HOLIDAY HONEY RECIPES 2

ROOT PUBLICATIONS

Dec 2015

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The Interview Issue

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Gene Robinson

Keith Delaplane

President's Plan

Doug Tallamay

Brenda Tharp-Bray

The Mraz Operation

Don Hopkins

Keegan Rufer

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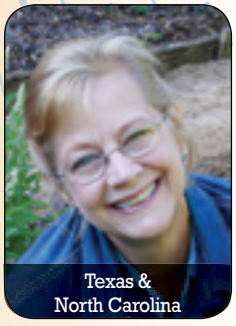

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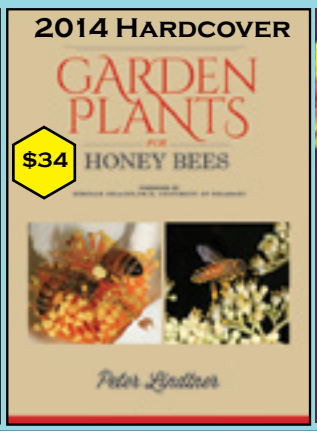

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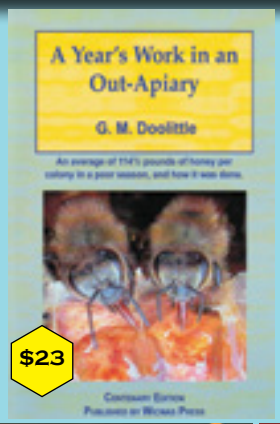

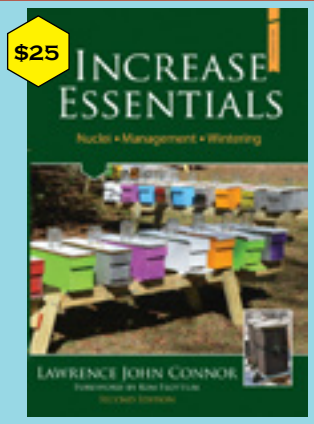

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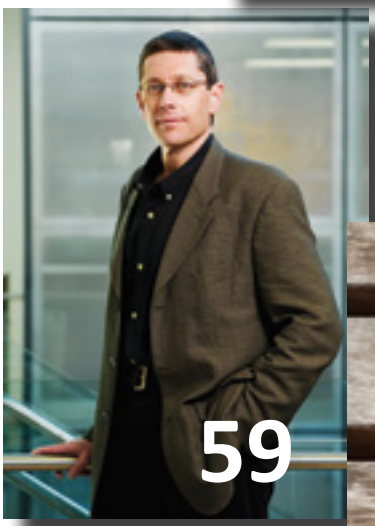

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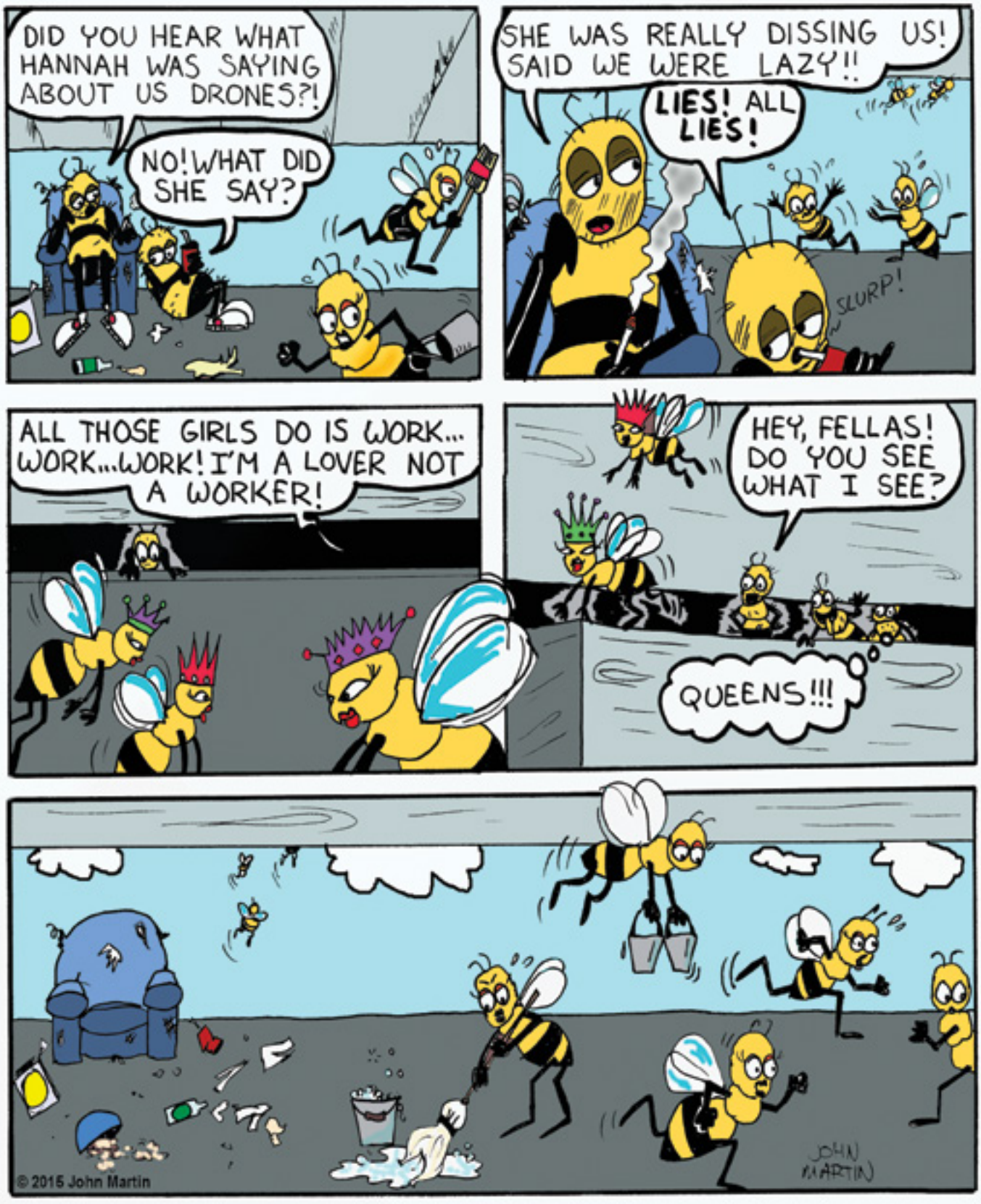
By John Martin



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I'm dreaming tonight of a place I love,
even more than I usually do. And although I know,
it's a long road back, I promise you,
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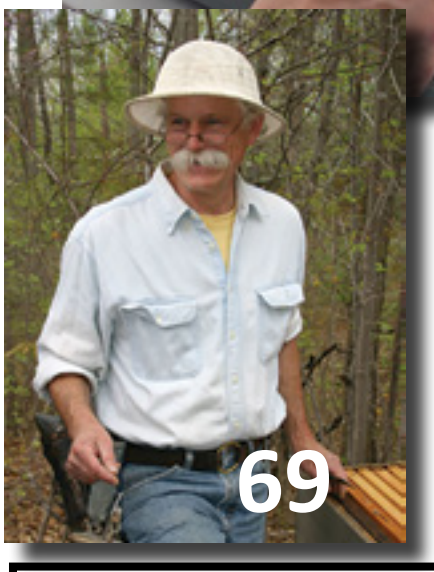

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Ask & You May Receive

I wrote the North Carolina DOT, Anthony Tata regarding the bee habitat that was being destroyed to make way for the new insterstates in Richmond County and Union County.

I asked that the NCDOT plant wildflowers that are beneficial to bees along entire lengths of roads rather in just small portions. Recently the U.S. Agr. Dept. started a wildflower program for farmers to help with the bee habitats. State Senate Bill 225 is supposed to help with bee habitats.

There are about 60 miles of road being built in these adjoining counties, which is a huge loss of land to all animals. If anything can be redeemed I think the honey bees could benefit from such a program. Also, wildflowers would *not* need to be maintained (mowed) by the state as well as beautifying the roadways. This would create a win win for the state and the honey bees. However, this matter would need to be expedited since both roadways have already begun construction.

I ask on behalf of all beekeepers and the honey bee populations.

Mr. Tata, Secretary of NCDOT was very responsive. He said the NCDOT was very aware of the issues currently facing the honey bee population and farmers and the impact other pollinators play in the environment and in our economy. NCDOT along with the Department of Agriculture and Consumer Services has partnered to promote and establish pollinator habitats across the state.

Through the establishment of pollinator forage crops, the NDCOT Pollinator Program will work in tandem with the Department existing wildflower program to provide a source of food to all pollinator species. The two projects that you have identified will be suitable locations for the Departments efforts. There will be pollinator habitat plots established along those corridors to promote pollinator species.

Be willing to take a chance by asking your state officials to help save bee habitats. You never know what kind of response you'll receive and the impact you may have.

Philip Perkins
NC

Up In Smoke

Jim Thompson's excellent article, "Up in Smoke," covered all the bases with regard to smoking tools and then some. Your readers might like to see the simple device used for providing smoke in the Slovenian AŽ hive. A small stick made of pressed wood chips, no glue or binder, is lit and then placed in the wire stand that comes with each box of "Dimak" (wood sticks). Hive frames are accessed via the rear door. After removing one or both "interior windows" the burning stick is placed on the floor of the opened hive. The stick emits an amount of almost odorless smoke equivalent to a burning cigarette. Most of the smoke remains inside the hive – there being no wind inside the bee house – and the "hive box" being tight. Bees move away from the smoke and toward the entrances as seen by their absence in this photo of a hive with a full colony of bees. An extra wood stick is available along with the standard hive tool. With no direct sunlight and a small amount of smoke the photo reveals the typical and calm experience when the Slovenian hive is opened and worked.

Mark Simonitsch
Chatham, MA

Horizontal Hives

I enjoyed the thoroughness of Leo Sharashkin's presentation of the Horizontal Advantage but there was one issue not addressed. In the traditional Langstroth hive, presuming you use at least foundation with vertical wires, extraction conserves the comb for return and reuse by the bees. It would seem to me that the variable form of the comb in the top bar hive, with limited mechanical reinforcement, would result in more

Bee Culture

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frequent destruction of the comb during extraction. As a result bees would be constantly needing to produce new comb. If I am wrong, would someone please clarify the issue and describe the procedure in the top bar hive.

Zack Comeaux
Lewisburg, WV

Editor's Note: *Although there are other issues with the slanted-sided top bar hives, replacing the wax on an annual basis isn't one of them. Yes, more work. No, dirty wax. All kinds of hive types would do better with this cycle of renewal.*

Independence Required

The Pollinator Stewardship Council is deeply concerned about the political influence and pressure placed upon scientists, especially U.S. Dept. of Agriculture scientists. Dr. Lundgren's experiences, and reports of other scientists who have faced consequences or investigations, when their work called into question the health and safety of agricultural chemicals is troubling. Dr. Lundgren, and other scientists have documented clear actions that violated their scientific integrity, including:

- USDA officials retracting studies
- watering down findings
- removing scientists' names from authorship
- delaying approvals for publication of research papers.
-

The Whistleblower Retaliation Narrative (**www.peer.org/news/news-releases/usda-scientist-**

punished-for-pollinator-research.html) published by Public Employees for Environmental Responsibility (PEER) Oct. 28, 2015, and their previous petition (**www.peer.org/assets/docs/usda/3_26_15_USDA_%20Rule-Making_Petition.pdf**) raises grave concerns for the integrity of the nation's agricultural science. The petition urged the agency to adopt policies to specifically prevent the "political suppression or alteration of studies and lay out clear procedures for investigating allegations and of scientific misconduct."[1] PEER found more than ten USDA scientists who have faced consequences or investigations, when their work called into question the health and safety of agricultural chemicals. The latest Narrative concerning Dr. Lundgren brings these concerns to light again. This, time, a well-known, and well-respected scientist is making his concerns public.

As beekeepers, we have had many opportunities to work with Dr. Jonathan Lundgren. Beekeepers have even provided our honey bee colonies for his research to better understand and improve the health of honey bees in the U.S. We have found his research to be insightful, unbiased, and supportive of solutions to the concerns of honey bee health.

The U.S. Department of Agriculture has a responsibility to protect the health and safety of the American public, and ensure long-term viability and sustainability of the environment and our natural resources. Dr. Lundgren's research could result in the improvement of our waters which could indirectly financially benefit the Agricultural Community overall by requiring *less* regulation.

All of the research the USDA conducts must maintain scientific integrity and transparency to ensure it is guiding science-based policy decisions.

The Pollinator Stewardship Council is concerned about the experience of Dr. Lundgren as a USDA scientist. We are concerned about any U.S. Department of Agriculture scientist being harassed and their work censored or suppressed, especially work related to pesticides. We again urge the USDA Inspector General's office to conduct a thorough investigation into this and similar matters. The USDA must maintain scientific integrity by not interfering with the valuable work of its scientists. Scientific evidence has implicated insecticides as a leading driver of bee declines, and herbicides as a leading driver of the destruction of pollinator habitat. Beekeepers, honey producers, and the crops pollinated by managed and native pollinators rely on USDA scientists to protect the health of our food supply. Honey bees and native bees pollinate one third of the human diet. For a sustainable and affordable food supply pollinators are key to crop yields, affordable food, and diverse nutritious food. The USDA must maintain scientific integrity, and not allow harassment, censorship or suppression of science-based findings. The Pollinator Stewardship Council will continue to support scientists

who are working to provide quality, unbiased science which will benefit honey bees and native pollinators, and the health and safety of all agricultural stakeholders.

Michele Colopy
Pollinator Stewardship Council

Editor's Note: *Because of deadline pressure on our side and the fact the USDA has little latitude on commenting because this is an appeal case, we don't have a response. However, we will have USDA's take ASAP here or on the BUZZ.*

Questions and Answers

Removing Wax From Frames

I tried the plastic foundation in water and it seems to help in scraping off the wax. Do you put foundation and frame in water or just the foundation? Can the foundation then be put in bleach water to help kill anything before reuse? Do you melt what comes off the foundation?

This like all the rest is a good issue. Enjoy reading.

Walt Weldon
Pittsburgh, PA

Honey Bees And LED Lighting

I have been a long time reader of Bee Culture magazine and have always enjoyed the many articles. My brother Phil and I live in North Central Ohio and we both have raised bees for many years. While discussing our honey bees the other day he mentioned something that I found quite interesting that I thought I would pass along to see if anyone else has experienced this.

He was telling me that he has been in the process of converting his lighting in his house over to LED in order to save a little money. He replaced the light over his kitchen sink with a new LED bulb recently. A couple weeks later he noticed that there were at least 60-70 dead honey bees in his window sill between the screen and the inside window. Upon closer examination he noticed they must have gotten in through a small opening in the screen. It seemed odd to have that many dead bees in his window sill. Then he mentioned a couple weeks after that he changed over his light near his couch to LED where he sits and reads. He started noticing a honey bee or two, coming in occasionally through the open door when he let his dogs out. What seemed strange he said was that they went straight to the light with the LED and tried to land right on the bulb itself while ignoring other lights in the room. I do need to mention that he has a couple hives behind his house because he lives in town so there would naturally be bees in the proximity. Still seems strange because both hives have been there a number of years now and he has never experienced any of this before. All this seems to have started with him changing over to some LED lights. I know bees navigate by using different spectrums of light so it makes me wonder if the LED bulbs are disorienting the bees?

I would be curious if anyone else has experienced this……

Steve Thompson
Bellville, Ohio

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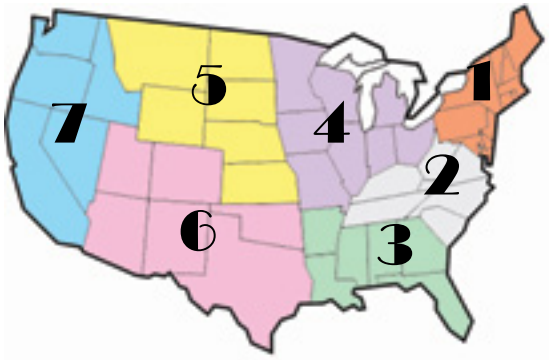
DECEMBER – REGIONAL HONEY PRICE REPORT



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	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	Avg.	$/lb	History Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																	
55 Gal. Drum, Light	2.30	2.25	2.00	1.90	2.45	2.65	2.58	2.25	2.30	2.30	2.20	2.25	1.85-2.80	2.27	2.27	2.21	2.09
55 Gal. Drum, Ambr	2.21	2.00	2.21	1.84	2.15	2.00	2.51	2.25	2.21	2.21	1.95	2.20	1.82-2.74	2.14	2.14	2.12	1.95
60# Light (retail)	209.00	202.50	146.33	191.25	180.00	191.05	189.00	170.88	191.05	191.05	159.00	245.00	84.00-300.00	190.09	3.17	191.38	184.68
60# Amber (retail)	209.00	210.00	172.50	186.00	180.00	203.08	183.00	170.88	203.08	203.08	150.00	223.75	150.00-280.00	191.15	3.19	192.67	174.36
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																	
1/2# 24/case	82.08	71.95	67.00	78.93	74.85	74.85	64.00	74.85	74.85	74.85	74.85	100.00	48.00-100.00	75.69	6.30	77.04	71.72
1# 24/case	126.68	90.97	111.60	92.60	108.00	120.00	96.67	105.00	115.31	147.84	104.40	152.00	42.00-192.00	113.61	4.73	112.78	108.00
2# 12/case	116.94	91.15	104.20	98.00	99.00	96.00	94.93	108.00	104.70	104.70	104.70	109.00	72.00-144.00	101.40	4.23	101.25	95.94
12.oz. Plas. 24/cs	103.68	86.63	73.80	75.33	79.20	96.00	75.13	96.00	89.59	89.59	106.80	99.67	64.80-120.00	86.78	4.82	86.50	84.29
5# 6/case	162.00	104.98	103.50	106.00	126.00	124.20	105.00	117.00	124.20	124.20	124.20	130.00	84.00-180.00	116.40	3.88	117.58	105.46
Quarts 12/case	170.00	154.44	169.00	116.13	99.00	110.00	153.90	117.00	118.50	166.32	119.40	151.50	119.40-202.80	130.63	3.63	133.91	124.78
Pints 12/case	99.50	86.95	96.90	74.67	78.00	63.25	138.00	60.00	89.03	110.88	89.03	95.67	48.00-138.00	85.06	4.72	85.33	80.34
RETAIL SHELF PRICES																	
1/2#	4.42	4.45	3.41	4.17	4.23	4.00	3.85	2.99	4.23	4.23	3.99	6.00	2.75-6.00	4.08	8.16	3.99	3.92
12 oz. Plastic	5.00	5.18	3.90	4.85	5.00	5.00	4.64	5.13	5.71	5.71	5.73	7.06	3.50-8.99	5.18	6.91	5.11	4.82
1# Glass/Plastic	6.56	6.30	6.24	6.80	7.50	6.00	5.42	6.13	6.76	7.50	5.50	9.00	3.00-10.99	6.52	6.52	6.53	6.28
2# Glass/Plastic	12.25	10.04	10.80	9.92	11.95	10.00	9.83	10.69	11.37	11.37	7.99	17.50	6.00-18.00	10.75	5.38	10.69	10.32
Pint	10.00	12.22	10.50	8.66	7.50	6.89	21.00	6.10	11.26	12.00	7.99	12.60	4.00-21.00	10.02	6.68	9.17	8.26
Quart	22.00	15.10	17.33	14.83	12.95	11.25	17.25	16.13	17.37	20.00	14.75	20.06	7.00-30.00	16.24	5.41	14.50	13.84
5# Glass/Plastic	26.00	22.86	26.00	23.00	24.95	24.08	22.90	32.00	24.08	24.08	14.95	30.00	14.89-34.00	23.72	4.74	24.46	22.53
1# Cream	8.50	6.98	9.25	7.00	8.21	8.21	7.25	8.21	8.21	8.21	7.59	10.00	6.00-11.00	7.91	7.91	7.85	7.45
1# Cut Comb	10.83	6.00	10.55	8.40	9.73	6.00	6.75	8.00	9.73	9.73	9.73	15.00	5.50-15.00	9.21	9.21	9.24	8.79
Ross Round	7.59	5.75	10.09	6.33	7.59	7.59	6.00	10.00	7.59	7.59	7.59	7.59	5.75-10.09	7.26	9.68	8.04	8.24
Wholesale Wax (Lt)	7.00	7.25	6.17	4.25	3.20	4.33	6.97	5.50	5.82	5.82	3.50	5.13	3.20-8.90	5.59	-	5.78	5.28
Wholesale Wax (Dk)	6.00	6.15	6.17	4.00	3.15	3.25	7.45	5.00	5.32	5.32	3.00	4.63	3.00-8.00	5.14	-	5.06	4.74
Pollination Fee/Col.	95.00	65.00	88.33	51.00	70.00	45.00	60.00	85.00	93.00	93.00	93.00	105.00	35.00-185.00	76.00	-	79.91	81.39

REPORTING REGIONS - 2015

	1	2	3	4	5	6	7	SUMMARY Range	Avg.	$/lb	History Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.00	2.07	2.15	2.48	1.90	2.16	2.40	1.82-2.95	2.18	2.18	2.23	2.27
55 Gal. Drum, Ambr	1.80	1.99	2.21	2.48	1.80	2.04	2.35	1.65-4.00	2.16	2.16	2.14	2.14
60# Light (retail)	225.63	176.60	187.14	216.67	171.00	179.25	295.00	145.00-300.00	205.33	3.42	204.42	190.09
60# Amber (retail)	226.25	175.83	186.67	198.20	205.48	180.50	245.00	135.00-290.00	198.45	3.31	203.73	191.15
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	85.75	74.95	91.40	55.25	51.84	87.45	110.00	48.00-132.00	83.20	6.93	85.86	75.69
1# 24/case	124.17	104.80	124.76	103.67	127.16	101.40	146.88	45.00-216.00	119.87	4.99	117.90	113.61
2# 12/case	115.36	92.33	105.49	96.70	97.44	95.50	130.00	76.80-168.00	107.71	4.49	105.80	101.40
12.oz. Plas. 24/cs	103.71	82.67	93.60	88.77	74.40	108.00	106.00	64.80-144.00	95.99	5.33	96.06	86.78
5# 6/case	132.48	103.75	111.18	109.80	102.30	105.00	126.00	49.75-180.00	118.72	3.96	115.86	116.40
Quarts 12/case	174.99	122.82	134.30	121.00	145.82	128.20	141.00	105.00-225.00	139.10	3.86	142.50	130.63
Pints 12/case	102.86	85.00	76.56	105.00	111.00	75.80	101.00	60.00-138.00	88.44	4.91	89.10	85.06
RETAIL SHELF PRICES												
1/2#	4.90	4.12	4.14	3.35	3.81	4.32	5.50	2.90-7.75	4.36	8.72	4.53	4.08
12 oz. Plastic	6.10	4.67	4.92	4.42	5.30	6.10	7.06	2.99-8.99	5.40	7.20	5.49	5.18
1# Glass/Plastic	7.24	6.55	6.88	5.65	6.52	6.40	11.80	3.00-16.00	7.06	7.06	7.09	6.52
2# Glass/Plastic	12.84	10.35	10.96	11.12	10.79	9.96	17.50	6.00-18.25	11.70	5.85	12.11	10.75
Pint	12.28	8.65	8.49	13.00	8.80	9.64	12.22	4.00-17.00	9.68	6.45	10.23	10.02
Quart	18.54	15.15	14.30	18.13	15.78	15.53	19.80	8.00-27.00	16.10	5.37	15.73	16.24
5# Glass/Plastic	26.76	23.79	32.50	26.69	21.47	21.77	30.00	15.00-40.00	25.52	5.10	25.35	23.72
1# Cream	9.02	7.69	7.13	6.90	10.47	6.42	12.00	5.00-16.00	8.22	8.22	8.37	7.91
1# Cut Comb	11.19	8.98	8.21	10.33	10.00	4.50	18.50	4.50-25.00	10.35	10.35	10.41	9.21
Ross Round	9.22	6.67	5.00	9.33	8.48	9.00	8.48	5.00-12.00	8.46	11.28	8.69	7.26
Wholesale Wax (Lt)	6.73	5.63	4.57	6.41	6.00	5.40	5.42	3.00-10.00	5.75	-	6.21	5.59
Wholesale Wax (Dk)	6.35	4.47	4.30	5.90	5.60	3.00	4.00	2.00-10.00	5.20	-	5.73	5.14
Pollination Fee/Col.	93.00	64.00	58.00	66.29	95.19	93.00	131.67	35.00-185.00	80.39	-	78.39	76.00

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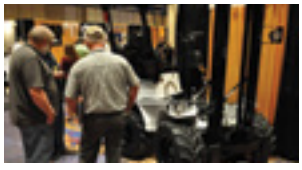

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INNER COVER

Merry Christmas and Happy New Year!

There's usually something here different than what's here this time. As you've noticed, this is the annual Interview Issue, and we have some terrific people for you to meet. And since this is an opinion page, and the person I interviewed has some strong opinions, and wrote a great book about his opinions, I thought this would fit nicely right here. So, meet Dr. Doug Tallamy, Professor & Chair of Entomology and Wildlife Ecology at the University of Delaware. I found him to be an incredibly interesting individual. I am sure you will also.

I met Professor Doug Tallamy at an EAS Conference about a year ago when I was the monitor for an afternoon session entitled Making Peace and Places for Bees. Speakers included Zac Browning, Tammy Horn, Chris Harp and Professor Tallamy. His talk, and it turns out his passion as an entomologist, naturalist, and conservationist was entitled Conserving Bees in Managed Landscapes. The thrust of which was that our managed landscapes – homes, businesses, city parks and the like were not at all natural, were not feeding much of anything and were being overcome with non-native trees, shrubs, and the never ending lawns of suburban America.

He went on to list a whole series of problems with the way we decorate our outdoors, and what it was doing to the insect and bird populations that had once inhabited these same areas. His strong suit is what feeds birds – mostly caterpillars for the protein source when raising their young, but he talked about pollinators also, since we was talking to a room full of beekeepers.

I later found out that much of what he was discussing was in his book *Bringing Nature Home*. How You Can Sustain Wildlife with Native Plants. Since he piqued my interest to such a degree during his talk I forgot I was in charge and almost neglected to continue the program that day. But I did, and then I bought his book, which is a wonderful breath of fresh air, written by someone who thought very much as I did regarding almost everything he discussed. I stayed in touch with him on occasion when a discovery or urban issue came to my attention I thought he'd be interested in.

Just recently, we were both on the same program at a Pollinator Conference in Cleveland, and we had an opportunity to talk a bit more about his book and his thoughts on several things. So what this piece is, really, is a book review, but one where I have the opportunity to ask the author questions about his work, to delve a bit deeper into particular aspects of what he says, and to expand on items that have evolved since the book was updated a few years ago.

The book starts with how landscapes have changed from where the wild things could live to where there was no place for them to live. The simple statistics of what we have done are amazing. We have more than four million miles of paved roads that offer no habitat at all and for almost all of those millions of miles, the roadsides are as barren as the pavement itself. We have 'developed' 54% of all available land in this country, and have turned just over 40% of what's left into agriculture, leaving right about 5% undisturbed, undeveloped and available for what little wildlife is left.

Add to this the fact that some 50,000 alien species of plants and animals have colonized north America, taking up much of what room was left for the natives. It's getting tough to find a place to hide anymore he says, and looking outside, you might agree.

Because of all this, many, many plants, animals and insects have suffered local extinctions in the most developed areas. He uses the same comparison I have been using for years – the windshield test. When both he and I were much younger, traveling by automobile at night for 50 miles required a stop to clean the window. The last time I drove at night any distance – well, let me expand – when was the last time you had to clean your windshield because of splattered insects? Years, I'll bet. That's the point here – fewer insects. Period. Development. Agriculture.

Part of the development issue is not only have we removed habitat and turned it into lawns, parking lots, paved roads, corn fields and foundation plantings around houses, we have replaced at least some of it with plants those starving, remaining insects can't eat – Invasives. But that's kind of a fuzzy word in the landscape business, so I asked Dr. Tallamy what criteria constitutes a plant, or animal for that matter, as an invasive, or conversely, why is that plant a native, and that one not?

It turns out it's even fuzzier than I thought. And then there are those that are naturalized. What about them?

Well, Tallamy's short, and to date best answer I've heard is that a native plant has a function, and is actively interacting with the local food web. It might not include definitions

Continued on Page72

Doug Tallamay.

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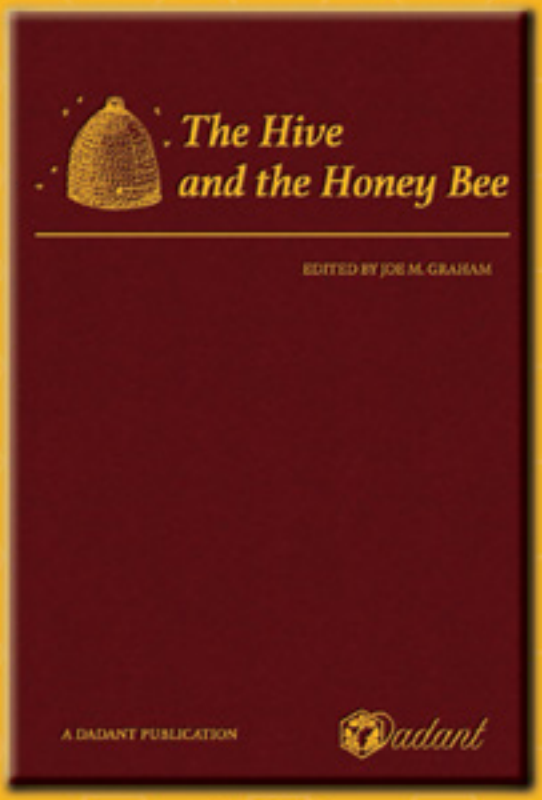

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Brenda At Mann Lake

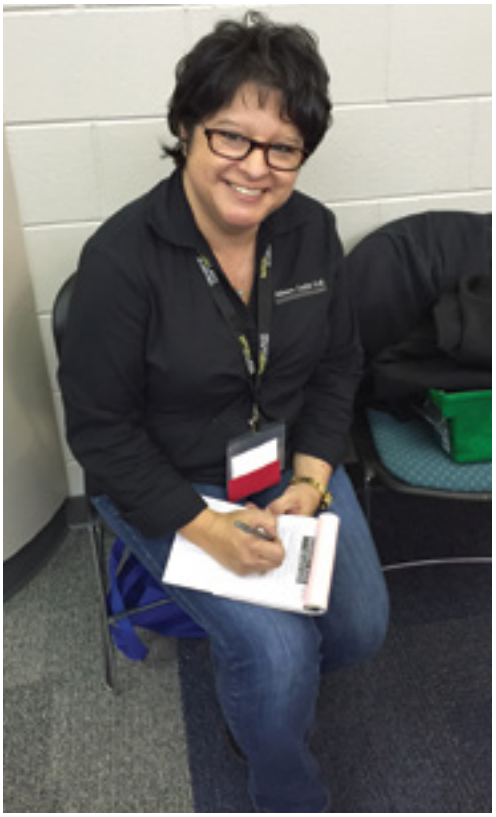
Kathy **Summers**

If you've been to a bee meeting of any size in the last 20 or so years you've probably met Brenda Tharp-Bray from Mann Lake Ltd. She even shows up now and then at some of the smaller state meetings.

I'm not sure exactly when I first met Brenda, but it's been close to 20 years ago. It might have been at the Tri-County meeting in Wooster, Ohio that happens every March. But we run into Brenda maybe two or three times a year in the vendor area of some meeting in some hotel or on a college campus.

She's one of those people I really look forward to seeing. We catch up on family and just talk about what's been happening in both of our lives. And now all of our children are adults. Brenda just sent her last daughter off to college. Maybe one day we'll be talking about out grandchildren.

Most recently we caught up with Brenda at the Ohio State Beekeepers Association meeting in the Columbus, Ohio area. We thought she'd be a good addition to our interview issue. So, here is a bit more about Brenda Tharp-Bray.



What brought you to Minnesota? My husband and I moved from the Phoenix area to northern Minnesota where his parents had a seasonal business. We were looking to get away from the big city life. Moving from Phoenix where I had grown up to Longville Minnesota, population 191 was a culture shock for sure but I love it here and I can't ever see myself permanently leaving Minnesota.

When did you start with Mann Lake and what was your first position with them? I moved to Hackensack when I got the job at Mann Lake in July 1995, I started as a temp in the Sales Department. I took phone orders and also handled the Customer Service calls righting any wrongs that occurred with orders and also managed our dealer program.

Throughout my years here I've been fortunate to have had the chance to experiment doing different jobs throughout the company. I've always done sales at some level but when we found ourselves without someone to do the advertising I kind of fell into that position. I'd never done any desktop publishing or graphic design. It was the dawning of the digital age and everything was changing. Stuart Volby (Mann Lake's COO) asked if I'd consider doing that job so my thought was "I don't want to let them down so I'd better figure it out." So I did, I think I even surprised myself to be honest.

What is your position now and what has the journey been like getting to where you are now? I still get to do sales when I do the beekeeping meetings at the local/state/regional and national levels, I love the traveling and getting to know the people who attend. My main priority is all things advertising. Catalogs, print ads, product packaging and the website are all handled by my department. I also enjoy doing product development.

How do you see things changing for you in the next five years at Mann Lake? I can't even begin to guess, I work in such a fast paced and ever changing environment I never know what tomorrow will bring.

What do you enjoy most about being part of the Mann Lake family? I love watching us grow and expand. It's exciting to be a part of that.

Thanks, Brenda. I'm sure we'll see you in January at one of the big meetings.

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A Closer LOOK

VARROA MITE ORIENTATION

Clarence **Collison**

Studies of Varroa destructor orientation to honey bees were undertaken to isolate discrete chemical compounds that elicit host-finding activity.

Female *Varroa* mites parasitize both adult bees and bee brood, but only reproduce in capped brood cells. Therefore, the mites have to leave the adult bees and invade the brood cells. Between reproduction periods in capped brood cells, female mites are phoretic (an association between two species in which one transports the other) on adult bees for a variable period lasting a few days to several weeks (Boot et al. 1991). Both worker and drone cells are invaded by the mites, but in drone cells reproductive success is higher than in worker cells (Fuchs 1992; Boot et al. 1995a). More adult offspring are produced in drone cells compared to worker cells. *Varroa* mites selectively parasitize honey bee larvae within a narrow time window: 15-20 hours before brood cells are capped for pupation for worker larvae, and 40-50 hours for drones (Boot et al. 1992). The mites also prefer to infest drone brood cells, which are eight to 12 times more readily parasitized than worker brood cells (Fuchs 1990; Boot et al. 1995b). In addition, female mites exhibit preferences for adult bees of a specific age as mites readily abandon newly emerged bees and move to nurse-aged workers.

Drone cell preference is partly influenced by the properties of the brood cells. Larger cells contain higher numbers of mites. Cells protruding over the comb surface either naturally (DeJong and Morse 1988) or induced by partly filling them with melted wax (DeRuijter and Calis 1988) were shown to contain increased numbers of mites. *Varroa* mite infestation levels on worker larvae reared in elevated individual cells was 6-fold higher than in the adjacent six cells surrounding them (Kuenen and Calderone 2000). This differential infestation rate is similar to published values of higher mite infestations of drone cells compared to worker cells. Infestation levels in control cells were the same as in the surrounding cells. In contrast to infestation of these individually raised cells, mites invaded worker larvae in raised cells along the perimeter of a patch of raised cells (10 by 21 rows) 2.5 times more often than surrounding unraised cells, and similarly ca. 2.5 times more often than in the remaining raised cells (interior) of this patch. In similarly prepared frames of drone comb, mites invaded individually raised drone cells 3.3-fold more often than the adjacent surrounding cells and control cells. On the other hand, mites infested drone larvae in the interior of the raised-patch area as often as drones in raised cells along the perimeter of the raised-patch, and this rate was ca. 2.5-fold higher than for drone larvae in unraised cells surrounding the raised-patch and drone larvae in control cells.

"When compared with invasion in colonies with exclusively worker cells, Varroa mites invaded drone cells 11.6 times more frequently."

Rather than the shape of the cell, the time and construction effort needed for capping might be the relevant factor in determining the degree of mite infestation. In addition, stimuli from the larvae are involved. Drone comb preference was not influenced by the number of infesting mites or the absolute number of available cells (Fuchs 1990).

Invasion of *Varroa* mites into honey bee brood cells was studied in an observation hive, using combs with cell openings at one side only. The cell bottoms had been replaced by a transparent sheet, through which mites were clearly visible after invasion into a cell. Mites invaded worker cells from 15-20 hours preceding cell capping, whereas they invaded drone cells from 40-50 hours preceding capping (Boot et al. 1992). The larger number of mites generally found in drone cells, when compared to worker cells, may be partly due to the longer period of mite invasion into drone brood.

Invasion of mites into drone cells of honey bees was studied in colonies without worker brood. The probability for a mite to invade was dependent on the brood/bees ratio, which is defined as the number of drone brood cells capped per kg of bees. When compared with invasion in colonies with exclusively worker cells, *Varroa* mites invaded drone cells 11.6 times more frequently. This suggests that the biased distribution of mites over drone and worker cells in colonies with both types of brood cells results predominantly from the higher rate of

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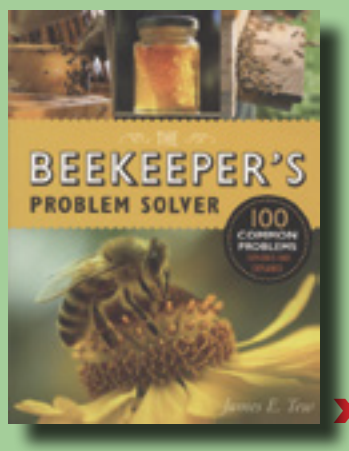

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invasion into a drone cell per se, when compared to that into a worker cell (Boot et al. 1995b). Since the rate of invasion is high in drone cells, a trapping method using drone combs may be very effective in controlling *Varroa* mites. When no other brood is present, 462 drone cells are estimated to be sufficient to trap 95% of the mites in a colony of 1 kg of bees.

In colonies of *Apis mellifera carnica* infested with *Varroa jacobsoni*, the invasion of worker brood cells and drone brood cells by reproductive female *Varroa* mites were studied (Fuchs 1990). In 68 choices between brood combs of both cell types, the infestation of mites per cell was, on average, 8.3 times higher in drone brood. This drone cell preference was not affected by the infestation level. It was more marked if drone brood was rare and it decreased toward the end of the drone rearing season.

Studies of *Varroa destructor* orientation to honey bees were undertaken to isolate discrete chemical compounds that elicit host-finding activity. Petri dish bioassays were used to study cues that evoked invasion behavior into simulated brood cells and a Y-tube olfactometer was used to evaluate *Varroa* orientation to olfactory volatiles. In Petri dish bioassays, mites were highly attracted to live 5th instar worker larvae and to live and freshly freeze-killed nurse bees. Olfactometer bioassays indicated olfactory orientation to the same type of hosts, however, mites were not attracted to the odor produced by live pollen foragers. The odor of forager hexane extracts also interfered with the ability of mites to localize and infest a restrained nurse bee host. *Varroa* mites oriented to the odor produced by newly emerged bees (<16 h old) when choosing against a clean airstream, however in choices between the odors of newly emerged workers and nurses, mites readily oriented to nurses when newly emerged workers were<three hours old. The odor produced by newly emerged workers 18-20 h of age was equally as attractive to mites as that of nurse bees, suggesting a changing profile of volatiles is produced as newly emerged workers age. Through fractionation and isolation of active components of nurse bee-derived solvent washes, two honey bee Nasonov pheromone components, geraniol and nerolic acid, were shown to confuse mite orientation. Pernal et al. (2005) suggested that *Varroa* mites may detect relative concentrations of these compounds in order to discriminate between adult bee hosts and preferentially parasitize nurse bees over older workers in honey bee colonies. The volatile profile of newly emerged worker bees also may serve as an initial stimulus for mites to disperse before being guided by allomonal cues produced by older workers to locate nurses. Allomones are chemical substances produced and released by an individual of one species that affect the behavior of another species to the benefit of the originator but not the receiver. Fatty acid esters, previously identified as kairomones for *Varroa*, proved to be inactive in both types of bioassays. Kairomones are chemical substances emitted by an organism which mediates interspecific interactions in a way that benefits an individual of another species which receives it and harms the emitter.

Several bioassays have been used to test the orientation behavior of the mites to semiochemicals. The activity of contact-chemoreceptive compounds has been examined using simple Petri dish or glass plate assays (Kraus 1993, 1994; Rosenkranz 1993; Zetlmeisl and Rosenkranz 1994; LeDoux et al. 2000; Nazzi et al. 2001; Calderone and Lin 2001; Aumeier et al. 2002; Calderone et al. 2002). These studies have established that mites orient to the stage-specific odor differences of live hosts, and that their movement can be arrested by blends of host cuticular compounds or larval food. Other researchers have employed a semipermeable membrane as a bioassay arena to evaluated the locomotory behavior of *Varroa* (Rickli et al. 1994; Donze' et al. 1998), revealing that mites are readily arrested by combinations of straight-chain hydrocarbons or primary aliphatic alcohols and aldehydes derived from extracts of larvae or cocoons.

The detection of airborne host volatiles by the mite also has been examined using several techniques. Le Conte et al. (1989) used a four-arm olfactometer to show that *Varroa* preferred to orient to the odor of live drone larvae, drone extracts and the fatty acid esters methyl palmitate, ethyl palmitate and methyl linolenate. Rickli et al. (1992) found that mites on a servosphere walked in straight paths confined to airstreams containing the odor of live larvae, adults, larval extracts or palmitic acid, but exhibited only a weak response to methyl palmitate.

Chemcial components of honey bee pheromones also influence the host-finding behavior of *Varroa* mites. Using wax tube choice tests and a Y-tube wind channel, Kraus (1990) demonstrated that the odor produced by honey bee sting glands, and most of the individual components of alarm pheromone itself, were highly repellent to mites. Hoppe and Ritter (1988) used simultaneous choice tests to show that the preference of *Varroa* for different ages of adult bees might be explained by the repulsion of mites to Nasonov gland odor or one of its principal components, geraniol.

Varroa mites are attracted to its major prey, drone larvae, by methyl and ethyl esters of straight-chain fatty acids, in particular methyl palmitate. These esters were extracted from drone larvae with n-hexane and were identified by gas chromatography-mass spectrometry. Their behavioral effect was evaluated with the use of a four-arm airflow olfactometer (Le Conte et al. 1989).

Varroa mites exhibit preferences for adult bees of a specific age as mites readily abandon newly emerged bees and transfer to nurse-aged workers, generally three to 12 days old, over older foragers (Kraus et al. 1986; Le Conte and Arnold 1987; Kuenen and Calderone 1997). With no known optical system (Bruce 1997), *Varroa* must rely on non-visual stimuli for orientation to specific larval and adult hosts. Within the environment of a honey bee colony, semiochemicals appear to be likely candidates for these cues. One alternative for controlling *Varroa* may be through the use of semiochemicals that either disrupt the normal host-finding behavior of the mite or to attract and trap a portion of the mite population within a colony. The high degree of host specificity exhibited by *Varroa* suggests that kairomones are used by mites to locate and parasitize larval and adult hosts (Pernal et al. 2005). BC

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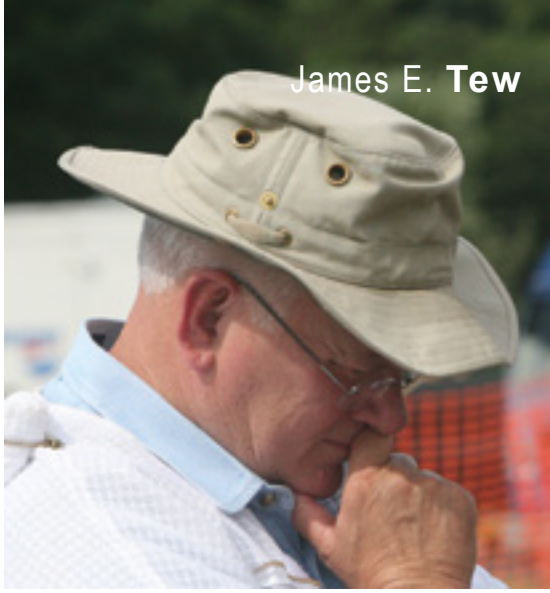
Beeyard Thoughts



Microfiber towels and small hive beetles
Some useless comments about the iconic hive smoker
J. Tew novice – Vaporizing oxalic acid
Field testing an experimental beehive heating system
Goldenrod – is it the real deal?
For the Brand New Beekeeper (Are screened bottom boards necessary?)
Odds and Ends[1]

Microfiber towels and Small Hive Beetles

Somewhere within the past decade, I was innocently introduced to microfiber cloth. I have no memory of my first use of these towels. It was uneventful. Today, these towels are widely used in the automobile detailing and cleaning industry, but this synthetic cloth, made from fibers with a diameter far smaller than the diameter of a human hair, can be used to make everything from basketballs to Sunday suits. The polishing cloths have an odd feeling and seem to cling to my hands and fingers. While not an unpleasant feeling, I can say that it is a slightly weird feeling.

One of their many uses is a dry polish cloth. I use them on many everyday items. I polish the screen on my phone. I clean my eyeglasses with them. I wipe my grandkids fingerprints from my computer screen. Occasionally, I actually use them for one of their original purposes – cleaning automobile windshields. Until I was recently introduced to the idea at the 2015 fall meeting of the Alabama Beekeepers Association, I had never thought about using them in a beehive.

An entourage of beekeepers brought Larry W. to show me a procedure he has used that seems to work. He puts strips of microfiber cloth on the top bars of his beetle-infested hive and checked them occasionally. Interestingly, in addition to trapping a few bees, he trapped a LOT of beetles. He said that this was not specifically his idea. He thought that he had seen a posting on Facebook (or some other social media posting) where this idea was entertained.

While I love the simplicity of the idea, the fact is that we only know the cloth caught some beetles and a few bees. We don't know how many beetles were unaffected in the colony. We don't know how many cloths to use or precisely where to put them within the hive. Some thought was given to putting them on the bottom board, but there was concern that they would capture too many bees. Put pieces in the corners of the inner cover? Maybe put some along the edges of the bottom board? Probably use them in conjunction with other beetle traps – right? While this may or may not work out, the procedure is simple, non-toxic and cheap.

I originally thought that when the cloth was finished, it could simply be burned in the smoker. DO NOT do that. When burned, this cloth emits toxic vapors and will readily burn. Other than tossing them in the trash and not using them for smoker fuel, can anyone think of a use for cloths that look like the one pictured?

(Thanks, Larry)

Nice smoker article, Jim T.

Jim Thompson, who is very nearly my neighbor, and a beekeeper I have known since 1978, wrote a great article in the October 2015, *Bee Culture* magazine. This smoker device and the inimitable straw skep (which US beekeepers rarely ever used) are acquired trademarks of the bee industry. Jim T. did a beautiful job showing the development of these bellows-driven canisters to the bellow-driven models of today. While smokers have changed, the function of smokers has not changed much.

Simply stated, we cannot routinely work our colonies without a dependably fired smoker. I truly wish that were not the case. In reality, these devices are obnoxious and smelly – and they always have been. Too often, they are the cause of fires.

A small hive beetle trapped in microfibers.

[1]For increased clarity, all photos and a few others are posted at: **https://onetewbee.smugmug.com/November-2015-Bee-Culture;** Shortened URL: **http://tinyurl.com/Nov-2015-Bee-Culture**

They all work the same. A smoldering fire, deprived of oxygen, is given bottom air through a manually powered bellows. As the smoldering embers recover, smoke is presented until enough air is given to cause flames to develop. Stop giving air before that point.

After using a smoker for much of the day, my clothes, my truck, my storage barn, and I smell of bee smoke. Yes, you can mist them with sugar syrup, but if working multiple big hives quickly and efficiently, sugar syrup will not carry the day.

Since the earliest days of beekeeping, smoke has been used to subdue bees. I don't know how the process got its start. Long ago, beekeepers developed lists of local smoker fuels that characteristically burned the way beekeepers wanted. Long lasting embers and thick white smoke are two major characteristics of a good bee smoke source. To my knowledge, only occasional scientific curiosity has been allocated to the effects of various smoke sources on both the beekeeper and the bees.

After all these hundreds (thousands?) of years, we still do not conclusively understand the effects of smoke on honey bees. Untested, but accepted answers are the only ones we have, so we continue to pass them to new generations of beekeepers. For example, *"smoke masks the odors in the colony so the bees cannot communicate efficiently"*. I have no doubt that some aspect of this answer is true, but bees do have other stimuli for hive defense. After all these years of evolution, are bees still just completely incapacitated by smoke? So am I to assume that smoke to a hive is much like kryptonite to Superman?

Why does smoke work? *"It (somehow) causes the bees to engorge on honey in preparation for leaving the hive for a safer location."* If this were precisely true, when a bee-infested house caught fire, the colonies within the walls would engorge on honey and abandon the cavity – probably to hang on nearby trees. In those dreadful wildfires last Summer, were bees ever seen departing the forest area for safer locations? Anyone seen that?

Additionally, according to bee literature, all this departing and engorging fills them and makes them heavy so they can't sting as well – consequently, they are gentle and more easily workable. But during a raging fire? Hmmmm. In light of me not having anything else to suggest, I suppose so, but this answer is weak and undocumented. Are bees gentler during a heavy nectar flow because every bee is fat and well fed so they don't defend the hive as strenuously? Where's the survival value in that? Or could it be that more of the older bees are out on foraging sorties? I don't know.

I wish we could replace the smoker but just as with my tinnitus, there is no idea or plan on the hive horizon. Apparently, bee smokers will be with beekeepers for a much longer time. Possibly, just genetically selecting for bees that are extremely gentle might be a better solution for future beekeepers.

Oxalic Acid and J. Tew

Because it is the flavor of the month, I bought a vaporizer and some of the oxalic acid chemical from the bee supply industry. I have read numerous instructions and studied copious advice and warnings. As is often the case, the recommendations can show a serious amount of variation. My following comments are not intended to be viewed as recommendations, but rather a bit of a fearful confession from me as I prepared to use this product. *(Suppliers and beekeepers, give me a chance to get through this. I want this product to work).*

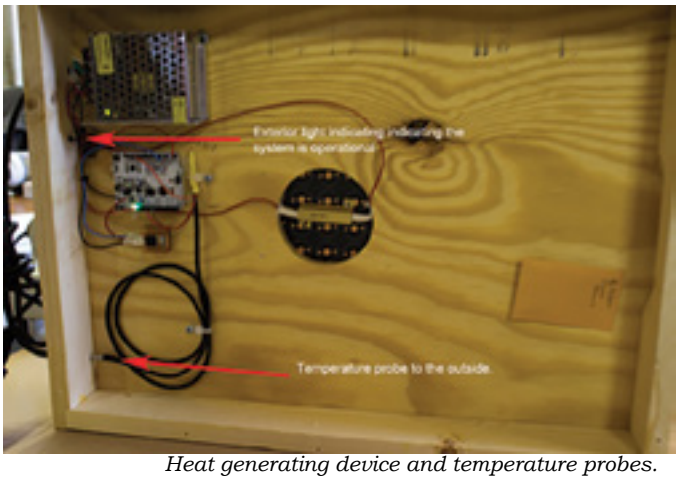
A small view of the beetles trapped on a microfiber cloth.

The list of *don't dos* on the MSDS information is formidable. Even so, the literature is extensive showing that this common natural acid will kill mites that are not protected within cells. I probably should have, but did not have these same concerns when I was using various other mite control compounds. When applying other compounds, I wore plastic gloves, and if possible, I did not breathe direct vapors (That was easy with applying formic acid. Breathing it was not as option.). Finally, I removed and discarded these earlier spent materials.

Not wishing to do harm or kill my bees, I have attempted some dry runs to see how this product works. I did this without a bee or hive in sight. I have not done and do not wish to do an evaluation of the various vaporizing devices. In the photo, the name shows but that is only because it was the only one available when I purchased mine. Even so, it does seem to be well made.

Yes, that is Jim Tew. Perpetually entertaining the neighbors.

Oxalic acid vaporizing.



Heat generating device and temperature probes.

Suiting up took me back to my earliest days of beekeeping. Full bee suit, gloves, veil and 125 feet of duct tape. As we all have done, over time, we slowly used the heavy protective equipment less and less. So here in my inaugural phase of oxalic use, I suited up. It's embarrassing, but have a look. Tell me this look is not the future of beekeeping!

I measured out the prescribed amount and attached the leads. For maybe two minutes, nothing, but then a wisp of smoke. Complete vaporization took only about five to seven minutes, but that is not science. I have only performed this procedure a few times. The instructions say to let it go ten minutes. I was surprised at the amount of smoke that it gave off. I did get minor whiffs through my respirator, and it clearly was not pleasant breath. It had the sensation I get when I get a whiff of formic acid.

I have experienced presenters coming to the Alabama Cooperative Extension System Spring Symposium next spring to discuss this topic. By then I look forward to having a bit of introductory Winter experience with this procedure.

Importantly, check your state regulations before using. Oxalic acid use for *Varroa* control is not yet approved in all states. I have posted a video showing the general function of the vaporizing procedure[2].

A heated bottom board prototype

A.M., a talented Alabama beekeeper who is also an engineer, has developed a heated bottom board prototype. He asked that I bring one to Ohio and use it during the Winter. I was eager to do that. It is only in the development phase and no doubt changes will be needed, but at least he has developed working prototypes. Even though A.M. said I could give some particulars, I think it more appropriate that he and I have a look this Winter and see how it goes. Out of respect for his ideas and time input, I have produced a photo that is slightly out-of-focus so that you can see the extent of his effort but not clearly see everything.

The top of the unit is clean and unobstructed. The temperature probe senses the air and determines the need for heat. The system is 120V reduced to 12 V. No matter what the results are, tinkering with this device will be enjoyable during the winter months.

Is goldenrod the real deal?

This discussion will probably get my rear handed to me in a bag. I know there are many varieties of golden rod and all varieties in all places do not exhibit the same nectar flow characteristics.

Regardless, my goldenrod is now gone for the season. The aged plants are still there, but they are giving it up for the upcoming Winter. As is so typical (even enjoyable), just a few weeks ago my apiary was filled with the aroma of goldenrod nectar coming in.

But here's my question. Yes, there were bees on goldenrod surrounding my apiary, but not by the thousands. I boldly told new beekeepers last month to enjoy the Autumn experience, but something nags me. To make a surplus honey crop with an aroma that fills the surrounding area shouldn't there be thousands of bees rather than just the few hundred that I observed. Not just this season, but for many I have noted how many other insect species were all over the plants, but only a modest number of honey bees. Other Asters or other plants are involved. How much?

Just a week or so later, white aster[3] was very attractive to all kinds of insect foragers. I wish I had looked at it during the goldenrod bloom – maybe it was not in bloom then. I sense that it must be from goldenrod. Maybe since there is so much of the bloom available and a limited supply of honey bees, the actually number on any plant is minimal. But, the same is true of the abundance of White-Heath Aster. Honey bees are buzzing all over this plant's blossoms. I made a video that I posted elsewhere[4]. Next year, I will be on this a bit more.

[2]**https://youtu.be/RSJyxl4M97g**; Shortened URL: **http://tinyurl.com/Oxalic-Vaporizer**

[3]White-Heath Aster Aster pilosus

[4]**https://youtu.be/joln-hh7kP0**

Shortened URL: **http://tinyurl.com/Aster-Bees**

Heat generating device and temperature probes.

For the Beginner – Screened bottom boards

I have never been wild about screened bottom boards, but they seem to be here stay. They play a minor role in *Varroa* control, but they do plan a role. They can be seasonally opened or closed. The tray can be useful when assaying mite populations that drop out due to a treatment or natural fall.

They are lightweight and, in my opinion, are not heavy enough for frequent hive moves. I can give them an "ok" but I cannot say that they are absolutely critical for *Varroa* control. If you see either at an estate auction or in the want ads, buy it if the price is right. Either style of bottom board works the same. I can't eagerly recommend that the screened bottom board should be exclusively used. You decide.

White aster, a smorgasbord for insect foragers.

Odds and Ends

Beekeepers have always been innovators. Hardly a century ago, the apicultural, academically trained bee scientist was only an infant. Insightful innovators –educated, but not specifically scientifically trained beekeepers – were the developers of our industry. A.I. Root, C.C. Miller, Doolittle and oh so many more laid our foundation.

I enjoy describing the efforts of clever beekeepers – even if some of their efforts are unsuccessful – as they try to improve our relationship with the bees. I have described a couple in this month's piece. A few issues ago, I asked about hive stands and received numerous descriptions and photos. Modern beekeepers are currently in the best position to be clever and creative. Exploratory beekeepers are a critical aspect of our evolving industry. They address the topics that specifically search for answers to the issues of today's beekeeper. Good Job! BC

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

COLONY DEVELOPMENT PART III

Queens

Larry **Connor**

Before obtaining the first bee colony, the future sustainable apiculturist must master key aspects of bee biology. Here we look at the activities of queen bees.

Queen Bee
Queen Activity, Behavior and Lifespan

When everything is working in a colony there is usually just one queen bee. This queen is a female bee that has been selected by her sister bees and is the only female bee that is fully reproductive. The queen is sexually active during the early part of her life, mating with multiple drones before spending the rest of her life laying eggs.

Worker bees feed and groom the queen, as well as take care of her waste products. She produces odors, chemical signals called pheromones and which we also call the 'queen substance' or 'queen signal'. There may be a link between the number of eggs a queen lays and the amount of these chemicals she produces.

Who Decides Queen Activities?

New beekeepers often assume that the queen bee is in charge inside the hive, but she has no such power. In fact, the queen is chemically reactive to the needs of the entire colony. Queen feeding, waste removal, and her eventual supersedure replacement are all the results of the collaborative decision-making nature of worker bees. These decisions are based on chemical information (feedback) the bees receive from the body of the queen. She also produces eggs that hatch into larvae and pupae. This is the brood. Both open and sealed brood influence worker bee behavior. The queen decides very little.

Developmental Time and What it Means

Queens are one of two female castes of bees found inside the hive, the other caste being the worker bees. Queens and worker bees develop from apparently identical eggs that are deposited into cells by their mother queen following successful mating with multiple drones. These eggs have two sets of chromosomes, making them diploid individuals. Worker bees are unable to mate and, in queenless and broodless situations, produce eggs with a single set of chromosomes. These become drones. Both queens and worker bees produce haploid bees.

Queen bees have the shortest developmental time, running 15.5 to 16 days from the time the egg is placed into the cell to the new queen's emergence from her queen cell. Some strains have shorter developmental times; African queens are known to develop in just 14 days.

Once a queen emerges from the cell, she will feed herself and is fed by nurse bees inside the hive. After a week or so, the queen will make orientation flights, then mating flights, coupling with 12 to 20 different drones. After several days of grooming and feeding by nurse bees inside the hive, the queen will start to lay eggs into worker cells which have been emptied and polished by the bees in the brood nest. Once she begins laying eggs, the queen does not mate again. Any shortage of sperm will not be corrected, and the fate of the queen, and her hive, is set.

In Nature, old and inferior queens are replaced through a process called supersedure. This happens when the queen's pheromone and brood production drops to about half of its normal level. Then several larvae are selected, their cells are enlarged, and peanut shaped queen cells are built on the surface of the comb. There are three to nine supersedure cells produced in the average colony, and these cells may be located anywhere on the surface of the brood frame. The production of queen cells requires the contributions of many worker bees. Nurse bees are required for the production of royal jelly, the substance key to the development of new queens. Other bees are concerned with temperature stability to ensure proper queen development, wax secretion and cell building.

Mating, Egg-laying and Sperm Storage

Queens and drones fly on warm and calm afternoons to Drone Congregation Areas (DCAs) where the queen is receptive to the many drones that follow the queen's pheromone plume and dark form against the sky. DCAs may be located anywhere around an apiary, and can be found by careful tracking with helium balloons or kites or radar and lures containing queen pheromone. Mating occurs 50 to 150 feet off the ground, and are thus rarely seen by humans. These are often associated with geographical 'edges.' Tree lines near

a field, bottoms of hills, openings in heavily wooded areas and the like.

Once laying, queen bees in the wild produce about 150,000 eggs per year and depend upon two large ovaries that nearly fill her abdomen. The ovaries are made up of about 370 thin tubes called ovarioles that produce eggs on a continuous basis. In the peak of the season, a queen will produce about 1,500 or more eggs per day. Favorable weather, food supply and genetic programming stimulate her productivity. Reports of queens with egg-laying rates of 3,000 eggs per day may be a reflection of a second queen in the colony (a mother queen and her supersedure daughter, an event that occurs in over ten percent of vigorous spring colonies.)

Sperm are stored at the end of the queen's abdomen in a clear, fluid-filled sac or sphere located called the spermatheca. This structure is covered with a fine network of breathing tubes, called trachea, that bring oxygen to the sperm stored there. The spermatheca floats in the blood (called hemolymph) of the queen and receives constant nutrition. The spermatheca holds five to eight million sperm, but a failing queen may only have a few thousand sperm and are identified by drone cells within the worker brood pattern in the hive.

Research has shown that when the queen finishes her reproductive flights, her median and two lateral oviducts are filled with sperm. The nurse bees massage her body and remove the surplus sexual fluids, while about 10 percent of the sperm successfully migrate through a spermathecal duct into the spermatheca. In one to four, days the queen will begin to deposit eggs into worker-prepared cells.

Longevity of Queens

Some queens only live a few weeks before the worker bees decide – for reasons we do not completely understand – to replace her with another. Sometimes queens stop laying eggs after several days, and no queen cells are produced from the eggs and larvae in the hive. Other queens produce a good brood pattern for several weeks before the colony replaces her with a daughter.

Once a queen is well-established in a hive, we expect her to remain there for a year or more. Reports of older queens are common, some as old as five years. Commercial beekeepers usually replace queens once a year or once every two years in non-migratory, northern operations. Small-scale beekeepers often keep queens in a hive for a longer time period if the queen continues to perform well for the colony. Bee breeders attempt to select queens that maintain egg laying for as long as possible in an attempt to select for genetic longevity within the bloodline. With selection, breeders keep productive queens for five years.

Behavior of Queens and Workers

As queen cells develop, the fully formed adult queen confined inside the queen cell produces some of the chemicals that make up part of her queen substance (pheromones). Worker bees surrounding the queen cell to keep it warm and remove the wax tip of the queen cell to expose the silk cocoon tip. It is widely thought that the workers will keep these cells under close surveillance, monitoring the development of the queen inside the cells. When the queen is ready to emerge, she will use her sharp mandibles to cut her way out of the cells. Almost immediately, she will move to other queen cells, her sisters, and chew a hole into the side with her mandibles and sting the queen inside the cell. Worker bees do not interfere with this behavior, but will remove the dead queen and her cell.

Sometimes supernumerary queens are produced in a colony and held hostage inside their cells until the bees determine the proper time for their emergence. The worker bees add beeswax to the incision the queen makes to cut herself free from the cell. While preventing her emergence, the workers carefully feed such queens to keep her healthy.

Newly Emerged Queens

After a newly emerged queen has finished killing her sisters, she moves rapidly over the combs. She does not produce as much pheromone as she will when she is a laying queen and, for the first twelve hours or so after emergence, her odor level is quite reduced. After 12 hours her queen substance production is enough for the workers to respect her as an unmated queen and to attract drones to her in the DCA for multiple mating.

Some beekeepers try smoke, strong odors and other techniques to introduce virgin queens. These may work under certain conditions but, as a general rule, virgin queens should be introduced in a queen cage with a candy release plug. This candy can be a mixture of honey and powdered sugar or common baking fondant. Virgin queens are able to fly and may escape while being handled, unlikely to return to the hive. Though a virgin queen is unmated she is a queen and is producing the pheromones and she should be treated as a queen by the hive. I place the virgin queen in a cage for three to five days before I allow the bees to remove the candy for liberation!

Virgin Queens at the Time of Mating

Worker bees may fly with the queen when she leaves for the mating flight. I have not learned of a reason for this mating swarm, but it is common in other social insects – perhaps it is a method of increasing security against predators. Back at the colony, there is a change in the behavior of the house bees while mating is underway: where bees had been storing pollen and nectar, they remove these products and polish them as a place for the queen to lay. Even the sharpest-eyed beekeeper may not be able to find the virgin queen before her abdomen starts to swell with egg laying (This is a hormonal response to the mating process.) Once mated, there should be a large area of polished brood cells for the queen to use. From the time of the last mating flight to the first eggs, queens may require one to three days for the hormonal changes and heavy feeding by workers to stimulate egg production.

Newly Mated Queens

From the time she emerges from

her queen cell, it takes at least four weeks for a queen to fully mature, mate and start to lay. During this month-long period, it is possible to disrupt the delicate balance between the queen and her colony (remember, these bees are not her daughters but usually sisters). If the queen was introduced to the colony from another hive, she may not be genetically related to the queen and the balance is even more fragile. There are reports of poor introduction and early rejection of queens introduced into unrelated stocks, like putting a Russian queen into a yellow Italian hive. There are undoubtedly genetically determined variations in pheromone production, as well as key queen behaviors that worker bees monitor which we know very little about.

Laying Queens

Once established, a queen only needs to be checked every three or four weeks to make sure she is doing her job. I like to have a queen that is clipped and/or marked so I am able to confirm her bloodline. If you find eggs and young larvae and a nice brood pattern, you have seen evidence that the queen is doing her job. This means you do not need to see the queen on every inspection! For many small-scale beekeepers some colonies may only require a queen check once or twice a year; commercial beekeepers rarely check their queens.

Grand Old Ladies!

Many beekeepers develop favorite queens and want to keep them forever. Other beekeepers want to have a set schedule of queen replacement. I view older queens, those two years or older, as Grand Old Ladies. In breeding programs older queens get special respect when they continue to produce a quality brood pattern and a gentle, productive, winter-hearty hive in their third and fourth season. She can be converted over to drone production if she is not used for grafting to introduce longevity traits in your apiary – stock development is a never-ending challenge in beekeeping.

Sometimes beekeepers move older queens into smaller hives and keep an eye on them and use them for grafting. A two-deep five-frame nucleus is great for this. The older queen can be used to establish a five-frame nuc and then a super added as the colony expands. If the colony gets too strong, remove a frame of graftable larvae and give it to someone who is producing queen bees. This reduces the population of bees, spreads good genes to other colonies and keeps the older queen in balance with her reduced egg laying. Pull out frames with supersedure cells and make increase hives with them to keep her genetics in your apiary. This is part of the Sustainable Art of Beekeeping that provides me with so much satisfaction. Letting these Grand Old Ladies die a natural death seems like a fair trade for a number of highly productive seasons. It has nothing to do with being a business person, but says a great deal about your appreciation of genetic diversity, longevity and productivity. BC

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The National Strategy To Promote The Health Of Honey Bees And Other Pollinators

What is it – smoke and mirrors or bountiful possibility?

M.E.A. **McNeil**

"It's a really rough world out there for bees," said Eric Mussen, UC Davis emeritus apiculturist. Our bees are just too weak. They are not healthy, not robust."

Eric Mussen (photo by Kathy Keatley Garvey)

"The average life of a colony is six months now," said beekeeper Bret Adee, who experienced the loss of 40,000 colonies over three weeks. It was "a big red flag. I started out with self-interest, but the more I learned, it concerns everyone – our children and grandchildren."

The guy who has been putting numbers to it, Dennis vanEngelsdorp of the Bee Informed Project, said, "The bees are not just dying during stressful times, they are dying all the time. What's shocking to me is that the losses in Summer, which should be paradise for bees, exceeded the Winter losses."

For years we have yammered on the same themes: Pollinators

Denis vanEngelsdorp.

deeply affect our lives – and vice versa. Honey bees are an index species, indicating the status of the environment. "Every third bite" is a research-based statement that, together with apocalyptic statistics, at last, has gotten public attention.

All the U.S. bee scientists – those who actually do peer-reviewed research – could be accommodated at a good-sized dinner party. A celebrated big money infusion for their work, the largest grant thus far ($5 million divided among 16 universities), would pay for some 20 minutes of the Iraq war.

These scientists, together with beekeepers have been crying uncle. And Uncle Sam has responded with a sweeping government-wide plan to take on the problem. If nothing else, it is huge. But is it wonderful? Humbug? Impossible? Far from enough? Best we can get? Whatever it is, by all accounts it is a federal mandate unique in its breadth, and it bears examination.

The genesis of the document is President Obama's June 20, 2014 Memorandum directing every department of government to come up with a pollinator plan. The Strategy came out over the signatures of the Secretary of Agriculture, Tom Vilsak, and the Administrator of the EPA, Gina McCarthy. Its goal is to "reverse pollinator losses and help restore populations to healthy levels" for the nation's struggling honey bee, native bee and Monarch butterfly. The butterflies are integral to the whole, but we'll talk bees here.

Gina McCarthy.

The plan envisions reducing honey bee loss to 15% in 10 years and adding seven million acres of wildflower habitat by 2020. To pull that off, a call has been issued for "all hands on deck". It will take considerable coordination for a crew consisting of federal agencies, state and local governments, universities, nonprofit groups and citizens to raise the sails – especially since everyone but the feds needs to opt in. At this point navigation is charted in two documents published in May: the *National Strategy to Promote the Health of Honey Bees and Other Pollinators*[1] and the *Pollinator*

Research Action Plan, which has sections on Habitat and Native Plant Development; Nutrition; Pathogens and Pests; Pesticides and Toxins; Genetics and Breeding; Economics; Collections; Models; Partnerships.[2]

Those without the time or fortitude to wade through the Strategy as well as the Action Plan's dense chapters and appendices could wonder: Is there a pony in here somewhere?

"There is a whole stable of them," said May Berenbaum, Professor and Head of Entomology at the University of Illinois. "There is very little a president can do on his own, but by creating this initiative for all agencies it is a brilliant idea. It is a substantive change in one fell swoop. It benefits pollinators across the board. This is achievable, affordable and doable, a great idea – not optimized but maximized."

May Berenbaum.

"What's important is the fact that this document even exists," said Christian Krupke, Associate Professor


Keith Delaplane

. . . consisting of federal agencies, state and local governments, universities, nonprofit groups and citizens

of Entomology at Purdue University. "As recently as a few years ago there was no admission that there was a problem. It's a commitment to huge, ambitious goals. I think it's a strong document."

"It's fantastic that we have a national Pollinator Strategy," said Claire Kremin, Professor of Conservation Biology and Entomology, UC Berkeley. "It's unprecedented."

"My take is positive," said Keith Delaplane, Professor and Honey Bee Program Director, University of Georgia. "These documents come around once in a blue moon. By necessity they paint with a broad brush – broad notions, key priorities."

"It is a great initiative," said Dewey Caron, professor emeritus, University of Delaware. "It is already off to a good start. There will be some innovative thinking coming out of this."

Dewey Caron.

"My overall impression is that it seems surprisingly balanced, said vanEngelsdorp, who, in addition to his role with BIP is Assistant Professor of Entomology at the University of Maryland. "It's surprising because of the number of pressures involved. It got the main drivers right – *Varroa*, nutrition, pesticides. And it is honest about the knowledge gaps. What remains is how to evaluate data."

"This has real meat," said Laurie Adams of the Pollinator Partnership. "Compare it to the strategies from England and France, which state only intent. This is specific, comprehensive – a great start."

"Now we need to do the work," said Krupke. "We are not going to make big changes but a lot of small ones. People looking for a quick fix are not going to get it. Honey bee research is very difficult."

"We are waiting to hit the ground running," said Juliana Rangel, Assistant Professor of Apiculture, Texas A&M University. "It's finally here. The researchers are anxiously waiting for funding to be defined. It's sad it's gotten to this point, but exciting that there is now momentum."

The 15%

"Winter losses down to 15% in 10 years: It's a great goal," said beekeeper Dave Hackenberg. "We were there before systemics. I've been running bees like this since I was in my 20s, and we didn't have these kinds of losses."

"We need an annual loss target," said vanEngelsdorp. "The 15% came out of asking beekeepers in the Winter Loss Survey. The 15% goal is doable."


Dave Hackenberg.

Now What?

Looming over the whole Strategy are some big if's. "The question is," said Caron, "Does it have legs? It is very ambitious, doable, reasonable, but it won't be done by doing business as usual. Is there follow-up?"

"They have put out enough questions to keep researchers going for decades," said Krupke "There is no shortage of competent scientists interested, but the funding rate for grant applications is 5 to 7%. A lot of good science is not funded."

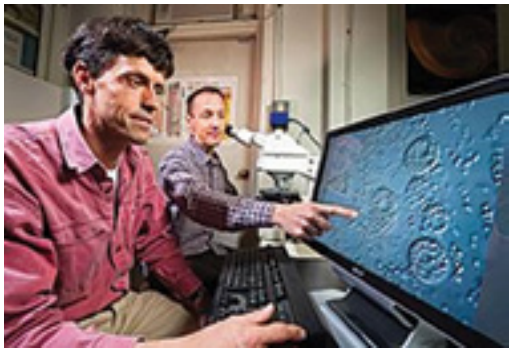
"How does this story unfold?" said vanEngelsdorp. "Long-term differences will have to be ironed out. It won't be perfect. How do we make it more perfect?"

Onward Into the Gaps

Dissent? Of course there is. "Every document from the government will fall short of what an individual stakeholder would write for himself," said Adams. "We still need to pick it apart page by page, but it is enough to drive change. Let's accomplish this much while we address what more has to be done."

Although some criticism reads like shots from the hip, much of it is valuable and well grounded – with points that will be covered as they apply to each section.

"We didn't identify all the gaps because we didn't know what's possible," said Jay Evans, Project Leader at the Beltsville lab, USDA-ARS (Agricultural Research Service, which oversees the bee labs). "This document reflects what we know so far – but there is more to be identified."



Jay Evans.

How It Came Together

At best, the Plan works from both ends: How to select or understand pollinator resistance to stressors and, from the other end, to reduce the stressors by examining more closely pesticide permits, increasing forage habitat and educating the public.

The Plan was created with multiple inputs. "Long before this presidential strategy, a lot of work was done in support of pollination," said Adams. Although the documents are government-written, many pollinator advocacy and environmental groups submitted memoranda of understanding. Researchers and NGO heads convened at a White House meeting.

The ARS follows a five-year plan, taking into account land-grant university research. "It takes two months of brainstorming," said Lilia De Guzman, Research Entomologist at the Baton Rouge lab. "Scientists come up with ideas, meet, present, and critique – especially methods." The current five-year plan provided a working base for Jeff Pettis, Research Entomologist at the USDA-ARS Beltsville lab, together with Kevin Hackett, USDA National Program Leader for Crop Production and Protection.

Jeff Pettis.

"We started by canvassing," said Pettis. "We spent a lot of time assessing what had been done and what we were missing. There was a lot of dialogue across agencies – some who haven't talked much."

"It was democratically done," said Evans. "It's not NASA, but the genome project [published in 2006] brought out consortium papers that were not that common before – field biologists, geneticists and others. This [Plan] was mandated to be written within the government, but we have all been collaborating. It is on purpose that there is no particular assignment for each goal. If there is someone better to do a task than a government agency, then we can turn to them."

"Teams form naturally, the ties come together," said Pettis.

The Strategy and the Action Plan came out less than a year after the mandate – lightning speed in government time, and in anyone else's, given the number of pieces to assemble. We have "things on paper that we have never had before," said Adams.

IPM

Because one observation was repeated in many of two dozen interviews for this article, it deserves comment. Although Integrated Pest Management (IPM) is mentioned in the Plan, it is not addressed as a viable alternative. It describes pesticide use as "a core component of integrated pest management (IPM) programs." The reverse is true: the core concept of IPM is the use of nontoxic methods first, leaving chemical treatment as a last resort.

"I think there is one major gap," said Kremin. "The stance of the whole Strategy itself doesn't question the continued use of pesticides. I quote, 'It is the misuse and overuse of these pesticides that leads to adverse ecological and human health consequences.' It's not questioning the actual paradigm of pesticide usage. A major research goal needs to be to find alternatives to pesticide use – promoting diversified farming systems, integrated crop pollination, natural predators, cycles of pests, crop rotation, habitat for natural enemies."

"Just not using pesticides is a question that needed to be more discussed," said Krupke. "It would've helped to have a section on that subject – on nonchemical agriculture. That is tunnel vision, and the document is not as diverse as it could've been. There is not a strong declarative statement whether there is any benefit from doing it this way. There are vague statements about IPM."

"This document assumes that pesticides are in the ballgame and we're going to find out how bad

they are," said William Quarles, a chemist who edits the Integrated Pest Management Quarterly. "But there is no alternative proposal."

"I am looking for change," said Berenbaum. "IPM was formulated in 1959. It was a great idea then, it is a great idea now – for the grower, the consumer. As a nation we seem incapable to understand the approach. There are so many forces allied against it. We are so American about this. A little is good, more is better."

"We have defunded extension," said vanEngelsdorp. "Those are the people who used to go out and count pests to say now is the time to use pesticides. Now chemical company reps do this and they have an economic stake. There is a whole network that needs to be in place."

"We're trying to educate beekeepers on IPM," said Rangel, because we are creating resistance to agrochemicals."

Jim Frazier, Professor Emeritus of Entomology at Penn State, was on the faculty of Mississipi State when IPM was developed there through consensus among biologists. At the time, cotton farmers in the state of Mississippi used more than half of the pesticides used in the nation. With an IPM program, a sterile male release all but eliminated the boll weevil in the U.S. "It's a great success story," he said. "In this [federal] proposal, IPM is ironic because treatment of seeds is not considered a pesticide application. The portion that goes into the plant is there all season long, which is the maximum way to develop resistance – the opposite of IPM. It is long known when insects create resistance to one pesticide, often a cross resistance to another is created. It's is biological suicide, a huge disconnect between reality and policy. Ag/chem dismisses this, the consequences be damned. It's completely biologically stupid."

Jim Frazier

"A major research goal needs to be to find alternatives to pesticide use – promoting diversified farming systems, integrated crop pollination, natural predators, cycles of pests, crop rotation, habitat for natural enemies."

"We have to really rethink the way we do agriculture," said Mark Winston, Professor of Apiculture and Social Insects at Simon Fraser University.

Goals for benign replacement of toxic chemicals can be found in the Plan. By any other name, they are the kinds of tools used in IPM, from breeding to bio controls – such as biopesticides and microbes as natural protectants being researched at the Tucson bee lab by Kirk Anderson, Lead Scientist, Molecular/Microbial Ecologist. These approaches could one day be front and center – such as the following one.

The Other Bees

The Strategy brings cautious optimism with its inclusion of native bees for study and support. An important IPM model is the attraction of native bees for a system called Integrated Crop Pollination (ICP). One large USDA funded ICP program looks at the status of native pollinators for major crops in 10 states – with over 40 species identified as pollinating apples.[3]

Kremin points out that an abundance of varied pollinators enhances pollination, and with almonds, the addition of native pollinators can double effectiveness. She is working on projects to plant hedgerows of native plants to support native pollinators as well as honey bees. Xerces is collaborating with almond growers and has thus far planted miles of hedgerows and acres of cover crop. Project Apis m's Seeds for Bees is a major contributor to that goal.[4]

What is known is that native bees are at greater risk from pesticide: "Honey bees have a kind of buffer system to process it," said Mussen. "But it goes directly to the native bees. That's getting the material straight, there is no buffer."

"We need a baseline population of native bees," said Neal Williams, Associate Professor and Pollination Ecologist at UC Davis. "It is a very expensive undertaking, with hours in the field and curating the data." The Action Plan states support for that goal, but it does not designate funding for any of the projects.

Krupke pointed out that pollinator habitat also provides a home for beneficial predators. Xerces has a biodiversity program to support beneficials such as the syrphid fly, wasps, beetles, spiders, assassin bugs, and damsel bugs – a little-heralded support team for a healthy pollinator environment.

Neal Williams.

A Call to Arms

"This is coming down from the top," said Caron. "Now it is time for the community to come down."

To do that, community will need to, well, communicate. There are divergent views to be dealt with.

"Partnerships is the area I am the most troubled about," said vanEnglesdorp. He is no stranger to the process of bringing people together: To form BIP, he gathered highly guarded data from beekeepers and coordinated with nine universities, the USDA and APHIS (Animal and Plant Health Inspection Service). Even so, he said. "There are different segments – the beekeepers, chemical companies, farmers. It's a complicated problem. We need everyone at the table."

When The North American Pollinator Protection Campaign brought 140 concerned groups together, the conversation took work with a skilled facilitator, Marion Cox, to guide consensus among diverse points of view.

Partnerships are a goal of the Action Plan. Diverse and even unlikely comrades have already been mustered to the cause, like the American Society of Landscape Architects, General Mills, Haagen Dazs, Keep America Beautiful, PG&E, Pheasants Forever and Toyota.

Individual states are asked to be key players by coming up with their own Pollinator Protection Plans. Eight have plans in place or in draft form. John Scott of the Colorado Department of Agriculture said that crafting the Colorado plan was a resource intensive process. In most states, extension apiarists have been eliminated, and putting together such a plan could be challenging. Several are using the Mississipi plan as a template, some are staying with some kind of voluntary program like DriftWatch, some are doing nothing and most of those say they are waiting for instructions. Though not yet well defined, it appears some pesticide restrictions will be applied if a state does not produce a program . . . certainly an incentive to work together.

For example, Juliana Rangel reports that the draft Texas plan took some creative thinking. She worked with the Texas Department of Agriculture, Farm Bureau, pesticide application people, a seed company and the manager of landfills. When each landfill is full, it is covered with earth and closed off for 30 years; arrangements have been made to plant those areas as pollinator food resources. "It's more collaborative now," she said.

The Pollinator Stewardship Council has created a U.S. map showing the status of such state plans throughout the country.[5] The EPA proposes relying on the state plans for voluntary participation of beekeepers and applicators to reduce risks to bees from harmful pesticide exposure.[6] "The EPA has turned over enforcement to the states, but it's not working," said Hackenberg.

"Now is the time for beekeepers to get involved at the state level," said Adams. "[They can create] local revision of what can happen by speaking up."

The Seven Million Acres

The most headlines and positive support has gone to the plan's goal to create seven million acres of pollinator forage – roughly the area of Maryland.

"That idea is extremely good, seven million acres," said Mussen. "It sounds like an extremely large number, but you have to remember a honey bee colony during the active season needs about an acre equivalent of forage plants daily to meet its nutritional needs. So we have two and a half, approaching three million colonies of honey bees in the United States. We'll eat up the food on those seven million acres."

All of the government departments are directed to plant for pollinators, with some managing vast amounts of land – like the Department of Defense overseeing 25 million acres and collaborating with the Pollinator Partnership for guidance. The grounds surrounding USDA Headquarters in Washington DC were dedicated as the first People's Garden, which expanded to a collaborative of over 700 local and national organizations creating community and school gardens. The Department of the Interior is preparing apiary permits for Bureau of Land Management lands by FY 2016. The Department of Transportation has a goal to reduce mowing, enhance native plantings and use minimal insecticides. The Department of State will plant flora local to international sites. Among projects already launched, the General Services Administration has a federal building in San Francisco with a green roof designed for pollinators. Interestingly, there are no pollinator landscaping requirements for Housing and Urban Development (HUD) funding.

Preparations for planting have long been underway. Pettis said that four five-year study maps of the Central States have been created by Matthew Sweet, as a post-doc at the University of Minnesota, to show the effects of land-use and its relation to nutrition for pollinators. Programs are in place for setting aside land in the Conservation Reserve Program (CRP), where farmers are compensated for pollinator plantings.

Among many published lists of

forage plants are those by the Xerxes Society,[7] the Pollinator Partnership[8] (with a Bee Smart Garden App[9]) and the USDA Natural Resources Conservation Service.[10]

Beyond these useful lists are deeper layers of inquiry addressed by the Action Plan. "We don't have much empirical evidence to understand what makes good forage," said Deborah Delaney, Assistant Professor of Entomology at the University of Delaware. "What do we plant and what is that based on? Because we see pollinators on it? Once we see what they collect, how do we know what they are using? Bees have been known to pack coffee grounds and sawdust, so is it the size of the grains and their ability to pack them? Color? Scent? There are timing differences, corolla tube differences.

Is it morphology? Getting baseline data is a lot more difficult in the field . . . I can say [from ongoing research] that different cultivars [of the same species] have significantly different attractiveness," but she emphasizes that more years of data are necessary.

"Most [forage] studies are in localized areas or with diets created in the lab," said Rangel. "What's missing is what happens in the open in various areas of the United States. Forage composition needs to be in a three mile radius and done every month in order to know if bees are foraging on the only plant available or selecting for high nutrition. Such studies take a lot of effort and money. They are difficult to do." She is working with citizen scientists and beekeepers to survey urban pollinator forage in Texas, Florida, Michigan and California.

Now to Plant It

The federal order is clear: Plant seven million acres. It turns out not to be so simple: There are flowers and then there are flowers. Schooling the reputedly intransigent Department of Transportation on the toxicity of rhododendrons honey may be the least of it.

The effort is national but focus is on the Central States, where about two-thirds of the nation's managed honey bee colonies spend the Summer and where Monarch butterflies migrate to and from Mexico. The USDA reports the availability of $4 million for pollinator forage planting on private lands.

"What we're up against is that much land is no longer available," said Neal Williams Associate Professor and Pollination Ecologist at UC Davis. "CRP land has gone to row crops – much of it."

"This program needs to segue with a huge number of variables," said Caron, "Government forest land, set-aside farm land, rangeland, railroad and highway right-of-way, tribal lands. Pollinators are just one more factor added to many established factors."

Then there is what to plant. "There are different viewpoints among those interested more in nectar or pollen," said Williams. "Seed mix development across the country is happening in various places, but it is not coordinated. NGOs, beekeepers, public institutions and government need to put together their information. It needs to be shared broadly. It needs to be different for different regions, even possibly local needs. Who is making the decisions? There are big players and everyone has his own agenda. I hope everyone can come to the table."

"There's a balance between the cost of seeds and what is attracted," said Caron. "There are weeds that honey bees love that are not normally a component of seed mixes. Sweet clover has become an issue in the Midwest because it is an invasive non-native."

Adee is among beekeepers who take issue with the exclusion of sweet clovers from the Central States seed mix because they are traditionally prolific nectar plants. He said, "Only native plants was the prevailing school of thought."

Mace Vaughn manages a team of Xerxes biologists that partner with USDA/NRCS (National Resources Conservation Service). Among their services are nectar plant recommendations, which they made for the Midwest. He said, "A big part of the work of Xerxes is to focus on native habitat." He sees the Midwest seed mix issue as an evolving balance. "Beekeepers want sweet clover because it produces high-quality nectar and the states don't want it because it is aggressive and has the ability to carry fire... Some clovers are not considered invasive – white and red."

Adee planned to plant about 30 acres on his land with the pollinator mix offered under the program, which has a subsidy of 50%. "We're very cognizant of cost. Their pollinator mix is over $400 an acre; even with the subsidy it would still be $200. It would cost $15 an acre with the subsidy to seed with clover. It is just too expensive to seed with the pollinator mix."

"Farmers need to get better value," said Vaughn. "Many studies are trying to hone in on it. We need much more work on cultivars." Xerxes is working with people at UC Davis, Rutgers, UC Berkeley and Michigan State on habitat restoration. "It will be a lot of work over the next decade."

"Cost was not primary in the NRCS seed mixes," said Williams. "They are entirely native plant materials . . . It is a goal to get the cost down. It's in our court to provide materials that are more robust and take account of all the stakeholders. This is a great opportunity to identify alternatives that are equally good for honey bees and native bees, mixes that are less expensive. I believe if we look we will find native species that meet both goals. The more broadly a seed is used, the price will go down with demand.

"These problems are not simple but they are not impossible. I feel really excited, and at the same time nervous. We don't know yet where these partnerships are going. Getting [the UC system] to the table to do things well will avoid mistakes, for example in plant selection. It is the universities that are studying plant mixes and evaluating invasives."

Power to the People

The Strategy invites innovative planting projects, and they have already begun. The National Pollinator Garden Network lists 38 organizations participating in The Million Pollinator Garden Challenge – a campaign to register a million public and private gardens and landscapes to support pollinators that was initiated by Michelle Obama.[11]

The Pollinator Partnership, together with the Burt's Bees Foundation is distributing seeds in the Bee Buffer Program to selected farmers, ranchers and land managers to plant pollinator forage in North Carolina and California, following up on the success of plantings and planning to expand the program to Ohio.

Citizen opportunities abound. "The contribution of forage in many backyards is not great, but it adds to the diversity of micronutrients," said Mussen.

The Great Sunflower Project has had over 100,000 participants logging pollinator sightings across the country.[12] The Xerces Society lists projects involving various pollinators: Among them are Bumblebee Watch, which gathers data throughout North America, as well as state programs.[13] Sam Droege, head of the U.S. Geological Survey, is gathering citizen-contributed photos of pollinators to help identify

undocumented species and offers a how-to video.[14]

Pathogens and Pests

Among priorities listed in the Strategy are to identify new diseases and explore the impacts of the bee gut biome. Evans is addressing bee pathogens together with Research Entomologist Judy Chen and a team at the Beltville lab. A new gut parasite studied there, Trypansome, is a one-celled animal that "looks like a fire plug with flagella," said Evans. "They affect nutrition and weight in infected bees and they impact on a level with Nosema."

As for bacterial species in the bee gut, he said, "Almost all seem to be performing a role. We are looking at which help nutrition, fend off disease or possibly trigger an immune response. [The bees] ingest them from the environment in the hive. We think the right set of bacteria will help bees against pathogens."

Varroa is at the top of the Action Plan's un-do list, with studies of mites, biopesticides, and resistance mechanisms in mites.

"We are collaborating on natural chemicals against mites," said Evans. "RNAi is feasible; it works in the lab but, it needs a lot of work for beekeepers to use it, and there have been no breakthroughs in a couple of years." With that work has come genetic sequencing of the mite and better understanding its development. On mite controls, he speculates that "It doesn't need to be a synthetic chemical, it might be an essential oil. [And] we have cultured out slow growing bacteria [from the bee gut] that attack mites one by one. It is a far stretch to say we can feed it to a colony and it will attack mites."

Rangel's lab is testing a bio-control agent, a small mite that, in vitro, eats *Varroa*. And she is alert to the possible importation of two problematical Asian species, the mite *Tropilaelaps* and the bee *Apis cerana*.

Pesticides and Toxins

"'Cide' means meant to kill," said Mussen. "No matter which pesticide a bee bumps into out in the field, it's going to have to turn on its detoxification system. There is energy going into that and sometimes they cave in" – to any of a number of stressors.

Among the Action Plan goals listed that address that problem are: Develop assessments for sublethal effects of pesticides, adjuvants and combinations of pesticides on managed and wild pollinators; determine field exposure of bees to pesticides by evaluating pollen, nectar, nesting materials and plant fluids; determine absorption, distribution, metabolism, and excretion (ADME) of agriculture chemicals in Apis and native pollinators.

At present, the EPA has no approved field condition test on honey bee colonies that the research community could critique and validate.

"I give that a gold star," said Frazier, who has done considerable research, not to mention battle, on the subject. "This is good research priority."

"In older days the bees came back to the hive and we knew they had been poisoned," said Mussen. "When the pyrethroids came along, they started to drop dead in the field instead. Now things have become even more subtle. It appears that if you test materials individually in bees in the lab, you don't see negative results, so we considered they were not really toxic. But it ends up in the stored food. As it is consumed by the colony and converted from pollen into bee food, we began to see these severe effects in the brood."

"It is good that we are going to move off of LD50," said Krupke, citing a measure long used for chemical approvals, the amount of toxic agent sufficient to kill 50 percent of a population of animals. "With that we had only two categories of bees: living ones and dead ones. This document is more rigorous, the questions are more rigorous. Woven into this document, the tiered system out of EPA is encouraging."

Quarles sounded a wryly hopeful note, saying that Gina McCarthy, the EPA head, "has a good reputation for using the Environmental Protection Agency for," and he shrugged, palms up in a gesture of mock wonder, "Environmental protection." But there is a lot for her to hear.

Frazier said that for research to move forward, bees need to be listed as an official nontarget species. Within the EPA, testing for aquatic life involves combinations of chemicals, so a product toxic to an aquatic food chain, starting at the bottom, is not permitted. In contrast, territorial research has dealt with one chemical at a time. "Although we have shown that formulation components can be more toxic than the main ingredient, the same rule does not apply because bees are not a nontarget species," he said.

"The EPA does not require efficacy, health and toxicity to nontarget organisms," said Delaplane. "The chemical works and efficacy is left up to market forces. In a study of one crop in the UK over six years, just published, half the time they are not efficient. How much are we wasting that's not necessary?"

"Farmers combine chemicals into a tank mix because of the cost of labor," said Caron. Realistically, registrants are not going to test the many possible combinations – surficants, energizers, stickers, penetrants."

"There are what, 400 active ingredients, and there is no way we can test all the combinations of them. What we need to do is look at and develop methods free of pesticides," said Kremin.

"Will this work be done by independent researchers? asked Quarles. "It doesn't say."

"The assessment of sublethal effects of pesticides," said Frazier, "Should be research priorities in academia. This has to be a wide-open research agenda. Given the current climate, putting it under the purview of the EPA and USDA guarantees that it will not be. At present, the EPA has no approved field condition test on honey bee colonies that the research community could critique and validate. The chemical companies do the testing and the testing is proprietary information."

"The chemical companies have by far the most resources for testing," said Krupke. "There is so much work that registrants have to be very much involved, and a lot, like protocols, are intellectual property. No one knows how the next phase will be done."

"We need independent science for

good policy," said Adee.

"The EPA itself has not done pesticide testing on bees," said Evans. "They are working on protocols." Would such protocols be public information?

The goal to quantify field-level exposures "is critically needed," said Frazier. "Getting the U.S. Geological Survey involved is a good idea. The USGS is doing by far the best studies on estimated pesticide studies in the US."

The goal to study ADME is important, he added, because it will help restore the role of biochemical toxicologists; the shift over the last 30 years has been toward molecular properties.

The Center for Food Safety, a Washington environmental group applauds the Task Force goals and asks to add: Closing the conditional registration loophole allowing pesticides to enter the market with limited review; and calculating the externalized economic and environmental costs associated with pesticide use. Krupke suggests that usage would likely drop significantly if farmers knew the true cost of treatments. "Every year at Purdue we run efficacy trials with all different tactics for managing pests for corn and soy, side-by-side with treated and untreated seeds. It is difficult to find yield effects."

"Neonic seed treatments are like taking a great step backward in history," said Delaplane. "We have 30-40 years of laboring in the trenches to develop IPM, and now we go back to the days of DDT. We have pesticides 24/7. They are useful compounds because they are systemic. They are dangerous compounds because they are systemic."

"The biggest issue is that we are dramatically overusing these compounds," Krupke said.

"Insecticide use is down according to chemical companies," said Adee, "But seed treatment is not classified as an insecticide and what they are putting out is a lot hotter and a lot longer in toxicity than products in the past; pesticide is four to five times more concentrated. The degradants of clothianidin are more toxic to bees than DDT was. They only look at the active ingredients."

Hackenberg said, "We have moved bees to pesticides and within weeks we see mite levels building up. An Australian beekeeper friend says, 'You have to take them to the bush.' Chemical companies see no problem in Australia, because there they have clean places to go. I tell him 'We don't got no bush'. We have no place to go to get away from the chemicals." Berenbaum's research shows that bees need a natural diet to detoxify – nectar and pollen.

On the other hand, the EPA labors with a problem of spotty reporting of adverse chemical effects on bees. The Plan asks for better information from beekeepers. That lack is reflected in Mussen's 35 years of newsletters from Davis, which repeatedly implored beekeepers to report incidents, with the problem being fear of losing pollination contracts.

"Of course pesticides are not adequately addressed," said Marla Spivak, Distinguished McKnight Professor and Extension Entomologist at the University of Minnesota, "But I'm surprised anything about pollinators was addressed, so I'll take it without complaints."

Pesticide Labels

Evaluating pesticide labeling might fall under the Plan's project to "assess effectiveness of mitigation measures". Some changes have been made and calls are out for more.

"The National Honey Bee Advisory Board (NHBAB)[15] struggled with the EPA for eight years," said Frazier. "They are now at the table. Labeling language is finally being addressed."

Adee, who is on that board, said, "At least they have changed the label from 'inert' ingredients, which are not at all inert, to note that they are not the primary ingredients."

Michele Colopy of the Pollinator Stewardship Council points out corrections that need to be made on pesticide labels, for example, those that say that bees will not forage at less than 55°F or after 3:00 p.m.

Hackenberg, also on the NHBAB board, said "We got hit with a pesticide called Delay, and the people apologized but they applied it according to the label. The chemical companies want the label vague and the Farm Bureau wants the label vague. It's a lot of paper that doesn't do anything. I've been at this for a long time."

Genetics and Breeding

"Breeding is central for bee health," said Krupke. Anyone who has looked into it understands that it is extraordinarily complex, and the Action Plan dedicates a section to it.

Among the priority goals are: Simplify means of selecting *Varroa*-resistant bees; enhance scientific methods for measuring resistance (eg phenotypes, proteomes and molecular markers); sequence multiple

Bob Danka.

honey bee stocks; promote the cryopreservation of bee germplasm. Tom Rinderer and Bob Danka, USDA Baton Rouge entomologists, were leads in creating that section in the Action Plan, and they emphasize that many contributed.

Bee importation is restricted by law to the USDA, and the Baton Rouge lab is the hub for bee breeding. The lab has a long history of seeking out better adapted honey bee stock. They imported the Yugo and Buckfast bee for resistance to tracheal mite. They scouted *Varroa* resistant bees in the Primorsky Region of Russia

in 1997, testing them for over a decade. After a process of selecting lines for favorable traits (mite resistance, honey production, grooming behavior) they worked with The Russian Honey Bee Breeders Association to maintain and propagate them for commercial release. "The stock has been well accepted in the beekeeping community," said Danka. "The downside is that there is much more demand than stock."

The Baton Rouge lab is "always collaborating with commercial beekeepers," said DeGuzman. Because the Russian bees don't breed early enough for almonds, she said that the lab found that buildup is enhanced by using eight frames instead of 10, as well as feeding pollen. There is also a commercial VSH [*Varroa* Senstive Hygiene] program associated with the lab.

"Standardized measure of VSH is a goal," said Rinderer. So far the

Tom Rinderer.

simplest means they have found for selecting *Varroa*-resistant bees is counting mites in 300 bees plus 200 brood cells on each of two sides of a frame. The procedure is done both early and later in the season. He said, "Doing an assessment on adults alone is more risky. We would like something that could be done one time." A candidate for the one-off test could be an assessment of older and younger mites fallen to the bottom board, with the proportion of younger mites an indication of a growing mite population.

For VSH behavior, "we'd like to be able to measure chemical stimuli," said Denka. "We don't know what they are. We can see low levels of mite reproduction with high VSH, but some colonies are different: There is some kind of brood effect. Somehow the mites are not getting the stimulus to reproduce. There is a lack of attraction of brood to mites, and a higher proportion of mites stay in the phoretic stage."

Plans are in the works at Baton Rouge for genetic sequencing of several lines of Russian, Italian, Carniolan, and VSH stock.

Cryopreserved honey bee germplasm will be added to the National Center for Germplasm Resources in Fort Collins, CO. Steve Sheppard, Professor and Apiculturist at Washington State University, has been importing semen from several honey bee subspecies. Through research of his doctoral student Brandon Hopkins, successful cryopreservation of bee semen is possible for the first time. Danka, Sheppard and Hopkins will work with industry to form the Center's required Species Committee to determine what will be preserved and how it will be distributed. Sheppard said, "Embryo freezing is a goal. Honey bee embryos are so much larger, relative to mammals, so it will not be simple". Even with semen, "One of the advantages of a repository is the possibility of screening germplasm for particular traits," adding that such selection of advantageous markers has been possible in agriculture for many decades. "We are starting like we are in 1956."

Collections, Models, Education

Those boxes of insects suspended on pins hold valuable information that the Action Plan proposes make available. Rosalind James, a National Program Leader at the USDA Beltsville lab, said, "Specimens collected from an experiment generate information for further work . . . We don't know much about the biology of wild bees. It is proposed to do DNA samples on insects in collections." The ARS lab in Logan, Utah, is working on bumblebees and alfalfa leaf cutters. "Alfalfa seed pollination is dependent on leaf cutter bees in isolation zones, so this needs to be modeled. For longitudinal studies the problem is that a colony lasts only a short time, so colony health can only be followed for a short time. The other way is landscape level epidemiology modeling." Two new ARS scientists will be based at UC Davis beginning next year to do longitudinal studies on bees with new funding from Congress.

"A model has been done in the U.S. for inside a honey bee colony", said Caron. "And a European model focuses on outside foraging. It would be good to put the two models together."

Creating models "is very complicated," said VanEngelsdorp. "BIP's job is to get as much correlative data as possible. We have five years of data, as was necessary to make a model. What's the unit? The bee, apiary, management? All models are imperfect. It's like predicting the weather. We don't even know what's normal. We need to map trends." The National Agricultural Statistical Service (NASS) will collect quarterly data to go into that model.

A stated Action Plan goal for modeling is effects of climate change on pollinators. The NASA project to track forage change by satellite and hive weight is now with BIP, which is networking with universities and citizen scientists with electronic scales.

Best Practices

Data driven information for determining beekeeping best practices is a goal of the Action Plan. BIP's Tech Transfer Teams, now in California, Minnesota, Florida, Oregon, Texas, can test for Nosema, *Varroa*, colony size, viruses, hygienic behavior, mite resistance to treatment (with live mites tested against products). New remote teams will train beekeepers to take and send samples.

A multistate project to develop sustainable bee management strategies, NC-1173, has brought together 30 universities, state cooperative extensions and the USDA/ARS to share technology and information with beekeepers, farmers, and other stakeholders through media, publications and programs. Pollen samples have been screened for pesticides, and miticides have been tested on bee health. Ecologists have identified management practices associated with high native bee pollination.[16]

What about the Money?

"The danger was to say what we want to do," said Pettis speaking of planning the Strategy at ARS. "But we can't ask Congress for money; we are the federal government. The farmer, landowner, the agricultural sector can ask. With the resources we have, this is what we are doing."

"We are always chasing dollars, always," said Delaplane. "The UK has a fraction of our population and has exceeded our annual budget for bee research." The Strategy will serve to direct grant applicants, he said: "Researchers for the next five to ten years can cite these priorities. The document has a lot of cred to it."

"There are lifetimes of work to be done," said Frazier. "If money was realistically matched to the size of the problem, we'd have a budget like the NIH."

Conclusion

This article offers a range of samples from the Action Plan and opinions that it has generated. Notably, it includes some strong critics of the status quo who are sounding hopeful – and watchful. So then, the answer to the title question is that there is bountiful possibility – with an emphasis on *possibility*.

"If we go through this document and nitpick," said Adams, "We will stay at our stalemate. Looking for perfection misses that this is a wave we can ride to make other things happen."

"I just hope we can push and deliver," said Pettis. "Some just laughed at our 15% in 10 years, but it used to be that way."

"There is nothing in the initiative that is not doable," said Caron. "There is no pollinator garden on the moon."

"When it was put together," said Pettis, "It was with the goal: Let's do this better." BC

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WOMEN IN BEEKEEPING

Michele **Colopy**

The USDA recently released a report on the impact of women in agriculture. Thirty-one percent of all farmers are women, or 969,672 women *farmers* who own 301,386,860 acres contributing $12.9 Billion to the agricultural economy.[1] In a rough survey of local, state, and national beekeeping groups women represented less than a third of leadership positions (officers and board members):

- national/regional beekeeping/ pollinator groups: 30.4% are women
- state beekeeping associations: 30% are women
- local beekeeping clubs: 42% are women

While, those numbers correlate with the statistics of women farmers, local beekeeping associations are beginning to include more women in leadership roles. However, still too often women in beekeeping are relegated to "refreshment wench," or "secretary" positions in organizations. (This outdated practice of ignoring women as leaders in groups exists in other associations as well, not just beekeeping.) A few beekeeping clubs still retain the very antiquated and separate "auxiliaries" for women in beekeeping. The "auxiliaries" focus on auctions, entertainment, and the "salves, soaps, and cooking." While "auxiliaries" still exist in a few fraternal and benevolent societies, it can be viewed as segregating membership, identifying some members as being "less than" other members, and restricting membership to a select few based on gender, race, age, experience, etc.[2] Members of some auxiliaries do have the opportunity to become full members when they reach a certain age, or "degree level." When an auxiliary is designated by gender however, limits have been defined.

Debbie Gilmore, President of Mason Valley Beekeepers.

What do women in beekeeping experience as beekeepers? I asked 12 women beekeepers across the U.S. about their experiences as a woman in beekeeping. Their personal experiences ranged from positive to frustrating. For example, the young women who participate in the Honey Queen program are and/or become articulate and charismatic spokespersons for honey and beekeeping. Whereas, a male beekeeping association leader stated he would run for Treasurer of his bee club, and have his sister do all of the work. Never thinking his sister could run for Treasurer, since she seems to be the one with the skills to do the job!

Women in beekeeping are supporting each other through mentoring, and encouraging women beekeepers to run for office in their local and state beekeeping groups. All of the women interviewed stated they ran for leadership positions in their beekeeping association (local, state and national level) because someone encouraged them to do so. Yet, in some associations, only certain positions are "open" to women, as president and vice-president "are always men," and that if a "woman held an officer position it would not be held for long."

I submitted questions to these 12 women beekeepers across the U.S. Ten responded, generously sharing their experiences. The women beekeepers comprised an average of 18 years of beekeeping, managing an average of 94 hives. These beekeepers rent their hives for crop pollination, breed queens, sell nucs, mentor other beekeepers, and are leaders in their local, state, regional, and national beekeeping groups. Three women, however felt a need to remain anonymous in order to contribute to this article due to their positions at the state and national level. I want to thank all of the contributors including Terry Lieberman-Smith, V.P. of Ohio State Beekeepers Assn., Debbie Gilmore, President of Mason Valley Beekeepers, Debbie Seib, Treasurer of Indiana Beekeepers' Assn., Beth Conrey, President of Colorado State Beekeepers, and WAS 2015 President, Eli Kalke, Fieldstone Farms, Caroline Adams, 2013 American Honey Queen, and Erin MacGregor-Forbes (the first woman Chairperson of EAS) for their time and insight for this article, and for their work on behalf of beekeeping.

Women beekeepers are similar to other beekeepers: they raise Italian, Carniolan, Russian, and survivor stock honey bees. They manage five to more than three hundred hives, by themselves or with their spouse. Debbie Seib became interested in beekeeping when she met her husband 29 years ago. Erin MacGregor-Forbes "stole her husband's hobby" of beekeeping. Beth Conrey became interested in beekeeping after reading articles written by beekeeper Tom Theobald in her hometown newspaper. For Debbie Gilmore beekeeping was part of the old family business. "Beekeeping has been in my family since 1918 when my Great Grandfather, who was a beekeeper, came to Nevada. The business was in my family until the 1970s when they sold their bees.

2013 American Honey Queen, Caroline Adams.

My husband, Andy Joyner, and I decided to get a colony of bees in 2007 to help with pollination of our and our neighbor's gardens." For Terry Lieberman-Smith she chose beekeeping "because unlike other agriculture "herds," they don't need 24/7 care."

These experienced beekeepers, who happen to also be women, expressed their thoughts about women leaders in beekeeping, the Honey Queen program, issues affecting the industry, and the challenges facing beekeeping in the next five years. All of the women interviewed have served as Honey Booth Chairperson, Vice President, Finance Committee member, State or Regional Association President, newsletter editor, secretary, and Board members. These women beekeepers were asked to join their respective bee clubs, or simply exclaimed at a meeting, "If you need my help . . ." As Terry stated, "if you have the vision and drive, you can help make the club a powerful influence in your area, and make a positive difference for beekeepers. If you just plan on keeping the chair warm, don't bother." Eli Kalke just wanted to support others who were working to move the association forward. She "wanted to help and make a difference, encouraging others to participate, and to give new energy and ideas." In that same vein, a woman beekeeper stated "I saw more could be accomplished and it could be done more efficiently, so I chose to run for the Board." Overall, current and prospective women beekeeping leaders were recognized for their energy, talent, and skill they could bring to their club and were asked to run for office, or simply jumped right in in order to make a change for the better.

All of these women give back to their bee clubs and their community through mentoring, club and conference presentations, and educational programs to school groups, garden clubs, and similar. They participate in their County and State Fairs through the association honey booth, and honey competitions. Terry did not "like how the jelly judge evaluated the honey categories in the county fair," so she worked with the Ohio State Beekeeping Association to have a Honey Judging Class. She is now the honey judge for a few counties. Another beekeeper stated, "I have openly received compliments from more senior beekeepers, and retired state apiarists, expressing their happiness seeing a dedicated fulltime female beekeeper. On the flip side I have not always experienced or been shown the same respect as my male counterparts." For a number of the women leaders, they have been instrumental at bringing the organizations into the digital age creating Facebook pages and websites, writing club newsletters, and generally utilizing electronic media to improve the communication among the club membership. Caroline Adams sums it up nicely, "I highly encourage clubs to encourage such involvement and to be open to their members' perspectives. As a young woman, it was a great honor to me to be active in my association's leadership and to collaborate with other leaders from varying demographics and backgrounds to better serve the needs of our club."

As beekeepers, what have been your biggest concerns/issues with your own honey bees? "As with everyone, mites have been a big concern. I think it does not matter if you have one colony or thousands, trying to keep bees healthy and alive is an ongoing concern. This year, Nevada has been in an extreme drought which has had a major effect on foraging for our bees. Timely rains in July helped with the nectar flow and honey production. I have also had to deal with bears. Three years in a row, we had extensive bear damage even with an electric fence. Bears are an increasing concern in our area and effective bear fencing is expensive." stated Debbie Gilmore.

Other issues of concern included migratory beekeepers bringing undesired genetics into an area, farming practices and crop rotation, the spraying of pesticides, especially herbicides reducing forage, and concerns over "thieves, vandals, and bears." For these leaders in the bee industry, another concern was time. "I'm so busy helping others, or working on two local clubs and the state club, that many times I don't have enough quality time to visit my 'girls.'" Only three of the women beekeepers rent their hives for crop pollination. The biggest concern was the exposure risk to pests and pathogens of mixing their bees with so many bees from across the country. The stress of pesticide exposure upon the beekeeper and the honey bees made crop pollination nerve-wracking. "Maintaining healthy bees within close proximity of other beekeepers, and "do nothing beekeepers" is a problem," exclaimed a woman beekeeper who does crop pollination.

All of the beekeepers were asked about the American Honey Queen program (AHQ), and a former Honey Queen was interviewed for this article. Comments varied, but in all, the young women in the program represent beekeeping well, benefit greatly from the opportunity to hone public speaking skills, and put a "face" on beekeeping. However, like "women's auxiliaries," the program can appear dated and sexist to women beekeepers, and limiting to young men who could benefit from the opportunities for education and public speaking through the program.

"The opportunities presented to these young women are obvious through their public speaking. However, beekeeping is more than cooking with honey. To me it shows the bee industry is stuck in the 1950s, with an antiquated view of the opportunities available to a beekeeper's daughter." stated a national beekeeper. The program is a bit of a 'throwback.' These girls are not, for example, allowed to wear pants. Ridiculous in 2015, I say. It just needs to focus on its core mission. Gender does not really make a difference if the mission is what matters. Concerning funding the state queen program one beekeeper stated, "My only disappointment

is during the annual conference live auction, it seems that each year fewer people understand the objective that all proceeds contribute enormously towards the funding of the queen program. Instead bidders are looking for a bargain by underbidding." "These young women are incredibly articulate and serve as excellent ambassadors for honey and beekeeping." "I think both young men and women are needed to be spokespeople for the industry, and are needed to inspire young people." "I believe the 'crown and sash' indicate and represent a tradition that may need to evolve into something different for our 'Youth Honey Advocates'. I think the outreach is valuable, but the context is dated and sexist. I would like to see this program re-vamped to be open to young men and women, and for the "beauty pageant" aspects to be downplayed or eliminated, and the "public speaker/advocate" aspects amplified."

The value of the Honey Queen program is evident from those who interact with these young women, and from their personal experience in the program. Caroline Adams, 2013 American Honey Queen was "amazed at the support I received, and the positive impact it had on my work as a spokesperson for the industry. Because I was invested as a young beekeeper, I am eager to continue encouraging and supporting beekeepers who are striving to make a difference in our industry. The Honey Queen/Princess program is a phenomenal program. By striving to involve young people in the industry, the program further evolves the face of beekeeping, leading to farther reaching education, and encouraging involvement across demographics.

I believe that all beekeepers (including young men) should be active in educational outreach and advocacy. As beekeepers, the well-being of the industry affects each of us on a personal level, and we all have a responsibility to invest in our future."

While, the Honey Queen program is viewed differently by women of varying ages and experience, Caroline Adams expresses well the benefits of the program and her experiences. Caroline participated in the AHQ program because she "knew the Queen program would provide me with an extraordinary opportunity to give back to the industry by raising awareness about the vital importance of honey bees and beekeepers' roles. "Serving as an official spokesperson for the industry greatly improved my communication abilities across cultures, landing me unique job opportunities based on the experiences I had serving the industry. I have acquired the skills necessary to serve in the professional business world, and have since implemented them in my career, board positions, and continued community outreach."

While Caroline does not advocate any change in the AHQ program to adjust it toward a young scholars program and make it open to young men as well, she does state, "There are countless needs in the industry that must be met by passionate beekeepers – there are fabulous opportunities for young men, and I *cannot encourage them enough* to give back to the industry, and further promote beekeeping!"

What do you see as the challenges to beekeeping in the next five years.

Eli Kalke: Sufficient forage. Encourage more land owners to provide more forage/habitat by converting grassland to wildflowers. Maintaining the momentum about the bees' plight and how the public can help do their part. Dealing with *Varroa* mites, pesticides, and beekeepers who still believe it is possible to keep bees healthy by letting them fend for themselves are challenges I see in the next five years."

Beth Conrey, President of CO State Beekeepers and WAS 2015 President.

Beth Conrey: The greatest challenge facing beekeepers is the beekeepers themselves. Our inability to work together across all aspects of the industry has made it nearly impossible for us to accomplish anything in the Federal and State arenas. From two national beekeeping organizations to a myriad of local organizations representing factions within the industry, we are a difficult bunch! How do we fix it? My suggestion is to focus on the one thing we can all agree on – healthy bees. Anything being considered is held against this standard: does it make bees healthier? If it does, it should be supported. If not, then move on. Ironically, I also view this diversity as our greatest asset. I feel that education and outreach are critical missions of the beekeeping industry, and that we need to rally more folks to participate in these sorts of activities. We call upon far too few of our numbers to make the case for bees and beekeeping, and greater participation would go a long way.

Terry Lieberman-Smith: Keeping our bees alive. If we can't keep our bees alive without drastic measures (chemicals, limited gene pool, "snake oil"), then we won't keep the beekeepers long-term. We need better training on apiary management, including increased training on monitoring techniques and management options related to pests and diseases. This training needs to filter across the state from the drawing board to every local association. We also need to monitor and have input to any legislation coming down the pike . . . such as food handling issues or other business rules that will impact beekeepers and their small businesses.

Regional beekeeping leader: Keeping the current trends in beekeeping. We need to continue to assist backyard beekeepers to keep their bees alive from year to year, get more women involved, and showing them they are capable of keeping bees. I remember I had to prove I could keep bees, and keep them alive from year to year. I had to prove I could do the heavy lifting, and fit into the beekeeping world.

National beekeeping leader: The practice of "we have always done it

like this," is strangling the industry, and turning off beekeepers with new ideas, and energy. Old grudges get in the way of progress. Beekeeping needs to move forward. Beekeepers waste time wishing to return to 1940s beekeeping: that world is gone. The world of our bees has changed, and beekeepers must change in order to help their bees. Women need to be respected for their skills and experience in beekeeping, as well as their work with National, state, and local beekeeping clubs.

Debbie Seib: *Varroa* mites and good queens will be the challenge.

Caroline Adams: I believe one of the biggest needs (and challenges) in beekeeping is for beekeepers to be united. I adamantly agree that one size does NOT fit all in beekeeping and I encourage diversity. However, as more and more issues face beekeepers (diseases/pests, dangerous chemical use, increasing die-offs, damaging legislation, etc.) it is all the more important for beekeepers to stand as a united voice promoting the furtherance and well-being of our industry. Beekeepers must be active in their communities and supportive of one another. Now more than ever, we have to stand up for what is right, and we must be willing to listen to one another so as not to destroy ourselves from the inside out. Beekeeping is under attack, and we are called to fight. It requires intense commitment and determination, but we are all in this together. This is OUR industry and all of us matter.

Debbie Gilmore: Keeping bees healthy:

Mites: This goes without saying . . . not treating vs. treating; treating with what miticide and when; side effects of miticides; other alternatives; getting Department of Agriculture's approval of new options available to beekeepers in a timely manner. The new Honey Bee Health Coalition information on *Varroa* mites is the best and most useful information I have seen in a while.

Forage: Creating pollinator habitat can be a challenge in extreme drought conditions. Education needs to occur on drought tolerant pollinator habitat. People want to help as much as possible, but information is not always available for local communities. With the influx of commercial beekeepers into our area, the locations with healthy pollinator habitat for local beekeepers will be increasingly difficult to find. Working with local groups/landowners to increase pollinator habitat and to allow local beekeepers access to these areas will be very important.

Pesticides: The biggest concern is trying to decipher the research that is occurring all over the world. It appears that the data/findings are controversial. My general understanding is that beekeepers believe pesticides do kill bees. The chemical companies and horticultural businesses indicate that pesticides won't kill bees when applied as labeled. How do beekeepers 'sort out' the biased research from the independent research with good scientific data? Do beekeepers and chemical companies really understand the impact of insecticides and particularly neonics on the long term effects on bee colonies and to people via soil and water supplies which in turn are in our food supply? I hope the next five years will bring the answers to some of these questions.

Education. Beekeepers need to educate people of all ages on the bees and their products. Beekeepers need to be involved in a positive, optimistic manner (even when they don't feel optimistic!) at all levels of government. Educating our children will be extremely important. Offering mentorships and scholarship to help youth get involved in beekeeping will be needed. What we have seen in our area is a demand for local honey, and some wanting to capitalize on what they perceive as a 'money-making machine' and misrepresenting local honey. Education needs to occur for the general public and look for opportunities to advocate for the true local beekeepers.

As a woman hobby beekeeper, I believe it is vital to stay informed and educated on the bees and beekeeping on all levels. I help everyone who asks for help and who are interested in learning about bees regardless of gender, age, etc. I have dealt with beekeepers of all sizes of egos. I try to assist and have a positive influence on those that I can. If I see what I perceive as an inequality of genders, I will mention it in a manner that will hopefully have a positive impact on the outcome.

I believe it is a great time to be a beekeeper! Times have been hard for commercial and hobby beekeepers. Recouping 50% loss each year is difficult for any business. But the public is very aware of the importance of bees and the problems they face. They ask questions and they want to help. It's a prime time for education. Honey is in high demand. There is nothing like talking to a group of 2nd graders and giving them a small jar of honey, and seeing the smiles on their faces!!!

Erin MacGregor-Forbes: Lack of intermediate and advanced level beekeeping education, and lack of hands-on training for beekeepers are challenges for the next five years. I feel that the Master Beekeepers, state and local programs, and national programs (EAS and ABF) must focus on improving the educational opportunities for the many new entrants to our craft. We need to provide excellent quality colony management and apiary management training to ensure a healthy population of colonies and beekeepers in our areas.

The one real difference in my beekeeping which I attribute to being a woman is the ready acceptance I received when meeting other women beekeepers. At conferences and meetings, and even just in day to day life, I have always felt extremely comfortable "over-reaching" my familiarity with other women beekeepers. From my first EAS (2007 Delaware) where I met EAS Master Beekeeper Anne Frey (my inspiration to become a MB) I have found other women beekeepers to be amazingly

Erin MacGregor-Forbes.

open, welcoming, and willing to share information. Women beekeepers quickly become fast friends, support one another, share information and resources, and regularly refer each other to other women beekeepers who might be helpful, or helped in some way.

Many male beekeepers, particularly at the researcher/inspector/master beekeeper level are also very open and collaborative, but I feel that I gained access to those beekeepers through the network of women beekeepers who helped me learn and grow in the beginning.

I place a high emphasis on sharing the information I've learned with other beekeepers, and I frequently teach workshops and classes both locally and nationally for that reason. I feel that intermediate and advanced level beekeeping education is the most critical area of focus that we beekeepers need to improve in order to create a healthy and sustainable population of beekeepers and healthy managed colonies. BC

[1]Impact of Women in Agriculture **http://blogs.usda.gov/2015/09/28/new-womeninag-infographics-show-impact-of-women-in-agriculture-in-every-state/**

[2]Fraternal auxiliaries **https://en.wikipedia.org/wiki/List_of_fraternal_auxiliaries_and_side_degrees**

[3]Fact Sheet: The Women's leadership Gap **https://www.americanprogress.org/issues/women/report/2014/03/07/85457/fact-sheet-the-womens-leadership-gap/**

Chapter 1: Women in Leadership **http://www.pewsocialtrends.org/2015/01/14/chapter-1-women-in-leadership/**

Keith Delaplane

Jennifer **Berry**

Induction into Most Excellent Order of the British Empire at British Embassy, Washington DC, Feb 2014.

It's interesting how things work out. How one minute your life is heading down a certain path, then the next it switches directions and everything has completely changed.

It's also interesting to look back and see how many people during the course of your life were responsible for encouraging change in your life's journey. And when those folks have helped you find or continue on a path to something you love, whether a hobby, career, or partner, their intervention means so much. Just think, without them, where would you be? Who knows? What I do know is this: there have been numerous people throughout my life that have made my existence so much better, and I wish I could thank them all. Some are no longer with us, and some, especially from my younger years, I wouldn't even know where to find them. But there is one in particular, whom I can thank now. He's the subject of this article – my boss, Dr. Keith Delaplane, MBE, Professor, & Walter B. Hill Fellow.

In a different life, many decades ago, I made the decision to go back to school. As it had turned out, the Hollywood dream was turning into a Hollywood nightmare. I decided to move back to my grandparent's farm and attend Central Missouri State University (CMSU), a small college 20 minutes from where they lived. This time around, the sciences were going to be my focus, so I loaded up on botany, chemistry, biology and the works. My favorite course while attending CMSU was an Entomology course. I never realized in my earlier college years that you could actually study bugs. *How cool is that!* While growing up, I would scare my mother to death carrying in this beetle or that spider, lightening bugs or caterpillars. After the semester ended, several of my professors recommended that I look into graduate school at the University of Georgia (UGA) since it had an excellent Entomology program. Looking back, I'm so happy they steered me in that direction, because my life was about to change forever.

The poem by W.B. Yeats "The Lake Isle of Innisfree."

After researching about UGA and the Athens area, I decided to give it a go, so off to the Deep South I ventured. After two semesters, the course that would make the biggest impact on my life was offered, "Bee Biology, Culture and Management," taught by Dr. Keith Delaplane. At first, I didn't think much about it. It sounded fun, and interesting. At that time, I only knew a few things about honey bees – the standards learned in basic Entomology courses: honey bees belong to the order Hymenoptera along with ants, wasps and other non-*apis* bees; they are fuzzy; they make honey; they *sting;* and they are the main character in several really bad b-movies. I was about to find out that there is a lot more to this story.

Throughout my college career, there were courses I enjoyed, and some I didn't; some I remember, some I wish to forget; and, of course, some where I just warmed the seat long enough to take the exam. But Dr. Delaplane's class – I loved it, and it only took a few weeks for me to realize I wanted to be involved with honey bees for a long time. Maybe even the rest of my life.

It was the third time that Dr. Delaplane taught the class. While he was lecturing about the biology of the honey bee, I realized something. You know how some people say "the light bulb came on"? Well, instead of a single light bulb, it was more like the roof of the building was ripped away, the clouds parted, a chorus of angels began singing, and out of the sky surrounded by blinding light came an enormous sledge hammer which knocked

me upside the head (kind of like a Monty Python Cartoon). *I knew, at that moment, sitting there in Dr. Delaplane's class, that bees would be in my life forever.*

After class, I approached Dr. Delaplane, nervously asking him if there was a possibility that I could be his graduate student. He said, "Yes, I think that can be arranged." I was his first graduate student and I guarantee he had no clue what he was in for.

My parents received a phone call that weekend, and listened to their daughter talk on and on about how she had found her life's calling, and that she was going to study honey bees in grad school. My mom thought to herself, '*Great, more bugs!*' But this isn't about my journey, it's about the person whose own life journey eventually helped mine.

Keith grew up in Cass County, Indiana, on a small farm north of Indianapolis. The family raised pigs, and cultivated corn and soybeans. There were many chores associated with the farm that Keith was responsible for each day. Even though he understood the inner workings of a farm, his heart wasn't in it. His ambitions and dreams leaned towards the arts. So after graduation, he left the small, rural environment for the big city and attended Butler University, a fine arts school in the heart of Indianapolis. His major was music and his instrument was his voice. Even though the love for music and theater drew him to the big city, it was the big city that drove him away.

As Keith describes it, he was 18, young, dumb and clueless (*I did not call my boss dumb, these are his words*). Growing up in a farming community did not prepare him for city life, which included large crowds, unfamiliar faces, acres of cement, and mind blowing traffic. So, after one semester he took flight back to the familiar: he enrolled at Purdue University in Animal Science, something he took comfort in. Even though he did miss the arts, he knew one day he would eventually find his way back.

After four years, he received his bachelor's in science, but wasn't exactly sure what was next. Friends and classmates were taking jobs at Pioneer, and Monsanto, but this didn't appeal to Keith. Luckily, a friend on faculty there at Purdue, helped reveal a path Keith had never considered—he encouraged Keith to pursue a master's degree in Entomology with a specialty in honey bees. It was like a brick knocked him upside the head. "*Why hadn't I ever thought of this? I've been a beekeeper since the age of 13, and I love bees,*" but he had never considered it as a career. Purdue didn't offer a degree in honey bees at the time, so he filled out and mailed applications to the few schools that *did* have a program. When LSU accepted him into the program, he said it was a 'no brainer.' With maturity under his belt, and a new sense of confidence, LSU was the perfect arena – especially with Dr. John Harbo as his major professor. In Keith's own words, "it was an intellectual renaissance." He was uprooted from everything familiar, everything comfortable, when he journeyed from Indiana to Baton Rouge, Louisiana – from the past to the future – and it was **perfect**.

Keith, received his master's degree in two years. Once again, he found himself at a crossroads, which way to turn next. He thrived while at LSU, he loved the challenges that research and course work provided.

A young Keith Delaplane.

Therefore, the logical thing for him to do next was pursue his PhD. At that time there was a vacancy in Dr. John LaFage's lab, but he would have to leave the world of honey bees and work on another social insect – termites. Keith was hired as a lab technician and was given free reign. Dr. LaFage explained, "Run the lab, and crank out as many papers as possible, all of which will be used for your dissertation." Their research, which is still relevant today, laid the groundwork for certain fundamental understandings about foraging ecology in termites.

Upon graduation there were choices once again to be made. This time it was Dr. John Harbo who was responsible for guidance that would cause yet another course change. He encouraged Keith to apply for a newly opened position at UGA. At the time, the position was 100% extension with the emphasis being beekeeping, education and pesticides.

After five years of hard work, he was tenured and offered the position he desired, with a research and teaching appointment. He was given a lab, (Dr. Dietz's old building), and a truck – but no funding. It was hard to lure graduate students or conduct research projects with no money. For years, the only money available came from small donations given by the GA Beekeepers Association and other local clubs. Time after time, grants he submitted were denied. It wasn't until the early 2000s that Keith was finally successful in landing substantial grants after taking a grant-writing course and learning the ropes. I remember those early days of shoestring budgets and overtime; we would ask beekeepers to collaborate with us so that we could use their bees and equipment for research projects since we had little to none ourselves. Many GA beekeepers stepped up and helped us out in those days: Carl and Virginia Webb, Bob Binnie, Jessie McCurdy, Reg Wilbanks, Fred Rossman, Lloyd Allison, Barry Wright . . . There have been many others since then that have helped us out in our time of need – we've been very lucky to have the support of the beekeepers in our state.

The end of the 20th century proved well for Keith and the UGA bee lab. Money released by the Georgia Department of Agriculture allowed Keith to hire a full time technician (that's me!) and build a new lab. The "old lab," as we so named it, was not only old, but limited in space.

Keith wanted a facility that could house offices, conference space, and classroom space. Since then, there have been more grants awarded, more students graduated, and more research projects completed. A whole new era at the lab began, and the goal shifted to being locally responsive to the needs of the bees and beekeepers—but at the same time being globally relevant.

Another goal Keith set out to achieve was making the Young Harris Bee Institute the flagship of our extension efforts. Not only does the institute expose beekeepers (or soon to be beekeepers) to an excellent array of instructors with a vast amount of good, solid information, it also offers the Master Beekeeping Program. By equipping beekeepers across the state, region and country with knowledge of how to best keep bees healthy and alive, our efforts have had a multiplication effect. Instead of just the two of us trying to teach folks and evaluate situations, now there are 100s of highly educated and certified beekeepers out there helping others. The efforts of these beekeeping ambassadors have an overreaching impact in our state and region, which is why Keith has strived for the bee institute to be the best of its kind – not only rigorous and science based, but also fun for the body, mind and soul.

To date, Keith has written over 75 research, extension and educational publications, authored three books, and has been an editor for several others – including the 42nd edition of *ABC & XYZ of Bee Culture,* which should be hitting bookstores soon. In addition, he has presented hundreds of lectures to local, state, national and international political, academic, scientific and beekeeping audiences. Because of this, several years ago Keith was awarded the Walter B. Hill Fellow award, which is UGA's highest and most notable award given for achievements in public service and outreach.

The Hill Fellow is not the only distinguished award he has received over the years. In 2014, Keith became a Member of the British Empire (MBE). While on Sabbatical at the National Bee Unit, in York, England (2012-2013), Michael Young MBE and the Institute of Northern Ireland Beekeepers nominated Keith for the award. He had no clue until one day, out of the blue an oversized envelope was delivered from the Foreign Affairs Office. Inside was a formal document describing the award, his nomination, and how it would not be official until Her Majesty Queen Elizabeth II herself, approved this honor. He was sworn to absolute secrecy. Keith had to hold his tongue until he returned back to the states. The induction ceremony was held February 11, 2014 at the British Embassy, in Washington DC. It was a spectacular and elegant event, as only the British can make it. The British Ambassador, Sir Peter Westmacott presented the award on behalf of Her Majesty Queen Elizabeth II. As quoted from an article written by J. Merritt Melancon, from the University of Georgia News, Keith said, "This is an honor I never saw coming. I am grateful to Great Britain and her people for the many rich experiences they have given me, both professionally and personally. I hope this recognition signals many more years of collaboration between bee scientists across the pond."

When asked about his sabbatical, he claims it was a life changer. For years Keith has been a frequent visitor to England but for short stays. The sabbatical lasted six months and gave him time to really immerse himself in the life and culture of England, which he truly adores. It also gave him the time to deepen and increase relationships with researchers, such as Dr. Giles Budge at the National Bee Unit. The research project they collaborated on should be accepted soon in *Nature* magazine. It is the first research to show, on a national scale, the impacts that imidacloprid has on colony mortality.

Keith has been at UGA for 25 years now. As noted, there have been many successes in his professional life, but there have also been a great deal in his personal life as well. Probably one of his proudest is being a father. I've watched Keith these past 18 years with his daughter, Eva. There have been many joyous moments, but it's also been hard on him, as it is with most fathers I imagine. They watch their little girl grow into a woman. Guess it's that way with all parents, mothers and fathers –they want time to cease moving forward so that sweet, precious, innocent child remains just that. Eva is no longer a child. She is 18 and will graduate as the Valedictorian of her school this Spring. Not only is she smart, like her father, but she is extremely talented. Her favorite activities are dance (Ballet: en Point), trapeze and climbing.

Keith is also an artist. Over the years, he has sang with numerous church and ensemble choir groups, and has acted in several musicals conducted by theatrical companies in Athens. He's also a painter. Several of his pieces have been used as cover art for IBRA publications, *Bee World Magazine*, *American Bee Journal*, and book covers such as *First Lessons in Beekeeping* and *Mites of the Honey Bee*.

Most recently, Keith married Pilar Pagés Delaplane. Pilar is a paralegal in Athens, working for lawyers who are extremely generous and empathetic to people with disabilities. This past year, she completed her master's degree in Pastoral Studies from Loyola University in New Orleans. She is an avid reader, consuming books daily. Since meeting Pilar, Keith is a different man. A happy man. This is good to witness, and much deserved.

As I wrapped up the interview, I asked Dr. Delaplane, where do you see yourself going? He pondered this for a moment, then said, "Nowhere for the time being. I really enjoy my job and my life here in Athens. But I do want to continue to make the Young Harris Institute Master Bee Program the best of its kind. I want to improve the curriculum, make it more straightforward, improve on the pass rate – yet not dumb anything down. I want to be involved in research that is long lasting and has a permanent value to science while delivering helpful information to our clientele. They will probably have to kick me out of here, since I am having so much fun."

There are 100s – no, 1000s – of people who come into our lives. Some duck in and out, some stick around for the duration. Out of the many, there are those who are instrumental in shifting our path, and influencing our future. Dr. Delaplane is one of those people for me. His influence helped change my journey, from what could have been just ordinary to something extraordinary. Thank you!

So, how many lives have you affected?

Take care of you and your bees! BC

CHAMPLAIN VALLEY APIARIES

Three Generations of Beekeeping

Ross **Conrad**

The son of Czechoslovakian immigrants, Charles Mraz (1905-1999) kept bees in Woodside, Queens, an enclave of Czech immigrants in New York City during the early 20th century. He started working for other beekeepers and finally bought a beekeeping business from a beekeeper named Phil Crane in Middlebury, Vermont. Charles had worked summers for Mr. Crane, and moved to Middlebury permanently in 1928 to buy the operation when Crane retired. Three years later (1931), he renamed the business Champlain Valley Apiaries (CVA), which is the name the business carries to this day. In the mid 1940s, he moved the business to its current location: a nondescript, three-story building on Washington Street Extension in Middlebury.

Charles went on to become a world famous beekeeper. He developed a pick uncapping machine (a variation of an older machine), invented the fume board for removing bees from honey supers at harvest time, and collaborated with Alan Benton of Vespa Labs, the man who is credited with developing the first bee venom extractor/collector.

He traveled extensively to South and Central America, Europe, Asia and the Middle East consulting with beekeepers on beekeeping methods and technologies. In 1992 the American Beekeeping Federation recognized Charles as one of the five most distinguished beekeepers in the United States for his advances in commercial beekeeping. Charles wrote regularly for *Gleanings In Bee Culture* and the *American Bee Journal*. Charles is perhaps most famous however for his work in apitherapy, the therapeutic use of bee products. Most notably he spent over 60 years treating people with bee stings for relief from arthritis and worked tirelessly to try to get the medical establishment to recognize the potential healing benefits of bee venom therapy (BVT). He went on to treat people with multiple sclerosis and other autoimmune diseases with BVT, as well as help found the American Apitherapy Society that to this day continues to act as a clearing house for information on the use of bee products for healing and health. He published *Health and the Honey Bee* in 1994, recounting his years working with bee venom in the treatment of many degenerative diseases that modern medicine has so far been unable to effectively cure.

Around 1976, Charles's son William (Bill) Mraz, began the transition of taking over the business. Bill, the younger of two sons, is a mechanical engineer. Over the years Bill juggled two jobs and eventually transitioned to CVA fulltime. Over the years Bill rebuilt and made improvements to the venom collector, built a new wax separator that was a lot smaller than the old Cook & Beal's and didn't require the heating of the honey, and invented a reversing jig that raised the hive off the ground and provided an easy way to catch the burr comb scrapings when reversing bees.

Unfortunately, Bill's taking over the helm of the company coincided with the tracheal mite's arrival in Vermont and CVA winter losses jumped from 5-10 percent in a bad year to around 30 percent. After suffering large initial losses, Bill got the beekeeping operation on an even keel just in time for the *Varroa* mite invasion at which time losses jumped back up to 30-40 percent.

It was around 2004-2005 that Bill's son, Charles (Chas) Mraz, transitioned into running the business. Chas had been a construction supervisor in New York City but was familiar with the bees having grown up around them. As Chas tells it, "It was a big transition, a big change. I'd be running jobs with over 100 guys working and I liked the camaraderie of that. It was fun, and I made a lot of friends. Now I'm usually working with just one or two people throughout the year, along with a few million bees. But I think it wasn't a hard transition for me because I knew what it was, having grown up in Vermont, coming home was not a difficult transition even though I lived in the big city for 17 years or so. I don't really ever remember disliking working bees. I

Bill Mraz (Left) and Chas Mraz are second and third generation beekeepers in Middlebury, Vermont. Caleb Kenna photo.

Champlain Valley Apiaries honey house and shop. The image on the sign of the state of Vermont and clover leaves has been consistently used on the CVA honey label for over 80 years.

think it was just a part of what we did. Being a Mraz, it wasn't really a question of whether you were going to work bees at some point in your life. It was kind of a given."

Bill had built the business up to around 1200 colonies, and CVA lost approximately 45 percent of their bees the Winter of 2004 and Chas came on board that Spring. "It was a wild start but my father and I worked side by side to build our numbers back up," he says. The numbers have been up and down ever since. Chas has moved away from using synthetic miticides like Apistan and Checkmite+, and today relies on formic acid and ApiGuard instead. Like his father, Chas does not treat for Nosema, but rather breeds from his survivor stock in order to build natural resistance to the disease throughout his operation.

Another practice that Chas has carried on from his father and grandfather, which is different from most operations their size is to winter the bees on honey. "Back in the 50s Charlie would do what everybody did, take the honey and feed back sugar syrup," explains Chas. "One year Winter came very quickly and they only had a chance to feed half the bees. They were taking the supers off and feeding, and had gotten through about half the hives, when snow fell and temperatures dropped and Charlie said 'Well, we can't feed them, its gotten too cold so we'll just leave a super of honey on that half of the operation,' and the next Spring, that half of the operation was just boiling out of the hives and the other half was not. So he said, '. . . well if this is the result, we are going to leave honey on all of them from now on.'" Chas goes on to explain, "We probably leave about $80 of extractable honey on every bee hive and it is expensive, but we're not buying syrup and we're not going back to the yard and investing in the labor to feed them, or wash the feeders afterwards, which we don't have time for anyway. There is a definite payoff. That honey is valuable, but I think it is more valuable for the bees."

Chas Mraz poses for a photo in the honey bottling area. CVA runs two bottling lines, one for liquid honey and a second for their naturally crystallized honey.

Despite his best efforts, Chas recognizes that the bees don't have the kind of vitality that they used to have. "We moved to Middlebury when I was 12, but before that we lived in Georgia, Vermont," says Chas. "My father always had bees in Georgia. I can't remember if I went out and worked with the bees with him (Bill) or not, I probably did when I was a kid, but we always had bees there and in fact my father said one beehive was there for 25 years just continuously, re-queening itself and just going on and on like many of them used to do."

Today, Champlain Valley Apiaries is primarily a three person operation. Chas has two full time employees, Head Beekeeper Levi Doria, and Shop Manager, Cee Denney. They also have a part-time bookkeeper, and will hire additional part-time beekeeping help during the Summer months, and part-time office help to assist with the rush of orders that come in, leading up to and during the holiday season. And then of course there's Bill, who Chas refers to as his "resident mechanical engineer," which Bill explains simply means that he primarily gets called to come into the shop when something breaks and needs fixing.

Over the years Chas has worked to build up the business side of things, revamping their print catalog, setting up a small store in the honey house on Washington Street Extension, and creating an on-line store. Today, Champlain Valley Apiaries supplies its customers with honey, beeswax, candles, books and related honey bee products, as well as, honey bee venom and a small amount of apple pollination in spring. CVA honey is a blend of premium honey from the U.S., Canada, and the Champlain Valley of Vermont. This allows them to keep the flavor of the honey consistent.

Chas has worked to make each branch of the business (production, packing, bee venom) independent and profitable. The most challenging area has been the bee venom side of the business, Pharmaceutical compliance is extremely stringent and sales are unreliable and irregular. Pharmaceutical companies use the venom primarily for creating the desensitization shots doctors provide to folks who are hyper allergic to bee venom.

CVA sells mostly to wholesale accounts but they do quite a lot of retail business, especially around the holidays, through their print catalog, their online catalog. By far the best seller is their crystallized honey. "We have a tremendous product. A strong brand and a great quality product in our naturally crystallized, raw honey," explains Chas.

Chas developed a strong work ethic early in life. "I've been working since I was 10," Chas goes on to say, "In my family we didn't get an allowance. My allowance was if you mowed the lawn, you were allowed to use the mower to mow other people's lawns for pay. My father instilled in all of us a real work ethic." Chas' beekeeping work extends outside of the everyday business concerns of running CVA. He served for three years as the President of the Vermont Beekeeper's Association, and currently he is working with faculty at the University of Vermont to develop ways for farmers to improve the amount of pollinator friendly forage on their farms as a way to bolster pollinator health, while improving farm income at the same time. His latest project is to work with Vermont Public Television on a documentary focusing on the impacts neonicotinoid pesticides are having on bees.

2016 will be Champlain Valley Apiaries 85th year in business and Chas reflects on the many changes he's seen over the years . . . "The farmers certainly cut hay more aggressively than they used to and they have the machinery to do it. They didn't have the machinery when I was a kid to cut hay like they do now. But perhaps the biggest change is all the extra work that comes with the diseases and varroa mites, that's really the most significant thing that has changed...the problems." According to Chas, "We used to have a problem come along every 10, 15, 20 years or so, there would be a new bee problem. Now it seems like every few years there's a new issue and it is a lot more expensive to keep bees today. There are more operations to do with the treatments and we spend more time checking the hives. It's always been hard work but there just seems to be a lot more activities and a lot more to do these days."

Despite the modern challenges, Chas explains he is not about to give up beekeeping . . . "I enjoy working bees. I enjoy having my office outside of a building. My father says it's a lot of hard work and bee stings. While I like to romanticize it a little more than that, some days it *is* just hard work and bee stings. And it's tough. You can feel great one day and absolutely down the next. But I'm really comfortable with the bees and I like being a steward of the bees. I think that I would miss them dearly if I didn't work them. I just couldn't imagine that happening, that I wouldn't have bees." BC

The Champlain Valley Apiaries crew from left to right: Chas Mraz, Owner, Cee Denney, Shop Manager, and Levi Doria, Head Beekeeper."

Disclosure: While Ross Conrad is the author of *Natural Beekeeping, he got his start in beekeeping working for Bill and Charlie Mraz from 1992-1998.*

Gene Robinson

Jerry **Hayes**

The world of Honey Bees, even though small in comparison to other hobbies or businesses, is full of humans who have a passion for, even a Love of bees from a science, environmental, botanical, personal and I am sure a spiritual perspective. Honey bees do that to a person who is paying attention. Honey Bees are so simple yet diverse in all their biology and so explicitly advanced in all they do and can do and can adapt and adjust to that many times they are the model for understanding parts of 'us'.

One of these people with a passion for Honey Bees is Dr. Gene Robinson, University of Illinois, Dept. of Entomology, Director, Institute for Genomic Biology Swanlund Chair of Entomology. Big title for someone who may not always be recognized as an everyday Beekeeper. Gene uses genomics (study of DNA and gene activation) and systems biology to study how social life began and its evolution itself from solitary behavior (solitary bees) to the Honey bee we know now with its very social society, division of labor, castes, dance language, foraging and navigation etc.. I don't want to dive so much into the 'scientist' Dr. Gene Robinson but give you a flavor of his passion and how he got to where he is today. You can go to **www.life.illinois.edu/entomology/faculty/robinson.html** to learn more about the scientist part of this really smart, interesting person who loves honey bees.

I have had the pleasure of knowing Gene for a very long time when he and I were both young and good looking. Actually he is still good looking. I had the pleasure of visiting with Gene when he came to St. Louis to speak at the Danforth Plant Science Center, Conversations Program. The Danforth Plant Science Center is the largest independent not-for-profit plant science research institute in the world. A very amazing place. The Center believes that advances in plant science can improve food crops, develop sustainable bioenergy crops, create technology, form new technology companies and train the next generation of scientists. The scientists at the Danforth Center know how important honey bees are to the breeding and survival success of plants. Go to their web site, **www.danforthcenter.org** to learn more about this great institute.

Let me share some things with you about Gene Robinson, that I didn't know, that I think makes his journey in this world in which we all share and are engaged much more real and interesting. And maybe even perhaps a glimpse as to why he has been so productive with his students and staff in understanding those things that are fundamental to Honey Bee biology but has those fundamental basic gene linkages to us and what makes us social creatures.

Gene at 18 years of age went as volunteer to a kibbutz (communal farm) in Israel. They had him driving tractors and preparing fields, picking grapefruit and all sorts of farm grunt labor they needed from an 18 year. One day someone came to him and said we need some help with the honey bees. This wasn't a backyard deal, the farm had a about a 1,000 colonies. Gene was tired of picking grapefruit and this was something brand new that he had never experienced before. Little scary, but new and different and had to be better than picking grapefruit all day. He got out into the Apiary locations, saw the colonies, opened them up, was immediately overwhelmed with the sights and smells of a bee yard and was amazed at being invited into a Honey Bee colony's world and the incredible organization of this insect. He was hooked. Does this sound familiar for you – it does for me.

He had a challenge though to overcome, his Mom. His Mom wanted him to be a Doctor or a Lawyer not a BEEKEEPER! So over the next few months in calls and letters he gently and slowly let her know of this new passion for honey bees and how he wanted to have that be in some way his career path forward. His Mother eventually accepted this and told him that if he didn't want to be a Doctor or a Lawyer, that if he stayed with Honey Bees, he had to get a PhD. no ifs, ands or buts. To learn more about Honey Bees Gene worked for a well known queen producer in California, volunteered in Columbia, South America to teach Beekeeping and got his BS in Entomology at Cornell. He was super fortunate to be able to have as his major professor at Cornell, Dr. Roger Morse and under him earned his Masters and PhD.

Gene was still intrigued with how genes regulate behavior and how this behavior developed and evolved. He wanted to know how a worker makes a decision – was it genomes or hormones or a back and forth of both. He wanted to know how out of 20,000 or so species of bees how Sociality developed. What brings individuals together to form groups? And why does an insect go from solitary bees to temporary small colonies to permanent small colonies that aren't perennial to the western Honey Bee *Apis m.* with a full robust socially diverse perennial colony? We understand the societal gains brought by this evolution now, but what genes were turned on or off or mutated to allow for social colonies of bees.

Gene wanted to "look under the hood" at the molecular level to see what similarities the genome of other organisms had to Honey Bees. He wanted to understand these molecular building blocks that make Honey Bees, Honey Bees and how that same process has made herd animals and birds and microbes and humans social creatures that get survival value from being social. And Gene has been able to answer some of these questions already but, there is so much more to discover and learn.

When Gene was introduced to the 300+ audience that packed the Danforth auditorium to hear him, they were told that he was the Michael Jordan of bees. Pretty nice tribute. He informed the audience of his love of honey bees and how he had progressed in his appreciation and awe and wonder of Honey Bees from his first experiences at the kibbutz and they were enthralled with the honey bee colony and all it does as Gene painted a verbal picture for them.

He was asked questions about honey bee health and CCD, and *Varroa* and flowers and what they could do to help honey bees. He answered all their questions and there were 300+ smiles.

For me, an old jaded beekeeper, he reinvigorated me and helped me see the fundamentals more clearly again. Bees are amazing for many reasons. Their contributions to us and the environment are oversized. Honey Bees are overachievers because they have so much impact on our activities as a result of pollination. At this date and time bees need our help. The one statement that Gene made that I want to remember is, "Let's put honey bees in the equation in all things". That's how important they are and that is why Dr. Gene Robinson might be the Michael Jordan researcher of bees. BC

TOM SEELEY

Ann **Harman**

You have read his books: *Honeybee Ecology* (1985), *The Wisdom of the Hive* (1996), and *Honeybee Democracy* (2010). You have attended beekeeper meetings and heard him speak. All who have read and all who have heard agree that Thomas D. Seeley is an outstanding researcher into the behavior and social life of honey bees.

Today he is the Horace White Professor in Biology, in the Department of Neurobiology and Behavior at Cornell University, Ithaca, NY. However his research takes him into the Dyce Lab for Honey Bee Studies at Cornell, into the Arnot Teaching and Research Forest nearby with bees nesting in trees, and out to the poison ivy infested Appledore Island off the coast of Maine where his honey bees can be studied in isolation.

The behavior of honey bees, a social insect, has interested him practically all his life. When he was in third grade a classmate's father, a beekeeper, brought an unoccupied Langstroth hive for the students to see. Tom was fascinated by how the hive housed a colony of bees. Comb honey was brought for taste samples. He was amazed that insects could make such a beautiful and delicious food. His amazement persists to this day.

That introduction to bees led Tom to become a beekeeper while he was in 11th grade. His first colony was a swarm he collected in a homemade wooden box. Beekeeping fit quite well with his other outdoor interests at home in Ithaca, NY – insect collecting, keeping pet raccoons, bicycling, and making model airplanes. Then it was off to college.

Tom went to Dartmouth for his undergraduate degree in chemistry. Here he also started receiving awards for his accomplishments. Awards and honors have been and are a continuing part of his research work. That chemistry major was supposed to lead to becoming a physician. But he realized that studying honey bees and their lives was more fascinating to him than studying medicine.

While he was studying at Dartmouth, he returned home to Ithaca every Summer to work at the Dyce Lab. Work, at the beginning, meant all the less-than-exciting tasks of keeping bees. He was assigned to repairing the hives and whatever other unchallenging work needed to be done. However he did move upward and began helping the graduate students with their research. After that he was able to work on his own research projects.

For his first one he chose to study the regulation of carbon dioxide in the colony. Just as humans produce carbon dioxide inside their bodies from the metabolism of food, honey bee colonies produce metabolic carbon dioxide inside their nests. Tom's thought, his hypothesis, was that as the numbers of bees in a colony increased, more carbon dioxide would be produced and this excess would result in swarming. Well, that is not what he found. Instead he found that the bees limit the buildup of carbon dioxide by ventilating their nest. The important lesson that he learned from this first investigation was that a beautiful idea can be completely wrong. The message: pay attention to what your data are telling you. An important lesson for every good scientist.

This research gave him his first publication in 1974, the year he graduated from Dartmouth. The paper: Seeley, T.D. 1974. Atmospheric carbon dioxide regulation in honey bee (*Apis mellifera*) colonies. Journal of Insect Physiology 20:2301-2305. That first one was followed by 176 more articles, several of which are in press.

If you read through the titles of all those articles you will see that Tom's research focus is the social behavior of honey bees. How does a colony of thousands of bees function?

Swarming – how does it start; how is it organized? How do bees choose a home? How do bees in the wild, in hollow trees, live and survive even today with all the problems lurking around? Foraging behavior and dance language. How do bees make decisions? Beekeepers can also find his articles in *Bee Culture* and in several other magazines. It is not surprising that today he teaches courses in animal behavior, animal cognition, and animal communication at Cornell.

After graduating from Dartmouth Tom chose to do his graduate PhD studies at Harvard from 1974-1978 under thesis advisors Bert Hölldobler and Edward O. Wilson, two very famous researchers of ants. However, Tom's PhD thesis research was done on honey bees back at the Dyce Lab where he was advised informally by Dr. Roger A. Morse, professor in apiculture at Cornell. Tom remains deeply grateful to Dr. Morse for letting him work out of the Dyce Lab for his PhD work. You may recognize some of Tom's PhD classmates there: Kirk Visscher, David DeJong, Rick Fell and Michael Burgett. After receiving his PhD, Tom stayed at Harvard for his postdoctoral studies until 1980. During this time his research took him to Thailand where he studied the Asian species of honey bees and their different strategies of colony defense. He then joined the faculty of the Biology Department at Yale until 1986, when he moved to Cornell.

You also may recognize his graduate students that are active in honey bee research: Scott Camazine, Juliana Rangel, Brian Johnson, David C. Gilley, Barret A. Klein and Margaret Wray. The three current students are Michael L. Smith, David T. Peck and Hailey Scofield. His postdoctoral students are also active in teaching and research: Drs. Kirk Visscher, Heather Mattila, David R. Tarpy and Barret Klein. Three are from overseas: Dr. Jun Nakamura (Japan) and Drs. Koos Biesmeijer and Madeleine Beekman (both from Netherlands).

In 2001 he went to the University of Würzburg, Germany, to write a biography of Martin Lindauer who had been a student of Karl von Frisch as well as an eminent bee researcher in the field of bee behavior and communication. Lindauer's work during the 20th century certainly gave valuable information for those studying bee behavior. Tom returned to Würzburg in 2002 and 2003 to study the sound signals made by bees during swarming. He also investigated whether plastic foundation, now used in many hives, interferes with waggle dance communication – he found it does not.

It can be difficult to find bee trees in a forest. In times past eager beekeepers used a method called bee hunting (aka 'bee-lining') to follow the bees to their forest homes. A beekeeper uses a type of capture box to catch a bee then releases it and follows it to its tree. Tom found this practice an excellent way to find wild colonies of bees in the Arnot Forest of Cornell University, allowing him to study whether these colonies survived the arrival of *Varroa* and how they have done so. Their survival is valuable in understanding the health problems of bees living in apiaries. Several of his published papers reflect his skill in bee hunting. More about this technique later in this article.

Tom has been showered with awards and honors, invitations to deliver named Lectures, elected a Fellow of several societies, and chosen to deliver Keynote Addresses. The Eastern Apicultural Society (USA) awarded him their highest honor, the Hambleton Award. He has spoken at beekeeper meetings in the British Isles, Scandinavian countries, Europe and Japan and, of course throughout the USA. Tom has had a bee species named after him. This bee, *Neocorynurella seeleyi* Engel & Klein, is a sweat bee living in the high mountains of Colombia and Venezuela. (Klein is Barret Klein one of Tom's students.)

He began writing his book, *The Wisdom of the Hive*, in 1992 at a farm in Maine. However he finished it in 1993 while he had a Fellowship at the Institute for Advanced Study in Berlin Germany. This book won a gold medal in 1998 at the Apimondia Congress. Tom took a sabbatical leave in 2008 to write *Honeybee Democracy* at his camp in Pembroke Maine. This wonderful book contains results of his research into how a honey bee swarm chooses its new home.

Soon it will be 2016. Keep your eyes open for Tom Seeley's newest book, *Following the Wild Bees. The Craft and Science of Bee Hunting.* Princeton University Press, due out in April. (I hear it has wonderful photographs!)

Do honey bees occupy every corner of his life? Definitely not. He has a wife, Robin, and two adult daughters. He is a beekeeper with a couple of hives kept at his place in Pembroke, Maine. Here he can harvest honey, 'clean and delicious and beautiful,' made by his own bees. In Ithaca he owns a 101-acre hardwood forest with a conservation easement donated to the local land trust so that it will always be a forest, not subject to the ravages of being developed. Half of this forest is managed for timber and also for maple syrup production. The other half of the forest, not for harvesting, will slowly become an old-growth forest.

The timber half is part of Tom's enjoyment of hard physical work, needed as a relief from deskwork. He taps the maple trees and makes the syrup. He cuts timber to thin the forest. He cuts and splits four to five cords of firewood every year for heating their house.

Some people have a hobby of collecting a particular thing. Because he loves old John Deere tractors, vintage 1950s-1960s, he has so far collected two. However, to help with his 'woodswork' in the forest he has a newer one, a 2006 Model 4410, 4WD.

You can bet he knows where the bee trees are in his woods! BC

Stuart Anderson

Co-Inventor of the Flow Hive

Toni **Burnham**

If you are a beekeeper in North America, and you have a connection to the Internet (or anyone you know has a connection, or their kid does) it is almost 100% certain that you have heard about the Flow Hive, a hive design that allows honey to be harvested without pulling and scraping frames, and the biggest crowdfunding phenomenon of 2015. The father-son team of Stuart and Cedar Anderson went looking for $70,000 in startup funds, raised over $12 million, and took the viral imagination of the Internet by storm. And most of us were not pleased.

Here are the facts: first, of the 30,000 Flow Hives ordered as of this writing, over 20,000 will arrive in the U.S. and Canada, most in time for the 2016 season. The majority will land in cities and suburbs. So, get ready urban beeks! The buyers are, for the most part, "backyard" beekeepers and often inexperienced. They are also excited, enthusiastic, and economically well off. They are going to need help, and many of them have no idea of this.

Please bear with me: over 1,000 (no exaggeration) emails from friends, family, colleagues, and "just folks" have clogged my inbox on this topic. Every outreach event for months has featured at least one wide-eyed, hopeful question about "that hive that could save the bees," and at the DC State Fair, a community gardener told me he ordered the hive because he "wanted bees but did not want to get stung." I have rolled my eyes, written "the honey is not the thing" replies, and done a slow burn. But I was no better informed than the excitable public that works my nerves. Both of us only watched the ad.

This article is not a product description: if you look up the FAQs, you can learn how the hive is manipulated, how the queen is kept safe, how you can monitor the harvest. But the Indiegogo video most of us refer to is an announcement, not an explanation. And it never claims to save the bees.

Stuart Anderson, co-inventor of the Flow Hive, enthusiastically and graciously responded to this request due to a shared observation: we can help these overwhelmingly urban and suburban beekeepers succeed with something that captured their imagination with hope – the way that CCD did with fear – or we can allow potentially dangerous failures to take place as these folks make mistakes. City beeks: this is coming to us, and it could be really cool. Or not.

Also, the owner of the first Premium Flow Hive in the U.S., Jason Allen-Rouman, allowed me to handle, photograph, and learn about the hive in person. In addition, users of three local bee fora were asked, "What would you ask the inventor of the Flow Hive?" Stuart agreed, with no hesitation, to answer.

The first question, in several variations, was: ***How can they do something that doesn't require people to know what is going on in the hive?***

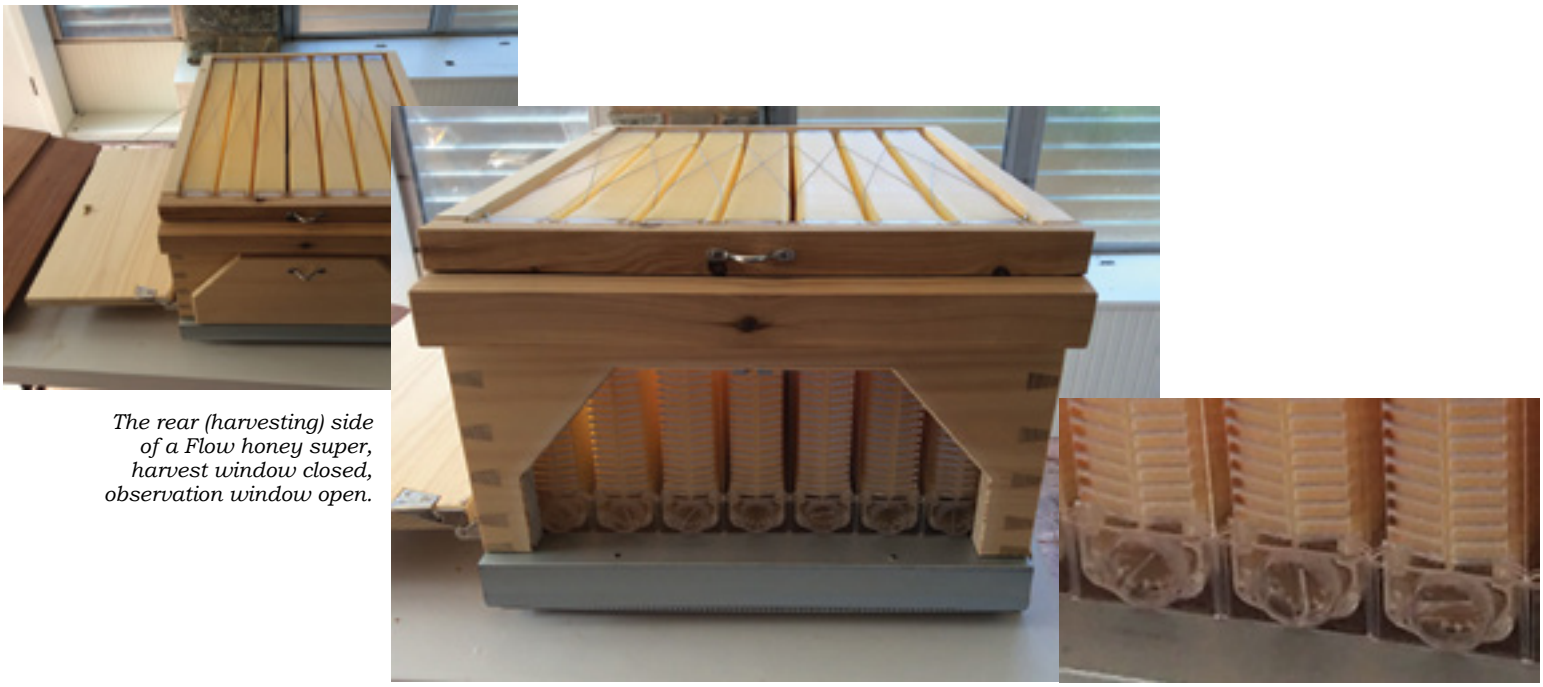
And the response is: The Flow Hive does not relieve beekeepers of the responsibility to inspect, understand, and manage the health of their colonies. Stuart Anderson added, "Some will have that impression if they don't read, and don't look at our [instructional] videos . . . we try to get across that you *still* have to open your hive, to inspect for disease. You need to watch over, get to know your bees, know the health of your colony, and open them to check them out. To do that you need connection to an experienced beekeeper who can point disease, or another condition."

"You still need a bee suit or a veil, and you still need to open your hive, you just don't need to open it as much. Though people with a Flow Hive don't need to pull [the colony] apart to extract honey, they have to get to know their bees, and the best way to do that is to pull it apart as many times as is recommended in your area. Here [Australia], it's at least twice: looking out for foul brood, for example, and if disease is going around, I inspect more."

Your responsibility is to towns and cities as well as the bees: "It's more than just the health of the bees. My background is community work and I really believe in getting people together. And when people get together over a project, then all sorts of wonderful communications and connections happen, and that strengthens us and our world."

"This is an enormous opportunity to educate and push bee-related agendas of health for bees and the environment: we certainly have a network, an instant network of beekeepers and potential beekeepers around the world. I'm hoping, I am *really* hoping, that we can use that well for the health and sustainability of our world. That's where I come from."

"The demographic we are reaching is everyone from experienced beekeepers to people without a clue. And so the support, the education, the emphasis on health



The rear (harvesting) side of a Flow honey super, harvest window closed, observation window open.

of the bees, and the interconnectedness of it all is so important." But also: "People who have bought the Flow Hive are video watchers rather than text readers, so I think more and more videos on identifying disease, and what you watch out for, as well as working with some really interesting developments in in-hive telemetry – you know, sensors and scales – we are working with a couple of companies on that."

"Unfortunately, with any innovation, with any invention, it will get used for good and bad. That happens. So we emphasize education."

"I think that [sometimes bees are put in the box and never opened again], too, and it has happened for many years before the Flow Hive. And of course, we have had wild hives forever, just doing what they are doing . . . While we want to put every effort into caring for the bees – and those that can't care for them should pass them on – we are going to find out how much of a problem it is because as I said, there have been uncared-for hives all around for a long time."

"Ten years ago, beekeepers were saying 'There's not enough young beekeepers entering the industry, we are really worried.' And we know that in terms of pollination and our food supply, it's commercial beekeepers that make the difference . . . So we really need people getting excited about bees to the point of becoming commercial and we need to support our commercial beekeepers." And Anderson stresses that the economics of commercial beekeeping have to improve, too: "When commercial beekeepers have enough funds, then bees are healthy. An example of that is the Manuka honey in New Zealand, the bee industry there is thriving! They are getting such good returns, so there are no worries about bee populations."

On putting their customers on the path to beekeeping ed, "Perhaps [we can] set up site pages saying 'watch out, check a few sites, check the prices for bees, connect with a local club, connect up with your local beekeepers, then you'll be on the right track' . . . On our community area of the **www.honeyflow.com** site we have a 'find a bee club' interactive app going." There are also online forums for customer support.

Since many new beekeepers are heading to us, perhaps our local clubs could do this, too. If you are worried about how many Flow Hives will turn up in the hands of wanna-bees near you, how about adding a web page titled "So you Bought a Flow Hive?" with instructions for plugging into the best local knowledge and vendors. Or advertising a talk with one or two of your green partners in the gardening or environmental communities? Viral works more than one way.

Question: Is there an expected life span for the machine? One season, two?

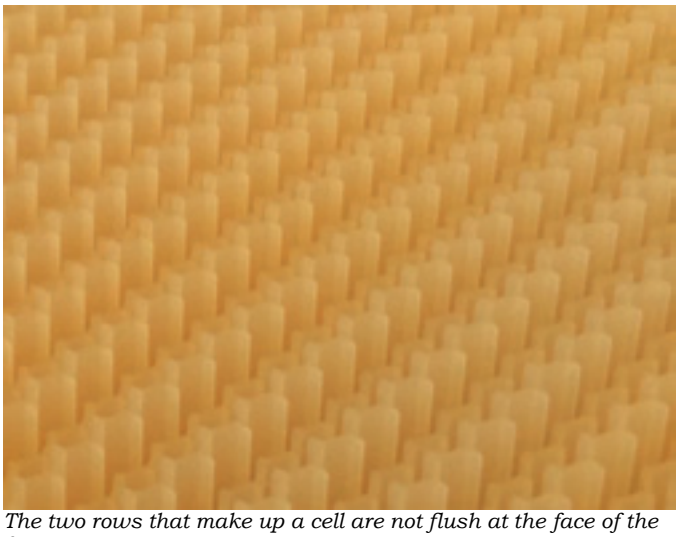
Anderson: "We think dozens, but we don't know yet. And the plastics companies don't give that sort of guarantee because they can't guarantee all the different environments that their plastics are placed in. We know is that the plastic doesn't degrade unless it is left in the sun, and there is no wear involved in the movement [of the plastic parts] and so we can't see why it wouldn't last for 10 or 20 seasons."

"But if you quote me, it's all about speculation, because we don't know. We've operated [the hives] five-six times in a row, and that has been fine, hasn't been any difference. In fact, we have noticed that they work a little bit easier on the second through fourth times than on the first. We think it is because of the way the wax seems to bind initially, deep in the honeycomb. But we don't know that of course, because it is all brand new."

Feedback so far: "The Flow Hives got out just in time in June to catch some peoples' later nectar flow in Europe and the U.S. We got some feedback from a limited number who managed to fill it and that was great. And the feedback was generally positive, with a few questions."

"There was one person whose honey must have crystallized in the frames, and that's a chief concern ... There are some areas of the States, I know, where the honey will crystallize within three weeks of capping, and that's an issue. Just like in normal harvesting, you try to extract before it crystallizes, and you do the same in Flow Frames."

From the rear the beekeeper removes a plastic cap and inserts a (supplied) crank to individually manipulate the desired frame for harvest.



The two rows that make up a cell are not flush at the face of the frame.

Question: Can small hive beetles and wax moths get into hidden parts where the bees can't reach them?

"That issue, and particularly Small Hive Beetle (SHB), is of concern to us. I've lost hives to SHB and they're horrible. And so we are well aware of the need to minimize the gaps in which they can hide and to make places where the bees can chase them into whatever trap you've got. That's really important."

"We've tried to design it with no gaps that a bee can't get into. And we think we have succeeded: however when you put a super of Flow Frames on a hive, you've got hundreds and hundreds of little half-formed cells for SHB to dodge into. The bees can still get at them, though, and will keep chasing them. So we haven't found it to create a niche for SHB, but we're still open to hear what happens to others. But that has been very important."

"Wax moths are more of an issue, as I understand it, when storing harvested frames away from the hives." That is not an issue with Flow Frames. "I haven't had any problem with wax moths getting into an operating hive."

In addition: "We've got everything you've got except *Varroa*. Most beekeepers [in Australia] are saying 'It's not if, but when.' And we've got the beekeeping organizations putting pressure on our government to keep sentinel hives in our ports. We'll see how we go, but meanwhile we've quite a few beekeepers breeding for strength, for hygienic behavior, for varroa, but yeah, it will still catch us out like it has everyone else."

Customer support

"We have a team of five or six, but sometimes it is up to 10. And we have only just started sending a small number of hives, or Flow Frames, out in June. Now a second batch is going out that is a bit larger. Most emails are concerning enquiries, pre-sales, and customer support is going to be very important. It's one of the reasons I am pleased that we teamed up with Bee Thinking [in Oregon] to make the [North American] boxes, because that has been their market edge: 80% of their effort, they put into customer support."

"We have done some work on suggesting that customers subscribe to a beekeeping magazine: in Australia it's called *Australasian Beekeeper*, and it's a great mag. I want that for elsewhere, too – to list all the respectable magazines around the world and get people to hook up to them."

And their website offers an expanding selection of videos and FAQs for customers and others, as well as a community area with links to outside informational resources and a customer discussion forum.

About the Flow Hive's development and future

The Flow Hive is the result of a 10-year, father and son labor of love. Stuart says, "It has been very much an invention together – but my son Cedar drove this project – it would have been yet another idea gone by the wayside if it were left to me."

"It was him pushing, saying, 'We gotta be able to do this!' and me thinking, 'Wow, that is really a tall order!' But I couldn't help but get intrigued and get involved as we started messing around with ideas. Soon I thought, 'Oh, maybe we can.'"

"But the first ideas were very clunky and clumsy, and we knew we had a long way to go . . . We were pleased to find that the honey drained out so effectively from those narrow, vertical channels [in the frames]. We were really surprised by that, we expected there would be a lot more honey left behind than there actually is."

From the first, the company went for the twin goals of high quality construction and holding prices low. The frames are designed to be usable in non-Flow Hives, and future developments are planned as tools that can be put into the hands of ordinary beekeepers. Construction is in Australia and the U.S., not in a lower priced economy.

Looking to the future, along the lines of more bee care with less deconstruction of the hive, sensors may help with identifying disease and monitoring colonies, "I think the big challenge is to get the telemetry cheap, at the moment it is pretty pricey per hive . . . The technical challenge in getting the information is no problem, meaning the sensors. I think getting it cheap is the challenge."

"As you probably know, there are a number of beekeepers who believe the best way for bees is actually to leave them completely alone . . . 'if they die then they die, but if they live then you have got a strong breed.' But we have to understand a bit more about disease

transmission at the same time in case, for example, a hive gets robbed out."

"Telemetry is going to give us a lot of information about the movement of disease all around the world, and therefore ways to combat it. Hopefully within five years you'll be able to get a signal on your smart phone 'Foul brood in Hive #5' in your backyard . . . Not only could you get a warning about your hive, but beekeepers in the area could get a warning. That seems technologically possible."

In closing

Everyone reading this knows that the history of beekeeping is one of discovery and invention, some of which have changed our relationship with bees, some of which were cockeyed. The idea that one of the most interesting latest inventions results from a decade of work within a family containing generations of beekeepers is comforting. The viral impact this invention had is the part that frightened us. Will people who know nothing kill bees? Will they kill beekeeping? Why do they think a honey harvesting technology will somehow "save the bees?"

Well the latter was never an offer, and many of us could afford to take a look beyond the sexy solicitation video. And after looking, remember that our beekeeping community could use a shot in the arm, and 20,000 of these idealists are coming to a town near you. Millions of people have seen something hopeful about beekeeping, and we can build with hope. We can prepare, welcome them, and succeed, or we can let a lot of failures and even tragedies happen. It's not that hard to turn idealism into something cool. Look at what these guys did. BC

BIGGER PICTURE

Jessica **Louque**

Don Hopkins, NCDA Chief Apiary Inspector

As an apiary inspector for North Carolina, Don Hopkins normally needs to be notified when you bring in bee packages from other states. I think he also likes to know where you are keeping your bees. Since our office is pretty close to Don's front door, he can usually spot our brightly colored hives (or someone tells them where they are) before he gets a call from us. We call him in when we get our packages in the Spring, or when we need an official inspection to move our hives across borders, or just an opinion on general colony health. It was at one of these more recent inspections that I asked Don to be my interview for this year. He seemed slightly surprised, maybe a little wary (Bobby pointed out later that everyone should be wary when I want to ask them questions), but game for being interviewed. Although I've known Don for a good few years, there were a lot of things either I didn't know, or were mentioned in passing that were interesting and made me want to ask more. Since Don is the chief apiary inspector for North Carolina, and I am a procrastinator occasionally, it was a little difficult getting the timing set up (maybe I waited a little too close to the deadline). Don came in to talk to me on his first day of the NC State Fair set-up on his way home, a little frazzled, but still totally rockin' his 'stache.

How long have you been working with bees?

I started working with bees around 10 years old, and I'm 67 now, so it must have been in the 60s. We had milk and bread delivered to the house every week, and sometimes the delivery man would sell us honey from his own bees. I started talking to him, and ended up with my own bees. My parents were pretty tolerant about that sort of thing, and I started selling my own honey. I became a junior member of the Morris County Beekeeper Association [in New Jersey]. After I went to college, I bought a house and decided that since I had a place of my own, I could keep bees again. I joined back up with the same bee club, and met the delivery man again. It turned out he only lived just down the road from my new house!

Tell me a little about your family. I know the other day you were talking about your sister being an amateur mycologist...

Well my sister actually moved to Saranac Lake in New York because she liked the mushrooms better there. She was recently in the area teaching a fabric dyeing class with mushrooms, then she came east to meet some friends and have supper with us, then she went back to Black Mountain for a mycology seminar.

My wife Susan is currently down in Pendleton, South Carolina for a horsemanship clinic. Her main focus is the discipline of dressage. She works at a farm in Walkertown raising Hanoverians from colts to get them ready for sale once they're older.

I have three kids, two of which live in the Boston area. The third was in nursing school and met me when Eastern Apiculture Society was in Burlington, Vermont [back in 2012]. She liked the area so much while she was there that she took a job at a hospital in Burlington when she graduated. It was a pretty neat train of events.

When did you move down to NC?

I moved to NC in 1988 and started working with the NCDA in 1989 with the tracheal mite quarantine. Logan Williams, who was the head of the department at the time, hired me on as a temporary position because they needed the help.

So how long have you been working as an apiary inspector?

I stayed in the temp position for a couple years before it became a permanent position. I took over as the chief apiary inspector in either 1993 or 1994. I knew that being an apiary inspector was a job that I wanted to do, but taking on the supervisory role opened more doors for opportunities

Don comes to do a health inspection on some of our colonies at work.

like national meeting attendance in addition to still being able to do the inspection part that attracted me to the job in the first place.

What do you have to do to become a state inspector?

The most important thing is beekeeping experience and an interest in bees. We have a broad range of educational experience with our inspectors here, from college to post-graduate work. It's still not an easy job to get because the positions don't open up very often. It's not a high paying job but it's really rewarding and it says a lot that most inspectors keep their job until retirement instead of trying to advance in other directions or change to a different position within the NCDA. You can also pick up a lot of valuable experience. It's personally helped me with my communication skills, which is something I hadn't even considered when I took the job.

As an apiary inspector, what are the biggest parts of the job?

Well, one of the biggest attractions to being an inspector is that no day is typical. There are seasonal changes more than anything, but usually no two days are the same. We do have a lot of preparation for the State Fair and meetings, and of course hive inspections. Spring is our busiest season, with package inspections and new beekeepers needing assistance and preparation for hive shipments to California – **[JL interrupt: how many commercial apiaries do we have in North Carolina that go to California?]** Oh, well we have about five, with two of the guys going to California every year, and three or so that waver between going and not going. North Carolina is predominantly a hobby beekeeper state, there's no denying that.

What's the biggest part of getting ready for the State Fair?

Getting the exhibits ready for everyone is the biggest time consumer. The exhibits are made on a county-by-county basis for how much space we get. We never know how many people may be coming in, but we don't want to lose our space allotment. Like last year, we ended up with only five exhibits, but we received space for 10. We don't want to get less next year, so we start calling the exhibitors in June or July to ask them about what space they might need. We also have all inspectors on duty during the fair. It's a 10 day event and we have about 120 positions to be filled by inspectors and volunteers from the area. We usually run four hour shifts with three shifts a day. Normally our volunteers are from Wake, Chatham, and Orange, but we do get a lot of other people helping out. It should be better this year because they've opened up parking at PNC Arena with a shuttle.

Our biggest day for me is after the judging, once everything is done on our end for preparation. It's a huge sense of accomplishment to finish judging and have the exhibitions ready to go.

What is the most interesting part of being an inspector?

I like looking for different things in the inspections. You'll always see something unusual, or something that has a question that isn't answered, like that swarm at your site the other day with the exterior comb [JL insert here: we had a swarm leave and build comb hanging on a branch in a nearby tree). It's the size of a basketball] and wondering what will happen to that colony later. It might die, or it might survive and you never know for sure. It's always interesting to see things like high *Varroa* counts and how they affect a colony, but you also get the odd stories about the blue honey, or purple brood, and you don't usually get a satisfactory answer. When you do though, you feel like you've achieved something. You also get to talk to a lot of guys who spend a lot of time in their hives and just their casual observations are things that you've never even thought about or realized.

What's different in North Carolina inspections than other states?

Our state is a lot more regulatory than other states, but I think it's been pretty reasonable regulation. We've had a good rapport with the NC beekeepers in the past and it's helped us make better judgment calls about what is needed in our state.

What is the biggest pesticide issue you see with North Carolina bees?

Varroa. We've started taking Pat Jones [pesticide extension agent for NCDA] out with us and taking samples at the hives, but it seems like the majority of our pesticide kills are actually from *Varroa* infestations. It doesn't seem like Occam's Razor applies here and people will come up with the most obscure rationale for their colony death instead of doing a sugar shake or an IPM board. It's also funny sometimes because I'm from New Jersey, and people are worried about overwintering their bees – and I want to know where this Winter is that they are so worried about? BC

Jessica Louque and her family are living off the land in North Carolina.

Inner . . . Continued From Page 16

of having always grown in North America – is an Arizona cactus 'native' to Ohio? I'm quite certain nothing in Ohio is capable of eating any part of an Arizona cactus, and that the cactus would probably not thrive in our relatively harsh winters. So that's out. What about other, more common ornamental plants? The blue spruce, native to western Colorado, when planted in suburban Litchfield, Connecticut has little in common with an east coast ecosystem, offering little and taking all it needs to thrive. The same for Douglas fir and a host of other commonly used ornamentals.

What about plant hardiness zones? Would a zone 6 plant from Tennessee be native to a zone 6 area in Pennsylvania? Perhaps. Perhaps not. Tallamy's belief is that only nature can define what a native plant is.

"Plants", he says in his book, "do not grow in isolation from other living things around them and are, in fact, essential to the lives of neighboring creatures, they interact with the residents of their habitats in countless ways." The plants and the animals, over long periods of time coevolve, each continually influencing the evolution of the other. A plant, or animal that is moved from a faraway place that contains plants, animals and diseases that offer constraints that keep it in check, plus it has no history of contributing checks of its own on plants and animals in the new ecosystem and uses the energy of its new ecosystem – soil nutrients, water, space, sunlight that was before used by natives. However, it offers nothing in return up the food chain.

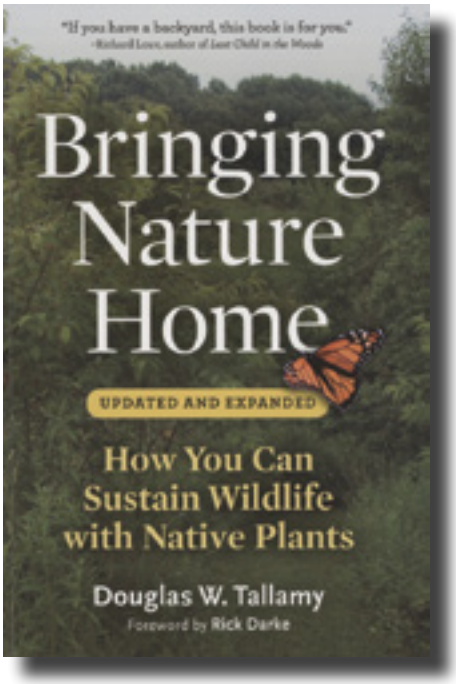
He uses as examples the Norway maple, introduced in 1756 from Northern Europe. After three centuries of exposure Norway maples are uninfluenced by our plants and animals, and our plants and animals are little influenced by Norway maples. Strangers in a strange land. Why? Simply, a history measured in centuries is the tiniest drop in the proverbial bucket of evolutionary time, he says. Another example is *Phragmites australis*, or common phragmites grass, or reed. Invasive in damp locations it will push out native grasses and plants and form huge beds, devoid of any other species of plant. And yet, after nearly 400 years on our shores, it only supports five species of insects. Only five. In Europe where it evolved it supports 170 species.

Sometimes, moving a plant outside of its native area, thus qualifying as a non-native, isn't as disruptive as might be expected and the plant behaves in such a manner that it becomes part of the ecosystem as soon as it is moved. This occurs when that plant is closely related to the others it relates to – the same genus for instance. Then, it's leaf chemistry, shape, growth rate and the rest will support and be supported by the native ecosystem. This, of course, enables the purists to hedge just a bit when looking for that perfect ornamental.

Dr. Tallamy's focus, as I stated, tends toward those insects that eat the plants native to where those insects come from. There's another issue with moving alien plants into an area – introducing non-native pests with them, especially if those pests are generalists as opposed to specific plant pests. The history of importing nursery stock is rife with examples, neatly examined in Tallamy's book – chestnut blight, sudden oak death, Japanese beetles, cottony cushion scale, viburnum leaf beetle, citrus long horned beetle, and newer than those, the insects causing citrus greening and the emerald ash borer, to name just a few.

When considering pollinators, and honey bees in particular, there are long lists of plants that honey bees enjoy because they are one of the best generalist feeders there are. Add to that that they are native to Asia and Africa, so they have, essentially, the whole world to choose food from, because we have brought them, and the whole world to them, here. Of course the irony of this should not escape you. An invasive species, us, has brought another non-native invasive species, honey bees, here, then, we keep bringing more and more food for them from where they came from originally.

In one of the final chapters he states, "We humans have disrupted natural habitats in so many ways



and in so many places that the future of our nation's biodiversity is dim unless we start to share the places in which we live – cities, and to an even greater extent our suburbs with the plants and animals that evolved there. These are the areas of his focus, and rightfully so as the extensive use of land that has been developed for the suburbs continues to expand.

Dr. Tallamy has published extensively on the value of native plants to native insects as food sources, and has actually ranked them according to value. The book has extensive lists of native plants by region, lists of host plants for butterflies and showy moths and, by extension, plants valuable to native, and certainly some non-native pollinators.

If you plan to plant for bees or other pollinators, all you need to do is follow the lists. Oaks, it seems are the most rewarding for most wild life when it comes to providing food, and oaks don't do much for bees. But what about sumacs, blueberries, native honeysuckle, birch, winterberry, willows, common milkweed, lobelia, black-eyed Susan, coneflowers, goldenrods, New England asters, Joe-Pye weed, boneset, lupines, bee balm, red and sugar maples, tulip poplar, basswood, shadbush, chokecherry, redbud, clethra, holly, butterfly weed, catalpa, sweet gum, black cherry, black locust – the list of natives that our bees love goes on and on and on.

Doug Tallamy's book is *Bringing Nature Home. How You Can Sustain Wildlife with native Plants*. If you get a chance pick up a copy. It's available almost everywhere books are sold.

BUILD A SWARM TRAP

Ed **Simon**

You have just caught a swarm using the swarm bucket, but now it seems as though there are more bees sitting on the lid of the bucket than are inside. How can you get them in the bucket without releasing the bees already in the bucket?

An easy solution is a variation of the swarm bucket lid that employs a funnel or cone to trap the bees. The funnel acts as a one way opening. It makes use of the bee's inability to recognize a small opening that is not on a flat surface as an exit. The same concept (cone entrances) is used in many bee related devices such as pollen traps and escape boards.

Directions on how to build a swarm bucket are available at **http://www.thebeeshed.com/publications.html**. "Build a Swarm Bucket" was originally published in *Bee Culture* May 2011 on page 55.

Parts

1. Plastic bucket with a lid – 5 gallon size works great
2. 8 mesh hardware cloth – ⅛" holes
3. Epoxy or pop rivets and/or silicone sealant

Construction

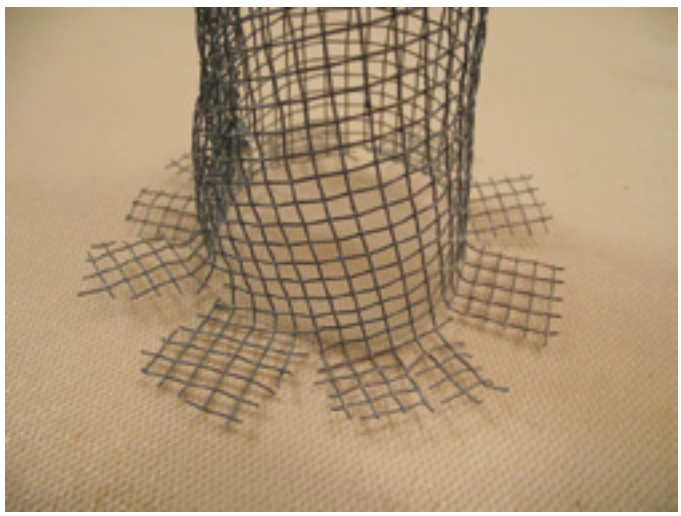
What we'll build is a bucket that has a tight screened top with a funnel in the middle.

Step 1: Build a swarm bucket as described in the article "Build a Swarm Bucket", but use hardware cloth (part 2) not window screen as described in the directions.

Step 2: Once the lid is complete, create a funnel from the hardware cloth (part 2). Make the funnel about seven inches long and taper it from a two inch opening to a half inch opening on the other end. Epoxy or pop rivet the hardware cloth into the funnel shape.

Step 3: After the funnel is complete, use a pair of tin snips to put a flange on the large end of the funnel. Then using the top of the cone (the inside edge of the flange) as a guide cut a hole in the center of the top you made in step 1. Slip the funnel into the hole and use epoxy or silicone glue to hold it in place.

Step 4: Allow the epoxy or the silicone sealant to dry and you have a very useful piece of equipment.



Usage

After initially getting the swarm into the swarm bucket, put this top on the bucket. Then set the bucket near where the swarm was originally caught and wait. Assuming you caught the queen, eventually all the bees in the swarm will try to get close to her. They'll walk down through the large end of the funnel and be unable to exit the bucket.

Thoughts

Have more than one swarm bucket handy. In the past three years I have come to rely on this device for most of the swarms I have caught. Twice during the peak swarming season I have been called out on a second swarm retrieval before I was able to hive the first swarm. On a third occasion the swarm was so big and difficult to get that I missed the queen on the first try. The bees immediately started to return to the original swarm location. I put the lid on this first bucket and used a second bucket to get the queen and the remainder of the swarm.

This device is cheap, easy to make and works fantastically. BC

Get a copy of Ed Simon's book Bee Equipment Essentials with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from ***www.wicwas.com.*** *Ed can be contacted through* ***Ed@TheBeeShed.com****. Now online are all of Ed's Bee Culture & BBKA magazine articles. They can be accessed through The Bee Shed website at* ***http://www.thebeeshed.com/publications.html****.*

The Right Size Wick

Petra **Ahnert**

Ahhhh… Fall. This is the time of year that we finally get around to transforming our cappings into beautiful yellow blocks of wax. It is also the time that people start ordering candles again. Time to get busy making more candles.

So, what makes a great candle and how is it achieved? Beeswax candles are more than wax and a cotton string. They are a symbiotic relationship between air, wax, and wick. Since the most challenging candle to get right is the pillar candle, I will focus most of this article on the components of making a great pillar candle. In my opinion, the perfect pillar candle will create a burn pool that extends out most of the diameter of the candle, but not all the way. The flame is nice and bright with no smoke trails and the candle burns down all the way to the bottom without looking ugly and misshapen. The latter is really hard to achieve with taller candles so, although I make them, I prefer the small and medium sized candles for personal use.

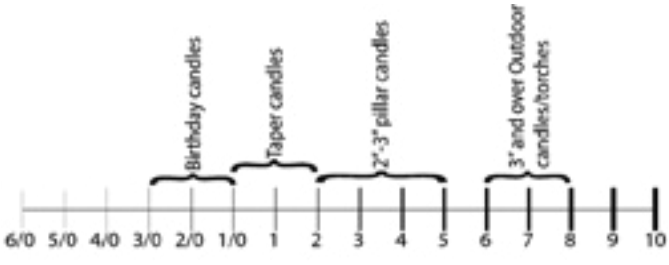
I will start with wicks . . . Big sigh . . . This necessary part of the candle seems like it would be an easy thing, but honestly, although it can be maddening to figure out, I can't stress enough how important this is to the overall quality of the candle. When a candle is lit, a series of events take place. First the match lights the wick and the wick itself starts to burn. The flame then starts to melt the wax. The wick acts as a pipeline that carries the melted wax in the form of a vapor to the flame via capillary action. Some wicks allow lots of fuel to flow quickly through a big pipe, while other wicks pump fuel more slowly through a smaller pipe. If you give the flame too much or too little fuel, it will burn poorly, or sputter out. The balance of fuel and flow needs to be just right.

The nomenclature of square braid cotton wicking refers to the number of bundles, the ply of the wick, and how tightly it is braided. The 6/0 to 1/0 range of wicks, are constructed a bit differently than the larger wicks, but all of them are square which helps to channel the wax fumes up to the flame. It is important to keep your wicks well labeled and separated since similar sizes look identical. Often the only difference is the tightness of the braiding.

The design and nomenclature of this wicking is, I believe somewhat unique to the U.S. Apparently wicking produced and sold in other parts of the world utilize a different grading system and are not the same. The fact that what we have here in the US isn't universal is something I discovered after my book was published and I was contacted by European editors that needed conversion factors for the wicking I recommended in my book.

Square Braid wick forms a carbon cap on the top of the wick. The carbon cap radiates heat outward from the flame which helps melt wax which is further away from the flame. The wick also bends slightly as it burns which minimizes carbon build-up and makes for a cleaner burning candle.

The oxygen seems like it would be the easy part- either the flame gets oxygen or it doesn't. But the type of the candle and the environment that the candle is burned in play a role in how much oxygen the flame receives. I have found that the more open to air the flame is, the better the candle burned. So taper candles are perfectly set up for this. Pillars and votive candles, on the other hand typically start off burning beautifully, but as they burn wax and the flame travels downward into the candle, the flame often has problems. Either the flame tunnels



Square Braid Wick Sizes *– Wick graphic: Although this is not completely correct in terms of actual diameter of wicking, it gives an overall picture of relative sizes, commonly available wick sizes and the range of uses.*

#2/0 on the left and #2 on the right. As you can see, the actual diameter is about the same, bu the number of threads and the configuration of the thread clusters that make up the wicks are different.


The blocks above, show the top and bottom of a wax block that I bought. From the top, it looks reasonably clean, but on the bottom, quite a bit of honey can be seen. This block will take some time and work before it can be used.

The dark spots are flecks of caramelized honey. Besides being unsightly, these are what ultimately can clog the wick, and ultimately keep the wax from reaching the flame.

down the middle of the candle melting very little wax and starving the flame of oxygen or the flame melts too much of the wax and flame is flooded and goes out.

So how does one ensure that the candle flame gets the oxygen it needs? Look at the burn pool. The width of the tunnel created by the burn pool is usually determined with the initial burning of the candle. The burn pool, which is the extent of melted wax, establishes the ultimate diameter of useable wax that the candle will ever use in subsequent burnings. The solid wax remaining around the outside of the burn pool will help the candle to retain its shape. For this reason, I always tell my customers that beeswax candles are intended to be burned all evening, not just a couple minutes and then extinguished. The combination of proper burning protocol and correct wick size should ensure that the burn pool reaches the desired width.

The last part of the candle trio is the beeswax itself. I personally hate to render wax, so I let my Karl handle the "heavy lifting" of rendering the cappings into big blocks of wax. I am not going to go into the rendering process here, since the process is often automated in larger operations. The wax that Karl renders out is really pretty clean, but since my candle business has outgrown what our hives can produce, I also purchase wax off another beekeeper in the area. His wax varies from relatively clean to blocks with rivers of honey buried inside.

For things like candles, especially pillar candles, the residual honey in the wax causes the wax to burn unevenly and to clog the wick. Even though a wax may "look" clean, it may still have honey in it.

The best way to get the last of the honey out of the wax is to allow it to clarify in a heated double boiler or wax tank. Admittedly, this task is easier to accomplish with the wax tank than a double boiler, since the wax needs to stay liquid for quite a while until all the honey has settled to the bottom. I usually let mine settle for a couple days. The best way to tell if it is done is by checking the clarity of the wax. When it is first melted, it has murkiness to it. As it settles, it starts to clarify. When the wax is clear, filter the wax through a clean piece of felt cloth and mold into useable portions. I usually do a variety of different sizes, so that I have the right size for whatever I am making. The resulting wax is still yellow and still has the signature honey-like scent, although the filtering may have lightened up the wax a little bit.

The chart gives some general guidelines for wick sizes, but in order to ensure that the correct wick size is used, a burn test needs to be performed. Actually, the odds of getting it right on the first try is pretty rare, so this test probably needs to be performed multiple times until the right wick size is found.

The Right Size Wick

Use the following test to determine the proper wick size and scale up or down as needed.

Basic Burn Test

1. Trim the wick to a length of ¼" (6 mm). If you are testing more than one wick, make sure the candles are clearly labeled.
2. Place the test candles on a clean, flat, heat-resistant surface about 3" to 6" (7.5 cm to 15 cm) apart. Be sure to select a draft-free spot that is in full view of your workspace. Do not leave lit candles unattended.
3. Light the candles and record the time. It is critical to keep an eye on the candles while they are burning, especially when testing new wicks.
4. If testing pillar candles, allow them to burn for two hours then record the details of the melt pool and wick appearance. Ideally the melt pool will achieve the desired diameter by this point. If it hasn't, the wick is most likely too small. Note any soot or mushrooming on the wick.
5. Allow the candle to burn for another four hours and record the details of the melt pool and wick again before gently blowing out the flame. At this point the melt pool of a well-wicked candle will have achieved the desired diameter and should be approximately ½" (1.3 cm) deep.

   If the wick is mushrooming, the candle is sooting, or the melt pool is substantially deeper than ½" (1.3 cm), the wick is most likely too large.
6. Allow the candle to cool for at least five hours and repeat steps 4, 5, and 6 until the candle is completely burned. The quality of burn will almost always change during the entire burning of the candle. Burn the entire candle before deciding on a wick.

Wax from different batches can vary a bit not only in color, but also in behavior. Once the correct wick size is determined, test subsequent batches of wax to make sure that the candle still burns the way it should and if not, make the appropriate changes to the wick size.

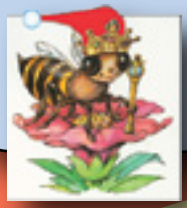
So now, we can make some candles . . . BC

Petra Ahnert is a specialty candle designer living in the Milwaukee area, and is the author of Beeswax Alchemy.

All The Buzzz in...

Hello Friends,

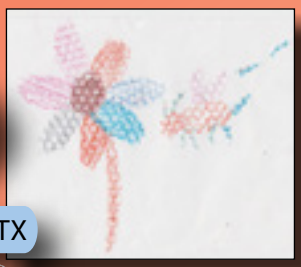
Happy Holidays!
See you next year.



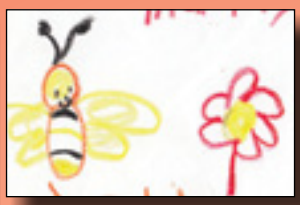
Bee B.Queen

Bee B. Queen Challenge

Draw a picture of a queen bee and share it with me!



Erica 8, TX



Joselin Ruiz, 8, TX

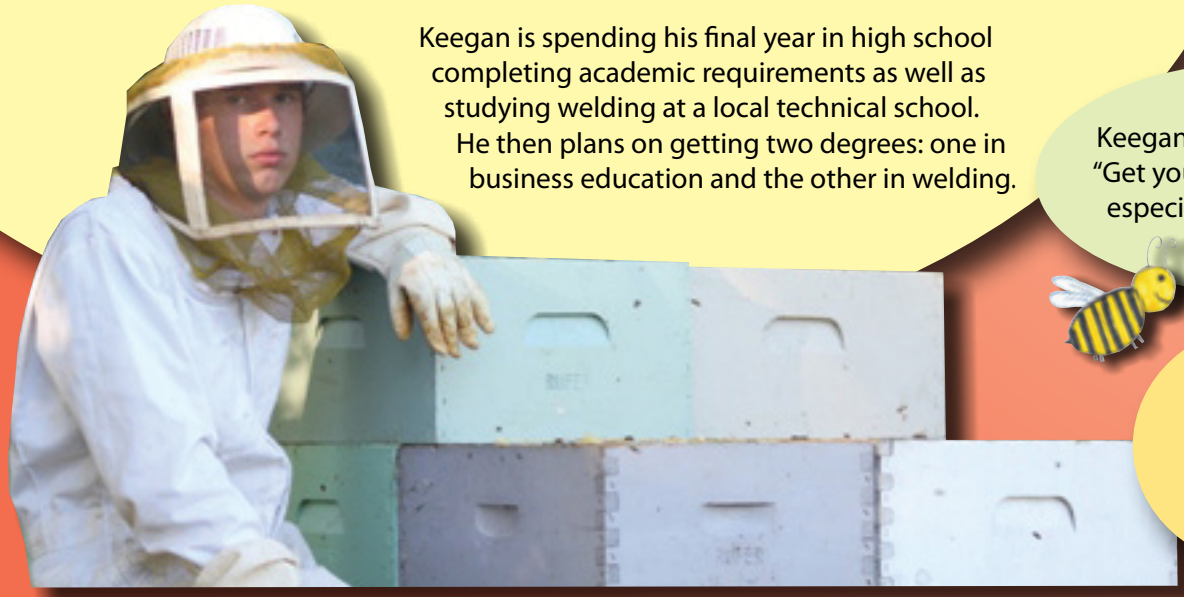
Beekeeping Spirit

It all started several years ago, when Keegan Rufer's grandparents Darrel and Cathy Rufer gave him and his brother each four hives of bees for their birthdays. While working toward his Eagle Scout requirements, Keegan started his own business bottling and selling his honey. He worked with a graphic artist to design his very own label "Keegan's Sweet Bee Honey." Now he sells his honey at two grocery stores, a local market, the Minnesota State Fair and he also sells honey in bulk. Keegan was even featured on the front cover of the local newspaper as a new young entrepreneur.

Over the years, Keegan's beekeeping knowledge and responsibilities have grown thanks to experience and his ability to ask constructive questions. He has traveled to help in bee yards in Texas and South Dakota and mentors new beekeepers most of which are much older than he is.

For the past four years, Keegan has set a great example for his friends and relatives by being an innovator and a leader. He has put together the extracting crew for his grandfather's beekeeping business. Through his work Keegan has shown great strength, is consistent in his work ethic and has matured in his way of handling difficult and long hours.

Keegan is a member of the Minnesota Honey Producers Association.



Keegan is spending his final year in high school completing academic requirements as well as studying welding at a local technical school. He then plans on getting two degrees: one in business education and the other in welding.

Keegan's words of wisdom: "Get your priorities straight, especially in high school."

Keegan loves to snowboard!

... Bee kid's corner

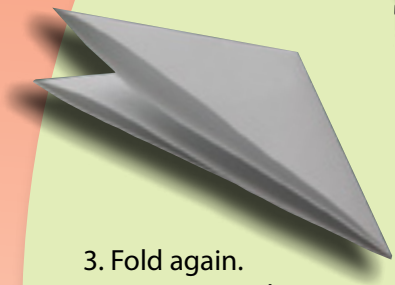
Produced by Kim Lehman
-www.kim.lehman.com
www.beeculture.com
December 2015

Snow Bee

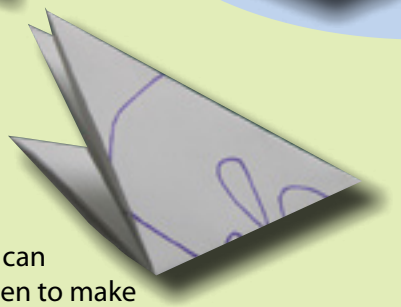
Create your own bee snowflake.

1. Fold a piece of paper into a triangle. Cut off the extra.

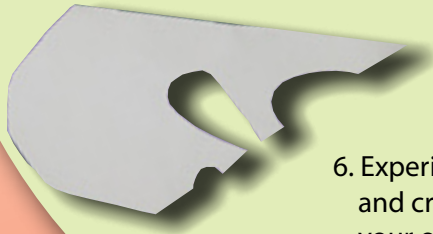
2. Fold again.



3. Fold again. Now comes the tricky part. Draw half of a bee body on the fold.



4. Cut out. You can use this patten to make a fun bee snowflake.



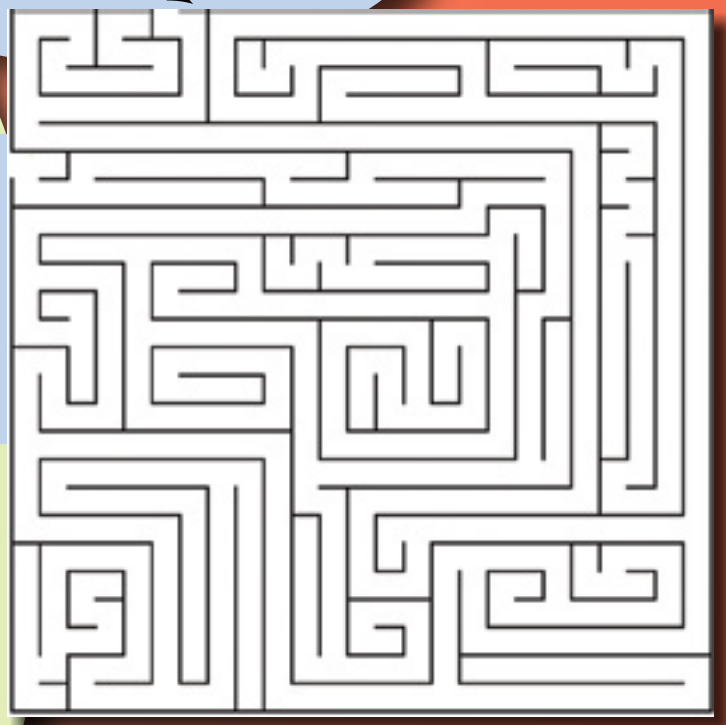
5. Unfold.

6. Experiment and create your own designs.

Sweet Gifts

Find your way through the snowstorm to share a gift with your friend.

Start



Finish

What is even smarter than a talking bird?

A Spelling Bee!

Bee Buddy

My name is Bryson Dudley (3 years old) and I live in Rome, Maine. My Grampy and Nanny have 4 hives of honey bees and I help them every chance I get. I even have my own suit! I like to look inside the hive and see the newly laid baby bees and I always say "hello girls." I think they like me when I visit them.

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 2743, Austin, TX 78768.

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Oklahoma writes:

In all of my years of beekeeping, it seems to me that when you introduce a new queen into a hive, the bees in the original hive need to contact the new queen's antenna with their antenna to transfer the queen pheromones. Am I right or wrong? An acquaintance bought a queen and the queen was in a thin cardboard box, similar to a paper clip box, with several small slits in the box about the size of a pocket knife blade. I believe that there was no way the hive bees could come in contact with the new queen's antenna. Is there another way to spread pheromones?

Phil replies:

As you may know, most honey bee communication is chemical in nature, carried out through substances called pheromones. Pheromones are produced, not only by bees, but by other insects and animals as well, including beekeepers. We are generally unaware of them, though they exert a powerful, unconscious influence on our bodies and behavior, but in the hive they regulate almost every aspect of life. For example, workers produce alarm pheromones, released when they sting, to alert the colony to threats. (Many beekeepers say that they can detect the distinctive odor after being stung.) Larvae of all castes produce pheromones which communicate the age of the developing brood, signaling to nurse bees the proper time to feed and to cap cells. The multiple pheromones produced by the queen, which are manufactured in several glands in her body and made up of dozens of different chemicals, affect numerous behaviors of the colony's workers. These include feeding of the queen, suppressing the building of queen cells, and repressing the complete development of ovaries in workers to prevent their laying eggs, to name just a few. Her pheromones also carry the reassuring message throughout the hive that the queen is present, playing an important role in the cohesiveness of the colony.

Photo by Mark K. Parnell.

I always say that the social order in the hive breaks down if the queen is not present. If she disappears from the hive, whether killed by robbing bees or by a clumsy beekeeper, the colony becomes aware of the fact in a very short period of time – within an hour – due to the dissipation of the chemicals making up the queen pheromones. The bees then start to become agitated, and soon begin to produce queen cells. If a larva of the correct age is not available to develop into a future queen, the colony will lapse into a dispirited, queenless phase, typically when all the brood in the hive emerges and their pheromone contribution to the contentment of the colony ceases. The presence of brood pheromones also inhibits the laying of eggs by workers, and without that restraint, some workers will begin laying after all the brood has emerged. A queenless colony with laying workers has no chance of survival without swift intervention by the beekeeper. I call these colonies "hopelessly queenless". An experienced beekeeper can recognize a laying worker colony as soon as the cover is removed from a hive, by the "unhappy queenless roar" produced by the bees – very different from the normal contented buzzing of a queenright colony. Conversely, when a beekeeper introduces a new queen into a hive, the bees quickly become aware of her presence as her pheromones permeate the hive.

The question is, how is that accomplished? Do queen pheromones have to be transmitted by physical contact, by the direct touching of antennae to antennae, which would be prevented by isolating her in a cardboard box with a few thin slits? The answer is no. Though they are often spread by direct touch from queen to workers and then worker to worker throughout the colony, queen pheromones are also transmitted through the air. We see evidence of this when we unite two colonies, one with a queen and one without, separating the boxes by a sheet of newspaper, with slits cut in it. Within a matter of hours, the bees eat through the newspaper creating a single colony. The bees from the old, queenless colony accept the new queen due to the volatile transmission of her queen

substance through the slits, and likely through the thin newspaper as well. That pheromones can be airborne is also demonstrated in the attraction of drones to a queen during mating. Though they have good eyesight, drones also depend on a queen's pheromones to locate her. Try this experiment sometime when installing a queen. Set the caged queen down near a hive, and within a few minutes you will see bees on and about the cage, having been drawn by her pheromones when no physical contact was possible. Whether a new queen is introduced in a conventional queen cage or in a homemade cardboard box, rest assured that the bees will be aware of her almost immediately and will recognize her for what she is.

A beekeeper in New York writes:

How can I remove wild bee comb and brood that I just boxed yesterday from an old log section where they were originally located, and relocate them into frames? I put them in two brood boxes with frames between them, but know they can't stay that way very long.

Phil replies:

Congratulations. You've already finished the most difficult part of the job; the rest will be easy.

Relocating honey bee colonies from trees, houses, out-buildings, etc. provides a source of bees for many beekeepers and a source of income for some. When honey bees swarm, they seek out a location with an empty cavity several gallons in volume and preferably an entrance about 15 to 20 feet above the ground. An opening in the wall or soffit of a structure such as a house provides an ideal colony site for a swarm, especially if insulation is missing or contains voids. My family lives in an older frame house with about 20 hives of bees sitting 200 feet away and throwing out swarms every spring. I was always amazed that we didn't end up hosting a colony or two within our walls before we replaced our old wood siding. Perhaps the bees preferred some or the many trees around us, or else we were just lucky. While some homeowners call in exterminators when they end up sharing their living quarters with a feral colony, many turn to beekeepers to relocate the bees to a new home instead. That solution has obvious benefits for the bees, but can also be a better option for the homeowner. I once heard that poisoning a strong colony and leaving it in situ has an effect similar to that of having a cat die inside your wall: odor associated with decay, a lure for other insects and vermin, not to mention the likelihood of the honey and comb attracting another colony unless every potential access has been completely sealed

Installing comb from feral colony into a frame. Photo by Fritz Vorisek.

Though it is often a lot of work (even more if the colony's location is high in a tree or in a second story wall), the removal process is pretty straight forward. Split the log with a chainsaw or cut open the wall (suit up – the bees may not appreciate the disturbance), and carefully cut out the exposed comb including as much of the brood comb as possible. The comb can be transferred to empty frames (without foundation), and placed in a hive body. As I understand it, your question is about how to attach the removed comb to the frames. Actually this is pretty easy. You may need to do some trimming to match the comb to the frame size, but it can be temporarily held in place with string, or even rubber bands – see photo. The bees will permanently attach the comb and fill any voids, but string or rubber bands will work until they do. You should also leave them some comb with honey in the same manner.

One factor which can complicate bee removals is location; the bees may be difficult to get at or, as I mentioned before, high off the ground. Another is that the beekeeper is working away from home with no way of knowing what the specific conditions at the site will be. He or she needs to come equipped for any contingency. But sometimes you get lucky. A homeowner once called a friend of mine, who removes bees for a fee, about some honey bees inside her garage. She could see them going in and out through an opening next to a window frame and assumed they were building comb in the adjacent wall. However, my friend quickly realized that the bees were going through the wall and into the garage, rather than into the wall. The garage was empty except for an old fashion steamer trunk sitting in the middle. He watched for a while, and observed bees flying in and out of the trunk's keyhole. Upon opening it, he found it full of drawn comb and honey bees. With the permission of the owner, he simply moved the trunk into the back of his truck and took it home - the quickest removal he had ever performed. I have also known of bees being found in empty wooden crates, and old water or gas tanks. In such cases, the container can be transported intact and the actual extraction done in a location convenient to the beekeeper. Most removals, however, are not that easy.

A word of caution to *Bee Culture* readers who live in parts of the country where Africanized bees have been identified: do not attempt relocations without proper equipment and experience, and even then do so only with the utmost care. The risk of a serious stinging incident is high not only for the persons doing the removal, but also for anyone in the area. Some state apiary regulations restrict or forbid removal and relocation of honey bee colonies for this reason. Be especially cautious if the location of the colony is atypical. Africanized honey bees are less choosy than their European cousins and have been known to colonize sites near the ground or in other unexpected places.

A beekeeper in Kentucky writes:

I have an ornamental pond (18' x 12') in my backyard within about 25 feet from my hives. It has water lilies in it. All Summer I rarely saw bees there. Since the goldenrod

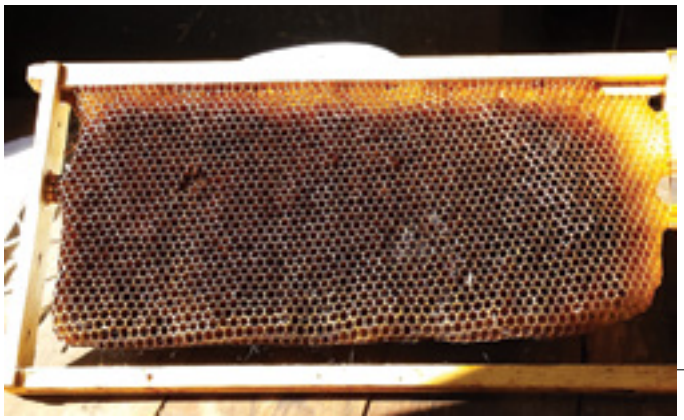
have come into bloom, there are a multitude of bees. They land on the water lily leaves for a drink. Is there a correlation of honey flow and hydration?

Phil replies:

A number of conditions might have led to the increased popularity of your pond, recent dry weather being one of them. Here in Kentucky (I live not too far from you), we had more than adequate rainfall in the spring and summer, but precipitation this fall has been below average. Your bees may have been exploiting another water source which has recently dried up.

Bees use water for multiple purposes. In summer it plays a role in regulating temperatures inside the hive. Water is collected and distributed in small droplets throughout the hive where air movement, propelled by the fanning of thousands of tiny wings, causes evaporation and lowers temperatures. However, the arrival of cooler Fall weather should reduce the colony's need for water for this purpose. It is still required for honey bee metabolism, though during flows the water content of nectar is usually sufficient. Bees also use water to dilute honey when consuming it, and to dilute nectar which is particularly low in moisture. You may be correct, then, in suggesting a correlation between floral sources and the bees' interest in your pond. When goldenrod blooms in Central Kentucky, so does aster. Both nectars tend to be concentrated, but in *Honey Plants of North America,* John H. Lovell describes aster nectar as ". . . so thick that at times it is extracted with difficulty . . ."

Except in the most arid conditions, honey bee colonies are capable of locating enough water to fulfill their needs. Never-the-less, many beekeepers without a good natural water source near their hives like to provide an artificial one. Most do this in order to keep their bees from becoming a nuisance to neighbors. Your bees' nearest water supply may be your neighbor's swimming pool, their dog's water dish, or a drip from their water hose spigot. Mine used to prefer our bird bath until my wife pointed out to me that the bird bath was for birds, not bees. I now use a modified chicken waterer to provide a more acceptable water source and keep peace in the family. One consideration when providing water for bees is making sure that it is shallow enough or that they have a place to alight in order to preventing them from drowning. My chicken waterer contains gravel in the trough for this purpose. Your water lilies also make a convenient landing pad from which to sip safely. I have seen numerous other watering devices created by beekeepers, some as simple as hoses slow dripping into shallow pans. So, if you would prefer that your pond remain strictly ornamental and less utilitarian, you have lots of options. BC



DITCH THE FOUNDATION

Good For You, Good For The Bees

Roger **Williams**

"Psst! Buddy! Hey you, with the veil. Yeh, you. Wanna save 100 bucks?"

This doesn't happen often to a beekeeper, some guy with a gray fedora shading his darting eyes, standing in a heavy coat in the shadows between the almond trees. And it didn't to me, but it might as well have.

Those who use plastic foundation can turn the page, as this does not apply to them. But for those who have become dyed in the wool organophilic beekeepers, those who think wax is what bees want and need and buy commercial wax foundation because of that leaning, this came as a surprise to me: Wax foundation is a low grade poison to bees. Moreover, we can replace it with – nothing.

Says who? For starters, says Steven Cook of the USDA bee lab at Beltsville, MD. Steven studies the effects of pesticide exposure on the metabolism of bees. He found in his testing that "if nurse bees are exposed via (physical) contact to a mix of two common miticides for one week, they lose nearly 30% of their basal metabolic budget (think "energy") when cleaning these chemicals from their systems[1]."

Both his test chemicals, coumaphos (e.g. CheckMite+) and fluvalinate (e.g. Apistan), are ubiquitous in commercial foundation primarily because commercial beekeepers used them in treatments against *Varroa* mites. The cappings from that commercial wax is made into standard wax foundation available from the major suppliers. These two miticides are not only chemically held by the wax, but their effect when mixed (as suppliers do when melting thousands of pounds of cappings wax together to make foundation) makes the combination even more toxic to bees. Beyond this, bees also are routinely exposed to other pesticides in their foods under normal foraging circumstances, so the metabolic debit only starts with the foundation. Steven also found that "nurse bees fed very low doses of the neonicotinoid Imidacloprid for one week lose over 50% of energetic budget.[2]"

Put the two together and, well, do the math. There is not much energy left to live on. These metabolic debits in bees are analogous to your liver cleaning last night's wine from your system, but the bees lose a significant amount of their total energy income to do it. In effect, bees on wax foundation wake up every day with a big hangover. This lost energy is not available for health, growth, work, or reproduction. We are trying to do something about neonic exposure, but it is beyond our direct control. In the meantime, is there anything we beekeepers can do about the issue of the chemicals in commercial foundation?

This got me wondering, but the penny didn't drop until Bill Castro, a thinking beekeeper in our club (Central Maryland Beekeepers Association, or CMBA), donated unused wax foundation to our club's nascent nucleus hive project. "I don't use it anymore", he said, off-handedly. That got my attention. He showed me a frame of perfectly drawn comb that the bees had made themselves entirely from scratch. Always the engineer, I had to test it.

The frame Bill showed me was a deep frame with fully drawn, wall-to-wall comb that had started with a blank wedge-top frame, three tongue depressors and two bamboo skewers. After I got the hang if it, the frame takes 15 seconds to prepare, is organic, sustainable, and is a fraction of the cost of a frame with wax foundation. The bees draw the foundation as they would in a top bar hive, guided by the lower edge of the tongue depressor. I have seen frames that were inserted with no guide and no foundation. The bees do a reasonable job with those, too, but nowhere near as neat as with the tongue depressors in place. They eventually fill in the whole frame, leaving the needed bee space beyond the vertical sides of the frame. The completed frame can be manipulated normally, used in an extractor and a solar wax melter (unlike plastic frames). Don't leave out the skewers (as I did in a test frame) or you risk the whole comb hinging out of the frame during an inspection. The bees do not appreciate that oversight. One CMBA member put 10 blank frames in a medium super and the bees drew them all straight and in line during a nectar flow. I staggered mine between normal foundation and the bees complied, drawing the comb straight and true.

The best thing since bottled beer, you might say. Though our club has started to use these frames in a pilot project in our nuc yard, all is not perfection. When a super has 10 of these waxless frames in place, there has been some cross-frame building on hives that are not level. However, we saw no more than the amount often associated with the use of new plastic frames. As well, some beekeepers have been shocked to find a frame almost completely drawn as drone comb. We do not know yet whether this is a seasonal affectation or a factor of the position of the frame within the hive. Also, given that all the parts are assembled with a friction fit to hold them in place, they don't manage rougher treatment until the bees cement the pieces together with beeswax. However, normal beeswax foundation is fragile as well,

[1]Direct quote from Steven Cook for this article, 8/2014. Steven Cook's tests will continue to investigate the effects to bee metabolism of several different types of pesticides to which bees are commonly exposed.

[2]ibid

and frames with wax foundation must be kept vertical before insertion in the hive. Lastly, if using a wedge top bar, the wedge can break free (what it is supposed to do), and therefore should be nailed (staples are faster) in place before assembly.

Getting a box of 500 non-sterile tongue depressors is as simple as an Amazon search. They are not expensive. Your local CVA or Rite-Aid will usually have only sterile, singly packaged pieces. And these are tongue depressors, not popsicle sticks. Similarly for the skewers, they are available in any super market usually in 12" length, but you can get them close to the length you need shopping online. I use sheet metal shears to cut them to length. BC

Angelo Prosperi-Porta

A Holiday Meal With Honey

I always like to veer a little off the beaten track when cooking especially when entertaining. This is the time to introduce new flavors – not a complete, radical departure from tradition (you don't want to upset Uncle Alfred!), but just a few subtle changes – enough to make your guests notice that something's different.

In this issue I will outline the rest of the menu that represents the transitional time of year started last month. These warm flavors of Fall will help inspire and kick-start your entertaining season. The menu can be approached in two parts, beginning with an informal stand-up gathering and followed by a more formal finale at the table. For starters, try just one or two of the dishes. I encourage you to experiment and make any changes you like.

Last time we made Ginger Lemon Soda, Spiced Honey Glazed Almonds and Rosemary Honey Scones. This month we finish with Honey Roasted Parsnips, Pan-Fried Trout and Spiced Honey & Roasted Yam Mousse.

HONEY ROASTED PARSNIPS

I love root vegetables at any time of the year, but Fall and Winter are the best times to enjoy these underrated veggies. Roasting or grilling brings out the natural sugars in most vegetables; parsnips are no exception. The honey, of course, adds even more flavor. If you do choose to grill root vegetables, you may want to lightly blanch or steam them prior to placing on the grill. This will allow them to cook a little quicker and maintain moisture. The result will also be more tender.

2 lb parsnips (about 4–6 medium-sized)
1 whole head garlic
6 large sprigs fresh rosemary
3 Tbsp extra-virgin olive oil
¼ cup honey
½ cup water
1 Tbsp smoked paprika
1 tsp table salt
1 tsp freshly ground black pepper

Preheat the oven to 375°F.

Peel the parsnips. Trim off the ends and cut into ½-inch pieces. Separate the cloves of garlic and peel.

Combine all of the ingredients in a roasting pan. (You can keep the rosemary sprigs whole.)

Roast in the oven for 20 to 30 minutes or until tender, turning every 10 minutes. Serves six to eight.

PAN-FRIED TROUT WITH ARUGULA, WALNUT AND HONEY PESTO

Fresh trout has always been one of my favorite fish. It brings back memories of the lakes surrounding the area where I grew up. Spring was always the best time. Fresh trout, salt and pepper, fresh new baby potatoes from Mom and Dad's garden for breakfast!

If you want to avoid more fully flavored fish, trout is a good choice. It is mild compared to most salmon species, although it is from the same family, and yet more flavorful than a basic white fish. The fresh sharp taste of the arugula goes well with the trout. This recipe can be adapted for any favorite fish. Try to choose one with enough flavor so it's not overwhelmed by the pesto.

4 (4–5 oz) trout fillets, skin on
2 Tbsp unsalted butter
1 Tbsp extra-virgin olive oil
Pesto
2 cups fresh arugula
½ cup Italian parsley
¼ cup chopped walnuts
1 Tbsp fresh lemon juice
1 Tbsp honey
¼ cup extra-virgin olive oil

Season the fillets with salt and freshly ground black pepper. Heat a 10-inch nonstick frying pan on medium-high heat. Add the butter and olive oil and let the foam subside. Place the fillets into the pan flesh side up and cook for three to four minutes. Turn over the fillets and cook for another two to three minutes or until the flesh just begins to flake when tested with a fork.

While the trout is cooking, process the pesto ingredients in a food processor or blender. Don't make the sauce too smooth – some texture should remain. Season with salt and freshly ground black pepper to taste.

Plate the trout, one fillet per person, and top with the pesto. Serves four.

SPICED HONEY & ROASTED YAM MOUSSE

Using root vegetables in desserts is not as unusual as it seems. There are many recipes for chocolate cake with beets, and, of course, carrot cake is a classic. Yams are used in quick breads, combined with pumpkin for pies, and even in ice cream. Here we use the yam in a mousse with honey. The result may be surprising. Yams bring a natural sweetness to this dessert, enhanced by the roasting process and the addition of honey. The spices in this mousse make it a great fall and winter dessert, reminiscent of pumpkin pie, but much lighter in texture.

1 medium-sized yam (or sweet potato)
4 large eggs, separated
¾ cup honey
1 tsp ground cinnamon
½ tsp ground ginger
¼ tsp ground nutmeg
¼ tsp ground allspice
Pinch of salt
½ cup heavy cream (35, whipped to soft peaks (optional)
Garnish
1 Tbsp light-colored honey
¼ cup toasted sliced almonds
Pinch each of ground cinnamon, ginger, and nutmeg

Preheat the oven to 375°F.

Scrub the yam or sweet potato, and poke it with a fork several times. Roast on a baking sheet until completely tender, about one hour. Slice it in half when cool enough to handle. Scoop out the flesh and put it in a food processor, discarding the skin. Process until smooth. For an even smoother consistency, press the purée through a fine-meshed sieve.

Combine the egg whites and honey in a bowl set over a pot of simmering water. Cook, stirring constantly, until the mixture reaches 160°F. Remove from the heat. Beat the whites using an electric mixer on high speed until glossy peaks form.

In a medium saucepan, combine the egg yolks, yam purée, cinnamon, ginger, nutmeg, allspice, and salt. Cook on medium heat, stirring constantly, until the mixture comes to a boil. Remove from the heat and set aside to cool.

Gently stir in one-third of the egg whites, and then gradually fold in the rest, along with the whipped cream (if using). Portion the mixture into 6 to 8 serving glasses, cover, and chill.

Make the garnish Have ready two 12- × 12-inch pieces of parchment paper. In a small saucepan on medium, heat the honey. Cook until it begins to caramelize or until darkened. This will take a few minutes. Once the honey is evenly colored, remove from the heat and stir in the almonds and the spices.

Spread the warm mixture onto one of the pieces of parchment. Top with the second piece of parchment, and roll flat with a rolling pin as thin as possible. Cool until the mixture hardens, and score or break into pieces of desired size for garnishing. Serves six to eight. BC

CALENDAR

♦ARIZONA♦

9th Annual Chemical Free Organic Beekeepers Conference will be held February 26-28 in Oracle.

The cost is $200 and includes two nights lodging, six meals and the meeting.

For information contact Dee Lusby, **deealusby1@aol.com**.

♦ALABAMA♦

The Alabama Cooperative Extension System's 21st Annual Beekeeping Symposium will be held February 6 at the Clanton Conference and Performing Arts Center, 1850 Lay Dam Road, Clanton.

Featured speakers are Marion Ellis and Jennifer Berry. A beginning workshop will be available. Lunch is provided with pre-registration.

For more details and to register visit **https://mellbase.uce.auburn.edu/wconnect**, or contact Paul Mask, 334.844.4450.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2016 Speaker Schedule – January 26: Allision Gillespie, author Hives in the City; February 23: Jonathan Snow, Barnard, TBD; March 29: Dr.John Boyce M.D., Yale, Honey as Medicine; April 26: Roberta Gantz, NYS TBD; May 24: James Wilkes, Hive Tracks – using technology for record keeping; June 28: Dinner & Silent Auction Meeting; September 27: Brenna Traver, Penn State, Honey Bee Pathogens; October 27: Anne Frey, TBD; November 17: Jennifer Tsuruda, Clemson TBD.

Each month we have timely weekend hands on inspection workshops, bee school, mentor program and more. For dates and locations and more information please visit **www.backyardbeekeepers.com**.

♦GEORGIA♦

Tara Beekeepers Association meet every third Monday at the Georgia powr Building, 752 Main Street, Forest Park at 7:00 p.m.

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

♦LOUISIANA♦

The LA Beekeepers Association will hold their annual convention December 4-5 at the Hilton Garden Inn, 400 Mane Street, West Monroe. Mention the beekeepers when you call for your room reservation, 318.398.0653.

Speakers include Cris Hiatt, Randy Oliver, and David Tarpy. Registration is $20/person or $30/family until November 13. Send check payable to LA Beekeepers Assn. to David Ferguson, P.O. Box 716, Brusly, LA 70719.

For more information contact Joe Sanroma, 318.308.5000 or Amy Weeks, 318.325.6614.

♦MICHIGAN♦

The Holland Area Beekeepers' Association (HABA) will hold its annual beginning beekeeping school February 6.

The cost is $40.

Visit **http://hollandbees.org** for details.

♦MONTANA♦

Master Beekeeping Certificate endorsed by MT State Beekeepers Association; The American Honey Producers Association and Project Apis m.

For more information visit **www.UMT.EDU/BEE**.

♦OHIO♦

Medina County Beekeepers Association meets the third Monday of the month at the Root Candle Company in Medina, OH. The meeting starts at 7:00 p.m.

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

Medina County Beekeepers will hold their annual Spring Beekeeping Classes starting in February, at Root Candle, 623 West Liberty Street, Medina.

The instructor is Kim Flottum. Classes will be held on Saturdays and Monday evenings. Watch for details.

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

♦PENNSYLVANIA♦

Penn State Seminar Series November 6 through December 4.

For details visit **www.ento.psu.edu/events**.

The Western PA Beekeeping Seminar will be February 19-20, 2016 at Doubletree by Hilton, Mars, PA.

Speakers include Jeff Harris, Diana Sammataro and Christine Grosinger.

For information contact Lyn Szymkiewicz at **lynszym@comcast.net** or 412.855.0710.

♦TEXAS♦

Austin Area Beekeepers Association will hold its 5th annual Beekeeping Seminar January 16 at the J.J. Pickle Research Campus, 10100 Burnet Road, Austin.

Pre-registration is $40. Speakers include Juliana Rangel-Posada, Mark Dykes, Mark Hedley and more.

For more info and to register for this event go to **http://aabaseminar2016.eventbrite.com**.

♦VIRGINIA♦

Virginia State Beekeepers Association will hold their Fall Conference November 8 at Blue Ridge Community College, Weyers Cave, hosted by Shenandoah Valley Beekeepers.

For more information and registration form visit **www.virginiabeekeepers.org**.

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I did some dumb things when I was a kid, so I didn't mind helping out a young man who could have wound up in a whole lot of trouble.

Driving down from Garfield Creek with a load of honey supers and thinking life was just peachy, I came onto a Toyota Tundra pickup on its side on the pavement, nearly blocking the whole road.

The driver was out of the cab. He might have been 20. "Holy guacamole!" I exclaimed. "How'd you do that?"

"I guess I was hot-roddin' it a little," he confessed, "I'd like to get back on my wheels. You don't got a chain, do you?"

"Something better," I said. "I've got a big ol' rope and a 460 under my hood. This'll be easy."

It was late Friday afternoon, but the kid didn't reek of beer. I do suppose he'd had a few.

The rope was a ski patrol rescue relic, 100 feet at least. I doubled it and threw a bowline around the truck's frame on the high end.

"Is that a square knot?" the kid asked.

I didn't want to pull too hard. I didn't know what was going to happen. When the rope went taut, the Toyota teetered, then slammed and bounced on the pavement, right side up! By the time I got out to untie the rope, the kid already had his truck started. "Nice thing about a bowline," I said, "You can untie the damned thing after you put a load on it. I saved you a ticket, you know."

"I owe you big time," he said.

I didn't think so. "Not me, but maybe somebody else," I said.

"Oh, I get it," he said.

Speaking of doing favors for strangers, our own MacArthur Fellow and patron saint of beekeeping Marla Spivak says you extend a kindness to your entire beekeeping community when you control your *Varroa* mites. Marla hit on this at the Western Apicultural Society meeting this fall in Boulder, Colorado. Especially with the proliferation of backyard beekeepers, too many *Varroa*-plagued hives go untreated, she opined, and the mite problem has gotten way out of hand. Marla argued for honey bee "herd immunity" from *Varroa*, much like the immunity conferred onto a human population when a majority of its members get vaccinated. If most of the people in your home town get vaccinated for say, smallpox, and then suddenly someone comes down with it, the disease is unlikely to unleash a pandemic.

Your hives can be a pit stop on the *Varroa* transmission highway, or they can be the dead end that saves the bees that live down the road. So gentle reader, maybe it's not just about you and your little darlings. Maybe it's about the rest of us, too.

Marla speaks softly and carefully, never jumping to conclusions. Throughout her distinguished research and university teaching career, she has always promoted bees and beekeeping, ever eschewing easy answers and radical bee ideology. She tirelessly seeks the middle way. We should probably send her to Congress.

Her talk also covered the importance of an ample, rich floral diet for honey bees and native pollinators. Bees that eat lots of pollen produce an abundance of vitellogenin, a blood protein that allows the glands in the heads of young adult bees to secrete good brood food for larvae. Among other benefits, a healthy diet makes it possible for honey bees to detoxify moderate quantities of pesticides, and brood food can be largely free from contaminants. Marla makes this all sound miraculous and wonderful, which of course it is.

She approves of the movement to ban neonicitinoid pesticide production and use, because it forces discussion and research on this important issue. Native bees are more profoundly affected by the neonics than honey bees, she notes, because their larvae's detoxification genes are not well developed, and they eat the pollen directly, rather than via nurse bees. But her goal is the judicious use of pesticides, not necessarily their outright ban. "We need to have our pollinators and some of our pesticides," she concludes. She reported on a study tracking a commercial beekeeper's bees over three years, from North Dakota to California. The bees with the best forage had the least Winter kill. Remarkably, these bees also showed the greatest exposure to pesticides.

The next morning our Boulder hosts Beth and Dave asked if we might do a mite test on her bees. We stood in her bee yard in the rain, shaking powdered sugar-coated *Varroa* out of a quart mason jar, like coarse pepper onto fried eggs. We didn't even shake very hard and counted 40 mites in a 300-bee sample. I said, "I guess we've seen enough!" We went ahead and treated her three colonies with Apivar, a time-release Amitraz strip.

Beth asked my opinion about hive wrapping for winter insulation. I said, "Look, your bees aren't going to freeze to death. Don't sweat the petty stuff. But do treat your mites. Now that's important." Her beekeeper neighbors should thank her.

Ed **Colby**

Marla & Mites

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