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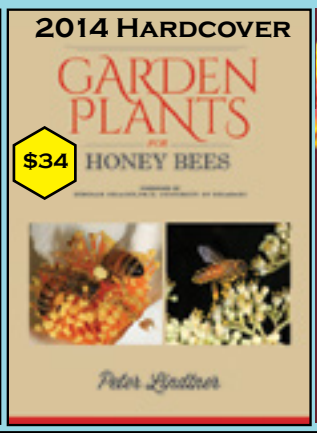

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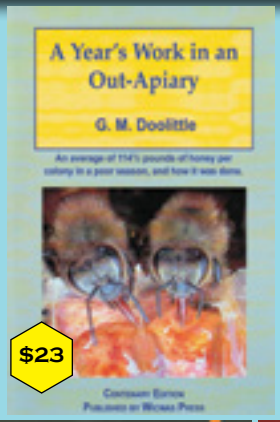

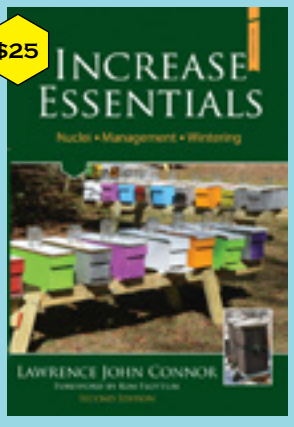

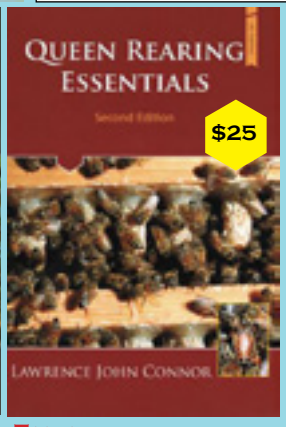

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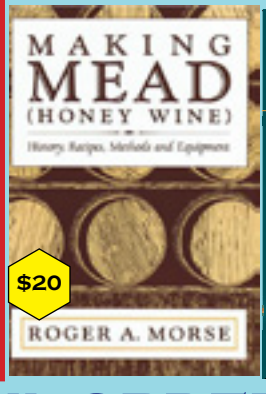

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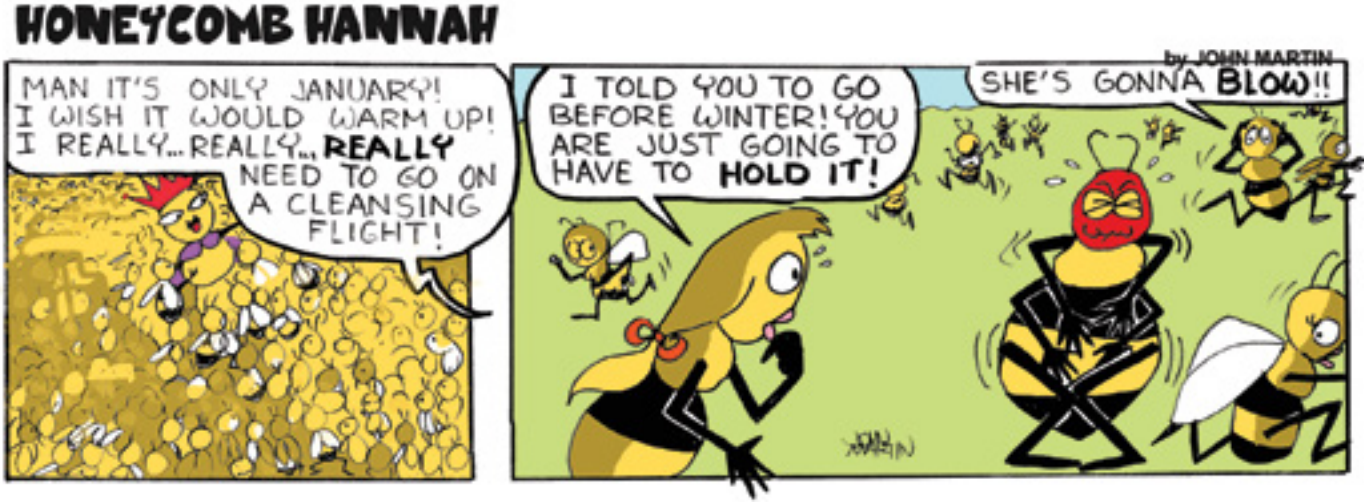

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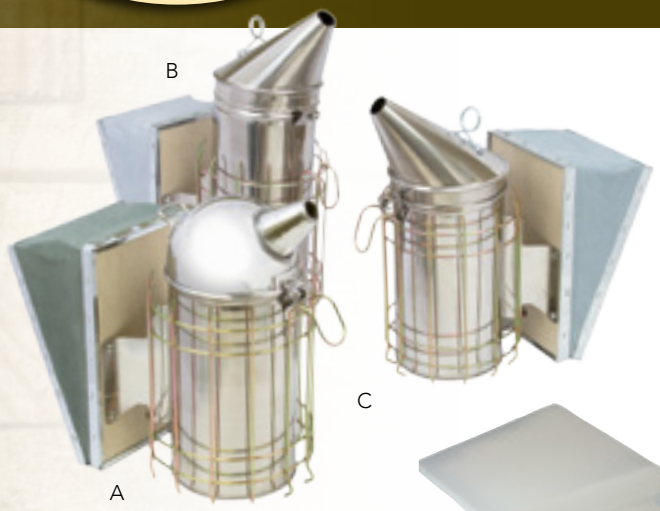

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Fungicides, Bees & Pollen

I'm a beekeeper and a diversified vegetable/cut flower farmer in RI. I've been at this for several decades – my first hive was in 1977.

I am not kidding when I say that one simply has to use fungicides on tomatoes if one is to get a marketable crop. I use Cornell's "Decision Support System" for my tomato crop (see **www.blight.eas.cornell.edu/blight**) and, per its instructions, sprayed 16 times this past season. Fungicides are similarly essential for my dahlias, cucumbers, charentais melons, long-season pumpkins, greenhouse okra, etc. Besides foliar fungicides that I use, there are, of course, systemic fungicides like myclobutanil which can be much more effective, but if any of these inhibit bee bread fermentation, that is a serious problem in my book.

A relative attended one of Marla Spivak's lectures and asked about this issue for me. Spivak's answer was that this is an active area of research, but that fungicides kill microbiomes in the bee's guts and may be killing enzymes in stored pollen. In other words, use of fungicides can be problematic.

I spray only in late afternoon, but when you are talking several hours every few days, it is obviously not possible to avoid touching some pollinators in the process. While I am not certified organic, I could be were it not for the necessity of fungicides. Even then, I alternate an organic (such as copper hydroxide) with a non-organic (such as chlorothalonil) so as to avoid contributing to fungal resistance – even though organic fungicides require greater spray volume and much more frequent spraying. In the meantime, all my field margins are entirely natural and I keep some part of my land in flowering buckwheat at all times.

Bee Culture has published articles that touch on this issue (fungicide impacts on bee nutrition), but I need management advice rather than speculation. I encourage you to commission such advisories and publish as soon as you can.

Dan Geer

Removing Wax From Plastic Foundation

I'm contemplating pressure washing the foundation, recoating it with new wax, and installing in new wood frames.

I'm not qualified to comment on the durability of viruses but have for years striped and reused plastic foundation with no observed ill effect. The key to fast stripping is the right heat. Too hot and the plastic bends and deforms, too cool and it is an arduous processes. Far better (IMHO) than pressure washing is laying the frames out on a rack in the sun and peeling the warmed comb off with a six-inch drywall knife. I believe the right temp is around 110°F. For me in eastern WA it is a summer job and the frames if set to receive direct sun will be just right in 10 to 15 minutes outside temp maybe 85 or 90. That is about as long as it takes to do a box of 10 deeps. A drum with a couple of re-bar rails on top to place the frames vertically on, a 6" knife and a straw hat is all you need. Experimentation will tell when the wax is just soft enough. When it is the old comb with cocoons it peels off in a single sheet just like wallpaper in a couple of seconds. No need to re-coat the foundation, there will be enough wax left and I reuse the frames. My experience is that the bees readily accept it and draw out new comb perhaps faster than with new foundation. My experience is that the economy is real.You trade labor for money. A new frame and foundation is $1.50 and 10 minutes to assemble. I can strip 100 frames in three hours including a sit down and a sip of brew. An oven would probably be even better but this method works good for me.

Paul Hosticka
Dayton, WA

Winter Management

I read with earnest the interesting article "Winter Management" by William Hesbach Nov 2016 *Bee Culture*, having done some "research" on wintering bees way back in 1969 at the University of Maine. Based on the prevailing overwintering methods of that time, (leave lots of honey as the bees do

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their own insulating) which haven't really changed much to this day. This was the premise I used for my senior paper . . . "Determining the Coefficient of Conductivity of the Insulation shell of a honey bee colony." The coefficient is the reciprocal of the commonly know "R" value of insulation.

I found the argument of adding insulation around the hive interesting. I do wrap my bees and add insulation above the inner cover. However in the beeyard at the University were the abandoned large boxes that were at one time used to insulate the entire hive.

Bill Scott
Upper Chichester, PA

Bill's Response From 2008 – I read with interest the article "Use Temperature to Monitor Hive Health" by Frank Linton in the May 2008 issue of *Bee Culture*. It reminded me of a project I conducted as Mechanical Engineering student at the University of ME during the Winter of 1967. Under Dr. Leo Boulinger of the Univ of Maine Entomology Department, I placed 96 thermocouples throughout a 1 and 1/2 story standard Langstroth hive. The goal of the project was to "Determine the Coefficient of Conductivity through the Insulation Shell of a Honey Bee Colony," or how good (R- value) was the insulation shell.

While the ambient temperature was around 30°F, the highest reading in the hive was 88°F, but this was early in February and hopefully not during brood reading. I used isotherms (constant temperature gradients) to depict the location and size of the cluster, and made

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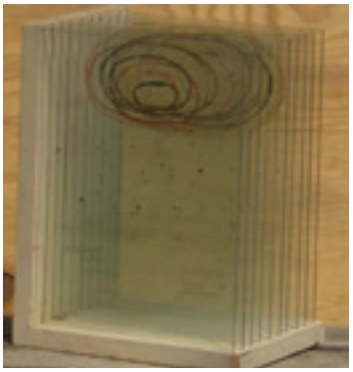
a half size model of the cluster using window glass pains sketch the isotherms. It can be seen that the cluster was at the top of the hive and formed an ellipsoid, not a nice sphere.

Oh, yes I did calculate the coefficient and it came to approximately the same as Gypsum or a R-value of about 1 for a two inch thick insulation shell of honey bees.



Master Beekeepers

I'm writing in response to your recent article about Master Beekeeping Programs written by Jerry Bromenshenk. I live in South Carolina and am past President of the South Carolina Beekeepers Association. Our state, along with North Carolina, Georgia and Florida offer very similar Master Beekeeper Programs with three to four levels of certification. In my first three years as a Beekeeper I was able to progress to the second level defined as "Journeyman." The only skill and practical evaluation in the apiary occurred early on in the "certified" level when I had to light a smoker, identify hive components and what point out different bees and resources in the hive. Thats it! Nothing in the Apiary at all for the Journeyman level!

My background is heavily in the technical arena and adult education so I understand how effective skills and knowledge training can play an important role in human performance. Unfortunately, many Master Beekeeper Programs across the country appear to be an academic exercise with a heavy focus on knowledge about Honey Bees and beekeeping and little emphasis on skills that are essential for Beekeepers. If you can read, watch videos and pass a written test, you can fly through these programs, however, the Honey Bees will not be impressed with your certificate if you don't know what you are doing when you pop the lid!

Master Beekeeper programs also tend to lump all beekeepers together when we know skills and knowledge requirements change from backyard beekeeping to sideline beekeeping to commercial beekeeping. While it is true that about 90-95% of our Beekeepers are hobby beekeepers, it is also true that 90-95% of the Honey Bees in the USA are owned and managed by our commercial Beekeepers.

Except for the University of Montana online program, most are not rigorous or connected to structured mentoring where Beekeepers can learn the "best practices" in the Apiary. After all, we are trying to develop successful Beekeepers and not add to the revolving door problem where over 60% of our new Beekeepers give up after a year or two.

Bee Culture has published articles from Ann Harmon, Ross Conrad and others about Mentoring. As we say in South Carolina, "Bless their Hearts" as they have pointed out the "Elephant in the room" when discussing Beekeeper training. No doubt, there are Mentors in most Local Associations around the country, but as Ann Harmon points out, the Mentors and Mentees need a program with guidelines to insure sustainability and use of "best practices" for their area. Some of the skills that need to be mentored are: detailed apiary/hive/colony inspections, splitting colonies, requeening, mite detection/ treatment, swarm prevention, swarm capture, to mention a few. Until we can offer structured mentoring to our new Beekeepers and connect that to the existing Master Beekeeper knowledge curriculum, we will continue see the revolving door, or should I say, "running for the door" beekeeping.

Larry Haigh
Mount Pleasant, SC

Bees Committing Suicide

I started keeping bees in April 2006. Mirret Lipptrap gave me my first swarm. Then, by catching

swarms on my own and catching other swarms people asked me to catch, in five or six years, I was up to 20 hives. The only thing I had to worry about were mites and wax moths. Then, shortly after came the hive beetles; I found out the hard way that you can't keep bees in shaded, damp places. I lost my first four hives because of hive beetles.

Then around 2012, I started seeing softball-size swarms in the Fall, and when I checked my bees in the Spring, I had lost four or five hives. Each Fall, the swarms got bigger and each Spring I lost half my hives. I'm down to three hives.

When the bees swarm in the Fall, the swarm can't survive because the bees have nothing to eat, and the hive can't make it because they don't have enough bees to stay warm. So they freeze or get robbed and die. But either way, when they swarm that late in the year they are committing suicide because there are no drones for the queen to mate with. So when they swarm in the Fall, both the swarm and the hive end up dying.

A friend that I helped get started in beekeeping called me on September 29 and said her bees had swarmed, and I called Shane at Valley Bee Supply on October 5, and he said he had a swarm that morning! The only solution I can think of is to do a split and then requeen both the hive and the split. This is the only idea I have, but maybe someone out there has some other remedy for this problem?

Steven Easter
Fishersville, VA

Climate Change

Jim Cody suggests that a discussion about climate change has no place in a journal like *Bee Culture (*October 2016). I disagree. Environmental change is the biggest issue that faces

us nationally and globally and it significantly impacts bees and beekeepers.

A changing climate is projected to cause longer, more unpredictable Winters and hotter Summers, with a shortened Spring in between. Wayne Esias in MD, for example, has NASA-based data to show how the bloom period, at least in the north east, has started increasingly earlier. If I recall correctly from his remarkable presentation, many plants are now blooming 27 days earlier than they were 40 years ago.

One example might explain the relevance for beekeepers. In PA, in February, honey bees respond to daylight hours to trigger their recovery from the Winter cluster. Daylight hours do not change; temperature does. So the date of the onset of the queen laying is likely to remain the same even though the nectar flow is starting earlier. Thus there is an increasingly shortened period in which a colony can reach the necessary strength to take full advantage of the available nectar, and farmers and orchardists are going to be asking for colonies increasingly earlier each year.

So colony build up in the Spring will become a major issue, and presumably more so the further north one lives. Again, the brood cycle is constant and cannot be hastened – no matter what the beekeeper does it takes 21 days for a worker bee to grow from egg to emerging adult bee.

What are the answers? I don't know, but at least let's pool our thoughts and seek collective solutions. Unlike the global actions and decisions needed to prevent climate change (that train has long since left the station) we as beekeepers have the chance to be proactive rather than reactive. It is regrettable that for some these environmental changes, their reality and their causes, are seen through political lenses, a division which can only forestall open discussion and positive actions.

So I for one hope that *Bee Culture* will continue the lead initiated by Ross Conrad and that it will foster a public forum on the topic, whether the connection with honey bees is implied or stated.

Jeremy Barnes
Seven Valleys, PA

Ontario – Neonics?

Who is Connor Lynch and why is he out to undermine the Ontario Beekeepers Association (OBA)? I'd like to know more about him and why he has written this article. The only thing I can find out is that he writes from Feversham, close to the operation of Hugh Simpson, a beekeeper he cites in his article, and who has unsuccessfully attempted to start a rival organization to the OBA.

I was recently alerted to Lynch's article in Catch the Buzz and was dismayed to read the misinformation and to see that it is being distributed in Facebook posts in many parts of North America. I am writing to correct some of the misleading statements in the article, that appear to be aimed at damaging the reputation of the Ontario Beekeepers Association (OBA) and discounting its concerns about the impact of neonicotinoids on bee health.

Let me respond to three of the most misleading statements included in Lynch's letter.

First, he describes the Ontario Beekeepers Association as made up "mostly of hobbyists and part-time beekeepers." This would actually be true of most beekeeper associations in North America where hobby beekeepers are proliferating. Ontario has an estimated 101,000 hives and 2500 registered beekeepers. Of these, 225 commercial beekeepers manage 85% of the colonies according to the Ontario Ministry of Agriculture. Most of these commercial beekeepers are members of the OBA and make up the majority of members of the OBA Board of Directors, and provide direction for the activities of the organization. The implication that the OBA is made up of hobbyists and part-timers who don't know what they are talking about is simply wrong.

Second, Lynch quotes Kevin Nixon, an Alberta beekeeper who says "money is being wasted (by the OBA) by fingering neonicotinoids when there are a number of other threats to bees." Although he is president of the Canada Honey Council, Nixon clearly has no idea of the broad work of the OBA, including the excellent Tech Transfer Program which employs four highly qualified staff who conduct and publish research on a wide variety of beekeeping issues. In addition to research, Tech Transfer staff offer training programs in areas such as Introductory Beekeeping, Integrated Pest Management and Queen Rearing. Tech Transfer staff also spend much of their time and budget educating Ontario beekeepers about methods to protect hives from *Varroa* mites, American and European foulbrood, small hive beetle and other threats. The OBA is NOT a single-issue organization. That said, the OBA has indeed been quite active on the neonicotinoid issue out of great concern about the widespread use of those pesticides on more than two-thirds of Ontario farms and its impact on honey bees.

A third misleading statement, and perhaps the most egregious, is Lynch's claim that science doesn't support the concern the OBA has for neonicotinoids. Wrong. The science is quite clear. There have been more than 800 studies examining the spread and impacts of neonicotinoids worldwide. The recent Worldwide Integrated Assessment on Systemic Pesticides, which involved 29 scientists from 10 countries, reviewed virtually all the studies done up to 2014, including studies financed by the pesticide industry. The scientists documented a perceptible decline in insect populations from the 1950s onwards, which they attributed both to the general impoverishment of the natural environment and the massive use of pesticides and herbicides. They noted the steeper decline that began in the 1990s, coinciding with the introduction of neonicotinoids in large-scale applications on an ever-increasing range of crops.

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The Assessment reported that: "The present scale of use, combined with the properties of these compounds, has resulted in widespread contamination of agricultural soils, freshwater resources, wetlands, non-target vegetation and estuarine and coastal marine systems which means that many organisms inhabiting these habitats are being repeatedly and chronically exposed to effective concentrations of these insecticides."

With respect to bees, the Assessment had this to say: "Studies of food stores in honey bee colonies from a range of environments worldwide demonstrate that colonies are routinely and chronically exposed to neonicotinoids, fipronil and their metabolites – often in combination with other pesticides in which some are known to act synergistically with neonicotinoids." Bees concentrate neonicotinoid contaminants in their food. Neonicotinoids are also concentrated in the honeycomb cells in which multiple generations of bees are raised. These exposures "have been shown to adversely affect individual navigation, learning, food collection, longevity, resistance to disease and fecundity…"

Considerable research, published since 2014, confirms the science on the negative impacts of neonicotinoids. Many jurisdictions – including Ontario – have begun to restrict the use of neonicotinoids in response to this science.

Like beekeepers in other parts of the world, Ontario beekeepers are having trouble keeping their bees alive, especially over Winter. Yes, part of the problem is *Varroa.* The OBA does not ignore this problem. On the contrary, the OBA has a very active program that encourages beekeepers to monitor for and effectively treat *Varroa.* It is a slander to say that the OBA ignores other problems confronted by bees and beekeepers in Ontario. The OBA has an active program monitoring and reporting on the small hive beetle, for example, which has only recently invaded Ontario from the U.S.

Full disclosure: I am one of those part-time beekeepers who is a member of the OBA. I took up beekeeping when I retired several years ago and have found the information provided by and the events hosted by the OBA to be invaluable in my development as a beekeeper. I have a doctorate in work environment policy, training in toxicology and worked for many years in the field of regulating toxic substances. I regularly read the science on neonicotinoids and other threats to bees and pollinators. So back to the point I made at the beginning of this response, I would like to know who Connor Lynch is and why is he spreading misinformation about the OBA.

Jennifer Penney
Toronto, Ontario

Bees On The Balcony

I was away for one week and the birds used my balcony as a toilet. To prevent this from happening again, I fashioned dull electrical tape(not the real shiny kind) loosely on the balcony railing with cable ties without removing the paper backing, hence the flutter-ability. This served as a semi-reflective item, it fluttered in the wind and the cable ties served as primitive bird spikes. But now the balcony is attracting bees. They are just sitting on the tape or the vertical balcony bars, lots of them! They didn't even move when I went to investigate. Any comments?

Linda M.

Russians On The Move

Thank you for running Malcolm's article on the Russian Bee program in *Bee Culture*. I thought it was a very good summary of the RHBA. He did recognize what we have accomplished, and also pointed out many of our concerns as we enter the next phase of the program. The need to grow, to do more outreach and educate beekeepers on best management of these excellent bees has been added our agenda. As the new RHBA President, I asked Steven Coy to head up a committee to develop a training program for beekeepers interested in working with our Russian stock. We hope that you can help us with some of the promotion, even to host another event for us. The idea will be to put a seminar together, presented by several of our members, in an organized "how to" program. We would schedule it in different areas in the U.S. where we have found interest in the Russian bee. It is apparent to me that RHBA needs to be developing interest and maybe potential members if we are to sustain this association beyond its founding members. I really do not want it to merely become another footnote in Beekeeping that gets forgotten after making important contributions to our bee culture.

Setting up a training or orientation program was suggested by Tom Rinderer at our Gulfport, MS. meeting and approved by our members as the next step for the program. Tom is continuing as our technical advisor even though he is officially retired. Members from the Bee Lab (Lilia De Guzman and Mandy Fake) reviewed our progress to date and gave us encouraging news. We have demonstrated that we can maintain a high level of genetic purity in our assigned breeding lines, and do so in a variety of regions & conditions. We have also made steady improvement in mite tolerance – keeping this flat and even seeing better results in the past several seasons. Commercial samples show a steady increase in mite levels, and increased dependency on treatments (more frequent), while our members are using little or no treatments on their production colonies (Colonies used for breeder queen selection are never treated as a requirement of the RHBA policies). We voted to raise the POA (Probability of Assignment - as Russian) to .75 for any Queen being considered as a breeder. Many of the members have shown they can reach 100% with proper drone source, and isolated mating yards. My point is that we are meeting our mission goals to maintain the genetics of our bees, and continue to improve *Varroa* tolerance. I can speak for myself, by saying this is hard work, and many times self-doubt that it can be, or is being done, come to my thinking. Having a program with other Queen breeders and the Bee Lab's testing affirms al the member's work.

As the new RHBA President I will be pushing for more outreach and growth for our association. Age has its wisdom and many of our members do have wisdom, but age also has a shelf life and we need young, energetic and skilled members to keep this thing going.

Dan Conlon
South Deerfield, MA

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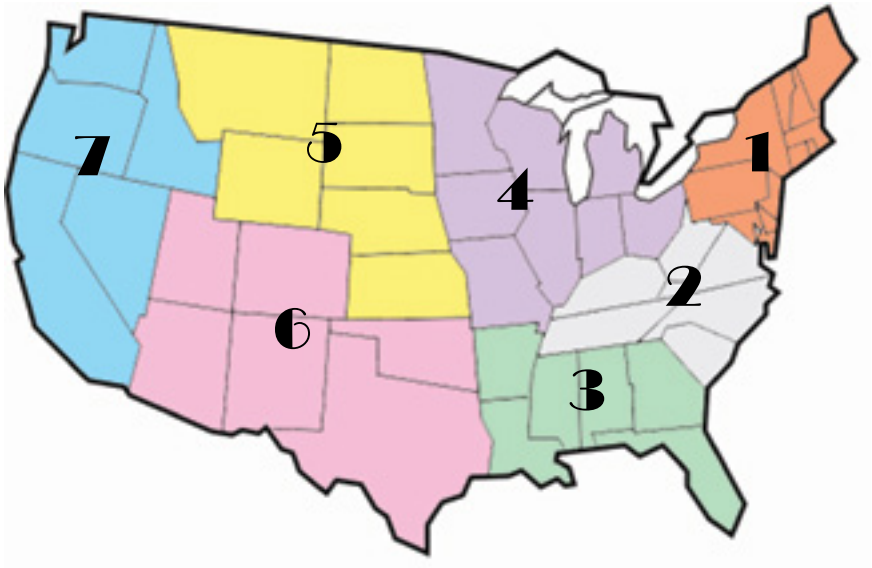
JANUARY – REGIONAL HONEY PRICE REPORT



Management Practices

We queried our reporters this month with several management questions covering pests, feeding, queens and other aspects of keeping bees. Take a look and see how they do bees, and where your operation falls in the list.

16% routinely medicate for Nosema, and 17 routinely treat for AFB. That AFB figure will change next year we suspect with the new antibiotic regulations coming on. 86%, however, routinely treat for Varroa, which meshes nicely with the fact that 39% are using survivor or locally obtained queens.

When feeding, 56% use sugar syrup, 24% give HFCS, while 12% feed fondant, and only 19% use a stimulant. Meanwhile 46% offer pollen substitutes and only 8% feed collected pollen.

Varroa IPM is important to all our reporters, but they vary in how, what, when and why. 55% use organic acids for treating, and 24% use essential oils and only 20% use drone comb removal. Using what works, and is cost effective in their operation remains the choice of most beekeepers.

Beekeepers are groupies, sort of. Only 60% belong to a local association, while 35% belong to a regional group, and only 20% belong to a national association. Other surveys we've conducted, of beekeeper readers who are not regular contributors, have memberships in these groups at just over half of these numbers, so our reporters are more social than many.

10 frame equipment dominates the beeyard still, with 79% using those big boxes. 15% are using 8 frame, and 11% have top bars. 18% do use 5 frame nucs during some part of the season, but in our group essentially nobody had a warre or other type of hive. This makes sense actually, since our reporters are businesses for the most part.

Queens are a problem everywhere it seems, but less so with those who rigorously chase *Varroa*. But where do you get new queens? 29% buy all of their new or replacement queens, 46% buy some, and raise some, and 13% raise all of theirs. But what kind of queens you ask? 17% have some Russians, not surprisingly 49% have Italians (maybe this is a surprise in that it's not more), 43% have Carniolans, and as noted, 39% are using at least some local/survivor stock, while 18% take whatever they can get and 31% are raising their own best stock. A good choice.

Old comb replacement should be practiced more we believe, but only 8% replace two year old or newer comb, 27% move out three year old comb, while 65% change it out when they have to, which wasn't asked about – so we are guessing when a comb breaks, or it's very, very dark.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.55	2.07	2.29	2.51	2.23	2.08	2.63	1.25-3.00	2.23	2.23	2.19	2.14
55 Gal. Drum, Ambr	1.45	2.03	2.01	2.49	2.12	1.99	2.63	1.25-3.00	2.12	2.12	2.06	2.09
60# Light (retail)	226.67	186.25	200.00	206.68	171.00	186.28	255.00	120.00-300.00	209.14	3.49	203.63	189.23
60# Amber (retail)	231.67	183.88	188.75	200.96	207.20	169.08	260.00	110.00-300.00	209.41	3.49	202.11	189.73
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	91.80	74.45	96.48	61.64	66.00	105.12	130.00	55.92-130.00	86.99	7.25	84.80	80.43
1# 24/case	127.92	106.85	112.93	104.03	127.16	128.86	161.60	81.00-190.00	122.04	5.08	127.53	117.20
2# 12/case	115.60	94.47	103.36	105.84	97.44	103.74	121.00	78.00-158.52	108.45	4.52	117.04	105.03
12.oz. Plas. 24/cs	107.57	84.06	87.67	84.11	74.40	109.20	111.88	63.00-168.00	96.59	5.37	99.48	92.92
5# 6/case	129.29	109.05	88.00	111.93	102.30	131.56	160.00	71.50-204.00	120.99	4.03	125.49	121.70
Quarts 12/case	161.94	128.63	127.67	127.46	155.32	138.48	170.25	108.00-216.00	142.11	3.95	142.72	138.59
Pints 12/case	137.23	86.61	70.40	63.27	111.00	82.74	101.33	45.00-280.00	91.98	5.11	89.21	89.15
RETAIL SHELF PRICES												
1/2#	5.29	4.30	4.25	4.25	3.90	5.89	6.17	2.00-7.75	4.84	9.68	4.74	4.30
12 oz. Plastic	6.39	4.93	4.96	5.13	4.73	7.11	7.96	3.00-10.00	5.98	7.97	5.75	5.35
1# Glass/Plastic	7.53	6.71	6.83	6.52	6.31	6.52	10.87	3.00-16.00	7.57	7.57	7.75	7.01
2# Glass/Plastic	13.40	10.59	11.73	11.59	10.47	10.45	15.50	6.00-20.00	12.26	6.13	13.03	11.59
Pint	12.39	9.10	7.64	10.56	9.00	10.75	15.15	4.50-20.00	10.54	7.03	9.84	9.67
Quart	19.24	15.75	14.17	15.50	15.66	16.79	23.36	9.00-40.00	17.38	5.79	17.13	16.14
5# Glass/Plastic	27.43	24.46	33.00	26.42	24.95	23.60	32.50	15.00-41.00	27.03	5.41	27.74	25.81
1# Cream	9.23	8.58	9.94	7.90	11.60	6.25	10.75	5.50-16.00	9.13	9.13	8.68	7.80
1# Cut Comb	12.31	9.56	8.33	9.38	11.00	6.50	15.33	5.00-22.00	10.83	10.83	11.08	9.40
Ross Round	9.49	6.50	14.26	10.50	14.26	10.25	16.13	6.00-30.00	10.53	14.03	9.68	8.36
Wholesale Wax (Lt)	7.55	5.21	3.90	5.83	6.00	5.31	7.25	3.00-10.00	6.13	-	6.17	5.75
Wholesale Wax (Dk)	7.31	4.84	3.95	6.00	6.01	3.25	5.50	2.85-10.00	5.60	-	5.60	5.09
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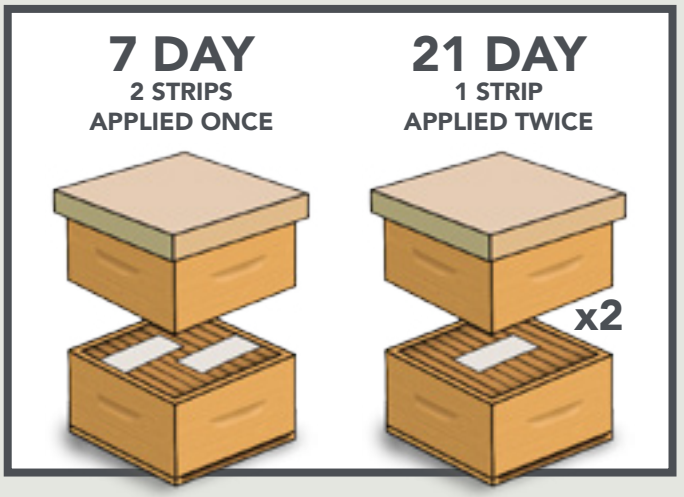

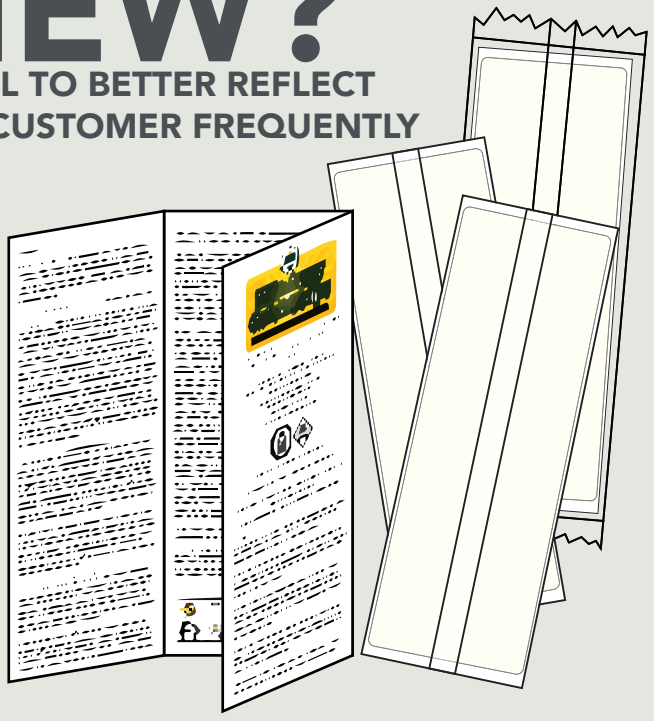

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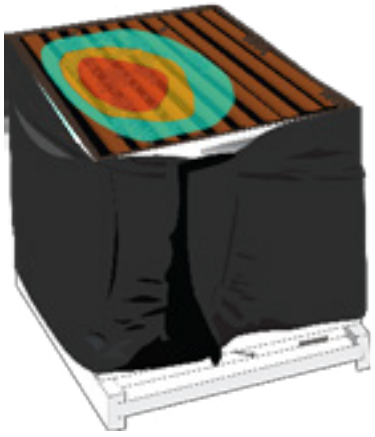

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Over the years I've had the opportunity to do some pretty awesome things in the name of doin' my job here. I get to travel to distant lands, meet very cool people, speak to an incredible variety of groups and get asked my opinion, a lot. And when I need information, most times any door I knock on gets answered. Plus, every day I get to work with some of the keenest beekeeping writers and minds in the world that have consistently produced excellent material for our magazines and books to share what they know and find. And I get paid to do all this no less.

But I'll tell ya something, last week I got to be a part of something that I think was even better than almost all of this.

A large contingent of University and Government scientists are applying for a humungous grant to deal with honey bee health by looking very hard at *Varroa* and virus. And to their credit, rather than assume they know the problems and where to find the solutions and proceed without any interference from those of us in the world who actually have to keep honey bees alive on a day to day to day basis, they invited commercial beekeepers, University Research and Extension folks, USDA bee scientists, Apiary Inspectors, Apis m people, queen producers, chemical and other industry researchers, and me, to come together for a day to share what we know, and to find out what it is this industry actually needs to economically, efficiently and profitably keep bees alive, doing what they are supposed to be doing. And to their credit, a third of these folks actually keep bees for a living.

Dr. Reed Johnson, our Ohio State Honey Bee guy in Wooster spearheaded this whole thing by actually writing another grant to make it possible for all these folks to get together for the meeting that covered travel for some, hotel and the rest so they could be there. Those of us not involved in the actual grant along with those writing the grant spent a day talking and listening and learning what it takes to keep bees alive, how successful those attempts are, what are the problems, what are the off-label solutions if any, how much does it cost, how long does it take, and in the end, does it work. This was, to me, an incredible eye-opening experience. To listen to that many commercial beekeepers, running from a small few thousand colonies to many tens of thousands of colonies detail their operation's *Varroa* control programs and quietly list how well it works, or doesn't, was a once in a lifetime experience for me, and, I'm told, by many in that room. The next day the grantees took what they already knew and what they learned the previous day and put their collective heads together to get the most, best information together to ask the hardest and best questions possible. I'm impressed with just the fact that this happened, let alone what we were able to accomplish in a day. Here's some highlights . . .

Quick reviews of *Varroa* life cycle, chemistry, mating and varieties (there are four, you know); *Varroa* genetics, resistance to chemicals, cooperation with viruses, susceptibility to honey bee behaviors relative to resistance to mites; the viruses – one of the other reasons this grant was being pursued – including a very long list of some of the viruses honey bees have, like Deformed wing virus A & B, Israeli acute, sacbrood, *Varroa destructor* A & B, acute bee paralysis, Kashmir bee virus, black queen cell virus, chronic bee paralysis virus and Lake Sinai virus. Get all that?

Then a quick discussion on action thresholds. When should you treat for *Varroa*? Well, that's a moving target anymore. The old way was to gather a half cup of bees, from anywhere in the colony as long as you always gathered them from that part of the colony (honey super bees will have fewer phoretic mites, but will always have fewer so if you always check those bees, you need a lower threshold, but if you know that you'll do OK). But, if you gather from the brood nest, give the collection tub a shake and the old bees will fly away, so you'll have mostly younger bees and always do it that way. Once gathered, do an alcohol wash to measure how many/300 bees. That threshold was 3%, or 9 mites in a sample and you should do something (see below), but that has changed because unofficially, commercial guys, well some of them anyway, have found that to be too high and too late and are now going with 1% and treat. But that, too, depends…on the time of year. See below on that, too. And that seems to be working better, kind of, so far.

Treatments . . .

Hard chemicals include Apistan, thymol, apivar (amitraz, tactic/mavrik), checkmite,

Or, soft chemicals like oxalic acid (seems to be working about as well as amitraz), hopguard, formic acid, and the essential oils,

Or, prevention, which includes finding a pest free area to have a beeyard, powdered sugar and small cell, controlling swarming so you had isolation from colonies with mites,

Or, avoidance which includes isolated bee yards, screen bottom boards, drone trapping, brood interruption and resistant bees.

You'll note where resistant bees are on this list. And every one of these folks tell me it's not because resistant bees don't work or they don't want them, it's because nobody is producing any in serious quantities. There's no demand because nobody is producing them so nobody asks.

Cost – rough estimates, but more better than I've ever seen. These are on a per colony basis for materials only, labor extra.

Varroa Virus Research

Apivar - $5 - $6, Apistan - $4- $6, Checkmite - $5 - $6, Apiguard - $4 - $5, Apilife - $4, Mite Away - $5 - $7, Oxalic – less than $1, Hopguard - $4 - $7. Can you imagine the labor costs to monitor, treat and re-moniter when you have thousands of colonies and hundreds of beeyards? Re-monitoring isn't really an issue they tell me because they'll be monitoring again in a month or so any way, and that'll tell you how well the treatment worked, or didn't.

But how many times do they monitor? On average for all these operations, eight to 12 times a year, with, depending on the year, four to eight treatments per year to keep the numbers of mites below that threshold, which does change over the season, running from zero to one in Spring, two to three early Summer, five in Summer and as many as six in Fall. Less brood in the fall means there will be more phoretic mites so you can expect more in later samples.

But you can't go by just this. After some significant research by commercial beekeepers, in the field with thousands of colonies, they are finding much different outcomes than researchers with a dozen colonies just outside the lab door. For wintered colonies in warmer areas there's high brood, thus lots of mites, and they need monitoring every 10 days. And, depending on where they sit after Winter, some will need 10 treatments a year, some only one. It just depends on – association with nearby colonies, farm management in the area (pesticide exposure), available nutrition, where they came from with an initial mite load. By sampling only three to four colonies per yard good beekeepers can almost tell without sampling how the load will be by how close to other bees, and how many operations are nearby – one big, but well run operation is less of a problem than lots together and one or two who don't take care of mites and mess up all the nearby bees.

As far as treatments are concerned, they need products and delivery to control pests with limited risk to the bees, they need new ways to deliver current products, novel modes of action on the mites, better cooperation from EPA and USDA, more examination of orphan compounds, and closer looks at adjuvants and carriers and delivery techniques. Needed too are antiviral products (mushrooms were mentioned) and reformulation of existing compounds. Wanted, too, are a lot are extension specialists who can actually talk to commercial beekeepers and offer that scale of advice and knowledge. And one excellent suggestion – survey almond growers and find out which beekeepers are consistently good, and then find out why from the beekeeper.

And problems. What were the problems that everybody in the room could list . . .

In no particular order, except that all should be at the top of the list – drifting/immigration of mites from other locations and nearby crashing colonies, off label use of unregistered compounds, lack of incentive for chemical companies to spend money on new compounds, sustainability/loss of efficiency, cost of material/cost of application labor, equipment contamination/collateral damage to bees, queen effects/non target issues, purity of honey, needed frequency of treatments/monitoring/labor, efficacy of existing treatments and resistance, new beekeepers, viruses, DWV/monitoring, the overall agricultural system's use of pesticides, and the general overall negative philosophy of state level ag departments toward beekeeping.

OK, that's what we did that day. I know I didn't get it all, and some of this may be a bit jumbled, but it was an eye opening day for me, and, I'm told, for many in that room. What does the commercial beekeeping industry need in terms of *Varroa* and virus control? Now you know. And so do those researchers applying for that multimillion dollar grant. Study hard friends. Ask the right questions, seek the right answers.

Oh, and one more thing, before I forget. About my job. Every day I get to go to work with my wife, who's my best friend. And you just know that's the most awesome thing of all.

•

All this brings to point the issues with *Varroa*, and not controlling *Varroa*. There is, as you well know, a fair number of beekeepers who espouse non-treatment, or natural beekeeping, offering nothing to the bees to deal with the mites. Chemical free, small cell, local, survivor, *Varroa* sensitive hygiene, Russian, ankle biters, hygienic – there are lots of names given to bees who either do deal with mites to some degree, or are left to their own devices and if they do deal with them, great – but if they don't, then they weren't meant to survive and good riddance. And any treatment at all is simply out of the question.

We all know the problem when they don't survive and the good riddance signal is given. Those bees don't simply all die, quietly, on the floor of the hive, without a whimper, without a whine, without so much as a good bye and good night. What they do is, swarm, abscond, leave. Taking mites and viruses with them. Research shows marked bees from collapsing hives in apiaries more than two miles from the original hive. Two miles! That collapsing hive infested nearly every hive within two miles with mites, with virus, with death, so not only do the bad die young, they all die young. And mites and bees and virus and death are spread around and around and around. Even quite hardy, nearly mite proof bees can't withstand an onslaught from an untended, uncontrolled, natural hive. Letting these hives collapse and spread their deadly message is a criminal act. Pure and simple.

But there is a right here. Selecting for bees that don't die of mites and virus means getting those bees out of the system. It's really the only way to make resistance/tolerance happen in the population. But it's not the bees. It's the genes. It's the queens. It's the queens. Let me say that again. It's the queens.

Got a collapsing hive, loaded with mites? TREAT THOSE BEES, AND REPLACE THAT QUEEN. And don't replace her with a queen from the same place you got the queen from that's in the hive that just collapsed. You know the saying about doing the same thing over and over and expecting a different result each time – that's just plain crazy.

Don't let the mites and virus spread from your natural hive. Save the bees, lose the queen and keep checking for mites and save the bees – and lose the queen.

Happy New Year.

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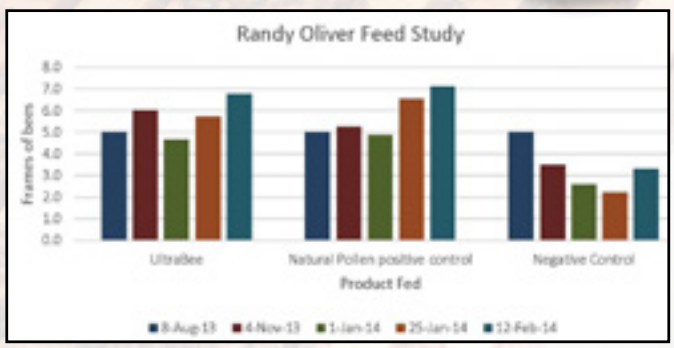

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It's Summers Time –

Catching Up

Here we are at the start of 2017 – can you believe it? The year 2016 was an exciting – and a little bumpy – year for *Bee Culture*.

We started a new quarterly magazine for absolute beginner beekeepers. It's called *BEEKeeping, Your First Three Years* and it has been very well received. In fact we sold out of both Spring and Autumn issues. There are some Summer and Winter left, but hurry if you want to get them. It has been available on our web site and also on newsstands like Tractor Supply, Barnes & Noble and other local stores. Starting now, actually a few weeks ago you can now subscribe to *BEEKeeping*. You can order online or send us a check for $20 for a one year subscription of four issues.

We're looking forward to the new year. There are lots of things ahead for our *Bee Culture* team. It's going to be a busy year. But even though we're short-handed – again – we're up for the challenge. We have an amazing group here.

You can subscribe to *Bee Culture* (print or digital), *BEE-Keeping* (quarterly, print only for now) and CATCH THE BUZZ at **www.beeculture.com**. It's easy to do. You can also order all of the books that we sell on our web page. And there is just lots of practical, helpful information on the website, also. So please take a few minutes and visit us there.

Kim, Jean and I will be at the joint meeting in Galveston in January. Jean is our advertising coordinator, so she'll be visiting all of you that are exhibitors to introduce herself so you have a face with a name. We won't have a booth ourselves but we'll be roaming around so make sure you say hello. Hope to see bunches of you there. It should be a great meeting. Our biggest challenge will be getting out of Cleveland in January. Keep a good thought about the weather.

Each year right about now I talk about the Tri-County meeting in Wooster, Ohio. It's the first Saturday in March which is the 4th this year. There will be a thousand people there so sign up early. Almost every bee supply dealer you've ever heard of will be there. It's worth the trip.

Bee Culture will be doing another Pollinator Day, probably some time in July right here on the grounds of the Root Candle Company.

I mentioned our next October event would be *Bee Culture's* Best. Well, we may have to change the date on that meeting. So stay tuned for more details. It's difficult to get all of our writers together on the same weekend. But we're still hoping to make that work with as many of them as we can.

We have several new books that will be published in 2017. We're working hard and as fast as we can to get them done for you. So keep watching the pages of *Bee Culture* and our website.

The last two years things have been bumpy for us – our new subscription data base which was painful for all of us, changes in staff which is also always painful, and starting a new magazine. The data base has all the bugs worked out and is working smoothly now. We are still short-staffed, but the staff we have is amazing. They work hard and fast to take the best care of you that we can. We appreciate your loyalty and we appreciate your frustration when we don't always answer the phone when you call and you have to leave a message. But some of us work other jobs and are here at some strange hours of the day sometimes. Please know that we will call you back and we will answer your emails just as soon as we can. We are all dancing as fast as we can.

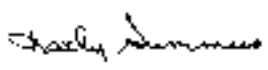
On the home front we're at 15 chickens now. We lost another one in early December. I'm never sure exactly what happens – acting fine one day and the next day hunkered down in the corner of the coop not interacting with anybody, the next day a little better again and the next day gone.

The new part of the coop is finished and we are set up now to house new batches of chicks and ducklings and keep them safe and warm and I now have easy ways to separate any that need to be isolated. So come Spring we'll be getting new young chicks and ducks. We're not sure how many – don't want to go too crazy.

This past weekend we had some wonderful Tomato & Basil soup – made from our own tomatoes and basil. It was delicious. And easy. That's critical to me when it comes to cooking – it needs to be easy.

We have three huge Osage Orange trees on our property. These trees are very odd. Apparently the wood is valuable, but after that they're kind of difficult. They have thorns that are about an inch and a half long and will pop a tire on your riding mower quicker than you can believe. I think I'm at four flat tires over three Summers. We try as hard as we can to get all the sticks picked up before I mow but always manage to miss some. They also have this very strange fruit you see in the photo. You can see how big it is – the size varies – you can't eat this. I did try cutting one open one time just to see what it looked like inside – almost broke the knife. They're kind of a milky white color, tough as leather. Rumor has it that if you put them in your basement it keeps the spiders away. Not sure about that.

Happy New Year. I hope you all have a peaceful Winter. And I hope we get to see many of you in our travels and things that we have going on in *Bee Culture* land.



Vaughn Bryant

Haley **Venglar**

The American Association of Stratigraphic Palynologists (AASP) recently awarded Vaughn Bryant, professor in the Department of Anthropology in the College of Liberal Arts, the **AASP Medal for Scientific Excellence** for his outstanding years of dedication in teaching, scientific research, and service.

"I am overwhelmed by this great honor and for this prestigious recognition," he said. "I only hope that I will not run out of time before finding more challenges to conquer."

The AASP has also chosen him to receive the **Outstanding Educator and Distinguished Service** awards.

Bryant is one of the nation's top experts in palynology – the study of pollen grains – and is one of two forensic palynologists in the United States.

He also started the Palynology Laboratory at Texas A&M University, which is used in a forensic capacity to track ivory poachers, identify counterfeit honey, help the federal government track down terrorists, probe the drug trade, and help investigators identify bodies.

According to Andrew Laurence, a former student of Bryant's who is the other forensic pollen analyst in the U.S., this type of analysis is possible because each region has its own unique pollen print generated from local plants.

"Think of it," says Laurence, in an article for *The Atlantic*, "as a fingerprint for a region."

In 1971, Bryant began his career at Texas A&M, where he began building what would later become the anthropology department. What started as him teaching the subject to small groups of students garnered enough interest to become an undergraduate major and, eventually, a course of study for a graduate degree.

Today, Bryant regularly teaches large sections of introductory-level anthropology courses as well as smaller, specialized graduate courses. Recently, Bryant became the first professor in Liberal Arts to teach anthropology as a distance-learning course via television and the internet.

His efforts to create an interactive learning environment for his students combined with his groundbreaking research reinforce the college's goals to provide a transformation learning experience for our students and conduct research that matters. His contributions to society have brought prestige – and the Department of Anthropology – to the college.

"[Bryant's] positive influence in scientific endeavor and in mentoring generations of scientists has left an enduring impression on the discipline that is more than deserving of the Medal for Scientific Excellence," Guy Harrington, president of AASP, said.

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Unusual Thermal Imag

Wyatt **Mangum**

Thermal cameras have become an important part of my colony management and a tool for my scientific research. In *Bee Culture* (March 2016), I showed how to use a thermal camera to observe colonies in the Winter. Some of those images (called heat signatures) from the Winter of 2014/15 did not fit into the expected behavior of bees forming winter clusters in top-bar hives. This article examines the unusual heat signatures of Hive 11, a three-foot long top-bar hive.

In Figure 1, the upper panel shows Hive 11 as it appears in the apiary with its metal cover removed. The lower panel shows its typical heat signature for mid January at 24˚F. The oval white pattern represents the warmest temperature corresponding to the central part of a Winter cluster. The other surrounding colors represent progressively cooler temperatures, a band of red, a wider band of yellow, a thin band of green, fading into the coolest background color of blue.

A convenient feature of a top-bar hive is that the combs can be numbered and used to indicate places in the hive from the entrance end of the hive. In Figure 1, I numbered the first 10 top-bar combs from the entrance end. Unlike a standard frame hive, the top-bar combs have a unique order from the entrance end of the hive. The number zero marks a narrow wooden cleat, which helps me gain access to Comb 1. From the heat signature of Hive 11, I would expect to encounter the Winter cluster on the back side of Comb 1, where the white color begins. The bees are not directly adjacent to the entrances. They have an empty comb barrier, which is typical, although large clusters may lack one. I expect the cluster would end somewhere near the back side of Comb 4, where the white color ends.

On January 20, 2016, a complicated heat signature appeared on Hive 11, comprising three main unusual features. First, a heart-shaped pattern shown in Figure 2 (upper panel) replaced the oval pattern of Figure 1 (lower panel). Second, the lobes of the heart pattern had different temperatures. The lobe temperatures, simplified as warmer and cooler, changed left and right positions, during the day. The warmer left lobe (morning) became the cooler left lobe (afternoon). Likewise, the cooler right lobe (morning) became the warmer lobe (afternoon). Third, the vertical position of the right lobe seemed to have risen over the day changing the tilt of the heart pattern.

Now let's look at Figure 2 in detail, starting from the left. In the morning, the left lobe appears to dominate with a brighter area of white, indicating a warmer temperature. The warmest place of the left lobe yielded a surface temperature of 10.8˚F marked near the left black diamond. The left lobe tilted up with a white core beginning near the back side of Comb 2, and continuing until near the front side of Comb 4.

In the middle of the heat signature, under Comb 4 appeared a cooler region (shown in red), which separated the lobes. That cool dividing region persisted over the day. What caused it to appear? That location in the middle should have been the warmest part of the heat signature.

Overall the right lobe in the morning was cooler with its warmest surface temperature only 1.9˚F taken near the right black diamond. The right lobe was smaller and lower on the hive. Its white core began near the back side of Comb 4, continued as shown, until near the back side of Comb 6.

In the afternoon, the approximate ambient temperature increased from 0˚F to 22˚F, well below when clusters would show activity (at least on the cluster surface). The day remained clear with little wind in the apiary. The sun could slightly warm the Figure 2 side of the hive, shining evenly on it until noon. Other hives in the apiaries had the same sun exposure, but they did not show the heart-shaped heat signature.

By the afternoon, the warmth of the lobes appeared to reverse. The lower panel of Figure 2 shows the

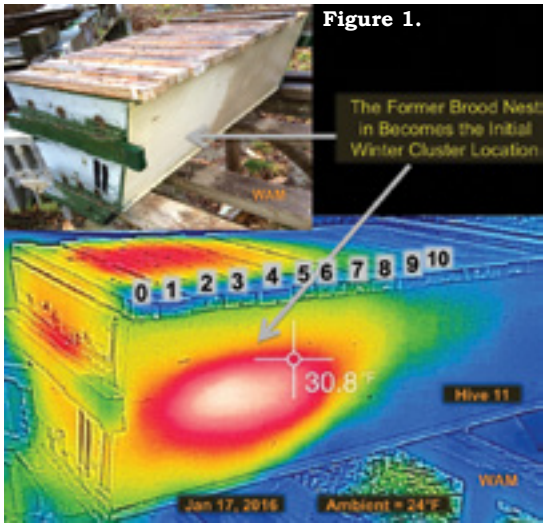

Figure 1.

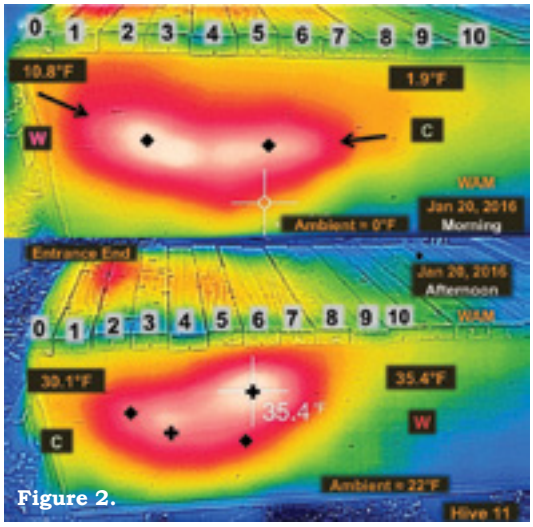

Figure 2.

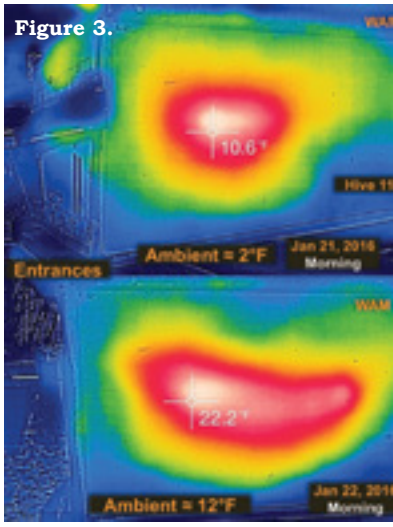

Figure 3.

ges Of A Winter Cluster

left lobe seemed to have diminished considerably, much less of the warmest white color, compared to the right lobe of white warmth. However in the afternoon, the camera used a different temperature color scale to account for the new higher temperatures in the 30s˚F. In the region of the left lobe from the morning, the black diamond had been reassigned from morning-white to afternoon-red. So the left lobe was there, even with a warm core (faint afternoon white) between Combs 3 and 4. The warmest place of the left lobe yielded a temperature of 30.1˚F marked near the left black cross. The new warmer lobe on the right dominated, high up on the hive (bright afternoon white), on Combs 5 and 6 marked by the right black cross, which was the warmest location on the right. The warmest place of the right lobe yielded a temperature of 35.4˚F marked near the right black cross. (I "plotted" the black diamonds from the morning on the lower afternoon panel to indicate the approximate shift in the warmest regions.)

The next morning on the 21st, Figure 3 (upper panel) showed the heart-shaped heat signature had not returned, only an oval, somewhat similar to the one on January 17, 2016 (see Figure 1), but this one was more compact. The next morning on the 22nd, the heart pattern seemed to be returning with the left lobe the warmest at 22˚F, like Figure 2. (I could not return for an afternoon reading.)

In the two previous figures (Figures 2 and 3), the other side of Hive 11 showed only a red amorphous heat signature (no pattern). On February 12, 2016 that abruptly changed. Now *both* sides of Hive 11 showed novel heat signatures (see Figure 4). The upper panels show the heat signatures of the sides of the hive. The panels below show close-ups of the corresponding heat signatures above. The close ups show the white core regions appearing as a horizontal "rod" on the left and a "triangle" on the right.

Even more striking, these heat signatures showed a sudden transition from the warmest white core to the blue coldest region directly above. The intermediate colors (red, yellow and green) were squeezed into very narrow bands. That represented a rapid temperature reduction from warm to cold, or white to blue. Given that heat rises, a more gradual gradient from warm (lower) up to cold (higher) should have occurred as in the other images (for example see Figure 1, lower panel). What happened to cause such a severe change to cold? I marked "Cold" on Figure 4 where the region seems too cold given the closeness of the cluster heat. I wondered if this cold above the cluster was a cold air current flowing over the cluster. If so, I would I expect to see it more often, but I only observed Hive 11 for a couple of days with this pattern, although I could not check the hive often. Another mystery.

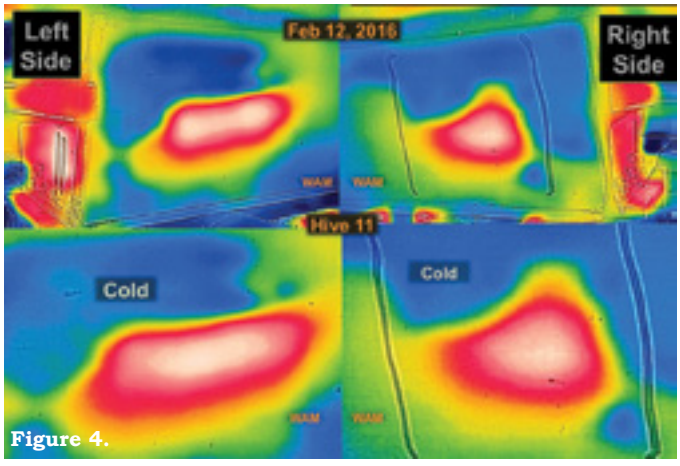

Figure 4.

I definitely wanted to inspect Hive 11 come Spring. I can inspect my top-bar hives in frigid Winter cold, even at night, even when it is raining or snowing. I only do that in dire conditions or when I need to collect data at a specific time. I considered conducting a limited inspection, just going into the ends of the Winter cluster and seeing its closeness to the hive walls. However when studying bees, patience is of prime importance, particularly when seeing something new. A Winter hive inspection could easily destroy the unusual heat signatures, although the disruption would be fairly minimal. Nevertheless, I waited. When I finally inspected Hive 11, guess what? Normal. Nothing out of the ordinary, at least by early Spring, long after the unusual heat signatures had ceased.

Hive 11 showed the thermal camera might become more than a diagnostic tool indicating the survival status of a colony as shown in *Bee Culture* (March 2016). The temperature changes in the heart-shaped pattern might be revealing something about changes in the winter cluster, but I need more temperature data than from one hive. Similar heart-shaped patterns appeared on other hives, but I could not collect much data from them, given their distances. (However, overall the heart-shaped pattern seems rare.) This Winter (2016/17), I am using a larger sample of top-bar hives, closer to home, and in various designs. Some hives have removable glass sides allowing direct thermal photography of the cluster, avoiding any heat distortion through the wooden sides. Hive 11 is at my home apiary where I can observe it daily.

This Winter my thermal work should keep me busy in my apiaries, hopefully to explain these heat signatures and perhaps observe new ones. BC

Acknowledgments

The author thanks Suzanne Sumner for her comments on the manuscript.

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A Closer LOOK

PARASITE, PATHOGEN, PESTICIDE, POLLINATOR INTERACTIONS

Clarence **Collison**

Honey bees are suffering from elevated colony losses in the northern hemisphere possibly because of a variety of emergent microbial pathogens, with which pesticides may interact to exacerbate their impacts.

There is an increasing body of evidence indicating that there are strong associations (synergistic or antagonistic) between honey bees and pathogens, parasites, pesticides and other pollinators that are impacting colony health (Johnson et al. 2009). Alaux et al. (2010) produced physiological evidence that the insecticide imidacloprid and the fungal pathogen *Nosema* can interact synergistically to affect bee health negatively, including physiological changes initiated by pesticide exposure that decreased bee tolerance toward *Nosema* infection. Similarly, Pettis et al. (2012) showed an increase in *Nosema* spore loads in colonies treated with imidacloprid.

Honey bees are suffering from elevated colony losses in the northern hemisphere possibly because of a variety of emergent microbial pathogens, with which pesticides may interact to exacerbate their impacts. To reveal such potential interactions, Doublet et al. (2015) administered at sublethal and field realistic doses one neonicotinoid pesticide (thiacloprid) and two common microbial pathogens, the invasive microsporidian *Nosema ceranae and black queen cell virus (BQCV), individually to larval and adult honey bees in the laboratory. Through fully crossed experiments in which treatments were administered singly or in combination, they found an additive interaction between BQCV and thiacloprid on host larval survival likely because the pesticide significantly elevated viral loads. In adult bees, two synergistic interactions increased individual mortality: between N. ceranae and BQCV, and between N. ceranae and thiacloprid. The combination of two pathogens had a more profound effect on elevating adult mortality than N. ceranae plus thiacloprid. Common microbial pathogens appear to be major threats to honey bees, while sublethal doses of pesticide may enhance their deleterious effects on honey bee larvae and adults.*

Gregorc et al. (2012) conducted experiments to determine the physiological responses of bees to chemical and biological threats by measuring gene expression after exposure to the ubiquitous (ever present) parasitic *Varroa* mite and a suite of pesticide threats. The tested pesticides included two fungicides (myclobutani, chlorothalonil), two herbicides (simazine, glyphosate) and five insecticides/miticides (fluvalinate, imidacloprid, coumaphos, chlorpyrifos, amitraz) and represent a range of modes-of-action and pesticide families. Three of these compounds (amitraz, fluvalinate and coumaphos) are used often by beekeepers to control *Varroa* mites and/or small hive beetles in colonies. The other chemicals are used commonly in agricultural settings and, with the exception of glyphosate, have been found as residues in honey bee colonies (Mullin et al. 2010).

"At least 18 honey bee viruses have been isolated, characterized and described and 11 of them are transmitted by Varroa mites."

Honey bee larvae reared in vitro (in an artificial environment) was exposed to one of these nine pesticides and/or was challenged with the parasitic *Varroa* mite. Total RNA was extracted from individual larvae and first strand cDNAs were generated. Gene expression changes in larvae were measured using quantitative PCR (Polymerase Chain Reaction-molecular technique used to amplify/copy a small segment of DNA or RNA) targeting transcripts (record of genetic instructions from DNA to RNA) for pathogens and genes involved in physiological processes, bee health, immunity and/or xenobiotic (foreign chemical substance found within an organism) detoxification. Transcript levels for Peptidoglycan Recognition Protein, a pathogen gene, increased in larvae exposed to *Varroa* mites and were not changed in pesticide treated larvae. *Varroa*-parasitized brood had higher transcripts of Deformed Wing Virus than did control larvae. *Varroa* mite parasitism arguably coupled with virus infection, resulted in significantly higher transcript abundances for the antimicrobial peptides abaecin, hymenoptaecin, and defensin 1 (chemicals involved in the immune system). Transcript levels for Prophenoloxidase-activating enzyme, an immune end product, were elevated in larvae treated with

"Phylogenetic analyses support that these viruses are disseminating freely among the pollinators via the flower pollen itself."

myclobutanil and chlorothalonil (both are fungicides). Transcript levels for Hexameric storage protein (Hsp 70) were significantly upregulated in imidacloprid, fluvalinate, coumaphos, myclobutanil and amitraz treated larvae. Definitive impacts of pesticides and *Varroa* mite parasitism on honey bee larval gene expression were demonstrated (Gregorc et al. 2012).

The association between the ectoparasitic *Varroa* mite and viruses is detrimental to colony health. In particular, viral replication in the mite and the transmission of viruses to the hosts through their saliva when feeding on mature and immature bees constitute crucial vectoring mechanisms (de Miranda and Genersch 2010; Mockel et al. 2011). At least, 18 honey bee viruses have been isolated, characterized and described (Allen and Ball 1996; Genersch 2010) and 11 of them are transmitted by *Varroa* mites (Kevan et al. 2006). Multiple viral infections are frequently detected in bee colonies (Chen et al. 2004; Ellis and Munn 2005; Tentcheva et al. 2004).

Bahreini and Currie (2015) quantified the costs and benefits of co-parasitism with *Varroa* mites and *Nosema ceranae* Fries / *Nosema apis* Zander on honey bees with different defense levels. Newly-emerged worker bees from either high-mite-mortality-rate (high-MMR) bees or low-mite-mortality-rate (low-MMR) bees were confined in forty bioassay cages which were either inoculated with Nosema spores [Nosema (+) group] or were left un-inoculated [Nosema (-) group]. Caged-bees were then inoculated with *Varroa* mites [*Varroa* (+) group] or were left untreated [*Varroa* (-) group]. This established four treatment combinations within each Nosema treatment group: (1) low-MMR *Varroa* (-), (2) high-MMR *Varroa* (-), (3) low-MMR *Varroa* (+), and (4) high-MMR *Varroa* (+). Overall mite mortality in high-MMR bees (0.12 mites per day) was significantly greater than in the low-MMR bees (0.06 mites per day). In the Nosema (-) groups bee mortality was greater in high-MMR bees than low-MMR bees but only when bees had a higher mite burden. Overall, high-MMR bees in the Nosema (-) group showed greater reductions in mean abundance of mites over time compared with low-MMR bees, when inoculated with additional mites. However, high-MMR bees could not reduce mite load as well as in the Nosema (-) group when fed with *Nosema* spores. Mean abundance of *Nosema* spores in live bees and dead bees of both strains of bees was significantly greater in the *Nosema* (+) group. Molecular analyses confirmed the presence of both *Nosema* species in inoculated bees but *N. ceranae* was more abundant than *N. apis* and unlike *N. apis* increased over the course of the experiment. Collectively, this study showed differential mite mortality rates among different genotypes of bees, however, *Nosema* infection restrained *Varroa* removal success in high-MMR bees.

Singh et al. (2010) found for the first time the molecular detection of picorna-like RNA viruses (deformed wing virus, sacbrood virus and black queen cell virus) in pollen pellets collected directly from forager bees. Pollen pellets from several uninfected forager bees were detected with virus, indicating that pollen itself may harbor viruses. The viruses in the pollen and honey stored in the hive were demonstrated to be infective, with the queen becoming infected and laying infected eggs after these virus-contaminated foods were given to virus-free colonies.

These viruses were detected in 11 other non-Apis hymenopteran (order containing ants, bees, wasps) species ranging from many solitary bees to bumble bees and wasps. This finding further expands the viral host range and implies a possible deeper impact on the health of the ecosystem. Phylogenetic analyses support that these viruses are disseminating freely among the pollinators via the flower pollen itself. Notably, in cases where honey bee apiaries affected by CCD (Colony Collapse Disorder) harbored honey bees with Israeli Acute Paralysis virus (IAPV), nearby non-Apis hymenopteran pollinators also had IAPV, while those near apiaries

without IAPV did not. In containment greenhouse experiments, IAPV moved from infected honey bees to bumble bees and from infected bumble bees to honey bees within a week, demonstrating that viruses can be transmitted from one species to another.

The issue of host specificity of honey bee viruses has been raised since it is a key in understanding disease epidemiology and the development of effective disease management practices. Studies have shown that Deformed wing virus (DWV) and Black Queen Cell Virus (BQCV), two viruses originally indentified in the western honey bee, *Apis mellifera*, can cause infection in several species of bumble bees, including *Bombus terrestris*, *Bombus pascuorum* and *Bombus huntii* (Genersch et al. 2006; Li et al. 2011; Peng et al. 2011). Other viruses commonly found in honey bees including Acute bee paralysis virus (ABPV) and Kashmir bee virus (KBV) were also found to infect different species of bumble bees (Bailey and Gibbs 1964; Anderson 1991). A recent study regarding inter-taxa virus transmission in the pollinator community reported the detection of DWV, BQCV, Israeli acute paralysis virus (IAPV), Kashmir bee virus (KBV) and Sacbrood virus (SBV) in multiple non-apis hymenopteran species and in pollen pellets from forager bees (Singh et al. 2010).

Levitt et al. (2013) examined managed *Apis mellifera* colonies, nearby non-Apis hymenopteran pollinators, and other associated arthropods for the presence of five commonly occurring picorna-like RNA viruses of honey bees- black queen cell virus, deformed wing virus, Israeli acute paralysis virus, Kashmir bee virus and sacbrood virus. Notably, they observed their presence in several arthropod species. Additionally, detection of negative-strand RNA using strand-specific RT-PCR assays for deformed wing virus and Israeli acute paralysis virus suggests active replication of deformed wing virus in at least six non-Apis species and active replication of Israeli acute paralysis virus in one non-Apis species. Phylogenetic analysis of deformed wing virus also revealed that this virus is freely disseminating across the species sampled in this study. In sum, their study indicates that these viruses are not specific to the pollinator community and that other arthropod species have the potential to be involved in disease transmission in pollinator populations.

Nosema ceranae and deformed wing virus (DWV) are two of the most prevalent pathogens currently attacking honey bees and often simultaneously infect the same hosts. Zheng et al. (2015) investigated the effect of *N. ceranae* and deformed wing virus interactions on infected honey bees under laboratory conditions and at different nutrition statuses. Their results showed that *Nosema* could accelerate DWV replication in infected bees in a dose-dependent manner at the early stages of DWV infection. When bees were restricted from pollen nutrition, inoculation with 1×10^4 and 1×10^5 spores/bee could cause a significant increase in DWV titer, while inoculation with 1×10^3 spores/bee did not show any significant effect on the DWV titer. When bees were provided with pollen, only inoculation with 1×10^5 spores/bee showed significant effect on DWV titer. However, their results showed that the two pathogens did not act synergistically when the titer of DWV reached a plateau. This study suggests that the synergistic effect of *N. ceranae* and DWV is dosage-and nutrition-dependent and that the synergistic interactions between the two pathogens could have implications on honey bee colony losses. BC

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Strategic Business Planning

For Sideline, Even Commercial Beekeepers

Steve **Payne**

Those of us attending local beekeeping clubs have seen several significant trends and changes over the last decade or so. There definitely seems more diversity of individuals who come to these meetings, as well as an overall increase in the numbers of people attending many clubs.

Many who initially attend local club meetings have at least an initial curiosity or interest in beekeeping as a potential hobby. They might read a bit about beekeeping and seek advice from veteran beekeepers at these clubs. Some will purchase nucs, packages or hives and try their hands at managing a few hives. Over time, they can have poor experiences or bad luck with their efforts, find that beekeeping isn't their cup of tea, or just lose interest eventually in keeping hives and going to meetings. Others will maintain a few hives and produce honey for family and friends, without that much time or effort put into this hobby. Some folks, however, develop a more sustained hobbyist interest, attend local club meetings regularly, and at least a few of these will eventually consider beekeeping as a potential sideline or full-time business.

My personal interest involves beekeepers, whether hobbyist, sideline, or commercial, who want to discover ways to be more effective and efficient in their personal or business beekeeping decisions. My objective here is to describe some strategic approaches for sideline and commercial beekeepers to improve their efforts and results.

Start-up Strategies

Full-time or commercial beekeepers seem more likely than hobbyists, or even sideliners, to view their beekeeping activities strategically. Many commercial beekeepers obtain some of their beekeeping assets and capital by the traditional approach of writing a business plan and using it to secure start-up financing. These commercial beekeepers might have secured partners or investors and/or financing assistance through a bank, the Small Business Administration (SBA), or other governmental loans or loan guarantees. In developing a business plan to obtain needed financial support, commercial beekeepers probably described many of their financing, operations, and marketing strategies. Some commercial beekeeping operations are more successful than others in developing and implementing effective strategies to gain sustained competitive advantage in their particular market niches.

Beekeeping sideliners, though, can often be very different in their objectives or goals, and in their planning and operations, than commercial beekeepers. Describing sideliners versus commercial beekeepers largely in terms of differences in the numbers of hives that they manage can ignore some of these huge differences. Some sideliners do follow the example of many commercial beekeepers in approaching their sideline start-ups strategically by developing a traditional business plan and trying to secure investments and loans. However, many of these sideliners do not, and some could best be referred to as "shoestring" sideliners.

Shoestring Sideliners

Shoestring sideliners often start as hobbyists and gain increasing beekeeping knowledge and experience. They have enough interest or passion to become more involved in certain aspects of beekeeping and recognize a potential to make at least a few bucks doing so. These beekeepers often approach sideline pursuits by "putting a toe in the water." They test a potential beekeeping niche, such as queen rearing, nuc preparation, or bee removals, before committing significant personal resources. They usually have limited start-up capital and funding for the first few years of their sideline activities, but may not need that much funding to get started in and test their sideline interests. Personal or family funding is used for many of their sideline assets and working capital, rather than obtaining major funding from debt sources such as banks and the SBA, at least in early sideline activities.

Shoestring sideliners are often retirees, young people just starting out in careers, and others who have some available time, and perhaps the need, to pursue these market-related activities. Unlike full-time entrepreneurs who devote most of their overall time and energy to the particular business, these sideliners often have competing or alternative work demands. Sometimes they also have significant personal or family obligations that prevent their putting in many hours of beekeeping work per week. Like me, perhaps you can count three to ten or more such shoestring sideliners who regularly attend your local beekeeping clubs.

Obtaining Strategy Assistance

There are a number of useful planning and strategy setting resources to assist start-up commercial and sideline beekeepers. Usually a short drive away in nearby cities is a college or university that has a *Small Business Development Center (SBDC)* and free counseling and workshops dedicated to the needs of budding entrepreneurs. Some universities also offer *Small Business Institute (SBI)* programs that might send senior and graduate student teams to study particular small businesses and provide consulting services. Still another option for consulting and advisement in many cities is the *Service Corps of Retired Executives (SCORE)* and its counseling services and many online video workshops.

Internet resources can also be useful, particularly for those who want to develop business plans for commercial beekeeping pursuits. A number of samples and templates for constructing business plans for beekeeping operations exist, can be easily accessed, and are profiled here – **http://docplayer.net/5116998-Beekeeping-business-plan-workbook.html.** This 47-page beekeeping business plan workbook was funded by the Illinois Council on Food and Agricultural Research and produced in 2003.

The authors, S.M. Daily, S. Kohler, S. Jacobson and J. Buchheit, were SBDC directors/counselors and university agriculture researchers who provided a good planning template, much useful information on writing a business plan, and some cost projections for operating 10 mature beehives. Also look to – **http://www.farmstart.ca/wp-content/uploads/Business-Plan-Template_CFBMC.pdf).** The 65-page document and example of a business plan was prepared under contract with the British Columbia Ministry of Agriculture, Fisheries and Food by J. A. Lloyd Management Services. It covers years 1995-1999 for an existing 500-hive operation planning to diversify into pollen, comb honey and candle production, as well as develop a brand name and improve their packaging and promotional activities. **http://extension.psu.edu/business/ag-alternatives/livestock/additional-livestock-options/beekeeping**

The site offers a sample business plan for a beekeeping pursuit starting with ten hives the first year and moving over time toward a 50-hive operation. It was prepared by M. Frazier, T. Butzler, L. Kime, T. Kelsey, and J. Harper, who are or were professors or researchers at Penn State University. **http://www.profitableventure.com/honey-bee-farm-business-plan/**. Another sample business plan is this one for a larger honey bee farm that packages and markets honey and sells bees, royal jelly, wax, propolis, pollen, venom and other bee products for domestic and global markets. **http://www.thebeeinfo.com/the-honey-bee-how-to-start-a-bee-farm/ and http://www.buzzaboutbees.net/beekeeping-business-plan.html.** These two sites also provide sample business plans, as well as offer some guidelines for starting a beekeeping enterprise.

Reviewing these and possibly other sample beekeeping business plans can obviously help those who wish to create a business plan for their own unique entrepreneurial concerns and future objectives, but keep in mind some serious limitations of these models. Some of these sample business plans are obviously dated in terms of their offering current beekeeping revenue and cost projections. These sample business plans also do not provide much guidance or market research for narrower and particular beekeeping market niches, even when mentioned as possible areas for future expansion or for secondary emphasis currently.

Although most useful as a checklist for including the many possible concerns in drafting a business plan, these samples hardly ever include guidance on how to analyze national or local markets and do competitor analysis in actually developing feasible operational, marketing, or financing strategies. Conventional strategy development tools such as SWOT Analysis (strengths, weaknesses, opportunities, threats), a focus on existing entrepreneurial strengths and weaknesses as well as environmental opportunities and threats, are mentioned and developed briefly in a few of these sample business plans. Yet this analysis and its strategic implications for beekeepers seem limited in scope with quite general recommendations.

Agricultural and beekeeping activities usually have even more threats and uncertainties than typical business enterprises. Diseases and weather are just two

major beekeeping concerns. Flooding in 2016 seriously hurt many beekeepers in both north and south regions of my home state of Louisiana. Risk management and crisis management strategies for commercial or sideline beekeeping deserve more study and explanation in business plans than is commonly offered. Contingency planning approaches do not "put all of a person's eggs in one basket" or in one set plan. A contingency perspective for strategy development anticipates the possibility or probability of major changes in economic and other key conditions affecting the business, and indicates the need for operational shifts soon after these conditions occur. Sample business plans found online hardly ever recommend a value or the basics of contingency planning.

As helpful as existing online templates for business plans, or even one-on-one SBDC or SCORE advisory assistance, could be for sideline or commercial beekeeper planning, these resources seldom reflect an awareness of regional or local beekeeping history, cultures, clubs, and relationships. The beekeeper, then, must supplement outside guidance with this type of awareness. Consulting or coaching resources for beekeeping business planning or strategy offered by those with significant beekeeping knowledge and experience can be more difficult to find and will likely be more expensive than SBDC, SCORE, or DIY approaches.

Many entrepreneurs actually approach start-up businesses activities using a "flying by the seat of their pants" approach. Shoestring beekeeping sideliners, in particular, may have little or no background in business planning or strategic thinking. They can also have little inclination to view what had just been a hobby, before, that strategically now. Not needing to acquire outside SBA or bank financing, and so not preparing any kind of formal business plan, they can easily overestimate or underestimate market opportunities, operate ineffectively and inefficiently, as well as poorly communicate their basic planning even to family and close friends assisting them.

Consulting and coaching assistance, such as free start-up advisement or strategy review, provided by a local SBDC or by SCORE volunteers may be overlooked. Even inquiries or visits to such sources may seem less than valuable to beekeeping sideliners due to these programs' focus more on typical entrepreneurial goals and their lack knowledge of the culture and practices of beekeeping.

Shoestring sideliner, or any type of sideline beekeeper, can benefit even more than commercial beekeeping firm owners or managers from a strategic perspective for choosing and conducting their particular sideline. This strategic perspective acknowledges the individual's unique goals, values, personal characteristics, strengths and weaknesses and ties this strongly to discovering particular opportunities and threats in potential beekeeping market niches. Commercial firms usually have more common profit-seeking goals and characteristics in contrast to the multiple goals, interests, and particular time and financial constraints of sideline beekeepers. Commercial firms can also have more access to market information about honey, other hive products, and beekeeping services than sideliners. Sideliners need strategic thinking to analyze possible beekeeping market niches and to develop more personalized approaches for choosing and undertaking the better options.

Developing a Basic Strategy

So how can a sideline or commercial beekeeper without much experience in or knowledge of strategic planning make better decisions and implement these more successfully? I'll try to provide at least a few tips based on my own background and experiences.

1) Try to describe better your own goals, interests, values, and other personal characteristics in establishing a beekeeping sideline or business. Although these might seem obvious to you, taking a little introspective time to list carefully these characteristics may allow you to develop a few less-than-fully-realized ones. This listing allows you to share it with one or a few close beekeeping friends or family members who might comment on these, question a few of your assumptions, and suggest other items that you could have overlooked.

2) Do more market research on the beekeeping niches that you might consider pursuing. There are likely

primary sources (ways to interview actual beekeepers involved in these niches) and secondary sources (data bases of collected information on these niches) of which you are unaware.

3) Consider carefully how opportunities and threats identified in particular market niches (from #2 above) match or fit your own personal or obtainable resources and characteristics (from #1 above). Can you see a strategy that allows you to take fuller advantage of your resources and strengths and compensates for your weaknesses in order to gain what seems a competitive advantage in a particular market niche? Securing some form of sustainable competitive advantage can be critical for success and profitability, especially in "lean" markets or geographical areas where there are many active competitors.

4) Steps #1, #2, and #3 are the strategic basics for creating a simple business plan. Go online and find sample business plans for beekeeping operations. Reading through a couple of these business plans should suggest a few additional planning concerns that you might want to consider and then cover in your personal planning.

5) Once you have several pages describing your sideline or business strategy, consider the possibility of sharing this with a SBDC, SCORE, or a strategy advisor with some beekeeping experience. These services should be free or might not be that expensive, and the advice might be well worth the brief time to obtain it.

6) Communicate this basic plan to family members and/or those who will be assisting you in your sideline activities, monitor operational progress related to these plans, and revise the plan when competitive conditions or your own personal circumstances change significantly.

The Small Business Administration estimates that over 50 percent of small businesses fail in their first several years. Even many beekeeping sidelines and businesses that survive likely do so with the albatross of certain nagging planning and operational inefficiencies. Since better planning, as well as operational control strategies, can improve beekeeping effectiveness and efficiency, why overlook this type of assistance and a potential for greater success?

Dr. Steve Payne is a retired university management professor, a beekeeper and former beekeeping club officer, and a current board member of the Louisiana Beekeepers Association. He occasionally provides strategy consulting and coaching through his beekeeping sideline business, Strategic Beekeeping Services. For information on this or obtaining Dr. Payne's recently completed book on these and related topics, Strategic Thinking and Management for Beekeepers, contact him at **steve-payne1@live.com**.

THE BEE BRUSH

Jim **Thompson**

One tool that is offered in most beginning beekeepers kits by bee supply dealers is the bee brush. After 48 years of working with the bees, I have several bee brushes, but they are primarily stored with some of the other bee equipment that I do not use regularly. What is the purpose of a bee brush, anyway? Most people will say it is to brush the bees off of the comb. Okay, when is that? During harvesting, queen rearing, and sometimes in making splits.

During harvesting, you would brush the bees off each frame before you put it into a box for safe transport to the honey house. It is a very time consuming job, where you might be further ahead removing a super at a time or using other methods such as shaking bees off the frames or blowing the bees off the frames. I could use chemicals, but I want to be able to go into my house without having to change clothes in the garage or outdoors.

I have seen some queen rearing people brush bees off of the frame that they are going to graft from, but I have also seen some queen producers shake the bees off the frames. I guess that it takes a lot of practice to know just how much shaking the eggs and young larva can take before they get damaged. You can also blow on the bees and usually they take off.

Have you ever tried to brush bees? The long soft bristles create a lovely haven for the bees to get trapped in and it does wonders to their disposition when you sweep the brush across the comb, rolling the bees. Just as soon as they can get free, they're coming after you. So maybe the soft bristles that are offered in bee brushes aren't such a good idea, but the companies make the pig bristles and horse bristles sound so good. Oh you can have several choices: one row of bristles up to three rows of bristles. Just think how many bees you could trap with three rows of bristles. Come to think of it, I do have a three row brush. However I call it a shop brush and it is good for sweeping up all kinds of dust and small particles.

As far as I can tell the bee brush was started by bee keepers using handfuls of grass or round brushes similar to brushes that are currently used to do stippling. Both of these have draw backs as your hands are very close to the bees and you might be better off waving your hands and using smoke. However in 1888 the Root Company sold two bee brushes, the Yucca Bee Brush and the Davis Improved Wire Handle Bee Brush. The handle on the Davis brush was galvanized metal.

In 1893 the Coggshall's Bee Brush was added to the Root line. It was a modified whisk broom with some of the bristles trimmed. It mentioned a flicking motion rather than a sweeping action.

In 1905, the Root Company added the Dixie Bee Brush to the line which had bristles on both sides of a wood shaft and handle put together with brass screws. The bristles were long enough that they would cover a Langstroth frame and in"two sweeps, you ought to clear the bees." The only other bee brush offered for sale in 1905 was the Coggshall brush.

In 1908, a new German Bee Brush was added to the Root line. The German Bee Brush is similar to the bee brushes of today and was available in black or white horse hair. There was a report that one beekeeper used a German Bee Brush for one season and harvested 20 tons of honey. That boggles my mind as that is a lot of sweeping or flicking of a brush. It is said that at the end of the season the brush was washed and didn't show any signs of wear. It also mentioned that the white bristles were less irritating to the bees.

In 1925 the German Bee Brush was offered for sale and the Coggshall brush was replaced by a Bee Whisk

Coggshall's Bee Brush
Offered 1893 to 1908 -Superior to Davis & Yucca
15 cents each w/5 cents postage or 10 for $1.25

The Dixie Bee-brush
Offered for sale 1905-1908
15 cents each or 20 cents by mail

German Bee-brush
Offered from 1908 to 1930
25cents each or 30 cents by mail
name changed to Bristle brush in 1939

Whisk Broom

Bristle Brush

Yucca Brush
Offered for sale 1888 - 1893
5cents each, 3 for 10 cents

Davis' Improved Bee Brush
Offered 1888 to 1893 - better than Yucca Brush
10 cents each, 10 for 95 cents

Handful of grass to be used as a brush

Broom. It only took 32 years to figure out that a whisk broom with thinned strands could still be a whisk broom. It takes a little effort to find an old fashioned corn whisk broom. Most of the whisk brooms that you see today are plastic brushes and I even encountered a sales clerk in the broom department that didn't know what a whisk broom was. She wanted to sell me a broom with a 30 inch handle.

In 1939, the Bristle Brush appeared on the scene. Guess what? It looks very, very similar to the German Bee Brush. The bristles are similar to some of the brushes today in that they are made of a man made material.

The handful of grass has some advantages. You never have to carry it with you and when you are finished with it, it can be thrown away. If it becomes broken or dirty, you can get another handful. I tied the bunch together for the sake of taking a picture. The only precaution that I can think of is to not use plants like poison ivy.

Pig Bristle, Nylon Bristle, & Horse hair Brushes

My mentor showed me two ways to shake a frame. The first way is to grasp the frame at the center of the top bar and hold it as tight as you can and then with your other hand give the gripping hand a quick rap. If it is done correctly, all the bees will fall off the frame. The other way is to hold the frame with both hands on the ears of the frame and shake it with a sudden jerk. It may take two times until all the bees are off the frame. With practice, you will find that it is faster than brushing bees. However a bee brush does come in handy when a swarm settles on a fence post, the side of a house, or the trunk of a tree. Some things are just too big to pick up and shake.

If you use a bee brush, you should make sure that you wash it occasionally to keep it free of the products of the hive. A dirty brush with honey in it is an attractant for bees and you may rile up the bees before you get a chance to use the brush. The synthetic bristles wash up and dry faster than the horse hair or pig bristles.

What is the difference if you sweep or flick the brush towards you or away from you? About two milliseconds!

Yet there might be another solution to moving bees. Rather than sweep, brush, or shake them why not herd them. A credit card or piece of cardboard could be used to move the bees around. I have even heard of people using large feathers. BC

Jim Thompson is a long-time beekeeper and beekeeping historian living in Smithville, Ohio. He's also a frequent contributor to Bee Culture.

References

Collection of Root Catalogs
Personal collection of bee brushes

Honey Bee Gut Microbia

What Is It and Why Is It Important?

Rebecca **Novak Tibbitt**

In June 2016, researchers from the University of Texas at Austin published the study "Gut Microbial Communities of Social Bees," in *Nature Reviews-Microbiology*. The microbial make-up of the human intestinal tract, called the microbiome, has received increasing attention over the past few years, particularly as it relates to the growing threat of antibiotic resistance. But bees? I talked with Department of Integrative Biology researcher and beekeeper, Nancy Moran, who co-authored the review, which included about seven years of studies describing microbiology of bee gut. Dr. Moran has taken a closer look – literally – at the features, shapes, and getting to name the genus-species – none had names – of the bacteria living inside of the intestinal tract of bees.

Why is it important to look into the microbiological makeup of the honey bee gut?

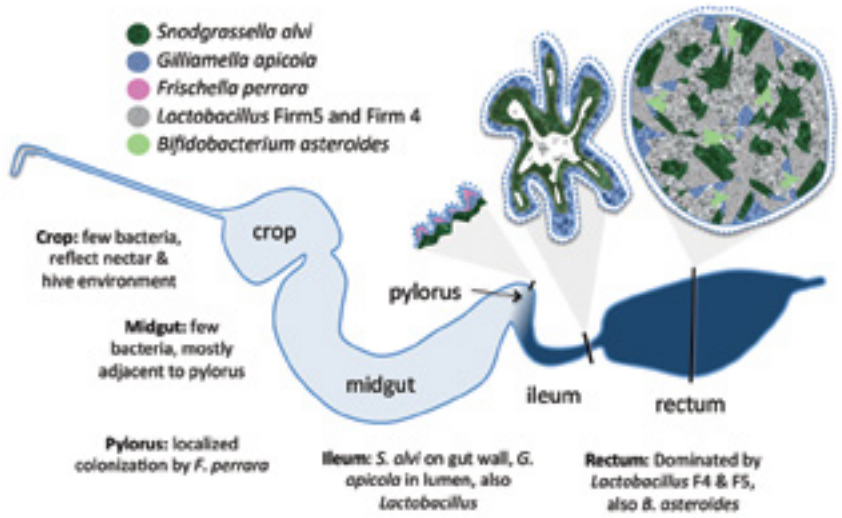
It is becoming apparent that the gut bacteria in animals are important to health, based on studies in mice, humans, insects and other groups. Therefore it is very likely they are also important in bees. In addition, our research has shown us that honey bees have a very consistent set of bacterial species, present in all honey bee workers worldwide. The microorganisms in the guts of animals can benefit their hosts by helping to digest food, detoxifying harmful molecules, providing essential nutrients, protecting against invading pathogens and parasites, and modulating development and immunity. However, although the importance of the gut microbiota is becoming increasingly appreciated, the processes that govern these microbial communities are largely unclear.

Since 2006, honey bee colonies have been suffering from a high mortality. Once we learn more about the internal bacteria and their role – helpful or harmful – we can look at external environmental factors like food supply, treatments and toxins on the effect on the bacteria and, therefore, the effect on the bee. All of these stressors might be modulated by their gut microorganisms. So studying this area can help us understand honey bee biology broadly, and contribute to a better understanding of the role of bacteria, specifically, in the digestive tract.

The idea is that the bee gut is a simple model, with similar processes, can help us better understand how gut communities work in general. This can, of course, not only help us become better beekeepers, but it can also help us gain insights into how a much more complicated and variable system like the human digestive tract works. The National Institutes of Health, who funded part of the research, is very interested in this area.

What were your key findings? Were they what you expected?

A central finding, and one that motivated the further studies, was that honey bee workers have a very consistent set of gut bacteria that make up most of the microbes in the gut – often 99% or more. I first became aware of this when I participated in a collaborative study in 2007 that tried to use new sequencing methods to identify possible pathogens that might be associated with Colony Collapse Disorder. It turned out that no clear pathogen was identified. However, one thing that stood out was that all of the samples had the same set of bacteria. Subsequent sampling showed that these bacteria were in all *Apis mellifera* workers worldwide, and some of these species are also present in other species, such as the Asiatic honey bee *Apis cerana*, and in bumble bee species.



Based on this earlier research, we have been trying to understand the role that the makeup of gut bacteria plays in the honey bee, whether different strains improve bee health or hurt it. Although there are only about eight species of bacteria that we consistently find in the digestive tract of the honey bee, each species has many strains with lots of genetic variation and different pathways. We used several kinds of experiments.

We took pupae out of the frame when they were close to emerging and put them in a clean dish. We found that they don't acquire microbiota in the pupal stage. We established what kinds of environmental exposure establishes their microbiota. We took new bees with a "clean" gut, marked them, and put into hive and sampled them over time. For a few days, the microbiota is erratic, but around days three to four, a consistent pattern emerges of what we call the core microbiota of the adult honey bee gut.

We were also able to determine where the microbes resided in the digestive tract. Few bacteria were found in the front and midgut. This started to change near the pylorus, which connects the midgut to the hindgut. The ileum is where we found the microbial population really start to colonize. The rectum showed the highest concentration of microbial population. It was important to determine this because then we can look at the role of those bacteria in the specific location. Is it to fight other disease-causing bacteria? Is it to aid in fermentation of food and digestion? Because the honey bee gut is host to such a small number of microbes, we can identify their roles more easily.

Nancy Moran

Scientific studies have shown that there is clear evidence that the microbiome can interact with at least some pathogens, such as trypanosomatid parasites like *Crithidia bombi*. This seems to be true in both honey bees and bumble bees. The genomes of the bacteria tell us that they are able to break down plant macromolecules that are present in the cell walls of the pollen grains. So, it's possible that the bees can extract additional energy that affects the economy of the hive (in addition to using sugars from nectar). They can also utilize a range of sugars, not just sucrose, fructose and glucose, but also some such as mannose and arabinose and xylose that are present in plant cells walls and that have been shown to be toxic to bees.

How do the bees acquire and share gut bacteria?

Sociality, which includes the sharing of the hive environment by a social group, is central to the between-host transmission of the bee gut microbiota. After pupating in capped cells inside the colony, adult honey bees emerge that have germ-free guts. If removed manually from the honeycomb cells and maintained under sterile laboratory conditions, the guts of the honey bees do not acquire substantial microbial communities. Newly-emerged bees that chew out of the honeycomb cells on their own may be inoculated by residual gut symbionts on the frame surface.

Initially, the microbial community is small and erratic in composition, dominated by environmental bacteria and lacking differentiation between regions of the gut. We found that by the third day, though, the microbial communities contain more than 107 bacteria mostly from the characteristic species of the bee gut, and the ileum and rectum begin showing "normal" community compositions. These microbial communities plateau at approximately 109 bacteria by the eighth day. Once established, gut microbial communities are generally stable as workers transition through different behavioral stages. This shift, incidentally, from an initial erratic microbial community to one dominated by "adult" bacteria, largely mirrors the development of the gut microbiota in human infants.

The establishment of a stable microbial community occurs before worker bees leave the hive, which implies that transmission occurs through other bees in the colony or hive components, such as wax surfaces. In experimental tests, the typical gut microbial communities developed with the highest likelihood when bees were directly exposed to older bees or were fed their macerated hindguts. Based on experiments that manipulated potential transmission sources, oral trophallaxis, a common behavior for communication and food transfer, is not a major route for transmission, which is consistent with observations that the foregut harbors few bacteria. A fecal route seems important, particularly for *Snodgrassella alvi*, *Gilliamella apicola* and *Frischella perrara*, although members of the gut microbial community may also be acquired through contact with hive components that have been in recent contact with live bees. Species in the Acetobacteraceae family might be transmitted through the stored pollen food supply.

Were there differences in the microbiome of worker bees vs. drones vs. queens?

Yes. We focused on workers, but other studies have shown that queens have very different microbiomes. Drones are more similar to workers, though not exactly the same. The workers have a microbiome that reflects an emphasis on fermentation of the food products – nectar and pollen – so it makes sense that queens and drones might not have this same gut community.

Adult workers have a relatively stable set of bacterial species in their gut compared with drones or queens, and when compared with other insects generally. Nonetheless, even workers of the same age in a colony can harbor very different proportions of the core species of bacteria in the gut. Colonies might also undergo age-related or seasonal shifts in the relative proportions of the core species of bacteria. The extent to which these shifts are specific to particular geographic regions or environmental conditions is unclear,

and is something we are interested in further researching.

Do you think this research can shed light into factors that might contribute to the health of honey bee colonies and possibly even the decline of bee populations? How so?

We think that the microbiome is central to maintaining health and that a disrupted microbiome makes the host susceptible to a variety of problems. Normally bees can acquire a normal, healthy, microbiome. However, we are starting to see that some practices could interfere with this. The most obvious is antibiotic application.

We found that the gut microbiome of U.S. honey bees has a very high incidence of tetracycline resistance, reflecting the use of tetracycline in U.S. beekeeping for the past 50-plus years for the treatment and prevention of foulbrood. These resistance genes were not found in guts of honey bees from countries that don't use antibiotics in beekeeping. Potentially, the use of antibiotics or other treatments could interfere with the normal microbiota and make colonies susceptible to various pathogens or other stressors—but I emphasize the word potentially. So far, we don't have results that firmly point to ways that beekeeping practices should be changed. We are more focused on the basic biology of these organisms. But we are hoping that the work will provide a better general understanding of the factors that govern bee health and may eventually lead to healthier bees because of better-informed beekeeping. One general idea we had was to look at differences in the bee microbiome based on geography. We could discover, for example, that certain environmental situations are better for bees living in Texas or New England, and beekeepers could benefit from those findings in terms of optimizing their surroundings.

Looking ahead, there may be some direct implications for the way commercial and backyard beekeepers care for their bees. Without getting ahead of ourselves, we can see that improper use of antibiotics for sure can have a major impact on beekeeping, just as it has had in humans. Antibiotic stewardship efforts are underway around the world – the right drug, for the right bug, at the right time – for humans, livestock, and yes, even bees.

There has been a lot of news over the past several years about the diversity of bacterial life in the human digestive tract. What are some of the similarities and differences between human and bee gut microbial communities? Can your findings be translated to humans, or help inform future research into human gut microbiology?

Indeed, one of our main motivations, besides understanding more about bee health, is that the bee gut microbiota is a good model for many aspects of the human gut microbiota. In both, there are specialized gut bacteria that are transmitted directly from individual to individual during social interactions or group living.

In honey bees, workers obtain their gut bacteria after they emerge from the pupal stage to become adults in the hive. Research has shown that the gut bacteria community is erratic for the first few days, with many environmental bacteria temporarily present. But this stabilizes by day five or so. This process is parallel to that seen in newborn babies, which initially have an erratic gut community that later stabilizes to become dominated by species specialized to live in the gut. In both bees and humans, the bulk of the bacteria are present in the hindgut, past the location of most digestion and absorption, so the communities are living in a low-nutrient environment and extracting energy from the more recalcitrant compounds such as plant polymers like lignocellulose or pectin. And in both cases, the communities have a lot of strain level diversity, with very closely related bacteria that differ in their genomes in ways that might affect the hosts.

There are also some parallels in how the microbes interact with the innate immune system, as both bees and humans share some of the same immune mechanisms that are found in all animals. For example, all animals and plants make small peptides – antimicrobial peptides – whereby normal gut bacteria develop resistance. Antimicrobial peptides help maintain gut symbiosis. We can think of this as a "truce" between host and normal bacteria. *Snodgrassella* is present on the gut wall the host and prevent other, more harmful, bacteria from invading. However, we don't want the bacteria to cross over that gut wall and into the host; *Snodgrassella* can live and not penetrate into the host and cause infections and could cause a protective layer against a more harmful infection, a pathogen that you want to keep out.

What are areas of future research in terms of the honeybee gut microbiota?

In addition to looking inside the gut of honey bees alive today, University of Texas researchers are looking at the evolution of bacteria living inside of the digestive system going back generations as bees have evolved. They have collected *Apis* species from around the world in an effort to identify the common ancestor 80 million years ago, and the original bacteria living in the gut that has evolved right alongside with the bee as the host. We are also looking at researching the genetics of bacteria and the effect of specific genes. Most bacteria cannot colonize in the honeybee gut, and the ones that have are very specialized. We wonder why that is the case and would like to learn more. BC

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Treat Your Bees To A Banquet of Poppies

Gary Noel **Ross**

Poppies Rank As Quintessential Plants For Pollen Production

I am not a beekeeper. I am, however, a professional entomologist and an avid gardener. As such, I am always on the lookout for flowering plants that are both aesthetic and especially attractive to pollinators such as butterflies and bees for my home garden in south Louisiana. Over the past decade I have sampled dozens of plants. None, however, has impressed me more than a group of Spring annuals characterized by uniquely showy flowers and commonly referred to as poppies.

Actually, I have experimented with four species: native California poppy, European Shirley poppy, Arctic Iceland poppy, and Asiatic common garden – aka breadstick, oilseed, or most commonly, opium poppy. The inflorescences of all species lack nectaries, thus there is no sugary nectar available to pollinators. By contrast, flowers are packed with pollen-bearing anthers. One species, though, proved the juggernaut: THE OPIUM POPPY.

For specifics, the opium poppy is technically classified as *Papaver somniferum*. The name translates as "sleep-inducing" poppy. The designation is a reflection on the species' storied reputation as the source of raw opium, a potent narcotic derived from the milky latex (sap) produced in the walls of unripe seedpods. (Raw opium is the basis for medicinal morphine, heroine and codeine.) Although all narcotics are controlled by the U.S. Drug Enforcement Administration, in practice, *P. somniferum* may be cultivated by American homeowners and in public gardens for ornamental and educational purposes without reprisal. Seeds are marketed on the Internet and in food stores; young plants can often be purchased in spring at many local garden centers.

The opium poppy is native to the Eastern Mediterranean region, principally Turkey. There winters are pronounced and rain is reduced. The poppy has been cultivated as an exotic annual in accent gardens

throughout Europe and North America for centuries. Also, these poppies have a long history of field cultivation for culinary purposes (cooking oil and flour, pastries and bread, for examples), and sources of narcotics. In fact, images of poppies are recorded in ancient Sumerian artifacts dating to roughly 4000 BC.

My individual poppy plants mature at between two and four feet. Leaves are large, heavily lobed, and an attractive silvery-green in color. Blooms begin as an egg-shaped bud on a terminal, goose-necked stem that gradually straightens as the petals unfurl. Flowers are large – as much as four to nearly six inches across. Petals are silky, crape-like. Colors include red, rosy pink, salmon, lavender, purple, and white. Additional variation occurs in flower shape. The basic form, for example is four petaled—the typical "poppy form" that is recognized universally. Horticulturists, however, have developed complex forms that consist of thin multiple petals, and even a powder-puff or pom-pom configuration that resembles a fancy chrysanthemum or carnation. There is virtually no fragrance except in specific varieties bred for the trait. Seed pods are large, globe-shaped, and topped with a winsome crown. As a pod dries, small windows beneath the crown open, facilitating the spread of seeds into the environment by wind and seed-eating birds – particularly doves. The dried/empty pods are stunning to the point that they are frequently included in decorative flower arrangements by commercial florists.

Each bloom of *P. somniferum* packs an extraordinary number of cream-colored anthers (tips of stamens – male reproductive organs). I have counted as many as 100-150 anthers per plant. The stamens surround a large central grayish-green pistil (female organ) with an ovary that contains myriad ovules (2000-3000), the forerunners of an equal number of miniscule seeds. Flowers are reported to be self-pollinated as well as cross pollinated by small flies (flower flies/hover flies of the family Syrphidae) and bees (**www.urbanpollinators,blog,com/2014/03/flies.forgotten.pollinators.html** and **www.bioweb.uxlax.edu/bio203/s2009/wasicek_lind/reproduction.html**).

In my garden, honey bees have proven to be the chief pollinating agent. I have, in fact, commonly logged in as many as four and five individual honey bees foraging frenetically within a single flower. Amazingly, I have observed that in spite of the difficulty in reaching the stamens within flowers that have compacted petals, the bees are able to burrow, emerging with pollen baskets enhanced and their bodies speckled with individual grains of pollen. Most visitations to my garden occur between early morning and noon. The activity from as many as 100 individual bees creates a discernable "hum" throughout my garden – something that I eagerly point out to any neighbor who happens to drop by. (Yet in spite of my frequent prying eyes and camera lenses, I have never been stung.) As the afternoon progresses, honey bees drop off but are replaced by a small number of bumble bees and carpenter bees. Sunny days are best although clouds do not completely interrupt foraging. The difference in foraging time between species seems to be an ideal adaptation for reducing competition, thus maximizing productivity.

P. somniferum is easy to grow throughout most of the contiguous 48 states (**www.gardenguides.com/127171-cultivation-papaver-somniferum.html)**. Poppies are sun-loving and prefer rich, loose, and relatively dry soil. Frost, drought, high or low soil pH, and diseases are usually no problem. Success, however, is highly dependant upon time of planting. To begin (dates refer to the Deep South; for cooler geographies, delay sowing or planting until late Winter when most snow has melted). Secure seeds or young plants in Autumn – mid October to mid November. Sow or plant and keep moist for a few weeks. Seeds will germinate within about three weeks. The nascent plants will set up a few leaves in a rosette pattern, but then go dormant. Meanwhile, the plants are establishing a small but strong tap root that usually does not tolerate disturbance. (If you plant young plants, these will remain dormant, too.) Growth resumes with the warmth of Spring (late February). At this time, the application of a liquid fertilizer will do wonders. The plants eventually bolt in March, achieving maximum height in early to mid April. Each plant then produces as many as a dozen flower buds. After, the plants wilt and turn brown. At this point, remove and discard. [Note: plants grown in more northern and western areas have a longer blooming season – often throughout much of the Summer.]

A given plant blooms for about three weeks, although each flower remains fresh for only two to three days. But when temperatures climb above 80 degrees F, flowers can quickly wilt in but a single day. Even though poppies are decidedly ephemeral, their bloom in early Spring is perfect timing for bees emerging from their Winter hibernation and in search of quick energy and pollen to restock their depleted hives. After seed pods dry in late spring, harvest most of the bountiful seeds. These are rich in oil, reported to be 45-50 percent (**www.hort.purdue.edu/newcrope_energy/Papaver_somniferum.html) and (**www.nutrition-and-you.com/poppy-seeds.html). Store within a paper bag within a sealed plastic bag within a refrigerator until the following Autumn. Cooled seeds can remain viable for five to six years – probably because of protection by their high oil content. When in the ground, viability is uncanny. The more sandy and dry the soil, the greater the longevity – up to several years. But if you enjoy baking, augment your baked products with a healthy sampling of the tiny dark seeds – aesthetic and highly nutritious with a nutty flavor.

Before closing, I would be remiss if I did not address two intriguing questions that often surface during discussions of poppy pollination. First, while the pollen from poppies is extraordinarily attractive to bees is poppy pollen actually nutritious for the insects?

Furthermore, some research (**www.honeylove.org/top-30-flowers-for-bees/**) includes "poppies" as #26 in a pantheon of 30 favored pollen sources for bees. (Cosmos is listed as #1, but my experiments have revealed that the rather small size of these flowers rank it as a poor second to *P. somniferum* for pollen production.) Of course, the size

and morphology of pollen grains reflect their evolutionary history. I theorize that those plant species that rely on pollination by the wind have adapted strategies that best meet those objectives (large and highly sculptured cell walls, for instance). By contrast, those species that have adapted to insect pollinators have developed other unique strategies (smaller size, for example) to satisfy their specific hosts. Most likely *P. somniferum* from the very onset of its developmental history has depended upon insect pollinators. Conjecture, of course, but still poignant.

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Second, does the pollen from poppies contain narcotic opiates, and if so, are these substances incorporated into honey and other bee products?

Consider the role of plant opiates. All plant alkaloids (including opiates) are potent astringents, even toxins to many vertebrates. Such compounds were originally synthesized as protection from potential predators – not as medicinal or recreational drugs for human beings. The fact that most poppy opiates infuse the walls of the developing seed capsule indicates to me that their primary goal is to protect the huge load of seeds that are responsible for a future generation. Why lace pollen? After all, pollen must remain alluring – indeed, safe – for pollinators. Furthermore, scientific analyses have documented that the seeds possess only minor traces of opiates (**www.snopes.com/medical/drugs/poppyseed.asp**), understandable since there would be no need to poison potential vertebrate foragers that could disperse the prodigious seeds. The bottom line is that in all probability, pollen from opium plants – as well as all resulting bee products – is, or is virtually, free of opioids. No need to concern yourself with consuming bee honey, bee bread, or pollen from bees that have foraged on poppies.

In conclusion, here is my take: The opium poppy, *Papaver somniferum,* is highly engaging and underutilized by homeowners and beekeepers. Considering the beleaguered status of the honey bee (Colony Collapse Disorder), I suggest that we who profess a genuine love of nature, gardening, beekeeping, conservation, biodiversity, and the world's food supply have a patent and easy opportunity to increase personal husbandry for Planet Earth. Including poppies – especially *P. somniferum* – in home gardens and when possible, along fence and hedgerows, can produce exponential results. That's my "food for thought." BC

California Foraging

Connie **Krochmal**

Although beekeeping and foraging might appear to have little in common, it turns out that a large number of native or naturalized pollinator plants are suitable for foraging. With over half of the profiled species offering nectar, pollen, or honeydew, this is definitely a helpful guide.

Of the various titles in this series that I'll be reviewing, this one is my favorite. The user-friendly table of contents lists the plants alphabetically by common name. There is also a comprehensive index of common and Latin names. I like the fact that this stresses critical safety and sustainability issues as well as plant ID tips under each plant entry and in the introduction.

The author urges readers to be 100% certain of a plant's identity before consuming it. Each plant entry informs the reader about the various habitats and regions of the state where the species can be found. Whenever appropriate, she provides information on similar species that are toxic or harmful.

Each title in the series features a quick, handy, seasonal guide to foraging. However, I found the format of this title's guide to be the most convenient and accessible of the volumes. Presented in an easy-to-use chart with the species listed alphabetically by common name, this has columns for each plant part and harvest time.

Each color illustrated plant profile gives the common and Latin name, a brief introduction, details on plant identification, when, how, and where to harvest, sustainable harvesting tips, and culinary ideas. The appendix features a list of websites and references. In addition, the author promotes the use of native species in landscapes.

While some of the plants presented in this volume are unique to California, others do occur in other regions of the country or have relatives that can be found elsewhere. The book features over 25 or so related species that I've profiled in *Bee Culture* articles over the years.

Let's look briefly at some edible honey plants that appear in this guide. These are chaparral yucca, fennel, salal, and tarweed. Some honey plants that also bring pollen are the nightshades, the walnuts, wild buckwheat, mountain pennyroyal, buttercups, California bay laurel, and assorted oaks.

Other nectar and pollen sources featured in this title are yerba santa, miner's lettuce, farewell-to-Spring, poached egg flower, mule's ear, chickweed, wood sorrel, tree mallow, and red maids. Nectar and pollen plants that can sometimes bring honey are elderberry, radish, mallow, plantains, and tree hollyhock.

Some of the plants profiled by the author that are sources of honeydew are the filberts and hazelnuts (also sources of pollen), the various walnuts, oaks, pines, and Douglas fir. Species that offer pollen are docks and some grasses.

Certain species in this book are quite praiseworthy nectar and pollen plants that deserve much more recognition than a mere mention. For that reason, I've selected a few of those to discuss below in greater detail.

Blue Palo Verde

(*Cercidium or Parkinsonia florida)*

A member of the bean family, this species occurs in California, Arizona, and Nevada. Suited to zones eight through eleven, the plant is most common from 1200 feet elevation to sea level in desert grasslands, canyons, desert scrublands, and hillsides.

Adapted to most all well drained soil types and pH levels, this salt and drought tolerant native prefers

Blue Palo Verde (Parkinsonia florida)

full sun. Blue palo verde experiences minimal disease and pest problems.

The fast growing, deep rooted species with a bushy spreading crown is typically 15 to 20 feet tall and 20 to 25 feet across. A spectacular shade tree for landscapes, it features stout, spiny, crooked branches and green, zigzag, thorny stems. The trunk is usually less than a foot in diameter.

The deciduous, doubly compound, greenish-blue, alternate leaves are about an inch in length. Typically short-lived, these can contain numerous pairs of very petite leaflets.

One of the common names – shower of gold – refers to the vivid yellow flowers. From March to May, masses of the large, scented, showy blossoms conceal the branches. Less than an inch across, the flowers contain five petals with the largest one sometimes displaying a reddish blotch. Blossoms appear on 4½-inch-long clusters. The flat seed pods grow to 3¼ inches in length.

Related Species

There are several related species that occur mostly in the Southwest. **Small leaved or little leaf palo verde** (*Parkinsonia microphylla)* is native to California and Arizona. Other common names are foothills palo verde and yellow palo verde. This inhabits desert plains and the foothills.

A spiny shrub or small tree with greenish-yellow bark, the long lived plant pretty much resembles blue palo verde. Reaching 20 feet or so in height, it differs by having slightly lighter colored blossoms with a mix of pastel yellow and white petals. These appear on one-inch-long clusters. The foliage consists of numerous pairs of hairy leaflets.

Texas palo verde (*Parkinsonia texana)* is restricted to Texas. Up to 25 feet in height, this tree features green bark. Several varieties of the plant occur across the state.

Bee Value of the Palo Verdes

Providing nectar and pollen, these are reliable sources of honey in parts of the Southwest, especially spots at lower elevations that are higher in soil moisture. Typically yielding about 30 pounds of honey per colony, this can sometimes provide much larger honey surpluses.

Ranging in color from clear to light yellow or light amber, this heavy bodied honey has a pleasant yet characteristic flavor. It compares very favorably with alfalfa honey in terms of quality.

Manzanita and Bearberry

(*Arctostaphylos spp.)*

Members of the heath family, these are most common in the western states. About 50 species are native to North America. The overall size and growth habit can vary slightly by species. The group includes both tall, upright types as well as low growing ones. Some of the latter are only one to two feet or so in height and are often grown as ground covers. The larger ones can reach 20 feet in height.

Typically, these exhibit picturesque, crooked branches, and lovely purple or red bark. The attractive, evergreen, oval, leathery, green leaves are usually one to three inches long.

Forming nodding clusters, the solitary, waxy, bell-like to urn-like flowers are likely familiar to beekeepers. Resembling the blooms of other heath family relatives, such as the blueberry, they're mostly white or pink. The flowering time can vary by species. With favorable weather conditions, these can typically bloom from Winter to Spring. In California, flowers are present mostly from November to February.

The fleshy fruits are long lasting drupes. The color can vary by species, but are often red or brown. Ripening in Summer to Fall, they can be quite showy in some cases. Around ½ to an inch in diameter, these contain one to ten stony seeds according to the species.

Growing Manzanitas and Bearberries

Depending on the species, these are suitable for shade to full sun. The plants demand well drained conditions. The pH preference varies slightly by species as well.

Moderate watering is needed until they become well established. Overwatering and wet soils can lead to stem and root rot. Propagated by cuttings, these experience few pest problems other than aphids.

Bee Value of Manzanitas and Bearberries

All of these species are major bee plants in the Southwest, the West, and the mountain states. Yielding both nectar and pollen, the blossoms are quite popular with bees. These flowers help build up colonies.

Some species are reliable sources of nectar in certain areas of California. The nectar flow is best with warm

Manzanita

days and cool nights. The frost-proof blooms secrete so much nectar that it can be shaken from the stems.

In some locations, large crops of honey are possible – up to two full supers. However, the average is generally around 40 pounds or so per colony.

The excellent flavored, heavy bodied honey has an aroma much like that of the flowers. Light amber to white, the honey from the various species tends to be fairly similar.

Other Recommended Bearberries and Manzanitas for Bees

Some of the related species that are known to be especially good honey plants include the following. Suitable for zones three through eight, **bearberry or kinnikinick** (*Arctostaphylos uva-ursi)* is by far the most widespread species of all. It occurs in all states except Missouri, Arkansas, Kansas, Nebraska, Oklahoma, and along the Gulf from Texas to Florida northward to North Carolina. The species favors ridges, sand barriers, and dunes.

This shade tolerant, mat-forming, acid loving plant is often grown as a ground cover. The trailing stems root wherever they touch the ground. Typically less than ¾ foot tall, bearberry can be quite wide – four feet or so.

The leathery, shiny foliage is green. The pale pink to white blossoms appear in Spring. Berries are pink to red.

Reaching 10 feet or so in height with an eight foot spread, **bigberried manzanita** (*Arctostaphylos glauca)* is hardy to zone nine. Native to California in chaparral, this can begin flowering as early as December, depending on location. The spreading shrub features lovely brownish-red bark.

The gray-green foliage is three inches long. Emerging in large clusters, the pale pink to white blooms feature downy flower stalks. The large fruits are orange to red.

The **common manzanita** (*Arctostaphylos manzanita)* reaches two to 20 feet in height with a six to ten foot spread. It is hardy to zone eight. Common in California, this small tree to tree-like shrub with crooked branches features reddish-green bark and dark green, oval foliage, up to 1½ inch long. The white to pink blossoms emerge over a 1½ to two month period. Initially white, the berries later become red.

Mazanita Bloom

Dwarf or glossy leaf manzanita (*Arctostaphylos nummularia)* is an acid-loving species that blooms during mid-Summer. Typically ½ to five feet tall and twice as wide, this occurs in California in northern coastal areas. Hardy to zone seven, it bears pink or white blossoms in Spring.

Greenleaf manzanita (*Arctostaphylos patula)* is hardy in zones five through eight. Preferring full sun, this native is found on dry slopes, glades, and open woods in Washington, Oregon, Montana, California, Nevada, Utah, Colorado, Arizona, and New Mexico. The plant is typically three to six feet tall and equally wide.

The picturesque shrub is noted for its twisted, gnarled trunk and multi-hued, peeling bark. The thick, stiff foliage is medium green to greenish-gray. The white to medium pink blossoms open in Spring.

Hairy or Columbian manzanita (*Arctostaphylos columbiana)* is hardy in zones eight and nine. Native to Washington, Oregon, and California, this reddish barked, hairy twigged shrub or small tree with a fast growth rate reaches five to seven feet in height and is almost as wide. Hairy when young. the greenish-gray foliage is three inches long.

The plant bears white flowers during the Spring. Although the honey can initially taste somewhat bitter, this diminishes with time. The berries are scarlet.

Pine mat manzanita (*Arctostaphylos nevadensis)* is a sun loving, Spring blooming species. It is reliably hardy in zones seven through eight and marginally hardy in zone six. Only ¾ to two feet in height and a spread of up to three feet, the plant occurs from Washington and Oregon to California and Nevada in open woodlands and outcrops.

Variable in growth habit, this very dense species features many crowded, twisted, brightly colored stems. Pine mat manzanita bears pastel pink to white flowers in Spring.

Sticky whiteleaf manzanita or silver manzanita (*Arctostaphylos viscidia)* is native to California and Oregon. Hardy to zone six, this shrub or tree reaches eight to 20 feet in height. The pink and white flowers are followed by red fruits.

Woollyleaf manzanita (*Arctostaphylos tomentosa)* is the second most common species in California. Hardy to zones eight through 10, it is named for the downy covering on the new stems and the newly emerged leaves. The plant can grow to eight feet in height. BC

Connie Krochmal is a beekeeper, writer and plant expert living in Black Mountain, North Carolina. She is recommending California Foraging-120 Wild and Flavorful Edibles from Evergreen Huckleberries to Wild Ginger *by Judith Larner Lowry, 344 pages, Timber Press, to beekeepers.*

Beeyard Thoughts

Beekeeping in the Gap.
New and recycled containers – when are they clean enough.
Odds and Ends – Shooting down a swarm.
A personal note.

Keeping bees in the "*gap*"

An interstitial space or interstice is an empty space or gap between spaces full of structure – a gap. For the past 30 or so, we have been keeping our bees in the interstice formed between mites not being in our bees and mites being in our bees. Presently, we know mites are in our colonies, but we do not yet have conclusive control procedures to rid our bees of them. We know the question – "How do we effectively control mites?" – but we don't yet have the final answer.

In the past three decades, we have tried a plethora of remedies. None have positively risen to the top of the "control procedures" pile. Though it has been the goal of scientists worldwide, nothing has been found that will let us routinely keep bees as we did in the 70s. Frequently, today's bees seem lethargic and weak. Replacement queens don't always seem great. Why? I don't know.

Welcome to bee life in the gap. It's the life beekeepers challenge until comprehensive answers are developed.

A resolute beekeeper – me

Last year, during the second week in December, snow had fallen and was crunching beneath my feet as I returned from my storage barn. It was bright day so it was easy to see the little black spot on the brilliantly white snow. It was a dead bee that I duly noted. *"Humph, odd" I thought.* A few more crunching steps and yet another black spot appeared. *"Whoa!"* In fact, there were dead and dying bees everywhere. Many were dead but just had not finished dying. *What in the world is going on?* The three beehives in question were near the storage barn. They were from established colonies that had built up nicely last Spring. I had given them full frames of capped honey, provided protein patties, and added plenty of extra supers. They exhibited good flight all Spring and Summer. Now, this? Where were all these dead bees coming from?

In fact, they were coming from the middle hive of my three hives. It was 28°F outside on a bright, still day. Yet the hive was alive with frantic bees at all entrances and a small pile of dead bees accumulating on the ground. They appeared agitated – as though they were all trying to leave at once. They seemed absolutely eager to die. As I stood there, watching in confused amazement, a few bees departed on suicide flights. *What was going on?* Old combs? Stores from toxic sources? I don't know. This mystery colony survived the Winter; though it must have been set back some. Later in this past season, I could not tell the difference between it and my other colonies. For a while this colony was in the "gap" of my bee knowledge. I don't know what happened, so I am not sure what to do for the upcoming season. When it happens, I will deal with it.

This is a single example of beekeeping in the gap, but the same could be said of oh, so many other beekeeping issues. These unknown areas like: poor queens, lethargic colonies, late season swarms, and on and on are examples of beekeepers striving to get through issues that have no defined answers. In a way, this informational void keeps beekeeping interesting and challenging. Such everyday beekeeping unknowns make up the core of beekeeping meetings. I offer some current topics below.

Some thoughts on unexplained die-offs – both yours and mine

Reusing old combs

Most beekeepers recycle old combs as they manipulate their colonies. The potential problem with this procedure is a low-key subject that is periodically brought up by various scientists and beekeepers. Beeswax is a chemical blotter – essentially a liver. It seems that any chemical that comes near it is partially absorbed by beeswax. It has been postulated that, at some levels, harmful intensities of residues are reached that negatively affect developing brood. Testing combs is impractical for nearly all of us. How long to use combs, when to replace, and how to replace are some of the

All seemed quiet, but the middle hive has serious problems.

common unanswered questions in this area. This is one of those partially answered questions in beekeeping. We know that chemicals accumulate, but when is too much too much?

Right now – best guess recommendation – change every three to five years. *(I will do my best, but I will also expect to fall short.)*

Beekeepers quickly begin to accumulate "pre-owned" honey jars. Their future use is generally uncertain.

Too many colonies die during Winter months

Winter colony deaths are like New Year's Resolutions. Each Winter/early Spring, I make a list of things I will do differently this upcoming season. I am now leaving plenty of honey – *plenty*. That is a change from seasons past. In fact, I commonly have honey left on the colony for the splits/packages that I will be installing next Spring. But for six years or so, some of the most unexpected colonies have died; and on occasion, some of the weakest colonies survive. Go figure. Am I just mis-remembering? Decades ago, did populous colonies sometimes die and I have just forgotten? Even so, I want to address this abnormal Winter flight that some of my colonies have exhibited for several (even many) years now.

Cleaning both new and old honey jars

I got this question from a county extension educator. Honestly, I had never truly thought about discussing the answer, so I had little published information to provide. After some consideration, I composed the following comments. Tell me if you do not like something I have said here (or anywhere else).

There has been some discussion at our monthly meeting that new bottles come from the manufacturer ready to be filled and do not need to be sanitized. Others say they need to at least be washed and well dried but not sanitized.

1. New, undamaged and unopened cases of inverted glass containers are suitable for filling with honey without pre-cleaning. Check them anyway.
   a. If the honey bottler wants to wash or otherwise clean jars, absolutely no harm is done. (See section 7 below)
   b. After bottle filling, fingerprints and residual honey should be wiped away with warm water and a clean cloth.
   c. Cases containing broken jars with glass shards would cause remaining unbroken jars to be scrupulously inspected for chips or cracks. Usable jars from damaged cases should be rinsed with water. After drying, such jars should be wiped to removed water stains.
2. The lids for glass bottles should be new, with properly fitting seal inserts. Ideally, they should not be scratched or dented and should fit tightly.
3. Plastic bottles that are shipped loose in large plastic or corrugated boxes or bags should be blown out with compressed air and inspected for plastic pieces or any other contaminants[1].
4. There are several variables.
   a. If any glass or plastic containers were purchased secondhand or in open shipping containers or in small lots that are repackaged, such honey containers would benefit from a warm water rinsing.
   b. If the bottling operation is viewable by customers, jars should be rinsed, air dried and wiped before use. The purpose is not to trick the customer, but to reassure the customer that this is a perfectly wholesome product packed in a clean environment.
   c. If the product is bottled in the vicinity of other activities (at farmer's markets or street markets), the honey bottler should be vigilant for insect or environmental contaminants (dust, leaf parts).
5. Reuse of honey containers.
   a. Customers logically want to reuse any container that can be reused. It is common to have containers returned to the honey bottler.
      i. Accept such containers, but seriously consider not reusing them.
         1. The total use history of the container is unknown.
         2. Plastic containers are more difficult to reuse and have a much shorter use life. In most cases, plastic containers should be recycled.
      ii. Lids can rarely be reused.
      iii. If containers are reused, obviously, they should be washed with soapy water, dried and then inspected.
   b. Specialty reuses of honey containers
      i. Personal use by the bottler, or family members, etc.
      ii. Items other than honey – including non-food uses.
   c. Using recycled honey jars for toxic materials happens. If seriously toxic, consider attaching a content label.
6. Honey is a remarkably stable and naturally wholesome product. In the natural world, honey is produced by bees, stored in combs, and stocked in trees or other natural cavities. Consequently, honey, as a food, is stable and storable. Naturally occurring

[1]Ideally, a diaphragm compressor should be used. A piston-driven compressor with an oil reservoir, after several years use, could wear enough to blow small amounts of oily water into the containers. This is a small concern, but container perfection is the goal.

A photo of typical swarm retrieving equipment.

hydrogen peroxide and very low moisture content desiccate most (all?) microbial growth known to science at this time. Even so, all honey bottlers must respect the purity of honey and the favorable opinion of consumers. Cleanliness is always an absolute requirement.

7. Individual State Department of Agriculture regulations and recommendations supersede anything recommended in this listing.

Odds and Ends

This time it worked.

From Mary T. in VA.

We roped and toggled the branch so the swarm wouldn't just drop to the ground if a clean shot went through it. We got the ropes up there by my adult son casting his fishing line with the ropes attached. We've all been on active duty at one point or another, so that's our excuse for capturing at "almost all means necessary" and NEVER giving up. The oddity of all this, is it's the only swarm we've ever captured that decided it didn't like the hive we put it in. It flew the coop 24 hours later.

We capture only our swarms from our hives. They seem to crawl over me but I haven't been stung during a swarm catch. I do plug my ears/nose with cotton and wear eye goggles because it's unnerving for me to have them crawling in and out of those. When the bees crawl around my eyes, it itches/tickles, so I wear goggles. We've gone from three to eight hives and given away seven swarm catches. We hope that's all we do. It's hard to let your $$ fly off even though we don't sell bees/honey.

An apology and an explanation

My Mom passed away in early October 2016. It took her several months to reach the final point. She was 91 years old for four short days. Making the experience more difficult, she and I live 850 miles apart. My wife and I frequently visited and commonly stayed for a week. During this confusing time, I increasingly began to fall behind in responding and communicating with those of you who wrote me, frequently sending photos and suggestions. Though I know I have a good excuse, I am still sorry that I neglected some of my correspondence. As I can find these neglected interactions, I will respond – no mater how late.

To the NJ Beekeepers, whose meeting was seriously disrupted by my personal events, I offer a particular apology. As soon as I can, I will make it up to the group.

Thank you, Jim

Taking a risk...

Thanks to the Iowa Honey Producers Association and to the California State Beekeepers Association for hosting me at their November 2016 meetings. I had a great experience at both events and, as usual, I learned much more than I could give. Both groups were in good beekeeping spirits. It felt good to feel good about beekeeping. BC

Dr. James E. Tew, State Specialist, Beekeeping, The AL Cooperative Extension System, Auburn Univ; Emeritus Faculty, The OH State Univ. ***Tewbee2@gmail.com; http://www.onetew.com; One Tew Bee*** *RSS Feed (****www.onetew.com/feed/****);* ***http://www.facebook.com/tewbee2; @ onetewbee*** *Youtube:* ***www.youtube.com/user/onetewbee/videos***

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

Send your questions to Phil at
phil@philcrafthivecraft.com
www.philcrafthivecraft.com

A beekeeper in Idaho writes:

We want to start a hive. We have someone who has a large honey bee nest in the wall of a barn they want to tear down in the spring so we're getting the things we need so we can get these bees. In the process I have a friend who has several heavy plastic beehives (I may be saying that wrong) that they want to get rid of, however after being in their shed a year wasps invaded, so he sprayed the hives. My question is, are those hives usable if they were to be cleaned or would they carry trace amounts of wasp spray that would harm/kill honey bees? Or would it just be wise to just get new ones?

We have no plan yet as to when he will remove the bees from the barn. I've just been researching as of yet. My father has transferred/rescued bees before and said he could help so I was leaning towards his knowledge there. I've only started researching the last two weeks and ran into your advice column so I wanted to see what advice I could get.

Phil replies:

Unless cost is a major consideration, I suggest that you purchase new equipment. Scrubbing the plastic hives with soap and water, might be enough to remove any pesticide residues, but do you really want to take a chance? Wasps, like honey bees, are insects, and pesticides designed to kill the one are not likely to be healthy for the other. The level of risk to any colony you install in the hive would depend on such factors as: the toxicity of the active ingredient of the product, the half-life (or rate at which that product breaks down), the amount applied (Did the owner spray the equipment lightly or really wet it down?), and your ability to eliminate any remaining chemical. Since you know the person who sprayed the hive, you might be able to find out the name of the product used and do some research, but there will probably still be unknowns in the end.

Plastic equipment.

My concern is that, if you should decide to clean and reuse the plastic equipment, you might not recognize any possible negative effects when they occur. It isn't just a question of whether or not there is enough chemical residue to kill the bees. Pesticides can, in small quantities, produce what scientists call sub-lethal effects. In other words, though they may not kill, they could impair in such a way as to make the colony more vulnerable to other stresses. As a novice, you wouldn't have any way of knowing that things weren't right. One of the difficulties new beekeepers contend with is recognizing when something is abnormal in their hives, because they haven't learned yet what normal looks like. Tossing in another unknown can only make the challenge more difficult, or at minimum give you something else to worry about. One way to mitigate the problem would be to purchase a second hive in a more conventional manner, and install a nuc or package of bees in it. I always recommend that people start with two hives when feasible. This allows you to compare one with the other. Similarities in the two new hives likely mean things are going well in both. Serious differences may indicate that something is wrong with one, and prompt you to get help and advice from someone more experienced.

Chemical residues are not the only reason for new beekeepers to be very careful about buying used equipment. They just do not have the experience to judge its condition. This is partly a question of value, which may not be an issue for you if you expect to get the plastic hive body at low cost or as a gift. Also, plastic is not prone to rot and deterioration as wood is. The other issue with used equipment is the risk of its harboring disease pathogens. Even an experienced beekeeper would not recognize the pathogens in equipment that cause nosema disease, or have difficulty recognizing signs of a mild case of American foul brood. To some extent one has to rely on the seller's

word and reputation. Disease issues are most likely in used frames, especially those containing comb, so I advise new beekeepers to always stay away from them.

I am glad you have someone with experience to help retrieve the colony from the barn. Removal is a task a veteran beekeeper might handle successfully without any prior expertise, but for a new beekeeper to attempt it is to invite an unpleasant experience, or even a dangerous one. Spring would be the best season to undertake it, though the timing depends on the weather in your area. At my old Kentucky home, the best period would probably be around the 1st of May. Depending on your elevation in Idaho, I would suggest late May or early June for you. The goal is to remove the colony after it starts to build up, but before it increases too much. Better not have a lot of fresh honey to deal with.

I am always interested in people's stories about how they got started in beekeeping. You have a lot of research to do before spring, but seizing an accidental opportunity is as good a way as any to begin. Let me know how it turns out.

Bee Culture readers, if you would like a copy of my handout: "Getting Honey Bees and Getting Started", drop me an email, or a note, and I will send it to you.

A beekeeper in West Virginia writes:

Hope you are doing well. My question is, I had five boxes on my hive all Summer, two were honey supers. At the end of Sept I took off the two honey supers. I took them down to three because I saw wax moths, but within two weeks I felt they were overflowing out of the box, so I put one back on. Now at four boxes. How can you go from five boxes down to three and the bees still have sufficient room? How do you know how many boxes to take it down to for Winter?

Also, for each solid box of bees you have, how many boxes of honey do they need for Winter? Is there an equation or ratio?

Phil replies:

Removing honey supers during harvest might cause crowding in a hive, but it's not necessarily the case. Obviously, it depends on the number of bees in the colony, but the time of year is also a factor. If the supers you took off were full of capped honey, which is most often the case during harvest, there might not have been very many bees in them. There is not much for them to do once honey is capped – no wax comb to be constructed, no nectar to move around, no cells filled with honey to be capped. At that point, most of the bees will move back down into the brood boxes or into other honey supers where there is still work to be done. Frequently, after removing several supers of capped honey from a hive in late Summer, I have seen an immediate increase in bearding at the entrance. That can be a sign of congestion in the hive, but if the weather is warm I don't worry about it. The bees are fine out on the porch, and they will move back inside when it gets chilly. If there is still a nectar flow on when I notice the bearding, I will put an extracted super back on the hive. That both takes care of the lack of space and garners me a little more honey. The bottom line is that, when you are concerned about crowding, the sensible thing to do is to give the bees more space by adding an empty box just as you have done. A super with undrawn foundation will do, even in a dearth. If the bees are going into the super because of crowding, it doesn't matter whether or not they have work to do.

The changing of the season brings a more permanent solution, at least in your part of the country. In late September it was still quite warm in West Virginia. As I write this reply in mid-November it has cooled considerably, and the bees are clustering to stay warm. It would not be surprising to find that the box you put on to reduce crowding in September is now empty. Lower night time temperature is the reason that bee escapes are effective late in the fall at clearing honey supers of bees. Workers occupied in the supers leave them to join the cluster in the brood chamber at night when the temperature drops. As the sun warms the hive the next day, the one way door prevents them from moving back up. Bee escapes are of little use in hot weather because bees have no reason to leave the supers when night time lows are in the 70s or 80s.

As to how many boxes of honey the colony needs, there is no equation or ratio. It all depends on the severity and duration of Winter in your area. Beekeepers relate the pounds of food stores required to a certain number of frames or boxes, which in turn varies with the size of your hive bodies (standards, mediums, and so on.) No formula works for all parts of the country; the best guides are your local bee inspector and the experience of other beekeepers in your area. As you know, I live and keep bees in central Kentucky which is similar in climate to West Virginia. Here we consider about 50 to 60 pounds of stored honey (including sugar syrup if the beekeeper has been feeding) sufficient to get through the Winter. A little more would provide a safety margin for hives located at mountain elevations. That is a probably a fair average in the contiguous states, but it is only the middle of a range. Beekeepers in the deep South can get by with as little as 25 pounds of honey, and those in the

Bearding.

far North need as much as 100. Alaska is in a separate category. Hives there may require 190 pounds of food as well as special preparations such as wrapping or wintering indoors. Short of putting your hive on a scale, how can you determine what weight of honey it contains? There is a formula for this part. A standard frame full of capped honey or syrup weighs about 7.5 pounds which comes to 75 pounds for a full deep box with 10 frames. Shallow boxes and frames weigh about half of that, and mediums about two thirds as much. I maintain my hives with two deep brood boxes each, and I like to see the top ones completely or nearly full going into Winter. A strong colony should be able to store that much easily, and if for some reason they don't, there's always the option of feeding with sugar syrup.

I'm inclined to think that you have more boxes than you need. I would be quite surprised if the bees were occupying or storing much honey in the super, and even the third hive body is probably superfluous. However, there is no harm in leaving them in place as long as the wax moths are not back at work.

A beekeeper in Ohio writes to set me straight:

Please be assured that your carefully composed writing each month in "ASK PHIL" is appreciated. However as you probably have already been informed, the statement "That all drones produced by one queen are genetically identical" (Bee Culture, Oct 2016, pp 40-41) is false. Please see Page and Laidlaw in The HIVE and the Honey Bee, Joe M. Graham, ed, 1992 pp 242-4, portions of which I quote here. "Different eggs laid by a (honey bee) queen contain different genomes, due to genetic recombination during maturation of the egg, and the sperm produced by males derived from different eggs of the same queen will differ accordingly.

Perhaps, what you were intending to write was that "all of the sperm that one drone produces contain identical genomes (with the exception of random mutations)" as quoted from page and Laidlaw, p243.

Please keep up the good work.

Phil replies:

Whereas I normally use the formula "A beekeeper in _____ writes:" to avoid disclosing the names of those who write in to my *Bee Culture* column, I will make an exception this time. This is not a beekeeper asking a question, but a friend doing me a favor. I try to be as accurate as possible, and if I don't have a ready answer, I do research to find one. However, when I make a mistake, I appreciate someone's setting me straight – especially when they do so in such a polite manner. So thank you Fredrick Burdell. I hope I don't require fact checking as often as some of the candidates in the recent presidential debates, but if I do err again in the future, I hope you'll let me know. BC

Celebrity Beekeeper

Peter **Sieling**

Henry Dormann is editor and publisher of *Leaders* magazine. Subscribers are heads of state and CEOs of major corporations. Mr. Dormann has probably interviewed more world leaders than Barbara Walters and Oprah Winfrey combined. He wanted to interview me about beekeeping!

It started in the dentist's chair. My hygienist, the "tooth fairy", has mastered the art of talking to people whose mouths are full of cotton and tools of torture. We talked about bees, of course. Gail asked all kinds of questions and I answered in grunts and monosyllables.

After the cleaning, Dr. Baxter opened my mouth and peered in. He jabbed the pick under my gums, looking for cavities while Gail filled him in on my bees and complained about my flossing.

Dr. Baxter also fills Henry Dormann's cavities. One of Mr. Dormann's retirement hobbies is hosting a local Sunday morning television show.

"You know," said the Dentist, "Henry Dormann is always looking for local people to interview. You'd be great. You really should floss more. Next time I see him, I'll suggest that he interview you…"

"So people can watch me freeze in front of a camera and look stupid," I thought to myself. Mr. Dormann was probably busy interviewing Vladimir Putin, Miley Cyrus, or President Obama. Maybe he, Barbara Walters, and Oprah were interviewing each other.

Three days later Chaz, Mr. Dormann's valet, called me. "Mr. Sieling, I'm calling for Mr. Dormann's *Friends and Neighbors* show. We'd like to do an interview…" I asked if Mr. Dormann would put on a veil and gloves. "Oh yes, that would be great!" Chaz exclaimed. But there was, I later reflected, a suspiciously disingenuous inflection in his voice. We set a date. I had three weeks to clean and worry.

The perfect bee day arrived – hot, sunny, and a good honey flow meant a yard full of happy bees. A white pickup truck pulled in first, with the camera and sound crew, followed by a shiny new Bentley. Mr. Dormann sat in the back with his valet at the wheel. Another car brought up the rear, security people, I supposed.

Chaz looked like a model out of GQ magazine. He held the door for Mr. Dormann, who stepped out in an Italian cut tailored suit.

Chaz warmly shook my hand. "Good to meet you, Mr. Sieling," he said.

I greeted Mr. Dormann in turn. Mr. Dormann looked through me. Where are the bees?" He sounded tired and mildly annoyed.

I explained that they were a couple hundred yards back from the road, across the hayfield. Mr. Dormann refused my offer of a ride on our Gator, so Chaz and I agreed that he could follow me in the Bentley. I led the entourage across the hay field, avoiding most of the tractor ruts, through the woods, and down a slope into the beeyard.

The camera man and sound girl set up their equipment as Mr. Dormann got out. "Now, Mr. Sieling, just do what you do and keep talking."

Do you want to suit up?"

"Absolutely not; I'll just sit back here." He seated himself on the Gator.

I expected some sort of back and forth chat, based on what I've seen of talk shows. Instead I pretended the camera man and microphone girl were beginning beekeepers. I didn't wear a veil, having picked a small, gentle hive the evening before. As I pulled out frames of brood and honey and tried to sound intelligent, I couldn't help noticing Mr. Dormann out of the corner of my eye. He was wildly flailing his arms. My bees apparently don't like Italian cut tailored suits. I was halfway through a sentence when Mr. Dormann called out, "That's it. We're out of time." Chaz bundled him back into the Bentley and they drove off in a cloud of dust.

The cameraman and sound girl stayed behind to get a final shot of the queen. I pointed her out and he filmed her walking across the comb. "That will be a great shot to end the segment." He was rubbing a swollen spot behind his ear.

"How do you like doing these interviews?" I asked him.

"Some are pretty dull. This was definitely one of the more interesting ones." They left. I drove back to the house and checked the clock. From the time they pulled in until the cameraman left, 25 minutes had passed.

My wife, Nancy, was making jam while I was in the beeyard.

"You're married to a celebrity now," I told her.

Without turning, she answered, "After you put your old clothes back on, could you run the garbage to the compost pile, please and thank you. Oh, those security guys with the mirror sunglasses? One of them bought a jar of honey." BC

Peter Sieling is a celebrity beekeeper in Bath, NY. He sells his books at ***makingbeehives.com****.*

Letters From A Beekeeper's Wife –

Winter Quarters, January 1, 1917

Dear Sis;

We have just had a funny experience that I must tell you about, while I wait for my bread. Did you ever notice the first meeting of two strange beekeepers? I have, often, and it is most curious how little it takes to get them around to bees. Then! Bing! Something happens! Some small cord is freed in each man's bosom that reaches out and wraps itself about the other fellow's heart, and draws those two close together. I have never known it to fail. The secret bond between beekeepers makes them bosom friends at once, and the stream of conversation begins to flow. It would flow on forever, I'm sure, were it not for beekeepers' wives, who have a way of announcing meals or bedtime.

Rob is always delighted to see a "brother" come up our lane and he always keeps him as long as possible. I know exactly the trend of the river of bee-talk with all its ramifications and branches and I must say that I enjoy it, and join in occasionally, too. They always begin with the last season's crop – why it was large or small – what it was in other parts of the country – then comes the honey-flow and the weather during it, then to sources of nectar. After that they compare strains of bees, warm up to methods of wintering, queen-rearing and disease. By this time day is waning and supper interrupts. The visitor tries to be polite and inquires about the children's school, but his mind is always on bees and he will probably interrupt my reply by turning to Rob with "Oh! By the way, did I tell you that I am trying out a new winter case?" It is so hopeless that we let him go and the stream wanders back to its accustomed bed. After supper they discuss the last national convention, then to personalities, find mutual beekeeping friends, until I go to bed. (They never notice my slipping out for they have begun on the relative merits of comb and extracted honey and that is an endless subject!) I hear the drone of their voices until I sleep, and in the morning when I say accusingly to Rob, "What time did you come to bed?" he always replies in a shamefaced way, "Oh! About half-past."

What I began to tell you was that last week an odd-looking man with a heavy, black beard and slouch hat came to the door to inquire his way and Rob stood talking to him for a few minutes. Then they sat in the steps and talked more, and I gathered from what I heard that he was a beekeeper. Soon Rob came into the kitchen and said, "Put on an extra plate. Mr. Samson will stay to supper." I whispered, "Why, Rob, you don't know a thing about that man. He may be a robber or a murderer, for all you know."

"Well. I know he is a beekeeper," Rob replied, and that settled it. Come to think of it, beekeepers as a whole are about as respectable and honest a group of men as you can find. I noticed at the State Convention how few of them smoked, and I know of many clergymen who keep bees. In foreign bee journals you will often see articles signed "Abbe _____" or "Pastor _____," so I believe that is the case in other countries, too.

The strange Mr. Samson did stay to supper, and not only that, but over night! I put him in the guest room, much against my wishes, but I put the silver spoons under our bed. I'll trust bee-men pretty far, but not to the extent of leaving my silver downstairs. Our guest seemed very grateful for our hospitality and went off the next morning, he and Rob the best of friends. I couldn't feel just right toward him because of his brigand-looking beard, I think; but this morning the nicest letter came from him engraved "Beechwood Apiaries" and with it was a little bank shaped like a bee-hive for Billy, with a five dollar gold piece in it! I'll never suspect a beekeeper again of trying to steal my silver spoons!

I will write again this month, but let me say that one of my New Year's resolutions is to be that I shall not mention bees to you in my letters, for I know you must be tired of them! My bread is riz, and I fly!

Mary

Sticky Situation With Canadian Bears and Honey

Alan **Harman**

When Canadian David Dubois bought himself six hives of bees and installed them in a northern Ontario city he forgot for a moment about one thing – bears.

Dubois of Sudbury, 250 miles north of Toronto, researched his beekeeping project for four years, but obviously didn't include bigger critters in his planning.

He received his C$4,000 (£2,335) worth of bees and equipment one day and by the next all six hives had been torn apart by a bear that dropped into town for a meal.

"He destroyed every one," Dubois told the Canadian Broadcasting Corp. "He opened every one. I'm pretty despondent, but it's not so much the money, as I was looking forward to the experience."

Dubois had ordered an electric fence – standard equipment for beekeepers in Canada's Great White North – but it wasn't due for a week. He figured no bear would be desperate enough to root out the little bit of nutrition in his new hives.

He was wrong.

A little bit of research shows how wrong.

Agriculture, Food and Rural Affairs data shows that in the 2014/15 year running from April 1 to March 31, bears in the province caused losses of 352 bee colonies and 349 hives and equipment valued at C$67,771 (US$52,250).

A year later, in the 2015/16 years, colony losses to bears rose to 518 along with 604 hives and equipment worth C$111,166 (US$85,668).

The 1,742-square-mile Grey County region, with a population of 93,000 on Georgian Bay in southwestern Ontario, accounted for the losses of 220 colonies and 226 hives and equipment worth C$47,085 (US$36,300) in 2015-16.

Further south, the much more densely populated 715-square-mile Niagara region's population of 431,346 didn't deter the bears in their quest for the sweet stuff. The major winemaking region bounded by the Niagara River – also the border with the United States – Lake Ontario and Lake Erie, lost 61 colonies and 64 hives and equipment worth C$15,100 (US$11,641).

Dubois had an explanation for his losses way to the north and it has nothing to do with the countless squadrons of black flies doing escort duty for waves of mosquitoes.

"I'm angry more at the aerial spraying that has made bears not be able to have any food in the bush," he says. "And they have to forego all their natural instincts and resort to coming in to an urban environment to feed themselves."

The comment had Internet trolls firing stinging remarks in his direction.

"He left a known bear treat in an area where there are bears," wrote one. "He knew the chance of bear engagement was high enough to warrant purchasing an electric fence. And then when his unprotected hives get hit by a bear, he blames people who are doing spraying?"

Others wrote that he should do his research before opening his mouth.

"There are no blueberries yet. Bears eat bugs and grubs at this time of year, and fresh grasses, as well as any easy caught animals (like newborn moose calves or deer fawns). There are no berries right after hibernation. They will eat whatever they can find, and they are drawn to bees and the hives at this time of year."

Another asserted there is no aerial spraying "in the bush" other than when fires are being extinguished.

"The bears are in an urban environment because there is plenty of food here and it is too early for a lot of food in the bush. If there wasn't anything to eat, they wouldn't be here.

"That's how bears work."

Another wrote: "The easiest source of food at this time of year is into the city, where all of the garbage-throwing, beehive-keeping people live. Bears aren't stupid."

In fact, research has found them to be one of the more intelligent mammals.

Adults grow to 50 to 80 inches nose to tail. Males weigh 125 to 500 pounds, depending upon age, season, and food. The record is 816 pounds, Females weight 90 to 300 pounds with the record at 454 pounds.

There are an estimated 100,000 black bears in Ontario.

The provincial Ministry of Natural Resources and Forestry says the bears' entire life revolves around food. When they are not hibernating, they spend their time looking for food.

From the time they come out of hibernation until berry crops are available, bears live off their stored

Cautionary advice in northern Ontario. (Alan Harman photo)

A solid electric fence keeps bears at bay on a wild blueberry farm. (photo by Alan Harman)

fat and the limited energy provided by fresh spring greens. They get most of their food energy by feeding on summer berry crops such as blueberries, raspberries, and cherries. In the fall, they turn their attention to hazel nuts, mountain ash, acorns and beech nuts.

So many fun-loving bears have visited Sudbury, a city of 165,000 people – 66 at last count – the Greater Sudbury Police created a triage system to handle bear reports.

Inspector John Somerset says the new approach takes 911 callers through a series of steps to determine whether the situation is dangerous or not. He says a trapped or injured bear, or a bear acting aggressively are considered a higher risk than a bear rummaging through a garbage can.

Critical situations include when a bear enters a school yard, tries to enter a house, attacks a pet, or stalks people.

Once the 911 call has been triaged, a dispatcher then determines the resources directed to the call.

Somerset says Sudbury bear sightings are an ongoing issue and blames residents.

"People need to see what's attracting bears to their areas and manage the attractants," he says.

Bears usually avoid humans, but are lured into urban and rural areas by the promise of food. They will topple bird feeders, ransack barbecues, raid garbage cans and even try to enter buildings. If they learn that they can find food where people live, they will continually return.

In Timmins, a further 185 miles north, police last year warned against discharging firearms within city limits by city residents seeking to bag bears in their backyards.

Offenders face fines of up to C$5,000 (£2,919).

The politically oriented online Northern Bear Report has been created to build a database of documented bear encounters – and to embarrass the provincial government into action.

"Bears have been regularly observed walking down streets in the middle of the day, posing an immediate hazard to public safety," it says.

"It is not reasonable that people living in built-up areas should be experiencing this degree of risk on a regular basis. The constant exposure of residents to roaming bears should not be happening in our province; unfortunately, this has become the norm in many Northern communities."

The North American Bear Centre, however, says the 750,000 black bears in North America kill less than one person a year on average.

Timmins resident Angie Corson, a professional biologist, says the situation where so many black bears are entering built-up areas of the city is a real problem. Many people have changed their behaviour and there is a genuine sense of fear, she tells the local newspaper.

Corson says her support of the provincial Bear Beware program includes distributing free whistles to hikers, children, berry pickers or anyone else who fears an encounter with a bear.

She says the whistles are an effective deterrent.

"A bear whistle makes the bear aware that you are there," she says. "People can be a lot quieter than you think. It also alerts the bear that he needs to move on."

"If you see a bear, you blow that whistle, and he will run. Nine times out of ten, he will run. Very rarely do they stick around. They really don't want to be around people."

Timmins, a grim little city of 43,000, has posted signs on all highway approaches telling people not to feed the bears.

But 205 miles to the southwest, Algoma Highlands Wild Blueberry Farm and Winery owner Trevor Laing shares his farm outside the tiny town of Wawa with as many as 50 bears and doesn't have a problem with them.

He says when his farmed wild blueberries are ripe for the eating there are also plenty available growing in the nearby forest.

"The bears also don't go too far into the blueberry fields because they don't want to get too far from the safety of the forest," he says.

Laing leases beehives to pollinate his crops, but there is a big difference between him and would-be beekeeper David Dubois.

Laing has his hives guarded by a sturdy electric fence. BC

Bears find ready food supply almost everywhere.

Alan Harman is a freelance writer and frequent contributor to these pages. He lives in Brighton, MI.

A Multi Style Hive Apiary

Ernie **Schmidt**

A Multi-style hive apiary is pretty much what it sounds like. I keep bees in Langstroth, Top Bar and Warre hives. I have been truly blessed to have lived for over 35 years in a location that is conducive with my passion of bees. My neighborhood and surrounding countryside is rural small acreage farms and homes. We are a friendly community and one of the things that brings several of the families together is being in the exclusive club of having "Ernie's hives" on their farm. I have small apiaries on neighbor's farms and scattered hives on my five acre farm. I've named the apiaries Warre Town, Langsville and Top Bar Hill. I would like to say they are all neatly arranged as Top Bars in one apiary, Langstroths in an another and Warres in another but they're not. I'm not quite that fastidious as a beekeeper. A different style hive is at times sprinkled into a different apiary. I am however a bit of a perfectionist with my second passion, building bee hives. As an accomplished wood worker with a large workshop I build nearly all of my woodenware. From conventional hive design to designing hives- I have build mainstream and experimental hives. I have even crafted an historically accurate skep hive.

One of the first questions I am usually asked is, "Why do you keep bees in different styles of hives?" My short answer is pretty simple, "I love bees." Looking back on my beekeeping career, I realized early on that my focus was on the bees themselves. I am fascinated by bees. I am not just passionate about bees, I am obsessed about bees. My number one focus for keeping bees is keeping them alive, everything else is secondary. The particular kind of hive I keep them in or the harvesting of any products from them is not that important to me. That's not to say I don't have the opportunity to harvest honey and render wax. It's that I don't intentionally focus on managing my hives for production. Keeping bees is pointless to me if I can't keep them alive.

I have no biases for or against a specific hive or management style. If there are bees in any manner of hive, I am open mindedly interested. This mind set makes me a excellent candidate to honestly approach the value of any style of hive and management for the health of bees. I have been studying the bees in different styles of hives to see if hive style can make a valid difference in colony health and longevity based on the hive style and management method. I do work to master the established intended methods for managing the bees in each particular style of hive.

However I will experiment with minor modifications in the construction of the hives and methods of managing them. Nearly everything I test and experiment with is focused on bee health and well being. One aspect I focus on in my research is how easy can I make it for the keeper to provide any new bee beneficial idea to bees I come up

Above photo – three of my regular Warre hives in the field, one custom design Warre and Langstroth hive on the stand. Since this apiary is across the street from my house in my neighbor's back acreage the yellow wagon is my equipment transporter.

Two of my Top Bar hives. The stand is a repurposed pallet.

with. In other words, I try hard not to over think or over engineer anything. Sometimes a subtle change can make a big difference.

The three different hives

The best way to start an explanation of the differences in these three hives is to quote the famous beekeeper, F.E. Moeller.

"Beekeepers in managing or manipulating colonies, are merely facilitating normal biological colony changes to suit their purposes."

I cannot think of a better explanation of what we do as beekeepers then that and in one sentence! The biggest difference between each style of hive is it's purpose and style of management. The fact that the "box" the bees live in looks different is really secondary. To decide if you want to keep bees in any particular style of hive, you don't compare one hive style to another. You compare the intended management style and purpose of each hive to your personal management style and your expectations from the bees. Bee keeper personality styles are as important as hive style to understand in relation to making choices. Making a wrong choice of hive style that has a different purpose and management method then the keeper is expecting can become frustrating and disappointing for the keeper. Each style of hive has a specific method of management that may or may not be compatible to the keeper's style. The bees will live happily in nearly any kind of cavity they find suitable.

Hand woven from Canary Straw Grass and covered with Cloam. Cloam is the original covering historically used to cover skeps in Europe. It is made of a cow manure,clay,and wood ash mixture. Very hard and

A keeper not liking the style of a hive because it doesn't produce the results from the bees that he expects, doesn't make it a wrong hive. It only makes that style of hive for that particular keeper a wrong choice of hive. The right hive style choice is a marriage of three things.

1. The management style for-*"facilitating normal biological colony changes"*-that matches the keeper's personality style.
2. The intended purpose of the hive.
3. The keeper's expectations for keeping bees.

The closer those three things line up, the happier the keeper will be with their chosen hive style.

The three different hives

The Langstroth Hive

Rev. Lorenzo Lorraine Langstroth developed the Langstroth hive in 1852[1]. He saw honey as a resource and the honey bee colonies as little natural industrialized societies that, with the proper habitat or "factory", could produce a large amount of products for humans. He saw the bee hive as an industrial factory and the apiary as an industrial complex. The hive and management style he developed, much like a factory, focused on a maximum level of production in the easiest way possible. The Langstroth requires a higher level of management than the Warre or Top Bar hive, but produces a higher level of products then the other two styles of hive.

The Warre Hive

The Warre type hive has deep past, predating the Langstroth style[2]. Working with hive designs dating back to the 1700s Abbe' Emile Warre developed the modern Warre hive and management in the early 1900s. He wanted a hive that incorporated a happy medium of the bee's natural world and the keeper's desire for products from the hive. Emile called his hive The People's Hive. He developed it for the homesteader farmers in France. A simple hive to build and manage, it's design and simple management style mimics the normal biological colony changes of the bees in natural hollow tree cavities. His simple objective was "Happy Bees, Happy Beekeepers." Requires less management, reflecting in less hive product return. Bees are more like "pets" then product-producing livestock.

Author working with one of his Langstroth hives.

The Top Bar Hive

The Top Bar hive has the "deepest" past with versions of it being mentioned as far back as ancient Egypt[3]. During an era of skeps, clay tubes, and hollow logs, versions of top bar styles began to appear as methods of managing hives without struggling with fixed combs. Credit for the present day Kenyan Top Bar hive seems to go to Dr. Maurice Smith of Canada who developed today's sloped sided version of the hive in the early 1970s. This hive is managed horizontally, in a single box, and by a single bar at a time. This hive needs less management then a Langstroth but a bit more than a Warre. As with the Warre, requiring less management produces less hive products than the Langstroth.

Three beekeeper style personalities

The Controller

Has a tight schedule. Makes a living with the bees. Much of the management methods involves timing normal biological colony changes with business interests. Desires maximum achievable product production from the bees. Will alter natural colony behavior to obtain keeper desired results. In this industrial style the hive is managed for maximum colony size and hive production output. The Langstroth hive will serve this personality well.

The Observer

Goes with the flow. Views themselves as a provider for the basic needs for a healthy colony. Believes the bees can make a large portion of the choices needed to keep balance in the hive. They are content with the bees just being bees. Enjoys having a bee "home" on their property. Hive products are appreciated when available, but not necessarily the reason for keeping the bees. This style of keeping will work well with a Warre hive

The Facilitator

Likes to help the bees. Would like some product from the hive and will work with natural colony behavior to create some human desired results. Sees beekeeping as a partnership with the colony. Embraces a relationship beneficial for both parties. Wants to be a part of the bees activities in the hive. Top Bar hive would be a good fit for this keeper personality

A keeper doesn't have to chose one exact personality over another. I find myself, at one time or another, having a combination or blending of all three. Even then, I tend to lean more towards a Facilitator and Observer then a Controller. This is mainly a basic personality style description to help a keeper choose a hive type most complimentary to their keeping style. If a keeper understands that the three styles of hives have different management methods, expectations, and results and they have a compatible management style for each one - then running a multi-hive style apiary can be quite enjoyable.

Does a particular hive style make a valid difference in colony health and longevity based on the hive style alone?

The short answer – no. In today's beekeeping it is short sighted to believe that a colony will be trouble free based on just the style of hive they are put in. Colony health and longevity is a condition that must be managed by the keeper regardless of the hive style the bees are kept in.

The method of management may differ somewhat from one style of hive to the other but it still requires the beekeeper to be a manager of the colony's health. In my research the management has a far greater effect on maintaining the health and longevity of a colony then a particular hive style. Proper management and attention, applicable to the specific hive style more then anything else leads to good results. Mismanagement or neglect will produce disappointing results regardless of the hive style.

What I tell them new keepers...

I am a member of the Olympia Beekeeping Association, a local club with over 250 members. Many members are Alterative hive keepers. We even have native pollinator expert member. I am also a mentor for many of the new members wanting to start Warre and Top Bar hives. My advice for new Alternative hive keepers revolves around this personal philosophy; ***"A keeper needs a greater knowledge of bees to manage them less".***

Some styles of hives may require less management but in my experience it requires a firm knowledge of keeping bees to be the most successful. A recommendation, especially for first time beekeepers. If you are going to start a Top Bar or Warre hive, start a Langstroth also. The first year is the steepest part of the learning curve in beekeeping. It is far easier to learn that "greater knowledge of bees" managing a Langstroth hive along with their chosen Alternative hive. Nearly everything you learn about keeping bees in a Langstroth will apply in an Alternative hive. Access to mentors and club members for help and assistance is essential on the path to successful beekeeping.

Many clubs may not have Alternative keepers available to help and mentor so the much of the reliable help will come from keepers of Langstroths. An example of how this would work is to ask a Langstroth keeper for help installing a package in your Langstroth. Then using what you have learned, install a package in your Top Bar or Warre. I would bet that most clubs have a member willing to help you with the Langstroth and then would want to get involved in installing the other package with you. Another example would be asking a club member, "I installed a package in my Langstroth, what do I do now?" Just about everything they say to do will apply to your Alternative hive also.

Summary

Beekeepers using any hive style or management method have far more in common then not. Beekeepers – regardless of hive design, management style, intention for the bees, or philosophy of beekeeping, all have one strong common bond- the sharing of their passion for the honey bee. BC

1. **https://en.wikipedia.org/wiki/Langstroth_hive**
2. **http://warre.biobees.com/wildman.htm**
3. **https://en.wikipedia.org/wiki/Horizontal_top-bar_hive**

HELP!

We need a speaker! Well, here's some ideas for your club.

Ann **Harman**

It's January and the East Cupcake Beekeepers Association does not have a speaker yet for their January meeting. Yes, they could ask Ned again. Ned has spoken 12 times in the last three years but there is nothing new in his talks. Yes, the neighboring West Gumshoe Beekeepers Association has been contacted but it turns out they are in the same fix – need a speaker! (They have used Ned too.)

Wait a minute! So many other ideas for local club meetings exist that you might not use all of them in a year. These topics do not necessarily mean a speaker standing up and giving a talk. Some of them involve everyone or just several members. Even if your club cannot provide the presenter (remember, not necessarily a speaker) a neighboring club probably can. Just remember to share ideas and presenters with those neighboring clubs.

Some of the programs will be seasonal. Just arrange the ideas accordingly. Some programs may need several tables. Be prepared to bring some if needed. Don't forget an extension cord. Make a list of any items necessary for the success of a program – paper, pencils, coffee stirrers, newspaper or something to cover a table. Doing something with honey? Bring a bucket for water and a cloth to clean up drips. For some meetings it might be useful to have a 'library' of catalogs from equipment suppliers. Look through the advertisers' list in the bee magazines to request one. Get a large assortment from all parts of the country. Mentally review the program and make a list of what is needed. Don't forget to add that forgotten item to the list!

Since it's January just about everywhere why not consider bee books for the meeting topic. Actually books offer several different approaches. Use one this year and a different one next year. If you read the bee journals you will see announcements, and even reviews, of new books on the market. Are all of them necessarily honey bee books? No. You will find books on bee plants, making pollinator plantings, and other environmental topics. Have someone buy the new book; read it; bring it to the meeting; give a review of it; read pertinent paragraphs. Maybe it's a good book – or not. At least the members attending the meeting will know something about it.

Another meeting about books could be having everyone bring their favorite bee book (new, old or ancient) to the meeting and read just one paragraph from it. The paragraph can turn out to be funny, quaint, valuable or nonsense. If too many members bring their books and discussion is taking forever, continue the program for the next meeting. (Imagine – two meetings all taken care of.)

Have any members bought any really bad bee books? Yes, they do exist! Have the members bring the books and read several paragraphs with the bad information. Then have the membership discuss what caused the author to think the facts were correct.

Have one person select several **books**. These could be bee books or even bee plant books. Several reprints of famous old books are available. Some members may own these books, some not. Discussion about the books could be whether these are good for beginner beekeepers, how the information could be used for a meeting topic, and how information from the past is still valuable today.

Enough about books. Beekeepers are inventive. Have any members made a **gadget**, or modified one, to help their beekeeping? Ask the beekeepers to bring their gadgets to the meeting, describe how and why they made them and even if any improvement could be made. If several members have made gadgets whose use is not immediately apparent, then have a 'Guess the Gadget' contest with everyone guessing the gadget's use.

Gadgets could be approached in a different way. The bee equipment suppliers show an assortment of useful tools. Have the members bring in some and give a review of them. Did it work as intended or was it a complete flop? Could it be modified to serve another purpose or even make it work better? Was the gadget worth the money?

Another approach to gadgets would be to ask the members to think of a problem they encounter in their beekeeping (no, not *Varroa* or small hive beetle). What could be made to solve that problem? Do any equipment suppliers have anything that could be modified to solve the problem?

One item that seems to come in many styles is **feeders**. Most beekeepers feed syrup at some point. This meeting could be beneficial for beginning beekeepers (unless you have addressed this topic in beekeeping classes). Members need to bring in feeders, large, small, useful and useless. You want to have as big a selection as possible. Discussion can be about advantages and disadvantages. It is even possible that a beekeeper has modified a

feeder to make it more useful.

Not every beekeeper has a refractometer or a **polariscope**. Find someone with them and have the current year's honey crop, whether large or small, evaluated. This is not a contest. Explain to the members what the two instruments measure. Have each member bring in a sample of their current harvest so they can find out the water content and also find the various things that can be seen with the polariscope. You will have to ask the members to have their honey in a suitable container to be viewed by the polariscope.

Suppose someone's honey, as seen in the polariscope, is full of miscellaneous mysterious junk? There is a topic for a meeting – all the steps that need to be taken to produce a beautiful clean jar of honey.

Design a **Honey House** can be the topic of a meeting. This honey house can be in a kitchen, basement, shed, or garage. The size and complexity does not matter. The designing is about how the beekeeper can go from removing honey supers to the finished product – honey in a jar, ready for use or sale – without creating a disaster somewhere along the way. If someone in the club does have a honey house, perhaps a visit to it could be arranged. Otherwise, have the members contribute their ideas along with their successes and disasters.

If you have several skilled beekeepers in the club, have a demonstration of their skills. You could have a bottom board, a hive body (does not matter what size), frames in the hive body, inner cover and telescoping cover, as well as an empty smoker and their favorite hive tool. Have each skilled beekeeper demonstrate opening and examining a hive and closing it up again. These beekeepers may have ways of making a hive **inspection** quick, easy and efficient.

Everyone is taking photos with their cell phones (or so it seems). Have a **photo contest**! This one will not have the strict rules of a true photo contest because many do not have the means of printing for those. Have the members choose a photo they wish to enter and make a print of it. The photos must have something to do with bees. Yes, ordinary computer color prints are just fine. Each member brings one photo. The photos are numbered and put on display. Then everyone can view all the photos and choose their favorite three. You do not have to give prizes; acknowledgement of the popular three is enough.

Swarm stories are inevitable. Give the members an opportunity to tell theirs. All have to be real. Put a time limit on the story. Some will be funny, others silly, perhaps some serious. You can have a contest if you wish with a prize for funny or unique or whatever you choose.

The swarm story meeting can lead into another meeting – what you do when you get a **swarm call**. This information can help a beginning beekeeper who happens to get such a call for the first time. Have the members contribute their questions to ask the caller – where? how high? How to figure out if the 'bees' are really honey bees or yellowjackets. Members can list the items they take to a swarm call or to 'bees' living in a shed or in the wall of a house. A beginning beekeeper can be invited to go on a swarm call with an experienced beekeeper. That trip could help them when they discover their own first swarm from their own hive.

Have a **honey tasting**. You will need coffee stirrers for dipping and tasting. Supply some water and small cups so that tasters can have a sip of water between flavors. Here is where a container of water and cloth will be needed for wiping up drips. Protect the tables from drips to make cleanup easier. The honey can come from everywhere. Beekeepers will bring their own harvest. It is amazing to find different colors and flavors from a relatively small area. Beekeepers are frequently given a gift of a jar of honey from friends and relatives who have traveled. Bring a small container of that honey. Be sure to indicate its origin. Honey bought in supermarkets and in various shops can be included in the tasting.

Some beekeepers have **collections** – honey pots, clothing with bee themes, toy stuffed bees, jewelry, mugs, other items. A display of some of the things from such a collection makes a good theme for a meeting. If no one person has enough, then have several collectors to exhibit. Sometimes fascinating stories are part of the collection items.

Is there anyone in your club or a neighboring club who makes soap, lip balms, skin care products? Has that craft person ever given a demonstration for your club? If not, then there is a good topic for a meeting.

Honey cookery lends itself to a good demonstration. Taste samples can be part of the meeting refreshments. No cooking facilities at the meeting place? Some things could be prepared on a hot plate. If that seems too hazardous then use a recipe that does not require cooking. How about a dip made with honey? In fact make the dip recipe with two different flavors of honey, one mild, one distinctive. Have coffee stirrers available for tasting the honey used in the recipe. It may be a surprise to find out that a honey with a strong flavor makes a tasty dip in contrast to one made with a mild flavor honey,

Have any of the members made **rolled candles** using the colored beeswax foundation available from equipment suppliers? If not, then everyone can learn how in just a few minutes and make one or two to take home. Think about holidays during the year – Thanksgiving, Christmas, Easter, Fourth of July. Don't forget Halloween. Well that's not an official holiday but everyone seems to be decorating for it.

Now stop whining about not finding a speaker. These ideas can lead to other ideas for meetings. Getting members involved in the meeting topics means more participation and can increase membership. I wonder what the East Cupcake Beekeepers Association chose for this month? BC

Ann Harman lives and keeps her bees and helps organize meetings in Flint Hill, Virginia.

DOWNTOWN

Varroa Bombs Are Real

In this season of vitriol we should all perhaps stand down, but there is something that must be said: if you are not raising or using locally-bred queens, or introducing hygienic lines, and you think you are doing survivor stock, you are an idiot. And I am so mad at you that my hands are shaking. My urban treatment-free neighbors, you have just cost me a colony, and a really precious one, too. In fact, I contend that your (lack of) effort is actually an obstacle, and potentially an insurmountable one, to the development of sustainable, resistant bees. Which does not even mention the hammer you are putting down on native bees in your area (Fürst, McMahon, Osborne, Paxton & Brown, 2014). Our urban clustered apiaries, containing bomb-silo *Varroa* factories every few blocks now, means that beekeepers that are *really* breeding for survival face an impossible challenge while you pump pests out into the world around you.

Why would you think, with a century-old genetic bottleneck (*Status of Breeding Practices and Genetic Diversity in Domestic U.S. Honey Bees, Cobey, Tarpy, & Sheppard, 2011*), perhaps 50 lines of commercial breeder queens in the whole country, that you could toss in an inbred unknown from a package or a non-local nuc and strike gold? That's like going to your backyard hose nozzle with a bucket every day, thinking that one of these times it is going to dispense champagne. You can click your heels and pretend to act like you're bringing us back to the days before varroa, but if you are here in DC I hope you really find yourself in Kansas, instead.

Sorry, Kansas.

My story goes like this: I run one of 10 hives at the National Arboretum. Mine is a demo hive that sits in the Washington Youth Garden there, and educates hundreds of kids each year from precisely the neighborhoods that eccentric middle-class, middle-aged ex-yuppies from the Historic District have a hard time reaching. It was decorated with pro-pollinator messages by third- and fourth-graders from three different schools. If you read my article a couple of months ago, you would also see that this particular hive also raises over a thousand dollars and a ton of friends for the Garden. So I stay all over it: it gets inspected, it gets fed, it gets tested, and it gets treated when thresholds rise. We were in a pitched battle with Small Hive Beetle, too, so those traps needed vigilance.

By the beginning of October, they had a super and a half of honey, a reduced brood nest but lots of workers, drones cast to the winds, and a complacent minder. I considered them tucked in, and planned to check again on a warm late November or early December day. I got a text from the Youth Garden staff on November 2, however, that there seemed to be a lot of disorganized activity between my neighbor's hive and mine. Looked OK to me when I stopped by: I did not open up, as the temperatures were marginal. By November 17, all the bees (except for a frozen queen and maybe a hundred dead girls on the bottom board) were gone. So were my neighbor, Dr. Steve's hive, and the eight others that are run by USDA elsewhere on the premises.

For the armchair quarterbacks out there, let me break down what I

Varroa *and deformed wing virus.*

Please, Be A Good Neighbor

found, and whom I called to consult about it.

There were a considerable number of dead SHB on the inner cover, but not a single slimed frame in four boxes. There was not one wax moth tunnel or adult. Interestingly, 15 frames of stores had become 25. My lonely marked queen was dead on a top bar just below the stores. There was a brood area below (with a wagon wheel of pollen but just nectar all around) of about a palm's worth of tight capped brood on both sides of three frames. Maybe one or two perforated caps on each side. No *Varroa* urine (guanine) crystals. No pile of bees around the landing board or on the bottom. No cast out pupae on the porch. No heads in cells. No funny smells, no scales, no ropes.

Even stranger, for this dry autumn after a poor light annual flow, the only creatures interested in the drips from the 25 honey frames were yellow jackets. My car smells like bees and wax and honey, you see (this would be a good moment to feel sorry for my husband) and one of my silent satisfactions is driving around this town with the windows down, receiving various *Apis* visitors literally everywhere I go. Most stoplights yield a worker or two. But the Arboretum, of all places, was a ghost town.

So I started dialing. First, I called EAS Certified Beekeeper Dr. Wayne Esaias, founder of HoneyBeeNet and not shy about telling me when I am being an ass. Some of the observations you see above are a direct result of him guiding me through an additional analysis of the frames after the initial shock. While all the words of this article are mine (and colored by emotions that the folks I mention here would manage better) his reaction was along the lines of, "What the hell?" I told him I was going to keep reaching out, and he asked to hear what I found.

So I called up my hive stand neighbor, who is a Fed entomologist (I am not sure whether we need to deal with some %$#@! press office if I call him by name, and my deadline is here, so…) and he and I mostly commiserated. We compared our management: we both found mites, we both treated end-July/August. Different methods, though. I used Apiguard this year, in alternation with MAQs in 2015. We seem to agree that the common "Wow, they just

absconded!" and veiled references to Colony Collapse Disorder are hallmarks of the clueless and the careless. Yes, I said it: he didn't.

So I went after big game. I called Dr. Dennis vanEngelsdorp of the BeeInformed Partnership, and due to some miracle for me (or mistake by him) he took my call. And he asked me about more thing: had I uncapped any of that pretty looking brood? And if I had, what did I find? Well, uh, no. I hadn't.

I grabbed a box from my disassembled hive out of the back of my bee-scented Kia, and used an uncapping fork to sample any of the pupae I could pull (ones that hadn't started becoming mush). Every single cell in the center of the brood nest had a mother mite. The ones on the outside, in the purple eye phase, showed more variety: some with varroa, some without. I'd been varroa bombed. Probably two to three weeks ago. Like November 2nd.

Yeah, I know there is skepticism about this phenomenon, but I held the proof in my hands.

The funky activity was probably my girls robbing the heck out of Dr. Steve. I think I know where that extra super of honey came from, now. And there had probably been a Domino Effect of crashing hives across the Arboretum, as each colony shared the infested wealth. I know as an unfortunate fact that the area around the Garden features a number of treatment- and test-free beekeepers, some by ideology, some by indolence. Plus, Washington, DC is one huge overlapping forage area now.

Then I called the editor of this magazine and told him all this and– however stupid it is after a decade-plus of keeping bees – that the loss of this particular colony was a shot to the heart, too upsetting for me to write my column. But he said that I just had. And he helped point me toward much of the research cited here.

My bees were hygienic, by the way: I'd purchased them on purpose from an apiary that shall remain nameless, so they don't take any fire from this article. The gals had done really well: my mite counts had only

Toni **Burnham**

bounced around the threshold, and I had treated primarily because I loved this colony so much and have a dour outlook on human nature. But even Michael Phelps can't swim a tsunami. There was a mite in every cell laid in the past two weeks; there was probably a mite on every adult bee by the end. All the grooming in the world won't commute that death sentence. They cut and ran, leaving mom behind. Clemson Cooperative Extension tells me that the remaining mites will die off after a couple of weeks, and I can shift the supers to other light hives at that point, but I am going to freeze the brood frames anyway.

And I am terrified. If this happened to my Golden Girls, what about the 20+ others who received a lot less of my spotlight? How many of them will winter? What should I have done to prevent this, and when should I have done it? Will I have any bees at all in a couple of weeks? It is too cold to open any of them as this article takes shape.

I don't really have an answer, but am willing to provoke a frenzy of activity rather than dwell on a sense of helplessness. Fellow beek (and friend) Jan Day has become a sort of local expert on oxalic fumigation (she will take her Honda anywhere and has jerry-rigged about 30 feet of jumper cables) and we have been talking about offering a low-cost, or even free, service to any broodless hive in Washington this winter. Probably one neighborhood at a time. I even went and bought a portable truck-engine-jumper-thing. Our editor says I should have purchased a different toy, but whatever. We have been pushing an across-the-board, herd-health sort of treatment push for mid-Summer here during the past two years. I am wondering whether a similar approach, with a different miticide, might be possible in July 2017, too.

I don't have a good ending for a column that began in wrath and ends in heartache and sketchy hope. If you are an urban beekeeper, or are thinking of becoming one, I beg you to help me make a healthier new beginning next season. Please test, treat, know, and care for your bees. Or just leave them to someone who will.

Toni Burnham keeps her bees on rooftops in Washington, DC.

BIGGER PICTURE

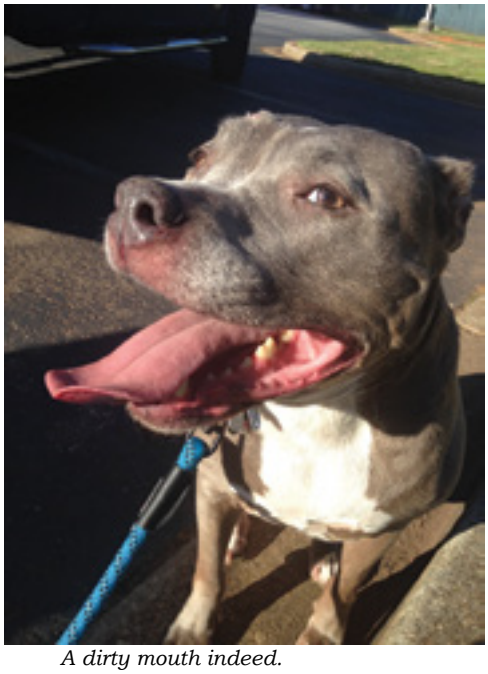
Jessica **Louque**

A Survivalist Guide To Bees

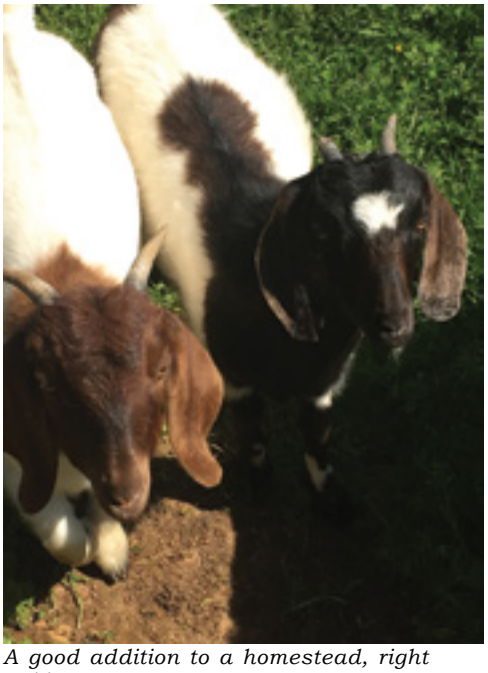
A lot of insanity has been going on in the country with elections, unrest, and political/cultural divides that, at least to me, are highlighting the benefits of a more self-reliant lifestyle. While "homesteader" is a popular word that's trendy in today's lingo, the word "prepper" seems to indicate a negative mindset towards worst-case scenarios and insane tendencies. For those of you that have been reading my articles for a few years, you may remember when I wrote about canning and how my grandparents were what I would consider the "OP"s, or Original Preppers, because that's what that era forced you to be when you lived in the country. It wasn't weird back then, just a smart way of life. I have a lot of fond memories doing things their way, mostly ending in super delicious food, but make no mistake that I will go kicking and screaming into whatever type of downfall that forces me into not being able to shop on the internet and renders my precious shoe collection worthless. That being said, being prepared for the short term is just a good idea. Whether or not you believe that government collapse or economic collapse is eminent, there are always natural event disasters like we here in NC have recently faced with Hurricane Matthew, or even the busted gas pipeline down south that caused such a panic up the east coast.

Well thought out planning is key to making these situations livable. If you've ever had an ice storm knock out your power for a few days, you learn quickly what you wish you'd had. If you've ever had an ice storm knock out your power for a few days and had kids in the house, you might choose freezing to death over staying inside if they don't have something to occupy them. Now, bear with me that if I could build an isolated fortress out in the woods on a hundred acres with a 10-foot razor wire fence, spring fed pond, multi-level underground house running on solar power, and a giant bio dome over the entire thing, I would. Driving in traffic every day makes me think that's the best option. However, these people who go all-out self-sustaining have a lot of expendable income in the first place, a lot of mechanical skills, a whole lot of help from family and friends, or all three. Sometimes planning means doing what you can to prepare for the future while still maintaining in the here and now. Those solar panels will have to wait because the hot water heater just exploded and the transmission went out in the car. You want to dig a new well with a hand pump, but your old well just had the electric pump go out and you have to fix that first. There are a lot of obstacles in planning for the future. What you can do, however, is do what you can on your own scale that you feel comfortable with.

Now, if you're already reading this, you probably have bees or you're strongly thinking about it. Bees are a fantastic option to start small for homesteading, prepping, or short term planning. There are a ton of benefits to bees if you can keep them alive. First thing's first on the list is preparing yourself for beekeeping. That includes understanding the best management for your hives in the long term and being able to handle it without intervention. Bees have *Varroa* mites, and there's not really any way around that. Bees can have a lot of influences on their well-being, but none of them are so critical to their survival as effective control of *Varroa* in the hive. You need to be able to understand all the methods of *Varroa* control and test them out to see what does and does not work for your time and skills. In theory, you could manually control *Varroa* with intensive management, such as putting bees on new frames each year, killing drones at the beginning of the year, killing capped brood for a few cycles in the spring, and sugar shaking frequently. In practice, I don't have time for that kind of coddling and I love me some Apiguard. That being said, I do like to pre-buy my Apiguard if I have a good



A dirty mouth indeed.



A good addition to a homestead, right Bobby?

place to store it so I have it on hand if I need it, and I'm not fighting with all the other beekeepers to get what I need at the same time of year.

You also want to make sure that you have enough colonies to be able to manipulate them as necessary. When you start beekeeping, everyone will tell you that you need two hives minimum so you can compare the health, and swap frames to equalize as necessary. You want to have enough colonies that you can combine hives in the winter if you need to, you can swap out brood frames to prevent swarming or boost a colony, and to be able to harvest from the hive without destroying your apiary. Moneywise, bees are somewhat expensive, but not when compared to other livestock that may be encountered in homesteading. If I had the space and time, there would be baby goats running all over our property like tiny little destruction demon fairies, but Bobby keeps telling me that we have enough destruction demon fairies (the kids, as in children not goat kids) to take care of and don't need goats. Goats are a lot more expensive and time consuming than bees, but also give milk for so many uses, and I guess you could eat them but I think goat meat is gross.

Chickens and guineas are not super expensive, but you have to stay vigilant for intruders who think you've set them up a drive-thru of nuggets and can be very costly if you break your ankle running through your yard at 4 am with a flashlight and a gun to see what's bothering your chickens. You may end up getting a dog to guard them, or putting up an electric fence.

Bees only require mostly the initial setup costs, and don't really take a lot of maintenance time. That's not to say they can't if you want to spend a little more time with them. You can do a bit of hands-off beekeeping and only intervene when necessary, or maybe you want to take out each frame, meticulously clean off the burr comb, straighten everything out, and take pictures of the frames. It's up to you. I would estimate that I spend less than three hours a year per hive in maintenance, and most of that is varroacide and splitting (I suppose also photography when I get carried away).

For homesteading and prepping, bees can provide immense benefits. The obvious one is garden pollination. Although you can purchase a Veggie Bee if you really want to hand-pollinate your garden, I prefer to leave it to the bees. If you're only growing nightshades like tomatoes and peppers, you're reliant on the local bumble bee population anyway. If you have lots of cucurbits and orchards, you're going to want the honey bees *en masse* stuffing their little faces in those flowers. It can really boost a production rate just to have bees in the vicinity. Separately for cost, it doesn't hurt to plant as many pollinator-friendly plants and flowers as possible anywhere you have space to attract the local pollinator force to your place. You can see the difference, although it may take a year or two.

Wood for the Winter.

Honey is the other most obvious output from bees. It can be used in canning for sweetener instead of sugar, particularly if you don't have any sugar available. I'd suggest trying out this tactic before it's a necessity to make sure you understand how the different types of honeys can influence the taste of jams and jellies and so forth. Honey also has great antibacterial properties, and can be used on cuts and scrapes to keep them from getting infected. I have used this multiple times not only on myself but also on the animals and it seems to work well. It's particularly good for idiot cats and dogs who think they need to lick a wound and get gross bacteria in it, or end up frothing at the mouth from eating chemicals in a normal medicated ointment. Whoever told you dogs have clean mouths lied to you and needs to take a science class. NOTHING about that is true. They can easily infect their cuts by licking them.

Speaking of ointments, propolis also has a lot of very cool antibacterial properties, and I have personally used it as an alcohol tincture on cuts

Bees ready for Winter.

and scrapes, and made it for other people with boils or other similar problems, and it is fantastic. It's good to know what you have readily available. Honey is also great for teas and drink sweeteners, as well as using them for people with allergies and sniffles in general. I don't have allergies personally, but I can say that a lot of people swear by local honey for allergy problems. It doesn't get much more local than your yard.

If electricity becomes an issue, candles on hand are the way to go. Batteries only last so long and flashlights are more of an emergency thing. Beeswax candles can't be beat for longevity and scent. This is something that would have to be done in advance, so learning about candle making should be a priority when possible.

Of course, all of these things are also money makers. You can sell or barter honey, pollination services, candles, propolis, and even pollen as a source of income. A caveat on pollen is that pollen baskets are not readily digestible by humans and aren't going to help you out nutritionally in the long run. They are basically coated in shellac and is kind of like when you eat corn, if you get my drift. Overall, the goal here is to be prepared for events with the items you have on hand, and knowing how to use them in the most effective way. If you're raising bees, it's in your best interest to find out how to best use them to your benefit. After all, it's your time and money! BC

Prepare pets for Winter.

Jennifer Louque, her family and pets are prepared for Winter in NC.

While the carbohydrates (sugars) in honey provide bees with energy, honey bees get all their vitamins, minerals, fats and protein from bee pollen.

Bee Pollen — An Overview

Ross **Conrad**

Pollen that is collected by honey bees is referred to as bee pollen. The grains of pollen that make up bee pollen are the tiny, male reproductive units (gametophytes) that form in the anthers of flowering plants. The majority of plants on the planet today require that their pollen be transferred onto the receptive stigma of flowers (pollination) by wind, water, birds, bats, butterflies, beetles or bees, the most important species. The characteristics of bee pollen will depend upon the plants from which it is gathered. Some honey bee foragers collect only nectar, some both nectar and pollen, and some only pollen. But flower fidelity, visiting only a single species of flower in one trip means the pollen pellets (one on each leg) will tend to be all from the same type of plant and uniform in color and can range from white to black. While pollen provides almost all the bees proteins and nutrients, there is no single type of plant that produces bee pollen that will have all the vitamins, minerals, fats and proteins in exactly the right ratios for optimum honey bee health. (Di Pasquale, 2013) Bee pollen is also the nutritional and mineral source for the production of royal jelly by worker bees. As a result, a bee colony will tend to forage on a variety of pollen sources and bee pollen will tend to be a mixture of pollen from all the different species of plants that the colony's foragers are able to visit.

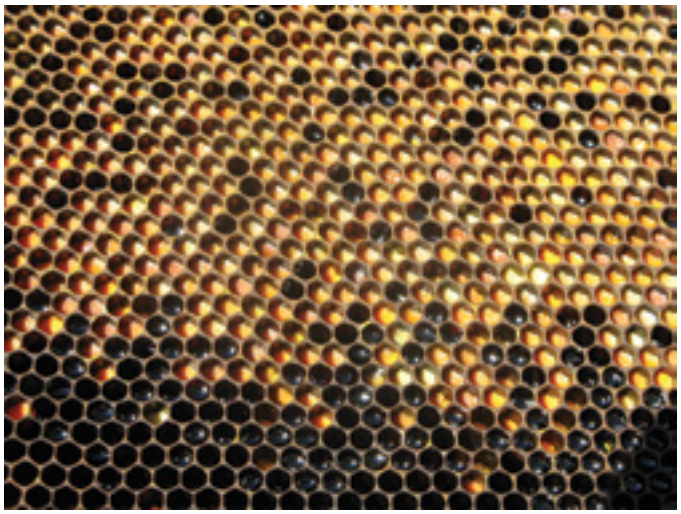
As bees fly through the air, they build up a positive static-electric charge on their body. This helps them to collect the pollen dust from the flowers they visit since the negatively charged pollen will be attracted to, and stick to, the bee's body in much the same way that a balloon rubbed against a wool sweater will stick to the wall. Once the bee's body is covered with fine pollen grains, the bees will use stiff hair-like structures on her legs to groom themselves and "comb" all the pollen off their body. Some honey or nectar is regurgitated from the honey stomach and mixed with the pollen grains in order to help them stick together. Special hair-like structures which are situated on the tibia on the bee's hind legs and nicknamed the pollen baskets (corbicula) are used to pack the pollen into small pellets to be transported back to the hive where it is used primarily for feeding and raising the young. This is why most pollen in a hive is typically found stored in and around the brood nest.

Fresh pollen is high in moisture and protein and, especially when brought into the hive – which stays around an internal temperature of 95˚F (35˚C) – it enters an ideal environment for mold growth. When the pollen is not consumed fresh, honey bees ferment the pollen through the process of making bee bread. To make bee bread, worker bees fill approximately three-quarters of a honey comb cell with pollen and then fill the remaining quarter of the cell with honey. The cell is then capped with wax. This helps preserve the pollen for future use (Anderson 2014) and it is theorized that it has the potential to make some nutrients more accessible for honey bee nutrition, although the science establishing this is weak.

Lactic acid bacteria (LAB) (Vásquez and Olofsson 2009), are the primary bacteria which come to dominate the pollen substrate when it is packed together and sealed from the air with honey. The bacteria metabolize sugars in the pollen, producing lactic acid and lowering the pH from 4.8 to around 4.1 (Mattila et al. 2012) – well below the generally recognized threshold for pathogenic microbial growth of 4.6. Some of these LAB come from the bees themselves, (Gilliam 1979a; Gilliam 1979b), but most of the beneficial bacteria apparently come from the flowers bees visit. (Anderson 2014) While the difference in microbial ecology of fresh pollen compared to stored pollen can be significant (Gilliam et al. 1989), it appears that despite what is commonly believed, the fermentation of pollen into bee bread is primarily a food storage activity rather than an activity aimed at improving the nutritional value of pollen (Herbert 1978). This theory is also supported by research into the beebread of stingless bees that found pollen storage appears to be of little importance in changing its nutritive value. (Fernandes-Da-Silva 2000)

Collection

Bee pollen is collected by beekeepers with the use of pollen traps, devices that fit over the entrance to a hive and contain openings just big enough for a returning forager to squeeze through. In the process of squeezing through the opening in the trap, the pollen carried on the hind legs of the bee are knocked off and falls through a screen into a drawer where it is collected by the beekeeper. There are many pollen trap designs available and in use. No matter what type of



Bees use their heads to pack pellets of pollen collected by foragers into cells where it undergoes fermentation in the process of becoming bee bread. These cells are filled with pollen but have not been given a final capping of honey and wax needed for long-term Winter storage.

trap is used, it is important that all other entrances to the hive be closed off or returning foragers will quickly learn to enter from them in order to retain their pollen loads. I have also observed colonies that modify their foraging behavior and return with smaller pollen loads that are able to fit through the narrow opening of the pollen trap without being knocked off the hind legs of the returning bee.

Due to the highly perishable nature of fresh bee pollen, the pollen collected in a trap needs to be collected daily and immediately preserved in some way to retard mold growth and maintain the pollen's nutritional and medicinal properties. This makes pollen production very labor intensive, and as a result the majority of pollen available tends to come from other countries that have lower labor costs.

Trapping pollen has the potential to inflict significant nutritional stress on the colony. Some traps are best only applied to a hive for a short period of time, providing a small amount of pollen for the beekeeper. Such traps may also be applied for a few days and then removed for a period of time, before being reapplied so that the colony is able to obtain a reasonable inventory of pollen for its dietary needs. Some pollen trap designs even advertise that they only trap a certain percentage of pollen from a hive, therefore allowing the trap to be left on the hive continuously, hopefully without causing undue stress and a reduction in the colony's population growth too severely. Colonies with traps usually quickly change the atio of pollen:nectar collectors to compensate for reduced pollen collection. Depending ont he efficiency of the trap, many nectar collectors may be recruited, reducing a potential honey crop.

Processing

Fresh pollen typically contains 10% to 12% water, while the moisture content of dried pollen is around four percent. It is estimated that drying in the sun may decrease the potency of pollen by as much as 50% due to oxidation of antioxidants. As a result, the best way to preserve pollen once it is collected is to freeze it immediately after harvest. The next best approach would be to refrigerate. When preserving pollen through drying, it is preferable to dry the pollen at a temperature of around 86°F (30°C) and dry it in the dark. While pollen is a common ingredient in many products, pure bee pollen for human consumption comes as granules, just as they appeared on the hind legs of the foraging bees.

Next month we will explore the human health implication of bee pollen. BC

Ross Conrad is the author of *Natural Beekeeping: Organic Approaches to Modern Apiculture*, 2nd Edition

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They Tried To Bury Us.
They Didn't Know We Were Seeds!
Mexican Proverb

From A Mite's Point Of View

M.E.A. **McNeil**

As the swarm winged over the highway, young bees carried passengers – mites holding tight to the bees' fuzzy hairs with tiny gecko-like feet. The travelers, and their riders, made a bee line for a distant hollow tree. As they settled in, the mites stayed bound to their hosts, biding their time astride their mounts.

A small voice spoke: This point in the story, said one of the mites, is where the writer would go on about the wonders of the bee, how scouts had selected the most ideal new home – not too big and expensive to heat and not too small for winter stores; how they build new comb, and the old queen starts to lay eggs in the hexagonal cells. She'll write it as though they are special, but I'm here to tell you it rankles; bees are not more extraordinary than the rest of us. That writer is really just an anthropocentric beekeeper who loves nature as it serves her humans; she extols the bees and demonizes us mites; but we get that all the time. We're used to it.

On the Internet, nobody knows you're a mite.

You may be wondering where that writer is while I so flagrantly usurp her voice. Well, she is tied fast to her chair in front of a computer screen where her eyes can see nothing but a thesaurus showing a list of synonyms for the word bigot. We had to call in a lot of favors to do that, but there are 48,200 species of mites around, 86 of them on bees, so we had help -- some on leave from E.O. Wilson's eyebrow. What I'm saying is we went deep, even reached out to some arachnids for the webbing. This was not our first choice, jumping genera: We first tried to unionize the bee mites, but most of them are scavengers, and they wanted to stay unnoticed.

This calumny starts with what they named us: *Varroa destructor*. The guy who did that, Dennis Anderson, is an Australian, so what does he care? We have avoided his continent, if he hasn't noticed. It makes it sound as though we have set out to make a mess of things. Sure, we are immigrants, but so are the honey bees. And sure, things have gone too far; but the death in our wake, since we jumped to the European bee 35 years ago, is not entirely our fault any more than the forest is responsible for flooding after it has been clear cut. It's not that we do not know how to behave like proper parasites; we have done it for millennia with their Asian sister species, and there are no complaints there. All we ask for is a cozy place to mate and a little hemolymph and vitellogenin, which is what the bees have for blood and stored food.

We are fed up with it, no pun intended. Now the writer, if she could, would no doubt continue by disrespecting our way of life. But what is our way of life but adaptive behavior?

I'll need to excuse myself for a moment to sniff out the progress in this hive. Hmm, first pheromone is already coming from the new brood. That means some eggs have lain down to pupate at the bottom of the cells, and they are sending out their signal for the foragers to step it up and feed them. Self-centered little bastards (It's true, there are 16 fathers among them). The bees have no idea that we mites can read their signals; they think they are transmitting through some kind of Enigma machine, but we are over here at Bletchley Park reading their messages like a newspaper. You'd think that they could smell us, too, but we can mimic the scent of the colony and move about freely in the dark; it's like a cloak of invisibility, cool, huh?

Pretty soon, the larvae will send out another odor to signal that they are ready to get sealed up to pupate. I won't get into how selfish that is, too, but they are telling the foragers to knock off bringing in food, with no regard for their hungry larvae siblings who are over there hollering "Feed me!" Just saying; we're not the only ones playing me-first. That scent is our sign to jump into the cell. It's a perfect place for me to hide down in the pool of milky food, breathing through a tiny tube, and lay my eggs. My daughters and I will emerge out of the cell on the bee, after the girls mate with their one brother, whose

usefulness will have ended and thus his life. Now don't go all anthropomorphic on me, we're mites, and you notice I'm not commenting on your mating habits. Anyway, the bees kick out their drones; in our world, survival trumps compassion, and maybe you know about that, too.

We are not unusual among mites in that we digest our food outside our bodies, liquefying nutrients and sucking them up. We don't mean to be spreading viruses this way, it's just happens. Anyway, the bees were already weak and susceptible to infection before we ever came, their numbers plummeting since after World War II, when industrial chemicals were spread in the fields. And we surely had no intention of becoming so virulent; it's not in our best interest. Left to ourselves we would be respectful of our hosts, as we have proven to be among feral bees in the wild that we coexist with in this country, taking a little hemolymph and space for some incestuous trysts but never taking them down. That would be evolutionarily stupid.

What's happened is that some people who take it seriously, this directive to take dominion over the creatures of the earth, they have been poisoning us in their beehives. So what mites among us can bully through that? The most aggressive, resistant, deadly of us – so they keep needing new poisons and they keep choosing out our worst. In the 80's it was 20 of us per 100 bees that could bring harm; now it's three per 100.

When left on our own to work it out, the bees come to terms with us: some can read our codes, some can groom us off, and some beekeepers split colonies to make a break in our breeding. We're good with that. In some places, where there has been no money or reach or intention to poison us, it takes a few seasons but we naturally come into balance with the bees and the beekeepers carry on. Some in this country are trying that, but they are taking it in the shorts from others.

Here in this tree hollow, a few of us philosophical mites are waiting to see if the barbarians among us will destroy us all – or if my daughters will live to coexist like their relatives on the feral bees in the Arnot Forest. So that's it, I've had my say, a mites' point of view. You can cut the writer loose now, my fellow Hymenopterites, but it might be wise not to mention this, as she is myopic on the subject. BC

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SHARING KNOWLEDGE

Iraqi Youth Learn From Oregon Beekeepers

Charlie **Vanden Heuvel**

Portland Urban Beekeepers (PUB) hosted a delegation of enthusiastic, **Iraqi Young Leaders Exchange Program** *students at the Portland Urban Beekeeping (PUB) treatment-free apiary located at* **Zenger Farm**, *SE Portland, OR, a sustainable, educational, urban farm. The delegation's U.S. visit was financed by the U.S. Department of State arranged by the* **World Affairs Council of Oregon**. *Following a short presentation about bees, moved to a hands-on experience with beekeeping practices, and finally to tasting honey. The PUB beekeepers demonstrating honey bee care and health management were: Linda Zahl, Susie Wilcox, Charlie Vanden Heuvel, Annette Carter, Frank Gransha, Lilly Glaeser, Micah Hamley, and Luca, (teenager).*

This is the second year that The World Affairs Council of Oregon asked Portland Urban Beekeepers (PUB) to host a delegation from the middle east. Last year we **hosted a group of Government Agricultural Agents from Afghanistan** and we felt it an honor to contribute toward their understanding of American honey bee management practices. This year, when approached by the Council to host a group of teenagers from Iraq, we felt extremely privileged to be able to help the next generation become, if not beekeepers, then young professionals who understand the role of beekeeping in the world.

Beekeeping in Iraq has existed for 5,000 years until it was shut down in 1992 (**Hartigan, Mahmoud and Michael, USA Today, 2005**). "The general situation is that conflict over the last decade and a half has devastated the beekeeping industry of Iraq, which at one time was a thriving activity with an estimated half million colonies of honey bees managed by a majority of the rural population." (Sanford, Dr. Malcolm T., University of Florida)

The Iraqi Young Leaders Exchange Program (IYLEP) is one of the many exchange programs the State Department administers each year to strengthen people-to-people relationships between Iraqis and Americans. It enables Iraqi and U.S. high school students and adult mentors to develop leadership skills and build action plans to strengthen the future of Iraq and the U.S. The students on the IYLEP were introduced to new skills and networks through participation in community service activities and leadership workshops, interactions with U.S. students, and site visits to civic, youth, and governmental organizations. The group was comprised of students from Kurdistan and Iraq.

Throughout the four-week program, the seven Iraqi youth participants were accompanied by seven U.S. high school students and two Iraqi adult mentors. The group spent one week in Vermont, came to Portland Oregon for two weeks to emerge in environmental stewardship and cross-cultural leadership opportunities, and then will move on to Washington D.C.

The moment the group exited the bus at Zenger Farm their faces displayed excitement coupled with a bit of anxiety about meeting *Apis mellifera* 'face to face'. Annette Carter gathered the group around the apiary for a short discussion on honey bee casts, drone congregation areas, plant pollination, nectar, and of course bee stings.

None of the students had prior apiary experience. Yet the students challenged the PUB presenters with insightful questions throughout the experience dealing with beekeeping management techniques and the honey bee.

PUB Members then broke the students into smaller groups delving into the hives to witness first hand hive activity. Each 'hive PUB mentor' turned their hive tool over to the students to enhance their personal experience. The expression of joy was evident as they lifted frames of capped honey, capped brood, pollen, and nectar. Although fully suited,

Iraqi Young Leaders Exchange Program group.

Bees on her finger.

Honey tasting.

each smelled the hives' honey and propolis all the while discussing the virtues of their apitherapy qualities. As the treatment of gout with honey is popular in their region it became a topic of discussion (Najafi, Tahereh Eteraf-Oskouel and Moslem) as did honey's and propolis's inhibitory effect on bacteria.

The members began to take covers off Langstroth Hives in search of the queen. Then rapidly moving to the upper box where each handled frames in exploration of the intricacies of hive populations and their interactions. Being August only a few drones were evident, but when found the drone was picked up by the student to have an up close feel. Each PUB mentor brought the hives inner-workings into the personalized time.

One of the hives was experiencing Idiopathic Brood Disease Syndrome (Oregon State University insect ID Clinic) allowing a great opportunity to visualize hive disease. Iraq's existing hives, according to a report by Sanders in 2005 have 10% and 40% *Varroa mite infestation. Due to time constraints, discussion on treatments of this devastating issues did not transpire.*

When one of the students came away from the hive with a dozen of the girls on her finger, it became clear a bond, as we have all acquired, was fermented. Watching each of the group's zeal as they held up frames, picked up drones, smelled the honey and propolis, and observed the bees on each frame proved the benefit of this occasion.

Some of the group moved on to the Top Bar Hive for a discussion on the differences between it and the Langstroth Hive. While the Langstroth Hives predominately had frames with foundations, in the Top Bar Hive the students witnessed natural comb. This provided an opportunity to discuss the bee's wax gland and how comb was created.

After the students' apiary explorations, the group moved to a honey tasting table to sample different types of the hives' gold, donated by PUB members from their local bees. Evidently this proved delightful.

While standing around the table, an open discussion of the morning's events transpired. "What is swarming?" "How long does it take the hive to recover from a swarm?" "How do queens mate?" And more. This culminating forum was evidence of the impact the morning's experience was for these eager minds. Allie Collopy, representing World Affairs Council of Oregon, at the end of the morning shared how excited the group was about their activities in the apiary.

Thank you, IYLEP high schoolers, for all that you gave us. And thank you, World Affairs Council of Oregon and the State Department, for making it possible. BC

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FERAL BEES

Rescuing A Feral Nest, After Collapse

Kathy **Keatley Garvey**

A collapsed feral honey bee colony in a hollowed-out Eucalyptus tree in a secluded area near the Nut Tree Airport, Vacaville, now has a permanent home: the Bohart Museum of Entomology at the University of California, Davis.

The colony, sheltered from the elements and located in an unpopulated area, buzzed with activity in June but collapsed in late September.

"We're really glad to get this and it will be a wonderful educational opportunity," said Lynn Kimsey, director of the Bohart Museum and professor of entomology at UC Davis. "Not many people have seen a feral honey bee colony and we haven't seen one as nice as this. Many thanks to the folks who saved it so carefully for us."

It all came about as the result of Karen Cometta Shepard of Vacaville walking her dogs in the area. On one spring walk, her friend's eight-year-old daughter, Madison Marshall, noticed something unusual. "What are those stripes in the tree?" she asked.

The stripes were a feral honey bee colony.

Shepard posted a photo on a community Facebook page but kept the location a secret to avoid disturbances. Some readers clamored for the bees to be destroyed. Some worried they were Africanized. Some wanted the honey. Shepard shared the location in late June with the UC Davis Department of Entomology and Nematology, which led to the permanent home at the Bohart Museum. (See photos of viable colony at **http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=21427**)

"Luckily, the hive is so hard to see and protected," Shepard said. "I've walked by that area twice a week with my dog for the last five years and if it weren't for my little friend, Madison, I probably would never have seen it."

The colony successfully escaped public view and predation. Last June Extension apiculturist emeritus Eric Mussen of the UC Davis Department of Entomology and Nematology weighed in on the find and said the colony was a good thing; "the bees are out pollinating our fruits and vegetables" and it's in unpopulated area and "not bothering anyone, " he pointed out.

In September, however, bees began abandoning the hive, and by early October, the colony was no more. One speculation: *Varroa* mite infestation and the bees left to find a better home? (A basketball-sized swarm appeared on a nearby tree.)

The Eucalyptus tree, on Solano County land, was one

Feral honey bee colony near the Nut Tree Airport before its removal. (Kathy Keatley Garvey photo)

Jose Garcia, project leader, Atlas Tree and Landscape, Santa Rosa, prepares to save the collapsed feral honey bee colony for the Bohart Museum of Entomology. (Photo by Kathy Keatley Garvey)

Jose Garcia (left) of the Atlas Tree and Landscape Co. hands the tree section to Robert Arndt of the Nut Tree Airport. (photo by Kathy Keatley Garvey)

The collapsed feral honey bee colony arrives at the Bohart Museum of Entomology. It is now being prepared for display.

of the dead, dying and hazardous trees removed through a county contract with Atlas Tree and Landscape, Santa Rosa. The removal began in mid-September, according to Robert Arndt, building trades mechanic at the Nut Tree Airport, and new trees will be planted.

Solano County Board of Supervisor John Vasquez of Vacaville said he's glad that the feral honey bee colony is being used for educational purposes and "is an opportunity for the public to see what one looks like."

Through arrangements with Arndt and project leader Jose Garcia of the Atlas Tree and Landscape, the section containing the collapsed feral colony was cut and saved Oct. 4. It was then trucked to the Bohart Museum where it is being prepared for display. Thousands of visitors are expected to see it.

The feral bee colony produced some five feet of honey comb in the hollowed-out tree. "That could have been for one season," Mussen said. The average honey bee colony in California yields about 60 to 100 pounds of honey per season. Many beekeepers remove 60 pounds and allow 30 pounds to carry over through the winter.

The Bohart, open to the public Monday through Thursday, from 9 a.m. to noon and from 1 to 5 p.m., in Room 1124 of the Academic Surge Building on Crocker Lane, is the home of nearly eight million insect specimens. Admission is free. The Bohart Museum hosts special open houses on specific weekends, which are free and open to the public. See schedule at **http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=22066** BC

Showcasing the collapsed feral honey bee colony are (from left) Karen Cometta Shepard of Vacaville, who helped save the comb for the Bohart Museum of Entomology; Robert Arndt, Nut Tree Airport; and Jose Garcia and Dennis Stark of the Atlas Tree and Landscape Co. (photo by Kathy Keatley Garvey.)

GLEANINGS

JANUARY 2017 • ALL THE NEWS THAT FITS

FRIENDLY PREDATOR BUGS AT RISK

Neonicotinoids significantly reduce populations of useful predatory insects when used as seed coatings, researchers at Pennsylvania State University report.

Their research challenges the previously held belief that neonicotinoid seed coatings have little to no effect on predatory insect populations.

In fact, they say they have found their work suggests neonicotinoids reduce populations of insect predators as much as broadcast applications of commonly used pyrethroid insecticides.

"Predatory insects contribute billions of dollars a year to agriculture through the elimination of crop pest insects," says Margaret Douglas, postdoctoral researcher in entomology, Penn State. "We have found that neonicotinoid seed coatings reduce populations of these natural enemies 10% to 20%.

John Tooker, associate professor of entomology, says the use of neonicotinoids has risen dramatically in recent years, especially for large-acreage crop species such as corn, soybeans and cotton.

The insecticide is most often applied to seeds as a prophylactic coating.

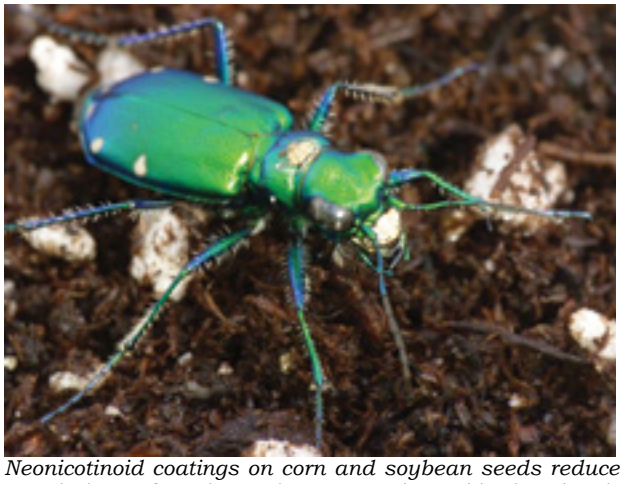
When the seeds are planted, the insecticide enters the soil where some of it is taken up by plant roots. The chemical then runs systemically through the plant, protecting young seedlings from insect pests.

"Applying insecticides to seeds rather than broadcasting them across a field was thought to reduce unwanted effects on natural enemies," Douglas says. "But we found that seeds treated with neonicotinoid insecticides reduced populations of natural enemies by 10% to 20% in North American and European farming systems. Surprisingly, this effect was about the same as that associated with broadcast applications of pyrethroids."

The team's research appears in the online journal PeerJ.

The team used a statistical method, called meta-analysis, to combine the results of more than 1,000 observations from 20 field studies across North America and Europe that tested the effects of seed-applied neonicotinoids on predatory insects.

"Unfortunately, the available literature is difficult to interpret," Tooker says. "Some studies show little influence of neonicotinoids presented as seed treatments on arthropod



Neonicotinoid coatings on corn and soybean seeds reduce populations of predatory insects, such as this tiger beetle (Cicindela sexguttata), as much as broadcast applications of pyrethroid insecticides. (University of California-Davis photo by Ian Grettenberger)

MIXED FINANCIALS FOR AUSSIE BEEKEEPERS

The Australian beekeeping business cash income averaged A$70,400 (US$52,421) in 2014–15, but average profits were negative for those with less than 200 hives, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) says.

The ABARES report says the honey bee industry had a gross value of production estimated at A$101 million (US$75.2 million) in 2014–15. This is 20% higher than the 10-year average of $92 million, largely because higher prices more than offset reduced production.

Australia has historically been a net exporter of honey, but in 2014–15 the trend reversed and honey imports were more than double the volume of exports, with imports increasing by 143% year-on-year to 9.1 kilotonnes (10,030 tons), mostly due to a significant rise in honey imported from China.

The survey found there were more than 13 000 registered Australian beekeepers, operating more than 448.000 hives.

During the 10 years to 2015–16, the number of registered beekeepers rose by more than 3 000, although many of these were non-commercial operators. Over the same period, both the number of hives and the number of commercial beekeepers fell by about 25%.

Over the same period, the total number of hives fell by 22%. The number of commercial beekeepers – those with 50 or more hives – fell by 25% to 1,280.

From 2006–07 to 2015–16 the number of commercial beekeepers declined in all states except Western Australia and Tasmania.

Registration of beekeepers and hives is compulsory in all states and territories except Tasmania, for which registration is required only for access to leatherwood forests.

Australian beekeepers sold 53% of their honey to major processors with the rest sold to other processors, direct to retail, local markets and door sales. Average sales of honey directly to export were less than 1%.

Beekeepers received on average A$198,500 (US$147,623) in total cash receipts from their business activities in 2014–15.

Honey sales accounted for 85% of cash receipts, and pollination services for another 11%. All other honey bee production activities – queen bees, wax, hives, packaged bees and pollen production – represented less than 5%.

There was a strong, positive relationship between business size and financial performance.

Small operators – 50 to 249 hives – had a negative average rate of return and business profit. Small–medium beekeeping businesses operating 250 to 499 hives had a small, positive business profit and average rate of return to capital. Large beekeeping businesses operating more than 1,000 hives had the highest average rate of return to capital and business profit.

An estimated 44% of beekeepers conducted paid pollination services in 2014-15. The proportion was highest in South Australia and Tasmania – states that produce high levels of almonds, cherries, apples, pears and other crops dependent on bee pollination.

Beekeepers who provided paid pollination services received an average A$44,200 (US$32,867).

An estimated 43% of beekeepers who provided paid pollination services in 2014–15 planned to expand this aspect of their business over the next five years, while 32% stated that they would remain the same.

Among those beekeepers who did not provide paid pollination, about 8% indicated they were likely to commence paid services over the next five years.

David Galeano of ABARES' agricultural productivity and farm analysis branch, beekeeping profits

generally increased with the scale of operations in 2014-15.

"However, average profits were negative for those with less than 200 hives," he says.

The report found most honey produced came from non-agricultural private land (39%) or public land (39%), with 23% from agricultural land.

"Larger businesses were more likely to derive a greater proportion of total honey produced from public land," Galeano says.

"The proportion of beekeepers and the value of payments received were higher in areas that produced large amounts of bee-pollination dependent crops, such as almonds and cherries."

The report says the industry faces a number of challenges through issues affecting the floral resource base which in turn impact the volume and quality of production.

Drought was the most commonly reported challenge, with 70% of beekeepers indicating drought had affected their floral resource base over the five years to 2014-15.

About 50% of beekeepers indicated that use of agricultural chemicals such as pesticides, fungicides and herbicides also impacted floral resources.

The presence of pests and diseases is a growing challenge.

During the five years to 2014-15, small hive beetle and the fungal disease chalkbrood were the two most common pests and diseases identified by beekeepers.

More than 50% of beekeepers also indicated that wax moth and American foulbrood had some impact on their honey and related production over the five years.

Nationally, 74% of beekeeping businesses changed their management practices in 2014–15 as a result of research. Large beekeeping businesses changed their management practices more so than smaller operators.

The majority of beekeepers felt that production had increased by between 5% and 25% over the five years as a result of implementing research results.

The volume of Australian honey exported has been relatively steady at around 4.6 kilotonnes (5,082 tons) since a 36% fall in 2010–11. In 2014–15, exports made up about 14% of total honey production.

Alan Harman

AUSSIES SET FOR LONG FIGHT AGAINST VARROA

A dedicated Australian *Varroa* mite eradication team, in it for the long haul, is being established in Townsville, Queensland scene of an Asian honey bee incursion.

The nationally funded campaign comes after *Varroa* mites were detected in two of the 10 detections of Asian honey bee nests and swarms in the Townsville area, 830 miles north of Brisbane.

The Queensland government says national cost-shared funding of A$2.6 million (US$1,925,000) will ensure that the national Varroa mite eradication program will run for the next three years, with two key staff leading the effort. There now are 23 staff engaged on the program.

State Agriculture Minister Bill Byrne sys the establishment of the program will ensure a continuing long-term effort to protect Australia from a significant mite pest.

Asian honey bees infested with *Varroa* mites were first detected at the Port of Townsville last June.

Biosecurity Queensland ordered a movement control area to help prevent the spread of the mite and later extended the area to cover all the Townsville local government area.

Byrne says there has been a very effective response to date.

"We have received more than 200 calls from the community and I urge everyone to remain vigilant and keep reporting bees to us, as we are still finding Asian honey bees in the Townsville area," he says/

Australia has been the last major honey-producing country to remain free of *Varroa*.

Alan Harman

Yesterday Is History.
Tomorrow Is A Mystery.
Today Is A Gift,
That's Why We
Call It The Present.

Bugs . . . Cont. From Page 90

predators that are common in crop fields, whereas others show a strong influence of these seed treatments.

"By using a meta-analysis approach, we were able to combine the results of many studies to quantitatively reveal the overall influence of neonicotinoids on predator populations."

Not only did the researchers find that neonicotinoid seed coatings significantly reduced natural enemy populations, they also found the insecticide acted more strongly on insect predators than on spiders.

"This result suggests that neonicotinoids are reducing populations of natural enemies at least partly through their toxic effects rather than simply by reducing the availability of their crop pest foods," Douglas says.

"After all, insects are more susceptible to these toxins than spiders, whereas the two groups should be similarly affected by a lack of food."

The researchers say their results may help farmers and pest management professionals better weigh the costs and benefits of neonicotinoid seed treatments versus alternatives.

"Several governments have restricted the use of neonicotinoids out of concern for their possible effects on pollinators," Douglas says.

"But this raises the questions, 'What will farmers do without these products? If they switch to broadcast applications of pyrethroids, will those products be better or worse for predatory insects?'

"While our results do not speak to the pollinator issue, they do suggest that predatory insects are affected similarly by seed-applied neonicotinoids and broadcast pyrethroids."

The answer to the problem, Tooker says lies in the application of integrated pest management (IPM), a strategy that uses a combination of techniques – which may or may not include the targeted use of insecticides – to control pests, rather than universally deploying prophylactic tactics like insecticidal seed coatings.

"Substantial research exists supporting the value of IPM for pest control," he says. "It is the best chance we have of conserving beneficial insect species while maintaining productivity in our agricultural systems."

– Alan Harman

TURNING HEROES INTO BEEKEEPERS

Michigan State University launches a Heroes to Hives program designed to teach veterans beekeeping skills.

Veterans work in teams to manage hives, so they leave the program with personal and professional relationships that open opportunities and ensure long-term support along with the skills to successfully manage a small beekeeping operation.

Heroes to Hives graduates will have opportunities for small business ownership, employment in commercial beekeeping operations, and ways to diversify their farm incomes.

"The partnership between veterans and honey bees represents a new mission for our nation's heroes as they learn to manage our smallest and most important livestock," the university says in a statement.

"We use beekeeping to address the financial and personal wellness of veterans through professional training and community development."

The program objectives include proficiency in honey bee biology and behaviors; hive handling; diagnosing and treating honey bee pests and pathogens; producing high quality honey; overwintering bees in northern climates; Michigan beekeeping laws and regulations; habitat management for pollinators; and small business development.

Heroes to Hives was established in 2015 by Bee Wise Farms owners Adam and Lacey Ingrao. Adam is an army veteran and PhD student in the Entomology department at MI State University.

A pilot program was composed of five veterans from the Vietnam through Post 9-11 eras. Students were instructed through a combination of lecture and hands-on educational experiences managing bee hives over an entire season. The pilot program received wide attention across Michigan, necessitating a program expansion and restructuring for 2017.

As a student in the Department of Entomology, Adam had developed professional relationships with faculty that helped the Heroes to Hives program in its pilot year.

In late Summer of 2016, he contacted MSU's newly formed Michigan pollinator initiative (MPI). The program fit directly into the objectives of MPI, and he helped transition it to become an MSU - MPI program with funding and support from the AT&T Foundation and private donors.

MIDWEST CONSERVATION PROGRAM AN ENVIRONMENTAL DISASTER

Researchers say a much-touted conservation effort is spreading the seeds of destruction across the Midwest.

Weed scientists in at least two Midwestern states are reporting that a conservation program meant to provide habitat for pollinating insects is sowing bad seeds – including seeds of the potentially devastating agricultural weed Palmer amaranth – along with the good.

Researchers at the University of Illinois have traced the weed seeds to at least one source – pollinator habitat seed sold by a company in the Midwest.

A tag on the seed mix claims it is 100% free of weed seed.

The provider of the seed, whom the researchers declined to name, is one of dozens of companies that sells seed mixes used in the U.S. Department of Agriculture Pollinator Habitat Initiative and Conservation Reserve Program.

"We're not going to name the company because we don't think this is the only one distributing weed seeds in their pollinator seed," says Illinois project leader, crop sciences professor Aaron Hager.

Champaign County, Ill. Farm Services Agency (FSA) executive director Yvonne Odom says the USDA and FSA, which helps administer the program, do not license the seed companies or inspect the seed mixes farmers use in the pollinator program.

They do review the seed tags, which are supposed to accurately represent the varieties and abundance of seeds in the mix and the presence or absence of weeds, she says.

The Illinois team germinated the seeds and grew the plants in a greenhouse to identify them. They found seeds of several species of the genus Amaranthus, including smooth pigweed, waterhemp and Palmer amaranth, a wildly prolific seed producer that grows up to seven feet tall. Some Palmer amaranth populations are resistant to several groups of herbicides, Hager says.

Once established, herbicide-resistant Palmer amaranth is almost impossible to stop. Some cotton farmers in the South have discovered that it can ruin once-productive farmland in only a few years.

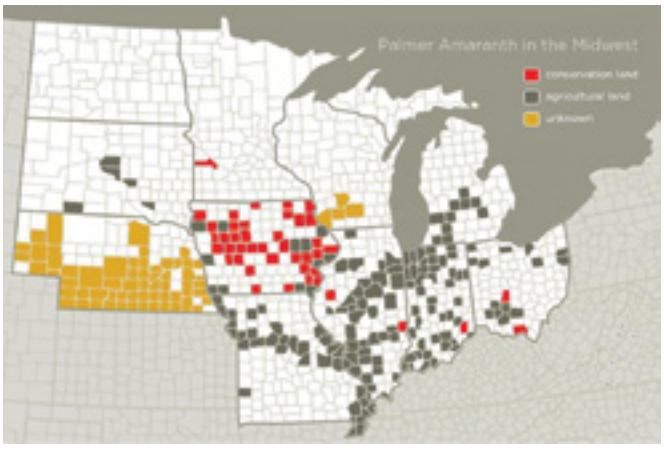
"There are a lot of scary stories about Palmer amaranth coming from the mid-South," Hager says. "It's hard to describe this species as anything less than potentially devastating. It's put people out of business before."

Herbicide resistance has become such a problem for farmers that reports of illegal herbicide use during the growing season to control resistant weeds are on the rise across the Midwest and South.

At least one recent murder, in northeast Arkansas, was directly related to a farmer's illegal use of the herbicide dicamba to control resistant weeds.

Thus far, researchers have found Palmer amaranth growing in dozens of counties.

At least 35 of 48 counties in Iowa with Palmer amaranth infestations, two in Illinois, two in Ohio and one in Indiana saw the problem first on conservation program lands.



Weed scientists are finding Palmer amaranth across the Midwest. Counties in black indicate Palmer amaranth was first found in an agricultural field, while red indicates it was first detected on conservation program land. Yellow signifies the source of introduction was not identified. (Graphic by Julie McMahon, University of Illinois)

The University of Minnesota also recently identified its first occurrence of Palmer amaranth in Minnesota, on land enrolled in the pollinator habitat program.

"These are just the ones that have been detected," Hager says.

Growers and extension educators need proactive guidance on how to prevent the newly introduced Palmer amaranth from moving onto agricultural land, he says.

"I don't know whether those enrolled in the pollinator habitat program are allowed the flexibility needed to control these populations," he says.

"We don't have any issues at all with the concept behind the pollinator habitat program; it's a good program," he says. "But as a result of this program, we've now introduced Palmer amaranth to potentially thousands of acres of land, and we need to know what we are going to be allowed to do to try to stem the spread of it. And we need to do that quickly."

Odom says participants in USDA conservation programs who suspect that they have weeds such as Palmer amaranth growing in their pollinator plots should call their local FSA administrator to report the problem and ask for guidance.

She says restricted mowing and applications of herbicides will likely be recommended for such infestations.

Alan Harman

UK ORGANIC GROUP EATS HUMBLE PIE

Britain's vocal organic group Soil Association is eating humble pie after saying farmers who are not organic abuse their animals.

The association apologized, sort of, for a tweet stating, "Millions of farm animals are abused in the pursuit of cheap food, but there is another way..."

The statement inferring organic is good and everything else is bad caused an immediate backlash from farmers who accused the association of putting others down to promote themselves.

The twittersphere filled with words such as disrespectful, deliberately misleading and totally inaccurate.

The Soil Association, founded in 1946, now has more than 27,000 members. It developed the world's first organic certification system in 1967 and campaigns for the system with almost religious zeal.

It defended its controversial message at first, asserting that more than 80% of animals raised in the European Union are factory farmed and cannot exhibit their natural behaviors.

But the backlash grew. Cheshire dairy farmer Phil Latham told the Farmers Guardian newspaper the tweet was playing on the misconception of the consumer and was unfair to conventional farmers.

"I have absolutely no problem with the Soil Association differentiating organic milk," Latham said. "There are fantastic examples of good organic, but also good conventional.

"The tweet enhanced the danger of deliberation and framed the narrative that organic is better – which for animals is just not true. You erroneously want to position your production system above others."

Finally, the association backed down, saying its problem is with the system, not individual farmers.

"We recognize that most farmers, whether organic or not, care deeply for their livestock," it said.

Chief executive Helen Browning led the retreat. "We horribly oversimplified our current concerns with farm animal welfare, used an inflammatory word or two, and upset quite a few farmers who rightly pointed out that it's not a black and white issue of organic good, everyone else bad," she said in a statement.

"We know there's loads of brilliant stuff going on, not least all the grass-based, low-input ruminant systems, development of freer farrowing systems, and genetic selection for low lameness and longevity, instead of just yield."

Browning said the association's concern about farm animal welfare is not so much about abuse, which conjures up overt cruelty or extreme confinement and now is largely illegal.

"The issue now is often one of mind numbing boredom for the many animals who still live their lives completely indoors in pretty barren environments," she said.

"Cows may look more calm, even as they are increasingly housed 365 days a year in ever larger herds, but that's exhaustion, not peace. The metabolic stress that very high yielding cows are under is apparently similar to running a marathon every day."

Browning said there is a strong need to provide more resources for farm animals and to take some production pressure off.

KIWIS ABUZZ OVER UK MANUKA HONEY

When is real manuka honey not real manuka honey?

According to the New Zealanders, when it is produced in Cornwall England.

The Tregothnan estate in Truro, 285 miles southwest of London, began growing Manuka, a New Zealand native plant, in the 1880s and started selling the honey about a decade ago

The Daily Mail newspaper reports the estate is defending its right to sell is manuka honey for up to £225 ($282) a jar after the Unique Manuka Factor (UMF) Honey Association – which licences manuka honey in New Zealand – is demanding the estate stop using the manuka name.

The association has gone to the European Union seeking protected geographical status for the honey. It's the same law the means sparkling white wine can only be called champagne if it comes from France's Champagne Valley.

"Manuka is a Maori word and this honey comes from New Zealand, just like Cornish pasties come from Cornwall," association general manager John Rawcliffe tells the newspaper.

"When you buy this honey, the bees have travelled up to 6km (3.7 miles) to collect it. It is a representation of that environment and our climate, just as if I bought Scottish whisky I would expect it to come from the peat soil of Scotland."

The association has also moved to trademark the name "manuka honey."

Tregothnan Estate in Cornwall, an area of myth and legend on the south-east corner of England, describes its honey as 'nature's most mellifluous medicine', and sells as range prices from £29.95 ($37.60) to £225 for a limited edition 420g (14.8 oz.) jar. It usually sells out within weeks.

Estate spokesman Jonathon Jones was dismissive of the New Zealand claim.

"Our European honey bee is used to produce the manuka honey in New Zealand.," he tells The Daily Mail. "There is no serious discussion about sending the bees back.

"Tregothnan will never compete on commodity production and is a luxury brand celebrating the best of British, pioneering new plants for centuries."

Rawcliffe says he has no objection to the estate producing the manuka honey – he just wants its name changed.

"It's great, give it a go, grow the plant, I have no problem with that," he says. "But give it another name that doesn't confuse the consumer."

Alan Harman

"Often the best approach is to get them back on the land where they can improve soils and have the potential for a healthier, more interesting life though excellent management," she said.

"Our job as a charity is to help things change, ideally through working constructively, sharing knowledge and helping more 'organic' approaches to soil care, managing pests and diseases and animal health and welfare become the new norm.

"So, while I'm wary of the soundbite and the tweet, we will use them to help the public understand and care and it's in all our interests that they do care, and are prepared to support good British farming.

"But we will take care too, to be as fair and accurate as 140 characters allows." – *Alan Harman*

BEE HEROES WIN UK AWARDS

An inner-London nectar bar and a disused coal mine transformed into a pollen-rich hay meadow are among a range of innovative projects helping protect pollinators in Britain that picked up government Bees' Needs Champions awards.

The awards ceremony at the Royal Botanic Gardens, Kew, brought together 30 champions to celebrate bee-friendly initiatives, from playgrounds to parks and farms to famous shopping streets.

Minister for Rural Affairs and Biosecurity Lord Gardiner said the Bees' Needs champions show how to keep pollinators happy and healthy all year-round.

"They show that whether you have access to acres of land or just a window box, everyone can play a part in helping these vital insects thrive," he said.

The awards celebrate success in six categories – youth groups, schools, local authorities, farming, construction and community groups. They were judged by a number of organizations on adopting the Department of Environment, Food and Rural Affairs national pollinator strategy. The champions come from all over England.

In Sydenham, south London, Grow Mayow community garden features its own nectar bar. Originally an old park keeper depot, it is now home to an award-winning garden with wild flowers and a beehive. Over winter, the garden is planted with a fast-growing 'green manure', providing winter food for pollinators and nutrients for the soil.

In Shropshire, the site of a former coal mine was left badly scarred by its industrial past before being turned into a pollinators paradise. The Severn Valley Country Park opened in 1992 and since then volunteers have been looking after 12 acres of species□rich hay meadows and bee hives. Volunteers trained as beekeepers are harvesting mason bee larvae to give to local fruit growers, so young bees can grow and pollinate fruit crops.

Paul de Zylva of Friends of the Earth, one of the organizations working with the government to put the national pollinator strategy into effect, said the award winners show how everyone can help bees and pollinators anytime, anyplace, anywhere – all year-round.

"The beauty is, you don't have to wait for Summer to start playing your part in reversing bee and pollinator decline," he said. "Taking action also helps bring the national pollinator strategy alive in homes, at work, at school and in your community."

Lord Gardiner said it is important not to forget bees' needs during the winter months, when providing food and a home are more important than ever.

"Planting evergreens for winter food and leaving areas of gardens undisturbed through the Winter to provide homes mean we can all help pollinators emerge safely in the Spring.," he said.

Experts have highlighted a number of easy steps everyone can take to help pollinators over the winter: Plant flowers, shrubs and trees that thrive in winter. The evergreen mahonia is excellent winter food for bees, while the pendant bells of winter flowering clematis can give pollinators a sugary energy boost. Ivy plants are also an ideal source of food for bees in late Autumn - avoid cutting them down.

Leave suitable places for hibernation undisturbed. Letting areas of a lawn grow long until the spring can provide a hibernation home while cool, north-facing banks are ideal places for bees to burrow. The hollow tubes of dead stems of plants in borders can also serve as a great nesting spot.

Plant early flowering bulbs such as crocus, primrose, snowdrop of coltsfoot that flower in February and March to help support bees and pollinators looking for an early feed. Winter is also the perfect time to plant bee-friendly trees, such as acacia, blackthorn and hazel. – *Alan Harman*

CALENDAR

♦INTERNATIONAL♦

45th Apimondia International Congress will be held September 29 to october 4 in Istanbul, Turkey.

For more information visit **www.apimondia2017.org**.

♦ALABAMA♦

The Alabama Cooperative Extension 2nd Annual Beekeeping Symposium will be held at the Clanton Conference and Performing Arts Center, February 4.

Speakers include Jamie Ellis, Phil Craft, Keith Fielder and Geoffrey Williams. Registration starts at 8:00 a.m. Lunch is provided with pre-registration by January 20.

For more information and to register visit **https://mell-base.uce.auburn.edu/wconnect/CourseStatus.awp?&course=-C170204A&Publish=ANYWAY**.

Alabama Master Beekeepers Symposium will be held February 9 at the Clanton Conference and Arts Center.

Featured speakers are James Tew and Jerry Hayes.

For more information contact Gerry Whitaker, **whitsfarm@centurytel.net**.

♦ARIZONA♦

9th Annual Organic Beekeepers Chemical Free Conference will be held March 3-5 in Oracle at the YMCA Triangle Y Ranch Camp and Retreat.

Speakers include Michael Bush, Laura Ferguson, Don Downs, Karen O'Brien and more. The cost is $225/person which includes lodging and meals.

For more information visit **www.tucsonymca.org** or **www.groups.yahoo.com/group/organicbeekeepers/** or contact Dee Lusby, evenings at 520.398.2474.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2017 speaker schedule – January 31, Paula Sharp and Ross Eatman; February 28, Aaron Morris; March 28, Carl Jurica; April 25, Frederique Keller; May 23, Christina Grozinger; September 26, Tom Seeley; October 31, Kirk Webster; November 14, Jennifer Berry.

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

♦GEORGIA♦

GA Beekeepers Association will hold their meeting February 17-18 at the University of GA, Griffin Campus (an hour from Atlanta).

Speakers include Marla Spivak, Michele Colopy and Charlie Parton.

For more information and to register visit **www.gabeekeeping.com/**.

♦ILLINOIS♦

LCBA Bee Seminar will be held March 18 in Mettawa at the Grainger Company.

Speakers include James Amrine, Gordon Wardell, Jon Frank, Dave Hackenberg.

For more information **www.mettawabee-seminar.com**.

♦INDIANA♦

IN Bee School XV will be held February 25 at Decatur Central High School, 5251 Kentucky Avenue.

Guest speaker is Sue Cobey. You must pre-register, no walk-ins.

For more information and to download registration form visit **www.Indianabeekeeper.com**.

♦MARYLAND♦

Maryland State Beekeepers will hold their Winter meeting February 11 at the Howard County Fairgrounds, West Friendship from 9:00 a.m. to 3:30 p.m..

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

♦OHIO♦

Medina County Beekeepers Beginner's Classes will be held five Tuesday evenings beginning February 21 through March 21, at Bee Culture Conference Room in Medina taught by Bee Culture Editor Kim Flottum. Saturday classes are at the Medina Library, February 11 & 25.

For information visit **www.medinabeekeepers.com,calendar**.

The Mid Ohio Valley Beekeepers' Association in conjunction with the **WV Extension Services** will sponsor the 15th Honey Bee Expo on the campus of the WB University, Parkersburg, January 28, 2017. The cost is $20/person before January 13 or $25 at the door.

The keynote speaker will be Phil Craft.

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

♦NEW YORK♦

HoneybeeLives' Organic Beekeeping Classes will be held January 21-22, January 28-29, February 25-26 in New Paltz. In Brooklyn February 2-5. .

For more information visit **www.HoneybeeLives.org** or call 845.255.6113.

♦PENNSYLVANIA♦

Western PA Beekeeping Seminar will be held February 17-18 at the Doubletree by Hilton in Monroeville.

Featured speakers include Roger Hoopingarner and Doug Oster. There will be breakout sessions on pollinators, nutrition and more. A Beginning Beekeeping workshop will be offered in tandem on Saturday (limited to 75)

Cost is $55; Beginning Beekeeping cost is $75.

For more information and to register visit **www.extension.psu.edu/beaver** or call 724.774.3003.

♦TEXAS♦

Austin Area Beekeepers Association will hold their Seminar January 21 at J.J. Pickle Research Campus, 10100 Burnet Road, Austin.

The cost is $60. Presenters include Juliana Rangel-Posada, Mark Dykes, Mark Hedley and more.

For more information visit **www.aabaseminar2017.eventbrite.com** or contct Lance Wilson, **lance@beekeepinghelp.com**.

♦VERMONT♦

Bennington County Beekeepers Club will hold their Beginner Short Course January 26, February 2, 9, 23, March 2, 7- p.m. at VT Veteran's home in Bennington.

For more information contact Jeanne Davis, **jdavisbwheat@comcast.net** or 802.823.7955.

♦WISCONSIN♦

Beginner Beekeeping Classes will be held at the Dane Co. Extension Building, 5201 Fen Oak Dr., Madison January 21, February 18, March 11, April 8 and May 6. **Second Step** is March 18. All classes are from 9:00 a.m. to 4:00 p.m. The cost is $50.

For more information visit **madbees.org/cat/classifieds** or contact Jeanne Hansen, **jeanniealabeannie@yahoo.com** or 608.244.5094.

♦WYOMING♦

The Wyoming Bee College will be held March 18-19 at the Laramie County Community College, Cheyenne.

Featured speakers are James Tew and Les Crowder and others. The cost is $75 which includes meals.

For more information visit **www.wyomingbeecollege.org**, **www.eventbrite.com** or call Catherine, 307.633.4383.

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My gal Marilyn and I just love Kansas! We took the scenic route back to Colorado from the Kansas Honey Producers meeting in Hays. South through Schoenchen and Liebenthal – German Catholic Kansas, with religious billboards and graceful stone churches in even the smallest towns. Then east on lonesome highway four through corn and milo and Winter wheat, to the Cuartelejo Pueblo ruins.

It's not on the map, but we stumbled onto Battle Canyon, site of the 1878 Battle of Punished Woman Fork. With winter looming, starving Northern Cheyenne under Little Wolf and Dull Knife slipped away from the reservation at Fort Reno, Oklahoma and headed for their ancestral home in the Yellowstone country.

They dug in at the limestone caves of Punished Woman Fork, waiting for the pursuing United States Army. You can visit the Indians' rock-rimmed rifle pits on the bluffs above the caves and creek bottom. Below huddled 261 women and children. When 250 troops from Fort Dodge arrived in the late afternoon of September 27, the Cheyenne tried to lure them into ambush in the shallow canyon leading to the caves. When that failed, 92 warriors engaged them on open ground.

The Cheyenne subsequently retreated into the canyon, and the infantry thought they had them surrounded. But on a dark and windy night the Cheyenne somehow slipped away, ever wending their way towards home.

Things you can learn if you just get off the Interstate!

I gave two talks in Kansas, but only one was on *Varroa* mites.

Before I gave a sugar-shake mite test demonstration, I quipped that I hoped I could find a mite or two, because it would be pretty pathetic if I couldn't, right? Well, I'd worried needlessly, because my 250-bee sample yielded some 75 mites, which works out to a 30 percent infestation rate. That hive should have been dead, and by now it probably is.

It wasn't all serious mite talk. I told those Kansans the tale of the morning I got stung (twice!) on the worst place any man can imagine getting stung, and how on that very same day I ran into the ghost of a dear dead friend!

For her talk, Marilyn recounted our trip to the international bee congress Apimondia 2013, in Kiev, Ukraine. We were invited by beekeeper and Ukrainian ex-president Victor Yushchenko, who can boil up a mean carp soup.

A week later I got elected president of the Colorado State Beekeepers Association at our semiannual meeting in Castle Rock. But not before getting grilled by a couple of members who challenged my ideological purity on the neonicotinoid pesticide issue. These guys blame neonics for honey bee losses. I'm not so sure. I said, "Look, I'm not convinced that, properly applied, neonics kill honey bees. I do believe they're hell on bumblebees and other native bees. I just call it like I see it. I'm offering you half a loaf. You should take it." Ultimately they did, and one of these gentlemen was kind enough to nominate me for the presidency.

Keith Delaplane from the University of Georgia gave fascinating lectures on the importance of queen bees mating with multiple drones, and on the hive as a superorganism. Later, at supper, he confided, "I'll tell you a dirty little secret. Honey bees aren't very efficient pollinators. For many crops, our native pollinators do a much better job." The exceptions, he pointed out, are Old World species like almonds and apple that co-evolved with honey bees. He told us about a hardworking native bee that specializes in pollinating Georgia blueberries.

When we got home, it was nearly November, and I hit the deck running. I segregated my hives: Ten frames or better got set aside on four-way pallets to go to the California almonds on one of Paul's loads. The remainder stay here. So there were a lot of loads of bees coming into yards, and leaving them. A weak hive would get moved out, and a strong one would come in to take its place on a four-way pallet. All this is hopelessly complicated, because you can't just consolidate hives, four to a pallet. If you move hives more than three feet within the apiary, you're going to wind up with foragers who can't find their way home, and we wouldn't want that.

After countless days moving bees, Paul mentioned something that I once learned but inexplicably forgot. They talked about this at a bee meeting I went to in July. You can combine hives to make the grade for the almonds, if you do it a special way. Here's how: You combine all the bees from one hive into a single deep super, and you put two pollen patties side by side on top. Then you put the second hive on top of the first, again, shaking its bees into one box.

Paul said he never had any luck combining hives for the almonds until he started doing it this way. Weak colonies would just poop out, even after the addition of another weak hive. Now his combination hives return from the almonds rarin' to be split. You don't use newspaper, like they tell you to in the bee books. Just pollen patties. You don't have to send your bees to California to try this. You could do this for any hive unions but especially for overwintering colonies. The old saying is to take your losses in the fall, not the Spring. That's sound advice.

I have no idea why uniting hives this way would work better than with newspaper. It seems like hives either unite peacefully under one or both queens, or they don't. But I do know one thing. I know who to listen to.

Ed **Colby**

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