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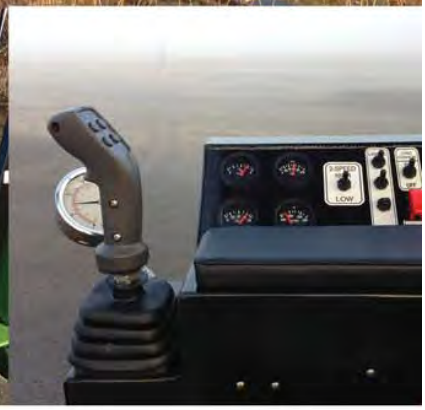

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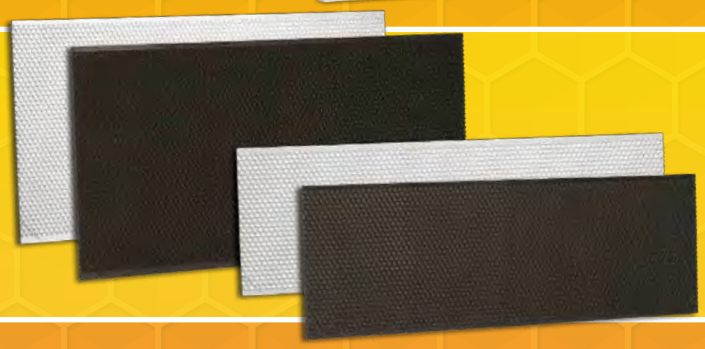

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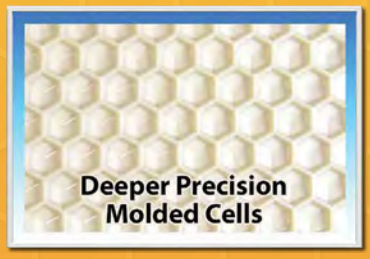

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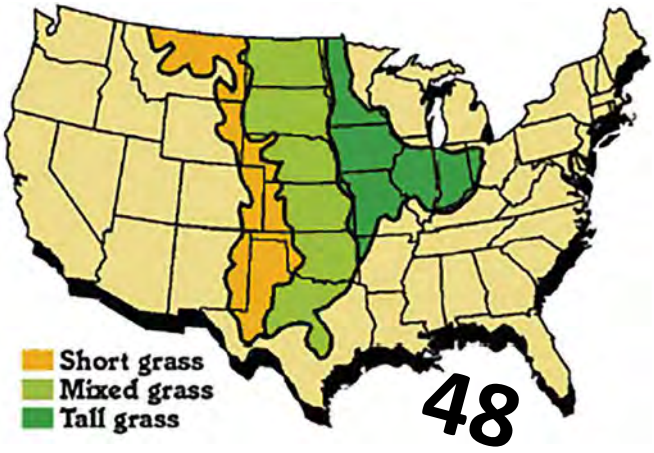

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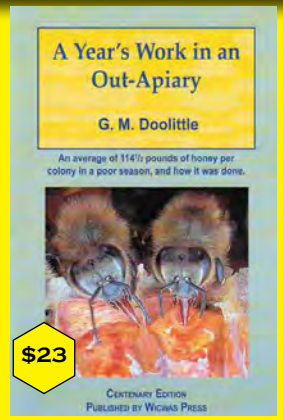

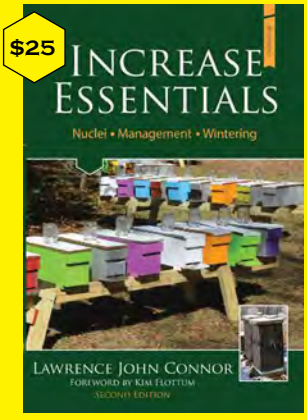

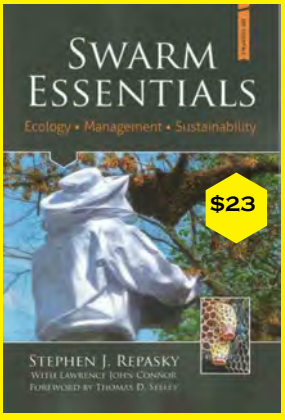

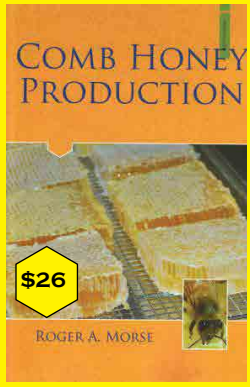

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Tree Hive Colonies

It was hard to understand why it would make a difference how high and what advantage there would be to strap a hive to a tree. The bees aren't *in* the tree but it's probably just me.

I've monitored feral colonies for years, especially after the mite introduction in the 90s. I check these feral bees in April. If they're alive then that means they survived the Winter. These colonies are in buildings and trees. I know of 16 colonies – half of these are in trees.

Looking at my records there is no difference in the death rate of the two, but most of them will be inhabited again by new swarms. None of these have existed for more than three years, about the same as my colonies although I have one colony that is into its 15th year.

I've done nothing different to this hive. It's a good producing hive most years. Three years ago it looked like AFB had taken hold but never showed up again. I did medicate that first year with teramycin but not since. It does seem to cast swarms in late July or August which seems strange to me. But perhaps it breaks the mite cycle and helps the Winter bees survive.

Getting back to the 'tree hives,' and how scouts prefer an elevation of 12 feet I can't argue that, but I've picked up more than 500 swarms in Decoy hives in the last 50 years. These were on or near the ground, but it could be with everything being equal, scouts would probably pick the higher one

Jim Cowan
Aberdeen, WA

Books On Organic

To Bill Day,

Regarding your letter to the editor "Books On Organic" in the March issue of *Bee Culture*, I agree that Gunther Huak's book was published before mine. However, *Toward Saving the Honeybee* is a book on Biodynamic Beekeeping, Published by the Biodynamic Farming and Gardening Association, by Gunther Hauk who refers to himself as a Biodynamic gardener and beekeeper. I don't think Gunther uses the word "organic" in reference to a type of agriculture in his book. I've always believed that there is a difference between biodynamic agriculture and organic agriculture, in fact some would say that biodynamics goes far beyond organic. I do agree with your point that Gunther has done a lot of work on behalf of the bees, a fact that was inadvertently overlooked in the activist article, as I am sure I overlooked many others who have done a lot of work on behalf of the bees as the article could only be so long. If you really want to get technical, *Elimination of American Foulbrood Without the Use of Drugs* was written by Mark Goodwin and Cliff Van Eaton and published by the National Beekeeper's Association of New Zealand before my book or Gunther's book were released. Rather than cover beekeeping generally as Gunther and I did however, this book focuses on one specific aspect of beekeeping, but is closer to representing an organic approach in my mind.

Ross Conrad
Middlebury, VT

Bee Culture

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Certified Organic Honey

Everything comes back to the hive – either the bees carry it back with food resources, propolis, and water, or they inhale the gases, and then there is the direct movement in and out due to the ventilation of the hive. Gaseous, particulate, water, all comes in. Added to this is that bees are electrostactically charged – just like modern dust mops.

Once in the hive, chemicals are shared amongst the bees, partition into wax, and can persist in wax for long periods – obviously the degree to which wax accumulates, how long it holds, etc. depends on the nature of the chemical.

The crud coming into the hive is not limited to pesticides and agricultural chemicals. Heavy metals, trace elements, volatiles and semi-volatiles, industrial, urban, even radioactive materials, all get into the hive. Many at very low levels, but each hive carries a finger-print history of its exposures.

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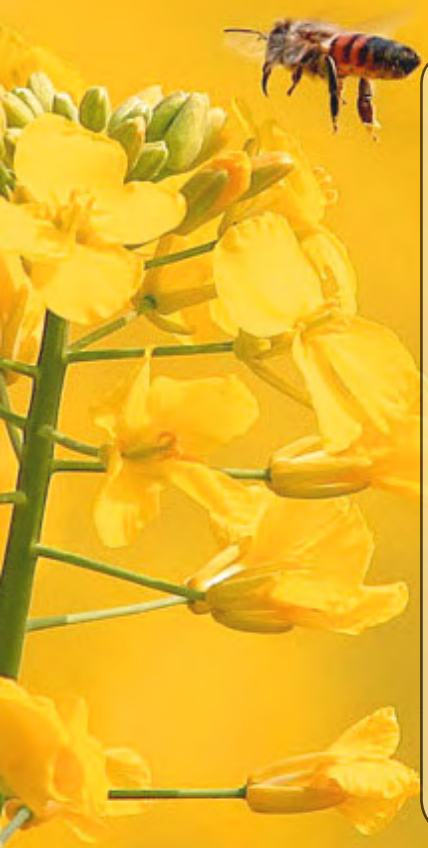

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And for migratory beekeepers and those in urban areas, the pesticides and agrichemicals are only a small portion of what's in the hive, it's contents, and its atmosphere. We typically find over 200 volatiles and semi-volatiles in the hive atmosphere, mostly reflective of traffic, heavy industry, urban sources such as emitted by dry cleaners and auto repair shops, to name a few.

Technically, these is no such thing as organic honey – even in the remotest areas of Montana, far from any urban or industrial facilities, long before the coal fired power plants – we found break-down products of gasoline and diesel, traces of industrial solvents and degreasers, inorganic elements, some of which are toxic such as Fl (from water from artesian wells) and selenium from native plants, as well as radionuclides from the Chinese atmospheric testing (70s).

What's in a hive varies by location, year; but it's a constantly changing soup. Bad news, particulate contaminants are commonly found adhering to pollen grains. Good news, overall, honey stays remarkedly clean, but it's never free of contaminants. So, I madden the organic crowd when I point out that the beehive is the collector of everything in its surroundings, and bees fly two miles easily, so just because the field next to the hive is organic; remember the bees aren't constrained by fence lines. Finally, in the 70s and now with the Permaculture crowd, there's a push to turn cheap, discarded, waste lands into sustainable, organic farms. So I've found over the years that these folks ignore the history of the site, but the bees share in what's left in the soil, water, etc.

I can find areas in MT that are 20-30 miles from another town,

miles from another ranch. Their honey may be cleaner, but long-range transport of pollutants in the air, even global, still exposes bees. Now, you can argue the same for the plants. It's where you draw the lines of the definition. Still, plants are place bound, don't move much. Bees on the other hand aren't on a leash.

Jerry Bromenshenk
Missoula, MT

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Larry Singer is a retired, award-winning photojournalist now living in Oakland Park, FL. Currently, five of Singer's photos are inside, and on the cover of, a 2015 Butterfly calendar now being sold at Walmart. The picture of the bee was taken at Bonnet House in Fort Lauderdale.

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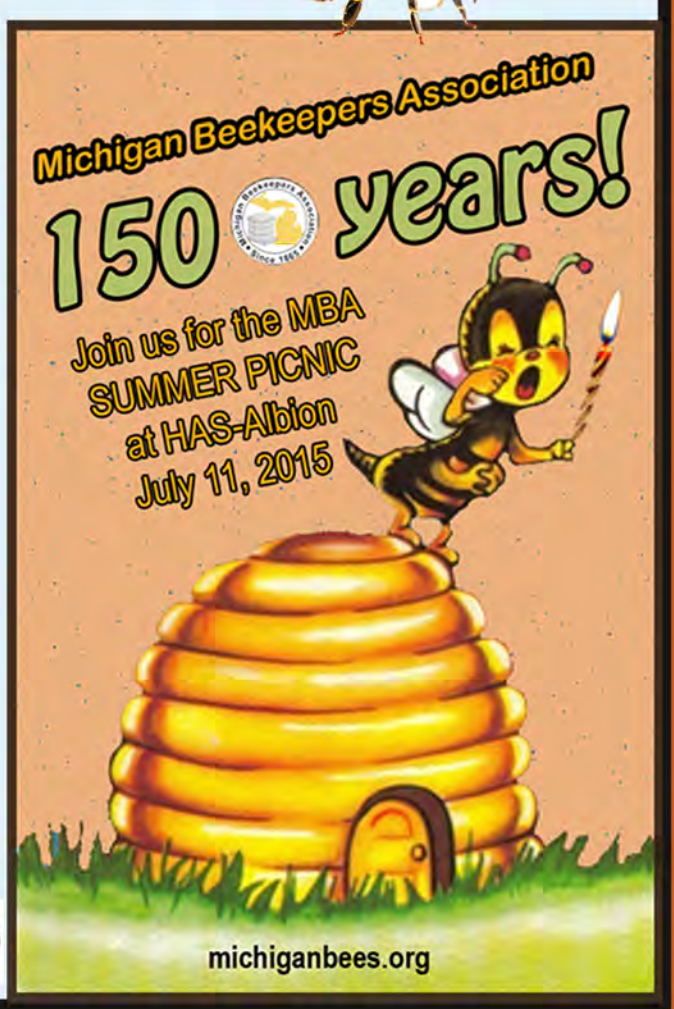

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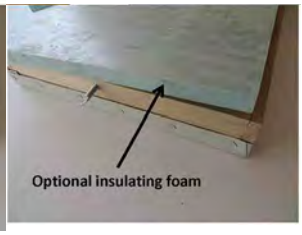

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To use the Bee Lining Box, the bee hunter captures a forager on a flower in the hinged end of the box. Honeycomb with anise scented syrup is placed in the second compartment and the captured bee is allowed to enter. The bee discovers the rich nectar source, loads up and heads for the beetree or hive. Other workers are recruited and return to the bee lining box. The direction that they fly is called the beeline, indicating the direction to the hive. Once this direction is established, the bee hunter takes the box (with bees) and moves 100 to 300 yards along the beeline until the feral colony (or your neighbor's) is discovered!

The Bee Lining Box is built for Betterbee by a local craftsman, patterned after the box described in George Edgell's The Bee Hunter. Consisting of two chambers separated by a movable slide, the front chamber has a window and hinged cover.

The Bee Lining Box can be purchased as a stand-alone item or in a kit that includes everything you need to get started – the Bee Lining Box, The Bee Hunter by George Edgell, Anise Extract, and a piece of plastic honey comb to place your syrup and extract. Available now from Betterbee **www.betterbee.com**.

Join *Bee Culture* Magazine's Exploration of the Four Pillars of Honey Bee Management in October, 2015 at the *Bee Culture* Conference Center (on the A.I. Root Co. campus), 640 West Liberty Street, Medina, Ohio.

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Then follow **Jim Tew's** arctic, and not-so-arctic adventures in wintering. Everything from as far north as you can get to moving bees south for a kinder, gentler Winter. Refresh your Winter biology, then get better at wrapping, moving, feeding, treating and all you need to know to get bees from Fall to Spring.

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Finally, Pillar Four. *Varroa.* Listen and learn *Varroa* biology, but most importantly, *Varroa* control from **Dennis vanEngelsdorp**. Get every detail on every *Varroa* treatment. How, when, why, where. *Varroa* control chemistry needs to be perfectly understood to avoid, or reduce wax issues, and IPM *Varroa* controls need to be understood and used as much as, and as effectively as possible. Space is limited. Register early. Watch for details.

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Wanting to make the brood area more accessible without the heavy lifting and a dismantled hive, I designed and built my first rotatable beehive using standard frames that are readily available on the market.

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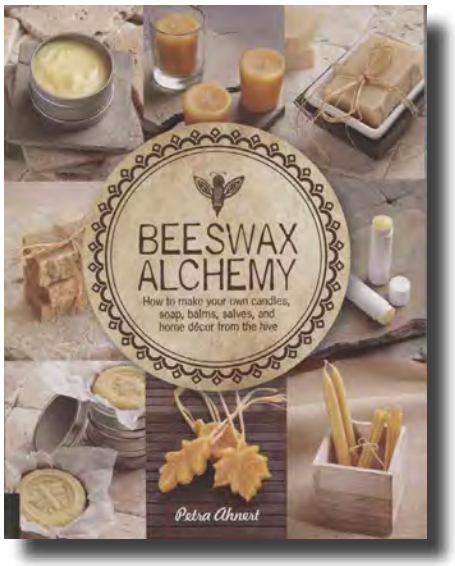


Beeswax Alchemy. How to make candles, soap, balms, salves and home décor from the hive. By Petra Ahnert. ISBN 978-1-59253-979-6. Published by Quarry Books. 8-1/4" x 10", 136 pgs., color throughout, flexi-soft cover. $25 at *Bee Culture's* book store, or book stores everywhere.

I have been working with the good folks at Quarry Publishing for several years now, and they have expanded their beekeeping titles and items greatly since we got together. Today they have my three books, a beekeeping calendar every year, a Beekeeping Journal, and a set of three beekeeping note books to use for anything bees. Now they've expanded their collection to include the best book on beeswax I have ever seen. They sent me a very advanced copy several months ago for comment, and I was so impressed I send back a rave review, and they used that comment on the back of the book. It is as good as they, and I say it is.

Chapters include basic beeswax info, candles (and more info on wicks than you can imagine), balms and bars, salves, creams and scrubs, soaps, home products (ornaments, firestarters, polish, luminaries, waxed wraps and much more), batik and encaustic painting, and pages and pages on ingredients guides and resources.

One of the features I like about Quarry is that they insist on lots of very good photos. They begged, cajoled, threatened and argued with me for more photos for my books, and they probably did the same for Petra because how to do everything is shown with good photos, ingredients lists, equipment needed and instructions. If beeswax is part of your business, your business should get better. If it's not, now it will.

Kim Flottum

New books from Northern Bee Books

The Hive and Honey-Bee, by L. L. Langstroth, third edition. ISBN 978-1-908904-52-2. 9½" x 7¼", 409 pages, black and white, paper bound. $25 Available at *Bee Culture's Book Store*, or book stores anywhere.

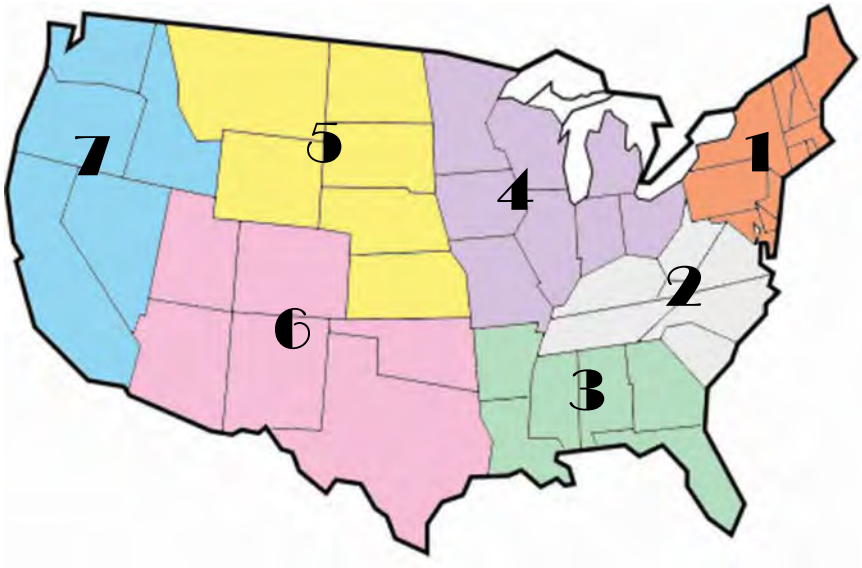
First published in 1860, this third edition has significantly more drawings of the equipment discussed, and introduces several new management methods that utilize the moveable frame hive to its fullest. It's always interesting to note how much they knew then, how much hasn't changed, that practical beekeeping information is still basically the same, and that the equipment isn't much different. Still, much has changed, and some of what they thought then was fundamentally wrong, simply because the technology hadn't caught up with them yet.

When A.I. Root was first introduced to bees here in Medina, he immediately wanted to know more so the very next day he went to Cleveland and looked in book stores for more information and found two books. This third edition of Langstroth's book was the one he bought, and look where that got him. If you haven't read any of the older editions of this work, this is a good place to start. You will be better for having immersed yourself in our history.

Kim Flottum

Continued on page 17

MAY – REGIONAL HONEY PRICE REPORT



Demand, Price, Production, Growth

The results of the NASS survey and our analysis of their data are publisher here this month. I encourage you to take a look at the historical and current information to get a picture of where we have been, and where we are relative to honey production, imports and exports, and most importantly, per capita consumption in this country. 30 years ago the assumption was that consumption was about a pound a person…and that assumption remained unchanged until we actually looked at it a few years ago. Well, it's more than that, and has been more than that for some time. Last year, over a pound and a half per person, and every year there are more people. So no wonder imports are up again. Given that, we asked our reporter what their plans were for this year.

Demand. 57% expect demand to increase again this year. We see that as a definite trend and beekeepers everywhere should be ready for that. 2% expect demand to remain the same, while 40% seem to think it will remain steady. That trend is strongest in the northeast and Midwest. The northeast has been strong for some time, so perhaps that is a good plan. Increase is strongest in the west and southwest.

Prices. With continuing increases in the cost of just keeping bees alive, 45% of our reporters will be increasing their prices this season, while essentially nobody is lowering them. The rest, of course will remain steady. The Midwest and southeast have the least activity, while the northeast and west are the most aggressive in pricing.

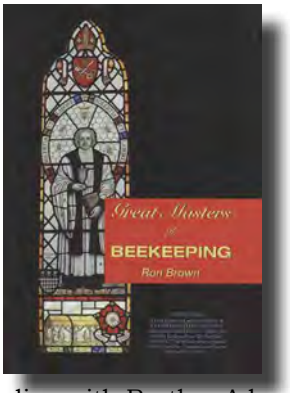
Production. 56% or our reporters will not increase production this season, probably, though we didn't ask, because they are increasing prices to gain or keep steady, their income. The remaining will increase production to capture this growing market. Reporters in the southeast are the most active in this, while the Midwest remains steady.

Growth. 46% of our reporters plan to increase the actual size of their operation this year, and 43% plan on remaining the same, while 6% plan to downsize. The west and southwest are by far the most ambitious in their plans.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7				Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**		
55 Gal. Drum, Light	2.22	2.03	2.33	2.48	2.23	2.18	2.30	1.89-3.25	2.29	2.29	2.26	2.26
55 Gal. Drum, Ambr	1.90	2.00	2.15	2.43	2.29	2.02	2.25	1.80-3.00	2.18	2.18	2.15	2.07
60# Light (retail)	202.38	197.00	183.00	198.46	171.00	176.55	282.50	136.00-285.00	198.38	3.31	203.12	196.67
60# Amber (retail)	205.50	201.00	181.00	190.85	205.74	172.33	248.33	136.00-295.00	195.99	3.27	198.34	192.28
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	83.91	76.32	60.00	64.02	51.84	86.40	100.00	48.00-120.00	77.53	6.46	75.83	78.34
1# 24/case	123.66	102.08	115.23	100.84	106.32	115.96	114.13	78.00-192.00	112.68	4.70	116.59	113.63
2# 12/case	106.03	89.67	96.71	91.86	97.44	95.60	114.00	70.00-163.20	99.37	4.14	100.17	97.79
12.oz. Plas. 24/cs	101.13	82.14	90.64	77.23	74.40	91.39	103.60	42.72-153.60	89.18	4.95	89.98	88.97
5# 6/case	134.18	104.20	125.23	106.50	102.30	105.20	125.00	84.00-216.00	117.89	3.93	114.76	117.85
Quarts 12/case	165.27	123.11	123.04	130.26	125.64	124.78	133.50	72.00-202.60	132.47	3.68	136.53	139.09
Pints 12/case	134.44	83.50	70.00	88.78	133.84	68.10	94.00	48.00-306.00	90.67	5.04	90.29	85.14
RETAIL SHELF PRICES												
1/2#	4.70	4.10	3.50	3.31	4.86	4.22	6.00	2.19-7.75	4.24	8.47	4.13	4.12
12 oz. Plastic	5.85	4.63	4.93	4.58	4.85	5.37	7.05	3.50-8.99	5.17	6.89	5.28	5.17
1# Glass/Plastic	6.90	6.82	6.97	5.75	6.73	6.30	10.00	3.00-11.99	6.68	6.68	6.52	6.40
2# Glass/Plastic	12.02	11.04	10.57	9.87	9.92	10.21	16.00	6.00-18.25	11.04	5.52	11.33	11.09
Pint	10.99	8.73	7.99	9.11	9.43	10.45	12.13	4.00-21.00	9.53	6.35	9.52	8.55
Quart	16.50	15.58	14.60	15.27	16.38	16.12	17.60	8.00-35.00	15.75	5.25	15.24	14.09
5# Glass/Plastic	28.22	23.36	30.50	22.79	21.95	23.51	30.00	15.00-39.95	25.21	5.04	24.76	24.66
1# Cream	8.51	7.63	9.00	6.87	7.24	6.20	9.50	4.50-12.00	7.70	7.70	8.09	8.04
1# Cut Comb	10.15	8.58	7.50	8.56	8.50	9.50	14.50	5.00-15.00	9.32	9.32	9.90	8.74
Ross Round	10.01	6.33	8.00	10.13	9.07	9.83	9.07	6.00-12.00	9.14	12.18	8.45	9.00
Wholesale Wax (Lt)	7.52	4.47	5.31	5.68	6.00	4.43	4.75	2.50-12.60	5.75	-	5.33	5.53
Wholesale Wax (Dk)	7.06	4.20	4.68	5.27	5.73	3.53	4.25	2.35-10.00	5.28	-	5.07	5.09
Pollination Fee/Col.	91.20	64.67	58.33	68.57	80.00	93.00	131.67	35.00-185.00	81.39	-	83.00	76.52

Great Masters of Beekeeping. By Ron Brown. ISBN 978-1-908904-73-7. 6-1/2" X 9-1/2", 110 pgs, black and white, soft cover. $18.00 available at Bee Culture's book store or book stores everywhere.

We did not arrive where we are today without the imaginations of many good people. Here are many of them, and the stories of what they accomplished. Starting with Charles Butler and the Feminine Monarchie published in 1609, to Francis Huber and his leaf hive, to Bevan and honey plants in the early 1800s, to Langstroth in the US, to the inventors of wax foundation, the honey extractor, the queen excluder, the smoker and the bee escape. With many inbetween, on to Karl von Frisch and the dance, Dorothy Hodges and her pollen color book,

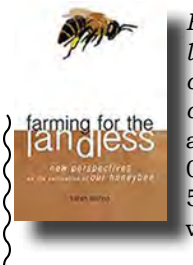


and ending with Brother Adam. The history of beekeeping is summed up in these pages, each chapter only a few pages long that captures the essence of the contributions of the 30 people highlighted here. There is much that is not new under the sun, but this book will help you understand how we got here.

Kim Flottum

The Principles of Bee Improvement. By Jo Widdicombe. ISBN 978-1-908904-62-1. 9½" x 6½", 80 pgs., color, soft cover. $20.

Jo Widdicombe, B.Sc. (Hons.) Environmental Science, has been beekeeping for over 30 years and has been a member of BIBBA for more than 25 years, serving on the BIBBA Committee. Jo worked as a Seasonal Bee Inspector for five years and is a Bee Farmer in Cornwall UK running over 100 colonies. *The Principles of Bee Improvement* offers a practical approach and is an attempt to lay down guidelines which are true and applicable to beekeepers in any circumstance. Rather than searching the country, or the world, for the perfect bee to breed from, this book explains how to select and improve bees from the local bee population. It discusses the problems of importation, the use of natural and artificial selection, assessment of colonies and selection within a strain. By following these methods, the standards of our bees can be raised, producing gentle, hardy and productive bees. *Northern Editors*



Farming for the Landless. New Perspectives on the Cultivation of our Honeybee, By Sarah Waring. ISBN 978-0-9569404-6-9. 8" x 5", 195 pgs, black and white, soft cover. $15.

Devastating honey bee losses have resulted in rallying calls to 'save our bees'. Media interest and a multitude of campaigns have raised public awareness and yet also reinforced popular myths. Concern for bees is high, but what might it mean to consider the conservation of a farmed creature?

Informative and thought-provoking, Farming for the Landless travels from the intensive agriculture of Romania to fallow post-war Kosovo, from remote sites in Slovenia and Sweden to the urban sprawl of Paris and London, exploring changes across the European landscape to better understand this critical moment for honey bees, beekeepers and the non-farming landless community we have largely become.

Sarah Waring lives and works in the UK and Italy. She studied Fine Art Photography at the Royal College of Art, lectured at the Univ of Westminster and Univ of the Arts and worked as a writer and media publishing editor in London. She has travelled extensively throughout rural Europe where her interests in ecology and agriculture have been brought to life especially via hands-on experience in Austria, Italy, Sweden and Wales. *Northern Editors*

Bee Keeping with ZEST, by Bill Summers. ISBN 978-1-908904-69-0 color throughout. Soft cover. $18.00.

This is a book like no other on the subject of honey bees. It addresses the author's belief and that of his colleague (Dave Durrant) that the welfare of honey bees in a traditional hive fails to provide for their needs as biological systems. This realisation led to the design of the ZEST hive which does do so according to the author. It deploys a longitudinal external envelope, with top bee entry and trickle ventilation, made from lightweight insulated building blocks and plastic lattice frames within which the bees draw out their wild honeycomb. The former is DIY from builders merchants and the latter available in boxes of 12. The external envelope is not just a lightweight insulated one, but is sufficiently heavy to provide the bees with a thermal lag of an envelope that is easily thermo-regulated to brood rearing temperature. From the honey bee perspective the ZEST hive overcomes all the problems of other hive designs and frame types. An unintended consequence of the ZEST hive design has been to eliminate *Varroa* according to the author. The ZEST is functionally free of it as is witnessed by the hive debris. The cause seems to be the smaller natural cell size and natural warmth of the hive envelope, both of which speed the biological process of honey bee pupation. The time available for the varroa to mature in the pupating cells is reduced. There has been a recent doubling of beekeepers in the UK caused by the ecologically minded seeking to assist honey bees in a better environment. This can be applauded. This book is to assist them and their bees. The ZEST hive is democratic. Anyone can have one. It is cheap, appropriate and amenable to a more self-sufficient way of life. It is a living sustainable system, not a product. It can be entirely D.I.Y. No one owns it. It can be free. Take it. Use it. Have fun. The ZEST hive does a great deal more with a great deal less.

From The Publisher

U.S. Honey Industry Report – 2014

Honey production in 2014 from producers with five or more colonies totaled 178 million pounds, up 19 percent from 2013's 149.5 million pounds. There were 2.74 million colonies producing honey in 2014, up 100,000 pounds, or 4 percent from 2013. Yield per colony averaged 65.1 pounds, up 15 percent from the 56.6 pounds in 2013. Colonies which produced honey in more than one State were counted in each State where the honey was produced. Therefore, at the United States level yield per colony may be understated, but total production would not be impacted. Colonies were not included if honey was not harvested. Producer honey stocks were 41.2 million pounds on December 15, 2014, up 8 percent from a year earlier. Stocks held by producers exclude those held under the commodity loan program.

Honey prices increased to a record high during 2014 to 216.1 cents per pound, up 1 percent from 214.1 cents per pound in 2013. United States and State level prices reflect the portions of honey sold through cooperatives, private, and retail channels. Prices for each color class are derived by weighting the quantities sold for each marketing channel. Prices for the 2013 crop reflect honey sold in 2013 and 2014. Some 2013 crop honey was sold in 2014, which caused some revisions to the 2013 crop prices.

OK. NASS has spoken. We did the same back in November, using our survey data to make similar comparisons. Let's see how we did.

But let's look at a little history first. For the record, in November 2013, we predicted the 2013 honey crop to be between 96 and 132 million pounds, the smallest ever recorded. And it was, but not as small as we thought it would be…it came in at 149.5 million pounds. We missed it by between 10 and 30%. Not bad on the high side, but not so good on the low side. Our colony prediction for 2013 was 2.4 million colonies, and NASS put the number at 2.6 million, so we nailed that one.

On to 2014. Last November we predicted, using our Honey Market Reporter survey data, that there would be 2.65 million colonies last year, and NASS says there's 2.74 million out there. We felt that the 2014 honey crop was going to be better than 2013, but not by much. Using our survey data of a 53 pound average our prediction for the 2014 honey crop was 143 million pounds. NASS came in at a 65 lb. overall average for a 178.3 million pound crop, due primarily to their substantial production numbers in the Dakotas and Montana. We missed the honey production number again this year by about 20%. At least we are consistent.

The top 10 producing states remained pretty much the same, with a little jockeying around for who is in what slot. Wisconsin dropped off the Top 10 list this year because MI got both a bump in number of colonies and had a better crop in 2014. Maybe the colonies Wisconsin lost moved east for that better crop. Combined, these top 10

Honey: Number of Colonies, Yield, Production, Stocks, Price, and Value by State and United States, 2014

State	Honey Producing Colonies[1]	Yield per Colony	Production	Stocks, Pounds Dec 15[2]	Average Price per Pound[3]	Value of Production[4]
	x1,000	Pounds	x1,000	x1,000	Cents	1,000 Dollars
AL	7	53	371	26	340	1,261
AZ	26	39	1,014	193	202	2,048
AR	21	65	1,365	137	200	2,730
CA	320	39	12,480	2,995	203	25,334
CO	27	37	999	200	200	1,998
FL	245	60	14,700	1,029	208	30,576
GA	73	62	4,526	362	219	9,912
HI	15	93	1,395	140	228	3,181
ID	100	34	3,400	850	203	6,902
IL	8	49	392	94	441	1,729
IN	5	62	310	115	324	1,004
IA	35	43	1,505	933	251	3,778
KS	7	75	525	84	233	1,223
KY	5	47	235	56	393	924
LA	48	84	4,032	524	226	9,112
ME	8	47	376	41	536	2,015
MI	91	63	5,733	1,835	250	14,333
MN	132	60	7,920	1,426	206	16,315
MS	20	112	2,240	45	201	4,502
MO	12	47	564	96	357	2,013
MT	162	88	14,256	5,132	205	29,225
NE	50	75	3,750	1,688	210	7,875
NJ	12	30	360	119	298	1,073
NY	60	55	3,300	1,518	272	8,976
NC	12	43	516	88	347	1,791
ND	490	86	42,140	9,271	200	84,280
OH	15	61	915	256	352	3,221
OR	71	40	2,840	767	219	6,220
PA	17	46	782	203	275	2,151
SC	9	54	486	19	383	1,861
SD	280	87	24,360	5,846	209	50,912
TN	7	63	441	88	323	1,424
TX	116	78	9,048	2,081	223	20,177
UT	29	28	812	130	213	1,730
VT	3	58	174	61	503	875
VA	6	41	246	57	507	1,247
WA	68	44	2,992	1,167	248	7,420
WV	6	31	186	33	404	751
WI	53	54	2,862	1,030	232	6,640
WY	38	61	2,318	255	206	4,775
Other States[5,6]	31	45	1,404	202	358	5,026
U.S.[6,7]	2,740	65.1	178,270	41,192	216.1	385,241

[1]Honey producing colonies are the maximum number of colonies from which honey was taken during the year. It is possible to take honey from colonies which did not survive the entire year.
[2]Stocks held by producers.
[3]Average price per pound based on expanded sales.
[4]Value of production is equal to production multiplied by average price per pound.
[5]Alaska, Connecticut, Delaware, Maryland, Massachusetts, Nevada, New Hampshire, New Mexico, Oklahoma, Rhode Island, and South Carolina not published separately to avoid disclosing data for individual operations.
[6]Due to rounding, total colonies multiplied by total yield may not exactly equal production.
[7]U.S. value of production will not equal summation of States.

Honey Prices 1995-2014

Cents/lb.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
All Honey	68.5	87.8	75.7	65.5	60.1	59.7	70.4	132.7	138.7	108.5	90.4	104.2	103.2	141	144.5	160.3	172.9	195.1	212.6	216.1
Retail Shelf	100.0	117.3	125.7	114.7	126.6	130.4	142.2	152.5	188.5	188.7	183.3	191.0	196.1	197.6	278.4	305.4	328.4	340.5	373.5	406.6
%Difference	31%	25%	40%	34%	53%	54%	51%	13%	26%	42%	51%	46%	29%	28%	48%	48%	48%	43%	43%	47%

states have just short of two million colonies. That's 71% of all the boxes out there. Those nearly two million colonies produced 139.1 million pounds of honey, or 78% of the U.S. total last year. When you look at average production for those Top 10 states however, they have an 89 lb/colony average, compared to the overall U.S. average of 65 pounds. Those figures, too, don't change much from year to year. If you want to make a living making honey, you know where to go.

Another statistic we try and develop each year is how much honey does each person in the U.S. consume, on average, during the past year. Here are our rounded figures for the most recent five years:

Year	Million lbs honey in	million lbs honey out	million population	lbs/person
2010	398	29	307	1.20
2011	470	80	309	1.27
2012	487	53	312	1.26
2013	500	49	314	1.44
2014	547	56	318	1.55

And here's how we arrive at those figures. We begin with the honey production figure this year, 178.3 million pounds, add imports (see below for more on U.S. imports in 2014), add stocks held over, plus honey on loan from the previous year. That total for 2014 comes to 547.4 million pounds into the U.S. From that total we remove honey that has otherwise been accounted for - exports, honey on loan and current stocks. That comes to 55.8 million pounds, for a total consumed for the year of 491.6 million pounds. To be consistent, we always use the July 4 Census Bureau population figure, which this year was 318 million people, and divide honey consumed by number of people consuming it and the per capita consumption for 2014 for the US comes to 1.55 pounds per person. That's up .11 pounds, or about 1 and ¾ ounces per person over last year. When multiplied times the 4 million more people we have this year over last, the amount of additional honey consumed is significant. The trend is positive, and has moved off the dime of that one pound per person we were stuck on for so long.

What's more interesting, we believe, is the fact that you know a lot of people who never, ever eat a drop of honey. Not one. Right off the bat you can figure that kids one year or less don't eat any, and that comes to 204 thousand people not eating that 1.55 pounds and releasing 315 thousand pounds to be consumed by someone else. Let's see, there are 29.1 million people with diabetes in the US. We think it's safe to say that most of those people consume very little honey…let's say none for argument's sake here. That comes to 45.1 additional million pounds released. Let's narrow down our numbers. 491.6 million pounds, minus (0.3 million pounds plus 45.1 million pounds) 45.4 million pounds = 446.2 million pounds, divided by the unhoneyed population of 289 million = not much change…1.54 pounds per person. Of course we aren't accounting for those folks who just don't like honey…but how do you count them? Everybody knows at least one, so does that mean half of the population doesn't like honey? For now, we'll leave that as a guess.

Let's look at some of these figures. In 2014, we produced 178.2 million domestic pounds of honey. We imported 366.2 million pounds and had 2.9 million pounds held over from 2013. That's where the 547 million pound figure comes from. So we produce only a third of the honey used in this country. A third. Imports, of course have by far the greatest impact on this…366.2 million pounds, or essentially 67%. The remaining 2 – 3 million pounds is what's left in the jar when it gets discarded.

So where does it all come from? We imported 366.2 million pounds of honey last year. 347.1 million of those pounds, which is 95%, came from just 10 countries.

Country	**Millions of Pounds**	**% of The Big 10**
Vietnam	103.4	28
Argentina	81.2	23
India	44.8	13
Brazil	42.3	12
Ukraine	19.5	6
Mexico	16.4	5
Canada	12.4	3
Uruguay	11.8	3
Taiwan	7.7	2
Thailand	7.6	2

The top five alone accounted for providing 79% of the imported honey last year. Interestingly, Brazil exported a total of 42.3 million pounds, of which 24.3 million was labeled organic, which was 95% of the organic honey imported into this country, and probably 95% of the organic honey consumed last year. Of the three main honey colors imported, 40.8 million pounds were

Top Ten Producing States Each Year

2008			2009			2010			2011			2012			2013			2014		
State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs.
ND	390	35.1	ND	450	34.7	ND	510	46.4	ND	460	32.6	ND	495	34.2	ND	480	33.2	ND	490	42.1
SD	225	21.4	SD	270	17.8	CA	410	27.5	CA	370	17.7	SD	270	17.0	MT	159	14.9	SD	230	24.4
CA	360	18.4	CA	355	11.7	SD	265	15.6	SD	250	16.5	FL	199	12.7	SD	265	14.8	FL	245	14.7
FL	150	11.9	MT	146	10.2	FL	200	13.8	MT	145	13.3	CA	340	11.9	FL	220	13.4	MT	162	14.3
MN	122	9.5	FL	150	10.2	MT	157	11.6	FL	180	10.9	MN	130	8.7	CA	330	10.8	CA	320	12.5
MT	134	9.4	MN	122	7.9	MN	126	8.3	MN	120	6.3	MT	149	7.7	MN	130	7.5	TX	116	9.0
MI	71	5.2	ID	103	4.7	TX	100	7.2	MI	74	4.7	TX	95	4.9	TX	106	6.2	MN	132	7.9
TX	77	4.9	TX	74	4.7	WI	68	4.4	TX	78	4.5	MI	76	4.3	LA	50	4.9	MI	91	5.7
WI	58	4.6	MI	66	4.0	MI	70	4.0	WI	57	3.6	WI	63	4.3	WI	59	3.5	GA	73	4.5
GA	55	3.9	LA	37	3.8	NY	47	3.0	GA	65	2.8	LA	41	3.5	GA	67	3.3	LA	48	4.0
Total	1642	120.3		1773	109.7		1953	141.9		1799	112.9		1858	109.1		1866	112.5		1957	139.1
All Sts.	2301	160.9		2462	144.1		2684	175.9		2491	148.4		2624	144.4		2640	149.5		2740	178.3
% of Tot.	71%	75%		72%	76.1%		73%	80.6%		72.2%	76.1%		71%	76%		71%	75%		71%	78%

Snap Shot Of Colony & Honey Production

YEAR	COLONIES (x000)	PRODUCTION (000 lbs)
1993	2875	230.6
1994	2783	218.2
1995	2655	211.1
1996	2581	199.5
1997	2631	196.5
1998	2637	220.5
1999	2652	203.1
2000	2622	220.3
2001	2550	186.1
2002	2574	171.7
2003	2599	181.7
2004	2554	183.5
2005	2409	174.6
2006	2394	154.9
2007	2443	148.3
2008	2342	163.7
2009	2498	146.4
2010	2692	176.4
2011	2491	148.4
2012	2624	147.1
2013	2640	149.5
2014	2740	178.3

white, 126.5 million pounds were extra light amber and 141.3 million pounds were light amber.

So with both demand and availability up, what do you think should have happened to prices…Up, Up and Away? All honey at the retail level jumped from $3.82 to $4.07 a pound. That's a hefty 6% increase… maybe hefty isn't quite the right work. Maybe anemic is better. It is a bump, but not much of one.

So, colony numbers up, yield per colony and total honey production up, honey prices up, enough honey around to have quadrupled stocks in warehouses, average price per pound up $.02/pound and overall crop value up 17%.

What we haven't discussed much is the number of colonies. NASS takes their count right after the first of the year, when the peak number of living colonies exists to accommodate almond pollination. Guesstimates are in the 2 million range for that crop alone. We don't think anybody knows how many don't go there but stay home, or move locally for pollination. In any event, over the course of the season, those same guesstimaters probably pretty accurately predict that 50 – 70% of those January colonies are lost, and then replaced again for almond pollination the next Spring. Serious swings in colony population have become more the norm than not. So does a January count accurately reflect colony population? NASS has been mulling that over we're told, and more than one count per year is being evaluated. For one, we would like to see at least two counts per year, but four would be even more accurate. An average over the four counts would probably give a better picture of the health of the industry, colony availability during honey flows and package shaking season, and an overview, and supporting view of the BIP Programs numbers. Would a better picture help, or harm our industry? We'd like to try it for a few years and see. BC

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Join us at the Heartland Apicultural Society's meeting in Michigan July 9th through the 11th.

INNER COVER

Several years ago Clarence Collison put together a large collection of his *Q & A What Do You Know* columns into a book we published with the same name. It was a fantastic collection of all manner of honey bee biology, beekeeping management, and almost anything honey bee. It has remained popular and we still sell this book. It has, however, aged, gracefully certainly, but the world has moved on and there are new discoveries to report.

Clarence, however, has moved with the times and his monthly column, no longer a Q & A, but a straight academic review of a different topic each month has kept us all in the know of what is known about his particular subject every month. Roger Morse, from Cornell used to produce a similar work each issue entitled Research Review, although his monthly contribution was on current work, not an entire review over time like Clarence is doing.

So Clarence has gathered another collection of his columns and entitled this book simply *A Closer Look – Honey Bee Biology*. He finished his part of this some time ago and we have been talking about this book for too long – the delay lies on my desk, along with too many other projects – but we will be going to press this month so it should be ready soon after you read this. Should be . . .

It is early April and I am nearly finished with my review of the last pages of the book – the references. Clarence has nearly 1100 of these wonderful nuggets of knowledge supporting the information he presents in this book. Many scientists here are well known and familiar, while many appear only once and from long ago. Just reviewing the names was a pleasure – some I've known and still know and recall when they were doing the work referenced, and many are Icons in the world of honey bee science from all over the world. And there are many still filling the voids of our knowledge yet today. There are others that show up who cross the line and report on their work in honey bee management. These are always good science, but also present information useful when you have a hive tool in hand, satisfying both the 'why' and the 'how' of keeping bees.

But as I studied each page I began to wonder about the most recent works, the answers to burning questions, the patches on our gaps to know. And then, how much honey bee biology has been gleaned since the dawn of the plague of what's been called CCD? What have we studied just to study – not to fix, not to solve, not to pander to the grant money and not to chase headline copy – just to know? So, I went back and looked again, picking an arbitrary date of post 2009 – what's come down the pike in honey bee biology that Clarence found useful in the five years previous to his completing his book? Remember – his book has been sitting here since some part of 2014, so really, it's what he found for the book in that time. Let's see.

Well, believe it not, the whole world doesn't seem to feel the rest of the world is ending, and that *Varroa*, viruses, pesticides and disappearing habitat and disappearing bees is all there is to study. It just seems that way I guess because that's all you ever get to read about. The two journals do report on the latest government and university findings, but invariably these are on some aspect of honey bee health because that's where most of the money, and most of energy is spent. But not all of it.

So, since 2009 there have been studies included in this book covering, are you ready? Let's start with biodiversity and conservation, evaluations of longevity and aging of workers and queens, studies on the methyation of genes for queens and workers, lots and lots on the refinement of both dances, including a pheromone-like chemical making the round dance (the one with the least directions) more useful, and even more on the cryopreservation of honey bee sperm. Add in *Varroa* sensitive hygiene breeding, comparison of ovary numbers and queen productivity, and a term I hadn't heard before – rhythmicity in queens and workers and you begin to see what we've been missing.

How about feeding intervals and queen survival, and how do the original circle shapes of cells end up hexagons? There's quite a bit on olfactory subsystems, some on nutrition (fine tuning diets, not how much), lots on guarding behaviors and alarm pheromone, and more than you can think of on small hive beetles.

There is quite a bit on primer pheromones, some having to do with pollen, brood and fertility, and issues with brood rearing temperatures and pesticides. Did you know there is recruitment choices to make having to deal with how related you are to the dancer in a hive? What about time-memory extinction, or the size of, and relationship of the bees in swarms? Dr. Tom Seeley of course

Clarence's Book.
Pesticide Kills.

leads the way in swarm research with paper after paper after another book. And then there's all the new information on drone and worker interactions, hygienic behavior control with odors, and quite a bit about *Nosema c*.

Have you read the latest on the meaning of vibration signals, gene expression and the division of labor, reproduction physiology and worker behavior, and more discoveries on the products of the hypophangeal glands.

Of course, since 2009 there have been reams of paper covering viruses, Nosema, lots and lots on neonic pesticides, *Varroa* and more *Varroa* and more *Varroa* and mite saliva and not enough food or enough good food.

Indeed, Clarence has found them all. And once I get this tome off my desk, so can you. Watch for this book. It's been too long coming, but believe me, it's well worth the wait.

•

On page 43-44 this month there is an information sheet on reporting pesticide-related bee kill incidents. I certainly recommend you read it, then remove and save it, and then use the information. EPA receives very few reports of bee kills due to pesticide applications, so, for good reason, has been assuming that there have been few pesticide spray kills. Maybe that's right. Maybe not.

It will be right if there are few spray kills, or, it will be right if nobody reports a spray kill. Often, beekeepers shrug, kick the dirt, and take the hit because A) nobody will do anything any way, B) even if they do, it won't be until Thanksgiving, C) even if they do and they find out what it was, they won't be able to find out who it was, D) even if they find out everything, when was the last time any sprayer got dinged for this, E) if I complain every farmer in the county will kick me off their land and then what will I do, F) if I complain I'll never get another pollination contract in this state again, G) take your pick of a dozen or more other reasons nothing ever happens. So EPA doesn't get many reports.

All of those are, to a point, valid reasons. Regulatory officials are more often than not going to favor a farmer because the farmer is big ag, makes money, and keeps our state as a major ag state so response is slow, or they are busy with real problems, so they are slow, or they don't have enough help so they are slow, or they just don't care and they don't come at all. And retribution is a real threat when bees put food on your table. Lose a contract, gotta find another one or cut on of the help. Have to move and lose a honey crop.

And how do you prove it, anyway? Well, this guide solves that problem. Photos, videos, samples, names and addresses and places to send bees. This guide goes a long way in solving that part of the problem. So like the little engine that could, this industry just has to keep chugging – has to do the leg work of reporting, has to hammer it home again and again and again that killing innocent bees is a crime. A damn crime.

Of course you have to do your part, too. If there's a location register, you have to register. If there's some way to work with farm advisers, you have to work with farm advisors, if there's some way to work with spray companies, you have to work with the spray companies. You have to do it all, every time, the right way so when you get asked did you . . . ? You can say, yes, I did, twice.

But here's a conundrum I often wrestle with. Why is it, when a spray kill occurs, or a poisoning of some water source occurs, or there's a spray drift of corn dust, or an herbicide kills every milkweed in the county – why is it that the company that makes the spray, or the dust gets the blame, and not the farmer who sprayed on a windy day, on blooming plants, from field edge to field edge, that didn't bother to look at the maps provided by the regulatory folks that made you sign up, that hired the cheapest spray outfit he could find, that didn't bother to ask the field supervisor if his recommendation was the best choice, and not the cheapest choice – why do chemical companies get blamed for farmers' crimes? It's like drug stores who sell tobacco items – purveyors of health selling poison.

Oh, I forgot, it's for all the same reasons beekeepers don't report spray kills. Monsanto won't cancel a pollination contract. Bayer won't make you move bees. Syngenta isn't responsible for enforcing these laws. Farmers and regulators are. But you can't blame them, and we need to blame somebody. Taken to the extreme, is Smith & Weston blamed for all the homicides their guns commit? Nope, you never hear about them. That may be a bad example of how this works, but it's in the same league.

It's time to get the EPA to do something about illegal spray kills of our bees. This guide will help. But you still have to do the leg work.

•

It has been an absolutely miserable April in Ohio. But the BIP survey came across my desk the second week of that month, asking about – national colony loss and management (gotta love the irony). I'll fill mine out – you do your part and do the same. It's the leg work thing again. Do the paper thing that came in the mail, or go to their web page www.beeinformed.org for the survey and more information. But hurry… you have to have it returned to them by April 30.

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It's Summers Time –

Old Chicks, New Chicks and Honey Jars

May 2015 – Wow! This year is flying by way too fast. We pined for Spring and here it came and now it's half over. What's going on? We're getting older – that's what's going on. Me, the cats, the chickens, the neighbors and all of our friends – getting older. We may as well enjoy it since we have no choice.

The chicken in the basement didn't make it. I thought each day she was getting a little better but I was overly optimistic. And, in fact we lost one of her breed sisters at the same time. They just went downhill and didn't bounce back. So we're nine and holding with those chickens that are now three years old and heading into their fourth Summer with us. Still three or four eggs several days a week. Of course, soon moulting will start and there goes the egg production. But we'll keep them around – I enjoy them too much.

A week ago we picked up 12 chicks – four different breeds, three of each. We have Barred Rock, Americauna, Silver Wyandott and Austrolorp (I had not heard of these). We lost one after about three days. She was just too tiny to make it. So we now have 20 chickens. At the moment, very manageable since the two groups are isolated from each other. They are located where they can see each other and hear each other. It's kind of like putting a queen cage in the hive. Hopefully everyone can get used to each other and when they time comes they'll all play nice.

We have six ducks coming at the end of May. Things will get a little crowded and exciting for a while until we get this all sorted out as to who belongs where.

The ducks we're getting are called "Call Ducks." We saw them at Medina County Fair last Summer, but didn't know what they were because they don't label the cages with the breed name. Hope someone is listening – mark the cages.

Anyway, they are beautiful, small ducks that were a creamy yellow color – the color of butter and also some very pale blue ones. Once I found the right person with the right information – a young lady named Courtney at our local feed store – we were able to zero in on what we wanted. It turns out that they are bred more for their size than their color. So we'll see what happens.

OK I have a dilemma. I really, really prefer bottling our honey in plastic one-pound jars – most preferably the ones that stand upside down and dispense without dripping. The friends and family we give to also prefer this. Here's my problem – what do you do when the honey crystallizes? And this past crop crystallized really fast.

No matter how gently I try to warm it, the jars still come out of the hot water misshapen and tipsy. Kim just purchased three cases of one-pound glass and is determined that we go to that because it's easier to liquefy once it has crystallized. Any suggestions out there. Help me out folks. There's got to be a way to gently warm that honey in those nice plastic jars!

We're gearing up for the garden this year. We didn't do it last year. But now we've added drainage to the yard and seemed to have solved some age old problems, including the basement which is now almost 100% dry. I've already bought my seeds from Burpee. In a few weeks, off to the nurseries for the tomato and pepper plants.

It's still early April in NE Ohio as I write this and so far not all that great – cold, damp and not all conducive to being outside for very long.

We are headed to Asheville, NC this weekend for the first of four Mother Earth News Fairs that we'll visit this Summer and Fall. Kim will be giving two talks this weekend, two at the one in OR in June, two in WI in August and then wrap it up at Seven Springs in PA in September. I know I've gone on about Mother Earth News Fairs before, but here goes. If you have a chance, if one of these is anywhere close to you, try and make it. It is an amazing experience.

We are very fortunate this year in that two of these trips will be taking us close to family which will be a real treat. We'll see our children and some of my family on the OR trip. And the WI event brings us to Kim's boyhood state and most or all of his siblings will be coming to hear him give a bee talk for the first time. It should be a real treat. I hope we see some of you along the way.

This Winter has kicked my butt in more ways than one. It was a long, cold, snowy Winter that kept us confined for long periods of time. And this Spring I've been sick twice in less than a month. The kind of sick that is not really life threatening, but you're sure that at any moment you could definitely expire – you would almost welcome it. I'm slowly recovering. This is the first time for me in a very long time to be major sick! I'm blaming it on stress.

Bee Culture has continued to have our struggles with new software, new web page, new digital edition and on and on and on. I know you're all tired of hearing about it. But I think we have survived and are coming out on the other side.

Thanks for sticking with us.

Hoody Summers

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APIMONDIA 2019

We Are Inviting The World To Our Beeyard

Rachel **Bryson**

Apimondia is an exciting, dynamic, diverse meeting of the world beekeeping industry. It is the bi-annual congress of the International Federation of Beekeepers' Associations. The federation was founded in 1949 and has a mission of promoting the scientific, technical, ecological, social and economic apiculture development in all countries.

One of Apimondia's main objectives is to provide a meeting for exchanging information and engaging in discussions between beekeepers, scientists, honey producers, government agencies, technicians and those working for apiculture development. Apimondia tours also give attendees an opportunity to see first-hand how the host country keeps bees.

Throughout the United States, a small, dedicated group of beekeepers has been planning, studying and gathering resources to host Apimondia, the world beekeeping congress. Since 2012, this group has worked tirelessly on the bidding process. Now, the time has come to put our best foot forward in inviting the international beekeeping community to be our guest, and select the United States to host Apimondia 2019.

Our Goal

The most obvious goal of the Apimondia USA committee is to win the bid to host the world beekeeping congress during the summer of 2019 in Minneapolis, Minnesota.

The committee's mission is to "bring the global beekeeping community together for mutually beneficial discussions, collaboration and education." This congress will provide a meeting point for everyone involved in the beekeeping world – beekeepers, scientists, honey packers, development workers, and those who work in the equipment industries – to come together and exchange ideas, while learning from world renowned researchers on the latest in honey bee study.

Why?

Supporting the Apimondia USA 2019 bid goes far deeper than just writing a check or helping to spread the word (though both of these efforts are very appreciated).

"I see Apimondia as giving some of the highest opportunities to further my knowledge of beekeeping," said Benton Kastman of Texas, who is a member of the committee. "Apimondia in the USA, would help strengthen our networking ability with beekeeping industries and beekeepers from around the world. This will also help strengthen our industry globally."

Louisa Hooven, 'Scientific Committee Chairman of the committee, adds that many issues, including colony loss, pesticides, global honey markets and the movements of pest and pathogens, are all concerns for today's beekeeper.

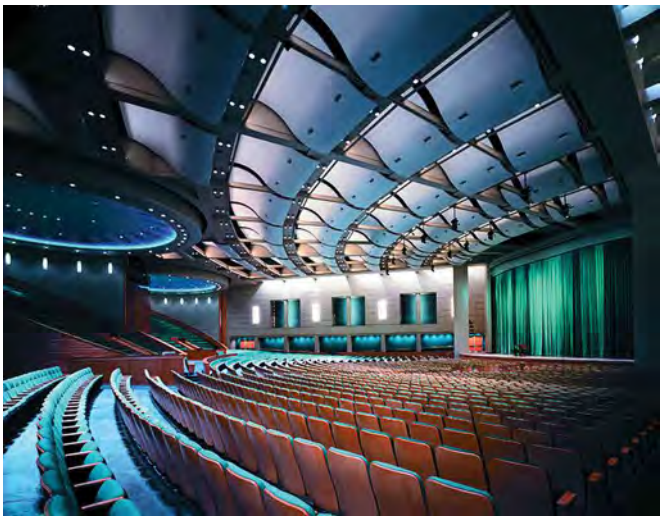
"These are issues that directly impact US beekeepers. And they are issues that most definitely spill across international borders," Hooven said.

"When so much is at stake for pollinators, it is critical that the US beekeeping and bee research community fully engage in this international dialogue," Hooven said. "We have a lot to share with the world, and a lot to learn from them. This is our chance to take an international role in pollinator issues."

She added "The media attention that is expected to result from holding this congress will help the beekeeping community reiterate that problems in U.S. apiaries have national and global impacts on agricultural and economic systems. This will help beekeepers to be heard loud and clear by our own policy makers as well."

Your Role

The United States has the unparalleled opportunity to bring the worldwide beekeeping community to our backyard. Winning the bid for the Apimondia Worldwide Beekeeping Congress in 2019 is the perfect way to showcase our industry as never before. Representatives from our chosen host city, Minneapolis, will join the United States delegation in Daejeon, South



Auditorium where main sessions will be held.

Korea, this September to invite the world beekeeping community to the United States for Apimondia 2019.

"But we can't do it alone," said Seib. "All of us will have to come together to make this bid successful." From volunteering to work on a committee, to making a financial contribution, any and all means of support are welcome.

The United States last hosted the Apimondia Worldwide Beekeeping Congress XXI in Maryland in 1967. Bringing the worldwide beekeeping community back to the USA for Apimondia XLVI in 2019 can only become a reality with your help.

To find out more on how you can contribute to the Apimondia USA 2019 bid, visit our website.

The Best of the Best

Plans are well underway for the proposed Apimondia USA 2019 program, which includes educational lectures, tours, the world's largest beekeeping trade show and the world honey show.

The Scientific Program is engineered not only to provide forums for experts to share knowledge, but also to create opportunities for beekeepers from around the world to meet and exchange ideas, and return home with satisfying and unique memories.

"We are creating a program that's not just focused on sitting through one lecture after another," said Hooven. "Our program will use various types of educational sessions, from scientific poster sessions to round tables to lunches with the experts."

"It's the small group or one-on-one discussions we as beekeepers have which are sometimes the most educational," Seib said. "You can't place a value on these conversations. Just imagine the value of conversations you have with your own local beekeeping group, then multiply that to a global scale. That's the kind of information exchange we're talking about."

Plans are still under development, but the program will feature:

- Symposiums, platforms, plenaries and keynote speakers.
- Lunch events to facilitate small groups to interact with speakers and experts.
- Roundtables, fishbowls and chat shows that encourage experts to interact with attendees on hot topics.
- Poster sessions to allow attendees to talk in person with presenters.
- Knowledge fairs to demonstrate new ideas, products, and methods.
- Hands-on workshops.

One highlight of the program is the opportunity to visit the University of Minnesota, which has maintained an internationally recognized research, teaching and outreach program on honey bees since 1918.

The University of Minnesota is located in the heart of the top honey-producing region of the United States. Its honey bee program is currently expanding with the creation of a Bee and Pollinator Research Lab and a Bee and Pollinator Discovery Center at the University of Minnesota Landscape Arboretum.

Plans are also underway to open portions of the congress to the public, following the vision of Apimondia USA 2019 to "advance the education and knowledge of beekeeping."

These public sessions may include demonstrations of beekeeping around the world; youth beekeeping educational workshops; touring bee friendly gardens; and a Master Beekeeping program.

Host City

Careful consideration, including months of potential location site visits, was conducted before one city rose to the top – Minneapolis. This city of nature where history, art, culture and beauty come together to form a mix that can't just be seen – it has to be experienced. Though filled with world-class museums, theaters, breathtaking architecture and a focus on outdoor activities, Minneapolis also falls in the heartland of the United States and the heartland of its beekeeping operations.

The Minneapolis Convention Center is well equipment to service groups from 30 to more than 10,000. The center is one the most energy efficient and "green" friendly centers in the world. Filled with the latest technological tools, it has a 3,400 fixed-seat auditorium, 475,000 square feet of exhibit space, 87 meeting rooms and both a 28,000-square-foot ballroom and a 55,000-square-foot ballroom.

The center includes a unique auditorium, exceptional production capabilities and many special features, including a UPS Store, Visitor Information Center and Dunn Bros. Coffee. It is conveniently ***located just 20 minutes from the Minneapolis International Airport***. The unique use of climate-controlled skywalks connects the center to 5,000 of the ***6,000 downtown hotel rooms***, countless dining options and other attractions.

"After touring the convention center and seeing first-hand the capabilities of this facility, there was no doubt in our minds that Minneapolis was the best city to host Apimondia 2019," Seib said.

About the Committee

The Apimondia USA 2019 committee is comprised of beekeepers, business professionals and government leaders from across the United States. The committee includes five sub-committees – finance, site, scientific program, bid materials and marketing. The members of these committees each work toward the common goal of seeing the United States selected to host Apimondia 2019. BC

On the Web
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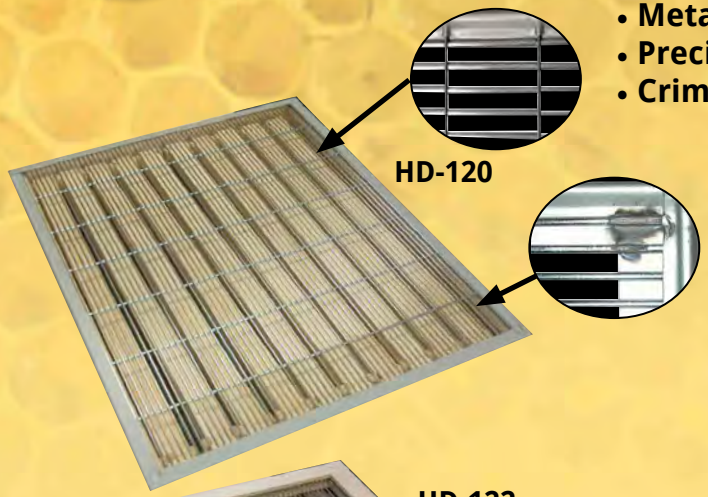

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Larry **Connor**

Heartland Apicultural Society Hosts Its First Michigan Meeting

For the first time in it's 14-year history, the Heartland Apicultural Society (HAS), will meet in Michigan. The venue will be Albion College and the dates are July 9, 10 and 11. During a recent driving trip to the Indiana Beekeepers Spring Bee School, HAS president and Michigan beekeeper Rich Wieske and I had a chance to discuss some key aspects of this meeting.

LC – What should beekeepers expect when they attend the first ever HAS held in Michigan?

RW – Michigan hospitality, along with a strong feeling of welcome and friendship. Plus, the Michigan Beekeepers Association will celebrate it's 150th year of existence during the HAS meeting with a special Saturday afternoon celebration.

LC – That makes the Michigan Beekeepers Association a very old beekeeping club in North America.

RW – It is one of the oldest continuously operating beekeeping clubs in North America, if not the oldest. It was established under the direction of Dr. A. J. Cook, a professor at Michigan Agricultural College (now Michigan State University). The MBA was formed in 1865 and had its first conference in 1869. Cook was a professor of Entomology at MAC, and wrote a series of books called the *Manual of the Apiary*, based on his class in Apiculture. The book went through over twenty revisions, and, at the time, was considered one of the most useful bee books available besides Langstroth's *The Hive and the Honey Bee*. Cook was part of the effort to provide education for farmers, a growing concept in the 1860s, and was part of the same movement that helped establish national Agricultural Land Grant Colleges throughout the United States.[1]

LC – What's Albion College all about?

Albion is a small town in south-central Michigan. Albion College is a small, liberal-arts 1350-student college in that village founded in 1835. It is located not far from the intersection of Interstates 94 and 69. Air travel is best through Detroit metro or Lansing but Amtrak does stop in Albion. Albion is certainly not a Detroit or Grand Rapids, or even a Marshall or Kalamazoo. The college faculty and staff have been extremely cooperative in providing full involvement of the community and have turned the entire campus over to HAS for the Society's meeting and events. This is a small, very compact campus, so folks will be able to walk from the main conference venue to their dorms, meeting rooms, and cafeteria without a great deal of effort. The sports field is next to the College's Nature Center and bee colonies will be set up so there are plenty of hives available to allow various projects and programs to be conducted. We will have bees from at least three different beekeepers, including some alternative hives, like the Kenya top-bar and Warré hives. In the past there have not always been enough hives for the queen rearing and other programs to use, so we want to be blessed with extra hives for everyone to work with.

LC—What should people expect while on campus?

1The Morrill Act was signed into law by President Abraham Lincoln on July 2, 1862.

Popcorn! I love popcorn and we will have two poppers located on campus for folks to enjoy. Also, the chief in the cafeteria promises to prepare a special honey dish every day, and folks can buy other food at the cafeteria or from vending machines. It will be a short walk to hear the many keynote speakers who will address the entire HAS audience. Then breakout sessions will be held in classrooms, laboratories and in the bee yard. We want people to complain that there is so much to do and not enough time in three days to do it all.

LC – Who are your featured speakers?

As you already know, we are putting emphasis on speakers from Michigan, with yourself, Roger Hoopingarner and Clarence Collison as featured speakers, along with Zach Huang in the microscope labs. We have invited Kim Flottum, Sue Cobey, Dennis van Engelsdorp, Renata Borba, Ken Schramm and Joe Traynor as well. We will have speakers discussing propolis and apitherapy as well. The queen rearing course taught by Dr. Greg Hunt, Krispn Given, Joe Kowaleski, Dwight Wells, Meghan Milbrath and Michael Risk will be limited for sign-up, so make sure you get your registration in early. Also, we expect a special program on Apitherapy.

LC – Describe a typical day at HAS?

Lots of people start out with breakfast in the cafeteria. After saying hello to some familiar faces, try to sit down with someone you do not know and share bee stories with them. For me, that is always the best part of getting to learn what people from different regions are doing. Then walk over to the presentation for the day's first keynote speaker. Then select one of the breakout sessions and have a more intimate learning situation. During the break, visit with the vendors – many of them will bring shipments with them so you do not have to pay shipping costs. You may get into the queen rearing or apitherapy session, so your time will be more structured.

At noon, this will all repeat, with lunch at the cafeteria, another keynote speaker and breakout sessions.

On Thursday night we will have a barbeque sponsored by Arcadia brewing out of Battle Creek and Kalamazoo, and Friday night will be a banquet. We plan to have music from the Benzi Boys, a French-Cajun group from Benzonia, MI.

On Saturday HAS will end around noon but the program will continue with the 150th anniversary celebration of the Michigan Beekeepers Association—all included in the day's registration fee. Dr. Roger Hoopingarner will discuss the history of beekeeping in Michigan and we are working to have the largest beekeeper pot-luck lunches ever. We will be inviting area beekeepers who are not part of the HAS event and expect to have a large turnout.

LC – All this sounds expensive. What will costs be?

We have set the registration for the three days at $100 per person. Meals will be reasonably priced. The big difference with this conference is the huge support we have received from Michigan beekeepers and many vendors. So far we expect to have between $25,000 and $30,000 donated to HAS to support the cost of speakers, as well as provide events from an ice cream social to a mead-tasting event. Without this generous support, this extensive program would not happen or would cost a lot more.

LC – What have we overlooked?

If all works out, there will be a Real Queen Auction, where people can bid on queens from several bee breeders. This is part of the program to grow queen rearing in the HAS area.

There will be some cool technology. We want to have a camera inside a hive that projects onto a screen in the cafeteria or some other area of the campus so people can see what is happening in the hive.

We plan to have a Droning for Drones, where groups of beekeepers will search for Drone Congregation Areas, mark the drones captured in the DCA's and then be released so we can trace them back to their hives.

There will be a campus-side art exhibit with a bee culture emphasis. The Albion Faculty is behind this effort. BC

*Registration information is found on the website – **www.heartlandbees.org***

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DOWNTOWN

Funky City Apiaries Can Make Urban Lifestyle Even Cooler!

Get ready: this column is about to contradict itself. Kindof. Our overall message each month (yawn) is meant to be that bees are a normal and important part of everyday urban living. Anyone who keeps bees for any length of time knows, however, that they change the keeper and they change the place in joyful and miraculous ways, and how can that be anything but cool? And it is cool for both bee and human.

In many ways, excessive hipness could be the downfall of urban beekeeping, especially on those Summer days when newbees have second thoughts while sampling melting drone larva, *not* an iced Americano. But you can approach looking amazing and ahead of the crowd in another way – by becoming a vibrant native part of a city which is totally cool in its essence, and attached to its very identity in place and time. It is looking at your urban home as a center of unlikely and inspiring bee sanctuaries, and making sure that people know they are there.

City beekeepers are more likely to need out apiaries anyway: year in, year out, in our downtown short courses the question that mentors get asked most frequently before, after, and on snack breaks is this: *"Can you help me find a place to set up my hives?"* Over the years, we have found many wonderful and unlikely places, but one of the hard-to-hear things I want to say sometimes is "Get out there and discover this wonderful place for yourself!" It is an inspiring and empowering thing to do, and it makes me even that much more grateful to the bees.

That's because I never knew my city, Washington DC, like I do now – from the tops of rec centers and the South Lawn of the White House, the garage roof of a major cemetery and the back walkway of a monastery. I've driven bees through embassy security, brought them up a Smithsonian elevator and wheeled them through the VIP floor of a five-star hotel. You can do this, too, and then all the people who use that hotel, goggle at the back fence of the Executive Mansion, hand out the specially labeled honey at the Annual Fundraiser or the G-20 Summit, or just comment in passing know that bees belong in important places as well as backyards.

Every city is cool – people wouldn't put up with the expense and hassles if they weren't. Metropolitan areas are centers of history and culture, museums and communities of faith and gardens – and stuff I have no clue about. These places have roofs, utility areas, parking structures, and sometimes ground level display areas where people can learn and see bees in action. I can't share with you in words, how much fun it is to get out there and discover it all, and sometimes be given keys to the back door.

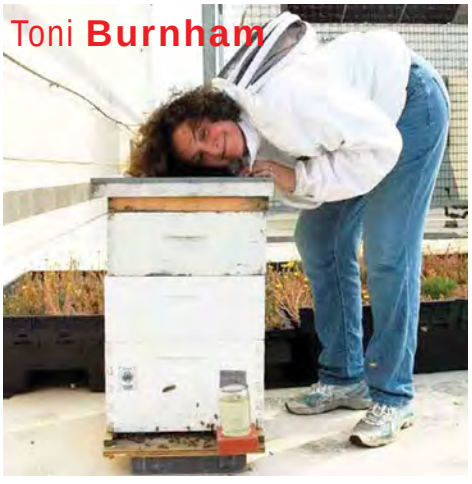
There are bees on the roof of Chicago's City Hall – and they were there long before I knew Thing One about keeping bees – as well as Buckingham Palace, the Waldorf-Astoria in New York, and NPR Headquarters right here (again) in DC. And the people in these cities know they are there: the local news finds them newsworthy, the tour guides throw in an aside as they shepherd groups down the sidewalk, the co-workers watch for tweets from the beekeepers and announcements of a harvest.

But how easy is it to get from the crowd outside the fence –looking in – to the utility corridor that goes to the roof? Well, it depends.

It's always easiest to just be invited, and that happens sometimes. The best way to be found is to actually join a local club, or a community with some sort of identity around beekeeping, which sometimes receives requests for bees. My most precious out-apiary came to me this way several years ago, but I am not seeing so much of this now. The ranks of urban beekeepers have grown enough that I think many good places have been approached. By people they already know.

These days, you mostly have to ask sites to consider the inclusion of an apiary, and your success is directly proportional to the length of your acquaintance with that site. Consider volunteering – a free way in the back door of museums, public gardens, parks and similar sites and building trust that gives you even more access.

Even if you are a familiar face, don't be surprised if the first response is "No!" They may be used to you, but not the idea (yet). And don't give up. We've had bees at the U.S. National Arboretum Washington Youth Garden since 2006, but I asked for the apiary for the first time more



For The Bees, Too!

than a year before. When they said they weren't up for bees in 2005, I asked them how they felt about beekeeper presentations (which were just fine). After a year of tons of fun with grade schoolers, our proposal for a three hive apiary was accepted and has flourished ever since.

It takes trust, and a sense that you are invested in their special place, too, sometimes. At Historic Congressional Cemetery, I'd participated in fundraising, greening, and celebration planning activities for years before I was a beekeeper, but I did not get my chance until one key (frightened) person left. So I asked again. We now have a teaching apiary with six to 10 beekeepers participating.

Think about communities in which you are involved, and your professional networks. While it's OK to try cold calling the reception or public outreach office of a major site, remember these folks are not in the business of making, but explaining access rules. Instead, I try to find someplace I have worked/volunteered or where a close friend or colleague has ties. I am not afraid to go to LinkedIn, identify the staffer at a site who may be well placed, and poke around until I find that indirect connection. Troll through company press releases to find the person in charge of green-er priorities, and maybe reach out to companies that provide those LEED consultations. Those companies *adore* beekeeper presentations! And have a coherent proposal in mind, and make it detailed and professional in proportion to how new your contact is.

There are so many corners of your city where people are doing wonderful things and creating beautiful places, and your bees can be there, too. Though this may seem intimidating, I can tell you from experience that it is enlightening, energizing, and empowering. I feel absolutely wonderful about the place where I live now that I know more about it, as well as about the lives of the creatures I look after here. The people who run those sites will be proud of the help they are offering the bees, and their visitors will share greater hope for a greener future. You all need to get to know each other, and give these people a chance to know the bees, and pretty soon your home town will be a better place for all of you.

The White House Bees – Leading From the Nation's Backyard

When Charlie Brandts brought the first colony of White House bees through security in 2009, guards used to handling the safety of the free world blanched. Thousands of student and dignitary visits later, those bees have made friends across the region and the world. Why does this matter to us? If a yard full of helicopters, teenagers, Prime Ministers, Portuguese Water Dogs, manicured landscaping, and an Easter Egg Roll can make room for 60,000 bees, what's your landlord's excuse?

But more seriously, right in DC's suburbs, activists who worked successfully to protect beekeeping in nearby counties in Virginia and Maryland pointed at the brand-new apiary as an example of how bees can fit in almost anywhere. And safely. And with real affection.

The G-20 leaders happily received this downtown DC honey in 2009, and Americans petitioned for the White House Honey Ale recipe in 2012. In the summer of 2014, honey bee health received a policy spotlight when the President's Memorandum on Pollinator Health became a multi-agency priority It is hard to deny that the colony in his back yard had put a bee in his ear.

The White House beehive with the Washington Monument in the background. photo by Charlie Brandts

Montreal Airport Bees – Hundreds of Thousands of Local Flights Daily

Aéroports de Montréal announced the June, 2014 arrival of five beehives managed by local beekeeping organization Miel Montréal with the headline, "300,000 New Workers at Montréal-Mirabel!" The hives are located on part of the brushy, open ground which is characteristic of many airport facilities, and in fact airports from Chicago to Hamburg have also established apiaries.

In its announcement, the airport authority directly connected the bees with community, culture, and the environment: "Conscious of the importance of preserving these pollinators to safeguard our culture and biodiversity, this project underscores the engagement of Aéroports de Montréal in preserving the environment, sustainable development, and reducing the environmental impact of its activities."

In June, 2014 five beehives managed by local beekeeping organization Miel Montréal arrived at Aéroports de Montréal Montréal-Mirabel!" The hives are located on part of the brushy, open ground which is characteristic of many airport facilities, and in fact airports from Chicago to Hamburg have also established apiaries. Miel Montreal photo

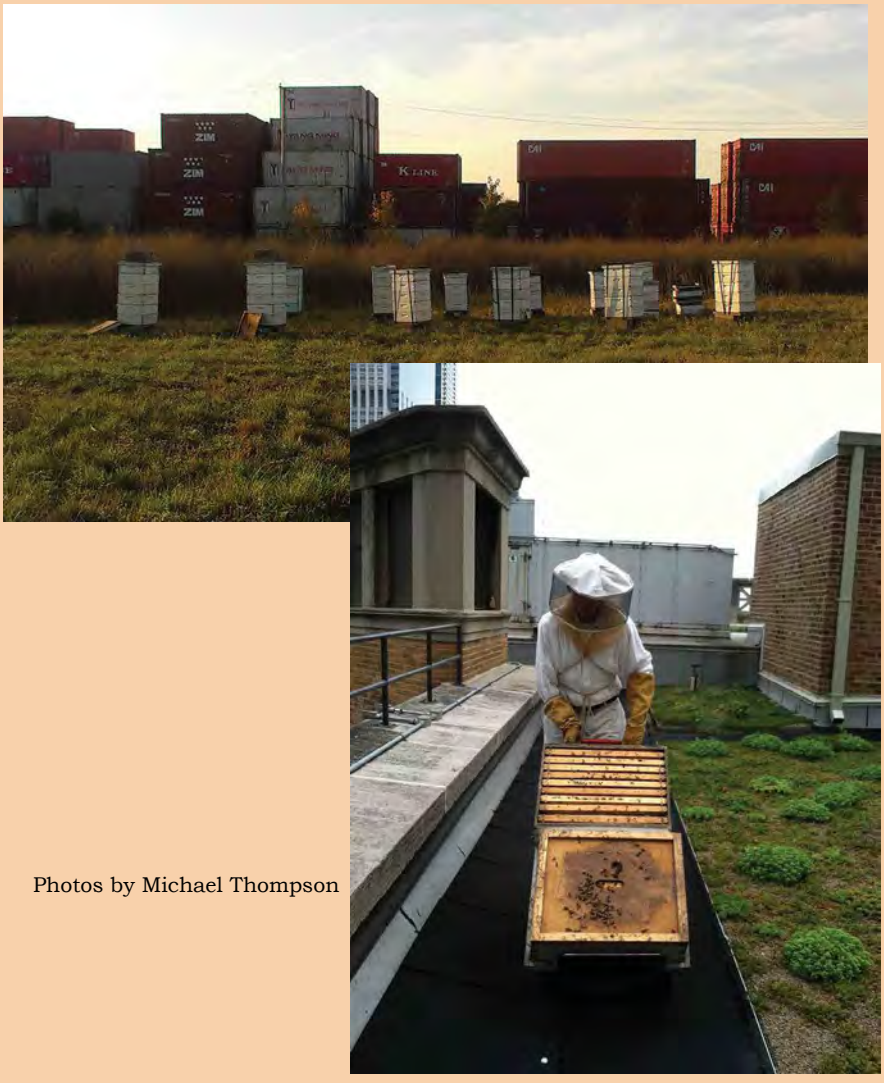
Chicago City Hall Roof Apiary: 12 Years of Females at the Top

The Chicago Honey Coop started out in 2004 as a way to connect young people with economic opportunities through an urban beekeeping program. Founders Michael Thompson and Stephanie Arnett were already rooftop beekeepers at the time! The organization is now even more a community partnership that also emphasizes education, food access, and connection to nature in one of the world's great cities: the home of the skyscraper.

CHC has more than 50 hives in Chicago, including apiaries on the roof of Chicago's City Hall! Thompson, CHC's Farm Manager, has kept bees in Chicago since 1974.

The presence of nearby plantings matters to all urban beekeepers, of course, but green roofs seems to really deliver big benefits. "Habitat was important on City Hall in 2012 due to a significant drought in May and June, rare for us. The prairie plants on the green roof were noticeably helpful during this period, especially for pollen. (Potentilla & Penstemon among others)." The 20,300 square-foot green roof was installed in 2001 as part of the Mayor's Urban Heat Island Initiative, a program to address higher temperatures caused by heat trapped in pavement and buildings in dense urban environments. In 2010, the City Hall roof experienced a cumulative 100 degrees F reduction in heat (adding the differences in temperature over time) compared to surrounding areas.

Thompson and beekeeping partner Stephanie Arnett have looked after the hives at City Hall since they were installed in the Spring of 2003. They founded CHC shortly thereafter. The City Hall Apiary is one of the most famous in the country, and the prized honey harvested there is used by the city to promote it's environmental activities and educate the public about urban agriculture in Chicago.



Photos by Michael Thompson

Buckingham Palace Bees: Their Own Urban Island

The Queen of England, like the President of the United States, has an apiary that was installed in 2009 on the grounds of her primary residence. But unlike the bees on the south lawn of 1600 Pennsylvania Avenue, they are not so easy to see. Nonetheless, if you ask about bees in London, this apiary (and probably the one at famous department store Fortnum & Mason) is the most likely to be mentioned.

The Buckingham Palace Apiary is located on an island at this Central London secured compound, and now consists of four hives tended by London beekeeper John Chapple and one of the Royal Gardeners. The island is basically wild, and is not otherwise visited. Like many other hives at high profile locations, the Buckingham Palace bees are there because people are concerned about the decline in pollinators, and are looking at creative ways to promote conservation. See for yourself at **www.kcpt.org/highlights/meet-bees-buckingham-palace/** BC

Toni Burnham keeps bees on rooftops in the Washington, DC area where she lives.

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A Closer Look

VENOM/VENOM GLANDS

Clarence **Collison**

Worker honey bees begin their first use of venom when they attain an age of of about 14 days for defense against predators and intruders.

Honey bee workers use venom for the defense of the colony and themselves when they are exposed to dangers and predators. The venom injected into the victim when a worker stings is a mixture of toxic proteins and peptides, the major component being a protein called melittin (Winston 1987). Venom contains other compounds such as hyaluronidase, phospholipase A, acid phosphatase and histamine. The venom gland and reservoir secretes a mixture of at least 50 identified components. A number of these components have significant toxic effects on many insect and vertebrate species (Bridges and Owen 1984). The complex nature of the venom may be due to the wide variety of insect and vertebrate pests and predators which might attack a bee colony; different components of the venom seem to be important in repelling different species of attackers (Winston 1987).

There are two glands associated with the base of the sting apparatus, the venom or acid gland and the Dufour's (alkaline) gland. The venom gland consists of a pair of long, slender, convoluted (intricately folded, twisted, coiled) tubules which float freely within the hemolymph of the posterior part of the abdomen (Stell 2012). Secretory cells occur along the length of the tubules, their small ducts opening into a common, chitin-lined duct. Each tubule ends with a small glandular enlargement, and the two tubules unite in a short common duct. The duct opens into the anterior end of the venom sac or reservoir and this in turn opens into the cavity of the bulb at the base of the sting (Figure 1). Muscle bands are attached to the venom gland and are reported to move the secretion down into the poison sac, where the venom accumulates. The epithelial walls of the poison sac have a thick, laminated cuticular intima (innermost lining of an organ) thrown into numerous high folds. In the neck of the sac the folds form regular transverse rings, holding the neck rigidly open. The poison sac walls have no muscles, and the venom therefore is not expelled by contraction of the sac; it is driven through the canal of the sting by the action of the sting lancets and their valves (Snodgrass 1956; Goodman 2003).

Along most of the length of the venom glands are similar secretory units that have four major components (secretory cells, duct cells, ducts, and end apparatuses), except in the part of the gland proximal to the venom reservoir, where the secretory units resemble those around the venom reservoir. In the latter secretory units a funnel structure occurs between the duct (which is shorter than that of the secretory units of the gland) and the end apparatus. This funnel may be important in protecting the secretory cells around the reservoir from the cytolytic activity (destruction of a cell) by the complex chemical mixture constituting the venom (Bridges and Owen 1984; Peiren et al. 2008).

"The Dufour's gland, previously called the basic or alkaline gland is associated with the venom, sting sheath and Koschevnikov glands in the sting apparatus."

The Dufour's gland, previously called the basic or alkaline gland is associated with the venom, sting sheath and Koschevnikov glands in the sting apparatus. Despite several studies, the precise role of the Dufour gland is still unclear (Martin et al. 2005). The Dufour's gland is a short thick, slightly convoluted, opaquely whitish tube. The glandular wall consists of a thick epithelium of distinct cells lined by a thin cuticular intima (Snodgrass 1956). The Dufour gland exits between the sting lancets. The exit is very narrow and indistinct and is in the same position in both queens and workers. The gland's exit is close to the setosa membrane, a region of cuticle, which acts as a platform for pheromone release. This is consistent with the idea that the Dufour gland secretes compounds that are utilized in defense by workers or reproduction in queens (Martin et al. 2005).

The venom glands of workers have a single secretory cycle, which begins at the end of pupation and reaches its maximum around the 16th day of the worker's adult life (Roat et al. 2006a). The venom that

is produced during this intense synthetic stage is stored in the reservoir (poison sac) and the gland enters the degeneration process (Owen and Bridges 1976), which is completed around 30 days after emergence. Thus, in foraging workers, the glandular cells have evident signs of degeneration, lacking most distinguishable cellular structures with the nuclei and the microvilli surrounding the canaliculi (small canal or duct) as the only discernable structures. Vesicles with irregular sizes and shapes are found in the remaining cytoplasm. In all, about 0.3 mg of venom is produced.

The venom gland is present in both the worker and the queen castes, but queens have significantly larger glands than the workers and produce more venom. Queens use venom during fights with other rival queens, an event that occurs as soon as the imago (mature adult stage) emerges, while fertilized queens rarely use venom. The queen's venom is only half as lethal to mice as worker venom, and by the time queens are one to two years of age their venom has become essentially inactive (Schmidt 1995).

Worker honey bees begin their first use of venom when they attain an age of about 14 days for defense against predators and intruders (Seeley 1985). Queens never use their stings for defense of the colony. Instead queen stinging is reserved for fighting rival queens just prior to emergence or that emerge during the same time period. Queen venom is more lethal toward other honey bees than is worker venom (Kato 1994). The queen fights occur during the first weeks of adult life, after which time the successful queen has stung or destroyed the rival queens. Once a queen is mature and laying eggs not only has she no need to fight other queens, but also her swollen abdomen renders her incapable of fighting efficiently. Thus, venom toxinology accords with the biology that a queen needs a plentiful supply of active venom at emergence and shortly thereafter, but not in later life (Schmidt 1995).

The protein content of venom glands from worker and queen honey bees falls after the first week of adult life. Queen bee venom glands lose 90% and workers 50% of their protein. This protein loss precedes

"Queens never use their stings for defense of the colony. Instead queen stinging is reserved for fighting rival queens just prior to emergence or that emerge during the same time period"

the ultrastructural changes in the morphology of the venom gland secretory cells (Owen and Bridges 1976).

Old laying queens that have been heading a colony for a year or more possess venom dramatically different than young queens. Venom from old queens was at least 15 times less lethal than the venoms of young queens (Schmidt 1995). In addition, dramatic changes in the venom of old queens were observed during dissection and venom collection. Young queens invariably contained reservoirs full of transparent, colorless, fluid venom. Old queens usually possessed venom of a tan to dark brown color that was viscous. In many old queens the venom had become a dark brown to black almost solid material that could not be collected and did not readily dissolve in water.

The worker's poison sac contains no venom at the time of emergence, whereas, newly emerged queens have already produced venom (Roat et al. 2006b). Queens exhibit maximal synthesis from zero to seven days, the process of degeneration occurs immediately after mating and they essentially stop venom production around day 30 (Owen and Bridges 1976). Queen venom contains much more histamine than worker venom, but lacks MCD-peptide (mast cell degranulating peptide); and by one year of age, queen venoms have little phospholipase A_2 and half the melittin of workers, and possess several other proteins.

Melittin is a major protein component of bee venom, comprising 50% of its dry weight (Habermann 1972). The biosynthesis of melittin was studied in vivo by feeding radioactive amimo acids to honey bees. Extracts from venom glands were analyzed for the presence of labeled melittin and other components. Radioactivity was first incorporated into another peptide which is considered to be a precursor of melittin (Kreil and Bachmayer 1971). After feeding labeled leucine to worker and queen bees of different ages, the synthesis of melittin and its precursor promelittin in the venom gland was analyzed. Marked changes in the synthesis of promelittin and the rate of its conversion to melittin occur during the maturation of the insects. In queen bees, both processes operate already close to full capacity in the newly emerged insects. On the other hand, in worker bees the production of promelittin increases slowly to reach a maximum at the 8^{th} to 10^{th} day and then decreases. During the first two days only promelittin synthesis was observed, whereas conversion to melittin was detectable only later on (Bachmayer et al. 1972).

The amount of melittin increases from the time of eclosion to an age of about four weeks when about 500 µg of melittin is present. In older bees (five to six weeks) the melittin level falls to about 250 µg. Melittin synthesis is most active in bees aged between one and two weeks after eclosion. The melittin content of the venom system changes as the Summer progresses. Melittin levels in a bee of any age greater than one week are lower in mid-August than in a bee of the same age in early June (Owen and Pfaff 1995).

Phospholipase A_2 is the most lethal of the honey bee venom peptides and melittin which is slightly less lethal, is the most abundant. Concurrent analyses of melittin, phospholipase and the combination of the two at their natural 3:1 mixture in bee venom revealed that the lethal activity of the mixture was about the same as native venom. This value was less than that for either melittin or phospholipase alone and indicates that synergism of the two peptides is not occurring. The results are consistent with independent lethal activities for the venom components, and show that melittin is not only the dominant, but also the main lethal component of honey bee venom (Schmidt 1995).

Owen et al. (1990) measured phospholipase A_2 activity in venom of worker bees of known ages. Low levels of phospholipase A_2 is present in the venom system at the time of eclosion (emergence from the pupal case). Phospholipase A_2 activity in the venom increases steadily through the 10 days after eclosion.

Maximal phospholipase A_2 levels (about 40 µg phospholipase A_2/venom sac) are maintained through the rest of the life of a worker bee in Summer.

Histamine is about 50 times as lethal to honey bees as to mammals (Owen et al. 1977). The amounts of histamine and histidine in honey bee venom glands, venom-reservoir tissue and venom taken from single worker bees were measured (Owen and Braidwood 1974). Neither of these venom components is present in newly emerged bees Histamine and histidine were first detected in the venom of week-old bees, and the amounts present increased for three to four weeks, reached maxima, and then fell off again in six-week-old bees. Owen and Bridges (1982) analyzed venom of honey bees of known ages for dopamine (DA) and noradrenaline (NA). They found both age dependent and seasonal variation in DA and NA levels in the venom.

Roat et al. (2006a) analyzed the influence of juvenile hormone treatments on the ultrastructure of the worker's venom glands. Newly emerged workers received topical application of one µl of juvenile hormone diluted in hexane, in the concentration of 2µg/µl. Two types of controls were used; one control group received no treatment and the other group received a topical application of one µl of hexane. The glandular cells of the group of newly emerged workers that received no treatments showed that the glandular cells are not yet secreting actively. Changes in the glandular cells happened according to the worker age and to the area of the gland. The most active phase of the gland occurred from the time of emergence to the 14th day. At the 25th day the cells had already lost their secretory characteristic with the distal area the first to suffer degeneration. The treatment with juvenile hormone and hexane altered the temporal sequence of the glandular cycle, forwarding the secretory cycle and degeneration of the venom gland.

Honey bee venom contains a multitude of enzymes, peptides and active amines. The main lethal factors for mammals have been considered to be phospholipase A_2, melittin and apamin, which are present in the venom in quantities of about 15-20%, 40-60% and 2%, respectively (Schmidt 1995).

The major component in honey bee venom is the peptide melittin, which upon injection releases histamine from mast cells and ruptures red blood corpuscles, causing pain and swelling. Two other peptides are present: apamine and mast cell degranulating peptide which also releases histamine from the mast cells, which contributes to the swelling. Two enzymes are present: phospholipase A_2 and hyaluronidase; the former causes the disintegration of red blood cells and the later acts as a spreading agent (Morse and Hooper 1985). BC

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Quick Guide to Reporting a Pesticide-Related Bee Kill Incident

1. First contact your state lead pesticide agency to begin investigation and determine when the inspector will come to your site. (*A list of state lead agency contact information is provided on the reverse side of this guide.*) If you do *not* want to begin an investigation, you should still collect information and file a report with EPA (see below).

2. Take photos/video of honey bees and incident area; record as much information as possible on conditions surrounding the loss.

3. Consider collecting your own evidence for lab analysis (i.e. pollen, comb, leaves or blooms from plant on which bees are foraging). For details on how to collect samples and where to find labs to send your evidence for analysis, visit: http://pollinatorstewardship.org/?page_id=1342 .

4. The Bee Informed Partnership offers an Emergency Response Kit (http://beeinformed.org/programs/emergency-response-kits-2/) that includes a pesticide screening of more than 170 pesticides through the USDA/AMS.

5. Contact the grower and/or applicator and determine what product(s) were applied.

6. If a particular product is suspected, contact the manufacturer of the product by using the 1-800 number provided on the product label, report the incident, and determine if and when they will visit the site of the incident.

7. Meet with the county/state inspector; meet with the manufacturer (if applicable).

8. Follow up with the lab to secure reports from the analysis of your own samples, and those evidence samples collected by the state (if available), and the manufacturer.

9. File a report with EPA through the National Pesticide Information Center (NPIC) web portal for the Ecological Pesticide Incident Reporting http://pi.ace.orst.edu/erep/ **OR** by sending an email directly to beekill@epa.gov

10. Consider contacting the Pollinator Stewardship Council for assistance in filing a report with the EPA.

State Lead Pesticide Agencies:
http://aapco.org/officials.html

Apiary Inspectors of America:
http://apiaryinspectors.org/members.html

Bee Informed Partnership:
http://beeinformed.org/programs/emergency-response-kits-2/ or contact your Tech Transfer team

Environmental Protection Agency:
beekill@epa.gov

Ecological Pesticide Incident Reporting:
(800) 858-7378 or file an online Ecological Pesticide Incident Report at
http://pi.ace.orst.edu/erep/

National Pesticide Information Center:
http://npic.orst.edu/index.html

National Association of State Departments of Agriculture:
http://www.nasda.org/9383/States.aspx

Pollinator Stewardship Council:
(832) 727-9492;
info@pollinatorstewardship.org

Product Registrants
If a particular pesticide product is suspected, call toll-free number on the label.

Information to Provide when Reporting a Pesticide-Related Bee Kill Incident:

- Contact information
- Location where the bee kill occurred, including county or parish.
- Date you first observed the bee kill and when it ended.
- Evidence collected, weather conditions, and ongoing exposure.
- Information on pesticides: name of pesticide applied in the area; registration number; active ingredients; crop the pesticide was applied to; and how the pesticide was formulated, used, and applied.
- Description of the pollinator: common name of species affected; magnitude of species; how many were affected; habitat; age or age class.
- Route of exposure for the pesticide contamination; distance from treatment site to affected organisms.
- Lab report of your bee kill evidence.

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Incident Reporting Contacts for State Lead Pesticide Agencies

http://npic.orst.edu/reg/state_agencies.html

- **Alabama**: Dept. of Agriculture & Industries, Pest Management Division (334) 240-7233
- **Alaska**: Dept. of Environmental Conservation, Pesticide Control Program (800) 478-2577
- **Arizona**: Dept. of Agriculture, Environmental Services Division (800) 423-8876
- **Arkansas**: State Plant Board, Pesticide Division (501) 225-1598
- **California**: CA Environmental Protection Agency, Dept. of Pesticide Regulation (916) 324-4100
- **Colorado**: Dept. of Agriculture, Div. of Plant Industry, Pesticide Programs (303) 869-9058
- **Connecticut**: Dept. of Energy & Environmental Protection, Pesticide Management Program (860) 424-3369
- **Delaware**: DE Dept. of Agriculture, Pesticide Management (302) 698-4571
- **Florida**: Dept. of Agriculture & Consumer Services, Bureau of Plant and Apiary Inspection: (352)-395-4636 or (386) 418-5515
- **Georgia**: Dept. of Agriculture, Plant Industry Division (404) 656-4958
- **Hawaii**: Dept. of Agriculture, Pesticides Branch (808) 973-9404
- **Idaho**: State Dept. of Agriculture, Pesticides & Chemigation (208) 332-8613
- **Illinois**: Dept. of Agriculture, Bureau of Environmental Programs (217) 785-2427
- **Indiana**: Office of IN State Chemist, Pesticide Section (800) 893-6637
- **Iowa**: Dept. of Agriculture & Land Stewardship, Pesticide Bureau (515) 281-8591
- **Kansas**: Dept. of Agriculture, Pesticide & Fertilizer Use (785) 564-6688
- **Kentucky**: Dept. of Agriculture, Division of Environmental Services (502) 573-9238
- **Louisiana**: Dept. of Agriculture & Forestry, Pesticide & Environmental Programs (855) 452-5323
- **Maine**: Dept. of Agriculture, Board of Pesticides Control (207) 287-2731
- **Maryland**: Dept. of Agriculture, Pesticide Regulation Section (410) 841-5710
- **Massachusetts**: MA Dept. of Agricultural Resources, Pesticide Program (617) 626-1781
- **Michigan**: Dept. of Agriculture & Rural Dev., Pesticide & Plant Pest Management Div. (800) 292-3939
- **Minnesota**: Dept. of Agriculture, Pesticide & Fertilizer Management Division (651) 201-6333
- **Mississippi**: Dept. of Ag & Commerce, Bureau of Plant Industry, Pesticide Program (662) 325-8789
- **Missouri**: Dept. of Agriculture, Plant Industries Div., Bureau of Pesticide Control (573) 751-5511
- **Montana**: Dept. of Agriculture, Pesticide Programs (406) 444-5400
- **Nebraska**: Dept. of Agriculture, Bureau of Plant Industry, Pesticide Program (402) 471-6882
- **Nevada**: Dept. of Agriculture, Plant Industry Division (775) 353-3716
- **New Hampshire**: Dept. of Agriculture, Markets & Food, Division of Pesticide Control (603) 271-3640
- **New Jersey**: Dept. of Environmental Protection, Pesticide Control Program (609) 984-6568
- **New Mexico**: Dept. of Agriculture, Pesticide Compliance Section (575) 646-2134
- **New York**: Dept. of Environmental Conservation, Div. of Materials Mgmt, Bureau of Pest Mgmt (518) 402-8727
- **North Carolina**: Dept. of Agriculture & Consumer Services, Structural Pest Control & Pesticide Division (919) 733-3556
- **North Dakota**: Dept. of Agriculture, Pesticide & Fertilizer Division (701) 328-4922
- **Ohio**: Dept. of Agriculture, Pesticide & Fertilizer Regulation Section (614) 728-6987
- **Oklahoma**: Dept. of Agriculture, Food & Forestry, Plant Industry & Consumer Services (405) 522-5989
- **Oregon**: Dept. of Agriculture, Pesticides Division (503) 986-4635
- **Pennsylvania**: Dept. of Agriculture, Bureau of Plant Industry (717) 772-5212
- **Rhode Island**: Dept. of Environmental Mgmt., Div. of Agriculture (401) 222-2781 x4504
- **South Carolina**: Clemson University, Dept. of Pesticide Regulation (864) 646-2150
- **South Dakota**: Dept. of Agriculture, Div. of Agricultural Services, Pesticide Program (605) 773-4432
- **Tennessee**: Dept. of Agriculture, Pesticides & Agriculture Inputs (800) 628-2631
- **Texas**: Dept. of Agriculture, Pesticide Programs (800) 835-5832
- **Utah**: Dept. of Agriculture & Food, Div. of Plant Industry (801) 538-4925
- **Vermont**: Agency of Agriculture, Food & Markets, Agricultural Resource Management & Environmental Stewardship (802) 828-6531
- **Virginia**: Dept. of Agriculture & Consumer Services, Office of Pesticide Services (804) 371-6560
- **Washington**: Dept. of Agriculture, Pesticide Management Division (360) 902-2040
- **West Virginia**: Dept. of Agriculture, Regulatory & Environmental Affairs Division (304) 558-2209
- **Wisconsin**: Dept. of Agriculture, Trade & Consumer Protection, Agricultural Resource Management Division (608) 224-4500
- **Wyoming**: Dept. of Agriculture (307) 777-6959
- **Washington D.C.**: Dept. of the Environment, Environmental Programs (202) 481-2600

Reporting Acute Bee Loss Incidents

Honey Bee Health Coalition

Multiple Factors Influence Honey Bee Health

Multiple factors impact honey bee health; these include bee pests and pathogens, forage and nutrition, genetics, bee management practices and pesticide exposure. The Honey Bee Health Coalition ('Coalition,' **www.honeybeehealthcoalition.org**) is a diverse group of stakeholders that is working toward solutions across all of these factors. Within crop pest management, the Coalition is promoting best management practices for controlling crop pests and safeguarding pollinator health. The Coalition is also promoting incident reporting to give all stakeholders access to better information and data to diagnose problems and prevent or mitigate future losses. This article explains the importance of incident reporting as well as methods for reporting.

The Importance of Incident Reporting

Information is the key element obtained from incident reporting. Incident reporting is not about compensatory damages, nor is it about placing blame; it is about determining the best methods to protect our honey bees while we also protect crops from pests, thus promoting strong agricultural crop yields in honey crops, as well as plant crops. The information provided as a result of bee loss incidents is invaluable to the EPA, states, manufacturers, pesticide applicators, growers, and beekeepers as we all work together to protect honey bees and better understand what is harming them. Accurate information on bee loss incidents is key to understanding the real-world experience of our pollinators and to inform best practices for pesticide use and application as well as federal and state regulations and labels intended to protect honey bees.

A working group of Coalition members recently conducted a review of how honey bee losses are reported. The Coalition concluded that many beekeepers do not know HOW to report bee losses. The purpose of this article is to acquaint beekeepers with the process of incident reporting, including how to report an incident to the State, the EPA, and pesticide manufacturers, and how to obtain help from non-governmental organizations. It also describes how beekeepers can collect their own evidence for analysis.

The Scenario

It is a bright and sunny day, a light wind is blowing: it has been a beautiful week for your bees to be foraging or pollinating. As you walk into your beeyard something is amiss. A small number of bees are flying, but in front of the hive is a carpet of dead and/or dying bees. As you get closer to the hive you realize there are hundreds of dead and dying bees, struggling to move, stumbling across the carcasses of the other members of the colony. Your heart sinks. You pull out your phone, switch on the camera and start videotaping the bees, their behavior, and the carpet of dead and quickly degrading carcasses. You reach your hive to crack it open, and find the adult foraging force is dead, dying, or simply gone. Younger bees are cleaning house, pulling out dead brood. It is a dramatic and stressful scenario, but a story often heard in the beekeeping community.

What do you do now? The answer is: take photos and video, and report through one or more of the following options for collecting, analyzing, and submitting bee loss information. Remember – it is important to share this valuable information of how our bees experience the real-world across agricultural stakeholders, and this often requires filing a report with more than one party. Refer to the Quick Guide to Reporting a Bee Loss Incident for more details on how to report an incident and additional informational links and contacts.

Collecting and analyzing your own evidence

Beekeepers should be prepared to collect their own evidence, particularly if the state inspector cannot get to the site in less than 24 hours. It may be too late to obtain a kit or gather the materials needed after the problem has been observed. The state lead pesticide agency inspector may not be able to collect it in a timely manner, and may not have the funds to do the lab testing. Additionally, collecting data creates more than anecdotal evidence and could help determine where to look to find the source of the problem. At a minimum, the beekeeper should prepare a written and visual (photographic or video) record that describes and shows the beekeeper's observations, and the circumstances surrounding the loss. This should include the weather conditions, what bees may have been foraging on at the time of the loss (*e.g.,* blooming crops/weeds in close proximity to affected colonies), approximate number and location of dead bees, and whether adults and/or brood were affected. The absence of foraging bees should be noted, and if nurse bees are present in the hive. Also, if dead and dying bees are present, the beekeeper should attempt to characterize any unusual behavior of surviving bees (*e.g.*, lethargy, intense grooming activity, loss of coordination). There is a how-to guide for collecting evidence of bee losses on the Pollinator Stewardship Council website **http://pollinatorstewardship.org/?page_id=1342**, as well as a list of labs to which you can send your evidence. Guidance may also be found at **http://www.epa.gov/compliance/resources/policies/monitoring/fifra/bee-inspection-guide.pdf**.

Check the prices of labs as none of the tests for suspected pesticide-related bee kills are free, and can cost between $300-$800. An academic research lab may accept your samples as part of a research project (at a reduced rate for testing costs), or similar opportunity. Keep in mind dead bees degrade quickly, and once degraded may not serve as reliable evidence for measuring pesticide residues. If you are unsure of what killed your bees or want a complete pesticide screen on pollen, wax, larvae, pupae or adult bees, the Bee Informed Partnership offers an Emergency Response kit (**http://beeinformed.org/programs/emergency-response-kits-2/**) that includes a pesticide screen conducted by

USDA Agricultural Marketing Service. Pollen samples and wax samples are the better hive products to determine levels of contaminants as residues may be more stable (less vulnerable to degradation). The caveat in collecting your own evidence is that investigators and pesticide manufacturers may not be able to utilize the samples/pesticide residue data you collect because of their requirements regarding who "handles" (collects and analyzes the data) and the chain of custody through which the samples are passed. While beekeepers may be anxious to collect bee, pollen, and comb samples for analysis, qualitative information regarding the circumstances surrounding the loss can be equally if not more important, particularly if inspectors do not arrive quickly, and the conditions surrounding the loss become less apparent.

Options for Reporting

Reporting to the State: The most critical contact is with the state lead pesticide agency (SLA) so that an investigation can be initiated in a timely way. Beekeepers should maintain ready access to the current list of SLA contacts. Contact information on SLAs can be obtained from the Association of American Pesticide Control Officials at **http://aapco.org/officials.html**. Contact your SLCA immediately, and explain the situation *without making inferences as to the circumstances surrounding the loss*; that should be left to the investigators. In states with apiary programs, the state pesticide agency will normally notify the state apiarist. Determine when an inspector can come to your site to investigate the incident. The state pesticide inspector will be looking for evidence of pesticide misuse and the inspection will consider multiple factors including pesticide products used in the hive. Under their cooperative agreement with EPA to enforce the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), states will file a report with EPA at the conclusion of the investigation. Note that the purpose of the state pesticide investigation is to determine whether pesticide misuse occurred, not to determine the cause of the bee kill.

Reporting to EPA: The information provided as a result of bee loss incidents is invaluable to the EPA. There are two ways to file a report with the EPA: sending an email to **beekill@epa.gov** or using the National Pesticide Information Center (NPIC) web portal for Ecological Pesticide Incident Reporting **http://pi.ace.orst.edu/erep/**. You can report to EPA whether or not you choose to report to your SLA and initiate an investigation by the state. The NPIC web portal leads you through questions, including the state and county of the incident, and what you observed. Even if you do not have answers to all of the questions on this web portal, submit the information you *do* know. You can upload photos to the site as well. You can submit the report anonymously, or provide your contact information. Contact information provided through the NPIC portal is not shared with EPA, and therefore EPA cannot follow up with you if you report through NPIC. For those under the stress of having just lost one or a dozen colonies, you could simply email **beekill@epa.gov** with your contact information and EPA will follow-up with you for additional facts about the incident; this can provide greater clarity of what happened to your bees, provided that you are comfortable with contributing additional detail. The extent to which detailed information is available on an incident will dictate the extent to which it can be used as a line of evidence in determining the cause of the loss.

Reporting to a pesticide manufacturer: In cases where there is confidence regarding the specific pesticide involved, contact the manufacturer by calling either the emergency or non-emergency phone number on the product label (if available). Additional information such as contact information for the farm that applied the product, bee yard location, symptoms observed and duration of the effect, product type (seed treatment, foliar application), crop, and weather conditions may be gathered during the initial call. The manufacturer will most likely ask if the state pesticide lead agency or EPA has been contacted about the incident. The manufacturer will most likely ask about a follow-up visit with the caller either as an on-site visit or via phone.

Receiving assistance: Do you need help navigating all of the reporting options or assistance in filing a report? The Pollinator Stewardship Council can assist the beekeeper in filing reports to EPA so you can get back to the business of beekeeping. You can also contact the Bee Informed Partnership (BIP) Program to request an Emergency Response Kit (**http://beeinformed.org/programs/emergency-response-kits-2/**), or, if applicable, contact your BIP Tech Transfer Team (**http://beeinformed.org/team-2/tech-transfer-teams/**) for a kit.

Incident reporting allows all stakeholders to learn from and prevent or mitigate bee losses, and provides the data needed to help build solutions for Healthy Bees, Healthy People, and a Healthy Planet. BC

The Honey Bee Health Coalition appreciates support from Bee Culture magazine in sharing this information with its readers. One thousand laminated copies of the Honey Bee Health Coalition *Quick Guide to Reporting a Bee Kill Incident* are available through *Bee Culture* magazine; order yours online today at ***www.pollinatorstewardship.org*** *or download an electronic copy at* ***www.honeybeehealthcoalition.org.***

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X135 Plants and Honey Bees

This book is especially for beekeepers who want to know the fundamentals and more advanced aspects of floral biology. Soft cover, 151 pages. Shipping wt. 3.5 lbs. **$23**

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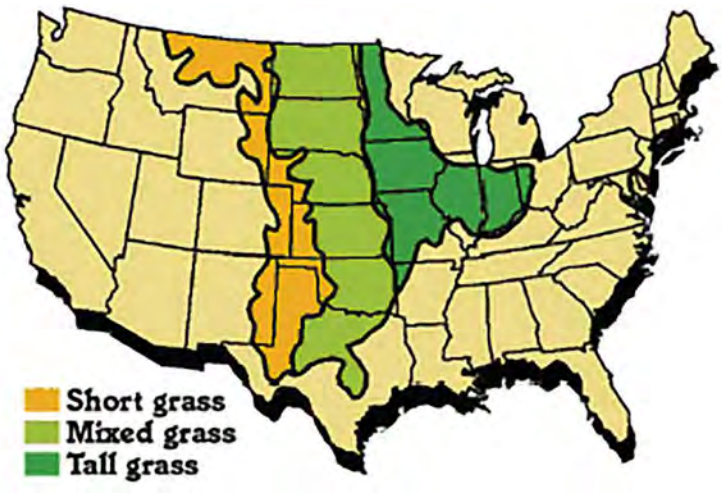
Chris **Schad**

"I can sit on the porch before my door and see miles of the most beautiful prairie… surpassing, in my mind, the beauties of the sea. Think of seeing a tract of land on a slight incline covered with flowers and rich meadow grass for 20 miles"

John Brooke, an early settler in the Tall Grass Prairies of Texas (1849)

Many beekeepers are interested in putting their bees in locations with diverse forage that produces nectar and pollen across a wide range of the growing season, like a well-stocked pantry that stays full until Winter weather comes around. Unfortunately, such diverse forage has become harder to find. The good news is that researchers are finding that native prairie wildflower plantings in the 'margins' of agriculture can be beneficial not only to pollinators but also to the bottom line of commercial growers.



How Prairies Came to Be

At one time trees dominated the landscape of the continental United States from coast to coast[1]. With the upwelling of the Rocky Mountains, a large "rain shadow" was created, robbing the lands immediately east of the Rockies of rainfall. As a consequence, trees retreated to the riverbeds where water was more abundant while short grasses, forbs (flowering plants) and shrubs which required less moisture came to dominate the landscape of what is now called "Short Grass Prairie."

Further to the east, moisture-laden air rolling northward from the Gulf of Mexico contributed to increased rainfall, enabling taller and more robust prairie plants to grow in "Tall Grass Prairies" of what is now Iowa, Illinois and Indiana. Interestingly, this spectrum of plant height from east to west continues today when one considers the dominant cash crops of the Tall Grass regions (corn) and Short Grass Prairie regions (wheat).

This adaption to rainfall variations took place in soil formed by the repeated advance and retreat of glaciers, massive sheets of ice that dragged and pulverized mineral-laden boulders and rocks from Manitoba and beyond into an extraordinarily rich blend of soil. Eventually, bison converted nutritious prairie grasses into compost; prairie dogs and gophers churned the soil from below, while natural (and, eventually, man-made) fires replenished the soil above with critical nutrients. All of this contributed

to one or more inches of new topsoil every one hundred years.

This deep topsoil enabled native prairie plants to grow roots down to twelve feet or more, leaving little doubt that prairie natives could withstand both drought and fire. The prairie biome teemed with life above and below ground. Although dominated in many places by wind-pollinated grasses, native pollinators thrived in the extraordinary diversity of wildflowers that was also part of the North American prairies. This is the landscape that homesteaders found as the American frontier opened in the 19th century.

What Happened to Prairies

Three important factors precipitated a breathtakingly rapid conversion of this prairie ecosystem to cropland between 1840 and 1900. First there was the personal motivation of homesteaders to "pay their way". They saw this incredibly rich and diverse ecosystem as a landscape filled with nuisances that must be cleared. Second, a new tool – the steel plow invented by John Deere – enabled homesteaders to tear through a tough prairie sod that literally broke conventional machinery. Finally, government policy and officials encouraged the conversion to cropland, exemplified by this statement from a land official in 1868: "*. . . the plains are an obstacle to the progress of the nation's growth . . . in not yielding sustenance for increasing population.*"[2]

A steady intensification of agriculture practices and urbanization continues to this day, having trimmed away at prairie remnants so that only 1-2% of residual prairie acreage can be found.

Many beekeepers believe that this loss of naturally flower-rich areas has had a significant impact on the production and health of honey bees. Fortunately, recent research suggests that prairie wildflower restoration not only benefit pollinators but also return a net positive return on investment.

How Restoration Can be Worthwhile

With funding from Syngenta, the Kellogg Foundation and other sources, three research universities studied the costs, benefits and best practices of establishing wildflower-filled field margins on farms. At Michigan State University in 2009, researcher Rufus Isaacs and colleagues seeded fifteen native wildflower species that would provide nectar and pollen across the entire growing season in the margins of five blueberry farms in 2009. They paired each planting with a control field with no wildflower planting and then evaluated crop pollination success by measuring the percentage of fruit set, the berry weight, and the number of mature seeds per berry. They also counted the number of wild pollinator species supported at each of the sites.

Their findings, published in the journal Applied Ecology, showed that were more pollinators in the fields adjacent to the wildflower planting. Importantly, their findings suggest that the wild pollinators complement, not replace, the work of honey bee pollination. They noted an increase in blueberry size and count that was sufficient to fully recover the initial expense of the wildflower planting after only four years.

Encouraged by these findings, Syngenta is now seeding wildflower buffers at commercial farms and at

more than sixty golf courses across the country. Isaacs has received funding to expand his research on wildflower plantings at over thirty farms in multiple states and with multiple types of crops.

Meanwhile, at Iowa State University, the Science-based Trials of Rowcrops Integrated with Prairie Strips (called the STRIPS project)[4] tested the hypothesis that putting a little bit of prairie in otherwise marginal land could yield significant environmental benefit. They found that re-planting the least productive 10% of farmland with a mix of indigenous prairie plants reduced soil loss by 95%, nutrient loss by 80-90%, water run-off by 44%, and showed a four-fold increase in biodiversity, including pollinators.

In some states there is talk of converting some of the millions of acres of mowed roadsides with low-growing native grasses and wildflowers. The fuel and manpower savings from eliminating the thrice-yearly mowing would go a long ways towards paying for the investment in wildflowers. If replicated widely across the country, such prairie wildflower plantings could have an impact on growers as well as commercial, sideliner and hobby beekeepers.

Restoration

Like all things worthwhile, developing a landscape of native prairie that is resistant to drought, conserves topsoil, protects water quality and provides support for honey bees and other pollinators takes work. One can purchase live plants, bare root plants, or seeds. Live plants and bare root plants are more expensive but will provide pollinator support sooner. Assuming that we are discussing restoration of a space one quarter-acre or more, it will be most cost-effective to seed the site.

The first step is to select what kinds of plants to seed into the space. Of course, the seed mix should contain wildflowers that are useful to pollinators in general and honey bees specifically. It would be useful to also include some prairie grasses for variety. It would be optimal to select a variety of plants that bloom across the entire growing season. A reputable operation should be able to provide seeds for plants that are appropriate for your

location. Identifying your USDA "Plant Hardiness Zone" is only the first step in identifying plants appropriate for your site. One must also consider various characteristics of the site before deciding which plants to seed. For example, clay soil has fine grains, causing it to be "heavy" and to retain moisture longer. Sandy soil, on the other hand, will drain more quickly. Some natives favor one type of soil over the other. The amount of moisture typically in the soil is also important. Soil described as "mesic" has a moderate and well-balanced supply of moisture, while dry soil and wet soil are fairly self-explanatory. The amount of sunlight the site receives – full, partial or none - is also an important factor to be considered.

It would not be unusual to see more than one of these at any given site. On the one-third acre restoration on our property, the entire piece has full sun exposure and heavy clay soil, but soil moisture runs from mesic to wet, with a spring-fed creek running through the middle of the site.

Site Preparation

While selection of the prairie natives that will go into your site is largely an exercise on paper, preparation of the restoration site is where the "sweat equity" investment begins. The optimal time for a native wildflower seeding in the upper Midwest is late Fall or early Winter, meaning site preparation should begin in the preceding Spring. There are two things that must be cleared away: vegetation and the "seed bank" on and in the ground from previous growing seasons.

Mowing, tilling, and burning are all options for clearing vegetation. As a general rule, tilling the site is not considered the best option because opening up the soil makes it much easier for "undesirable" seeds to take hold. Mowing will get the vegetation down to the ground and the roots will still hold the soil to prevent erosion, but the legacy vegetation is not killed and could come back. A controlled burn will remove the vegetation down to the soil and could kill off those plants will more shallow roots. Of course, a controlled burn is more complicated and requires specialized experience, expertise and tools. Of course, one should follow the local rules and regulations regarding a burn, and notifying the local fire department in advance of the burn would be a good idea. All things being equal, a controlled burn is the preferred method for clearing a site of legacy vegetation. However, that is only the first step of site preparation.

Once the site is initially cleared, seed and rootstock in the soil will quickly spring to life. Be prepared to take steps to clear out this new growth, perhaps more than once. The most effective way to clear out this re-growth is with a low-impact glyphosate-based herbicide. If the initial vegetation load was cleared with a spring burn or mowing, plan on doing two herbicide treatments through the Summer months before doing the Fall seeding.

Seeding

Late Fall or early Winter are a good time to put out the seed for a native wildflower planting, especially in the northern tier states. Most seeds require a soil temperature of 60°F or greater in order to germinate, so this means the seeds will lay fallow for the Winter, germinating in the Spring. Since many forbs require a period of cold and wet treatment called "stratification," a Fall/Winter seeding works quite well. Second best option for seeding time is late spring, after the first weeds have a chance to germinate and then be removed.

Bare dirt without tilling is the best surface for the seeding. As noted earlier, tilled ground offers a nice bed for new or existing "undesirable" seeds to germinate. If the site is prone to erosion and a fall seeding is planned, the erosion risk can be mitigated with a late Summer seeding of oats or some other annual. The oats will quickly germinate, holding the soil and keeping undesirable plants at bay. The wildflower seeding can be done right on top of the oats before the first killing frost.

There are a number of ways to distribute the seed, with the best method depending on the size of the restoration site and your access to specialized seeding equipment. Organizations that routinely do large-scale restorations often have a seed drill machinery that functions much like the name suggests. This equipment is usually out of reach for most of us. With a small restoration, perhaps a couple of acres or less, hand-broadcasting the seed is a viable option.

The seed should be mixed with filler material, to give a good mixture and to provide some volume for more even distribution of the seeds. Sand, dirt and sawdust are all acceptable fillers. Mix the seeds and the filler(s), put it in five-gallon pails and start throwing it out on the site. It will seem rather futile, and you will probably question whether you are getting a good distribution or if this will even work.

One good way to insure even distribution is to use

Agriculture and Urbanization Have Removed 98-99% of the Original Prairie

a very visible filler. Something light, like white sand or kitty litter work well because you can see where you've seeded or missed.

Don't worry – it will work!

What to Expect When Expecting Prairie Wildflowers

Do not expect any of the native wildflowers to show up during the first growing season. Those plants are there, but they are germinating and must first grow *down* in order to group *up*. Instead, the "undesirable" plants will likely reappear in season one. As satisfying as it might be, resist the urge to pull these out by the root – the small tender wildflowers just getting started might also be pulled out. Instead, mow all vegetation at the highest setting on the mower and do not let the undesirables bloom.

The second growing season is probably when the seeded wildflowers will start to appear. This is when hope rises, when the doubts you had when hand-broadcasting the seed disappear. Once beyond the second growing season, it would be fine to mow the site once blooming is done at the end of the season. Eventually, after the fifth year or so, a Spring burn would be helpful to remove the accumulated plant debris.

Do not be surprised if the composition of wildflowers shifts after a burn. Some of the natives might not be obvious until a burn gives them room to show off. In our case, the Compass Plant did not become evident on our restoration until the fifth growing season. Each season the constellation of blooms will change. Some species will flourish early and then dwindle in numbers as other species become more prevalent. With or without a burn, the floral makeup of your new prairie will change from year to year, giving your honey bees a new pantry every year. BC

References

[1]Where the Sky Began, John Madson, Unniversity of Iowa Books, 1982

[2]National Park Service, U.S. Department of the Interior, **http://www.beatricene.com/homestead/prairie.html**

[3]Rufus Isaacs et al, Journal of Applied Ecology, Vol 51, Issue 4, pp 890-898

[4]**http://www.nrem.iastate.edu/research/STRIPs/**

Cornflowers, Star Thistle and Related Bee Plants

Connie **Krochmal**

The centaureas are reliable, long-blooming, sturdy, easy to grow plants. The group includes native, naturalized, and cultivated species. These are valuable sources of nectar and pollen in most regions.

Generally frost tolerant, they withstand temperatures slightly below freezing. Most are suited to zones four through 11. With around 450 species worldwide, a number are native to Europe and Asia. These can be hardy annuals, biennials, perennials, or sub-shrubs. The invasive spotted knapweed (*Centaurea maculosa)* was covered in a previous article.

On average, the honey crop is around 50 to 80 pounds per colony. The honey color can vary by plant species. Typically, it has a pleasing flavor.

General Description

Members of the daisy family, these are usually one to four feet tall and generally upright.

Often lobed, the feather-like foliage varies in appearance by its location upon the plant. Usually, the lower leaves form a basal rosette. The upper foliage is often toothed.

These bear showy, thistle-like flower heads. The flower color and the flowering period vary by species or variety with annuals generally blooming from late Spring until frost. Blossoms are usually blue, pink, yellow, white, or various shades of purple to lilac. Bees are particularly attracted to the blue and white flowered ones.

The one-to-two-inch-wide flower heads are usually hemispherical or spherical. They arise from a prominent whorl of large, overlapping, fringed bracts. The crowded individual florets can be tubular, elliptical, or lobed. The fertile disk flowers are typically surrounded by very showy, conspicuous sterile ones.

Growing and Caring for Centaureas

Cornflowers and the other cultivated species are grown in containers, flower beds, and rock gardens. Some perennials are treated as annuals and are grown as bedding plants. Numerous varieties are available with double-flowered ones being unsuitable for bees. In warm climates, partial shade is best. Elsewhere, full sun is needed.

Preferring a well drained soil, centaureas adapt to most average, rich soils with a pH of six to seven. Most perennials are somewhat drought tolerant. Globe centaurea and mountain bluet require a moist soil.

Plant seeds of perennials and biennials during the Spring or Fall. Annuals should be planted during the Spring in cold climates. Bee gardeners in warm climates can sow them in Autumn since the plants prefer cool conditions. Seeds should be planted 1/8 inch deep in containers, or ¼ inch if direct sown.

The perennials can also be grown from divisions or cuttings. They can be divided every two to four years during the Spring. Space plants about ¾ to two feet apart in the bee garden, depending on the species.

Prepare the soil well, adding organic matter and fertilizer before planting. Centaureas need a steady supply of fertilizer throughout the growing season. Pinch the plants back to keep them compact.

Deadhead centaureas to encourage reblooming. Generally, these experience fewer disease and pest problems than most garden flowers. However, they can suffer from downy and powdery mildew, rust, thread blight, southern blight, rust, and white mold.

Recommended Species for Bees

Of all the various centaurea species, the following are among the best for bees.

American knapweed (*Centaurea americana)*

Mainly native from the Plains to Arizona, this is also found from Texas to Missouri, Arkansas, and Louisiana. It frequents pastures and prairies.

Reaching three to five feet in height with a three foot spread, this erect annual features thick stems. Mostly entire, the rough, oblong to lance-like foliage is four inches in length. The large flower heads, six inches wide, emerge from May through August. Closing at night, these are lilac-rose to purplish-rose or pale pink.

Cornflower (*Centaurea cyanus)*

A popular garden flower, it is also called bachelor's button and bluebottle. Introduced from Europe, cornflower has naturalized in all states except Alaska. This frost tolerant species inhabits roadsides, waste places, and fields.

A slender, upright, erect, branched annual, cornflower reaches two to three feet in height. Covered with gray woolly hairs on

Cornflower, also called bachelor's button. (Centaurea cyanus)

Giant knapweed. (Centaurea scabiosa)

the underside, the linear to lance-like foliage is eight inches long. While the basal leaves are lobed, the others are either entire or sparsely lobed.

The tufted, round, solitary flower heads are 1½ inch wide. They emerge during Spring and Summer on long stems. Usually vivid blue with lighter colored centers, the blossoms can also be white, pink, purple, or violet. Green, fringed bracts surround the flower heads.

Throughout the daylight hours, bees work cornflowers. The unopened flower buds and seed heads contain extrafloral nectaries. The blossoms can yield 0.43 mg of nectar per blossom daily, while flower buds produce five mg.

Cornflowers can provide around 100 pounds of honey per colony. This can be dark amber with greenish tinges to yellowish amber or yellow-green. Sometimes, the honey has a slightly strong or bitter flavor.

Globe centaurea (*Centaurea macrocephala)*

Also known as giant knapweed, this cultivated species is suited to zones four through . Native to Turkey and the Caucasus, it is a frost tolerant, clump-forming perennial, three to five feet in height. The stiff, leafy stems bear lance-like foliage, eight inches in length.

Flowering from mid to late Summer, the globe-shaped, golden yellow blossoms are three inches wide. These feature fringed, shiny, showy, brown bracts. The flower stems are largely leafless.

Greater knapweed (*Centaurea scabiosa)*

This European native has naturalized in various states, including Wyoming, Utah, North Dakota, Iowa, Idaho, Indiana, Kentucky, Ohio, Connecticut, Maine, New Hampshire, New Jersey, and New York. It grows along roadsides, woods, pastures, fields, and open cliffs.

Tolerating salt spray, this plant is very leafy at the base. A variable, erect, branched, hairy perennial, greater knapweed is up to three feet tall. It features angular, branched stems.

The rough, deep green leaves can be toothed or pinnately lobed. The upper foliage is small, lobed, stalkless, and mostly linear.

The large, solitary, showy flower heads are two to three inches across. Emerging on long spindly stems, these display prominent purplish-red florets and green bracts.

Hardhead or lesser knapweed (*Centaurea nigra)*

Also called Spanish buttons, this was introduced from Europe. Naturalized along roadsides and in fields, this is found from Washington and California to Montana, Minnesota, and Iowa eastward to the Northeast.

This variable, coarse perennial with harsh, branching stems reaches 3½ feet in height. The lower leaves form a rosette. The foliage can be oval to lance-like. The upper leaves are much smaller.

Similar to greater knapweed, this bears small, purplish-rose flower heads, 1½ inch wide, from July through September. These feature blackish or brown bracts.

Hardhead is a valuable nectar plant. The golden, thin bodied honey is considered fair to good quality. Sometimes, it can taste strong.

Maltese or Napa Thistle (*Centaurea melitensis)*

Also known as Lombardy star thistle and tocalote, Maltese thistle is native to the Mediterranean region. This has naturalized in the Northwest and Southwest as well as in Missouri, Wisconsin, Indiana, Alabama, Georgia, South Carolina, Delaware, Pennsylvania, New Jersey, Rhode Island, and Hawaii. Preferred habitats include fields and pastured hills.

While this naturalizes, it generally isn't as persistent as the others. The seeds, sometimes found in ballast, can be a contaminant in grain and grass seeds.

Similar to star thistle, this rough annual is covered with slender, purplish spines. Appearing in late May and June, the yellow flower heads open in bunches of three or four. The floret tips feature short spines.

Maltese thistle is an excellent bee plant. Mostly pale amber, the good quality honey has a pleasing flavor and good body.

Mountain Bluet or Mountain Cornflower (*Centaurea montana)*

Also called mountain knapweed and perennial cornflower, mountain bluet does best in zones three through nine. This frost and drought tolerant, woolly, mat-like, European perennial spreads by creeping underground stems and seeds, which readily self sow. It has naturalized in various states, including Washington, Oregon, Utah, Wyoming, Montana, Arkansas, Idaho, Minnesota, Wisconsin, Michigan, Pennsylvania, New York, New Hampshire, and Maine.

Mountain bluet. (Centaurea montana)

Mountain bluet features two-foot-tall, winged stems. The slightly winged, stalkless, toothed foliage, 2½ inches long, can be broad, ovate, or lance-like.

With brownish-black fringe, the blossoms resemble cornflowers except for the wider flower heads. While the central florets are reddish-pink, the outer ones are usually some shade of purple, violet, or lilac, rarely white. The blooms are much favored by bees. The flower heads contain dark extra floral nectaries.

Sow seeds in late Summer, or take root cuttings in Winter. The plants are typically staked. Black Sprite, reaching 1½ feet in height, is a newer variety with black blossoms.

Persian cornflower (*Centaurea dealbata)*

About two to three feet in height, Persian cornflower is equally wide. Often needing staking, this cultivated, clump forming perennial is suited to zones four through nine.

The deeply lobed foliage reaches eight inches in length. The lavender to rosy-pink flower heads are 1½ inches wide. Opening late Spring through mid-Summer, these contain showy outer, forked florets with pastel centers.

Russian knapweed or hardheads (*Centaurea repens)*

Originally from Russia and Asia, this creeping perennial naturalized in the West, Midwest, and Central regions. It inhabits fields, ditches, pastures, waste places, and roadsides. Considered a noxious weed, Russian knapweed spreads by seed and creeping underground stems.

Bushy with many stiff, branched, ridged, leafy stems, this is two to 4½ feet tall. The alternate, firm leaves vary in shape. Forming a rosette, the basal foliage is lobed and four inches long. Generally small, the oblong stem leaves are often lobed or toothed and only half as long.

Blooming from June through October, the small, solitary, cone shaped, flower heads emerge on leafy bracts. The tubular blossoms can be purple, pinkish-rose, or bluish-lavender.

Russian knapweed can provide a good crop of light colored honey. Sometimes, this has a slightly bitter, unpleasant flavor.

Sweet sultan (*Centaurea moschata)*

Native to the Caucasus, Turkey, and the Mediterranean region, this half hardy, cultivated annual requires a long growing season. Preferring warm conditions, it reaches about two feet in height and is half as wide. Sweet sultan features thin, gray-green, toothed foliage. The basal leaves are four inches long.

Opening on long stems, the fringed flower heads are about two inches wide. The sweetly scented blossoms can be yellow, red, pink, purple, lavender, or white. Shaped like those of the common cornflower, the flowers feature spectacular, silky, dainty outer florets.

Yellow Star Thistle or Star Thistle (*Centaurea solstitialis)*

Also known as yellow thistle, this has naturalized locally in all states except Arkansas, Louisiana, Mississippi, and Georgia. A major bee plant in the West, yellow star thistle was introduced from the Mediterranean region and Asia.

Yellow star thistle grows in fields, hedge rows, waste places, pastures, rangelands, and along roadsides. It can occur at slightly over 8000 feet elevation. Forming thickets, the plant spreads in warm climates by seed.

This tap rooted, bushy species prefers dry soils. Generally an annual, it can become a biennial in warm climates. The drought resistant plant is frost sensitive.

The winged, rigid, branched, grayish, woolly stems can be eight feet tall. The woolly leaves are alternate. The basal foliage forms a rosette. Usually entire, the stem leaves, sometimes winged, are narrow and pointed.

This is named for the vivid yellow, tubular blossoms, opening from July through October. The green bracts feature soft yellow spines at the base. The stalkless, urn-shaped flower heads are solitary and terminal.

Yellow star thistle is an especially good honey plant in California and the West. Drought temporarily stops the nectar flow, but it begins anew once rains return. Generally, this provides a slow, steady nectar flow of .123 mg per flower daily.

These plants can bring 50 pounds or so of honey per colony. Often granulating, this extremely sweet, heavy bodied, high quality honey has an excellent flavor. It can be almost white, profound white, extra light amber, yellow, green with yellow tinges, or greenish.

Other Cultivated Species

Hardy to zones three through 10, one biennial knapweed species (*Centaurea rothrocki)* occurs only in New Mexico and Arizona. Typically blooming the second year, dusty miller (*Centaurea cineraria)* is a highly heat tolerant, tender perennial. Hardy to zone seven, this is mainly grown as an annual for its gray woolly foliage. BC

Connie Krochmal is a writer and beekeeper in Black Mountain, North Carolina.

Ross **Conrad**

Flow Hive

Good or Bad. Time Will Tell.

Stewart and Cedar Anderson of Byron Bay, Australia have made history and are fast becoming legendary. The father and son team have invented the Flow™ Hive and launched a crowd funding campaign on Indiegogo to raise the money needed to begin mass production and distribution of their invention.

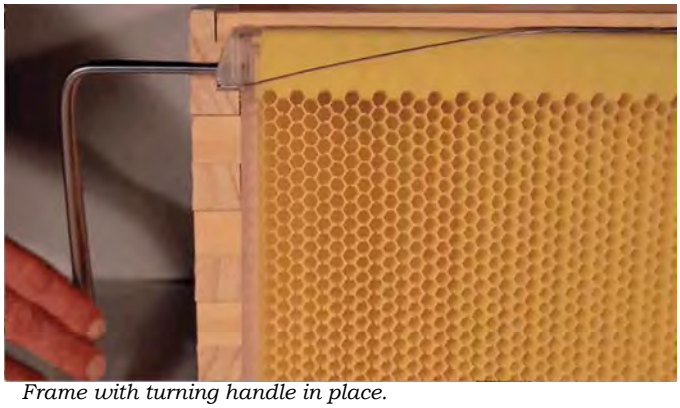
As this article was being written the campaign, whose original goal was to raise $70,000, had raised over six million dollars and contributions were still rolling in. With many days left in their 45-day fundraising campaign, Stewart and Cedar are disproving the long-held belief that one will never strike it rich through beekeeping. According to a Flow Hive media release, "the Flow Hive Indiegogo campaign is the most successful crowd funding venture ever launched outside the U.S., with contributions from 116 countries." In dollar value, the U.S. is by far the largest contributor followed by Australia, Canada, and the U.K. As a result, plans are afoot to establish a Flow Hive manufacturing facility in the U.S. in order to reduce shipping costs to the Northern hemisphere.

This invention is so new that with the exception of the inventors and a small number of beekeepers who over the course of the last three years were involved in product testing, nobody has used this harvesting method before (though by the time you read this the first production models will likely be in use). Thus what follows is what I have been able to learn about the Flow Hive and my initial thoughts on the subject without the benefit of direct experience.

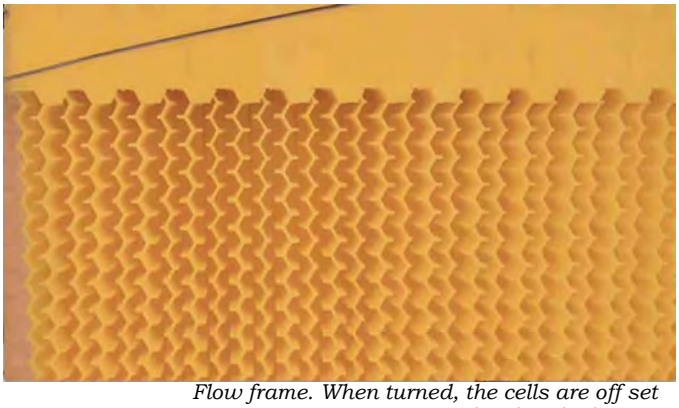
The Flow Hive allows the beekeeper to harvest honey without opening up the hive and with minimal disturbance to the bees. The system utilizes a wooden honey super that is the same size and shape to a standard Langstroth deep super, except that it is modified with openings facing the backside of the hive opposite the hive entrance. This Flow Hive box holds one or more Flow™ frames that while wider, are similar in height and length to the standard Langstroth frame. Each Flow frame is composed of fully drawn plastic comb with deep cells that the bees fill with honey, and cap. A hose is attached to the base of the Flow Hive frame that is exposed by the opening in the side of the super and a bent metal rod is inserted into the top of the frame. When the rod is turned (like a tap), it forces the two sides of the Flow frame to move slightly in the middle,

Opening door.

Bees on frame.



Frame with turning handle in place.



Flow frame. When turned, the cells are off set releasing the honey.

allowing the honey in the cells to run down through the channels that are created, and out along a trough at the bottom of the frame leading to the hose. Simply insert the other end of the hose into your container of choice. The force of gravity allows the honey to flow out of the end of the hose extremely clean, eliminating the need to strain or filter out the bits of beeswax, propolis, pollen, bee's legs, etc., that is typically required when producing liquid honey by uncapping and extracting. Any tiny amounts of pollen that do happen to find their way into the honey are individual grains of pollen that fall off the bodies of the bees as they go about their business in the hive.

Each Flow frame when completely filled and capped by the bees is reported to hold about seven pounds of honey. Depending on the ambient temperature and the moisture content of the honey being harvested, draining an entire Flow frame is reported to take as little as 20 minutes to more than two hours. The Flow frame only works when temperatures are warm enough for honey to flow.

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Once the frame is drained the metal rod in the upper slot of the Flow frame is turned back to its original position, resetting the comb allowing the bees to uncap the empty cells and get to work refilling them with more honey. A viewing window is cut into the side of the Flow Hive super that allows the frames inside to be monitored without the need for opening up the hive. Both Flow frames and traditional beeswax frames of comb can be combined in the same honey super, with the maximum of six Flow frames fitting in an eight-frame honey super and seven Flow frames fitting into a 10-frame honey super. However, it is likely that the bees will be able to squeeze past standard wax combs and exit via the cut-out in rear of the Flow Hive super especially if the end bars are not full rectangles but are milled to allow bees room to pass between the end bars of adjacent frames. This "rear entrance" could make it difficult for a weak hive to keep robbers at bay and could lead to defensive behavior when the Flow frames are being harvested.

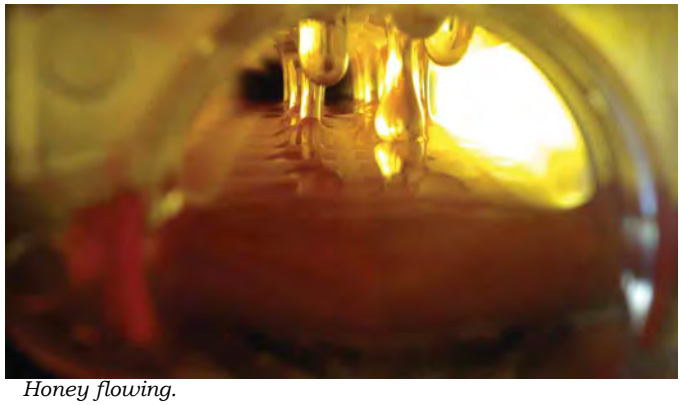
This invention is revolutionary in that it has the potential to eliminate about 95% of the labor typically involved with conventional honey harvesting; a process that requires the removal of honey supers, the removal of bees from the supers, transporting the supers to an extraction site, uncapping the comb, and extracting and filtering the honey, then returning the honey supers to the beeyard or storage area. Since there is little disturbance to the bees in the hive when harvesting honey in the Flow frames, the likelihood of being stung is greatly reduced. This is likely to be very popular in South and Central America, and Africa where highly defensive bees are commonly managed.

After three years of field trials, Flow Hive maintenance appears to be minimal with the recommendation to scrape out burr comb from supers the same as with standard Langstroth equipment, and to flush out the bottom channel with warm water and perhaps use a bottle brush to clean the channel at the end of the season. Should beebread be stored in some of the Flow frame cells, they do not seem to impede the harvesting of honey in any way.

Some critics of the Flow hive have accused Stuart and Cedar of ripping off old patents that describe similar devices for easily harvesting honey from the hive. When I asked Stuart Anderson if the idea for the Flow Hive came from old patents that some are claiming were used as the basis for their invention, the answer I received was, "*No, our design is quite different from those old patents and, in our opinion the designs in those patents would not work. As it happened we did not see those old patents before we came up with our own design.*"

As I pointed out in the article "Beekeeping and Technology" (*Bee Culture*, February 2015), there are often unintended consequences, sometimes good and sometimes not so much, that come with the implementation of new technologies. Two potential issues that the Flow Hive brings to mind are the increased reliance on plastic in our bee hives and the type of philosophy or attitude that this beekeeping invention may foster among its users.

According to the company the Flow frame that lies at the heart of the Flow Hive, is "made from high quality, food-grade, BPA-free plastic." Setting aside the fact that the bees tend to not like plastic, the reason for this statement is because estrogenic chemicals (such as BPA) found in common plastic products have been linked to a litany of problems in humans and animals. Scientists have tied BPA to ailments including asthma, cancer, infertility, low sperm count, genital deformity, heart disease, liver problems, and ADHD. Meanwhile the



Honey flowing.

Honey draining.

synthetic nonsteroidal estrogen drug DES, which is also classified as an endocrine disruptor, was once prescribed to prevent miscarriages but caused obesity, rare vaginal tumors, infertility, and testicular growths among those exposed in utero. While chemicals having estrogenic activity are clearly a cause for concern, plastic honey containers, plastic foundation and fully-drawn plastic comb have been used for many decades without any noticeable negative impacts. Critics however would argue that since the amount of surface area in a plastic comb, such as the Flow frame, is many times greater than the plastic normally found in the hive, there is potential cause for concern. Helping to allay such concerns for some however, is research that has found that "honey has a potential role in reducing BPA-induced ovarian toxicity by reducing the morphological abnormalities of the ovarian follicles and improving the normal estrous cycle."[1]

Other studies show that current manufacturing processes that produce plastics with estrogenic activity are unnecessary. To quote from one abstract, "Almost all commercially available plastic products we sampled – independent of the type of resin, product, or retail source – leached chemicals having reliably detectable EA (estrogenic activity), including those advertised as BPA free. In some cases, BPA-free products released chemicals having more EA than did BPA-containing products." The authors of the study conclude: "Many plastic products are mischaracterized as being EA free if extracted with only one solvent and not exposed to common-use stresses (microwaving, ultraviolet radiation, and/or autoclaving). However, we can identify existing compounds, or have developed monomers, additives, or processing agents that have no detectable EA and have similar costs. Hence, our data suggest that EA-free plastic products exposed to common-use stresses and extracted by saline and ethanol solvents could be cost-effectively made on a commercial scale and thereby eliminate a potential health risk posed by most currently available plastic products that leach chemicals having EA into food products."[2] It is well established that the substance royal jelly, that is critical to raising healthy larvae during their first three days or so of development, and the queen that is fed royal jelly throughout her life, exhibits weak estrogenic activities.[3,4,5] Given the apparent importance of this estrogenic activity in honey bee development, not enough is known about how the estrogenic compounds emitted by plastic hive components impact the health of the hive.

As if the health concerns of compounds related to the use of plastic are not enough, the toxic pollutants produced during plastic production and the huge volume of plastic debris that is clogging up our landfills and accumulating in our seas, trapped and accumulated by ocean currents will not be helped. Unfortunately it is hard to see how the Flow frames could be manufactured any more economically by anything other than plastic. Of course this also means that when a hive must be burned due to American Foul Brood contamination, a lot of toxic fumes will be released into the air and a significant monetary investment will be lost. One has to assume that the current price of $51-$77 per frame will eventually come down as production is scaled up.

The other major criticism of this new system for harvesting honey is the potential mind-set that it may encourage in beekeepers that use the Flow Hive. The ease with which a beekeeper can monitor the buildup of the Flow frame comb through the window on the side of the Flow Hive super and extract the harvestable honey from the hive without having to lift the lid and open the hive may aggravate an issue that is already a concern in beekeeping circles: beekeepers who don't regularly inspect their colonies and keep tabs on the health and well-being of the hive.

While the Flow Hive window can give one a rough idea of how fast the Flow Hive honey super is filling up, it does not provide a window into the brood nest potentially preventing the timely diagnosis of queen issues or diseases. It is a simple fact that unless a beekeeper knows what is going on inside the hive, they are unlikely to be able to intervene on the bees behalf in a timely fashion when trouble rears its head.

For beekeepers in the northern regions of North America, overwintering is a major challenge. One of the primary requirements for successful wintering is an adequate store of honey. Unless beekeepers take care

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Some folks have pointed out that this invention seems to flow from the same extractive mindset that is part and parcel of our capitalistic approach to world governance.

to ensure that each hive has filled enough honey supers *before* installing the Flow Hive super on the colony, the ease with which the honey can be harvested could easily result in overharvesting and colonies that either starve during winter, or require a lot of feeding in order to ensure their survival. If the bees are fed an artificial diet in place of their natural diet of honey and pollen, we now know that the overall health of the colony's immune system is likely to suffer making the colony more vulnerable to disease.

The inverse of this situation could also be just as disastrous. Conscientious beekeepers who modulate their impulse to harvest and leave full Flow frames on their colony in order to ensure the hive will have plenty of honey for Winter may find that the significantly deeper cells of the Flow frames so conducive to abundant nectar and honey storage, are not the depth of cell that is favorable for brood rearing. As a result, leaving supers of Flow frames full of honey on the hive in cold climates may result in weak hives in Spring and increased queen issues.

Some folks have pointed out that this invention seems to flow from the same extractive mindset that is part and parcel of our capitalistic approach to world governance. Given capitalism's current path of never ending growth based primarily on resource extraction to the detriment of planetary health, one can't help but be concerned that the ease with which we can now take honey from the bees may similarly lead not to their salvation, but in some cases may hasten their demise.

Beekeepers will be challenged to fight the temptation to overharvest and rededicate themselves to proper hive stewardship based upon sound beekeeping principles and an apicultural ethic that does not place their needs above the needs of the bees.

Judging from the comments on the Indiegogo campaign site, Flow™ technology is stimulating a new wave of people getting involved in beekeeping, and has rekindled the spirit in people that gave up beekeeping in the past. Make no mistake, from now on everyone who leads beekeeping workshops and teaches beekeeping classes must take the time to become at least familiar with the Flow Hive in order to knowledgeably answer the questions that will inevitably arise. Teachers should be prepared to offer advice such as: if you are concerned about bee stings you should probably still wear a veil, gloves, etc., you will still need to do brood inspections, deal with mites and diseases, hive beetles, wax moths, swarming, and all the rest. Unless your bees are located in a warm desert, semi-arid or tropical climate such as occurs throughout most of Australia and the bees have forage available through most of the year, the Flow frames should not be left on overwintering hives lest the cluster move up onto the frames of honey but are prevented from raising healthy brood in the extra deep cells of the comb (as mentioned above the plastic honey cells in the Flow frame are extra deep which is fine for honey storage, but not conducive to proper egg laying by the queen.

Additionally, the build-up of larval skins in the plastic cells used for brood rearing may eventually cause problems with the ability of the honey to flow through the channels properly when the frame is activated.)

The Flow Hive appears to be the biggest technological breakthrough in hive design in well over 150 years. It is likely to take at least several more years of use in all manner of climates and geographic locations in order for beekeepers to learn how to fine tune the Flow Hive benefits and mitigate any of its negative attributes. With over 12,000 beekeepers from around the world placing pre-orders through Indiegogo, the Flow Hive has not just captured the imagination of beekeepers around the globe, it is poised to have a major impact on beekeeping generally. Whether it proves to be of long-term value to the health of the hive and the economics of the beekeeping industry, or simply results in a short-term bubble… time will tell. BC

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

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Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Texas writes:

I recently watched a video on YouTube that advocates using a nine frame bar spacer, as shown below.

It looks like a great idea but I have never known of anybody else using this method. I like the idea because it seems to me like this creates less crowded conditions inside the hive which would make the frames easier to pull out at inspection/harvest time.

I found a nine frame spacing tool for sale at Mann Lake and this tells me that nine frame spacers must be somewhat commonly used. My question is, what do you think may be the advantages and/or disadvantages in using a nine frame spacer?

Phil replies:

I don't know whether the video you saw advocated using spacers in brood boxes, honey supers, or both. My opinion on the merits of eight or nine frame spacers depends on where you want to put them. However, if you're going to use them at all, I recommend the type in your picture, which I call push-in spacers. Whether metal or plastic, with or without a handle, they are used just like the rack in a game of pool – placed to get the positioning right, and then removed. Beekeeping suppliers also sell spacers which are nailed into a ten frame box, permanently dividing it into eight or nine frames. I don't care for that kind in honey supers, because you can't switch between eight, nine, and ten frames without removing the spacer (not easy to do when it's nailed in and propolized over.) In brood boxes they're even worse, because they make it impossible to slide frames over when working hives. When I do inspections, I first remove an end frame and set it aside (on the ground leaning against the hive, or in an empty brood box.) I then scoot the next frame over before pulling it out. That gives me a bigger space to work in, making it easier to remove the frame and less likely that I'll "roll the bees" (squash them between two frames) or even the queen. With mounted spacers, the frame must be lifted directly up. The permanent, nail-in, spacers are also more expensive because they require two per box, whereas one push-in type can be used in any number of hives.

In my July 2013 column, I discussed the advantages of using eight or nine frames in 10-frame honey supers. (*Bee Culture* readers who are interested and don't keep issues that far back can email or write me for a copy.) In brief, I much prefer fewer than ten frames in supers. I think, though I'm not certain, that a super with eight or nine frames may actually hold more honey than one with ten. I know that fewer frames cost less, take less time to put together, and are quicker to extract. They also encourage the bees to draw comb out beyond the edges of the frame, which makes decapping faster and easier. When using foundation only, I start with 10 frames per super and trust myself to space them by eye. As the bees draw out the comb, or when I start with a mixture of foundation and drawn comb, I use nine frames, and eventually change to eight. To distribute them evenly in the super, I use push-in spacers with the appropriate number of divisions. I find that the fewer the frames, the more difficult it is to gauge the spacing visually.

Some beekeepers also prefer to use nine frames in ten frame brood boxes in order, as you said, to make the box less crowded and make frames easier to remove and replace. I would never suggest using eight frames in a brood box. Bees treat brood comb a little differently than comb for storing excess honey. Given extra room in a honey super, they will just draw the cells out slightly deeper, which is why they are easier to decap. However, in brood boxes with fewer than nine frames, they will connect frames together with extra wax (bur comb) or even make a complete extra layer of comb between them (bridge comb), generally just making a mess of the brood box. A similar result can occur with nine frames in a standard brood box if the frames are not evenly distributed. That's where the spacer comes in.

Early in my beekeeping career, several people recommended to me that I use nine frames instead of ten, and I tried it for a couple of years. It did make getting into my hives easier, as long as I kept the frames correctly spaced. I returned to using ten frames when I realized that I was reducing the area available for brood rearing by 12.5%. Why 12.5% instead of 10%? Bees typically do not rear brood on the outside frames because it is harder for them to maintain ideal temperatures for the brood there. They tend to use those frames for food storage. So, instead of sacrificing one frame out of ten for brood when I changed to nine frames, I was really giving up

one out of eight. I switched back to ten frames mostly because I wanted to maximize honey production, and to do so I needed my hives to be as strong as possible. To build the colony's population, I needed all the brood frames that the hive was designed to hold. That was not the only reason I went back to 10 frames. I found that, despite using a frame spacer, I sometimes got in a hurry and left a little more room between some frames than others. The result was that the combs varied slightly in thickness. I make nucs in five-frame nuc boxes. When I put one of these slightly thicker brood combs into a nuc box, I had difficulty fitting all five frames in, which I found frustrating. After resuming using ten frames in the brood boxes, I found that I could very easily space them evenly by eye and that, as long as I went through my hives every couple of weeks in the spring and summer, I had little difficulty removing frames or putting them back in.

Your question is a good example of different strokes for different beekeepers. I like eight frames in honey supers, but my son prefers nine, so I may have to change - not because he's right and I'm wrong, but because he now does most of my extracting for me. I went back to ten frame brood boxes, but there is nothing wrong with using nine. You might decide that giving up some brood area is a good tradeoff for the extra room and convenience. You'll never know until you try, and a frame spacer is a small investment to make. I recall hearing Dr. Tom Webster, apiculture extension specialist and researcher at Kentucky State University, say that we each need to learn what works for us, and develop our own beekeeping style. I think that is very true.

A beekeeper in California writes:

Is there a race of bees with all yellow abdomens? All the ones I have seen suffer from deformed wing virus. I have ordered MAQS [Mite Away Quick Strip] to control the Varroa.

Phil replies:

The yellowest bees are Italians. I've read that the color is even more pronounced on Italians in the United States than on those in Italy because Americans tend to prefer more saffron colored bees, and queen breeders have selected for that trait. There is even a line of almost pure yellow Italians called Cordovans, which was first developed as genetic markers for research purposes. These very yellow Italians are sold by some queen producers, including at least one in California. I have long thought about buying one for my observation hive.

Within a hive, coloration can vary because of different genetics. Though all the bees in a given colony may have the same mother, they carry genes from several fathers. Queens generally mate with more than a dozen drones. (The number of matings cited differs from one article or book to another, and all are estimates or averages.) The sperm stored in the queen's spermatheca after these couplings can be sufficient for her to fertilize eggs for up to several years, creating a genetic diversity among the half-sisters in the hive which is beneficial to the colony as a whole. It reduces susceptibility to disease, and increases resilience because the offspring from one drone may be resistant to a particular disease, whereas another group may possess other traits which give them, and the colony, a survival advantage. We can think of this diversity as being similar to the contributions to a community of a group of citizens possessing distinct, specialized skills. Color is an incidental trait which accompanies more substantive differences.

Deformed wing virus.

However, your saying that all the bees with yellow abdomens suffer from deformed wing virus *(DWV), makes me suspect that what you are seeing has nothing to do with genetics. I think that they are very young bees (a few days old at most) whose coloration is different from that of the adults because their exoskeletons have not yet hardened. My own bees being of a darker stock, they look grey to me when newly emerged. The virus which deformed your bees' wings affects the developing pupa prior to emergence. Its victims never live long; the adults will sense that they are defective and remove them from the hive. Thus all your deformed wing bees are young, and all your young bees have yellow abdomens.*

You are quite correct in associating the DWV symptoms you are seeing with a Varroa issue. Varroa mites carry DWV along with at least two dozen other viruses. This number keeps going up the longer researchers study Varroa. While some viruses are not accompanied by any observable signs, they can still have serious consequences for the well-being of the colony as well as for the health of individual honey bees. Deformed wing virus is one which can produce clear characteristics – the deformed wings from which the name derives – but they may only appear on some of the infected bees. The asymptomatic ones still suffer less visible damage from the virus, including lower body weight and shortened life span, which can lead to high winter colony losses.

The same California beekeeper responds to Phil's emailed reply:

Thank you for the detailed response and I agree with your assessment. By way of background information the queen is an open mated Carny from a central CA beekeeper and breeder. The few drones I have seen are dark and the workers are typically colored Italians. The bees are very calm when inspecting the hive but use a lot of propolis.

I knew the colony was in trouble when in early December I began seeing a lot of dead bees near the hive. The sticky board showed a very heavy mite load. Then the blond bees with deformed wings appeared so I ordered MAQS and treated with two pads a few days after contacting you. The

colony now appears to be doing well with the bees foraging on fiddleneck and mustard. We have mild winters in the Central Valley and the bees forage even in winter in this urban environment. I have not opened the hive since treating but with all the recent activity I'm sure the colony is growing and have even seen bees orienting.

The colony was installed in early April 2014 and filled four medium eight-frame supers with honey. We harvested three and left one on for Winter. The honey is dark with a distinct but mild flavor.

The "blond" bees intrigued me since I had not seen anything in the literature about all yellow bees. I agree, they were recently emerged bees, somewhat small in size and loaded with viruses.

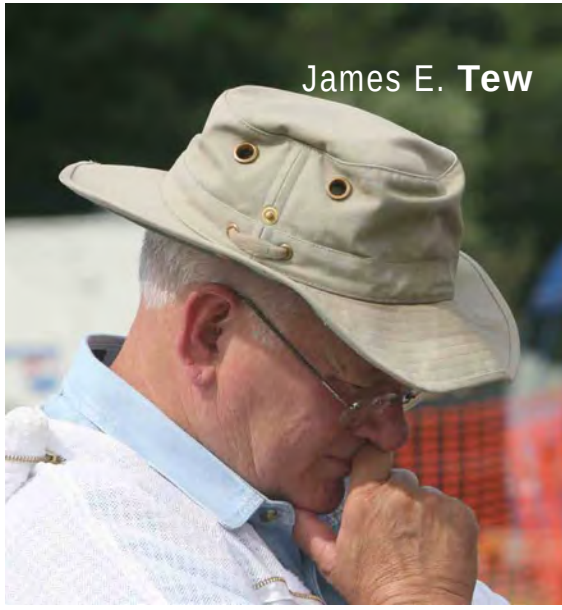
Thanks for the information and I greatly enjoy your column.

Phil replies again:

I'm glad that you treated to control the *Varroa*. The consensus among experts is that controlling mites is the most important action beekeepers can take to improve the health of their colonies. Unfortunately, much of the damage they do is by stealth, like the viruses for which they are vectors, and it is often attributed to other causes.

A Short Story About A Wintering Colony With Dysentery

When to treat and when to simply accept the disease?



I'm only fooling with you

I am afraid that all too often I write about gloomy things and that my writing persona has become a *"poor beekeeper Jim"* image. While that may be true, my writing-reasoning is that I tend to write about beekeeping issues that plague us rather than the upbeat success stories – and, yes, there are some of those, too. To me, it feels like things that are going right do not need fixing.

I would argue that we grow in our beekeeping abilities when we make mistakes. When we solve a problem, we are able to mature from those experiences. As I write, I have a colony that I am late Winter-feeding. I am feeding this colony because it is lightweight and the cluster is up high in the equipment. Obviously, I made a miscalculation last Fall. It did not have enough stores to make it through the cold season. In early Winter, I always make my Winter stores estimation as best I can, but sometimes I miss. Consequently, due to those miscalculations, I have been pushed into learning and developing Winter-feeding techniques (ergo, a mistake that results in growth). As such, I have grown – kicking and screaming – in my beekeeping experience. Where is the adventure in everything always working well? *(My ramblings do not mean that everything should go wrong and unlimited errors are okay. Keep things reasonable.)*

Disappointing and smelly

The sick colony's situation was a surprise, but the odor and mess was predictable. The affected colony has been in my apiary for many years – though obviously not the same queen stock or as a perpetual colony. My point is that I had come to assume that this particular colony was fine and would always be a survivor. It appeared to be very unassuming as it wintered – all quiet and covered with snow. Ironically, due to *late-season lunacy swarms*[1], two different colonies of mine needed serious assistance and I gave my attention to them.

For much of the U.S., the Winter cold was impressive this past Winter. Days and days passed with the temperature well below zero. During previous Winters, such coldness did not appear to result in a massive colony die-off so I was reasonably sure that most of my colonies would survive.

The weather broke and bees began to take cleansing flights and what a mess they made. They ***really*** needed to cleanse themselves. The two late season swarmers were dead. No surprise there. They nearly deserved their fate. But I did not expect dysentery from the unassuming colony.

What now?

Part of my plan from last year was to leave all my colonies dead heavy with honey stores. This sick colony is packed with honey stores. Maybe something was wrong with some or all of these stores, but why are the other colonies not showing it as badly or not at all? All of my colonies had access to the same floral sources.

For all of the dead bees in and around the colony and the fecal mess on the colony, the questionable colony is still surprisingly strong. To lessen even more stress, I have not gone deeply into it so I can't say exactly how strong. If it can survive, I will let it develop longer into the Spring before I open it.

Other more energetic beekeepers would take samples to determine if a form of Nosema had overtaken the colony. Of the 15 colonies in my apiary, this is the only one that scoured. It is simply one of the unknowns of this past Winter. I will clean the hive as best I can and I will check the stores to visually see if I find anything I don't like. If necessary, I will discard some frames or require the bees to build new wax combs. I doubt I will do much more than that. During other years, I have been through all of this before.

It was in 1975 or so . . .

During 1975 or 1976, I was new to the academic program at the University of Maryland in College Park, Maryland. Dr. Dewey Caron was (still is) my major professor. Normally about 10 to 15 colonies sat in front of the university apiary. During an uneventful late Winter one of the colonies went wild with dysentery. As such, dysentery is a symptom and not truly a disease any more than a stomach ache

The colony on the far left in better days.

[1]This concocted term, lunacy swarms, is my wording for describing colonies that are bizarrely persistent about casting late season swarms until the parent colony is nearly adult bee depleted and ultimately does not survive the Winter. Sadly, I seriously doubt any of these departed lunacy swarms had any chance of surviving either.

This colony has never had this issue before.

is a disease. I had aspirations of becoming a honey bee academician so I felt a need to solve this mystery.

I took scrapings and other samples and bothered everyone I could within the department who I felt could help. As the investigative weeks passed, the sickly colony died. Even more weeks later, a diagnosis was developed that seemed plausible. The honey stores contained a high melizitose (a sugar that bees do not digest well) level that most likely came from a honeydew source. The colony was wintering on poor stores. So there – I now had an academically derived (possible) answer to the problem. I had used a lot of my time and that of others and had invested funding in determining that the dead bees died of causes beyond my control. To this day, that experience dampens my eagerness to perform complicated treatments for dysenteric diseases such as Nosema.

Now what to do?

Each beekeeper will go one of several ways – (1) do something, (2) do nothing, or (3) not sure what to do or not do. To see where things are, search *honey bee dysentery* or *Nosema* on the web. Of interest within these research results will be the paucity of hits from traditional academic institutions. The usual bee people are writing the usual in-depth articles that offer information that is not always practical as a solution for all beekeepers. Other articles provide complicated "field evaluation" sessions that actually require a microscope in the field. It becomes unclear what should be done.

Several diseases or issues can cause dysenteric symptoms. Now, there are two forms of Nosema. For the typical beekeeper, both are hard to conclusively diagnose. Researchers report that in some cases, simple cold weather is enough to lower the infection rate of the newer form of this pathogen and that a control solution may not even needed. I know of occasional passionate beekeepers who have actually purchased compound microscopes and related equipment to analyze the level and type of Nosema at hand. Even with a scope, it is remarkably difficult to derive a conclusive diagnosis and even then a control plan has not yet been developed.[2]

A sickly colony in 1975 with paper on top to collect samples.

So where does that leave me now?

As the decades have passed, other instances of dysentery have shown up in my bees. To monitor for Nosema, I did occasionally pull guts and take spore counts. At times, I went through the treatment process with Fumadil-B[3]. I always ended tinkering with a diagnosis while my colonies dealt with the issue on their own. Normally, they recovered, but yes, occasionally some of these afflicted colonies died.

Unless something else arises, I suppose my practical plan for this colony is to employ the traditional management scheme to feed the colony and encourage its recovery in any managerial way possible. I am not inclined to perform extensive in-apiary testing and evaluation procedures. I will do what I can to keep all of the colonies healthy and productive. I will not always be successful.

Altering my apiary layout

My Alabama heritage frequently shows through in my apiary. I like shade. In south Alabama, beehives in the sun are hot, hot locations during Summer months. The bees are also hot and testy. Full protective gear has to be worn at all times. Working bees in the early morning or late afternoon becomes the norm – or put the apiary in the shade where things are *somewhat* cooler.

Even though I now live in Ohio, my home apiary now is still in the shade. In Ohio, there are many Summer days when the weather is hot. The shade is still nice. However, more important to me, my apiary is in the deep shade and out of respect for my neighbors, secluded in the back corner of my property. Out of sight – out of mind. Don't panic. I am not writing on that subject here in this article.

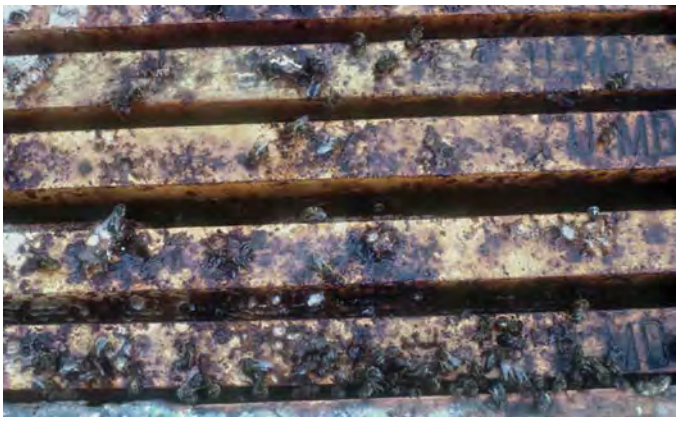
I'm adding a stockade fence

This Spring, I plan to add a barrier fence so I can move my beehives into more direct sunlight

[2]For a thorough review of the two forms of Nosema, see: http://entomology.ucdavis.edu/files/147621.pdf

[3]As such, this product is no longer available. Medivet produces a product named Fumiligin-B that available.

and out of the deep shade they are now in. I'm serious about this fence building for several reasons: neighbors, grandkids, and beehives. I have contracted with a company to do the job but not without disruption. I will have to move the colonies from the work site until the project is finished. I hope the occasional sunny Winter day gives my colonies a bit of a respite from the cold. As you would probably expect, I will write future articles on this fence caper.



These frames from the colony above, smell just as badly as they look.

I'm raising my hives higher off the ground

My entire bee life, I have used cement blocks or some type of treated wood hive stand. Keeping colonies near the ground makes it easier to put supers on and then to remove supers. I have a constant problem with critters. My apiary is near a woodpile, wild brush, and trees with low-growing branches. The vermin of the area feel that I have provided these resources for them. When these animals can move about, my colonies are relentlessly harassed. I don't know how much this disrupts my wintering bees, but I will try to inconvenience the critters as much as possible.

I would like to come up with design for individual stands rather than the communal stands that I now use. If any of you have an idea for such a hive stand, I would enjoy having a look at it.

Back to the water issue – again

I have written about providing water for bees until you and I both are exhausted on the subject. Yet I must add that providing a small, but dependable water source for bees can be a potential site for disease spread. I suppose it would be a bit like everyone drinking from the same water glass. But as usual, I am not prepared to say that this is a common source of disease spread such as Nosema or related dysentery-causing issues. But it looks like it could be.

Many years ago, a USDA scientist, now long retired, made the passing comment that he routinely found what he felt were pathological spirochetes (a bacterial type) in the nectar of poplar trees. He wondered if diseases could be spread in nectar.

Much more recently, there are exciting discoveries indicating that healthy bees have beneficial gut bacteria that help suppress the pathological bacteria that bees encounter in their natural lives. The project hope is that an inoculum can be developed that will encourage the "good" bacteria and suppress disease-causing pathogens.[4] I'm telling you all of this because my water improvement project could very well be JTew "busy work." Most experienced beekeepers have seen some of the places that bees collect water. It's not always pretty sources.

Sustainable beekeeping – my way

I think I can expect my bee life to continue as it has during many past years. I will wonder why this colony experienced this stress. I will do what I can to boost my surviving colonies. If necessary, I will make some splits, and if even more necessary, I will possibly buy a few packages or some splits. One way or another, I will sustain my bee operation as I have done for the past 40 years or so.

But know this . . .

If this situation gets worse within the next season or two, I ***will*** explore treatment options. I can't just let the situation get worse and worse. But if it is just this one and all other colonies seem normal this season and next Winter, I will simply let things slide. BC

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4 You see, this information puts a bit of a damper on the recommendation of past years to treat for American foulbrood and Nosema with approved antibiotics. Presently, I have no idea what the effects of these antibiotics are on the "good guy" bacteria in my bees' lives.

THE BEST SPLIT

Buddy **Marterre**

Splits are easier than you might think. And I'm going to explain how to make my favorite kind. Perhaps you are thinking about expanding your operation or perhaps you just wish to limit your overwinter losses without varroicide treatments. My 2013 article "*Why Treat for Varroa?*"[1] asks a legitimate question. In it I show that the marginal benefit (or the percentage of additional survival over no treatment) of any chemical used for *Varroa* is only about 7%. And the chemicals required (even the "soft" ones) are bad for your bee's health and accumulate in your beeswax. National averages over the last seven Winters show a paltry 69 % colony survival – and that's with treatment.[2] So in a hypothetical example, if you had used chemicals on all of 14 hives, 10 would've survived, and if you had not used varroicides, nine would've survived anyway. But how do you get those nine out of 14 to survive without harmful treatments? And how can you cover your losses so that you have 14 or more survivors the next Spring – without chemicals? Easy. Perform reverse splits after the honey flow in the Summer on your best hives. And you might even wind up with more than 14 . . .

Splits are a great cultural *Varroa* control because they both split the mite population and break the brood cycle. They are also an easy way to rear your own queens, prevent swarming, and expand your operation. But you

To use one of these templates you must have Microsoft Excel. If you have a Windows based machine, Excel 97-2003 works and if you have a Mac, Excel 3.0 works. Download the template of your choice depending on the type of queen rearing you plan to perform.

Open the file; change the BOLD DATE of your primary procedure in the yellow cell or box, and save the file as a new file using the "save as…" command. This keeps your original template file intact for future use. Then print the new file in landscape format (you may need to ensure that the file prints on one page by using "fit to 1 page" under scaling or page setup), carry it with you to the bee yard, and follow the instructions. Orange cells are for important procedures; do not change the contents of those cells manually.

Refer to "Calculating Queens" in the February 2014 issue of Bee Culture for more instructions.

Reverse Split Queen Rearing Calendar

To Receive A Copy Of This Excel File Please Send An Email To Our Capable And Reliable Publications Assistant Amanda@BeeCulture.com And She Will Reply With The File Attached. Please Put "Splits" In The Subject Line Of Your Email.

Drone Brood	Age	New Queen Stage	Age	Date	Procedure
		egg layed	*0*	June 12	
last old egg!	*0*	very young larva	*3*	**June 15**	**Make reverse split** w/ queen and very little capped brood, a few frames of empty drawn comb and 1 - 2 frames honey. Feed donor 3 gallons. Use very small entrance in split.
		larva capping	*8*	June 20	Examine the donor colony and **cut out all but 2 - 3 queen cells**: keep the youngest ones that are uncapped and contain queen larvae and lots of royal jelly. Feed donor more.
		pupa	*12*	June 24	Feed donor 3 more gallons sugar syrup and feed split if necessary. ? Transfer 5 more frames without capped brood to split?
		emergence	*16* / 0	June 28	Quit feeding donor to allow empty drawn comb for new queen to lay in. Feed split if needed.
		orienting	2	June 30	
		begin mating	4	July 2	*[Adequate mating weather is 45 minutes of > 69 degrees on a sunny afternoon.]*
first new egg?		peak mating	6	July 4	[Earliest possible egg laying date for new queen in donor.]
none capped	1 / *6*	end mating	12	July 10	**Check donor for a** ?-12-day-old **egg-laying queen**. Assess donor for Varroa mites.
		egg laying	15	July 13	**Treat donor (HopGuard)** during capped-broodless period if eggs seen and threshold met. *If no eggs/queen, transfer eggs and nurse bees in from another colony and repeat.
first new caps	*12*		18	July 16	[Earliest possible capped brood date in donor.]
			21	July 19	Check donor's brood pattern and **cut out any supercedure queen cells**. (The donor bees may try to supercede the new queen - low brood pheromone during the interruption).
		phermone mature	24	July 22	

To use this file: change the BOLD DATE in the YELLOW BOX (the day of the reverse split), save as a new file or worksheet, and print in LANDSCAPE

Good Luck and HAVE FUN! **Buddy Marterre**

can also use them to increase the number of colonies that you have to overwinter with. And splits can improve *Varroa* tolerance by selecting from your own survivor queen mothers for breeding "stock" year after year. The reverse split has many advantages over a regular split, particularly if you are doing a split after the honey flow in the Summer time. The only disadvantages that I have found with reverse splits is that: 1) you have to find the queen in a strong colony in the hot sun right after you've taken the honey from the hive. The bees aren't generally very happy to see you under those circumstances. And 2) you usually have lots of other things to do during that time (like process honey).

How does a reverse split differ from a regular split? You merely transfer the old queen from the donor colony to the split or nuc instead of keeping her at home in the donor. But because you are transferring the queen, there are some other fine points to make it work really well as a *Varroa* control that you might as well take advantage of. What – other than doubling your number of colonies to overwinter – do you accomplish with a reverse split? First, it allows you to do your splits with the colonies that were both the most productive and with the queens that you not only want to breed from, but also want to keep for another year. The most productive colonies are the most likely to succumb to *Varroa* mites over the Winter, but this way you can increase your chances of keeping that productive queen for another year (or two, if you do this two years in a row). I have successfully kept a gentle very productive queen for 3¾ years this way before she finally started slowing down. And in my experience nucs survive better over the Winter with an established queen than a newly bred one. Also, in a reverse split the donor colony's new queen is reared from the eggs of a successful queen mother. So in your second year of doing this, the new queen is reared from a survivor, who likely is *Varroa*-tolerant. Reverse splits also solve the small hive beetle (SHB) nuc problem in the Summer because the split contains an established queen and will not be devastated by SHBs like a queenless nuc would be during this time of year. Although the donor colony is queenless, it is strong in numbers, and SHBs won't be able to get a foothold there either.

Reverse splits are also an excellent method of cultural *Varroa* control. By moving the established queen into a nuc with little or no capped brood, very few *Varroa* mites will be transferred to the split. And all the *Varroa* mites that are left in the original colony will be exposed during its ensuing brood cycle interruption. These phoretic mites can either be groomed off by their hygienic host bees or, if you plan on using a non-toxic method, only one brief treatment will kill almost all the remaining mites in the colony before the new queen's brood is capped and she begins the fall brood nest expansion. And if you do your reverse splits in the late Summer, the new queen should have three or four brood cycles with a very low mite load to build up before the Winter. There's also a lower robbing potential with reverse splits as the donor colony is the one receiving most of the sugar syrup, and it is the strong colony whose bees would otherwise be doing the robbing.

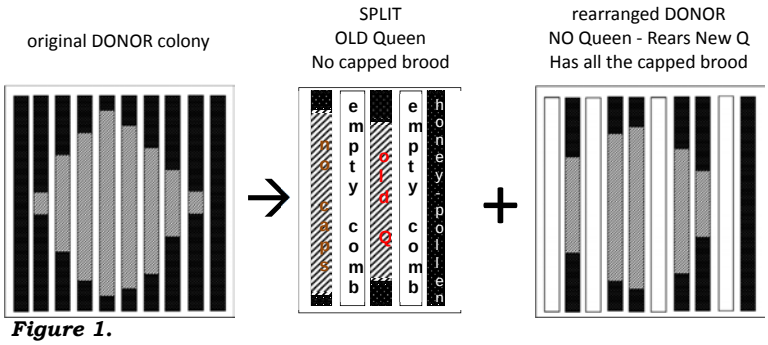

Figure 1.

And since the split has an established queen, it too is less likely to be robbed than a queenless nuc.

Furthermore, think about how you've positioned yourself for the following Spring. There is a low swarm potential in the populous donor colony because it now has a young queen. And the colony with the old queen isn't likely to swarm either because she'll be busy expanding into her new space. Therefore both colonies are likely to make a lot of honey the next year.

So how do you do it? Use the Reverse Split Queen Rearing Calendar and the instructions in *Calculating Queens*[3] from the February 2014 issue if you like. See Figure 1 of this current article as a diagram to explain the instructions and refer to Figure 2 for the dates and reasoning behind the procedures. Making a reverse split is basically the same as making any other split, but you move the frame WITH THE OLD QUEEN from the donor

Age	Queen Stage	Age	Drone Brood Stage
0	Egg Layed (to become new Q)		
2	* Split Day	*0*	Last Drone Egg Layed by Old Queen
7	* Cut Capped Queen Cells		
16 / 0	New Queen Emerges		
4	Earliest Virgin Queen Mating		
7	New Queen Starts Laying Eggs		
10	* Check For Egg-Laying Queen	*24* / 0	Last Old Q's Drone Brood Emerges
16	New Queen's Brood Capped	6	First New Queen's Brood Capped
~ 21	* Cut Supercedure Cells		

Figure 2.

colony into the split. You also remove either four or nine other frames from the donor and place them into either one or two five-frame nuc boxes with a new bottom and top of course. The new colony then contains the old queen and is called the split. Transfer as little capped brood as possible from the donor to the split. Transfer frames with a little uncapped brood and clinging bees and empty drawn comb, and transfer at least one frame of honey. Arrange the new split (assuming it is five frames) as follows: Place at least one frame of empty drawn comb near the middle for the old queen to lay eggs on. Place whatever egg and open brood frames near the empty drawn comb, and place a frame or two of nectar/pollen on the outside. The reason you don't transfer capped brood to the split is that 2/3 of the *Varroa* mites are in the reproductive or non-phoretic phase under the wax cappings and you want to leave the vast majority of the *Varroa* mites in the donor colony. Reduce the entrance drastically to prevent robbing, move the split to a new location (or set it beside the donor if you don't have one), and feed it some sugar syrup, unless there is incoming nectar.

You will need to expand this split colony before Winter as its queen is actively laying eggs; personally I try to get them up to 10 (and sometimes 15) frames before Halloween. Then use five or 10 frames of stored empty drawn comb or foundation or better yet no-foundation frames to add to the rearranged donor colony so that its original size is maintained. Feed the donor colony right away with lots of sugar syrup. Those bees have to rear a queen and draw beeswax.

Keep all or most of the capped brood frames in the original donor colony. That donor colony MUST have a frame near the center that contains eggs in order for its bees to rear their new queen. The donor hive also MUST contain at least one frame that is heavily bee bread-laden as bee bread (moist pre-digested pollen) and the nurse bees that are already feeding on it are the key ingredients to raising big queens. Dry pollen is NOT the same as bee bread[4] and neither is a pollen substitute[5] (see Figure 3 for a comparison of bee hemolymph protein content based on food source in caged bees after six days). Your newly developing queen only has four or five days as a developing larva to eat that royal jelly so that she grows up big.

You need to go back to the original donor hive in exactly five days (the split is made on day 0) and cut out all but two or three of the least developed queen cells (ensuring a healthy queen larva and lots of royal jelly first). See Figure 4 for a photo of what constitutes the kind of cell you want to keep (the photo has some of the comb pealed back to show the day two queen larva). Once you have found your two or three young "keepers," shake bees off all the other frames to find capped queen cells that are hiding under adult bees and cut all of the remaining ones out (if already capped at day five, they started with too old a larva which will develop into an inferior queen). Make sure to leave only two or three keeper queen cells that are uncapped, contain developing queen larvae, and are each sitting on a heap of royal jelly.

Figure 3

Caged bee hemolymph protein concentration after 6 days:	
27.6 ug/ul	if fed bee bread
11.4 ug/ul	if fed pollen
2.2 ug/ul	if fed sugar

- Cremonez, et al, 1998

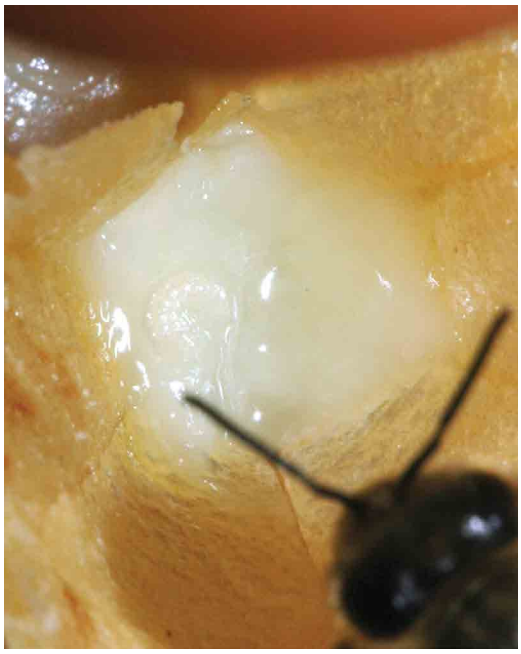

Figure 4. *Day three queen larva on royal jelly.*

You want to rear the biggest queen you can. Bigger queens have a bigger spermatheca and therefore hold more sperm and are even better mated than smaller queens.[6] And queen size is all based on the nutrition they receive during those five days. So you only have a five day window of royal jelly feeding for your potential queen to be big and beautiful and lay lots of eggs for two or three years!

To achieve the best possible queen development, you KEEP the larvae whose cells are the LEAST developed (certainly not capped yet) five days after you make the split. Let me explain: Since queen cells are capped on about day 8½ after the egg was laid (which was day 0), any potential developing queen in a queen cell that is already capped five days after the split didn't start getting royal jelly feeding until it was a day four larva. That's a larval age that is too old to develop into a big queen. You want the developing queen larva that was fed royal jelly right from the time its egg hatched at the very end of day two (or at the very latest as a day three larva). Such a queen cell won't be capped yet five days after the split. And at six days of queenlessness, unless the nurse bees started with day one eggs at the time of the split (which is uncommon), ALL the queen cells will be already be capped, so you won't be able to tell which queen larvae got the best nutrition. And don't be fooled by capped queen cell size on the side of the comb as it's unreliable. I typically only keep two or three of the youngest cells. One queen cell will work if that's all you have. But if you leave more than three, in all likelihood at least one of the emerged virgins will fly away rather than stay for a fight that she knows she's going to lose. If she does fly away, she'll take a bunch of bees with her (an afterswarm) and further weaken your donor. See Figure 5. Which one would you cut and which one would you keep? So why leave more than one? Sometimes a queen doesn't develop, and dies in her cell before emergence. Also, if you leave

Figure 5. *Two queen cells.*

two or three, it gives the colony a chance to decide which queen they prefer. I've always liked the concept of letting the bees choose which larvae to rear into queens AND which virgin they like the best too.

Check the donor again about six days after the first good mating day (four – 12 days after virgin emergence, requiring only 45 minutes on a warm sunny afternoon), or 24 days after the original split for an egg-laying, mated queen. If you see eggs, do a *Varroa* assessment (the sugar roll test[7] is best) that day. If you do not see eggs, check back after four more days as your new queen may not have started laying yet. Once you see eggs, do your *Varroa* assessment and look for brood.

After you close the donor, feed more sugar syrup. There shouldn't be any capped brood in the donor colony at this point because all the previous queen's drones will have emerged and it is too soon for the new queen's brood to be capped. Thus your original donor hive now has at least a five-plus day period of no brood under wax cappings. That means all the *Varroa* mites are exposed! If the colony achieved treatment threshold for your area, one quick and simple *Varroa* treatment with a non-toxic substance such as HopGuard or one Dowda powdered sugar dusting will drop the vast majority of the mites. If you do the Dowda method, be sure you catch and kill the live mites so that they don't crawl back up into your hive. Although HopGuard has gotten some bad "press" from folks who don't understand how it works on the internet, it is an excellent product that is all natural and very effective. A single HopGuard treatment (with one strip per five deep frames of bees) is all you need to kill 90+ % of the colony's *Varroa* mites *during a capped-broodless period.* Personally when I've checked at this stage, my mite counts have actually been very low as apparently I have bred very tolerant bees with this method, so I still haven't treated any colony with anything for seven years now.

Recheck that donor colony again in about 10 more days (or five weeks after the original split procedure). Yes, recheck it again. This time you're checking for capped brood to ensure that the new queen is well mated and not a drone layer. Also, look for and cut out any queen cells you find at that time. Bees have been known to question a newly reared queen's quality and try to supercede her.

Initially the donor from your reverse split has a lack of brood pheromone because of the brood cycle interruption, and the new queen hasn't yet reached QMP pheromone maturity, so you may see them. If you do, just cut those supercedure cells once (make sure you get them all). The bees will reassess her (now that there is more brood pheromone) and realize what you already know: she's big and awesome and is laying lots of eggs! Now just continue feeding both colonies sugar syrup and pollen/substitute as necessary unless there is a good nectar flow and pollen stores are adequate – until both colonies are sufficiently populous and stored-up to overwinter in your area.

You've just doubled your numbers from your best colonies, reared great big queens from your best donor mothers, avoided destruction from SHBs, prevented robbing, prevented swarming next Spring, and improved the genetics of your local population of bees! All without harmful varroicides! Give yourself a hand. Or better yet eat some of that honey you should've been processing. BC

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Dr. Buddy is a Master Beekeeper with both the NC State Beekeepers Association and the EAS. He is the author of Certified Naturally Grown's Apiary Standards and serves on CNG's Apiary Advisory Council. He has taught bee school to over 600 students in his county club since developing its curriculum nine years ago. He enjoys keeping turtles and chickens, woodworking, nature photography, biking, acute care surgery, and studying for divinity school when he's not with his bees.

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Courage & Persistance

Ross **Murphy**

On part of my acreage I have created a Community Garden. There I rent out garden plots to 12 families. I set aside some additional room for growing communal crops: cantaloupes, watermelon, Winter squash, cucumbers, and flowers. These are crops that would cover a single garden plot with foliage. People share what is produced in these areas.

It works out well, not as a profit-maker, but at least with the additional help I now have a fighting chance against The Weeds. There is something else I grow, bee food, especially white, crimson and alsike clover. As urban growth continues in this area, the former open prairies which formerly fed my bees has been covered over with shopping centers, duplexes, condos, apartments, homes, asphalt and concrete. So what was once my lawn is mainly clover and other flowers.

Everyone grows lots of food: beans, 16 varieties of tomatoes, 10 kinds of hot and cold peppers, peas, beets, potatoes, well, just everything. I also keep 12-15 colonies of bees, partly to pollinate everything but mainly to assist in the world-wide effort to sustain the bees until the scourge of CCD can be eliminated.

Before I retired, I was a top salesman and small-business consultant for IBM. One of our gardeners is Dave Williams, formerly a salesman, sales manager and district manager for Xerox.

As with all salesmen, we enjoy talking about our sales careers, our great successes and triumphs that only other salesmen can understand and appreciate. A sales career produces lots of interesting tales, especially how one goes about prospecting and selling new customers for our former companies, IBM and Xerox. Selling isn't easy, and any idea that works well is used over and over again, until it doesn't work any more. Then new, clever ideas must be invented. Or re-invented, because there is really nothing new under the sun.

Some of these stories are fascinating, and some of them, I think, are just a little fanciful. I mean with maybe just a little embroidery around the edges to increase their beauty. At least Dave's are, not mine; mine are always completely true, at least as I recall them with my stainless steel memory.

I also like to talk about bees and beekeeping, fascinating topics indeed. I talk about bees to anyone I can

The Swarm

A garden section.

corner. Sometimes I bribe them with cold beer. They often see me, surrounded by puffs of smoke and puffs of bees, usually in shorts and a tee shirt. Of course they wonder what I am doing.

The most frequent question I am asked is, "Aren't you afraid of being stung?" "Actually yes, I'm terrified." "But can't you wear protective clothing?" "I could, yes, but there's a certain nobility in displaying courage in the face of danger." Then I look slightly heavenward. "It's a calling, I suppose, one man's effort to confront his fears and overcome them, sometimes at a fairly high price. It's just something I have to do. The bees need me and, I suppose, I need them. I guess some bees just have to sting and it's better that they sting me instead of you. By the way, would you like to buy some honey? It's cheaper if you buy three pounds."

When Dave Williams hears this, he also looks heavenward and he rolls his eyes as if he is thinking, Am I really hearing this stuff?

I often wonder what he is thinking. Of course the other gardeners hold me in awe, or even esteem, which is good for business.

So with this explained, one recent sunny day, I had been engaged in garden-talk with Dave, the master salesman, watching him digging potatoes. I left him and walked around the other side of the pole barn. There, on a fairly low branch of a pin oak tree was a large swarm of bees. They were almost the size of a basketball, six feet off the ground. I felt sure they were from one of my Carniolan hives and I had missed the clues that they were going to swarm.

I walked back around the barn to Dave. "Dave, I've been thinking about something. What is the most important character trait that a top-notch salesman must have in order to be successful?" He leaned on his spading fork and gave it considerable thought. "It's Persistence, that's what a salesman must have, Persistence."

"I agree that persistence is important, but it's just a part of something bigger, Courage. Persistence is only a part of being courageous. I've told you that I was a top salesman for IBM, and it's true, for I was both brave and persistent. If you will follow me, I will give you a demonstration of both these qualities and just how brave a man can be."

He trailed after me to the oak tree. He could hear the bees, because some of them were still flying. He looked up and saw the swarm. "Oh my gosh! What is that? Oh no, it's bees!"

"Yes it is, it must be at least 15 thousand, and I think they are a little angry. Okay, here I go. Watch this!" I used my left hand to grasp my right wrist, as if to steady it. With my fingers pointed on my right hand and assisted by my left, I slowly thrust my hand into the writhing swarm, all the way up to the wrist.

"Oh! Oh no! Ow! Ow! Ouch! Oh no! No!" I kept my hand in and never stopped whining, "Ow! Ow! Ow!"

Dave: "Are you crazy? Take it out! You're going to kill yourself, you'll go into antididactic shock!"

I kept my hand in. I was gritting my teeth, like John Wayne. "Dave, when I stuck my hand in, Ow! that was Courage. Oh! Ow! Keeping it there is Persistence.Ow! Ow!" Still complaining in my great pain, I slowly withdrew my hand, with the help of my left hand pulling on the right wrist. A few bees clung to my "badly stung" hand; I shook them off.

"Dave, you'll have to excuse me. I think I feel a reaction coming on. Oh yes, I do. I am going in to soak my hand in epsom salts and tomato juice; I read somewhere that could help." I left to go in to watch a golf match on television. The only antidote I took was a large Pepsi with lots of ice. And Fritos. Later that day I moved the bees into a hive body.

A week later, I saw one of my women gardeners, Brandy Alexander, coming in with her two little daughters to work in her garden. She looked at me with great admiration. "Dave Williams told me you are the bravest man he has ever met."

"Well yes, I suppose I am. He didn't say I was the bravest man in the whole world? No! He didn't? Listen, would you like to buy some honey?"

Of course she did; three pounds. See? It's good for business. BC

The Voice Of The South

Control *Varroa*

I investigated several episodes of significant colony losses in Mississippi during the last year, and in almost all cases colony demise stemmed from failure to control *Varroa* mites below damaging levels. However, there were several instances in which this conclusion was not based on observed evidence simply because the dead empty hives retained nothing to implicate the cause of death. As with all inquiries that I make, the client suffers through an interview about management practices, and high on the list are the inevitable questions about management of *Varroa* mites. I investigated at least 12 episodes that spanned late Summer into early Winter – and all of the clients either elected to do nothing to control *Varroa* mites or they used techniques that could not possibly control the mites. Collectively, these dozen people lost > 900 colonies to *Varroa* mites. These losses disturb me because we are now well into the 3rd decade of dealing with this key pest in the U.S., and people should have more sophistication and savvy in dealing with it.

The frustration of losing colonies to mites and finding colonies slimed by the subsequent Small Hive Beetle (SHB) infestation generates pain and anger from anyone who loves their bees. The first battle to fight with some clients is to convince them that SHB probably did not kill your colonies. I see the clinched teeth and strained faces as we examine the lost and slimed colonies looking for the culprit. I have heard beekeepers say, "The next time Harris tells me that SHB did not kill my colonies, I'm gonna punch him." I stay firm and suggest that something besides SHB killed the bees, and it is the SHB preying on severely compromised colonies that is the final insult of which we bear witness. Some beekeepers become indignant and deny the possibility that *Varroa* mites were the real problem.

For example, one client actually said, "I do not have varroa mites now, and I have never seen them in my colonies!" We were looking at 200 dead colonies from a total of 400 during mid-Summer when the honey crop should have been extracted. I asked how he managed *Varroa* mites. He had done nothing EVER to manage the mites. He declared that he never wanted to contaminate his hives with pesticides, and so he elected not to use chemical controls for the mite. I asked if he had ever sampled to see what mite levels were reached in his colonies, and he declared in a shaky voice, "Yes! I used sticky boards just this spring, and I saw NO mites on the boards." I was slightly dumbfounded because the level of colony loss should have been preceded by at least some mites dropping on sticky boards.

It was not until much later during the day when I saw that the man had trouble reading from a slip of paper, and I wondered if he simply did not see the mites because of failing vision. I did not want to insult him with such a suggestion, so I asked if I could return the next day with a stereomicroscope to examine brood combs from his remaining hives to look for the mite infestation levels. He agreed that this was indeed a good idea. Early the next day I asked him to pick colonies at random from his survivors, and we removed combs with capped brood and took them back to his shop where I had set up a stereomicroscope on a boom stand with a bright light source. I did not need the scope to see that the combs were heavily infested. I could see mite feces on the walls of brood cells where worker bees had recently emerged, and I had already pointed out significant levels of workers with deformed wings while we were in the field collecting the combs. I found mites in every one or two worker brood cells that were examined – suggesting extremely high and potentially lethal levels. I yielded the microscope to the client and watched as the reality of the high mite infestation registered across his face. He looked up from the scope after examining about a dozen brood cells and said, "I guess you're right, the mites are killing my bees." Such a response saddens me more than it gives me a feeling of vindication.

I now routinely carry the microscope with me when investigating colony losses. Many folks need to see before accepting my conclusions. The previous client was actually a fairly new beekeeper of only four to five years. He chose not to treat for mites, and I understand completely the desire to avoid contaminating hives with miticides. Beekeepers have the right to choose the path of not treating, but they should understand that if they do

This many Varroa *in worker cells means this colony is already dead – it just doesn't know it yet.* (USDA photo)

nothing, colonies will be lost to varroa mites. It may not happen this year or next year, but when it does occur, it could be a large proportion of the colonies that are being kept.

I have written about this attitude in previous articles, but it deserves some attention even now. If a beekeeper can accept episodes of high colony losses, then this approach does guarantee that the beekeeper is not contaminating his own hives. I still encourage these beekeepers to DO SOMETHING. Increase the distance between hives in apiaries. Increase the distance between apiaries. Do anything to reduce the drift or movement of mites between colonies. Implement some kind of brood break to slow the growth of mite populations. Allow swarming as a form of natural brood break. Use a *Varroa* -resistant stock of bees. Use drone-trapping, if feasible.

A second example occurred within two weeks of the previous event. This encounter disturbed me more because the client claimed to be a beekeeper with more than 30 years of experience. He was managing somewhere near 1,000 colonies, and at least 40% of them were dying (and many of those were being destroyed by SHB and/or the larvae of Greater Wax Moths when I drove up in my truck). As is usual, I asked about his methods for control of *Varroa.* He said, "I have been controlling *Varroa* mites with beef suet placed in the colonies." He seemed confident of the technique, and I was more than a little perplexed about his choice of control. What made him think that beef suet would work?

Then it occurred to me that he may have confused the use of grease patties, which is an effective treatment for the Honey Bee Tracheal Mite (HBTM), as an effective alternative for varroa mites. After a few questions, I decided that he simply misunderstood and made a huge mistake. As with the previous client, it took me showing him highly infected worker brood from his survivors to make the claim of *Varroa* mites plausible. I recently inquired about the fate of the remaining colonies, and the man is no longer in business as a beekeeper.

These first two clients were people earning at least some of their income for bees. I expect these guys to be a little more capable than some of the small scale beekeepers or hobbyists. I often find small scale beekeepers that have made a similar decision to not use chemicals in their hives. Some folks are pretty forceful in suggesting that this is the way that all beekeepers should operate, after all, they have been running bees chemical-free for years and have not suffered catastrophic losses. I often tell these beekeepers that they must be using management techniques that help slow the growth of mite populations, or they are fairly isolated from other beekeepers, or they have simply been lucky.

Small hive beetle slime is secondary to a Varroa *infestation.*

I remember one husband and wife team that proudly showed me their 20+ colonies in their suburban yard. The colonies looked strong and healthy upon my first visit. I asked how they managed *Varroa* mites, and they promptly told me that they did not use chemicals, and their bees were doing just fine, thank you very much. I encouraged them to use an IPM approach to manage *Varroa* mites. I asked them to at least consider adding drone trapping or a resistant stock to their beekeeping repertoire. They politely declined and said that they had kept bees without controlling varroa mites for eight years, and they saw no reason to change now. I just shook my head and wished them the best.

About 1.5 years later they called me in December to say that something terrible had happened to their bees. I immediately drove to their house and surveyed the bees. Starvation was not an issue. All of the dead colonies (more than half of their full complement) had plenty of Winter honey stores in the top supers. There were not huge piles of dead bees on the bottom boards. Most colonies had either no bees or only a handful of bees and a queen trying to survive. I said that without any evidence, my best guess was *Varroa* mites. The husband responded, "Dude, you always see *Varroa* mites as the problem…!" I said that my summation was simply a guess based on my knowledge that they were not controlling the mites and my many years of experience in culturing mites in field experiments. I explained that I had seen plenty of colonies die during the Winter in much the same way as his colonies after I had purposely grown mites to high levels in the colonies for research purposes. I admitted that I could be wrong, but with no other evidence or symptoms and the knowledge of lack of *Varroa* management, my guess was not unreasonable. They seem stubbornly resistant to the idea that *Varroa* mites killed their bees when I finally left them.

Finally, I will relay a more recent encounter with a client that just left me scratching my head in disbelief. This particular client had 30 colonies in an apiary located in a fairly idealized bee forage area, and the apiary was far removed from other beekeepers. I had talked to the beekeeper on previous occasions and knew that he was not opposed to chemical control of varroa mites, but he did not want to practice regimented use of chemicals. Instead, he wanted to sample his colonies to make his treatment decisions. On at least three occasions, we talked about sampling and action thresholds to use in making these treatment decisions. He told me that he would collect samples from all

Something as safe as trapping drones helps control Varroa.

colonies, and because the alcohol wash was more reliable, it would be the method of choice to dislodge and count the mites from his samples. His plan was to collect samples in Ziploc bags and hold them in a freezer until a rainy day kept him from doing other field work, and he would wash the samples to determine the mite loads. Confident that the man had a reasonable plan, I forgot about him and just knew he would have few problems ahead if he would just stick to some kind of IPM approach.

I happened to run into the beekeeper at a Winter commodity meeting and asked how his bees were doing. His face turned a little red, and he said, "Not so good. I lost 27 out of 30." My mouth hung open for several moments as I struggled with what to say next. I said, "You're kidding me, right?" He did not answer and the solemn look on his face told me that he was not. I asked what killed the bees, and he responded that he did not know, but all of the losses occurred in the early to mid-Winter period. He reported that all dead colonies had full supers on top of the empty brood chambers. "What were your *Varroa* mite levels in late Summer after taking the honey off?" I asked. He explained that he did not take the samples in July or August, but he did take samples from all colonies in October just before the colonies went broodless for the Winter. "Well, what were your levels then?" I persisted. He told me that he did not know because he had not counted the mites yet; the samples were still in the freezer. He explained that he just got busy and forgot to wash the samples. He felt like his colonies were really strong going into the Winter, and the *Varroa* mite issue was probably not a problem. I just slapped my forehead in disbelief.

I told the beekeeper that it would be nice to examine the samples to at least see if mite levels were as low as he presumed. He counted the mites and bees in his samples in February, and he reported a mean infestation level of 18% (that is 18 mites per hundred bees) for all 30 colonies. His average number of bees per sample was 350 worker bees. The five living colonies had a range of 1-5% infestation level of the adult worker bees, while the 27 dead ones had a range of 12-80% infestation level. Those numbers tell more than I could ever tell the beekeeper.

One could argue that the near broodless conditions of his hives in October led to an inflated infestation rate on the adult bees. This is true; however, a mean of 18% is horrendous under any condition. If his bee clusters averaged at least 40,000 – 50,000 bees going into the Winter, the total mite load was at least 7,200 – 9,000 mites. These levels are well above damaging levels, and there should be no surprise that the bees died.

Even if a large percentage of these mites were to die in the Winter, the bees that were expected to overwinter were greatly compromised by fostering such a large population of mites in the late Summer and early Autumn brood rearing periods. I can only presume that many of these bees (thousands) could have been compromised by the viruses that are vectored by *Varroa* mites. These bees probably had reduced lifespans, and the Winter cluster fell apart as sick bees dwindled from the group.

The lessons to be learned here are not new. I just wish the learning curve was not so steep. I will continue to push folks to consider managing *Varroa* mites in better ways – but for the life of me, I cannot make people follow through and examine the samples once they have been taken. I do not wish to poke fun at the fellow who did not examine the samples until after his bees were dead, but his situation provides strong evidence that sometimes I know what I am talking about. There is one thing that I know more than a little about, and that thing is the *Varroa* mite. My understanding has only come from 20 years of working with the beast, and it would be nice to use that knowledge to save other beekeepers from the grief of disproportionate colony losses. I hope my stubbornness is stronger than the resistance that some beekeepers have to learning how to better manage the mites. Sometimes I wonder . . . BC

Jeff Harris is the Extension/ Research apiculturist in the Department of Entomology at MS State University.

Beekeeper, Gardener, Teacher Meet Portland's Glen Andresen

Dewey **Caron**

Glen Andresen has been keeping bees over 22 seasons. He is also a Master gardener. He enjoys teaching others both practical, sustainable gardening and beekeeping using a basic do-it-well and sustainable approach.

Glen is a kindly, natural-born teacher. When instructing about what to do in the garden or with bees, he is first and foremost very respectful of the students and their decision making. He doesn't tell people how to garden or keep bees, rather he tells how he gardens and how he keeps bees. He will point out things that could be done but then lets students decide for themselves how they want to do it. It is thorough and options and consequences of actions or in-actions are patiently covered.

Glen is passionate about bees and plants as he is about protecting clean water. He has irrigated most of the gardens with an ingenious grey water system. He feels clean water and garden and apiary sustainability begins with individual decisions such as what and how chemicals are used in home, garden and with the bees. He was honored as Oregon recycler of the year in 2009 by the Association of Oregon Recyclers, which is a trade association organization of local businesses.

In his beekeeping and gardening, Glen initially experimented with use of control chemicals. Now he prefers to not use chemical controls on either his bees or plants. He also does not utilize smoke in his hive inspections but will use gloves when the need arises. He has developed he feels a bee and a gardening system that provides sufficient return for his efforts.

He is a master artist and it is a joy to see him open, evaluate and close the colony all with smooth and measured manipulations. Like a Tai-Chi master, he moves smoothly and efficiently, never rushing, seemingly performing his inspections effortlessly to "read the hive"

Glen does a locally popular edible gardening talk radio show, now in its 18th season, called appropriately "the Dirt Bag." It is about edible plants but he will also work pollination and bees into some of the themes. He is also an organic beekeeping instructor at Portland Community College and Garden Fever nursery in Northeast Portland. At monthly meetings of the local bee association (Portland Urban Beekeepers - PUB), he gives a popular update of what currently is in bloom.

When a customer asked Glen if beekeeping was the only thing he does, Glen, in his very characteristic scandanivan understatement said: ' No I am a cobbler – I just cobble a bunch of things together.' He has many adapted pieces of bee equipment and is always trying new items to evaluate if they make a difference.

Most of his adult life he has been self-employed. He has put his Economics degree and music background into practice in his daily activities. For example, 1985, Glen created and marketed *Only Oregon Trivia,* a board game where players travel the highways and byways of Oregon answering questions to move along. That game had three printings and has long been sold out. He followed that up in 1992 with *Second Generation Only Oregon Trivia.*

Beekeeping done basically

Glen is a master at recycling and regularly reuses old items tossed out by others to make functional equipment. He practices a low consumption lifestyle, adhering to the principal of 'voluntary simplicity.' For example he owns two rental properties on either side of his home and his backyard hives and large urban vegetable garden extends to using the land surface in all three properties. Both are long-term renters and they often inquire how the bees and vegetables are doing when Glen is in their backyards.

Glen selects "jobs" based on whether he enjoys doing them. The one consistency is he does things related to plants or bees – beekeeping has stuck as a "job" because he can make money from the bees. When he captures a Spring swarm, he is sure to talk with homeowners and others and that often then leads to a paying bee removal job later in the same season or a call-back next spring for another swarm.

Glen keeps his bees in the city and always has. Virtually all of his sites are in backyards in the NE section of Portland, Oregon. Portland requires that immediate neighbors sign an agreement for beekeepers to have an apiary so his home apiary is registered. He does have a couple of more rural production sites (to help secure the major western Oregon nectar flow – blackberry) and he has one blueberry pollination contract in the Cascades foothills. He uses a trailer to move the bees to this site. He also keeps bees on the Portland International airport

Glen explains a swarm to a homeowner.

Glen in the honey house.

property (PDX) in a developing program to provide suitable wildlife habitat on their non-operations properties

Glen has just recently upgraded his honey extracting facilities. That too must be licensed in Oregon. He worked with the Department of Agriculture and finally has a "nearly perfect" dedicated area to handle honey he says. It has been several years in the planning and having to make do. He sells honey and organic produce from his porch self-service stand but most honey is sold through a neighborhood co-op grocery store and a local donut shop, well-known for their honey coated offerings. He usually runs out of honey each year, retailing close to 5000 pounds most seasons.

Honey supers are removed with triangle escape boards. He seeks to manage 60 colonies for honey production so he typically overwinters 120 or so colonies. He has recently been looking at overwintering a larger number of nucs. Since the colonies are scattered throughout several neighborhoods, he has a mixed wild flower product. Most of his customers are repeat visitors who spread his product virtues via word of mouth. He doesn't advertise.

Glen restocks colonies and starts new ones with swarm captures and colony cut-outs. He does some 10 building removals each year (many for a fee). In a normal season he may capture 50 swarms. He says he gets lots of "repeat" swarms. For example he has a contact at the University of Portland from his involvement with their music program so when a swarm appeared one season they called Glen. They keep calling back as the campus, with numerous tall trees, has been a continuing swarm source for him each season. About half the swarm calls are new locations to him.

Glen uses standard Langstroth boxes for brood and westerns for supers. Most hives have screened bottoms. He uses a variety of materials for hive stands. He has both a long 30 frames wide) and top bar hive (increasingly popular "options" among new Portland urban beekeepers – "to see how they do." His locations often have several nucs, from swarm captures, divides and in conjunction with his recent queen rearing partnership with Tim Wessels.

Bridgetown Bees

Tim and Glen have recently teamed up to form Bridgetown Bees (www.bridgetownbees.com). The primary mission of Bridgetown Bees is to selectively breed and raise queen bees in the city of Portland that are suitable for year-round survival in the urban environment of the Pacific Northwest. The "mother colony" selections come from colonies that have produced and successfully overwintered in the city from Glen's years of informal selection. The stock has not been treated for mites, other pests, or diseases. To speed local selection they have sought to saturate, as much as possible, the breeding area of Northeast Portland with drone-producing colonies and their initial selections that have also over-wintered without treatment.

Their selected stock incudes production and over-wintering success but also includes other desirable factors, including gentleness and low-swarming tendencies. Right now the intention is to produce queen stock suitable for their own colonies and perhaps in the future offer locally-selected queens for sale to city beekeepers. Like much of his beekeeping he does not plan to rush but to get it 'right' before having others use the selections.

Can there be too many bees?

There has been a big increase in urban beekeeping in Portland, as in many other communities. The question is asked "Can there to be too many hives in the city to get good honey production?" In Glen's experience, the answer is, "well, not so far." For the last seven years, his average pounds per colony yield was (starting in 2014 and working back): 74, 66, 61, 65, 87, 90 and 96. The most honey Glen has harvested from one colony in the city is an astounding 366 pounds!

Another talent

Each August for the last 35 years Glen has hung up his hive tool and bee veil to pick up a ladle and put on an apron. With two brothers and three-generational assistance, Glen makes Swedish pancakes for the Scandinavian Festival in Junction City, in the lower Willamette valley (near Eugene). Glen and his brother Gordon prepare these thin, crepe-like pancakes by rolling them with either local blackberries or strawberries or lingonberries imported from Sweden. The pancakes are made using his Swedish-American grandmother's recipe. They are so thin they only have one side according to Glen. Glen has not missed a single day of pancake making for the 4-day festival in the 35 years of Andresen family participation.

Tim Wessels, President and founder of the local beekeepers association PUB talks of Glen as "always respectful to those we work with who are generally newer beekeepers. Though he may have strong opinions about a particular topic, he will always clarify whether it is his opinion or science-backed fact."

Glen is a quiet leader and proponent of natural and sustainable gardening and beekeeping in Portland and the region. He is a leader by example keeping bees and growing vegetables and in his teaching skills. BC

This Year Join Or Start A

FARM MARKET

Ann **Harman**

Farmers markets are now such an important part of our society that in 2014 the U.S. Postal Service issued a stamp commemorating them. Perhaps you have thought about joining a farmers market to sell your honey along with beeswax candles and ornaments. Or are you considering starting one on your small farm not only with your honey but also the neighbors' excess tomatoes, zucchini and other vegetables and fruits? Let's consider these two choices. Then you can decide which is best for you and your hive products.

Before you make any decision important items must be looked at – your insurance policies. Are you covered for product liability? Claims have evidently increased in recent years. What is product liability? It refers to legal liability for any damage or injury that came from the use of a producer's goods or services. Does your insurance cover sales of unprocessed foods, such as honey, tomatoes, squash, etc., sold at a farmers market or at a roadside stand? In addition, more insurance coverage may be needed if anything can be considered processed, such as jams and jelly or flavored honey. If you are unsure about exactly what your liability insurance covers, contact your insurance agent and explain exactly what you plan to do.

First we'll look at the local farmers market. Have you visited this market? Bought something there? If so, you have a good idea of the various stands, what they sell, if prices seem reasonable. How about the customers – lots of happy ones? Just one more question – is anyone selling honey there? Some large farmers markets can support more than one beekeeper selling honey; small markets probably cannot.

Well, nobody is selling honey or any other hive products. Now your first step is to ask some questions and get some information. You need to speak to the organizers of the market to see if there is room for your table and if your honey and beeswax candles would be accepted. You also need to know what fees may be required to participate in the market. What about charging customers any sales taxes? You now need to consider all the possible expenses. Well, is it worthwhile? Will it be profitable? If so, then participating in the local farmers market could be an excellent way to sell your honey and any other hive products.

You will need to investigate any requirements, rules, regulations, and inspections of the county and state you live in. You are producing a food product. However the only thing in your containers is honey, not a mixture of honey and other ingredients. Once you start adding other items to your honey or selling honey cookies you enter another world of those regulations and inspections.

If you live in an area where your bees collect honey from several sources, having a variety of colors and flavors is desirable. One question to find out from the market organizer as well as county and state regulators

A label on top, and a tablecloth beneath these honey containers would help sales considerably.

People are more inclined to buy anything if it looks like there are lots to sell. Seldom do the last two of anything sell – the question in the buyer's mind is 'what's wrong with those?'

is – can taste samples of honey be given to customers? Taste samples do help sell honey but if it is not possible there are ways to provide take-home taste samples. The two-ounce bear could be used, either given free or sold at a small price. You can find other small plastic containers suitable for a take-home taste sample but be certain they are food-grade plastic.

One item you could make with your honey and probably does not belong to the world of regulations and inspections, is – dog biscuits. These could turn out to be your best-selling item. Recipes for these using honey do exist, as do the bone-shaped cookie cutters. List the ingredients on a small label since some dogs do have allergies. To be safe, check that they are acceptable with the market organizer and do not fall under any county or state regulations.

Now for your basic equipment. You need a table unless the market provides them and it must be stable enough so children pushing against it cannot upset the jars of honey. Remember, wind will blow and rain will fall. Protection from sun and rain can be had with a pop-up canopy or tent. (Make sure it is permitted.) Look for fabric with bees for a tablecloth; if you can't find bees, flowers would be fine. Think about signs. They can take the place of answering questions when you are busy talking with a customer. Any posters or signs should look professional, not hastily scribbled and misspelled. Hand your customers a business card and suggest they pass it along to a friend, a neighbor.

Have you considered the sizes and types of honey containers available? Children (and adults, too) like the squeeze bear. They come in different sizes and styles. Some need hang tags; others have spaces for labels. Glass jars make honey look beautiful. You could attach a honey dipper to those jars as an extra enticement. Be sure to have the inverted jar. These have become very popular because they do not drip or make a sticky mess. You could have one as a demonstration – squeeze a bit on a plate, then show how it does not drip when you stop squeezing.

In the beginning you will not have any idea of the size containers of honey your customers prefer. Those who cook with honey and those with family might prefer a two-pound container. Those who use honey in only their tea or for a cough may want a smaller one. A small label explaining crystallization and how to liquefy honey is very helpful. Some may believe crystallized honey has spoiled. Don't hesitate to educate your customers about honey.

Your labels must be legal. Sometimes inspectors do come through farmers markets and may or may not look at your labels. To check the requirements you can visit the National Honey Board website at **www.honey.com** and put the word 'labels' in the search box. Generally states follow those but to be safe, check with your state's Department of Agriculture. Although you may wish to use the word 'natural' on your label there is no official definition of that word.

You will probably be displaying your honey on a table. So customers will be looking down at the tops of your jars except for the inverted ones. So put your jars on your dining room table and pretend you are a customer. Those jars with caps would certainly look more eye-catching if a colorful label were on top. Those labels could have various designs perhaps indicating floral source or saying 'local honey.' For the bears, the spout tops come in a large assortment of colors. Different colors could indicate different flavors. Also colors could be for holidays – red, white and blue for the 4th of July.

A cover, signs, posters, tablecloth and lots of help go a long way in being successful.

Do you plan on giving handouts to your customers? Recipes for something quick and easy to make, seasonal recipes, and ones that children can make might be appreciated. Recipes use honey so your customer has to buy more! The National Honey Board has many recipes and new ones are put on the website continually. Conversation with a beekeeper frequently leads to current bee problems. One handout could be a list of garden plants bees use for pollen and nectar.


Don't be afraid to sell products other than honey. Honey plants – feed a bee – do well, too.

It's hard to wait on customers, take money, weigh produce, refill displays and answer questions if you are all by yourself, but price signs help.

How busy is this farmers market? Will you need an assistant? Although it would be nice if the assistant were a beekeeper able to answer the usual questions, it can be just as helpful for someone to take money and give change as well as giving handouts.

You must give serious thought for your answers to questions that some customers will ask. For example, you will be asked 'will your local honey *cure* my hay fever?' You must not in any way say or imply a *cure*. That is a health claim and you can get into trouble making it. Another common question is: 'Since I have diabetes, can I eat your honey?' The correct answer to that is to tell those people to consult their doctor. You are not a doctor and even if you were you have no knowledge of the diabetic condition of the potential customer.

Now that you have had some experience with a farmers market perhaps it is time to consider making one of your own. Your neighbor, with a huge vegetable garden, always grows too many tomatoes (look at all the varieties!) and has plenty of room to grow melons and pumpkins. The vegetables and fruits are not exposed to insecticides and other sprays. Although the products might not exactly fit the organic standards, they will be very desirable. You live on a rural road but it has enough traffic to support a modest farmers market with your honey and the neighbor's vegetables and fruits. You have plenty of space to set up a stand. The neighbor and family will help set up and sell.

First of all check with your county to see if regulations will permit your planned mini-market, if any fees or licenses, and if you can have a sign by the road. It would be nice if you could have a sign at your entrance plus signs a short distance away on both sides of the road. If people driving by those signs know that the market entrance is ahead they can look for the entrance easily. By the way, put the days and times the stand will be open at least on the sign at the entrance.

Now that you have the permission from the county, it is time to start constructing the market. Is your lane to the stand area full of ruts and mud after a rain? Now is the time to fix that lane! What about the place cars will park? Customers really do not need to slide around in mud there either.

You and your neighbor will have to decide on the days and times the market will be open. You may wish to have one day for late afternoon and early evening to sell to those going home from work. Saturday morning is good. If there are other vegetable stands nearby you may want to plan to be open at different days and times than those. Know your weather patterns. Make your open times accordingly.

The neighbor has offered the old hay wagon as the place to put the honey and the veggies. The bed is in good condition so a cover for it may not be needed although it may be more attractive. However a pop-up canopy or top would be good protection, especially if fog or mist is a problem. If no trees are shading the wagon a pop-up will provide needed shade also.

Customers will be able to walk around the wagon. Your honey can be at one end of the wagon so the containers will be visible from three sides. Make some price tags for the vegetables. The prices can also be on a poster in large, easy to read numbers. You can put up a card table a short distance from the wagon for the person taking the money. Ask your friends to save bags of all kinds – plastic and paper – so you can offer them to customers. You can even suggest that the customers return with the bags when they come to buy again.

If vegetables and fruits are sold by the pound, a digital scale will be necessary. They are inexpensive. Your neighbor can buy one that will either come with a container or will support a container. If your neighbor will be selling berries and cherry tomatoes these would be best if sold in the pressed paper boxes. Recipe handouts using honey with the seasonal fruits and vegetables will help to sell both.

Does your area have a local newspaper? These are disappearing all over the country but if one exists in your area ask them to put in a little article, with perhaps a photo, announcing the opening of your farmers stand. If no local newspaper, make posters – remember, a professional appearance – and put up the posters in a number of places nearby. At the start of the mini-market advertising will be necessary. After all, nobody has seen honey or vegetables for sale at your place before so people will just drive past.

When customers find that you are a beekeeper you will suddenly become a voice for the preservation not only of honey bees but also for all pollinators. Read books and magazines and keep up with the news so that you are giving correct and useful information. Your honey bees will appreciate that. BC

Ann Harman lives and keeps bees in Flint Hill, Virginia and knows all about running a Farm Market.

BIGGER PICTURE

Jessica **Louque**

Space Tunnels In The Front Yard

Do you ever have those neighbors that are always doing really strange things and you think maybe they are somewhere between slightly eccentric and slightly insane? Every time you go past their house, there's a new contraption, piece of junk, large trash pile, or animal in their yard, and you can't help but wonder if they know how strange they are? For our area, WE are those weird neighbors. We are the ones with random bee equipment scattered in the garden because it just hasn't made it quite to where it should be, or a project that didn't make it to completion, or we have bad children who leave their toys everywhere. Sometimes, it's a little funny, like when we kill things that kill chickens and use the crossbow to bolt their carcass to the wall or a tree or something. Sometimes, it's embarrassing, like when we sat trash on the front porch and something ripped it open overnight and it was all across the front yard. Every once in awhile, we don't even realize it's weird, like our vegetable-predator fence around the garden maybe seemed a little strange (once the neighbors asked why we had a circle garden) but it made sense to us at the time.

Even though we live in the country, most of our neighbors are not the gardening, outdoorsy type of people. While we are cramming our days with too much work and not enough time, they might grow a single tomato plant in a pot (and kill it). We usually donate to the needy, by which I mean we give extra vegetables to the neighbors, especially if they come water while we are gone on a weekend. Some of the gardening concepts seem to be pretty foreign to this group of people. Of course they know what food looks like (sometimes we have some oddballs and we get some questioning stares, but who wants to admit they don't know what a vegetable is?), but how it's grown is another story.

The first time I realized this was when one family didn't understand why I had "dirt boxes" in the back yard. I was explaining the concept of raised beds to the blank stare of my neighbor, when I finally just told her that plants like to be higher up than the grass, which seemed to satisfy her (this is not true. I was just being snarky because she wasn't listening to me). When we put the large raised beds in the front yard- that was a whole new round of questions. Why would you put those ugly boxes in the front? Why are they so tall? Can you put them somewhere else? Why are you hoarding cardboard? So many questions . . .

So now, we will have a show and tell demonstration of how, you too, can confuse your neighbors with your raised beds! Hopefully, your neighbors are a little more "in the know" than ours and won't ask about your space tunnels in the front yard. What we really did is put up hoop houses on our beds to maximize our growing season, but I guess it could also be a space tunnel.

For our area, it's time for cabbage, lettuce, beets, carrots, spinach, broccoli, bok choi, et cetera. In North Carolina the weather is extremely unpredictable, so we wanted to have a little more control over our gardening. We can't go full force, but we're going stir crazy with the Spring fever of garden season. Something has to be done! We've been talking about putting plastic on our raised

PVC ½-inch elbows.

Hole Pipe Straps, just a visual reference.

Wood screws that clearly say 50 on the front.

Bobby and George putting together the end pieces.

Bobby attaching the brackets and ribs.

beds, but never got around to it until now. I'll explain what we did and what the cost was for each of our pieces. We bought everything at Lowes, which took two trips, because between the two of us I don't think we could count to 20 unless we took our shoes off and we miscounted the number of brackets we would need.

We planned to cover three of our beds with plastic hoops. Two of the beds were 3x7 feet, and one was 3x10 feet. For the seven-foot beds, we wanted to do four ribs, and for the 10-foot bed we wanted six ribs. We also decided to make ends to attach to the sides when we need it without covering them permanently. Each rib is made of a 10' - ½ inch PVC pipe. The end pieces were the same 10' - ½ inch pipe, plus a three-foot section of pipe to close off the bottom. For this part, we needed 14 pieces for the ribs and eight to make the ends. We ended up buying two 20-packs of the 10' PVC for $1.63 per pipe on the Contractor Discount for buying 10 or more. In the same section, we had to buy elbows to hook together the end pieces. Since we were making six end-pieces, we needed two elbows for each piece giving us a total of 12, which brought us in a $2.52 for a Contractor 10-pack and then another $0.28 each for two more. Note here that these were slip elbows of the ½ inch size, not threaded.

Our brackets were called "2-Hole Pipe Strap", for those of you who need an actual name for "that thing made of metal that holds pipes and is shaped like an Omega" as would be my best description. Our mistake in calculation comes here where we originally accounted for one per rib, but really we needed two. With 14 ribs, we needed 28 brackets. We bought three Contractor 10-packs for $2.59 each in the ¾ inch size. A quarter inch size larger than our pipe gives enough maneuverability to work easily during the construction.

The next miscalculation was more of an oversight than anything. We purchased wood screws for $5.58 in a 50-pack, but we only came home with one box… except that each bracket has two holes and 28 x 2 does not = 50. When we went back for more brackets, we also bought another box of screws.

Our last purchase (but definitely not the least) was the plastic sheeting for the cover. The one we chose is Blue Hawk Consumer Sheeting in the Heavy-Duty 3.5 mil two-pack of 10x25' rolls (500 square feet total). This was $19.98 for the two-pack, and we were able to cover the two eight-foot beds with one roll, and the 10-foot bed with the other, as well as the end pieces.

In total, our equipment list and cost was:

- (22) 10-foot ½ inch PVC pipes @ $32.60
- (12) 90° elbows @ $3.08
- (3) 10-packs of brackets @ $7.77
- (2) 50-pack 1" wood screws @ $11.16
- (1) 2-pack plastic sheeting @ $19.98

o Total cost: $74.59 +tax

- Drill for the screws
- Duct tape
- Measuring tape
- Hacksaw
- Child labor (free! Not really, ever, are children free)
- Slap stapler
- Random long wood pieces (8 foot-ish)

Charles and George holding the plastic.

The spacing was measured out first, with one rib on each end, and then the total length divided by thirds to

place the other two ribs. The brackets were screwed on first, then we pushed the pipe in. We pulled the plastic over longways, so that the 10-foot wide part was the length of the bed and the 25-foot part was rolled over the ribs so we had enough on each side to anchor at the ground. We rolled the excess on each end around the ribs and had the boys hold them while we duct taped the rolled part to keep it stable. Then, the sides of the plastic were rolled up around some extra wood we had from tomato stakes last year. Bobby used the slap stapler to attach the plastic, and the weight of the wood is enough to anchor the sides. It took us about an hour per bed, doing two beds the first day, and having to go back for supplies the next day. It was relatively easy to put up, but did need an extra couple pairs of hands every once in awhile to make it manageable. The kids also enjoyed it because it's a mostly quick project that has very apparent results at the end of the project. They like it when there's a tangible product for the effort of work so they can see the fruits of their labor.

Overall, it seems to be a success. There are a few noticeable down sides to the hoops, with the lack of down sides being one (pun intended). Other than the removable ends, there's no easy way to access the center of the beds without removing the ribs, or Bobby's long arms can do the trick. The center of the 10-foot bed is especially difficult because you don't want to put weight in the carefully fluffed soil to reach the middle and support your weight. It is also particularly rainy this week and we can't just pull it off quickly to let the rain in, so the soil is a little drier than we would like. The placement of the beds doesn't make this too bad of a problem since it's about 10 feet from one of the outside spigots, but I'd rather it get rain if it were possible. Hopefully we won't find out how it holds up to a snow/ice storm anymore in 2015, but again, in North Carolina, anything is possible. Other than those things, there doesn't seem to be too many issues. If you're making your own, you'll probably come up with your own quirks or hacks to make it a little more suited to you or eliminate a few of these problems. I would absolutely recommend this project to anyone looking to extend their season or just wanting to make a space tunnel in your yard to confuse the neighbors. BC

The finished product with the boys.

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

Confessions Of A New-Bee Beekeeper

Jim **Grupp**

There are a lot of us "new comers" in our bee club, just starting our beekeeping this year. Thought it might be interesting to the "old and experienced" beekeepers reading *Bee Culture* and the others just getting started like myself to hear some tales from the "new hive."

First, not sure what you call us new beekeeping folks? In sports, the new guys and girls are called "rookies"; in the trade professions the term used is "apprentices"; and at the U.S. Military Academy at West Point, right out my back yard, the new comers are called, "Plebes."

So what do we call us "fledgling" beekeepers; just trying to learn a whole lot about keeping bees in a relatively short time – how about "New-Bees" – sound about right? I know that is how I feel at times as I try to learn the tricks of the trade in keeping bees; a "Neew-Bee", just crawling out of my cell ready to be nursed on the ways of the hive before fully flying out on my own to master the intimacies of backyard beekeeping!

One thing I quickly learned is we have a pretty special club, the Beekeepers of Shawangunk, "BOS." I really enjoy going to our meetings. They are professionally run with a whole lot of knowledge put forth in a very short time – kind-of-like the intense Honey Flow this Summer – lots of nectar and pollen coming in from all over, very quickly. In our case folks from varied backgrounds and experience share their beekeeping knowledge and "tricks of the trade" over two plus hours so we all can benefit, learn and in the end be better stewards of our bees!

Sometimes I feel like I'm drinking from the "honey-lode" of beekeeping wisdom as I sit and listen to all at our meetings. The time spent "packing the information into the honey comb of cells" in my brain is invaluable as I forge ahead with my beekeeping chores. I also found that if you ask each of the 30 or so experienced beekeepers at our meetings a question about bees and the hive, you will get 30 different beekeeping answers.

Much like the bee colonies themselves, each Beekeeper is different and unique and each has their own way of doing things – and their way works. So for us "New-Bees," we get to shift though all that fine wisdom and then decide or experiment on what works or will work best for us. This is invaluable knowledge, like the best honey of the year. We feed on it and will eventually grow out of the "New- Bee" stage into a worker bee, an experienced beekeeper and maybe someday a queen bee. I do know it is taking me a lot longer than "21 days it takes a worker bee to hatch", to reach that point – but I feel the wisdom of our club and *Bee Culture* will help power all us "New-Bees" into full-fledged, functioning Beekeepers.

I have often also heard it said by many at our meetings that, "The bees take care of themselves." I have to admit in my short months of keeping bees that is exactly right. Screw up the frame comb, they will repair it; put the frames in crooked, they will "comb them together"; leave cracks in the supers, they will cement them shut; work too quickly around the hive, they will remind you to work slowly with a sting or two; provide too little water for their needs, they will use your pool; not provide enough ventilation or space in the hive, they will beard; provide a nice vegetable garden, they will pollinate it – they do what they have to do to survive and build their colony – we provide them with some of resources to help them and strengthen them along their way.

As a "New-Bee" I have actually learned that. I am sure many of the "New-Bees" reading this feel the same way. I also treasure the experiences of learning from the bees: watching them at the landing board come and go and dance; opening the hive and hearing the buzz from with-in; then smelling the scents of honey, pollen, brood

My 'foundation' hive stand.

Bees will get water, somewhere.

Honey!

and smoke all mixed together; looking with amazement at the frames filled with honeycomb, eggs, larvae, capped brood, pollen and honey with thousands of bees working on them; then closing up the hive and seeing all the bees return to put their home back together.

For me personally, another real beekeeping thrill was the very first time I saw one of "my golden orange" honey bees collecting pollen from a garden bed around our house. Really, felt like "proud Poppa" as I watched "my bees" dig into those garden flowers. In fact I became so aware of all their pollinating work, I now watch where I mow the grass – trying not to hit any of them collecting the white clover flower nectar and pollen in my lawn.

Like the title of this short story says, "Confessions of a New Beekeeper" – I would have never ever thought I would worry about how I mowed my lawn – now I do – don't want to possibly injure or kill any of the "ladies". Plus, I leave the lawn longer so the weeds can flower and bloom. My neighbors have made a comment or two about that! Yes, I'm a Neew-Bee and the neighbors now know that also!

Flowers at the base of my foundation.

Perhaps my most exciting "New-Bee" experience came the other morning. My hives sit about 10 feet off the ground on an old foundation. Below the hives is a swatch of wild flowers, orange, white and yellow in color. These flowers attract all kind of pollinators – bumblebees, wood bees, honey flies, honey bees and wasps. That morning when I went to make my daily check of the hives all these insects were doing their thing amongst those flowers – a pretty amazing, buzzing sight of activity framed by the rays of the morning sun.

Then the movement of a hummingbird caught my eye. She was also working these same flowers right below the hives along with all the other pollinating creatures. Wow – what an unbelievable sight and I smiled! I thought about the video clip showed at one of our meetings, "The Pollinators" and then of Louis Armstrong's famous song –" What a Wonderful World! This magnificent living "video," played out right in front of me really put this bee keeping stuff in a truly wonderful perspective.

Yup, confessions from a "New-Bee" and like many "New-Bees", I have learned a lot quickly. I also know I still have a ton to learn about bees and beekeeping. The experiences so far have been enlightening and rewarding. I truly do enjoy learning about these insects and providing them with "tools" and resources to help them build strong and vibrant hives.

Mostly, I have learned to look at the world a little differently now. The flowers and their pollinators have taken on a "new light" in my life. They have slowed me down a bit, which is good. I have also enjoyed and am tremendously grateful for all the wisdom and knowledge shared at our BOS meetings and in *Bee Culture* Magazine – without that I would be a struggling "New-Bee" not one that is looking forward to developing into an experienced Beekeeper! Thanks to all and especially to those intriguing "bugs" we call honey bees! BC

The Good Thing About Science Is That It's True Whether Or Not You Believe It

Niel deGrasse Tyson

Overcoming Barriers

How To Continue Doing What You Love

Morris **Ostrofsky**

They say death and taxes are unavoidable. There is a third item that can be added to this list; physical changes whether due to aging or disability.

This article is written for any beekeeper who is encountering physical barriers that affect their ability to continue keeping bees. These barriers can come in the form of mobility issues, arthritis, diminishing strength, back problems, eyesight or other unexpected challenges.

Beekeepers are resourceful and find creative solutions to continue keeping bees. Aging or other obstacles can be addressed on multiple fronts: lifestyle, equipment and management changes. Some of the solutions can be put into practice now and some will take planning and time to implement. The objective of this article is to provide practical information to help beekeepers adapt to changing physical conditions thus allowing them to continue doing what they love.

If you use Google to search for "common aging changes" you will find an abundance of information about how the body changes overtime. Sight, memory, bones, joints and muscle strength, are obvious changes as we age. Put another way, age or disability can get in the way of keeping bees. We will describe some of the more common barriers beekeepers encounter followed by possible solutions.

Are the eggs getting smaller? No; it's just your eyes. Presbyopia is a slow loss of ability to see close or small objects. It is a normal process that happens as we get older. Having to hold a frame at arm's length is a sign of vision loss. Reading glasses usually fix the problem. However, in some situations beekeepers need greater visual acuity. Queen rearing is an example. Finding 24-36 hour larvae when grafting can be next to impossible without extra help.

One immediate solution to

reduced vision can be found as close as the internet. Randy Oliver of Scientific Beekeeping has advice for those over 40, "I recommend grafting in a very dark room, wearing a jeweler's type head-mounted magnifier of 3x-4x power, plus a focusable headlamp (battery powered). Put the headlamp as close as you can between your eyes, and aim the spot directly where you are looking." This is a piece of equipment worth splurging on; get visors with good optics and a built in LED light source. I used to struggle finding 24 hour larvae when grafting. It is fun again now that I can see. The LED light is very bright and does not give off larvae-drying heat. An added bonus is that I can use this visor for reading the finest of fine print.

"When was I supposed to release that new queen?" Mayo Clinic points out that our "Memory tends to becomes less efficient with age. It might take longer to learn new things or remember familiar words or names." Our memory affects all aspects of our lives including beekeeping. Think about that always missing hive tool.

Jotting down details of your hive visits in your journal is one tool to combat the effects of our aging brain. There are many types of journals, both paper and electronic, that can be used. What is important is to keep track of what you have done and plan to do on your next visit to the bees. This is especially true when raising queens. Missing a key date can mean the difference between success and failure.

It is a shock when you realize your hands are starting to look like your grandparents'. Degenerative arthritis is a general term for inflammation of one or more joints in the body. The areas most often affected are the hands and the weight-bearing joints of the lower extremities. The onset of osteoarthritis is usually related to aging and will affect most of us at some point in our beekeeping careers if we stay at it long enough. Activities such as manipulating hive tools or lifting heavy boxes can become difficult if not impossible.

As the Mayo clinic web site says, "There's no known cure for osteoarthritis, but treatments can help reduce pain and maintain joint movement." Treatments vary from medication, therapy to surgery. For Judy Scher, Oregon Master Beekeeper instructor and mentor, arthritis in her hands and back has made it necessary to ask fellow beekeepers and mentees for help in lifting boxes. It is a win win situation. Judy gets help with lifting and her mentees learn something in the process. As an extra bonus, Judy adds a "thank you" lunch.

Muscle loss and back problems are the "evil" twins of aging. From the time we are born to about the time we turn 30, our muscles grow larger and stronger. According to a January 2012 Berkley Wellness article, most of us lose muscle as we age – a loss of one to two percent a year after age 50, on average, or about 30 percent between age 50 and 70. Even beekeepers and "Arnie", whose decades-long workout routine has included lifting heavy supers or weights, will still experience some muscle loss as they age. Any loss of muscle mass is of consequence, because loss of muscle means loss of strength and mobility.

Arnold Schwarzenegger as Mr. Universe in 1968.

It becomes harder to lift packages or in the case of beekeepers supers. While we can't completely halt this aging process, researchers believe we can do a lot to slow it down following the "Use it lose it principle". The primarily the goal is to avoid being sedentary.

"Eighty percent of the population of the United States, at some point in their life, is going to have back pain," says Ronald J. Wisneski, MD, an orthopedic surgeon, specialist in spinal disorders and spine surgery, and associate in the Department of Orthopedic Surgery at Geisinger Medical Center in Danville, PA.

"You can wreck your back in any number of ways, but a few major offenders stand out: not stretching, not paying attention to your movements, and years of wear and tear." says Nick Shamie, MD, associate professor of orthopedic neurosurgery at UCLA and a spokesman for the American Academy of Orthopedic Surgeons.

While there are many roads to loss of strength and back problems, all can lead to reduced beekeeping activities. Richard Taylor in The Joys of Beekeeping sums it up, "... no man's back is unbreakable and even beekeepers grow older. When full, a mere shallow super is heavy, weighing forty pounds or more. Deep supers, when filled, are ponderous beyond practical limit."

Early documentation of beekeepers with back problems? Tomb of Rekhmire at Luxor

In your mind's eye you see yourself as a much younger person. You realize you are not that same person when you get half way through a large apiary and realize you are ready for a break. Even though your strength isn't what it was at 40 or even 60, and your back doesn't want to cooperate, there are strategies you can use to minimize the impact and keep doing what you love.

Life style change is a place to start whether it is keeping your weight under control to lessen stress on joints to being aware of ergonomics. There is an abundance of information available on how to lift boxes as well as how to improve back and leg muscle strength. The bottom line is when lifting brood boxes and heavy supers, lift with your knees, not with your back.

While most of us know what we are supposed to do when picking up a super, it does not hurt to remind ourselves how to do this ergonomically.

1) Stand close to the super and center yourself over it with your feet shoulder width apart.
2) Tighten your abdominal muscles.
3) Keeping your back straight, bend your knees and squat down to the floor.
4) Get a good grasp on the super with both hands.
5) Keeping the super close to your body use your leg muscles to stand up lifting the box off the floor.
6) Your back should remain straight throughout lifting, using only the muscles in the legs to lift the box.
7) Do not twist your body when moving the box. Instead take small steps with your feet turning until you are in the correct position.
8) Again bend at the knees using only your leg muscles and place the box in the appropriate spot.

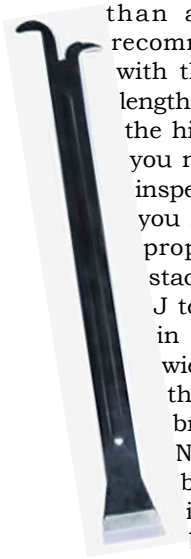
Your equipment choices can also help you deal with an aging back. Bill Greenrose, a New Hampshire beekeeper with 19 years experience, commented on dealing with beekeeping after surgery, "... and I also use a lower back brace for support. Along those lines, I would suggest wrapping your knees very well beforehand to help stabilize them. A lot of the injuries with knee replacement therapy come from twisting or torquing the knee and it's easy to take a misstep with a box in both hands on uneven ground."

The great thing about tools is that they provide leverage. Make gravity work for you not against you especially when moving heavy honey supers. If at all possible, place your hives at an elevation higher than where your truck or extracting equipment is located. This way you can load the honey supers on a garden cart found at most home improvement stores and roll them

down to where needed. Remember new beekeepers too are happy to help move honey supers in exchange for learning the process of extracting.

Tools at hand can be used to save your back. For instance Kelley Beekeeping's longer J hook hive tool at 15-3/8" increases the leverage that you would normally get from the traditional, shorter 10-1/8" J hive tool. The hooked end also makes it easier for lifting frames. The combination of easily lifting frames along with a longer reach means less stress for your back.

Two hive tools can be used together to give you more leverage than a single hive tool. I recommend using hive tools with the large J hook, either length, because when you open the hive there are two things you need to do to prepare to inspect frames. The first thing you need to do is break the propolis seal between the stacked boxes. Twisting the J tool with the curved end in the space created now widens the space between the boxes and completes breaking the propolis seal. Now the box can easily be lifted off. Or you can insert a piece of wood between the boxes if you only need a small space; i.e., applying a grease patty or Thymol wafer. I do not have to hold the box open or completely remove the upper box. It leaves my hands free and makes the job go faster. Not to mention it is much easier on my back.



There will be times when the space created by the small block of wood is not sufficient; i.e., during spring when looking for queen cells. You can create a wider space by

simply tilting the upper brood box back. This exposes the bottom bars of the upper most brood box. Tilting the box back eliminates heavy lifting and makes the frames more visible.

The question that comes to mind is "When the upper box is tilted back, what prevents it from sliding off? The answer is a simple modification to the brood box. The modification involves attaching a metal strip and washers to the brood box. I purchased a 96 x 1.5 inch strip of aluminum at a home improvement store and cut it into 16 x 1.5" pieces. I drilled four non-centered holes using a 7/32"

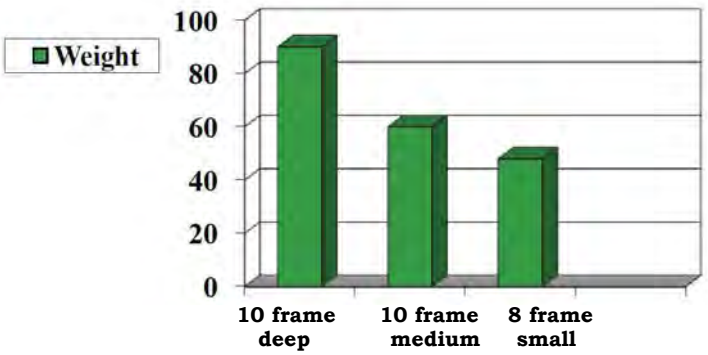
drill bit to avoid the thin wood in the frame rest part of the box. I used four 3/4" screws (#6X ¾") and two 3/16" washers per screw to attach the strip to the brood box. The top of the strip must be flush with the brood box to avoid interference with the cover. The washers create a small space between the metal strip and the wood of the box. It is this space that prevents the top box from sliding off the lower brood box. Now I can place a block of wood between the upper and lower brood boxes. My hands are now free.

There are times when you can not avoid lifting boxes i.e., reversing boxes, moving hives or supers full of honey. Here too there are options that help keep you going and your back healthy. The first option is to change the way you move boxes. As Bill Greenrose says, "I have another suggestion, which is a change in methodology. I have used this method successfully, whenever I have tweaked my back and need to go light with the lifting for a while. I use a second box – deep, medium, shallow – whatever will hold frames from the box I want to lift/move. I move half of the frames from the full box to the empty box before any manipulations. If half a box is still too heavy, just move more frames until the first is light enough to work. It will take more time, but it beats having to give up something you love."

Another option to avoid heavy lifting is to imitate how the bees work collectively. There are a couple ways to do this; the buddy system and mentoring. Although beekeeping tends to be solitary, it doesn't have to be. In fact working with a fellow beekeeper is not only easier, it can be more enjoyable not to mention safer. This is a good time to mention another social tool; the cell phone. Having a cell phone with you could save your life or the life of a companion.

When I think of getting older and the limits to what I can do, I think of a series of articles that Roy Thurber wrote in the 1970s titled "Older but Wiser". As we age, hopefully we get wiser but we definitely have picked up skills and techniques along the way. This is an opportunity to share that knowledge with new, enthusiastic beekeepers. These new beekeepers are usually more than willing to do the heavy lifting in exchange for gaining knowledge. Mentoring is a win win situation: you get help plus enjoy sharing and the mentee gains knowledge.

Another back saver involves changing your box size to either eight or 10-frame westerns. When I discussed my plans for this article with Kim Flottum, editor of *Bee Culture*, at the recent Oregon State Beekeepers' conference in Seaside, he said two words to me, "Eight frames". Put another way, James Fisher stated, "I've often intoned 'Friends don't let friends lift deeps.'



Michael Bush is the author of "The Practical Beekeeper" and manages the Bush Farms website. This chart from his "Lazy Beekeeping" presentation illustrates the relative weight of different size boxes with honey. Of course, if these boxes contain brood, they weigh much less. So basically you can see that going from a 10-frame deep to an eight-frame medium reduces the weight by half. As Michael Bush says, "I find I can lift about 50 pounds pretty well, but more is usually a strain that leaves me hurting the next few days. The most versatile size frame is a medium and a box of them that weighs about 50 pounds is an eight frame."

Robin Dartington, creator of the Dartington Long Deep Hive in the UK, says, "Changing to a new type of hive is a big step but can prolong the years of beekeeping if specially designed to reduce lifting and also increase convenience."

Transitioning to all eight-frame westerns is a long term strategy. Why not start now? One way to get started is to transition from a 10-frame box to an eight-frame box. This can be done by purchasing one (easier) or cutting down a 10-frame box (more work). For details on cutting down 10-frame boxes see Michael Bush's "Lazy Beekeeping" in the reference section.

Another way to reduce weight is to cut down 10 or eight-frame deeps into westerns. See the references for directions. Again I find the easiest way is to purchase the correct size box. By using a single box and frame size, everything is standardized and interchangeable. They can be used for both brood production and honey storage. The bees don't care if you give them two westerns for brood or a full depth brood box. While the bees do not care, your back sure will. Why not suggest to new beekeepers just starting to acquire equipment that they start with eight-frame westerns? They can save their back now and do not have to transition later.

Next month – Reconsider your goals to make keeping bees still part of your life. BC

Topic	Reference
Bush Farms	**www.bushfarms.com/beeslazy.htm**
Randy Oliver	**www.scientificbeekeeping.com**
Magnifiers	**www.magnifier.com/headband_magnifier.htm**
Beekeeping supplies	**www.mannlakeltd.com/beekeeping-supplies**
Beekeeping supplies	**www.dadant.com/catalog/index.php?cPath=88unassembled 8 frame**
Journals	**www.cafepress.com/+beekeepers+journals**
Hive Tracks (electronic version)	**http://hivetracks.com**
Safe lifting	**http://physicaltherapy.about.com/od/ergonomics/qt/SafeLifting.htm**
Back strengthening exercises	**www.realsimple.com/health/fitness-exercise/workouts/4-back-strengthening-exercises/side-plank**
Osteoarthritis	**www.mayoclinic.org/diseases-conditions/osteoarthritis/basics/treatment/con-20014749**
Leg strengthening exercises	**http://healthyliving.azcentral.com/home-leg-strengthening-exercises-6286.html**
Extra long hive tool	**www.kelleybees.com/Shop/12/Smokers-Tools/Tools/4636/Extra-Long-Hive-Tool**
Instructions to cut down 10 to 8 frame western	**www.bushfarms.com/beeseightframemedium.htm**
For plans or already constructed Valhalla hive (no delivery) The Hive Man Richard Nichols 541-447-7907	**richardtarsia@gmail.com**
Fabricator and supplier of Valhalla hive arm latch and metal for outer cover McAlister Industries Tim McAlister 541-610-5554	**mcalister@cbbmail.com**

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www.pollinatorstewardship.org 832-727-9492


Nov. 2014 bee kill in Florida


March 2014 bee kill in Calif.

Honey, Like You've Never Tasted It Before!

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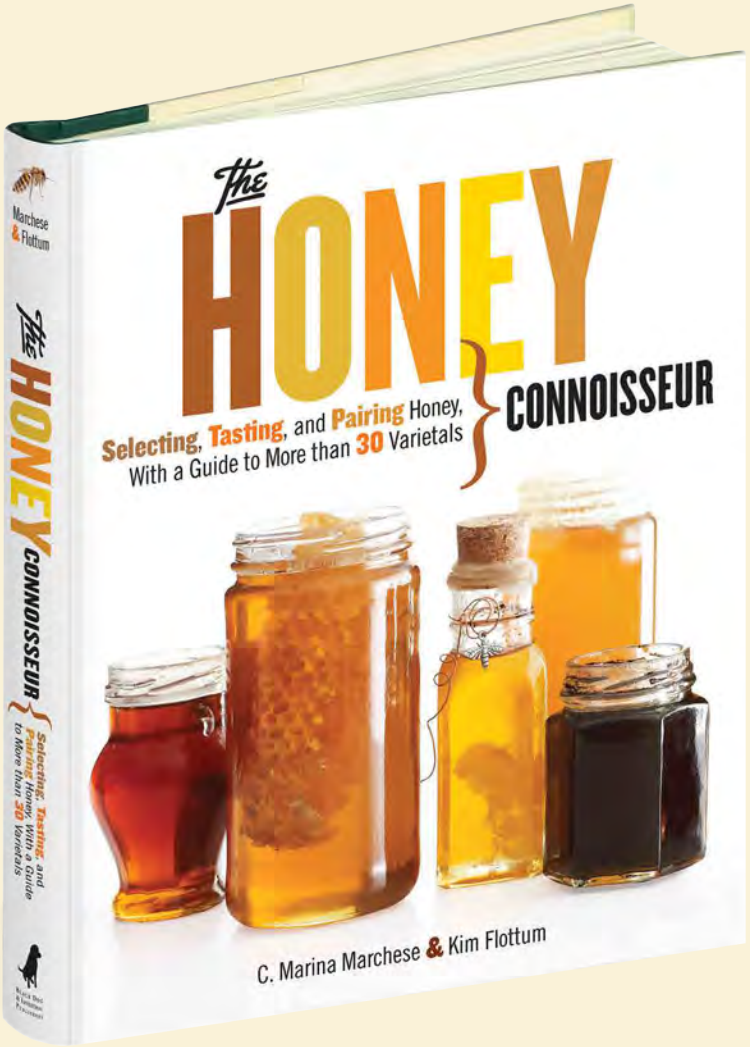
—Julian Niccolini, Owner of The Four Seasons Restaurant, New York City



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"*The Honey Connoisseur* lays it all out on the table… The reader will never look at the honey jar quite the same way."
—Max McCalman, author of *Mastering Cheese, Cheese: Connoisseur's Guide to the World's Best*, and *The Cheese Plate*

"Marina Marchese and Kim Flottum's knowledge of this fascinating and increasingly popular subject is unparalleled."
—Nicholas Coleman, Chief Olive Oil Specialist, Eataly NYC

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Black Dog & Leventhal Publishers New York

REPAIRING A LEATHER BELLOWS SMOKER

William **Hesbach**

Leather, the mainstay fabric of early smokers, existed in an age of less disposable products making repair a common skill practiced by beekeepers. In modern times, leather has been replaced with various vinyl or rubberized materials. Now we can simply order a completely assembled bellows and fix a smoker in minutes. So when I became the owner of a circa 1907 all copper A.I. Root smoker, with a partly disintegrated leather bellows, my immediate thought was to buy a stock replacement and be done with it. But when I took a closer look at the beautiful patina and the fine copper work around the bellow's box, I began a quest to learn how to replicate and attach an old fashion leather bellows.

Smoke, the anesthesia of beekeeping, has a long history as a useful and necessary tool. The smokers we use today are the result of many earlier experiments – some good others not so good. Early designs were dealing with the placement of burning fuels in relation to the stream of forced air, or draft, created by the action of the bellows.

Moses Quinby, a native of St. Johnsville New York, one of the first commercial beekeepers in the U.S., is credited with inventing the first bellows operated smoker around 1873. Known as the Quinby Bellows Smoker, it was a three-inch tin cylinder with a tall removable cone top. Compared to a modern smoker, the spring-operated bellows was attached inverted with the wide end at the bottom of the cylinder. It was loaded and ignited right side up by removing the cone and then inverted when used. When inverted, the cone filled with ignited fuel making it the hottest part of the combustion chamber. Consequently, the draft created by operating the bellows produced hot smoke that contained the occasional lit ember. Quinby's "hot blast" smoker was slowly improved while other inventors like Norman Clark reconfigured the bellows and barrel allowing the draft to enter above the smoker's burning fuel creating a cooler smoke. Unfortunately, Clark's cold blast smoker died out without constant draft from the bellows making it inconvenient to use.

By the early 1900s smokers had evolved to resemble modern units with the bellows repositioned, wide side up, eliminating the need to invert the smoker after lighting. This also allowed the draft to enter under the ignited fuel and the smoke to rise through unburned fuel cooling the smoke. The all copper smoker I'm repairing was well preserved except for the bellows. So the primary task was to completely disassemble the smoker and design a template shaped like the original leather. The leather is attached to the wooden front and back of the bellows with a delicate thin copper trim. The trim was deformed from repeated attempts to repair areas where the leather had worn and become detached. I used my hive tool and a hammer to work the soft copper back to its original shape. With the trim ready and the wooden back and front prepared, I turned to the new leather template.

In 1907 smokers, mail ordered from A.I. Root company, came in various sizes beginning with the two inch barrel named the Little Wonder to the four inch Smoke Engine. These smokers were made of tin, ranging in price from 50 cents to $1.25 with an additional 25 cents for postage. Copper, a metal more durable than tin, was available as an option for 50 cents. In 1907 a smoker like mine would cost about $2.50 with shipping and would have been considered a premium model. Other models like the asbestos lined Danzenbaker could be purchased for $1.25 with postage and there were other off brand models available for

Interior view of the back half with a new flap valve

just 35 cents. A premium copper barrel would last a long time, but the leather bellows would dry and crack eventually needing replacement.

The leather on my smoker had mostly disintegrated. The small scrap that remained modeled just enough of the side angle for some guess work at a final design. I started with paper and estimated the shape that would operate the bellows using the extended interior spring to gauge the width of the top. I developed the pattern by measuring the wooden sides and projecting the angle of the scrap to full size allowing me to wrap the pattern around both the front and back of the bellows while keeping the spring just slightly compressed. With the template complete, I then used it to shape the leather. I chose medium weight leather with a worn authentic look that complimented the aged copper.

One interesting part of these older smokers was the rather large hole drilled in the lower back of the bellows used as an air inlet valve. On the inside, the hole was covered with a small leather flap acting like a one-way valve. When the bellows release after compression the leather flap opens and the box inflates with air entering the hole. When the bellows are compressed the internal pressure closes the flap forcing a small intense airstream to exit the small hole, or short tube, facing the bottom of the cylinder.

If you've ever wondered why that small tube isn't actually connected to the cylinder's fire chamber here's why. In earlier models, like the first Quinby bellows smoker, they were connected but that connection allowed hot burning embers to be sucked back into the bellows causing them to occasionally ignite. The space between the output of the bellows and the cylinder prevents that from happening.

Back at my workbench, the assembly began by attaching the leather to the wooden back of the bellows with a few small copper tacks. Since I could not determine the exact finished length of the leather, both ends of the narrow part that runs under the bellows was left long and at this point I trimmed them to meet in the middle. I then ran the delicate copper trim around the wood and tacked the back half together. The smoker was still disassembled while I worked on the back, but the next step required complete assembly because the working parts of the bellows are inside. I reinstalled the spring and attached the wooden front to the smoker barrel using the original hardware. The flap valve also needed replacement, so I cut a little square piece of new leather and nailed it over the inside hole using the old nail holes as a guide for it to properly hinge.

I then began some awkward attempts at trying to attach the assembled back to the wood front while the spring kept flopping out of position. With a few tacks through the leather on top, I worked my way around the bellows until the assembly held in place under light spring tension. I then attached the delicate trim detail on the front and it was done. I was surprised how well the leather bellows worked. The delicate trim lightly tacked around the edges makes the bellows box nearly airtight.

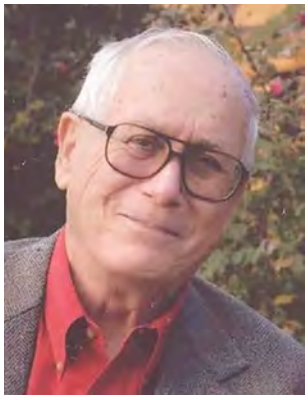
Once the design of smokers improved, allowing for longer burns and cool smoke, beekeepers were able to control bees with less distraction. Improved smokers allowed beekeepers to work larger apiaries ushering in the era of commercial honey production. Through the ages beekeepers have expressed some affection for their favorite smokers. During summer gatherings and beekeeping conventions beekeepers often compete to see how long a smoker can remain lit.

In some ways, the ritual of selecting a type of fuel, packing the cylinder, and lighting the smoker is symbolic of the art of beekeeping. Repairing this smoker was like breathing life into a small part of beekeeping history and was both enjoyable and rewarding. BC

GLEANINGS

MAY 2015 • ALL THE NEWS THAT FITS

OBITUARY



Paul W. Jackson, 72, of Bryan, passed away February 19, 2015 in Bryan. A funeral service was held Sunday, February 22, 2015 at the First United Methodist Church in Bryan. Graveside services followed at the Mississippi County Memorial Gardens in Osceola, Arkansas.

Mr. Jackson was born May 3, 1942 in Memphis, TN, the son of John Paul and Margaurette Shilling (Worsley) Jackson. He received his Bachelor's Degree from the University of Arkansas and his Master's Degree from Texas A&M University, Class '71.

Mr. Jackson was a member of the First United Methodist Church in Bryan where he attended the Koinonia Sunday School Class, member of the Bryan Rotary Club, the Apiary Inspectors of America, American Honey Producers Association, American Bee Keepers Association, Texas Bee Keepers Association, and was a supporter of the Museum of Natural History. Mr. Jackson retired from the Texas Agrilife Extension Service, where he was the State Entomologist and Chief Foulbrood Inspector from 1977 to 2013. He also conducted Africanized Bee Surveys for several years, identifying and tracking their migration from Mexico into Texas and farther north. Prior to this, he was the first entomologist with the Stephenville TAMU Experiment Station where he worked for 8 years. Mr. Jackson served in the U.S. Army.

He was preceded in death by his parents, John Paul and Margaurette Jackson, a sister, Nora Ann Hanshaw, and his son-in-law, Brandon Denk.

Survivors include his wife, Irene Jackson; children, Paula McCann and her husband Nathan (Buster), Courtney Jackson and his wife Jenny, Wendi Denk; four grandchildren, Logan McCann, Cameron McCann, Julia Jackson, Lucy Jackson; and his father and mother-in-law, Elkin and Idell Raper.

The family would like to thank Dr. Sreeram and the staff at St. Joseph Wound Care Clinic, Dr. Jenkins and the staff at St. Joseph Cancer Clinic, Standards Home Health and Hospice, and Visiting Angels for all their care and support.

The family request that memorials be made in Mr. Jackson's name to the Bryan Rotary Scholarship Fund, P.O. Box 2760, Bryan, TX 77805 or to the First United Methodist Church Music Ministry, 506 E. 28th Street, Bryan, Texas 77803.

FLOWER POWER

Naturally occurring chemicals found in the flowers of tobacco and other plants could be just the right prescription for ailing bees in their fight against parasites.

A Dartmouth College-led study finds that chemicals in floral nectar, including the alkaloids anabasine and nicotine, the iridoid glycoside catalpol and the terpenoid thymol, significantly reduce parasite infection in bees.

The results suggest that growing plants high in these compounds around farm fields could create a natural "medicine cabinet" that improves survival of diseased bees and pollination of crops.

The researchers from Dartmouth in New Hampshire and the University of Massachusetts-Amherst studied parasite infections in bumble bees and their findings appear in the journal Proceedings of the Royal Society B.

Plants produce chemicals called secondary metabolites to defend leaves against herbivores. These chemicals are also found in nectar for pollinators, but little is known about the impacts of nectar chemistry on pollinators, including bees.

The researchers hypothesized that some nectar compounds could reduce parasite infections in bees, so they inoculated individual bumble bees with an intestinal parasite and tested effects of eight naturally occurring nectar chemicals on parasite population growth.

The results showed that consumption of these chemicals lessened the intensity of infection by up to 81%, which could significantly reduce the spread of parasites within and between bee colonies.

"Our novel results highlight that secondary metabolites in floral nectar may play a vital role in reducing bee-parasite interactions," says senior author Dartmouth Professor Rebecca Irwin. – *Alan Harman*

BOTTLING & SELLING CAIFORNIA'S WATER

Nestlé is wading into what may be the purest form of water risk. A unit of the $243 billion Swiss food and drinks giant is facing populist protests for bottling and selling perfectly good water from drought-stricken CA.

Nestlé Waters says it does nothing harmful in the watersheds where it operates. Its parent company also signed and strongly supports the United Nations-sponsored CEO Water Mandate, which develops corporate sustainability policies.

The company's reputation may be at risk in CA, whose severe drought is in its fourth year. The Courage Campaign has organized an online petition, with more than 40,000 signatures so far, that demands Nestlé Waters stop bottling H_2O during the drought.

The Swiss firm drew 50 million gallons from Sacramento sources last year, less than half a percent of the Sacramento Suburban Water District's total production. It amounts to about 12 percent of residential water use, though, and is just shy of how much water flows from home faucets in the United States, according to the U.S. Environmental Protection Agency. In other words, Nestlé may be bottling more than locals drink from the tap.

Consumers can only blame themselves, of course, for buying so much bottled water. The average price for a gallon of water to be bottled is $1.21, according to the International Bottled Water Association. For just $1.60, Californians could purchase 1,000 gallons of tap water, according to the National Resources Defense Council.

Moreover, Nestlé's water business is its smallest and least profitable, generating a trading operating profit last year of 10.3% – less than half that of its powdered and liquid beverages unit. With CA imposing a 25% cut on residential water use, Nestlé Waters may want to consider turning off its own taps.

BC UNIVERSITY OFFERS FIRST BEEKEEPING COURSE WITH A PAID SEGMENT!

A Canadian university plans to boost crop pollination by introducing the first commercial beekeeping program in the province of British Columbia.

Kwantlen Polytechnic Univ will launch the program next January with the first class graduating in November 2016. The program will give students the skills to work in, manage, and expand beekeeping operations. Graduates will also be able to establish and grow their own diversified cottage beekeeping business.

The program includes a five-month paid practical section to give students a real-world perspective of the industry and will teach them about beehive care, bee disease management, bee botany, integrated pest management, livestock production and colony management, food safety, processing, packaging and marketing, and bee business planning, management and growth.

Funding of C$350,000 for the program was provided by Agriculture and Agri-Food Canada and the B.C. Ministry of Agriculture.

Jim Pelton, executive director of Continuing and Professional Studies, says the university, located in Surrey, about 15 miles southeast of Vancouver, came up with the program because there is a bee shortage in BC

"Our aim is to bolster BC's beekeeping industry by providing the training that will allow our students to meet the province's growing pollination demands," he says.

"Crops that need pollination are increasing in BC, and the provincial government says that honeybee pollination is responsible for more than C$200 million (US$156.4 million) a year in agricultural production. The 20,000 acres of blueberry farms in BC by themselves need 60,000 bee colonies for pollination."

As there now are only 45,000 commercial bee colonies in BC, the farms import colonies from neighboring Alberta to meet the demand.

The new university program will graduate an initial 16 students.

The university estimates these first graduates could increase BC's honey production by $250,000 (US$195,500) a year, while supporting more than C$6 million (US$4.69 million) in agricultural production, even if they just worked part-time managing 50-colony operations.

"Our graduates will have the skills to work in, manage and grow existing beekeeping operations or establish and grow their own diversified cottage beekeeping business that could include pollination, honey and apitherapy (the medicinal use of honeybee products)," Pelton says.

After the first three years, the beekeeping program is forecast to grow to 24 students a year.

"Increasing the educational opportunities available to beekeepers will boost the efficiency of the bee industry," says local Member of Parliament Cathy McLeod.

"A healthy bee population is integral to a successful harvest, a prosperous agriculture industry and a strong economy," she says

BC Agriculture Minister Norm Letnick says the program to train the province's next generation of beekeepers is important.

"Honey bees play a critical role in BC agriculture as pollinators of crops and contributing an estimated C$275 million (US$215 million) to our provincial economy," Letnick says.

John Gibeau, president of the Honey bee Center in Cloverdale, helped develop the program outline and will be part of the advisory committee of apiculture industry partners who are guiding curriculum development in preparation for the first students next January

Gibeau, who has some 45 years of experience as a beekeeper, calls the program a "sweet deal" because it sets up grads for family-supporting careers and includes the five-month paid practicum equivalent to a trades apprenticeship.

Then there is the profession itself, says Gibeau, He estimates a family can bring in revenue of about C$100,000 (US$78,200) a year and work until retirement.

"A career in professional beekeeping offers the freedom and independence of entrepreneurship, and you're outdoors where it's fresh, you're grounded and you're surrounded by nature with your kids," he says. "It's a wonderful career."

From a market perspective, Gibeau says, honey continues to gain popularity as the healthiest sweetener, driving worldwide demand and sending prices soaring.

Gibeau's Honeybee Centre offers three-day hobbyist courses and has taught almost 1,000 people over the years, but less than a handful of those hobbyists have gone on to become commercial beekeepers.

"The timing is right for this program," he says. – *Alan Harman*

OBITUARIES

PETER EDMUND ALLAN, 62
Gainesville - Peter Teal, 62, Gainesville FL, died Feb. 11, 2015 after a brief but courageous battle with pneumonia. He was born in Ontario, Canada, to Wilfred Teal and Margaret L. (Peggy) Ferguson Teal.

Peter earned his BSc & MSc degrees in Biology from Univ. of Ottawa, and PhD from UF in Entomology. After completing a post-doctoral fellowship with the USDA in Gainesville, he took a position as Assistant Professor at the Univ. of Guelph, Ontario, Canada, teaching insect physiology and conducting research from 1983-86. In 1986, Peter returned to Gainesville to work as a scientist, then later, research leader at USDA-CMAVE in Gainesville until his death. He was also Acting Station Director at the Subtropical Horticulture Research Station in Miami.

Peter was a scientist, teacher, naturalist, and humanitarian. Since his research involved controlling insects that threaten our food production, his main goal was to find a way for his work to have the greatest, safest effect, so as many people could benefit as possible. During his career, he earned many awards, both within the government and, most importantly for him, from the agricultural community that he worked so closely with. He published extensively and held numerous patents in the area, helping to advance the field in this singularly important area of science.

Dr. Hayward Gosse Spangler born July 6, 1938 in Red Bank, NJ, passed away December 7, 2014 after a long illness. Hayward was a polio survivor who accomplished many things. He received his BS degree from La Sierra College in Riverside, CA, the MS degree in Entomology at the University of Arizona, and the PhD in Entomology from Kansas State University, Manhattan. He returned to Tucson in 1967 as a research entomologist for the Carl Hayden Honey Bee Research Center, commonly known as the "Bee Lab." He retired in 2001 after 34 years of service. He was appointed Adjunct Professor of Entomology and a USDA representative to the Center for Insect Science. A specialist in Insect Acoustics, Hayward invented and patented an Africanized Honey Bee temper tester used to study "killer" bees in Costa Rica. He presented lectures and insect sound recordings to local organizations, UA students, NPR and to Entomology meetings in the USA and Europe. He was an avid nature lover who felt most at peace in the Butterfly Garden at the Arizona Sonora Desert Museum. He was always available to share his knowledge and enthusiasm for his work. He leaves a legacy of mentorship, entomology papers and discoveries that are cited regularly in scientific journals.

MANGANESE HAS BEES IN A TIZZY

Researchers say low levels of manganese, a common industrial pollutant, is affecting the behavior of honey bees.

Biologists at Washington University in St. Louis, working with colleagues from Macquarie University in Australia found that at levels considered safe for human food, the metal appears to addle bees.

Yehuda Ben-Shahar and Eirik Sovik report the bees advanced through age-related work assignments faster than normal, but completed fewer foraging trips than their sisters who were not exposed to manganese.

"We've known for a long time that high doses of manganese kill neurons that produce dopamine, causing a Parkinsonian-like disease in people," says Ben-Shahar, a biologist at Washington University. "In insects, as well, high levels of manganese kill dopaminergic neurons, reducing levels of dopamine in the brain.

"But in this study we were looking at low-level exposure and we saw the opposite effect. Instead of reducing dopamine levels, manganese increased them. Increases in dopamine and related neurotransmitters probably explain some of the abnormal behavior," Ben-Shahar says.

Paradoxically, a trace amount of manganese is essential for life. All living organisms rely on the chemical properties of this metal to drive reactions in cells and to mop up the toxic byproducts of cellular life in the presence of oxygen.

"We evolved in an environment where there was little manganese, and so we developed ways to pump it into our cells," Ben-Shahar says. "But now environmental levels are quite different from those to which we are adapted and we don't really know what that means for human health."

"The bees, which vacuum up everything in the environment, might be serving as an early warning indicator of an environmental toxin."

Ben-Shahar didn't set out to discover the effect of manganese on bee behavior.

He was trying to study the link between responsiveness to sugar and the reward circuit in the brain. When a honey bee detects sugar, it reflexively extends its proboscis, a stereotyped behavior that can be experimentally manipulated and quantified.

The older the bee, the more responsive it is to sugar. In honey bee colonies tasks are divided according to age. For the first two to three weeks of adult life, bees typically take care of the brood in the hive. They then shift to foraging outside the hive for the remainder of their five- to seven-week life.

In 1995, scientists screening for genes that affect sugar response in fruit flies discovered a gene that reduced it. They named it Malvolio, after a sour character in Shakespeare's Twelfth Night who is accused of wanting to outlaw cakes and ale.

Malvolio (the gene) was later shown to encode a protein that pumps manganese across cell membranes. Ben-Shahar published research results in 2004 that showed age-related transitions in honey bees are associated with increased expression of the Malvolio gene and higher levels of manganese in brain cells.

Ben-Shahar wanted to know why manganese changed feeding behavior. At high doses it affects a dopaminergic pathway in the brain that is associated with motor control. This is why manganese toxicity causes Parkinsonian-like symptoms, such as tremor and rigidity in humans.

To make the connection between diet and behavior, he needed to be able to quantify tiny amounts of neurotransmitters (chemicals that transmit signals between neurons) in bee brains.

He contacted co-author Andrew Barron of Macquarie University and they worked together to study levels of these molecules in the brains of fruit flies and honey bees fed differing levels of manganese. They also tracked the bees by attaching radio-frequency tags to them when they were a day old.

In both honey bees and fruit flies, exposure to manganese at levels considered safe for humans increased brain levels of dopamine and octopamine, a neurotransmitter important in insects. At the higher exposures it also altered the behavior of the bees, which became foragers sooner than normal, but made relatively few foraging trips, perhaps because they got lost or tired.

"Manganese is not the number one dangerous thing out there in the environment," Ben-Shahar says. "Nor do we know if it affects our brains the same way it does those of insects. Nobody has done the studies. But even if it has no impact on us, it clearly affects bees."

Alan Harman

IMIDACLOPRID CLEARED IN HONEY BEE DEATHS

The neonicotinoid imidacloprid, the world's most common insecticide, does not significantly harm honey bee colonies at real-world dosage levels, U of MD researchers report.

Their study, published in the research journal Plos One, looked at the effects of imidacloprid on honey bee colonies for a three-year period.

To see significant negative effects, including a sharp decrease in Winter survival rates, researchers had to expose colonies to at least four times as much insecticide encountered under normal circumstances. At 20 times the normal exposure levels, the colonies experienced more severe consequences.

The research team says the study does not totally absolve imidacloprid of a causative role in honey bee colony declines. Rather, the results indicate that insecticides are but one of many factors causing trouble for the world's honey bee populations.

Galen Dively, emeritus professor of entomology at UMD and lead author of the study, says everyone is pointing the finger at these insecticides.

Imidacloprid is one of a broad class of insecticides called neonicotinoids, so named because they are chemically derived from nicotine. In tobacco and other related plants, nicotine acts as a deterrent by poisoning would-be herbivores.

While nicotine itself was once used as an insecticide, it has fallen out of favor because it is highly toxic to humans and breaks down rapidly in sunlight. Neonicotinoids have been engineered specifically to address these shortcomings.

"Imidacloprid is the most widely used insecticide in the world," Dively says. "It's not restricted because it is very safe – an order of magnitude safer than organophosphates."

For the study, Dively and his colleagues fed pollen dosed with imidacloprid to honey bee colonies. The team purposely constructed a worst-case scenario, even at lower exposure levels.

They fed the colonies tainted food for up to 12 continuous weeks. This is a much longer exposure than bee colonies would experience in real-world scenarios, because most crops do not bloom for such an extended period of time.

Even at these longer exposure periods, realistic dosage levels of imidacloprid did not cause significant effects in the honey bee colonies. Only at higher levels did the colonies start to have trouble producing healthy offspring and surviving through the Winter.

Dennis vanEngelsdorp, an assistant professor of entomology at UMD who was not involved in the study, says a lot of attention has been paid to neonicotinoids, but there isn't a lot of field data.

"This study is among the first to address that gap," he says. "It's not surprising that higher levels will hurt insects. But this study is saying that neonicotinoids probably aren't the sole culprit at lower, real-world doses."

Dively and vanEngelsdorp both agree that a synergistic combination of many factors is most likely to blame for colony declines.

Climate stress could be taking a toll, and malnutrition could be a factor as well. The latter is a particular concern for industrial bee colonies that are rented to large-scale agricultural operations. These bees spend much of their time eating pollen from one or two crops, which throws their diet out of balance.

"Except for the imidacloprid exposure, our test colonies were treated well," says co-author David Hawthorne, associate professor of entomology at UMD and director of education at the National Socio-Environmental Synthesis Center.

"They weren't exposed to additional real-world stressors such as malnourishment or multiple pesticides. Colonies coping with these additional pressures may be more sensitive to imidacloprid."

The researchers did find some evidence for at least one synergistic combination. At the highest dosage levels – 20 times the realistic dosage – colonies became more susceptible to *Varroa* mites.

"It's a multifactorial issue, with lots of stress factors," Dively says. "Honey bees have a lot of pests and diseases to deal with. Insecticide exposure is one factor among many. It's not the lone villain."

In addition to Dively and Hawthorne, study authors included UMD technician Michael Embrey, Alaa Kamel of the U.S. Environmental Protection Agency and Jeffery Pettis of the U.S.D.A.

The research was supported by the USDA-ARS Bee Research Laboratory, the Foundation for the Preservation of Honey Bees, the Maryland Agricultural Experiment Station and the U.S. Environmental Protection Agency.

Alan Harman

CALENDAR

♦INTERNATIONAL♦

Apimondia International Apicultural Congress will be held in Daejeon, Korea September 15-20 at the Daejeon Conven tion Center.

For more information the official website is **www.apimondia2015.com**.

♦COLORADO♦

The Colorado State Beekeepers Association will be held June 13 in Rifle/Silt.

The featured speaker is Maryann Frazier.

For more information visit **www.coloradobeekeepers.org/summermeeting2015/**.

The Colorado State Beekeepers Association will host the Western Apicultural Society conference in Boulder October 1-3.

For details visit **www.coloradobeekeepers.org/western-apicul...ty-was-meeting/**.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2015 Speaker Schedule – May 26, Wyatt Mangum subject TBD; June 30: Dinner Meeting; September 29, Sam Comfort subject TBD; October 27, Juliana Rangel Posada on the Reproductive Biology of Honey Bees; November 17, Michael Fairbrother of Moon Light Meadery on Mead.

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**.

♦GEORIGA♦

Young Harris College will be May 14-16. Scheduled teachers are Marla Spivak, Tom Webster and Elizabeth Hill.

Vendors will be on siteThere will be a Honey Show.Certification programs offered for the Georgia Master Beekeeper Program and Welsh Honey Judging.

For information visit **www.ent.uga.edu**.

♦ILLINOIS♦

The 2015 IL State Beekeepers Association Annual Summer Meeting will be held June 27 in Effingham.

For information visit **www.ilsba.com**.

♦INDIANA♦

Purdue Queen Rearing Course June 18-20. at Purdue Honey Bee Lab and Apiaries

Learn the art of queen rearing. Included are a video and queen rearing manual. Instructors are Greg Hunt and Krispin Given. $150 will be collected on site.

To register and for information contact Debbie Sieb, dlseib@yahoo.com, 317.432.4952 or visit hoosierbuzz.com.

♦KANSAS♦

Northeast Kansas Beekeepers Funday – June 6 at Douglas County Fairground, Lawrence.

Marla Spivak, Marion Ellis and Chip Taylor will be the guest speakers.

For information visit **www.nekba.org**.

♦MINNESOTA♦

Bee Symposium - Keeping Bees Healthy, May 9 at University of MN.

Marla Spivak will be the keynote speaker. Other speakers include Christine Casey, Brian Johnson, Elina Lastro Niño, Amy Toth and Neal Williams. Admission is $75/person, $15/students.

For more information go to **www.honey.ucdavis.edu/events**.

♦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**.

♦NEW YORK♦

The Long Island Beekeepers Club will host Tammy Horn, May 24 at the Frank Brush Barn, 211 E. Main Street, Smithtown from 2-4p.m.

For information visit **www.longislandbeekeepers.org** or 631.265.8249.

♦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.

May - Jim Thompson
June - Field Day
September - Phil Craft
October - Dave Duncan and Ellen Harnish

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

The Ohio State University Bee Lab Webinar will hold Jim Tew, May 20 - American Foulbrood; Joe Raczkowski, June 17 - Social Insects; Reed Johnson, July 15 - Effect of Tank-mix Pesticide Combinations on Bees.

For more information contact Denise Ellsworth, **ellsworth.2@osu.edu**.

♦OREGON♦

Oregon Honey Festival will be held October 17 at the Ashland Springs Hotel. This even showcases primarily small and medium sized beeyards.

Presenters include Marie Simmons, Susan Kegley, Lynn Royce and John Jacob.

For information contact Sharon Schmidt, **oregonhoneyfestival@outlook.com** or 541.951.5595.

♦PENNSYLVANIA♦

The Capital Area Beekeepers' Association will hold their 28th Annual Short Course May 2 and 9. The first class will be at the Dauphin County Agriculture & Natural Resources Center, 1451 Peters Mt. Road, Dauphin 17018 at 8:00 a.m. The second class start at noon at Dave Anderson's Apiary, 7081 A Colebrook Road, Palmyra 17078.

The cost is $40 which includes CABA membership.

For more information contact John Novinger, 717.365.3215 or **jdnovinger@epix.net**.

Delaware Valley College will Queen Rearing classes June 13,14 and 23, $185/person and Beginners classes July 10-12, $190/person. Both classes will be held at the Main Campus, Feldman Building, 122.

The instructor is vincent Aloyo for both classes. Bring a lunch, veil, three-ring-binder and dress appropriately for the beeyard.

For more information and to register visit **delval.edu/non-credit**.

♦VERMONT♦

Organic Beekeeping For Beginners will be held May 10-11 or May 17-18 at Metta Earth Institute Center For Contemplative Ecology, 334 Geary Road South, Lincoln. To register call 802.349.4279.

The cost is $110/person which includes *Natural Beekeeping* book. Ross Conrad will be the speaker.

Advanced Organic Beekeeping will be held May 24 at Metta Earth Institute Center For Contemplative Ecology, 334 Geary Road South, Lincoln. To register call 802.349.4279.

The cost is $50/person. Ross Conrad will be the speaker.

If you are having an annual meeting or teaching a beginning beekeeping class, we are happy to send you magazines to give to your attendees and students. BUT – we need to receive your request four weeks before your event so that we have time to process your request. Please email Amanda at Amanda@BeeCulture.com with the number of magazines needed, a complete mailing address and a contact person.

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In March I helped out in Aspen Mountain's emergency gondola evacuation drill. My job – Climb an 80-foot gondola tower with 40 pounds of gear, including the end of a 200-foot rope. Work my way past the sheave wheel assembly, using one hand to hold on, the other to mount a little two-wheeled trolley onto the gondola cable. Untangle and un-snag a morass of ropes, safety hooks, carabiners, straps, and webbing ladders, all attached to my climbing harness. Set the trolley brake and slip off the tower head until I'm hanging from and just below the trolley, with nothing but air under my toes and ravens wheeling overhead.

Re-check for tangles and snags, take a deep breath, and now, my favorite part! Gently feather the brake as the trolley slides smoothly down the cable.

Arrive at the first gondola car, unhook myself from the trolley, kick open the door, drop down into the car, lower all the passengers on the end of that 200-foot rope, climb back onto the top of the car, re-hook to the trolley, slide down to the next car. Repeat. When I finish with my span, the tower I climb down is 150 feet high.

I used to teach this stuff. But this time my throat parched up. How curious! Was this my old friend Fear coming along for the ride? A little fear? So what? I like my job. I'm lucky that way.

The other day I shipped some frozen pollen to California, overnight UPS, per customer request. It went out on Thursday, and UPS lost it in Denver. It finally arrived at its destination on Monday, no worse for the delay, I hope.

A couple of years ago, I sent a five-gallon bucket of honey to a "meditation center" in California, regular UPS. I shipped it in just the bucket, the way I always do. It never arrived, and when I contacted UPS, they blamed "defective packaging," meaning the bucket somehow failed – the five-gallon bucket with a pound of duct tape securing the lid. The contents were "destroyed," they said.

My hunch is that that bucket fell off a forklift. UPS and I had some conversations, but of course you never get to talk to the blue-collar guys who know what really happened. I eventually got a cash-value refund, plus my $70 shipping fee. I re-shipped, this time U.S. Mail, for $50. Live and learn.

I have an old friend in Alaska, with a sweet tooth. I send her five-gallon buckets – FedEx Express collect -- sometimes two at a time. I've never had a problem, and I have no idea what she pays for shipping. Maybe she doesn't care. She married well. I've sent her at least a dozen buckets. The FedEx pickup guy is so impressed that now he's a honey customer, too.

On my way back from dropping off bees for apricot pollination in Palisade, I picked up 10 buckets of my honey stored at Paul's place. There was a bunch of stuff in the back of my pickup, but no tailgate. I wedged in the honey buckets where I could, but I didn't tie them down, like you always should. I was headed to nearby Hy-Way Feed for chicken scratch, and I thought, well, I'll just drive carefully, and then I'll block those buckets in with chicken feed for the drive home.

All seemed well until after dark, when I hefted honey buckets out of the truck, up five steps and through the front door into the living room. From there I wheel them on a hand truck, through the living room and kitchen, into the sun room, where they live. In the heavy-lifting world of beekeeping, I need mechanical advantage. Thankfully we have hardwood floors.

I found only nine buckets on the truck. I was positive there were 10. The only place the 10th bucket could be was Paul's loading dock. Where else could it be?

I backtracked the seven miles to Paul's, but I never made it to the honey house. Halfway through the last straightaway, I spied an upright five-gallon bucket by the side of the road, just sitting there in the moonlight, its dented lid still intact. It didn't fall off a forklift, but it did tumble out of a pickup. It must have fallen over at the big bend, then rolled around for awhile, before tumbling out.

photo by Mike Britt

The granulated honey inside was no worse for its adventure. Some guardian angel found that bucket on the road, surely wondering how a bucket could be so weighty, maybe looking inside at the waxy residue on top of 60 pounds of granulated honey, and still wondering. But that Good Samaritan knew that bucket meant something to someone and took the time to do the right thing. How did I get so lucky?

Ed **Colby**

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