stocks, I transferred and Italianized them and commenced beekeeping on modern principles." (April 1886 issue of *Gleanings*, pages 294-295.)

Joseph continued to tell his story about his apiary locations, overwintering and beekeeping supplies. He then credits the women for their accomplishments in beekeeping. "Although this article is too long, I wish to refer to one feature in our apiary. It is primarily done by women who demonstrate that women can adapt themselves to the business and become successful apiarists—Mrs. Hains and her cousin Miss Bennett, by the way, is a treasurer and secretary for the Progressive Beekeepers Association in Cuyahoga, Ohio. Both women have control of the Queen nursery and other work departments." (April 1886 issue of *Gleanings*, pages 294-295.)

The two cousins removed the small and medium queen cells because they believed only the perfect cells deserved the title of royalty. Some beekeepers found this wasteful. In *Gleanings in Bee Culture*, A. I. Root described Lodemia as "Skillful queen breeder for the A. I. Root Co. and for Mr. Hains as a sample of what she could or did do, she once grafted forty-eight Doolittle cell cups on the frame. They were all accepted without a miss, and everyone hatched a queen. This breaks the record, as far as I know. She was also a successful honey producer who occupied a prominent position in our State Beekeeper Association meetings. She was twice elected secretary for the Ohio State Beekeepers Association and was secretary of the old defunct organization at the time of her death."

Lodemia's writings can be found in the *American Bee Journal* and *Gleanings in Bee Culture* from 1886-1893. She shortened her name to Dema Bennett instead of Lodemia Bennett.

She was secretary and treasurer twice for the Ohio State Beekeepers Association during this period. She would call to order the readings of the minutes for the meetings. Dema Bennett wrote about the Ohio State Beekeepers Association annual conventions and where they were held in Ohio. For many years she recorded the Ohio State Beekeepers Association's meetings. She worked on the constitution and was elected to organize the Ohio State Fair honey displays.

The North American Beekeepers Association met on October 2, 1888 at the Statehouse in Columbus, Ohio. Dema Bennett was voted in as a life member. Thirteen ladies were life members, and the organization had thirty-six male members. Lodemia died in 1903 at age fifty-six. She never remarried or had children. She devoted her time to bees and beekeeping organizations. She was a religious woman who was part of the temperance movement. Lodemia's journey worked out pretty well, considering her hardships. Lodemia is buried in the Bedford, Ohio Cemetery. Her name is listed on the same headstone as Joseph B. Hains 1904, Hattie Hains 1914, and Lodemia Bennett 1903. Lodemia made a mark on bee culture and proved to men and women that women could be good business partners and excellent beekeepers!

Nina Bagley
Ohio Queen Bee
Columbus, Ohio

Welcome Apiary

Lodemia's Home, Hains Home

Me in my farmers market tent – photo by Tom Holtey

Finding a Local Beekeeper

Athena Contus

Actually, they found me. I came to New Hampshire from Hawaii in 2000 for what turned out to be 22 years of living in the woods… bears and deer and such… and fisher cats (something I did not previously know existed). In 2005 through 2007, while working for local farmers in Tamworth and Sandwich, it was necessary to commute to the other side of the country on a monthly basis to my mother during her final times at our family home in California.

On one work day at a farmhouse in Tamworth, I found myself observing a newly arrived delivery in the foyer of many packages of bees. I didn't think I ever knew a beekeeper before. The idea was presented to teach me beekeeping. This was on the cusp of my mom passing in the Summer of 2007 and while I decided if beekeeping was something I was destined to do, all nine of mom's children sat on our old childhood campfire chairs in the driveway of our South Bay, Los Angeles family home trying to decide what to keep or throw out of the overstuffed garage she left behind before the new owners of the house came to take possession.

There in a box my mom had cradled next to her bed that included childhood treasures from all of us, was a children's book on beekeeping I never returned after borrowing from Edison Elementary in 5th grade. I was too embarrassed. It was worn to a frazil.

I took it as a sign.

My farmer mentor would drop everything to come out to help me in my early months of beekeeping. There were no local clubs to help. My first swarm was an embarrassment and I was riddled with a feeling of betrayal. My bees left me! I could not talk to anyone about it for weeks… except my farmer. He suggested I find Beekeeper Wendy to learn more. She was known to speak at garden clubs in the area about honey bees.

Beekeeper Wendy, from Lee, New Hampshire, like her name, was a force of nature, holding all day workshops two hours south of me that eventually trained the future of New Hampshire beekeeping club leadership. I met local equipment supplier Beekeeper Ben through her, an apiarist from the age of 12 in the 1950s, and continue to learn from his decades of experience when he routinely shows up for our now established local club meetings.

When I finally felt I could take some honey from my bees, another neighboring farmer offered his barn and spinner, teaching me about the value of a warm space for honey harvesting. It was the first time I used an extractor or a hot knife, learned the importance of closing windows near a bee yard or felt the weight of a super of honey climbing barn stairs to the loft. It smelled of hay and sweet beehive supers and brought back memories of my grandfather's farm in Colorado we'd visit as kids.

Soon, as word got out in our rural community that Athena was keeping bees, a call came out of the blue from another resident about five miles or so down the road to town. Ingrid, a registered nurse-beekeeper-educator extraordinaire asked me if I would be interested traveling to a workshop in Vermont held by an author of a new popular book. I had one book on beekeeping from the '80s gifted to me for Christmas by New England's Richard Bonney called *Hive Management*. My apiary sun rose and set on his words. This was before Google or YouTube was mainstream, or paying any attention at all to beekeepers and Amazon was still rivaled by brick & mortar Dalton and Barnes & Nobel bookstores. I came home one day to find Ingrid had dropped off *Natural Beekeeping* by Ross Conrad onto our porch.

I asked her on the phone that night, "Isn't that how all beekeeping is done? Naturally? Seems an oxymoron." We called the number in Vermont from the book and the author himself picked up the phone. The workshop was three hours away. We booked a B&B offering an amazing breakfast and enjoyed night life in the college town of Middlebury, Vermont that weekend eating and eavesdropping in on the young and vibrant student population. I had a glass of red wine at an Indian restaurant with amazing food we found down an interesting dark alley. At the next table was a professor, complete with corduroy suit jacket bearing patches on its elbows, surrounded by his adoring students. During the day, we traveled out of the main to a farm and learned from Ross. We joked a lot in the back of the classroom and agreed to hit the road home early. It was the first time I realized I had already learned a little something more than beginner's class.

On the drive home Ingrid talked about different kinds of honey bees she wanted to try out that I'd never heard of before and some equipment she wanted to experiment with like

screened bottom boards and slatted racks… two very valuable tools I use to this day. We got together a few times to go through her hives in some open acres across from her house. She always brought an epipen and I learned even a nurse might not take chances.

Then Ingrid's friend Maura, another educator and beekeeper just around our country corner, called and asked me to accompany her out to her hives. It was a glorious day on a field of wildflowers in Wonalancet, NH, surrounded by the Sandwich Mountain Range. A storm was blowing in over the hills. Not a sound otherwise and the silence telling us there was not a vehicle or other people in sight.

That image of two beekeepers in the gloaming of the day on that field moving to secure beehives against the coming storm would prove as my peaceful, quiet place during times of needing such a thought refuge. She introduced me to yet another event featuring the rock stars of beekeeping on an overnight adventure to Boston.

I never felt like I was much help to Ingrid or Maura in those early experiences but I learned things about bees and beekeeping no one could have told me or written in a book. As soon as I thought I might actually know what I was doing as a beekeeper, I paid these generous mentoring experiences forward.

My most pivotal moment as a beekeeper came with the request of a retired gardener in a small cabin at the end of my road who'd been asked to take care of a neighbor's fallow field. She invited me to build a bee yard that would prove to host the most educational apiary of my experience.

All these years later, I now help organize bee schools in well-established clubs, sell my honey and hive products in a tent at the local farmers market side by side with those farmers I learned from, while seasoned beekeepers stop by with their most interesting stories and beginners ask for advice. I've traveled with other friends from the Minoan Ruins on Crete to Apimondia in Istanbul and humble farms in Virginia to learn from other "rock stars" of beekeeping.

Beekeeper Wendy is retired from decades of faithfully educating the apiarist of the future; and Ben has passed his work on to the up and coming generation. Maura stops by to say hi during the market now and then, and Ingrid came by last Summer to say goodbye. She passed this past Autumn from ALS at far too young an age for someone of her vibrancies and skills. She came to visit our humble farmers market with all her small town friends to express gratitude for their help with a life well lived in a community that then embraced her along that painful journey.

I often reflect on the professional beekeepers I've learned from over my 15 years… a mere drop in the bucket of years compared to those that have helped me on my way; but maybe forget sometimes the local farmers and beekeepers who set me on my current path, sharing their values and common sense in managing our very ancient and amazing honey bees. I never imagined being an educator or farmers' market vendor or having anything to offer the future of beekeeping; but sometimes it just takes stopping by to help with an inspection, dropping off a book, lending out the attic of a warm barn, asking for help on a quiet field during a coming storm, signing up to speak to the 5th grade class you stole a book from at your old elementary school or offering a workshop to share what you think you know to help others on their way. I didn't think I ever met a beekeeper before that day in that farmhouse foyer but it turns out I was surrounded by this generous culture of folks all along that has now become my world.
- In memory of Ingrid Albee BC

About the author:

Athena Contus has been keeping bees in the Sandwich Mountain Range of New Hampshire since 2008. She currently serves on the board of the Winnipesaukee Beekeepers Association and as a teacher of Apiary Management through the Carroll County New Hampshire Adult Education Program. She received her Master Beekeepers Certification through the University of Montana.

Athena Contus (left & author) with biodynamic road trip buddy Kelly Goodson of Rivendell Farm – photo by Tom Holtey

Ben Chadwick, former NH State Apiary Inspector – photo by Jeff McCormack

PHEROMONES

Ed Erwin

Communication without Sound

Beekeepers know that pheromones are the key to controlling all activities of the bees in the beehive. In 1959, the word pheromone was suggested in an article in *Nature* by two German scientists. The word pheromones comes from two Greek words: homan, to carry, and pherin, to excite.

Pheromones of the honey bee are a variety of chemical substance mixtures in varying percentages produced by the individual bee. The array of chemical compounds are released by 15 different glands located in different parts of the body. Each chemical pheromone is different and when excreted or secreted, they trigger responses from other bees.

These discharges are either a releaser pheromone, which have a short term effect with almost immediate behavioral response from the receiving bee, or a primer pheromone with long term effects which change the physiology and behavior of the recipient.

Pheromones are initially produced in a liquid form and transmitted to the other bees in the liquid form or as a vapor. Depending on the pheromone, they are either produced as volatile (evaporates easily at normal temperatures) or non-volatile (does not readily evaporate). The chemical messages are received principally on the bee's 170 odor receptors (chemoreceptors) located on the antenna and other body parts, such as the feet.

The honey bee pheromone communication is one of the most complex and effective among insects. The worker honey bee is known to transmit over eight pheromones, which include: Alarm, Brood recognition, Drone, Dufour's gland, Egg marking, Footprint, Forager, Nasonov and a few others. The queen honey bee produces a few of her own pheromones which include the Queen mandibular and Queen retinue.

Pheromones are the key factor in the way the queen, workers and drones communicate and coordinate the complex activities within the hive. They are important to all types of activities including foraging for resources, wax foundation construction, defending the hive, new queen development and swarming. Here are some of the key pheromones.

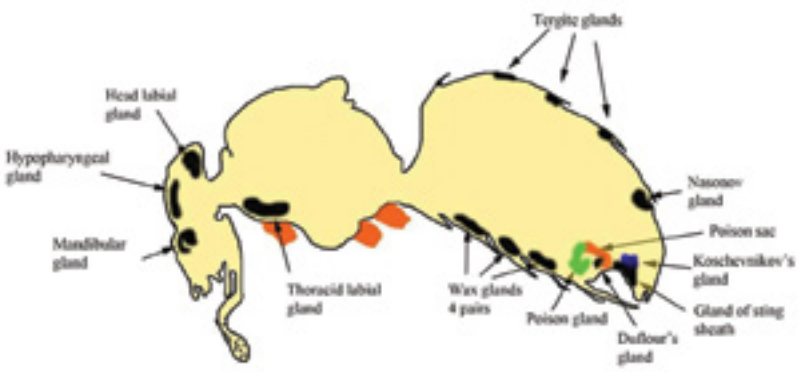
Alarm pheromone

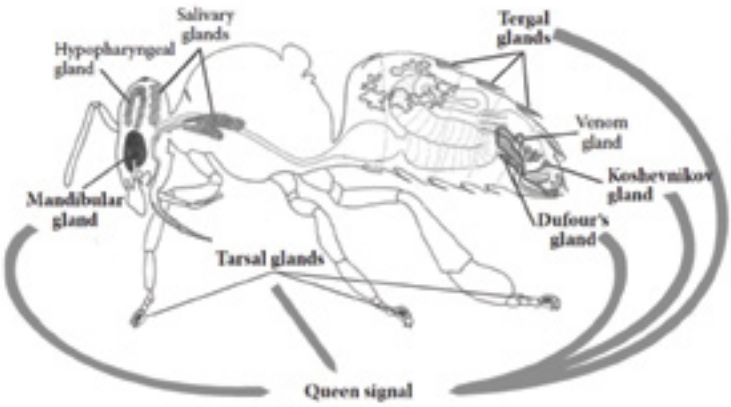
When a honey bee stings another animal, it releases a chemical known as isopentyl acetate or alarm pheromones, which signals other bees to become defensive and attack the sting location. Two main alarm pheromones have been identified in honey bee workers.

The Koschevnikov gland is located near the sting shaft. It releases an alarm pheromone when a bee stings. This pheromone is made up of over forty highly volatile chemical compounds. When released, this pheromone attracts other bees to the sting location and all the bees begin defending the colony. The isopentyl acetate in the alarm pheromone smells like bananas.

The other alarm pheromone is released by the mandibular glands located on the head and can be a highly volatile substance. When honey bees are in their foraging stage (older worker honey bees) the mandibular glands produce an alarm pheromone. When the worker bees are younger and performing nursing tasks they produce a nutritional secretion called royal jelly from the mandibular gland, which along with pollen and honey is fed to larvae. If a larvae is fed only royal jelly the larvae will develop into a queen.

Smoke can mask the bees' alarm pheromone. Most beekeepers know that the smoke works on bees by impeding their sense of smell and triggers their not being able to detect the alarm pheromone, their survival response. Second, most literature on the subject suggests that the smoke incites the bees to gorge themselves with honey in preparation of leaving the hive due to fire. However, Dr. Norman Gary, emeritus professor of entomology at the University of California, Davis, who has kept bees for more than seven decades and smoked thousands of hives during his career writes, "Bees react to smoke by fanning, motion, flight and immediately ingesting nectar and honey, and the smoke disrupts their defensive behavior." In his observations, there was never any indication that bees left the hive area in response to smoke. Additionally, "migration of the colony away from the fire and smoke would be impossible because the queen is full of eggs and much too heavy to fly. Consequently, a colony that migrated from a fire could not survive without their queen."





Brood Recognition Pheromone

When the bee colony is raising larvae and pupae, they emit a brood recognition pheromone from their larval salivary glands. This pheromone acts both as a primer and releaser. Brood cannot survive without the constant care and feeding of nurse bees. This pheromone also helps nurse bees differentiate between female worker bee and drone larvae and pupae development. When it is time for the developing pupae to develop a cocoon the silk for the cocoon is produced from the salivary glands. This pheromone also hinders worker bees ovarian development and prevents worker bees from bearing offspring.

Drone pheromone

In the Spring, the queen begins the production of drone (male) bees from unfertilized eggs whose purpose is to mate with virgin queens from other hives. Drone bees produce and emit a pheromone from their mandibular gland to attract other drones to the drone congregation area (DCA) to mate with virgin queens. It is also believed that the virgin queens follow this pheromone scent when locating the drone congregation area. The drones are generally concentrated in area between 100 to 770 feet in diameter and 50 to 130 feet above the ground.

Egg Marking and Dufour's pheromone

The queen produces the egg marking pheromone that has several chemical compounds unique to the queen. Because both the queen and workers can lay eggs these compounds allow workers to differentiate between eggs not deposited by the queen and they will destroy the eggs without the marking pheromone. It is believed that the egg marking pheromone is associated with the Dufour's gland. The Dufour's gland opens into the dorsal vaginal wall and is named after the French naturalist Léon Marie Dufour. This pheromone is composed of 24 different alkaline chemicals and lets the workers know when the colony is "queenright" or if the colony is queenless.

Tarsal Pheromone

Also known as the footprint pheromone and trail pheromone, the tarsal pheromone is an oily, colorless, chemical secretion, with a low volatility. It is deposited by queens, workers and drones as they walk on surfaces. The pheromone glands are located on the fifth tarsomere of all six legs. Queens secrete 12 compounds, workers secrete 11 and drones one. This attractive order affects the behavior of other workers, particularly in locating the hive entrance, nectar and other food sources. When bees are standing at the entrance of the hive with their abdomens raised and fanning their wings, they are helping returning foraging bees in orientation and location of the hive. As the queen walks on the comb, she deposits her tarsal pheromone, which inhibits queen cell construction, and therefore less motivation for the bees to swarm.

Queen Signal

The queen honey bee controls the main colony functions by means of a complex chemical blend of pheromones produced by different glands known as "queen signal". This signal is a primer pheromone causing behavioral modifications in the worker bees and establishes social hierarchy and preserves the queens dominance in producing offspring for the hive. The queen signal is constant and if it decreases, or is absent, the worker bees will begin feeding larvae royal jelly within 24 hours in order to produce a new queen for the hive.

Amazingly, the communication within the hive is conducted by the emittance and receipt of pheromones – all done in the dark. BC

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Reckless Courage –

When one finds themselves several hours into a marathon, weekend mowing session, there is plenty of time to ponder. As you mow row after repetitive row, you have the time to observe your surroundings. To take notice of the landscape and how you have changed it for the better. That row of faltering pears in the orchard that should probably have fell to the axe already… perhaps give them one more season. The vibrant bunting perched upon that invasive seed head, plucking away at it frantically. Doing his part to disperse it onto another area of the farm where I don't want it growing.

The inebriating belch of the Troy-Bilt's overworked, two stroke motor in conjunction with its constant hum soon begins to make you feel like Carlos Castaneda on a "spirited" outing with Don Juan. The blistering heat, the occasional sting I endure while trimming around the beehives, and grass coating the right side of my face after shooting from the side of the mower, I have come to embrace this time away from constant brain stimulation. A time where I can get lost in thought and just focus on the world that is unfolding around me within my immediate proximity.

One of the many rewards that comes with land management is witnessing first-hand the wide array of fauna that take up residency once you start improving the landscape. Our farm was severely overgrown and riddled with invasives when we took possession, hence we didn't see a whole lot in the ways of bird life those first couple of years. This has changed exponentially since and our yard list (birds who frequent our farm) continues to grow annually as we continue to manage the landscape and improve it.

If you build it, they will come.

This has become a popular catch-phrase in the restoration and native plant movement, but let's distill it a smidge more. Ray Kinsella, (played by Kevin Costner) an Iowa corn farmer, while out working his field, hears a voice from up above. "If you build it, he will come." Spoiler alert. Ray decided after several sleepless nights to mow down his corn, drain his savings and build a ballpark so that he could have one last catch with his dad. Imagine if more of us heard the same voice, yet it prompted us instead to bring back our natural landscapes. Landscapes that are capable of healing the wounds that we have all been personally responsible for inflicting upon the earth.

It has brought me immense pleasure to discover that with each passing year, new species of birds arrive on our farm to take up residency. Being on a riparian corridor with available woodlands, we inherited the incredibly striking Red-headed Woodpecker (*Melanerpes erythrocephalus*), the stream side marauder Belted Kingfisher (*Megaceryle alcyon*), and the yellow bandit, Common Yellowthroat (*Geothlypis trichas*). After a few years of active managing, we welcomed several more prized avian tenants such as the Fox Sparrow (*Passerella iliaca*), Northern Flicker (*Colaptes auratus*) and my personal favorite, Yellow-breasted Chat (*Icteria virens*).

Tyrannus tyrannus

Another one of my favorite Spring/Summer residents, the Eastern Kingbird (*Tyrannus tyrannus*) or "Bee Martin" as was once referred, accompanies me week after week as I tirelessly trudge the uneven, rolling planes of our land. With each passing cut the "King" swoops down from his convenient, Black Locust (*Robinia pseudoacaciaperches*) perch and takes a stab at the insects being flushed by my mower's ever-dulling blade.

The Smithsonian's first museum curator, Spencer Baird had this to say about the Kingbird in his monumental, three volume, *History of North American Birds*, published in 1874, *"…the audacious boldness with which it will attack any birds larger than itself, the persistent tenacity with which it will continue these attacks and the reckless courage with which it will maintain its unequal warfare, are well-known peculiarities of this interesting and familiar species."*

I have witnessed the Kingbird's courage firsthand as I toil about on my farm. It has an unmistakable boldness and will present itself confidently, within just a few feet from you and its perceived bounty. During the first year of their residency, I was foolish enough to think that I had forged a bond with one such Kingbird as he waited ever so patiently as I worked the bees. What I soon figured out was that the King was fonder of

Birds and Bees

Jeff Kennedy

my thriving apiary and the smorgasbord that it encompassed. Baird continues, "*The Kingbird feeds almost exclusively upon winged insects and consumes a vast number. It is on this account one of our most useful birds, but, unfortunately for its popularity, it is no respecter of kinds, and destroys large numbers of bees. In districts where hives of honey bees abound, the Kingbird is not in good repute. Wilson (Alexander) suggests that they only destroy the drones, and rarely, if ever, meddle with the working bees. But this discrimination, even if real, is not appreciated by the raisers of bees, who regard this bird as their enemy.*"

I disagree with Wilson's assessment of them only destroying drones as for the third consecutive season, we are seeing drastically lower rates of return on virgin queens at our Marengo apiary where the Kingbirds frequent. As we have managed this land to accommodate a variety of wildlife and other insectivorous birds, all of the blame can't fall upon the King's feathered scapulars (shoulders).

World renowned artist and ornithologist John James Audubon echoed a similar sentiment in one of the finest works of ornithology that was ever created, *The Birds of America* (1827-1839). "*The Tyrant Flycatcher, or, as it is commonly named, the Field Martin, or Kingbird, is one of the most interesting visitors of the United States, where it is to be found during Spring and Summer, and where, were its good qualities appreciated as they deserve to be, it would remain unmolested. But man being generally disposed to consider in his subjects a single fault sufficient to obliterate the remembrance of a thousand good qualities, even when the latter are beneficial to his interest, and tend to promote his comfort, persecutes the Kingbird without mercy, and extends his enmity to its whole progeny. This mortal hatred is occasioned by a propensity which the Tyrant Flycatcher now and then shews to eat a honey bee, which the farmer looks upon as exclusively his own property.*"

We are all just trying to get by.

In Langstroth's *The Hive and the Honey-Bee* published in 1853, beekeeping pioneer Lorenzo Langstroth said of the Kingbird and of birds in general "*That some kinds of birds are fond of bees, every Apiarian knows, to his cost; still, I cannot advise that any should, on this account, be destroyed. It has been stated to me, by an intelligent observer, that the Kingbird, which devours them by scores, confines himself always, in the season of drones, to those fat and lazy gentlemen of leisure.* Langstroth continues… "*Still, I have never yet been willing to destroy a bird, because of its fondness for bees; and I advise all lovers of bees to have nothing to do with such foolish practices. Unless we can check among our people, the stupid as well as the inhuman custom of destroying so wantonly, on any pretense, and often on none at all, the insectivorous birds, we shall soon, not only be deprived of their aerial melody, among the leafy branches, but shall lament over the ever increasing horde of destructive insects, which ravage our fields and desolate our orchards, and from whose successful inroads, nothing but the birds can ever protect us.*"

I couldn't have said it any better than Lorenzo. Long live the King!! BC

BIGGER PICTURE

Jessica Lawrence

Assessing Colonies

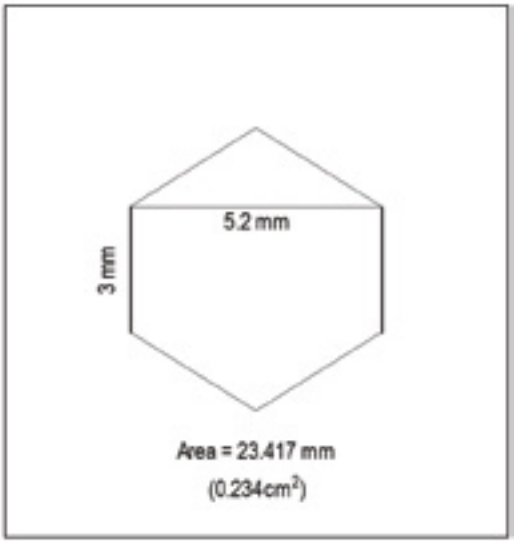
Think about when to watch your colonies decide to die, swarm, or abscond, or explode with growth and maybe you catch them in time. In some cases, beekeepers are very hands-off on their girls, while other beekeepers want to stick their nose in every single day and see what's happening. The thing that is most important for actually keeping up with your bees (in my opinion) is consistency. If you check your bees every week or every couple weeks, you'll at least know when they're about to swarm… maybe. When you perform a hive check, what is it that you are looking for and how does it help you to figure out what your colony needs?

The way I assess colonies is way overboard for most beekeepers, but I have to have the data. In general, this doesn't have to be quite so insane but hopefully this explanation will help you decide what is most important to you. I would recommend keeping up with your bees in some way via a notebook, or writing all over the hive with a sharpie. After two hives, I no longer have the ability to remember who had what and I definitely won't remember after a few days. It's pretty common for me to at least mark the lid with the queen and if she's marked or not and if she is, what color. Other than that, it's really up to you what you want to write and where to put it.

On my paperwork, I always keep up with the hive with some kind of identifier, the date and the time. The matrices are how many bees, how much empty space, honey, nectar, pollen, capped brood, open brood and eggs. When each frame is pulled out, both sides of the frame are scanned for an estimate of adult bee coverage because that changes quickly once it's removed from the hive, and then go back and assess what's in the cells. For this purpose, the standard dimensions used will be from a plastic frame from Dadant. Since they are mass produced, the cell number doesn't change and they're pretty specific dimensions. I would imagine if you really care to do it, you could use my same numbers on a different frame and be pretty close, but if you are to the point of doing this math then you probably went out and counted your own frame cells. Below is a diagram of a plastic frame, with the dimensions and calculations listed.

Now, with this math, it shows what would be the population of adult bees in each hive body as shown by 100% coverage on both sides of each of the 10 frames. This does not include any stragglers on the sides, bees in flight or bees in your veil. A shorter way to do this might be to go through the frames quickly and estimate an average coverage and multiply it. Or, if you only have bees on some frames, only go by those frames instead of using 20 sides. Having an estimate of your in-hive population is a good indicator of colony health because it also lets you see if your brood is successfully emerging into adulthood. You can also do a quick scan for *varroa* while doing this, but if you can see the mites you probably already have a different problem.

Now, with having 3,936 cells on the frame that are fully formed (some of the corners and edges are not a full hexagon and are excluded from the calculations for consistency), you can go down to how many cells of each bee matrix you have. I don't know that this is any more reliable than the percent coverage, but sometimes it's fun to figure out. It might not seem



43cm x 21.6cm = 928.8cm² = 9.29dm²
150 bees on average per decimeter
100% bee coverage = 150 x 9.28 = 1,394 bees per frame side = 27,870 maximum number of bees per hive body

	Brood Box Coverage (% of comb)								
Frame No.	Bees	Empty	Honey	Nectar	Pollen	Capped Brood	Open Brood	Eggs	100?
1a	40	90	0	10	0	0	0	0	100
1b	55	80	0	20	0	0	0	0	100
2a	55	80	0	20	0	0	0	0	100
2b	45	20	5	75	0	0	0	0	100
3a	35	15	5	80	0	0	0	0	100
3b	50	10	35	15	40	0	0	0	100
4a	45	5	15	15	0	65	0	0	100
4b	75	5	15	0	5	75	0	0	100
5a	60	0	5	10	30	45	10	0	100
5b	65	0	5	5	45	35	10	0	100
6a	40	0	0	5	15	75	5	0	100
6b	65	0	5	10	0	70	10	5	100
7a	60	0	0	5	0	30	50	15	100
7b	55	0	0	5	0	35	40	20	100
8a	50	35	5	5	0	55	0	0	100
8b	55	0	0	10	0	35	0	55	100
9a	50	0	0	15	0	25	60	0	100
9b	55	0	10	5	0	35	45	5	100
10a	45	0	25	40	0	10	0	25	100
10b	60	0	25	25	0	25	15	10	100
	1060	340	155	375	135	615	245	135	

Cells

Bee Coverage	Empty	Honey	Nectar	Pollen	Capped Brood	Open Brood	Eggs
14771.1	13382	6100.8	14760	5313.6	24206	9643.2	5313.6

like you have a lot of eggs if you only have something like 5% coverage on a frame, but when you realize that's almost 200 cells, it definitely can seem like more!

The visual assessment is the hardest part. I have completed over ten thousand Colony Condition Assessments over the years for various forms of government submissions, and it becomes second nature to spout off numbers in percentages of five. This is easier for me because sometimes there is enough of something that you want to count it but maybe it's not quite 5%, but you can kind of average it out as you go. You don't necessarily need to keep up with empty space either. I only use it because I can take the full set and use it to sum each row and make sure it's 100% on each line. I don't know if it's easier for anyone, but when I've worked with beekeepers in Germany, they do it in eights instead of 5%. Maybe it's because the hives are slightly different or it's easier to them or maybe the Germans are on a different plane of thinking, but I can't really do those well. If it's just a general idea, you could do tenths and just make a note if something is present but in small amounts.

If you decide to do these on your own, it normally takes somewhere between 15-30 minutes per hive body, depending on the weather, the size of the colony, and the aggression. Of course, it is the easiest to do on a moderate colony that is extremely chill in sunny weather that makes you sweat to death but not have to wear a veil. It's a lot harder to see eggs or larvae or anything small really through a veil and if you have a lot of hives to do, this can give you a massive headache. I also like to wear disposable gloves even when I'm not doing it for work because it keeps the honey and sticky off my hands and the bees seem to be less inclined to sting me through the gloves.

Something to consider during this is time of day. If you look at your

Y/N	
Y	Is the queen present?
N	Are swarm cells present?
N	Are supercedure cells present?
N	Are there signs or symptoms of disease?
N	Are there signs or symptoms of *Varroa* mites?
N	Are there any pests presents?
N	Are there any unusual behaviors?

bees in the early morning and check them again in two weeks on a sunny afternoon, you might have less adult bees because they are out foraging. If something looks odd or unusual, think about what could have caused it that is not the imminent demise of your colony. A lot of beekeepers jump to crazy conclusions if they are not familiar with pest and disease signs and symptoms, but usually Occam's razor holds true if you are paying attention.

I have a self-professed "math nerd" Mr. Hirschy, that explained how my acreage calculations were off in one of my earlier articles. A one-mile flight area for a bee is just over 2,000 acres (2,011), and five miles would be 50,265 acres of bee coverage. If he has any opinions on other calculations that might be useful here for assessments, I will share them with everyone if he writes back in. Sometimes it's easier to get a good idea of your bees if you look at the bigger picture over the year rather than each individual assessment. I've included a CCA example from one brood box on a colony in June as an example so you can see how the percentages work out. BC

Pollen
A Nutritional Powerhouse

Jeannie Saum

Flower Pollen Grains to Bee Bread

Honey bees collect pollen from hundreds of different types of flowers including blooming trees, wild flowers, perennials and annuals. Pollen is the male seed of flowers. Flower pollen particles stick to the hairy bodies of the honey bees. As bees visit from flower to flower, pollen is transferred to other flowers, resulting in pollination. Without honey bees and other pollinators, our vegetable and fruit food sources would be drastically reduced – over 30% of these foods are dependent on insect pollination. In addition, up to 50% of plant food sources for animals in the wild rely on pollinators for their reproduction.

To collect pollen, the bees moisten the pollen with nectar and brush it down their bodies into baskets on their hind legs, packing it into larger particles called pellets. It takes two million flower pollen grains to make one pollen pellet. The bees can collect their weight in pollen. It takes one bee working eight hours a day for one month, to gather one teaspoon of pollen.

Pollen in the Hive

Once back at the hive, the bees offload their own pollen into waiting cells. Pollen spoils quickly, so the bees process the pollen into a longer lasting substance called bee bread. Mouth and mid-gut enzymes are added to ferment and convert pollens into a pasty consistency for longer storing. Nurse bees consume this bee bread so their glands can make royal jelly and food for the growing larvae. House bees also convert this bee bread further, by layering it in the cells with honey. It is a long lasting, stable food for easy digestion. This becomes the hive's long-term food storage for times of scarcity. Bee colonies must have this vital protein, vitamin, lipid and mineral source to raise brood and perpetuate their existence.

History of Pollen Use by Man

The use of pollen by humans can be traced back to Ancient Egypt, Chinese Dynasties and Ancient Greece, used as food and in religious and cultural practices. The use of pollen has been part of the folklore and ceremonies of Native Americans in both North and South America, as well. In the 1970's, it became popularly used by athletes based on research conducted by The British Sports Council reporting that it increased strength, stamina, and workout recovery. This study has not been supported by more recent research.[1] Bee pollen has shown recent popularity as a dietary supplement for human health. Research does show that pollen has nutritional benefits.

Pollen: a Super Food

Pollen is considered a "Super Food" due to the wide range of nutrients it contains. Pollen has 40% protein, free amino acids, enzymes and vitamins, including B-complex and folic acid.[2]

According to researchers at the Institute of Apiculture, Taranov, Russia: *"Honey bee collected pollen is the richest source of vitamins found in nature in a single food. Even if bee pollen had none of its other vital ingredients, its content of rutin (a bioflavinoid) alone would justify taking at least a teaspoon daily, if for no other reason than strengthening the capillaries. Pollen is extremely rich in rutin and may have the highest content of any source, plus it provides a high content of the nucleics RNA [ribonucleic acid] and DNA [deoxyribonucleic acid]."*

Pollen, however, is relatively indigestible due its hard coat. Sprinkling fresh or dried bee pollen on cereal or yogurt is not going to benefit one's health! Pollen must be ground, soaked in liquid at least overnight, or added to honey and made into bee bread, in order for one to be able to digest it and benefit from its nutrients.[3] Heat destroys the active enzymes in pollen and reduces the nutritional value, so it should be eaten in fresh, freeze-dried or dried form. Fresh pollen must be kept refrigerated or frozen. Dried pollen should be kept in a sealed container, and will last up to one year.

Bee on goldenrod by Hanna Costello

Use as a Dietary Supplement

Serving suggestions vary from source to source, but most range from one tsp. to one tbsp. per day. It is suggested that one checks for an allergic reaction to the pollen by starting with one pollen pellet.

Pollen can be ground using a mortar and pestle or in a coffee grinder. It is too fine to be ground in a food processor. Ground pollen has a very grainy flavor that is not appealing to some. It can be flavored with cinnamon or other spices; stirred into juices, smoothies, cereal, yogurt and salad dressings; or sprinkled on toast topped with peanut butter or jelly. It can be mixed with honey to make tasty bee bread. It is also a beneficial ingredient in unbaked nutrition bars made with nut butters, honey and various nuts and grains.

Pollen in Skin care

Much has been written about the great benefits pollen has for our skin, but not much research can be found to back up its topical use on skin. It makes sense that due to the vitamins

Bee with pollen basket by Ryan Lehman

and nutrients found in pollen, eating it would help improve one's skin. A healthy diet affects all our body parts. It can be used as an exfoliant in facial and body scrubs, due to its hard coat. But be wary of anything else you read. Look for footnotes that indicate cited research; you won't find them in most cases!

Pollen for Health and Healing – What the Research Says

There are many health and healing claims about bee pollen that are often repeated in popular culture. There have been some animal studies in recent years showing that pollen inhibits harmful bacteria, regulates intestinal function, increases white and red blood cells, increases levels of hemoglobin, normalizes cholesterol and triglycerides, delayed/prevented cancerous tumors in mice and fights infection and disease.[4] Most research studies, however, state that the evidence is still insufficient and that more research is needed. Both MedlinePlus[5] and WebMD report that there is insufficient evidence to rate effectiveness for: appetite stimulation, premature aging, hay fever, mouth sores, joint pain, painful urination, prostate conditions, nosebleeds, menstrual problems, constipation, diarrhea, colitis or weight loss.[6] At this point, medical research has not shown definitively that bee pollen is effective for any of these health concerns.

There is popular belief that bee pollen helps prevent allergic reactions. The theory is that pollen works like desensitizing allergy shots, when consumed six weeks before the allergy season. This theory falls apart, however, under closer examination. Consider this: the flower sources of pollen and honey vary from season to season. If one is allergic to say, goldenrod, which blooms in the Fall; then one would need to consume the previous Fall's honey or pollen, in order to expose and desensitize one's self to goldenrod pollen. There would be no goldenrod pollen in Spring or Summer honey or collected pollen! And when one buys pollen, it is not sorted or labeled as to what season it was collected in, or where.

There are NO human studies to verify that seasonal honey or pollen consumption can help with allergy symptoms. There are a few studies on mice that indicate pollen can inhibit certain parts of the allergic response, like inhibiting mast cell production,[7] but overall, the claims are anecdotal at best. A few studies on pollen have shown promising results for certain treatments, but scientists still say more research is needed. A report from the Agronomic Institute, Faculty of Zootechnics, Romania, showed the immune-strengthening effects of bee pollen.[8] A study on animals in 2014 indicated improved muscle protein and energy metabolism from ingestion of pollen.[9] Since pollen cannot be duplicated in a laboratory, there is little incentive for research facilities to do studies on pollen, so duplicate, confirming research is hard to find.

The Bottom Line

Most claims about pollen have limited or no supportive research. However, pollen is a nutritional powerhouse and can be a healthy addition to one's diet, if prepared correctly.

Pollen supports Health ~ Powered by Bees! BC

End Notes

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Bee on aster by Hanna Costello

Frame of bee bread by Chris Cree

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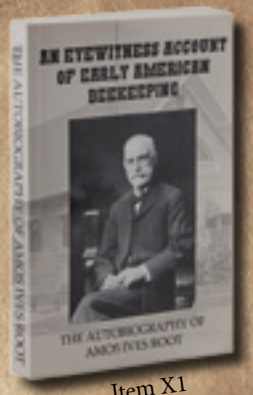

Item X1

One day in August 1865 a stray swarm of bees passing through the air attracted his attention. That evening, after hiving the swarm, other books and papers had to be laid aside in favor of anything pertaining to bees and bee culture. From that time on he was a student and breeder of the honey bee. It has been said that he did more than any other man in America to commercialize beekeeping. Take a step back in time and follow his journey and see how his quest for knowledge and profound religious conviction helped shape American beekeeping.

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Lilacs – A Favored Fragrance for People and Pollinators

Alyssum Flowers

Few flowering shrubs are more reminiscent of Spring than lilacs, with the varying shades of blues, violets, pinks, yellows and creams and the lovely, deep perfumed fragrance. Although not a big magnet for honey bees, it is loved by small native bees, carpenter bees, many beetles, flies, butterflies and moths, as well as hummingbirds. The dense branching also provides a safe harbor for birds. With many cultivars and sizes available, it is a must for every landscape!

Syringa vulgaris, the common lilac is believed to have originated from the Balkan peninsula in Eastern Europe. It has been grown and cultivated since the 1500's and has graced yards in the United States since the mid-1700s. This multi-stemmed, deciduous shrub is tough and long lived. In fact, the oldest living lilacs in North America may be those growing in Portsmouth, New Hampshire, believed to have been planted around 1750. Both George Washington and Thomas Jefferson wrote about transplanting lilac bushes and remarked on their beauty.

Although the common lilac displays peak bloom in mid to late Spring, different cultivars bloom later, so planted together, one can enjoy the fragrance for six weeks or more! Lilacs are hardy in northern climates and are tolerant of a variety of soil types, although they prefer a slightly alkaline, moist but well drained soil. They will bloom profusely in full sun, less in partial shade. For the most consistent bloom every year, remove spent blossoms and prune back to a set of leaves to prevent seed formation. Since flower buds are formed the Summer before they bloom, do not cut back in the Winter.

Lilacs can be grown in many settings for different needs. Over 30 species and 2000 cultivars are available to fit the needs of any landscape. They can be grown as a hedge, a focal point in the yard, for the foundation or as a tree for the patio. Popular species include *Syringa x hyacinthiflora* (e.g. cultivar 'Pocahontas'), with flower heads resembling that of hyacinths in early Spring, bred for good disease resistance and *S. pubescens* ssp. *patula,* including cultivars such as 'Miss Kim' and 'Miss Susie', that bloom in mid-Spring. These compact bushes grow five to seven feet wide by four to six feet tall. An even more compact cultivar is *Syringa meyeri,* which includes the dwarf Korean lilac, reaching a width and height of four to six feet, and is growing nicely at A. I. Root Candle Company. All three are good for low screens and disease resistance. Note though, that their scents are stronger (sometimes too strong), and the flower panicles are not as large as that of the common lilac. The Japanese tree

Syringa vulgaris, *'Michel Buchner'* *https://mortonarb.org/plant-and-protect/trees-and-plants/common-lilac/*

lilac, *S. reticulata* has become a popular street tree with large fragrant, creamy white plumes appearing in late June. This compact upright tree grows to be about 30' tall and 20' wide.

Despite their beauty and dependability, they are not without problems. Some species are susceptible to powdery mildew if planted in the shade, in heavy clay soil or in low areas with poor air circulation. The lilac borer is an annual concern for bushes that are stressed or have a poor root system. Follow recommendations for proper planting and care to reduce potential root trouble later. Fertilize with a 10-10-10 granular food when planting but avoid fertilizing more than once a year. Avoid directing lawn fertilizer near lilacs as well because overfertilizing reduces the plants' ability to defend itself against borers.

Remove the oldest canes after bloom as well as dead branches or those crossing other limbs. Cut the suckers that grow straight up. Maintain the shape of the plant by cutting branches as far down as possible. Remember to prune as soon as the lilac has finished flowering to maximize next year's perfumed display. Now is the time to peruse the catalogues and decide which lilacs are right for you! BC

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SMOKER BASICS

Ed Simon

Every beekeeper has one. Some have two.

An essential piece of equipment for any beekeeper is the smoker. They are available in all sizes with different features, from the ones with heat shields to the old trusty, rusty smoker that your grandfather used. They are basically of the same design and provide the same function of producing smoke to calm the bees or to chase them away. Their smoke can even help you escape when that nasty colony decides it doesn't like you.

Your choice of this tool is important. After discussing some features and what you need to consider when choosing one, I will provide some information on how to use one.

Selection

The first and major consideration is the size of the smoker you need for your operation. A two-hive hobbyist hasn't the need for the large smoker that a commercial beekeeper will need. Size is basically a statement of the amount of fuel it will hold. The more fuel, the longer it will produce smoke. Other features make the smoker easier to use or safer. Here are some of the things you need to think about when purchasing your smoker.

Size

Two sizes are commonly available. There are other, less common sizes available from a variety of manufactures. Here are the two common sizes:

- 4" x 7" – 4" diameter and 7" tall
- 4" x 10" – 4" diameter and 10" tall

Obviously the larger the smoker, the more fuel it will hold.

If it is too large, it will get unwieldy to handle and more difficult to store. If it is too small, you will be adding fuel to it more often.

Material

Two metals are used for smokers:

- Galvanized steel
- Stainless steel

Stainless steel is more durable than galvanized steel. Nowadays, most smokers are made of stainless steel. If you have a choice, select the stainless one.

Lid Style

Two common lid shapes are available:

- Cone
- Dome

This seems to be a manufacturing or patent decision. I have used both types and either function equally well. It does seem a little easier to direct smoke with the cone-shaped lid, in my experience.

Lid Hinge

The sturdier the better. A weak, floppy hinge makes opening and closing the lid difficult. When you are in a hurry and have creosote buildup on the rim, you don't need or want the problem of positioning the lid.

Opener Tab

The opener is a small tab used to open the lid. This is an important item when you need to reload a HOT smoker.

Two common opener tabs are available:

- Shaped metal
- Coiled wire

The coiled wire opener seems to be more robust than a shaped opener. It is easier to grip between your fingers with gloves on than the smooth, bent opener. When you are having trouble opening the lid by grabbing the tab, grip the lid in your hand with your thumb under the opener and around the chimney. Then use your whole hand to remove the top.

Heat Shield

A smoker either has a heat shield or it doesn't.

This is where safety counts. Get a smoker with a heat shield. The first time you bump your new smoker with no heat shield and burn yourself, it will convince you it is important to order a new smoker with a heat

shield. In addition, the heat shield often provides a way to hang the smoker.

Bellows

Plastic, wood and probably many other styles are available. All of them work and are usually replaceable.

Usage

After purchasing your smoker, there are some tricks that will help you with its use. I'll list these items in order of usage, starting with fuel selection, to extinguishing it and finally how to clean it.

- *Fuel:* You need something to burn. Almost everything that you can light on fire will work, but some items work better and are more convenient than others. Jeans, burlap, pine needles and wood chips are some of the fuels that are cheap and readily available. Whatever you choose needs to be dry enough to burn. When we lived in the country, I used dried cow manure. It was cheap, easy to obtain and burned great. Lately, I have been using landscaping wood chips available at any home improvement store. When you're desperate, you can always steal wood chips from a flowerbed.
- *Loading and Lighting:* Lighting the smoker is easiest if you start with a loose wad of newspaper. Remember, it's that thing you used everyday before all the news was delivered online? After starting it, add your fuel slow enough to get the fuel burning. Pump the bellows to force the rapid burn of the paper and get the fuel on fire. Once it is burning, add enough fuel to keep it burning for the length of time needed. What I really mean is FILL IT UP. You will always think of something additional to do that will take more time.

Stuff the chimney with some green grass. It will act as a filter and reduce the ashes blown on to your bees.

Close the lid and allow the fuel to smolder.

Hint: Use a propane torch with a self-starting handle. Super easy and much easier than matches or a fire starter.

Hint: If you are having trouble lighting it, use a squirt of hand sanitizer. A good one usually contains 60% or more alcohol and will burn easily.

- *Usage:* A couple puffs of smoke at the hive entrance and under the cover as you start the inspection helps calm the bees from the start. Rather than smoke the bees directly, allow the smoke to drift over the bees. This just seems to be a little gentler. Do not smoke the bees when flames or high heat is coming out of the smoker. You are using the smoker to calm the bees not barbecue them.

Warning: The smoker is Hot! Do *not* put it on dry grass. Do not try and hold it between your knees (this usually only happens one time). Setting it on an adjacent hive makes it handy and less likely to tip over.

- *Extinguishing:*
  1. Cork – Place a cork in the chimney. This works great, except a cork is usually hiding from you when you need it.
  2. Lay on its side – Lay the smoker on its side on a non-burnable surface. This was relayed to me by a University of Minnesota bee squad member. It worked, but you need to be careful. Supposedly, the air will flow above the fuel, not through the fuel.
  3. Pail – Set it in a metal pail and let it burn out. This is safe, but it is still hot. It is *not* safe when traveling to another bee yard.
  4. Allow it to burn – Allow the fuel to burn until it is used up.

  All these methods work. BUT they will cause a problem. To be effective, the smoker produces prodigious amounts of smoke which will collect at the body-lid seam. When cool, this collection (a form of creosote) seals the seam and makes a subsequent opening of the smoker difficult. Bad words, even though they may make you feel better, do not help to open the lid. I recommend emptying the smoker's unused fuel into a metal bucket. Then, leave the lid open and hang it on the side of the bucket to cool. It is safe and the lid will not be sealed to the body of the smoker. It will be open and ready for loading the next time you need it.
  Warning: Be careful with the smoker's unburned fuel and ashes. Even when dumping the ashes into a metal bucket, the smoker's residue will probably be hot and can possibly flair up. Place the bucket in a safe place. Burning your shed down or catching your car on fire makes for a bad day.
- *Cleaning:* This can be a real hassle. It's not much of a problem if you follow these simple directions.
  1. With your hive tool, scrape as much soot and creosote off the device as you can.
  2. Use a propane torch to burn the remaining soot and creosote. Let it burn until it extinguishes itself.
  3. After cleaning the big chunks out of the smoker, use a wire brush to remove the remaining ashes.
     Hint: I use a three inch wire brush on an electric drill to remove the remaining ashes. You'll probably never get it completely clean, but at least you can close the top.

Along with the hive tool, the smoker is the most frequently used tool in your beekeeping work chest. A good, reliable smoker is well worth the extra cost. BC

Get a copy of Ed Simon's bee *Bee Equipment Essentials* with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from **www.Wicwas.com**. Ed can be contacted through **SimonEdwin41@gmail.com**

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This is *not* a negative article

While it may sound like it is, this is ***not*** a negative article; however, it is a realistic piece. Many articles in *Bee Culture Magazine* present beekeeping management information that help the evolving beekeeper manage their colonies perfectly. Yes, problems and challenges will always arise, but when they do, some of the published articles explain what procedures would be required to get colonies back to high standards. That's always the goal – perfect colonies in a perfect yard. It's a lofty aim.

A *"beekeeper"* is not a standard designation

The ability and energy of individual beekeepers are all over the page. Few things about us, as a group, are standardized. But to many of the population of this country, who do not keep bees and know nearly nothing about them, being a *"beekeeper"* is a unique designation. When viewed by this large group, all beekeepers are seen as being the same. Cookie-cutter as it were.

Yet, within our group, there are beekeepers who are on the job night and day, and their colonies normally show the positive results of their energy allocation. But there are also beekeepers who are not able, or inclined, to contribute large amounts of their life's resources to managing their bees. The colonies of this group may, or may not, show the effects of their laissez-faire philosophy of bee colony management. It's difficult not be judgmental, isn't it? It would seem that every beekeeper should strive for *perfection beekeeping*. I sense that is never going to happen.

It's not just beekeeping

For instance, as you drive down a suburban street, have a look at the variation of the home maintenance and landscape each house has. Some homes are perfectly manicured while others have not been given the same level of attention. Is one homeowner more deserving of respect than another?

It depends, doesn't it? Are city ordinances being violated? Is clutter excessive? If homeowner basics are being met, do we not expect some homes to be better maintained than others? Common reasons for this variation are simply innumerable. It's just the way of things. The same is true with beekeepers.

Bees are not pets

Bees are not actually pets, but they have commonality with pets and other domestic livestock. Obviously, pets and livestock must be nurtured and maintained. In fact, they are protected in many legal and moral ways.

Due to challenges like *varroa* predation, honey bees are similar to pets and domestic animals. Without human assistance, managed honey bees do not normally thrive. Colony decline and death are the frequent outcomes. So, beekeepers, you need to take care of your bees. But the devil is in the details. Exactly how much care is necessary?

It really gets tricky at this point. Bees are wild animals and, as such, should be able to fend for themselves without human assistance. Yes, that's true, but feral honey bees conduct their natural lives differently in several notable ways. In the wild, colonies do not normally grow nearly as large as managed colonies and they do not produce as much surplus honey. Plus, they swarm more often. A wild colony provides incidental pollination rather than directed pollination. For instance, you can't move a feral colony to a commercial apple orchard. And finally – and importantly – they frequently die during the Winter.

At this point, enter the beekeeper and their artificial domiciles. For the bees in managed hives, many things change. Beekeeper care is required to help the colony thrive under these artificial conditions. But again, exactly how much care is necessary?

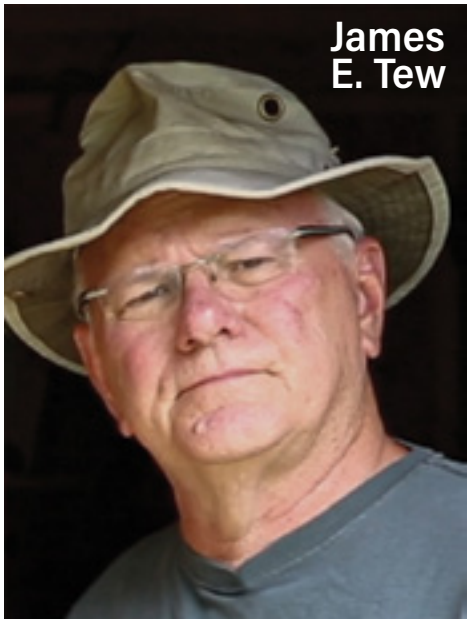

Figure 1. This dog is a perfect example of a pet.

Figure 2. This animal is not a pet, but it is treated as one.

Figure 3. Perfectly functional, but minimally maintained hive equipment

Everything changes

In life's big picture, everything changes. As we age, many things about our lives change, too. When change comes our way, we adapt. We reallocate. We improvise. We refurbish ourselves. As life's "things" morph, we do whatever it takes to embrace and incorporate the changes and push our lives forward. We really have no other choice.

Beekeepers and their relationship with their bees are no different. A dedicated beekeeper may not always be able to commit to all the demands that *perfection beekeeping* requires. Should they quit the craft? No, but they will need to adapt and reallocate the resources they still have.

Sloppy beekeeping

I am not condoning sloppy beekeeping. I feel that I need to write that again – in this article, I am ***not*** condoning sloppy beekeeping. But sometimes, try as we might, things change in our lives and our energy and commitment to our bees can seem to approach something that resembles "sloppy" beekeeping.

Job changes, health changes, monetary changes, marital changes or societal changes are examples that can cause a staid beekeeper to have to consider a restructured management level compared to the level they were previously maintaining. Sometimes these changes are temporary while in other instances, they are permanent.

Blended beekeeping

Is what I am naming "*sloppy beekeeping*" simply "*blended beekeeping*?" For instance, let's say that things have changed and we are forced to back down our commitment and contribution to the bees' way of hive life. If the bees can't make up the difference, they will most likely die. In my view, this mix of feral schemes with managed schemes could be named *blended beekeeping*.

Things changed

Okay, it happened. Big changes have occurred. Let's say the beekeeper retired and had experienced some health declines, but they still are devoted to beekeeping. What are some ways they can adapt and alter their beekeeping protocols?

Be a hobby beekeeper

Bluntly, if big changes are coming your way and you want to stay in beekeeping, you should most likely consider being a hobby beekeeper. Proficient sideline and commercial beekeepers are already being as cost and labor conscious as possible. They live in a different management world and are answering to different management mandates. It's the hobby beekeeper who can reduce or alter their standards without serious retribution.

The apiary

There are no lawnmowers, string trimmers, and herbicides in the bees' natural world. That's all on us. In *perfection beekeeping*, the grass and weeds are kept mowed and trimmed. Yes, colonies with artificially low entrances will probably appreciate this work, but will uncut grass be the premier reason that a colony dies during the Winter? Probably not. Will the apiary look scruffy and not be photogenic? Definitely.

But if the weeds and brush are allowed to truly run rampant, the beekeeper will nearly be unable to walk to the colonies – much less remove honey or perform colony manipulations. Maybe the recommendation should be to "*cut back*" but don't "*cut out*" weed maintenance.

The hive equipment

Even in reduced labor and energy situations, hive equipment should be assembled correctly. When filled with bees or honey, equipment will surely be stressed as it is moved and manipulated. If you are having strength and health issues, heavy hive equipment will sometimes be handled roughly – even dropped.

Either don't paint or only paint once and forget it. *(That comment is a pain for me to write. My Dad had a paint supply business. I spent my early life dealing with all things paint. Now, I am suggesting that you cut out painting.)* Yes, thorough paint applications will help wooden equipment[1] last a bit longer and it will certainly look better. But really? How much longer will it actually last, or is looking good the primary goal? Maybe the recommendation should be to assemble the equipment soundly but, if necessary, skimp on the protective coatings. Distasteful, isn't it?

Colony manipulations

Colony opening events can be significantly reduced if labor and energy are to be lessened. After a new beekeeper has acquired the necessary basic skills, whimsically opening a colony is not often necessary. Much

[1]Plastic hive equipment, made of expanded plastic foam, should be painted. Otherwise, it's useful life is shortened.

can be determined by simply being aware of the season of the year and reading entrance detritus evidence – but make no mistake here. Reducing colony manipulations will limit the beekeeper's ability to stay intimately aware of the colony's condition. But the question re-arises at this point – how many colony manipulations are necessary to meet the minimal? That's an unanswered question. How much are you willing to give up?

Lost swarms

All beekeepers, at all levels, will lose the occasional swarm. Alternatively, sometimes all beekeepers will acquire a swarm that moves into empty equipment or they will acquire a free swarm that they hive. Either way, swarms happen. They come and they go. But reduced colony manipulations will require the beekeeper to be more tolerant of lost swarms.

Queen productivity

The more committed a beekeeper is to their colonies' management, in general, the more anxious they are about the queen stock heading their colonies. Again, being aware of the season, a beekeeper, who has elected to implement *"blended beekeeping"* concepts should know what a suitable brood pattern would look like during that season. In this way, the investigative beekeeper evaluates the seasonal brood and brood pattern rather than the actual queen. In many instances, no effort, at all, is made to see the queen. Just seeing eggs or seeing the queen's brood pattern is normally enough for a quick inspection.

I don't sense a strong argument for the minimalist beekeeper heavily investing in high quality replacement queens. Escaped swarms will most likely be an issue, and they will take costly replacement queens with them. If one is not making splits or is not suppressing swarming and has only a casual interest in surplus honey production, naturally produced queens will meet most needs. For all beekeepers, marked queens are a good idea.

Yes, reducing queen management will greatly reduce time and economic demands. But at the same time, that management pathway will reduce overall colony productivity. Can you – or should you – live with that fact?

Mite management

Like swarm suppression or queen management, *Varroa* mite control requires time, labor and money. This is a serious aspect of honey bee management. If the beekeeper does not implement a conscientious mite control program, most likely that colony will die and will produce mites that will invade surrounding colonies not yet dead.

Managing mites is one of those instances when the colony *should* be opened for treatment. There are few ways to cut corners on this issue. If the beekeeper does not implement mite repression programs, then next Spring, to replace dead outs, the beekeeper will be required to purchase bees (packages or splits) from beekeepers who did implement such programs. I can't see that much money or labor was saved by taking this tact.

Honey processing

Surplus honey removal and processing is a huge labor and energy drain. In past articles, in this magazine, I have written that honey processing is *not* beekeeping. Indeed, I know a few specialists who only process honey and have few colonies of their own. They contract-process honey for other beekeepers.

In the bright light of reality, capped honey can be taken off at nearly any time of the year – even in the dead of Winter. I don't know why you would do that since it only makes for a miserably, cold job, but neither do I know your exact situation.

Before extracting, frigid honey would need to be allowed to warm up, but not held too long. Without bees to protect it, that warming interlude gives an opportunity for Small Hive Beetles and Wax Moths to begin damaging the combs. Other than producing comb honey, I cannot think of a way to easily short-circuit the cumbersome process of setting up an extractor and dealing with the folderol that comes from honey processing. I suppose that contract processing would be an alternative.

Dramatically, one could simply leave the surplus honey on the wintering colony. Even for the reduced labor beekeeper, in cold climates, I would suggest wintering the colony in one or two deeps and moving the capped honey supers above the inner cover. In this way, theoretically, the colony could better manage its wintering environment. Honey, held like this, could be used the next Spring as supplemental food for initiating replacement colonies or for giving food to other needy colonies in the apiary.

My point

My point in this piece is there are beekeepers who, for whatever reason, cannot or do not commit to maximally managing their colonies. Representatives from this group are rarely asked to give presentations on their management procedures. There are no articles published in bee magazines for this group, and these beekeepers rarely speak out at meetings. They quietly hang on.

We all have our reasons and procedures that allow us to continue to co-exist with our bees. As I wrote before, *"The ability and energy of individual beekeepers are all over the page."* There is no standard beekeeper.

Thank you for reading this piece.

Dr. James E. Tew
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The Ohio State University
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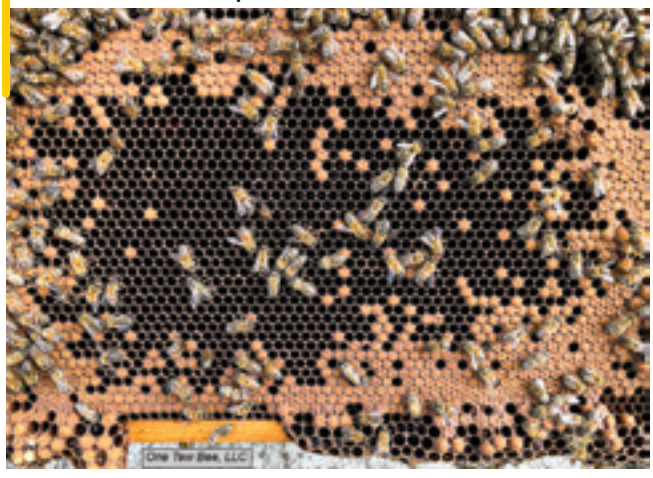
Co-Host, Honey Bee Obscura Podcast
www.honeybeeobscura.com

Figure 4. A good brood frame. When I view this photo in my photo processor, there are visible eggs in the center of comb. I do not need to find the actual queen.



Peanut Butter Cookies

Shana Archibald

Ingredients

- ☐ 1 cup creamy peanut butter (natural will work too)
- ☐ 1 cup honey
- ☐ 1 large egg
- ☐ 1½ teaspoon vanilla extract
- ☐ ½ teaspoon salt
- ☐ ½ teaspoon baking soda
- ☐ 2 cups flour (you can also use whole wheat flour)

Directions

Step 1
Preheat oven to 350°F.

Step 2
Line a baking sheet with parchment paper.

Step 3
In a large bowl or the bowl of a stand mixer, combine the peanut butter and honey. Beat until completely incorporated.

Step 4
Stir in egg and vanilla.

Step 5
Add the salt, baking soda and flour. Mix until it comes together to form a dough.

Step 6
Shape dough into small balls (about 1 tablespoon of dough). Place balls on the prepared sheet.

Step 7
Use a fork to lightly press each dough ball down.

Step 8
Bake for 10-12 minutes until cookies become slightly golden brown.

Note:
Be careful to not over-bake! Honey burns much more easily than sugar.

Step 9
Remove from the oven and place cookies on a wire rack to cool.

CALENDAR

♦INDIANA♦

The Beekeepers of Indiana 2023 Bee School will be held on February 25, 2023 at Horizon Convention Center in Muncie, IN.

There will be two plenary speakers: Jerry Hayes and Scott McArt. The event will also include sessions and discussions for beekeepers with any level of skill, experience or ability. Session topics include Tricks and Tips for Installing Packages, All About Drones and How to Grow Your Business Using Social Media, among many more! The raffle, live auction and silent auctions will also be held again. There will also be many vendors with a variety of displays and supplies on-hand.

The cost to attend is $50 for members and $60 for non-members. All registrations include lunch.

A Beginning Class will be held at the same time this year. The cost for that is $55 for members and $65 for non-members. All registrations include lunch.

For more information about speakers, topics, vendors, hotels and to see the registration links, go to **https://indianabeekeeper.com/events/indiana_bee_school_xxi**

♦IOWA♦

Central Iowa Beekeepers Association's (CIBA) annual Winter Seminar is Saturday, March 18, 2023 at the Iowa Arboretum and Gardens in Luther, IA.

Speakers include Dr. Judy Wu-Smart of the University of Nebraska-Lincoln; Dr. Mike Simone-Finstrom (via Zoom) of the USDA, ARS, Baton Rouge, LA; Andrew Joseph the Iowa State Apiarist; Kurt Rueber of the Iowa Department of Inspections and Appeals; and Pat and Peggy Ennis of P&P Honey in Goodell, IA.

This is a full day seminar with lunch included in the registration cost.

Details and registration process at **www.CentralIowaBeekeepersAssoc.org**.

♦MICHIGAN♦

Holland Area Beekeepers Association are conducting their 2023 Bee School on February 11, 2023 from 8am to 4:30pm. The Bee School will be held at Grand Valley State University Meijer Campus (515 S. Waverly Rd., Holland, MI).

Registration is currently open at **https://www.holland-bees.org/events.** Adults cost $60 with the second adult in the family cost $30. Students cost $15.

The Bee School includes keynote speakers, breakout sessions and vendors. The School is for new beekeepers and individuals interested in exploring beekeeping. It is also for individuals who need a refresher on the basics. Topics include how to get started, honey bee behavior and equipment and supplies needed.

For more information go to **www.hollandbees.org**.

♦PENNSYLVANIA♦

The **Western Pennsylvania Beekeeping Seminar** is back! It will be held on February 10, 2023 from 7pm to 8:30pm and February 11, 2023 from 7:15am to 4:30pm at Gateway High School (3000 Gateway Campus Blvd, Monroeville, PA 15146).

Registration is currently open. The cost for adults is $75 and $38 for children under 18.

Featured speakers include Dr. Thomas Seeley, Dr. Jay Hosler, Dr. David Peck, Dr. Robyn Underwood, Joe Zgurzynski, Randy McCracken and Roxanne Swan.

For more details and registration go to **tinyurl.com/WestPABee**.

♦SOUTH CAROLINA♦

South Carolina Beekeepers Association's Spring Conference entitled "Show Me the HONEY!" will be held on February 24-25, 2023 at SIMT Florence-Darlington Technical College (1951 Pisgah Rd, Florence, SC 29501).

The keynote speakers are Bob Binnie, Steven Coy and Marina Marchese.

Learn anything and everything about that sticky stuff! Hear industry experts share how they manage and grow their honey operations and market their honey. The conference will include a variety of presentations and discussions, workshops, a honey show and vendor fair.

Registration is currently open online. Early bird discounted registration through January 31, 2023.

Visit **SCStateBeekeepers.com** for additional attendee and vendor information and registration. Send conference questions to **info@scstatebeekeepers.com**.

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Image Contest - Holiday Hives

We've started an image gallery! This month, we want to see any and all pictures you have of **Holiday Hives**. Please make sure that your image is nice and big! We may pick your image for the gallery, or you have the chance to get on the cover! So get creative.

Try out lights around your hives. Throw some stockings up. Maybe you find a turkey checking out your hives. We want to see all the holidays from Thanksgiving to New Years. And if you're lucky, you may be the featured cover for next year's December issue!

How To Submit:

Email your images to **Emma@BeeCulture.com**
Use the subject "**Image Gallery**"
Please include in your email:
- The image as an attachment (we will not consider it if it is embedded)
- Your First and Last name
- Your mailing address
- Your renewal code (if you know it)

If your image is chosen:

For the Gallery:
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For the Cover:
You will get twelve months added to your current subscription.

I only have to utter the magic words "climate change" in one of my columns, and somebody fires off a letter accusing me of promoting some "leftwing agenda." Yet like any elephant in the room, the dramatic environmental changes brought on by global warming merit our attention, and a little blow-back comes with the territory. I can't please everybody. Why would I want to?

In John Miller's delightfully disparaging piece on the Siren song of treatment-free beekeeping in the October issue of this magazine, his prose got downright colorful. Good, because sometimes you have to let it all hang out. Maybe I did a fist pump. John carried the torch for a cause I believe in. Control your mites. Save your bees.

Predictably, not everyone was pleased. Two letter writers took issue in the November *Bee Culture*. Both said or at least implied that they were successful treatment-free beekeepers. This would make them rare birds indeed. Neither said that they kept their bees in isolated locations.

It's no secret that if you live out in the boonies beyond the flight range of other managed colonies you can make a go of treatment-free beekeeping. If you're willing to take some big losses along the way, live-and-let-die natural selection may eventually leave standing some colonies that can make it on their own with no outside help. You've created a closed mini-ecosystem, populated exclusively by mite-resistant bees. Good for you!

But most of us live in communities, not out back of beyond. If your neighbors' treatment-free bees get overwhelmed by mites and collapse from *Varroa*-vectored viruses, your bees can and will pick up hitchhiking mites when they rob honey from these hives. Now your no-treatment colonies have a potentially very big problem. They need to deal not only with their permanent-resident mites but also with an influx of newcomers. This horizontal transmission of mites, from hive to hive, is one reason no-treatment beekeeping is so challenging.

It's mid- November as I write. Some of my treated colonies have succumbed to *Varroa*, with a few 300-bee sugar-shake samples coming in at 50-plus mites. These high-mite colonies lose most of their bees very quickly. This, after two Apiguard (thymol) treatments, or an Apivar (amitraz) treatment. Here in Colorado at 5,500 feet, we experience dramatic day/night temperature swings, and I suspect I may have administered the Apiguard too late, when cool nights reduced its effectiveness. In beekeeping, timing is everything. The lesson here is that when you administer a treatment, you need to do it when the treatment is most effective, and not wait until you get around to it.

In some of my colonies, Apivar showed reduced efficacy, with stable or even higher mite numbers four to six weeks post-treatment. But in other hives in the same yard I got a good knockdown.

So what did I do, too late for some, just in time for other colonies? I gave 'em the hotfoot. I dribbled a weak solution of oxalic acid between the frames. This treatment is hell on mites, as long as there's little or no sealed brood in which they can safely hide and reproduce.

Herein lies the rub. When I dribbled ten days ago, some colonies had gone broodless. Others, not so much. I had planned to dribble later, in late November or early December, when the queens should be reliably shut down and the brood mostly hatched.

My grand plan was to keep my mite numbers acceptably low through November (ideally under 10 for a 300-bee-sugar-shake sample) by treating with Apivar or Apiguard and then finishing off the survivors with that oxalic dribble.

So much for the grand plan. The mites had their own strategy, which was to strike early and overwhelm as many of my colonies as they could.

Prior to dribbling, I didn't have time to mite-sample all my hives, or to look for brood in all of them. Today, November 18, ten days post-dribble, the results are not what I'd hoped for. My sampling of 10 hives found that all but one tested positive for mites. Thirteen in a 300-bee sample was the high count, and the rest were under 10. I saw more brood and more mites than I wanted to.

I opted to dribble early because I felt I had to. My mite numbers were unacceptably high, and I didn't know what else to throw at 'em. Now, after dribbling, my mite counts are not as low as I'd like going into Winter. But re-treatment later when they're reliably broodless is a no-go, because more than one application of oxalic can kill long-lived Winter bees that are key to colony survival.

All right then. I made my bed. Now I'll lie in it. Failure is, of course, the greatest teacher. Next year I'll stay on top of my mite testing and treatments. I promise!

My friend Megan lives just down the road from one of my yards, and she likes to come along. She's the opposite of a treatment-free beekeeper. A couple of years ago she learned the hard way. Now she's an obsessive *Varroa* killer. I tease her because she freaks out if she sees even one mite in a sugar shake sample. But now the joke's on me, and Megan gets the last laugh. The other day when we looked at one of my colonies that got decimated by mites she said, "Those used to be your best bees!"

On the way home we opened her two hives. Both were three-high, eight-framers boiling over with *Apis mellifera*. "Wow! Your little darlings put my bees to shame," I said.

"I have you to thank for that. You taught me. And Ed, when the student shows up the teacher, that's the crowning achievement of a really good teacher, isn't it?"

What a nice way to put it. BC

Ed Colby

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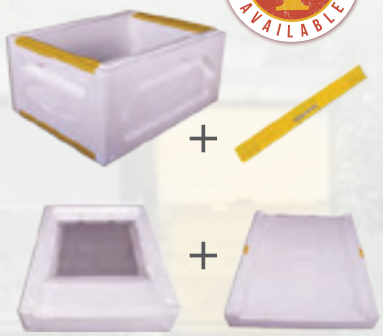

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