Apr 2013

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Bee Culture

The Magazine Of American Beekeeping

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Take The Survey!

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Features . . . Bee Culture . . . The Rest

Kenny Haff is a commercial beekeeper based in Mandan, ND. This Spring his bees were in an almond pollination holding yard near Chowchilla, CA when he filled out his survey. Go to ***www.Beeinformed.org*** *and get your survey, and be a part of the solution.*

800.289.7668
Executive Publisher – John Root
Associate Publisher, Senior Editor – Kim Flottum, Kim@BeeCulture.com, Ext. 3214
Assistant Editor, Design Coordinator – Kathy Summers, Kathy@BeeCulture.com, Ext. 3215
Circulation – Dawn Feagan, Dawn@BeeCulture.com, Ext. 3220
Advertising Manager – Peggy Garnes, Peggy@Beeculture.com, Ext. 3216
Publications Assistant – Amanda DeSimone, Ashaffer@RootCandles.com, Ext. 3255

Contributors
Clarence Collison • James E. Tew • Ann Harman • Kim Lehman
Phil Craft • Larry Connor • Connie Krochmal • Jessica Laurence
Toni Burnham • Jennifer Berry • Ross Conrad • Audrey Sheridan • Jeff Harris

Take BIP The Survey

The Bee Informed Partnership (BIP) is a USDA/NIFA (U.S. Department of Agriculture/National Institute of Food and Agriculture) funded project with the stated goal of reducing colony losses. The program is a collaboration of research institutions, Universities and Beekeepers in the U.S.

While some Beekeepers are experiencing near normal losses others are experiencing devastating losses. BIP and the nation's beekeepers, as a strong collective group, could find the answers to better management by gathering and sharing information on what works and what doesn't work. Two annual surveys, which are anonymous, cover both annual colony losses and management strategies. The information coming directly from beekeepers is analyzed and displayed graphically in a way that is easy to understand. Beekeepers can find out which management techniques correlate to lower colony loss from beekeepers anonymously sharing data. We can learn a lot by working and sharing together.

More data is always more accurate than less data. Last year's survey had over 5,000 participants sharing information. As the third year of these surveys approaches, the goal of the partnership is to increase participation AND make it more significant and meaningful to the beekeepers. Starting this year, beekeepers in states that have at least 300 participants will be able to access information specific to their state. Commercial beekeeper data will be separated to highlight this group's special needs and concerns.

Participating is *free*. It take's about 30 minutes or less to take the survey. In return, you will have access to the compiled data from all aspects of bee management. The information you enter into the survey is confidential and used strictly to collect data to make the information meaningful and useful to improve everyone's beekeeping success. Go to **Beeinformed.org** to see what we have gathered so far and sign up for this year's survey. The surveys will be available beginning March 29 and will stay open until April 15. For information, to sign up to participate or to fill out a survey on March 29, visit **www.beeinformed.org** or email Karen Rennich, BIP Project Manager at **usbeesurvey@gmail.com**

Should I Buy This Book?

Buy That Book? Check Out the Library First.

Your recent issue had an excellent article that asked the question: "Should I buy that book?" However, (you knew that was coming didn't you) it left out the best place to start when trying to answer that question: Your Local Library.

The library in your area may not have a large collection of books on beekeeping, honey, or plants. But the combined libraries in U.S. – both public and university – do have a massive collection of books on these subjects. The key to accessing them is the term: "Interlibrary Loan."

Simply ask your librarian to see if she can track down the book for which you are looking. Usually she can. I've read books supplied by libraries from California to Texas to Maine (I'm in Washington state).

Plus, when a library is asked for a book that they think will interest other library patrons, they may buy the book for their collection. They cannot know of every book published. For specialty subjects, they often depend on knowledgeable patrons.

Once you have read the book, you can make a determination if it is one that you would want to keep in your collection. Or perhaps it is one you would simply check out again, if needed.

Before you cry "But the authors will make less money," remember, if the book is worth keeping, you can always buy it. My now vast collection of beekeeping, honey, and plant books were first read with an eye to their "return" date. Plus, speaking as one who has product in many libraries (not on beekeeping, on but on hiking), I always say, if enough people check out my works, they will show signs of use. Then the library buys a new copy, which means another sale.

Happy reading, listening, and viewing – our libraries educate, inform, and entertain.

Karen Bean
Maple Falls, WA

Sugar Syrup

I have been a beekeeper for over 40 years. I mentor new people just entering the field.

One of my mentors, Robert Howard of eastern NE, showed me a much easier method to make sugar syrup without heating the water. Take a five-gallon pail and pour into it one gallon of water (no need to heat) – then for syrup 1:1 add eight pounds of sugar; for 2:1 put in 16 pounds. Then stir.

After about three hours, much of the sugar will have precipitated out of solution to the bottom of the pail. Stir again. After two hours, stir again. After about four stirrings all the sugar will be in solution.

Joseph L. Strecker
Bellevue, NE

July Splits

I'm seeking a low intrusion method to successfully implement July splits, both for increase, and for *Varroa* reduction.

I plan to have hives of three mediums for brood, topped with an excluder, plus some unfinished extracting supers still on them.

I look forward to our *Bee Culture* magazine each month, and would encourage "How to do it" articles, as I keep forgetting what was said prior to the last "Blue Moon" or only a few seasons ago.

Adin Ramer
Wakarusa, IN

"3 Cents" On DDT

I was not very amused with the "2 cents worth" letter in the December issue. I too was born in 1946 when DDT was in use. I remember my parents saying how great it was at killing house flies, until it didn't. That one in a million house fly, that was not effected by DDT, soon multiplied to a multitude of DDT immune flies. We see this story being repeated today, with

some of the *Varroa* mite treatments. My first year in college, 1964, my biology professor spoke in amusement about another professor who was eating a gram of DDT a day (whether he needed it or not), and he said, "What's the point?", as it was well known that DDT has a low immediate toxicity for humans. But then what are the long term effects? The web of life is so complex man can't really see all the ramifications of changing one part of the web. Sometimes it takes time to see consequences. I am no expert of DDT, but I know that DDT is a good example of not seeing the long distance effects. DDT washing off the fields and into the ditches, the creeks, the rivers, and finally entering the oceans, began to build up in the food chain, and worked its way up to eagles, pelicans, and sea birds of many types and was killing them off because of the unforeseen effect of causing birds to lay eggs with shells too thin to be viable. Who could have foreseen that?

I'm so happy that Frank is alive at 66 after ingesting DDT, as much as he could, as a kid, and after smoking 2½ packs of cigarettes for 40 years. It's good he doesn't have cancer. But what's the point? Last week a friend of mine died of lung cancer. She had quit smoking years ago, but then we both worked with incarcerated juveniles and back in the 70s and 80s they were allowed to smoke. So we were both exposed to large amounts of second hand smoke. The fact that Frank survives does not mean that he did not contribute to the death of someone else who did not even smoke. Frank can put that in his pipe and smoke it.

People are not the same. Everyone's body chemistry is different and their vulnerabilities are not equal. Some people die from a single bee sting. Only one of 10 people who drink become alcohol dependent, and only 4% of those become addicted. A few who smoke will do so without harm, but it's a fact that the more and longer you smoke the higher your risk of heart disease, or cancer. It is a fact that people who smoke, generally don't live as long as those who don't.

So Frank calls Rachel Carson a "crazy lady." Recovering alcoholics define insanity as "doing the same thing over and over, and expecting different results." Scientists are normally not in that group. Scientists are forced by their methods to change their ideas as new facts are made known. I suspect, if there are errors, that Ms. Carson would modify her book today based on what has been learned in the last 50 years. But there are the traditionalists, those afraid of change, who are afraid of new ideas, and these people reject science and as they cling to belief systems becoming more and more antiquated. They seem to be unable to learn new facts in some areas. They seem to believe what ever they want to believe and find excuses to deny new facts. In the criminal justice field we call them "thinking errors." Rush Limbaugh said, "It not been proven that nicotine is addictive; the same with cigarettes causing emphysema." Some said Rush was lying. He was not. To be able to lie, you must know the truth. If thinking errors keep new fact from getting in, then one can not know the truth. Nietzsche said, "That you lie to me, I can forgive you that. That you lie to yourself, how can I ever forgive you that?" I don't know if Ms. Carson had some things wrong or not, but her basic premise that man is part of an ecology, and if man seriously damages that ecology, his own survival could be threatened, that premise stands. Thank you Ms. Carson.

Lisa and Roger

Cotton Pollination

I have just read your article "The Contribution of Insect Pollinators to U.S. Agriculture" in the December 2012 issue of *Bee Culture*. I have found the information developed by Dr. Calderone and Roger Morse since 1989 valuable and very useful on many occasions in the past. Your periodic updates and explanation of the enormous challenges in compiling these figures is appreciated.

I do want to question your inclusion of cotton as one of the ID crops which is included in your tabulations. I've spent nearly 65 years studying honey bees (and other pollinators) in cotton. Yes, they collect nectar from the nectaries (3) in the blooms, the nectaries (3) outside and on the base of the blooms and those on the mid-veins of the leaves (under some conditions) when ants and other nectar-collecting insects haven't collected all the nectar from the leaves. Your statement (p.35) under the "cotton lint" section that "cotton lint is produced from seed that requires insect pollination" is inaccurate. Cotton is self fertile. It does not require any pollination. I've bagged squares before bloom (as well as caged plots) to exclude all insects and found absolutely no difference in seed or lint yield nor in seed production, seed quality or seed germination vigor.

I've also been involved in efforts with cotton breeders, apicultural researchers, seed companies, cotton farmers and others in efforts to develop hybrid cotton (1987-1990). We used genetically and chemically male-sterile lines for the maternal parentage. We flooded these fields (5+ colonies/acre) with honey bees since all pollination would be unintentional; a result of cotton pollen grains on the bees body. Honey bees do not collect cotton pollen. When they exit a cotton bloom they do everything they can to rid all pollen grains from their body. I don't know whether it is the size, spines on the pollen or they recognize the nutritional inadequacy of the pollen as a protein source. They never put cotton pollen grains in the pollen baskets on the hind legs.

I've checked pollen pellets collected in pollen traps on colonies in the middle of large blocks of cotton and have never found a single pollen pellet composed of cotton pollen grains.

I'm not sure where you got your information on honey bees and their activity in cotton but I can assure you that they didn't spend as many hours, days, months or years observing bees visiting cotton blooms that I have. I'll admit my observations were in upland varieties. I have limited experience with pima cotton; but I don't believe the behavior in the long staple varieties is any different.

Your economic tabulations are far too valuable to gamble that a critic could/would use the cotton data to proclaim that all of the study is suspect, then use the cotton data to question the entire study. Don't risk it!

I wrote Roger Morse in 1989 and questioned the cotton pollination claims. Never heard from him. If you have questions, just contact me.

John Thomas
Bryan, TX

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New For Beekeepers –

National Honey Board Offers Free Honey Brochures to Industry Members – NHB announced that it has produced two new educational honey brochures for 2013 entitled Honey – The Journey from Hive to Bottle and Honey – Discover the Versatility.

Honey – The Journey from Hive to Bottle is a four page, accordion style brochure that takes the reader through the journey of honey production, beginning with the humble honey bees. Topics include pollination, honey extraction, honey varietals and honey's versatility, among many others. This brochure is beautiful and makes the learning process both fun and informative.

Honey – Discover the Versatility is a six page brochure that celebrates honey's versatility both inside and outside the kitchen. In addition to highlighting honey as an all-natural ingredient, this brochure features recipes to showcase honey as an energy booster, natural cough suppressant, and beauty aid. It also informs readers about honey substitution and honey's functionality when used as a culinary ingredient.

"We are pleased to offer both of these new brochures to the honey industry," said Bruce Boynton, CEO of the National Honey Board. "The brochures are a continuation of our effort to provide materials to the industry to help promote honey. With colorful images and lots of useful information, each brochure is attractive and showcases the journey of honey, from hive to bottle, as well as its versatility."

The new complimentary brochures are available in limited quantities. To order, please contact Andrea Brening, the National Honey Board's fulfillment coordinator at 800-553-7162.

The National Honey Board is a federal research and promotion board under USDA oversight that conducts research, marketing and promotion programs to help maintain and expand markets for honey and honey products. These programs are funded by an assessment of one cent per pound on domestic and imported honey.

The Betterbee Queen Muff – Betterbee proudly introduces the all new Betterbee Queen Muff, is large enough to accommodate a deep brood fame. The Muff has a Velcro seal and allows you to place a frame of emerging brood into the muff. Inside the Betterbee Queen Muff, you can introduce a queen safely using a push-in introduction cage. Push-in cages allow dependable introduction of valuable queens. If you are not using the push-in cages, you can enjoy having a little more room for releasing attendants or marking the queen without worrying about having her fly away.

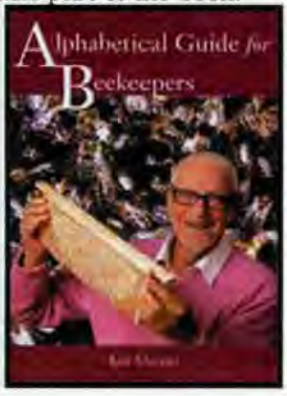
When requeening, remove the queen from the hive to be requeened one or two days prior introducing the new queen so the bees will be ready to accept the new queen. On the day you are to introduce the new queen, remove a frame of emerging brood, brush the bees off, and place the frame in the Betterbee Queen Muff. Close the cover. Release the queen from her shipping cage and place her on a portion of comb with nectar and emerging brood. Confine her without attendant bees by pushing the push-in cage into the comb. Place the frame of brood with queen in the push-in cage back into the queenless hive. Make sure to leave enough room between frames. Shortly, some young bees will emerge and become queen attendants. In three days, check the cage and release the queen. Prior to releasing the queen, acceptance of the queen can be gauged by how tenaciously bees cling to the push-in cage. If bees are easily brushed from the cage, all is well and the queen can be released by removing the push-in cage. If bees cling to the screen and it is difficult to brush them off, all is not well. The hive should be carefully checked for another queen.

The queen muff also works well for removing attendants from queen cages before introduction. It is also suitable as a secure place to mark queens. The cost is just $29.95 or about the cost of one good queen.

Alphabetical Guide for Beekeepers, Ken Stevens. Paperback, 948 pages. Published by Northern Bee Books, 2013, ISBN 9781908904218. 245 x 170 x 50 mm £32.50pp from NBB

The contents of this book are set out so that the inquirer could find information quickly; first a list of subjects followed by an index for each subject with an entry in the latter giving the page number of the topic required. Why did I choose this encyclopaedic book over others, like for instance Root's 'ABC - XYZ of Beekeeping'? The answer is easy, for I found that Ken's book covered most of the subjects I was searching for, plus beekeeping matters related to the UK which weren't found in other publications.

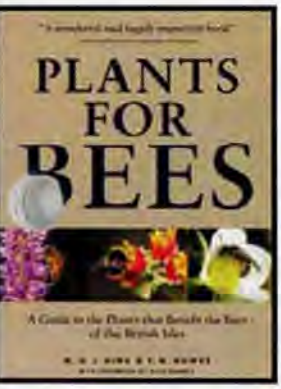
This year has seen the publication of a revised version of the Guide, produced commercially, but in paperback rather than the original hard cover. At first glance, I saw that Ken's delightful sketches present in the first edition are absent. Whilst these were small, they were useful for further clarification of the text. The layout is similar, with the contents and subject indices, but sadly they do not give the page number required in the main part of the book.



I opened the book like someone might randomly open the Bible to find a suitable text for the day and came across 'cleptolecty', which I hadn't come across before, with the entry 'the habit displayed by some honeybees of stealing pollen from the bodies of some solitary bees'. Directly above there was the recipe for Cleopatra's facial balm, and in the same pages 'climacterial number.' The latter was another mystery to me and I am still not sure that I understand it having read the entry 'a critical number or period when great change is supposed to occur - CHAMBERS 1906. 9 x 7 beehives in a bee garden BUTLER Gk. klimakter -ladder'.

Next I looked for terms or names of people I would expect to find and mostly I wasn't disappointed. How-

Continued on Page 13



Plants For Bees. A Guide to the Plants that Benefit the Bees of the British Isles, W.D.J. Kirk & F.N. Howes. Hardback, 312 pages. Illustrated throughout with colour plates. Published by IBRA, 2012, ISBN 9780860982715, 260 x 20 x 25 mm, £27.50pp from NBB

F.N Howes' 'Plants and beekeeping' has been the authoritative work on bee forage in the UK ever since it was first published in 1945. The original edition had 32 pages of plates and in subsequent reprints these were omitted. Now, thanks to the great efforts of W Kirk, we not only have a thoroughly revised book, but one that is fully illustrated with the most striking photographs of flowers bees love to visit, many of them featuring foraging honeybees or wild species. Whilst the larger part of the book deals with the best plants for bees, in alphabetical order by their common names, other chapters relevant to the subject of forage include: Why bees need help, by Norman Carreck; Plants for honeybees, by David Aston and Sally Bucknall; Plants for bumblebees, by Jane Stout; Plants for solitary bees, by Christopher O'Toole – all of whom are experts in the fields they have chosen to write about.

The 'Best plants for bees' gives, where appropriate, under each entry a list of species and varieties available and their origin, revealing that many of the plants are not indigenous to Great Britain. Each plant has alongside its main text a table showing its family name, flowering time, cultivation (i.e. habit), honey producing (ie enough for a flow or not), importance to honey bees, short-tongued or long-tongued bumblebees and solitary bees. The value of the flowers to the different types of bee is also presented as a table at the end of the chapter as a quick reference guide.

This is a valuable book packed full of information and beautifully put together. It includes something I always find useful in a book and which gives me a feeling that a lot of care went into its production, I mean of course the simple but excellent addition of a page marker.

The book's scope transcends the world of beekeeping and should be in the offices of all those people whose jobs involve the management of public gardens and parks. Given the ever-decreasing variety and amount of forage for bees this is a timely guide for those who want to involve themselves in creating a better habitat for pollinating insects as well as beautiful gardens rich in colour and perfume. – *John Phipps*

HOMEGROWN HONEY BEES. Beekeeping Your First Year, from Hiving to Honey Harvest. By Aletha Morrison. Published by Storey Publishing. ISBN 978-1-60342-994-8. 7" x 9", 159 pages, color throughout, $14.95.

This is definitely a book for beginning beekeepers. It has lots and lots of photos, but unfortunately, too many of them are simply eye candy, and far too few show pertinent information or demonstrate a technique or situation. There are good technique photos here, but there could have been so many more with the space allotted to art.

Like other Storey books, it has short interviews with real life beekeepers in various settings which are entertaining, but not very helpful for someone trying to figure out how to find a queen, is there more than one queen, and what if the queen cage in my package doesn't have that disk, and doesn't have anything to hang the cage with? Then what?

Since it's for first year folks, the info on diseases and pests in minimal, and that's too bad I think, but most beginner books are problem lite because there aren't many problems the first year. It doesn't deal with a dead colony next spring, other than one of the comments...sometimes it's not your fault they died.

But the price is right, the information for the most part accurate, if sketchy sometimes, and, as Randy Oliver said on the back of the book, not too little, not too much, charmingly presented. – *Kim Flottum*

Producing Royal Jelly. A Guide for the Commercial and Hobbyist Beekeeper, R.F. van Toor. Paperback, 101 pages. Illustrated B&W plates and line drawings. Published by Northern Bee Books, 2013, ISBN 9781908904263. 245 x 170 x 5 mm £15.00pp from NBB

Van Toor's book starts by disclosing why bees need royal jelly, how it is produced, what its constituents are, and how it is fed to larvae of different ages and castes – the latter being more detailed than you can often find in general beekeeping books. Its therapeutic uses for animals and humans are discussed with examples of some well known effective benefits and others which are of a more speculative nature.

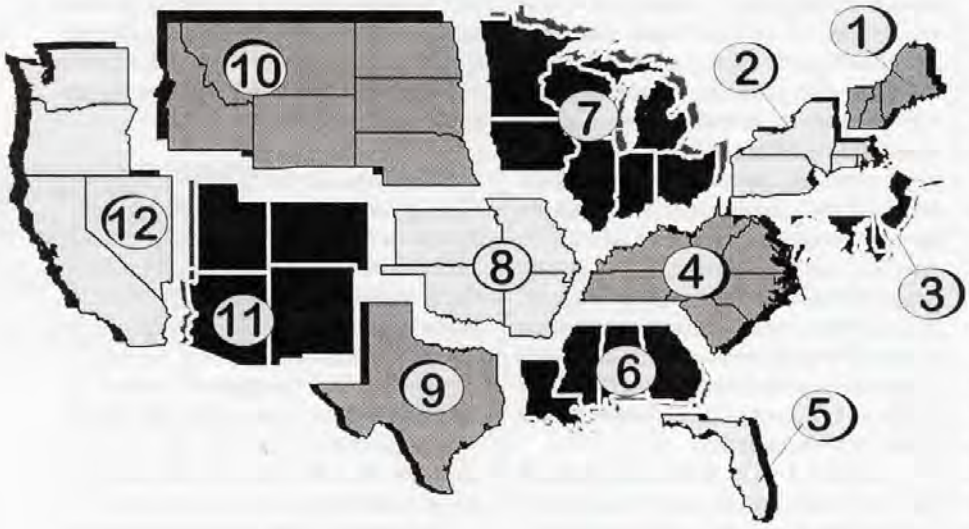
The main part of the book gives a detailed step by step account of how royal jelly can be produced in the apiary with a detailed analysis of how hives should be managed, what equipment is needed for production, harvesting, storage and marketing, and recommendations of timetables/programmes a beekeeper would need to follow.

What is evident from reading the book is that the beekeeper has to be very well organized and have the necessary support colonies and nuclei if success is to be achieved. He stresses that close attention has to be paid to hygiene at all stages of of production, too, as royal jelly is a product which could so easily be spoilt. Possible yields per man hours are discussed and he shows that given enough units of bees, a beekeeper could spend a full twelve weeks of his time in a season working on this product alone, giving a good return on his labor.

Line drawings help illustrate the apiary setup, hive arrangement and the queen cell frame, and photographs show various stages in the development of queen cells and the selection of cells from which royal jelly is to be harvested. A diagram also shows an example of a suction pump for removing the jelly from cells.

One thing I found difficult was in comfortably reading the lines of text, which seem to be more than double spaced, making it not very restful to the eyes.

APRIL – REGIONAL HONEY PRICE REPORT



We surveyed our reporters this month on first look at winter losses. Our reporters represent a fairly good cross section of American beekeepers…5% are commercial, with 1000 colonies or more, 28% are loosely considered sideliners with between 100 and 1000 colonies, and the remaining 67% are backyarders, with 10 or fewer colonies.

The graph below summarizes the data we collected. A word of explanation on the numbers. Look at the first two boxes on the commercial line. The L, M, and H, denote low, medium or high losses, according to the beekeepers. For the commercial beekeepers then, there were 0% who felt they had low losses, 25% felt their winter losses were moderate, while 75% felt their losses were high. Directly to the right of that box, there is another, directly under the Pesticide heading. The question asked if any colonies were lost to pesticides. The % indicates that 25% of the commercial beekeepers lost colonies to pesticides, and just below that, the average number of their colonies that were lost this time 50%. So 25% of commercial beekeepers lost, on average, 50% of their colonies to pesticides. The rest of the boxes can be read the same way.

	Losses	Pesticides		Nosema		Disappeared		Starved		Varroa		Diseases		Pests		Queenless		???	
Commercial	L 0% M 25% H 75%	% Loss	25 50%	% Loss	0 0	% Loss	25 30%	% Loss	85 24%	% Loss	100 48%	% Loss	0 0%	% Loss	0 0%	% Loss	50 20%	% Loss	25 20%
Sideline	L 41% M 32% H 27%	% Loss	23 30%	% Loss	23 29%	% Loss	14 17%	% Loss	50 37%	% Loss	59 37%	% Loss	32 23%	% Loss	18 24%	% Loss	55 34%	% Loss	55 39%
Backyard	L 50% M 30% H 20%	% Loss	6 45%	% Loss	7 67%	% Loss	15 39%	% Loss	35 59%	% Loss	39 48%	% Loss	7 1%	% Loss	19 49%	% Loss	22 35%	% Loss	22 44%

REPORTING REGIONS													SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS													Range	Avg.		
55 Gal. Drum, Light	2.01	2.10	2.01	1.63	1.95	1.88	2.14	2.00	1.80	2.00	1.94	2.13	1.56-2.55	1.97	1.95	1.74
55 Gal. Drum, Ambr	1.92	2.03	1.92	1.60	1.90	1.70	2.06	2.00	1.60	1.90	1.73	1.98	1.54-2.45	1.84	1.86	1.78
60# Light (retail)	187.00	182.00	155.00	148.00	160.00	172.50	169.25	155.00	100.00	102.00	167.50	185.40	100.00-240.00	167.66	160.97	152.95
60# Amber (retail)	155.75	170.00	155.00	158.75	160.00	180.00	166.67	155.00	125.00	156.89	155.00	186.25	78.75 -225.00	161.90	162.75	154.89
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	82.23	82.82	37.10	68.50	69.30	60.00	57.44	69.30	69.30	49.20	75.84	92.00	26.20-115.00	68.01	66.50	64.99
1# 24/case	113.18	111.14	110.40	88.00	90.00	107.68	91.12	93.20	72.00	100.80	103.60	119.80	72.00-158.40	103.64	101.34	86.94
2# 12/case	107.96	86.01	103.00	80.00	84.00	87.36	83.73	96.00	73.50	91.92	144.00	100.70	63.00-144.00	94.06	88.41	79.25
12.oz. Plas. 24/cs	104.14	87.22	50.75	78.50	72.00	76.00	65.91	80.40	66.00	70.08	87.60	82.48	34.80-126.00	79.11	79.70	75.60
5# 6/case	116.40	104.49	100.50	87.00	105.00	104.42	96.88	95.55	72.00	95.40	140.00	111.50	72.00-140.00	102.84	99.81	92.46
Quarts 12/case	135.00	172.44	153.00	112.75	102.00	101.77	130.20	107.20	130.10	117.36	114.20	138.50	60.00-216.00	122.20	120.95	111.49
Pints 12/case	96.10	84.98	96.90	79.75	78.00	61.33	80.42	61.20	52.00	81.45	73.20	80.00	48.00-125.00	76.40	75.87	84.67
RETAIL SHELF PRICES																
1/2#	4.63	4.63	2.77	3.50	4.03	3.50	3.34	2.59	4.03	2.61	3.83	5.00	1.96-6.75	3.70	3.75	3.62
12 oz. Plastic	5.45	5.35	3.80	4.07	4.95	4.38	4.08	4.41	4.99	4.24	4.96	5.10	2.99-7.75	4.65	4.54	4.45
1# Glass/Plastic	6.34	6.12	5.92	5.13	6.95	6.27	5.03	6.20	5.99	5.64	5.52	7.56	3.00-9.99	5.86	5.77	5.66
2# Glass/Plastic	11.22	9.96	11.45	9.01	10.00	9.54	9.16	10.67	8.00	8.64	7.57	12.25	5.55-15.75	9.93	9.84	9.33
Pint	10.00	8.24	8.40	7.08	8.00	7.03	8.83	6.86	5.00	8.75	7.07	10.06	4.00-13.50	7.89	8.11	7.88
Quart	14.33	13.99	13.28	10.92	12.00	11.21	12.87	14.58	13.22	15.50	11.77	17.33	5.00-22.00	12.93	12.72	12.78
5# Glass/Plastic	25.75	21.28	21.35	19.75	21.85	21.85	20.39	24.00	21.00	18.56	18.03	25.00	10.00-35.00	21.20	20.90	21.47
1# Cream	8.33	7.44	7.56	6.35	7.10	7.10	5.99	5.39	7.10	6.76	8.13	8.25	3.99-10.00	7.20	7.18	6.86
1# Cut Comb	8.89	8.32	8.60	6.00	9.08	5.50	7.11	16.00	9.08	9.50	9.25	13.77	3.00-16.00	8.67	8.40	9.19
Ross Round	9.10	5.98	8.19	6.13	7.22	7.22	6.32	9.50	7.22	7.22	9.25	7.20	3.00-10.50	7.69	7.63	7.64
Wholesale Wax (Lt)	5.83	5.15	4.38	4.51	3.20	5.18	5.30	5.33	5.00	8.00	3.85	4.00	2.50-8.00	5.01	4.95	4.31
Wholesale Wax (Dk)	4.90	4.65	4.38	4.21	3.00	4.68	4.34	5.75	4.65	4.65	2.53	4.00	2.00-8.00	4.29	4.20	3.75
Pollination Fee/Col.	86.67	108.00	78.33	61.20	60.00	45.00	58.83	80.00	90.39	60.00	80.00	119.00	35.00-165.00	80.78	77.96	72.79

MAILBOX ... Cont. From Page 9

Don't Get Complacent

One thing a beekeeper learns is to never be too complacent. This Autumn, as I surveyed my little seven hive apiary I had a rather subdued satisfaction. All colonies had full food chambers above the clusters and there were no signs of mites. They appeared to be in the best condition since before 1995 when the first Varroa mites were detected here. Still, I routinely checked the inserts below the screened bottom boards for mites this past November. When I saw too many pinhead size red bodies glint in the sun, it was more with chagrin than surprise. For I had treated, according to directions, in late Summer with a thymol product and even followed with a couple of drenches. Now, what could I do to head off early brood infestation beginning sometime in January?

I needed a few days of bee activity when it warmed into the 50s, at least. The report was favorable for the end of November into early December. In the interim, I checked the inserts for the heaviest debris streaks to help with cluster location. Then, I bided my time when it warmed to 49° on November 29. I inserted Hopguard strips in the food chambers above the clusters. At 78 years of age I'm in no condition to set off full medium depth honey chambers. I could have removed several frames of honey from the supers, but that was time consuming and also messy for clustered bees. So, forget sticking or draping the Hopguard strips into the cluster in most of the hives. Hopguard gives a quick, efficient kill which is ideal for broodless bees. Also, it is well tolerated by the bees. I wouldn't advise getting it on the queen, but that's another story.

Fortunately, as I write this December 3, the weather did warm to about 60°. Several of the inserts had at least 200 to 300 dead mites, maybe a few more. I hope this will sufficiently knock the mite levels below the threshold. The only hive with a low kill of two to three dozen mites was the pure New World Carniolan. And since it had a deep super of honey above the cluster I did have to remove briefly, four frames of honey to do things properly and actually drape the strips into the cluster. The bees tolerated the disturbance alright. All in all, I think the imperfect Hopguard application was well worth while.

Roland Walls
Beckley, WV

Tarpaper Debate

I noticed Ed Colby, February 2013, suggested tarpaper for entrance reducing. I disagree. I have animals chew up my tarpaper (see photo).

Marlene Czarkowski

NEW ... Cont. From Page 11

ever, some things relating to beekeeping were missing, including 'neonicotinoids', 'Asian hornet', 'Cecropian bees', 'Small hive beetle' and 'Horsely board'. I was disappointed, too, when searching for 'Bayvarol', 'Apiguard' - or in fact anything relating to *Varroa* control but I found the explanation for this when I checked out 'Varroasis treatment' which states 'Because of the the plethora of different treatments in the year 2010, none of which are put forward as cures and which call for several different chemicals which one person or another claim are effective – no particular treatment is put forward at this time.' Well, I think the names of many of the commonly used treatments do need listing, together with their active ingredients; the publisher does ask readers to submit any corrections or possible additions to the book, so perhaps these could be included in future editions.

Ken gives plenty of information on well over the majority of the topics, with many entries being over half a column long. It is a fascinating book to browse through, and the reader, like me, will be pleased to find many interesting and illuminating entries. For those who never managed to get hold of the first edition, I am sure it will be useful source of information to have nearby.

Ken, now 95, has been able to draw on his many years of experience in beekeeping to produce this enormous work. He served both as County Beekeeping Lecturer at Hadlow and Bicton and as a long time contributor to the British Bee Journal. Still active, and producing honey from his Langstroth hives, we hope he has many more healthy years in before of him. – *John Phipps*

Ferris Apiaries

One failure Greg Ferris found with woodenware over the years is the bottom bars pulling loose from the frame end bars. If proper bee space is maintained between frames, they won't build burr comb between the top bar of one frame and the bottom bar of the frame above. Unfortunately no one has ever explained this to the bees!

Frames undergo a considerable amount of stress every time they are pried out of the hive for harvest or inspection, so he redesigned the bottom bar to end bar joint. This new joint requires the bottom bar to be inserted into the side of the end bar prior to being stapled. It can't be pulled straight down without breaking off the two wood tabs. To make this frame even tougher it's made of a strong lightweight hardwood, poplar, the same tree Maryland honey is so famous for.

The Gorilla Frame was born! This joint turned out to be far stronger than expected. The bottom bar can support 100 pounds of lead ingots! The bar bows but the joints hold the force. For pricing and information visit **www.ferrisapiaries.com**.

INNER COVER

A month ago on these pages, and a couple of weeks ago in an Editorial on the Buzz I talked about the trainwreck waiting to happen in the California almonds this year. Not enough bees to pollinate those ever expanding orchards, and many of the bees there too weak to do a good job - bees still stressed since the last time they were there by the drought at home, so's there's not been nearly enough good food almost anywhere all year; *Varroa* still unchallenged by beekeepers or bee scientists and all the while spreading viruses to every bee in every colony everywhere they go. Meanwhile, nosema up the ying yang and the Coup de grâce – just a touch of poison from everywhere and anywhere crops are grown – systemic insecticides and fungicides, herbicides – all extreme biocides each with its own special carrier, adjuvant, spreader or sticker – every one of them bringing their own secret synergistic partner in crime, the stuff that makes bad poison worse.

But those first mentioned challenges – food, *Varroa*, virus, nosema – bees can actually handle them – it's tough, but so are bees. Really. They don't thrive when they're under attack and, yes, sometimes they die, though mostly they deal with them. But the game changer is when they add that last drop of poison, that last straw, that final curtain. And everywhere honey bees go there's that good to the last drop waiting for them.

Corn, for instance. Over 100 million acres of it this year. The high prices paid for biofuels have refueled an expansion unparalleled in U.S. farm history. And every one of those acres is saturated with systemic pesticides. Two, three, four, five, six, seven years running. The buildup in the soil continues unabated. More and more and more. One year's worth, no problem. Two, some's still left from last year, but not so much. But after five, six, seven years...there's almost more poison than soil left in those fields. And every year more is added. More and more and more.

The research says, rightly so, that it's not the poison that's the problem. Not when the bees are given only one dose at a time from a first year field when there's no other problems going on, like *Varroa*, Nosema or virus. Then, after a single dose they're measured for reactions to the pesticide they encountered for only a few days or a few weeks – nothing long term, nothing of substance, actually. Kind of like that canola study. And the second one. But you can't argue with the refereed journal facts. When you take out the *Varroa*, nutrition, nosema and virus variables, the poison isn't an issue. A little bit of poison all by itself just isn't an issue. Those science folks have it exactly right. It's just a little bit of poison. And that's the problem.

Here's the real world story. When you compress beekeepers from all over the U.S. into the tiny world of the central valley of California for a few weeks, they get to talking. Not that they don't otherwise, phonewise, but when they're there it's face to face over breakfast, lunch, or a beer after dark. And they're from all over. From the east, where these not-so-new poisons have been used for more than a decade. From the Midwest, where they've not been around for not quite so long but there is oh so much more of them. And now heading west – there's no place to hide and no bees can escape the onslaught. The poison is everywhere corn is, and corn is everywhere. And you know, it's not just the corn because a whole grocery basket worth of crops are involved.

And when beekeepers get to talking it always comes back to where to go and the conversation always, always comes down to ag bees compared to woods bees. Ag bees seem to crash and burn on a regular basis. All the variables are there – *Varroa*, virus, nosema, bad food . . . and poison. And like I said, it's that last one that's the kicker – it's like jumping off a 20 story building – it ain't the fall that kills you, it's the very sudden stop right at the end. That poison, years and years of poison buildup, that's the very sudden stop that kills bees on a regular basis every year it seems. And it's not just us. The research people have seen this again and again and again. Just ask them. I heard a Penn State report this weekend that said exactly that. Add a pesticide to this industrial waste mix our bees have to deal with – maybe a systemic insecticide or a fungicide and things go south – fast. Spores build up, viruses skyrocket, bees die. Trainwreck.

Woods bees, however, seem to avoid that sudden stop – that dose of poison that tips the scales. They have *Varroa*, virus, all the rest, except they don't get that dose of poison. And for the most part, they don't crash and burn. But even then sometimes they do, spectacularly. The virus and nosema especially, couples with not enough food, and sometimes that combo wins no matter where they are. Sometimes. If your bees crashed and they aren't in Poison County, maybe this is the demon you have to deal with.

But one instance in California told to me by a beekeeper there this year sort of demonstrates the real world when poison is involved. The bees checked in from Dakota–used-to-be-clover-but-now corn country – got evaluated at seven to eight framers no problem. Lookin' good. Less than a week later the beekeeper's looking for those good colonies to show off – and they had only three or four frames, and a bunch were already empty – dead. Gone. What happened? I saw the same thing last year wandering the orchards so it's not a rare occurrence. It happens a lot, and a lot more this year. What happened? Trainwreck.

And the story gets told over and over and over. Ag bees mostly crash, woods bees mostly don't. But folks,

Ain't No Safe Place To Go

anymore it seems there ain't no safe place to go at all. We're running out of places and we're running out of bees. I'm listening to a late Saturday night geezer music festival on PBS finishing this up and a tune catches my attention . . .

And you tell me
Over and over and over again, my friend
Ah, you don't believe
We're on the eve
Of destruction.

By Barry McGuire

Really?

•

On a sort of related note . . .

Have you noticed the attention honey bee health has been getting of late? It's been gratifying to see. Lots of folks are concerned about our charges all of a sudden. Well, in the last couple of years anyway. I'm not talking about people taking up beekeeping – that's been going on longer. No, it's the folks who are worried about actual honey bee health that I find interesting. Häagen Dazs and others came in early and are still in the game, certainly. Two others in particular have surfaced. Monsanto, who suddenly found out there were honey bees out there, and maybe they have something that can be used, and Bayer, who hasn't been killing them left and right, day and night for some time now.

Have you seen Bayer's traveling road show yet? Or seen the plans for their Honey Bee Health center opening soon in North Carolina? Or have you read about Monsanto's generous donation to Project Apis m's forage planting program, providing food for almond's bees in California? I'm sure there's more these agricultural giants have done for bees and beekeeping. I know they do a whole lot of good stuff for the rest of the world – giving money to worthy causes and making generous donations to all kinds of folks for all kinds of projects. Don't get me wrong. I'm not finding fault with either of these behemoths, at least when it comes to good money given to good programs.

But we all know that these are the companies everybody loves to hate. Monsanto has this thing with seeds and food, and Bayer has a thing with poisons. And they both have more money than God.

So, how hard is it to take money for a good cause – bees and beekeeping and beekeepers – from companies who haven't paid attention to any of the above, ever, for any reason at all until now?

But recently it seems there must be good reasons, though by any metric the money spent so far is pocket change to these guys. But they have very deep pockets.

So I'll ask again, is it OK to take money from these, and in all probability others who have not had our best interests at heart in the past. Good money from, maybe, not so good companies?

The British Beekeepers Association was in a situation for several years where they received financial support from a pesticide company because they simply agreed with the label on the bottle, ". . . when used according to label instructions these chemicals are safe for bees." They paid a heavy price for that money from beekeepers that wouldn't support the organization and refused to benefit from those pieces of silver.

I understand that they have, or will shortly quit that position, and with that stance end the chemical welfare they were on. But they did good things for beekeepers with that money. Good money from, maybe, not so good companies?

Is 'money' bad? Or, because it comes from someone perceived to be bad, the money is bad?

Should you say, "no don't ask, don't offer, don't even think of giving us money? You can't buy your way out of this." Or, do you take the easy way out ". . . you caused it, you fix it. Of course you give us money. In fact, you should give us a lot of money, you should change your ways and you should offer a (financial) mea culpa to us all for being greedy, short sighted and downright evil."

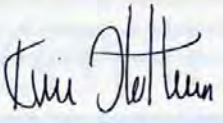
Well, that they are evil isn't a given, at least when it comes to bees. Not yet anyway, though there's plenty of evidence pointing in that direction. But the sudden influx of cash and attention gives pause, doesn't it? It was only a couple of years ago that they fought us at every turn, out lawyered us at almost every trial, and simply outweighed everybody that got in their way. Curious, no?

Well, I have a thought. You knew this was going somewhere, right? Since these giants didn't cause any of the problems they are now trying to fix, which is a good thing, if they really want to help advance the business and science of keeping honey bees, why don't they also fund research that doesn't have anything to do with any of the things they are trying to fix? Not the same amount of money simply spread further, but more money.

Things like drone congregation areas. Or better wintering equipment. Or better honey ID science to snoop out those Chinese crooks they finally caught. And what about just setting up some graduate programs, so Universities could study whatever they wanted to do with bees or beekeeping? Wouldn't The Bayer Chair On Honey Bee Genetics look good on your annual report? What about supporting both of the national meetings, so they don't cost so much to attend so Joe Beekeeper can learn the latest in disease control, management techniques, and marketing. In fact, why aren't they supporting far more than just the nationals?

But of course you immediately reply, you cynic, what's the price of that support? Speakers on the program, full page ads, an open bar at the banquet? Nope. Nothing. No mention. Just a check.

So if any of you companies out there are feeling a little bit guilty, what about helping out where you're not causing a problem. That'd go a long way in convincing me you have our best interests at heart. Not just yours.



It's Summers Time –

The Parking Lot Was Full

We pulled in just before 9:00 a.m. on a very cold, somewhat snowy Saturday. The parking lot was full – cars, trucks, big white trailers, Amish buggies and horses. I watched an Amish man unhooking his horse and tieing him up. I felt a brief moment of sympathy for the horse who would be standing outside all day in the cold. Then we headed inside to get registered.

This was the 35th Tri-County Beekeepers Meeting in Wooster, Ohio. It is most likely the biggest one-day beekeeping event in the U.S. and it's always held the first Saturday in March. There were close to 900 beekeepers + 100 or so vendors and volunteers. This happens every year. No matter what the weather is like – and some years have been an all out blizzard – and still 600 or more people showed up. Why? What makes this meeting so successful?

I think there are several reasons. It's really the first big meeting in the Spring and folks are a little stir crazy up here in the north. It's a chance to talk about bees, learn about bees and buy bee stuff – equipment, packages, books, candy, soap, lotion, earrings – if it looks like a bee or smells like a bee, it's for sale at the Tri-County meeting.

It's a great meeting for beginners just coming out of their local beginning classes. They offer a whole day of beginning sessions.

They also offer an all-day kid's program, so you can bring them along. It's hard to tell sometimes who has the most fun – the kids or the grownups.

There is a lot to be said, too, for having the meeting in the same place every year. I know what to expect. I know the format. I know where the coffee and the amazing Amish baked (huge) cinnamon rolls are. I know when to get in the lunch line in order to be able to find a seat and I know where the lunch line is. For the most part things are comfortable.

All of the big vendors are at this meeting and lots of local Ohio companies. The vendor area is definitely the busiest area all day long – well except for lunch time. Even the vendors are, for the most part, in the same spot each year, so you know right where to go to get that special deal from that special vendor.

And I know I'll see many folks that I only see at this meeting once a year. After this many years of attending – I've probably missed two or three in the last 15 years – some folks are missing each year. And the rest of us are looking a little older each time. There is an Amish man that Kim sees every year and he was just a boy when Kim started attending this meeting in 1986. That "young" Amish man still comes every year but now he brings his children who are almost grown.

It's startling how fast the time goes by. I hope you're taking advantage of each day and not wasting a moment!

So that's how we spent Saturday. We're about 45 minutes away, so by the time we got home it was supper time and we were tired.

Sunday actually brought a day of sunshine – still only in the 20s, but the sun makes a huge difference. It made the task of doing some cleaning in the chicken coop a little less daunting. And while I was giving them clean straw in the laying boxes, mixing up the straw on the floor and just chatting and enjoying their company – Kim took time to go out and take at least a peak at our beehives.

The top bar hive and the Omlet hive from England are both dead. It looks like at least six of the other seven though are surviving. And the one on the front porch seems to be OK. We're supposed to be in the 40s this weekend so we're hoping to get some fondant on them.

We still have a good chunk of Winter to come here in Ohio, while they're already getting swarm calls in Georgia and other places.

I talked to my sister in northern California over the weekend (early March) and she was getting ready to plant her raised bed gardens. She asked if we had planted ours yet – silly girl! I've got those seed catalogs though and I'm getting ready for Spring.

Congratulations to our Senior Editor and fearless leader, Kim Flottum. March 3 he celebrated 27 years at *Bee Culture* Magazine. Here's to many more. I think he's still having a good time.

Hardy Summers

A Closer LOOK

JUVENILE HORMONE

Clarence **Collison**
Audrey **Sheridan**

It affects growth, development, caste differentiation and aggressiveness.

Juvenile hormone (JH) regulates metamorphosis, reproduction and behavioral development in honey bees (Sullivan et al. 2000). JH is synthesized by the corpora allata (CA) glands; two globular organs found on the sides of the esophagus of both larvae and adults. The corpora allata are connected by nerves to two other endocrine organs, the corpora cardica and the neurosecretory cells of the brain (Snodgrass 1956; Breed 1983). The brain regulates CA activity via neural and neuroendocrine signals. The JH titer in the blood is correlated with the rate of JH synthesis by the CA *in vitro*, which suggests that the amount of circulating JH is determined primarily by the rate of synthesis (Rachinsky and Hartfelder 1990; Huang et al. 1991).

Juvenile hormone in concert with ecdysone (molting hormone) controls growth and development in the larvae and pupae. Developing bees undergo six molts during which the outer skeleton is shed; five of these take place during the larval stage and the last occurs when the bee emerges as an adult. The first four larval molts occur approximately once a day for workers and queens and allow the larva to grow rapidly by shedding the exoskeleton when it has become too small (Winston 1987). Whether the larva molts to a larger larva or proceeds to the pupal stage depends on the balance between ecdysone and juvenile hormone. In larvae, changes in JH levels induce molts between larval to pupal and pupal to adult stages. The titer of juvenile hormone (JH) is higher during the early instars (developmental stage between each molt) and lower during the late instars. Prior to the molt to pupae, JH production ceases so its level in the hemolymph goes down and the next molt produces the adult from the pupa. Juvenile hormone production returns in the adult where it serves additional functions.

The titers of JH III were studied in the larval and pupal stages of the two female honey bee castes, the queen and the worker (Rembold 1987). Whereas the early larval stages, L3 and L4, had to be pooled, all the last instar larvae, pupae, and newly hatched adults, were titered individually. The queen stages produce two-fold higher JH III titers in comparison with the worker stages. Both have relatively high titers during the early larval instars, decreasing from an average of 450 pmol/g at L3 to about 20 pmol/g in the queen and 75 pmol/g at L3 to 5 pmol/g at L5 in the worker. Both castes build up another JH III peak at the end of their spinning phase when entering the pharate pupa stage, with about 200 pmol/g in the queen and 60 pmol/g in the worker.

Juvenile hormone (JH) is also involved in female caste differentiation.

"Developing bees undergo six molts during which the outer skeleton is shed; five of these take place during the larval stage and the last occurs when the bee emerges as an adult."

Honey bee larvae show a predictable pattern of JH signaling; levels increase in queen larvae during the third to fifth instars, reaching a peak at early stages of the fifth instar, when they are 15 times higher than in worker larvae. Experiments have revealed that consumption of a diet rich in royal jelly increases larval JH titer (Rembold 1987; Rachinsky et al. 1990; Rachinsky and Hartfelder 1990) and that application of synthetic JH to larvae reared on a restricted diet is sufficient to cause the development of queen-like traits (Rembold et al. 1974; Goewie 1977; Dietz et al. 1979).

In adult workers JH is involved in regulation of age-dependent polyethism (division of labor) and glandular development (Winston 1987). Division of labor is based on a pattern of behavioral development by adult worker bees in which they perform different tasks as they age. Bees work

in the hive at tasks such as caring for brood (nursing) for the first two to three weeks of adult life and then forage for nectar and pollen outside the hive for one to two weeks until they die. The JH titer increases dramatically during honey bee behavioral development; it is low in nurse bees and high in foragers during the late Spring and Summer, the bee's active season. Foraging occurs sporadically during short periods of warmth in the Winter and early Spring in temperate climates. Winter foragers have low JH titers suggesting that high JH titers are not required for foraging (Huang and Robinson 1995). However, treatment of one-day-old bees with JH or the JH analog methoprene results in accelerated behavioral development and precocious foraging (Robinson 1985, 1987; Robinson et al. 1989: Sasagawa et al. 1989).

Sullivan et al. (2000) studied behavioral development in the absence of JH by surgically removing its glandular source, the corpora allata (allatectomy) from one-day-old adult bees. To control for effects of genetic variation on the pace of behavioral development, bees in all treatment groups (focal bees) in each colony were daughters of a queen instrumentally inseminated with the semen of a single drone. Bees were allatectomized within two hours after emerging from their cells. A horizontal incision was made with a micro-scalpel in the back of the head and each corpus allatum was grasped and removed with forceps. The incision sealed as the cuticle resumed its original shape. Sham-allatectomized (sham) bees were treated identically but the corpus allata were moved gently and not removed. Bees in the untreated group were anesthetized, but otherwise unmanipulated. Immediately after a bee was treated, it was placed in a small holding cage with others of its treatment group and held in the incubator. To assess if the CA released JH during allatectomy, blood was sampled from the incision before and after surgery.

The age at onset of foraging for allatectomized bees in typical colonies was significantly older compared with that of sham-operated bees in three out of four colonies; this delay was eliminated by hormone replacement in three out of three colonies (Sullivan et al. 2000). To determine the effects of corpora allata removal

"Juvenile hormone is also involved in female caste differentiation."

on sensitivity to changes in conditions that influence the rate of behavioral development, they used "single-cohort" colonies (composed of only young bees) in which some colony members initiate foraging precociously. The age at onset of foraging for allatectomized bees was significantly older compared with that of sham-operated bees in two out of three colonies, and again this delay was eliminated by hormone replacement. Allatectomized bees initiated foraging at significantly younger ages in single-cohort colonies than in typical colonies. These results demonstrated that JH influences the pace of behavioral development in honey bees, but is not essential for either foraging or altering behavioral development in response to changes in conditions.

Lin et al. (2004) investigated whether JH titers change significantly under stresses commonly experienced by workers in experimental manipulations. In this study they determined the effect of caging and cold-anaesthesia on JH titers in both nurses and foragers. The JH titers of nurses and foragers kept in cages at room temperature, or anaesthetized on ice, for up to 24 hours were determined at various time intervals. Nurses displayed a significant and sustained increase in JH titers by one to two hours in two out of three colonies, regardless whether being cold-anaesthetized or caged. Nurses in four out of four colonies showed remarkable JH titer elevations 24 hours after being caged. The increase ranged from three to 142 fold compared to their initial baseline JH titers. In foragers, changes in JH titers depended on their initial JH titers: foragers with low JH titers increased while those with high JH titers decreased. These results suggest that nurses and foragers respond to stress differently. The fact that JH did not always increase under stress conditions suggests that JH apparently does not function as a "stress-hormone" in honey bees under the conditions that were studied.

Giray and Robinson (1996) investigated if behavioral development in drones is regulated by hormonal mechanisms common to workers. Drones were treated with the juvenile hormone analog methoprene and they started flying at significantly younger ages than did control drones, as in the case for workers. In the second experiment, there was an age-related increase in JH associated with the onset of drone flight, as in workers. In a third experiment, drones derived from workers with fast rates of behavioral development themselves started flying at younger ages than drones derived from workers with slower rates of behavioral development. Thus the endocrine and genetic mechanisms associated with temporal polyethism are not limited to worker social behavior.

Robinson et al. (1992) conducted three experiments to determine the role of juvenile hormone (JH) in worker reproduction in queenless colonies. In the first experiment, egg-laying workers had low hemolymph titers of JH, as did bees engaged in brood care, while foragers had significantly higher titers. Experiment two confirmed these findings by demonstrating that laying workers have significantly lower rates of JH biosynthesis than foragers. In the third experiment, ovary development was inhibited slightly by application of the JH analog methoprene to one-day-old bees, but was not affected by application to older bees, at least some already displaying egg-laying behavior.

Some studies have suggested that JH might be involved in the regulation of aggressiveness. Older bees, which have higher JH levels (Huang et al. 1994), are generally more aggressive than younger bees with lower JH levels (Breed 1983). Bees treated with a JH analog exhibited an earlier response to alarm pheromone (Robinson 1987), and the proportion of bees acting as guards also increased (Sasagawa et al. 1989). Workers reared in isolation showed higher levels of aggressiveness toward other bees (Breed 1983), and Huang and Robinson (1992) found that isolated bees have elevated JH levels compared to bees reared in groups or in a colony. JH titers of guards are higher than all other middle age bees except undertakers (Huang et al. 1994); again, this links JH with aggression because guards exhibit low thresholds for the expression of aggressiveness (Breed et al. 1992). Giray et al. (1999, 2000) suggest that differences in division of labor between European and African strains of honey bees may result from the effects of JH on the rate of behavioral development (Robinson and Vargo 1997). This pacing effect applies to

aggressive behavior, as well as other behaviors such as foraging.

Pearce et al. (2001) investigated whether defense by individual bees against non-nestmates is correlated with their juvenile hormone titers, which are known to vary developmentally and seasonally. Winter and Summer bees were bioassayed for aggressive and non-aggressive individuals. Bees in Winter could not be distinguished by task group, but bees in Summer were segregated into nurses and guards. JH titers were correlated with aggressive behavior at two levels. First, Winter bees and Summer nurses, known to have lower JH titers, both showed less aggression toward foreign bees than did Summer guards. Second, aggressive individuals had significantly higher JH titers than did non-aggressive bees within each colony. Inter-colonial variation in aggressiveness was maintained during Summer and Winter, suggesting a genetic basis for these differences. An alarm pheromone test further substantiated the existence of inter-colonial differences. Significant variation in JH titers among different colonies was found, but this variation was not significantly associated with colony-level aggressiveness. The correlation between JH and levels of aggressiveness within a colony suggests a regulatory role for JH, but variation among colonies involves factors other than JH.

Even though the research was done with the cape honey bee (*Apis mellifera capensis*), Muller and Hepburn (1994) found that juvenile hormone and the corpora allata do not play a role in regulating the age-related physiology of wax secretion. Neither factor affected either the onset of wax production or the amount of wax produced. Allatectomy of newly eclosed workers did not affect wax production in adult workers. An experimentally increased juvenile hormone III hemolymph titer, as a result of either a single large injection dose or by implanting corpora allata from older workers into younger workers did not affect either the onset of wax production or the mean amount of wax produced. No critical period could be established during which an elevated juvenile hormone titer would affect the rate of wax secretion. BC

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Clarence Collison is an Emeritus Professor of Entomology and Department Head Emeritus of Entomology and Plant Pathology and Audrey Sheridan is a Research Technician at Mississippi State University, Mississippi State, MS.

Managed Pollinator CAP
Coordinated Agricultural Project

CCD, Federal Funding And The Challenges Of Bee Decline Research

Mary **Purcell-Miramontes**

A Bureaucrat's Perspective.

Some may think that the life of a National Program Leader is a piece of cake and 9 to 5. Before I came to Washington DC, I thought this was true, but I was quickly proven wrong. I am an entomologist with USDA's National Institute of Food and Agriculture, whose purpose is to provide extramural support to research, extension and educational programs for U.S. agriculture. In the past seven years, an increasing amount of my time has been spent responding to Colony Collapse Disorder, a seemingly new crisis which threatens the honey bee industry and crop growers who depend on honey bees for pollination services. In this article, I describe my experience as a public servant responding to this calamity, including an overview of USDA funding resources that were tapped to address the problem, and my perception of the challenges in conducting research to understand and mitigate colony losses.

In February of 2007, I received a phone call from our agency's congressional affairs liaison; Senator Max Baucus of Montana was asking how much money USDA was spending on a problem that was leading to the collapse of beekeeper's colonies. Soon after, I picked up a New York Times and saw on the Op Ed page an article by May Berenbaum on a mysterious malady called Colony Collapse Disorder (CCD [Berenbaum 2007]). She wrote:

> "In more than 20 states, beekeepers have noticed that their honey bees have mysteriously vanished, leaving behind no clues as to their whereabouts. There are no tell-tale dead bodies either inside colonies or out in front of hives, where bees typically deposit corpses of dead nest mates."

CCD is believed to be a condition in which bees incur multiple interacting stresses (e.g., parasitism by *Varroa* mites, exposure to harmful levels of pesticides, disease infection, poor nutrition, and the ravages of being transported across the U.S.). Worker bees are absent, no dead bees are left in the hive; the brood, food stores and the queen are all that remain, and the hive soon collapses a few days or weeks later (vanEngelsdorp et al., 2009).

I was intrigued. I knew that since the 1980s honey bees were in serious decline because of the parasitic *Varroa* mite, an invasive species from Asia. I had also read the National Academy of Sciences study on the Status of Pollinators in North America (National Research Council 2007). But I had never heard about vanishing bees before. Soon after, I began receiving more calls and emails from congressional staffers and the media asking me what I knew about CCD (as if I was the expert), and more importantly what was NIFA doing to address the problem. My other counterparts in USDA were similarly besieged. Kevin Hackett at ARS, Colin Stewart at APHIS and Doug Holy at NRCS were called to briefing after briefing on Capitol Hill.

A multitude of meetings among and between scientists, apiary inspectors, beekeepers and industry representatives were abuzz in the Winter and Spring 2007. I team up with Hackett, who oversees bee and pollination programs at ARS, in Beltsville MD to bring together scientists, beekeepers and inspectors that observed the collapsed colonies and other honey bee researchers and apiculturists. The group deliberated for 2½ days and provided several recommendations for what research was needed to better understand the problem.

At the Beltsville Meeting, the scientists hypothesized that there were at least five suspected factors interacting to cause these losses: pests, microbial bee diseases, pesticides, nutrient deficiencies, and other management stresses imposed on bees such as transporting hives across the U.S. to pollinate crops. The USDA undersecretary, Gale Buchanan, advised USDA program leaders to coordinate a national response to CCD. Our first step was to write a National CCD Action Plan to prioritize a federal strategy for research needed to address CCD (**www.ars.usda.gov/is/br/ccd/ccd_actionplan.pdf**). Five USDA agencies (APHIS, ARS, NASS, NIFA and NRCS) along with EPA and administrators from Purdue and Pennsylvania State University co-authored the action plan. We formed a committee called the National CCD Steering Committee which was composed of program leaders from the above agencies and universities.

USDA has been the principal source of Federal funding for research and other programs designed to protect and conserve pollinators. The 2008 Farm Bill directed USDA to devote more resources to conduct research on CCD and to support conservation programs for pollinators. (Johnson 2010). Since the inception of the Cooperative State Research Service in 1981 (now known as the National Institute of Food and Agriculture [NIFA]), extramural grant programs have historically funded hundreds of pollinator health projects primarily to university and federal researchers, educators and extension specialists. Given the level of urgency of the problem, the Coordinated Ag-

ricultural Projects (CAP) competitive grant mechanism was used, which supports nationally important problems that require coordination of multiple researchers, extension specialists and educators. Between 2008 and 2012, the NRI and AFRI funded a $4.1 M CAP grant to Keith Delaplane at the University of Georgia and 14 associated researchers and extension specialists at 20 universities and ARS (**http://www.beeccdcap.uga.edu/**). This grant laid important ground work to understanding factors associated with colony losses. A second CAP grant for $5 M went to Dennis vanEngelsdorp, now at the University of Maryland, and 10 other institutions, to build the infrastructure for an ongoing national database on honey bee health and to provide beekeepers region-specific data for making management decisions (**http://beeinformed.org/about/**). Another NIFA grant program, the Specialty Crops Research Initiative (SCRI) was instrumental in supporting pollinator research. One of its legislatively mandated focus areas was to "identify and address threats from pests and diseases, including threats to specialty crop pollinators (**http://www.nifa.usda.gov/funding/rfas/pdfs/12_scri.pdf**). In 2011, SCRI awarded Dr. Anne Averill at the University of Massachusetts $3.3 M to address declines in native bee pollinators in fruit and vegetable crops. In addition, smaller grants to single or smaller groups of investigators (up to $500K) from several programs have provided another important source of funds to researchers, educators and extension (e.g., AFRI Foundational Programs, regional IPM, Sustainable Agriculture Research and Education program, Small Business Innovation Research and Hatch funds).

In addition, the farm bill authorized USDA to encourage "the development of habitat for native and managed pollinators" and "the use of conservation practices that encourage native and managed pollinators" during administration of any conservation program. Several programs administered by the Natural Resources Conservation Service (NRCS) were then used to carry out these goals (Vaughn and Skinner 2008). In 2008, $5 M from USDA-ARS was allocated to initiate the "USDA-ARS Areawide Project to Improve Honey Bee Health" led by Jeffrey Pettis (**http://www.ars.usda.gov/research/projects/projects.htm?accn_no=412674**). The overall goal was to conduct demonstration tests across the U.S. with an emphasis on *Varroa*-mite resistant bees, improved nutritional supplements, and developing effective controls (Pettis and Delaplane 2010). In 2009, USDA-APHIS funded a national survey of beekeepers in 34 states to detect exotic pests and diseases of honey bees (**http://www.aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/SurveyProjectPlan.pdf**).

Much of the knowledge about bee declines and CCD was made possible by these sources of USDA funds. However, researchers were confronted with numerous challenges to studying a problem of this magnitude, and quick solutions were not easy to come by. So here was the first challenge: Because the foragers had vanished, researchers were left with sampling and measuring diseases, pesticides and pests from the bees that remained in the hive. Although researchers might argue this point, I wonder if it's valid to consider the bees that remain as comparable to the disappearing foragers. A further challenge would be to track foraging bees exposed to either diseases and/or pesticides after leaving the hives and to quantify their return rates. Several researchers are tackling this problem (e.g., Ciarlo et al., 2011; EAA et al. 2012; Yang et al., 2008). In the U.S., some bee kill incidents were believed to result from spray drift of Clothianidin, a neonicitinoid insecticide from cornfields (Krupke et al., 2012). So are pesticides and/or diseases the culprits? Although it may be tempting to say yes, we cannot make firm conclusions yet. Dosages were probably far higher than what a bee would encounter in the field. More studies are needed using doses that approximate what bees typically consume under field conditions. In addition, these studies tested individual bees, and did not study bees at the colony level, which would better reflect actual conditions.

Further complicating the story is the possibility that CCD is occurring with diminishing frequency. The CAP-funded longitudinal studies on stationary beehives were the first to systematically track bee losses in experimental beehives in seven states (Spivak 2010). They identified and quantified diseases, pesticide and pest levels within these hives. However, in the four years that these hives were followed, CCD was rarely observed (Spivak, personal communication). Moreover, vanEngelsdorp and Pettis indicated that the number of reported cases of CCD by beekeepers was sharply decreasing. For example, in the 2010/2011 winter survey, starvation was cited as the most frequently reported cause of bee losses and CCD was the 7th most reported cause of colony loss on the list (vanEngelsdorp et al. 2012).

So, was CCD just a transient problem? It's quite possible. Was the problem gone? Unfortunately, the answer is no. Winter surveys 2012/2013 indicate that honey bee losses have resurged to levels approaching 30%; beekeepers – even large scale operators – are experiencing heavier losses than during last year's mild Winter (Pettis, personal communication). Although fewer in number, beekeepers that reported losses from CCD incurred more than 60% losses (vanEngelsdorp et al. 2012).

Therefore, beekeepers are still confronted with a myriad of challenges to keeping bees (diseases, pesticides, *Varroa* mite, lack of forage, etc.) and for the most part lack effective ways to manage these problems. Almond growers, whose acreage has increased in the past decade (835,000 acres in 2011), depend on the services of honey bees supplied by beekeepers who manage them. Still other specialty crop growers are seriously concerned about how to meet the demand for pollination.

The CCD Steering Committee regrouped and agreed another meeting was needed to review the state of knowledge gathered over the past five years with an emphasis on obtaining recommendations for developing best management practices. A stakeholder workshop was convened in Alexandria VA in late October for 2 ½ days. Research progress in the four areas (pests, diseases, nutrition and pesticides) was reviewed. An impressive plethora of information was presented and constructive discussions were held to help USDA and EPA program leaders to determine next steps for a renewed federal strategy. The second part of the workshop focused on developing solutions or Best Management Practices to man-

age the declines. Breakout sessions were held to identify concrete strategies. It was an excellent collaborative effort between researchers, beekeepers, apiary inspectors, pesticide company reps, commodity group reps and conservation organizations. Important lines of communication were established. Some solutions will not involve science but will require agreements with land managers for agricultural and recreational use and special interest groups like duck hunters and environmentalists. In addition, hurdles must be crossed to increase communication between beekeepers, farmers and crop advisors. Finding effective strategies to influence growers to change their practices to protect bees were identified as another big challenge. A published report is expected within the next few months and will serve as the basis of a new action plan to prioritize future research on management of bee declines.

The challenges that surround the management of honey bees are certainly vexing to beekeepers because their enterprises (both personal and professional) are at stake. The silver lining to this, however, is that a tremendous groundswell of concern arose from the public about the welfare of honey bees and other pollinators. The average person is more aware than ever that the health of honey bees and the reproduction of plants that depend on them are at risk and wants something to be done. Much progress is being made in providing practical solutions that beekeepers can use. For example, Bee CAP co-investigator, Marla Spivak, established a "Tech-Transfer Team" in California, the Midwest and the Northeastern U.S. to help honey bee queen breeders to select for "hygienic behavior", a trait which helps bees defend against *Varroa* mites, still believed to be the main reason for colony losses. In addition, the teams identify and assess infection levels of several bee diseases from samples provided by beekeepers. Other investigators, Judy Chen and Jay Evans, funded both by USDA-ARS and NIFA, found that the *Varroa* mite spreads the Israeli Acute Paralysis Virus (IAPV), a disease that was strongly correlated with CCD (Di Prisco et al., 2011). Still, other questions loom large and overall losses are unacceptably high. Despite the complexities, I am optimistic that with continued investment of funds for research and outreach in the not too distant future (maybe five or 10 years) that practical answers to these challenges will be at hand. BC

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The Voice Of The South

Used As A Spring Board For Growth And Knowledge

Frequently, college professors like to teach graduate students in science about the scientific process. The study of how human societies produce new scientific ideas is called epistemology. The major goal of these lectures is to get the new generation to think about how knowledge is acquired by a society. Quite often the transition from the classical physics of Isaac Newton into the more recent quantum theory beginning with Albert Einstein (and friends) is the episode of scientific revolution that gets dissected in these classrooms. One goal is to show that growth in knowledge is a messy process and that progression in science does not follow a straight line.

I often like to move the discussion of epistemology from physics to biology. Specifically, I often present the debate surrounding how it is that honey bee foragers recruit their sisters to food sources. This remarkable ability enables a colony of bees to quickly monopolize a food source before either other colonies of honey bees or other species can compete at the food source. The two major ideas regarding recruitment are (1) that recruited foragers are stimulated by food-related odors on the bodies of dancing bees and they follow odor gradients to locate the food source, and (2) that recruited foragers are directed to a food source by a set of instructions delivered to them by a dancing bee.

Before I describe the debate about the two major ideas concerning the recruitment of hive mates to a food source by forager bees, let's consider the relative importance of this issue to all of science. Essentially, whether bees use a language or not is not that important to anyone but bee scientists and animal behaviorists. The "truth" of the matter is not likely to dramatically change the quality of the average person's life, even if that person is a beekeeper. However, I think that Adrian Wenner and Patrick Wells (1990) have found value in this episode of scientific inquiry in their book *Anatomy of a Controversy, The Question of a "Language" Among Bees*. They use their own lives as a model of the socio-political forces that can temporarily and chronically drive scientific investigations.

The overwhelming acceptance of a hypothesis and the condemnation of those scientists that opposed the popular notion are not uncommon. Many of us may have the naïve belief that science and scientists are part of a higher social institution that finds the truth of things in the world. Science may ultimately progress toward truth, but scientists do not always move in the same direction.

The episode in bee science described by Wenner and Wells provides personal testimonial about negativity in the scientific process. A friend of mine once stated that scientists spend 1% of their time being objective and 99% of their time protecting fragile egos and theories attached to these egos. I tend to be less cynical about these matters, but I do admit that scientists are humans like everyone else. It is my sincere hope that in most cases, the "truth" will prevail.

One concept essential to this discussion is whether or not objective knowledge or truth even exists. Realists are philosophers who believe that objective knowledge does exist. The most famous realist in contemporary times is Sir Karl Popper. His book *Objective Knowledge* is the cornerstone of modern realism. He believes that although man may never be able to know the truth, he can present the best model of the truth by attempts to falsify a major theory. His idea is that although you can never prove a theory, you can certainly falsify one.

Only the simplest theories that have survived major attempts at falsification should be retained until new evidence suggests further testing. The Popperian philosopher would view any negative evidence against a major scientific theory as a welcome sight, and perhaps the beginning of a new scientific revolution. Usually, a theory is not totally falsified; only parts of it. The new theory must explain all old information and any new facts that have been discovered. Often the new theory is a modified version of the old theory that better explains all known data.

The other school of thought in realism is verification, which was developed by Rudolf Carnap. These philosophers also admit that objective knowledge exists, but they believe that mounting evidence in support of an idea is enough to justify belief in the idea. In other words, they search for evidence to verify an existing theory.

The major problem with the verification approach is that anyone can find evidence to support just about any reasonable idea. Volumes of circumstantial evidence would be enough to support a scientific theory. The tendency is for evidence against the idea to be ignored, or at least not sought after.

At the other philosophical pole are the relativists. These philosophers do not believe that objective truths exist. Instead, they feel that acquired subjective knowledge is useful and necessary. I include in this group Thomas Kuhn (even though Wells and Wenner do not). Thomas Kuhn wrote a very famous book, *The Structure of Scientific Revolutions*, in which he presents the ideas of

Karl von Frish *initially* supported an odor-search model of recruitment during 1938-1939.

relativism. I am grossly paraphrasing the idea when I say, "He who carries the biggest stick is heard over the rest." However, this summarizes the general notion that knowledge is subjective and controlled by social and political events. There is no real truth, only what is perceived as truth by the masses.

According to relativists, the perception of truth in a person is controlled by rose-colored glasses called paradigms. A paradigm is a ruling idea that controls subsequent ideas about science. A person may have a paradigm without knowing it. For example, you may have been raised to believe that the Theory of Natural Selection is the best scientific explanation of biological speciation. Acceptance of this theory may have affected your views on many other ideas without you even knowing it. You might tend to view changes in many other human arenas (e.g. politics, religion, etc.) as evolutionary, the result of gradual and minute changes through time.

A person can change the paradigm when mounting crisis in a scientific community occurs. Kuhn describes two types of scientific activities: (1) normal science, which occurs in non-crisis periods, and (2) revolutionary science which occurs during crisis periods. The strange and flawed component of Kuhn's ideas is that during normal science, negative evidence toward a ruling paradigm is the result of faulty scientific practice (criticism is aimed at the experimenter). However, during the crisis phase, negative evidence is used to generate the new paradigm (criticism is aimed at the theory). Kuhn fails to delineate just how one knows when he's operating in a "normal" phase versus a "revolutionary" phase. This theory leads to the cynical interpretation that force or persuasion control what we call knowledge.

Even stranger is how the paradigm changes within the mind of someone. According to Kuhn, the paradigm shift is a gestalt switch, an instantaneous change in perspective that is not mediated by logic. Simply, the person wears a new pair of glasses having a different color (rose-colored to green-colored glasses). Kuhn says that a single person cannot consider the merits of competing theories because the languages of two theories are not compatible. The change in perspective is a lot like the light bulb going "ON" in the brain of a cartoon caricature. Some have even called Kuhn's transition between different scientific theories a religious change.

As evidence against this idea, many physicists at the turn of the century were interviewed and asked how they switched from thoughts of classical mechanics to quantum mechanics. Most of them acknowledged that they had considered the merits of both theories simultaneously and chose the theory that explained the most data.

The Honey Bee Debate

Karl von Frisch (1886-1982), an Austrian zoologist born in Vienna, discovered how honey bees orient themselves and communicate. He began his research on honey bees in 1919 when he found that their sense of smell was similar to that of humans, and that they could distinguish all flower colors except red. He later discovered that bees use the sun as a compass.

Karl von Frisch initially supported an odor-search model of recruitment during 1938-1939. The odor search hypothesis states that bees recruit nestmates to food sources with odors adhering to their bodies. Recruited bees leave the colony and fly upwind and follow a concentration gradient of the floral odor to locate the food. This is the same way that a male moth is attracted to the sex pheromones of female moths.

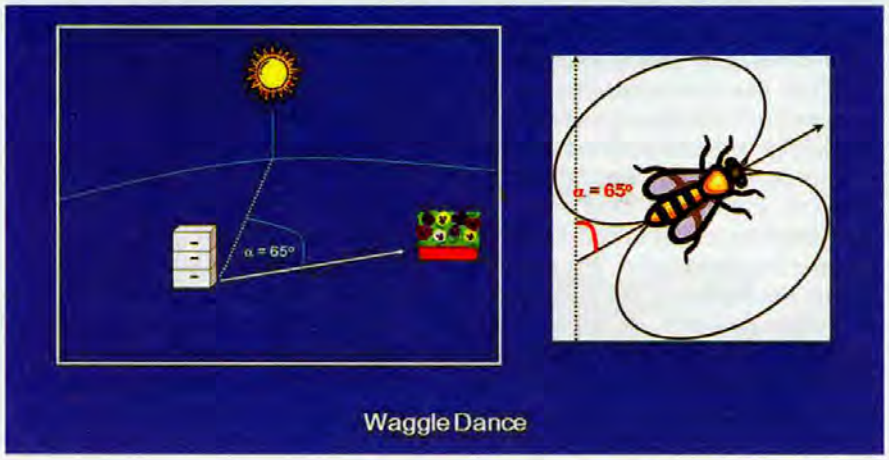
In the mid-1940s von Frisch switched beliefs to the idea that bees use dances to communicate the location of food. He proposed that the dance behaviors of forager bees actually provided information on distance and direction of a food source from a hive. The dances were a set of instructions communicated from one bee to another. This was truly shocking to many folks who had assumed that language was only found in higher animals like humans.

In 1973 Frisch shared the Nobel Prize in physiology or medicine with Dutch zoologist Nikolaas Tinbergen and Austrian zoologist Konrad Lorenz, who were cited for their individual studies in animal behavior.

Historically, the dance language hypothesis gained much popularity in scientific and non-scientific communities, and it has succeeded in nudging out of public view the odor-search model of honey bee recruitment to food sources. The "dance language" hypothesis implies that forager bees can communicate information about a food resource to recruited hive mates. The odor-search hypothesis states that the different dances of the bee are stimuli that trigger recruitment, but the actual food-finding behavior of recruits is dependent on chemical gradients or odor cues.

Karl von Frisch and most of his supporters used the verification method of scientific inquiry; they sought evidence to support their ideas. These experiments often did not have the appropriate controls to eliminate the possibility of odor search. Many subsequent experiments were mere copies of von Frisch's original experiments.

For twenty years, the language hypothesis became a ruling paradigm



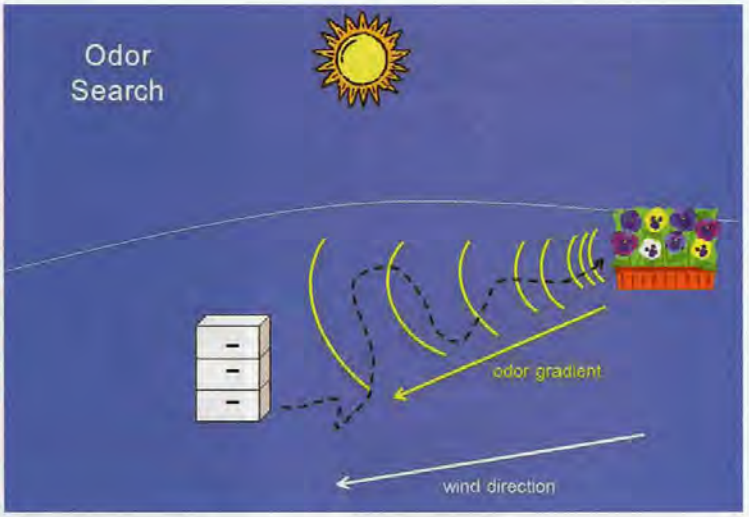
in the world of animal behaviorists, but only a few scientists actually tried to challenge the basic hypothesis. These guys (including Wenner and Wells) generated evidence against the dance language notion, but they became ostracized for their suggestions that the odor-search model might be a better explanation. They were squeezed out of scientific meetings and funding for their research disappeared!

In the 1970s, James L. Gould conducted experiments that tried to disprove the dance language hypothesis. Although still argued, most scientists believe that the design of his tests were not mere attempts to find data to support the hypothesis. He seriously challenged whether or not bees could communicate by doing carefully controlled experiments that became known as misdirection experiments.

Without too many details, he developed ways of training foragers to a food location, and he could do things experimentally to make them tell their sisters the wrong location of the food (he tricked them with strong light bulbs to confuse their orientation to the sun). He literally had foragers tell a lie about where the food was. The recruited bees went to the location told to them by the "dishonest" bees. His experiments included protocols to control for odors at all feeding stations in his experimental array.

His experiments showed that although bees utilize odor-search to find food, the dance language can provide instructions for nestmates to find specific locations. The maneuvers that we call dancing could be used to misdirect recruited bees to a wrong location. This could be best explained by the language hypothesis. However, if given time, recruited bees can utilize their keen sense of smell to orient and find similar food sources. Most other non-dancing social insects find food using olfaction, even when recruited to a source by nest mates.

So what? Our goal as teachers is to make students to stop and think about their own actions and attitudes about people who hold opinions or ideas vastly different than their own. We try to make them understand that criticism is the springboard for the growth of knowledge. They should try to punch holes in their own ideas and those of others, and they should accept the attempts by others to challenge them as part of the scientific process. Although some believe that the ideas of Popper are an unobtainable and an idealized prescription of how scientists should behave, the alternative offered by Kuhn is a much darker description of human behavior that stems from the irrational. However, it would be wrong to deny that the real world consequences of Kuhnian behavior did not negatively impact the lives of Wenner and Wells who opposed the popular theory of the day. It is our hope that students become more like the idealized model of Popper and less like the socio-political animal of Kuhn. BC



Jeff Harris is the Extension/Research Apiculturist in the Department of Entomology at Mississippi State University.

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EAS 2012 Colony Monitoring Workshop Speakers left to right – David Atauri, Stephen Engel, Robert Seccomb, William Meikle, Huw Evans and Wayne Esaias. Not shown: Stephen Page.

BARSTOOL BEEKEEPING

Frank **Linton**

Remote Sensing The Bees

Last January I asked Kim Flottum, editor of this magazine, "What do beekeepers really need to know regarding the health status of their colonies?" He replied that two factors are more important, by far, than all the others: First, the health of the queen, and second, the presence of *Varroa* mites.

As remarkable as it may seem, in the not-too-distant future it may be possible for beekeepers to monitor this information about their colonies by glancing at their hand-held devices from their barstools, or their Barcaloungers®, or even from their beeyards, wherever they might choose to be.

For example, last Summer at the Eastern Apicultural Society's (EAS) annual conference in Burlington VT, Jerry Bromenshenk and Robert Seccomb of Bee Alert Technology and the University of Montana demonstrated a device that provided beekeepers with this information. Their device consisted of a hand held computer and a microphone on a rod. Using the rod, the user placed the microphone through the hive entrance and into the heart of the colony where it picked up the sounds the bees were making. Every beekeeper knows that the sounds a colony makes can reveal a lot about the status of the bees, and Bee Alert has developed software that, like some good beekeepers, can analyze these sounds and interpret them. Among other things, their device will tell you, the beekeeper, whether the colony is queenright and whether it is suffering from *Varroa* mites.

While the device they demonstrated was hand-held and required the beekeeper to walk from hive to hive to insert the microphone, it is not difficult to imagine a device similar to a cell phone placed inside each hive which periodically sends audio samples to a website for analysis. Beekeepers would then access that site with their own hand-held devices to see their colonies' status.

A second method might also be at hand in the not-too-distant future. Instead of using audio, this method would rely on temperature sensors. For example, knowing that bees keep their brood at 95°F., a number of temperature sensors placed strategically about the brood nest would monitor the brood volume. As long as the brood volume is normal, one could infer that the queen was in good health. Of course, *normal* brood volume is highly variable, so knowledge of local conditions would be required to interpret the data, but by their third year, most beekeepers will have acquired that knowledge. On the other hand, pooling the data from a number of colonies, all the colonies in a county, say, would provide more than enough information for a statistical definition of normal as brood volume varied over time. These numbers would be valuable not only to individual beekeepers, but also to researchers and state apiarists, and being able to compare themselves with others might inspire beekeepers to improve their practices.

Placing temperature sensors in a frame of drone comb would enable beekeepers to determine when the drone comb was capped – and full of mites, thereby alleviating those aggravating inspections that involve lifting several heavy supers of honey off the brood box only to discover that the drone comb is still broodless, or worse, that the drones have already emerged and you have produced a mega-load of hemolymph-guzzling, virus-vectoring, *Varroa* mites. While some beekeepers might choose to remove the drone comb and freeze it to destroy the mites, others may elect to use Zach Huang's Mite Zapper frames and kill the mites without removing the drone comb from the hive. With either method, the mites will have been, as they say in the Army "found, fixed, and destroyed."

To summarize, we have seen how two different sensing modalities, audio and temperature, could each be used in the near future to remotely monitor two different colony status factors, the health of the queen and the presence of *Varroa* mites.

Enabled by advances in communications and computation technologies, numerous other sensing modalities are actively being explored by researchers, entrepreneurs, and engineers for their capability to monitor a variety of honey bee colony health and status factors. For example, Bee Alert was not the only organization to demonstrate or describe their colony monitoring devices at the EAS Conference in 2012. In all, members of seven different research and development organizations from the U.S. and Europe attended and presented their devices at the workshop. You can find them here:

- David Atauri: **http://apilink.net/wp/**
- Jerry Bromenshenk and Robert Seccomb: **http://beealert.info**
- Stephen Engel: **http://www.stephensapiary.com/**
- Wayne Esaias: **http://honeybeenet.gsfc.nasa.gov**
- Huw and Sandra Evans: **http://www.arnia.co.uk**
- William Meikle: **http://www.ars.usda.gov/pandp/people/people.htm?personid=43893**
- Stephen Page: **http://hivetool.org**

Many other potentially-useful colony monitoring devices can be found on the Internet. To save readers some tedious searching, I have compiled everything I could find on the Internet pertaining to honey bee colony monitoring and put all the URLs on one website: **http://colonymonitoring.com**. Check it out. BC

P.S. By the way, if your day job involves the mass production of reliable, economical, wireless sensing devices, I think I hear an opportunity knocking...

*Frank Linton, an EAS-certified Master Beekeeper, may be reached at **buckaroo.beekeeper@gmail.com**.*

Electron Irradiation

Saves Equipment And Reduces Chemical Use

IOTRON Industries Canada/USA Inc.

Lauren **Bennett**

Protecting bee populations from disease has been top of mind and a major priority within the industry for years. Honey bees have a direct and significant impact on human life; they are responsible for pollinating $19.2 billion worth of U.S. crops and honey itself is a valuable commodity. However, not all solutions to eradicate disease are as efficient and effective as electron-beam irradiation.

Traditional modes of protection against disease in bees have increasingly become vulnerable and less effective. It is well known that diseases are becoming resistant to the registered antibiotic Oxytetracycline and while there are other antibiotics available these are not registered for use in Canada. Antibiotics also complicate residue allowances. Honey containing residue is not saleable in the EU or Japan. Canada and the U.S. have working residue limits but it is often the case that buyers will always choose residue free honey wherever they can in order to appease the ever-demanding consumer.

Irradiation in the apiculture industry has been a secret weapon amongst a growing number of enthusiasts and commercial beekeepers, yet awareness of the technology is not yet mainstream. Disease and viruses amongst bee populations spark a chain of poor population health and a decline in yield. Electron-beam irradiation provides the ability to quickly break this negative chain. In 1999 Ron Greidanus, an Apiculture Industry expert and Commercial Honey Producer, in search of a solution, began working with Vancouver, BC and Indiana-based Iotron Industries Inc. Since then, he has been successfully managing healthy populations and attributes this shift directly to the electron-beam technology.

Greidanus explains electron-beam processing is an integral part of his and any beekeeper management practice. "For me this technology is the best and only viable solution to preventing all forms of disease, pests and virus. The difference after sending boxes for irradiation can be seen over night. In fact, the health of my population is improved so much that populations grew exponentially."

Irradiating product will guarantee that present organisms are killed and that no residues are left behind. Iotron's electron-beam irradiation destroys the DNA of all organisms that plague bee populations, even hard spores that can remain present but dormant for up to 35 years in the hive. Up until irradiation, fire was the only legislated method for destroying diseases, particularly American Foulbrood. As a result many beekeepers still turn to burning hives too quickly and effectively destroy traces of disease without the knowledge that electron-beam irradiation, which can offer same-day turn around, kills all pests and still maintains equipment and yields.

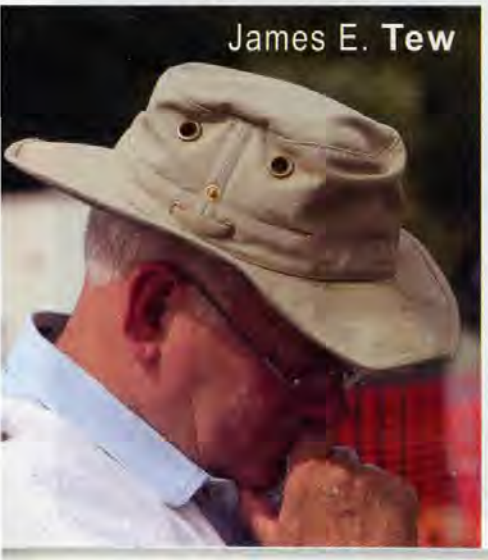
Iotron has been servicing the beekeeping industry since the late 1990s based out of British Columbia, Canada and this year expanded to Indiana, United States. Tino Pereira, CEO of Iotron explains, "Our process utilizes electricity as its power source meaning that Electron-beam sterilization is a green solution that is safe, destroys traces of all diseases, offers just-in time delivery and competitive rates. The less than 60 second process time is attractive to our clients as scarcely any wax melts, meaning no loss of yield or further contamination."

Electron-beam irradiation treatment per box is around $5. When you consider total destruction of the box through fire and the cost of replacement being around $100, electron-beam irradiation becomes a very viable solution.

Electron-beam irradiation technology is currently the most scientifically researched form of irradiation that was born within North America. Irradiation offers safe sterilization of a number of additional products outside of the apiculture industry servicing medical, food, agricultural and aerospace industries.

"We have seen the direct and profound impact that our technology has had on the apiculture industry," notes Pereira "and want to share our knowledge and expertise as much as possible. We know that we are offering a viable and guaranteed solution to growing and maintaining bee populations, and that has resulted in growing industry interest." BC

HOW I DO IT – Continue To Live With My Smoker



What else can we do?

I wish there was an alternative to smokers and smoking a bee hive. I have reasons that I will discuss later. But first I need to prepare you for my thoughts. Maybe, over the years, I have evolved into some kind of crabby honey bee complainer. If that is the case I don't really know exactly when it happened. I don't think it was abrupt. In past articles I have written about some of the cruddy things that have happened in my bee life – things that could make a rational person wonder why anyone would ever continue to work with these specialized bugs, but continue I will. And I would like you to know that my complaining does not mean that I have any plans for quitting anything beekeeping, but that I do expect to continue complaining – apparently even increasing in my grumble rate a bit. I have my reasons.

In my own bee-life experiences, I have seen a lot of changes and though I freely admit that some of those changes have been great, I must say that not all changes have been so good. Well, maybe at first flush they didn't appear to be good, but I am now realizing that *"good"* is a moving, flexible kind of target. Early in my life it was *good* to drink whole milk. Not now, and no, smoking cigarettes is not *good* for your after-dinner digestion. We used to think it was.

Within beekeeping, take *Varroa* for instance . . . How can I rank the horribleness that *Varroa* has caused beekeeping when presently *Varroa* is at the very heart of the biggest boom that U.S. beekeeping has ever experienced? If honey bee populations had not declined precipitously, would we now have this wonderful influx of new bee people? Would all honey bee meetings be packed out the way they are? Would the public still be sympathetic, and would cities all across the U.S. still be inviting bees into town? I have no way of knowing but I do know that *Varroa* has single handedly put our craft on a different trajectory than the one it was on in 1984. Am I saying that *Varroa* is a good thing? No, *Varroa* is not a good thing, but I am saying that *Varroa* and our current related beekeeping problems have spawned some unexpectedly good, even very good, attributes in modern-day beekeeping.

So for many beekeepers there are two versions: Pre-*Varroa* and Post *Varroa*. Pre-*Varroa* beekeeping is filled with information and recommendations that simply do not apply to proper beekeeping any more. For instance, you can no longer buy cyanide from bee supply companies. In the 1960s you could. But everything else has changed, too, not just beekeeping. Any slide rule users still out there? Who of you still dials a telephone? Oh . . . and wait a few days while I write you a letter and drop it in the mail. All those years ago when you and I were dialing phones and talking on party lines, did I ever have any notion that, one day, I would walk around with my phone in my shirt pocket? Nope – never had the thought once. So it is with beekeeping. *Varroa* nearly killed us but the episode redesigned and restructured beekeeping as an industry. Arthur C. Clarke wrote, *"How can it be, in a world where half the things a man knows at 20 are no longer true at 40 – and half the things he knows at 40 hadn't been discovered when he was 20?*[1]*"*

The unchanged bee smoker

And through the entire paradigm-shifting, *Varroa*-initiated event, there is the bee hive smoker – essentially oddly unchanged. To work bees, you just build a fire in a smudge pot with any readily available fuel that will produce white cool smoke and then you puff smoke into the colony. Well, that's certainly technically complex. Out of all the changes in beekeeping, techniques for using a smoker are exactly as they always have been. As I have already written, I wish there was an alternative to smokers and smoking a bee hive.

If you have been a beekeeper longer than about twenty minutes, you should already know the fundamentals of smokers and smoker lighting. At some meetings, there are even smoker lighting contests. Who of you does not have a "favorite" smoker fuel? Like a fine wine, if doing serious bee work, I like to use a blend. I start with a piece of paper. As the flame catches, I add pine needles and puff up white, billowing smoke until the flames come from the smoker barrel; then another charge or two of needles on top of that and puff the smoker bellows back to a flame. As the flame dies back, I add either thick planer shaving or dry chipped mulch and puff until I get good smoke flow.

[1]Clarke, Arthur C. 1977. *The View from Serendip*, Random House

Then lastly, to keep wood chips from blowing out of the nozzle, I add a final charge of pine needles or dry grass clippings. This concoction will burn for several hours and can easily be recharged on top of the hot coal bed in the smoker. If I am doing quick bee inspections, I just stay at the paper and pine needle level – quick, white smoke that burns out readily. My way is not necessarily correct for all of you, but these are the fuels I have at hand that provide a dependable source of smoke for me.

Beehive smokers and their use are at the very core of beekeeping and they have been at that core point since our earliest days of honey robbing. There are all kinds of varieties and sizes of smokers but they all require the same basic procedure – build a fire, snuff it out and puff smoke from its embers. Indeed, it is the very trademark of beekeeping. Recently, we were clearing and cleaning my recently departed Dad's disheveled shop, and a Woodman smoker turned up. It was like an old friend. It represented hours and hours of bee work from years gone by. We kept it as though it was one of the greatest treasures from Dad's estate. Outside of beekeeping, many other people seem to feel that way, too. How many common smokers have you or I seen in antique shops as though they were highly coveted? Even burned up and worn out, they still bring about one-third to one-half of their original selling value.

But as with so, so many other things in life, as we have learned more, we realized changes might be needed. But as far as smokers and their use are concerned, I don't know of anything truly new on the horizon. We seemed to be destined to use them for years to come. I know that all bee supply companies either manufacture smokers, or at least, sell them. Other companies are presently offering new and improved smoker models. I have four or five smokers that I plan to continue using. So there . . . we have used smokers for a long time and will probably continue to use them for a long time, but being the complainer and whiner that I am, can I very, very tactfully ask, *"Should we?"*

I have absolutely no science, no citations and precious few examples to support a distant, foggy concern that I have about smokers and their use. I know, I know, we have nothing else to use, and the bees will kill us if we open their hive without smoke, but bronchial asthma and I have been lifelong companions. I have never had a life-threatening experience, but I can – nearly on command – come up with restricted breathing issues. When I am in and around bee smoke (any smoke for that matter), I feel more than just a bit threatened. I become wheezy with watery eyes and have trouble getting enough breath. I have smoked colonies hundreds of times and plan to do it hundreds more, but is this procedure as benign as it has always appeared to be? What should we do with the following information? Abundant citations are easy to find. Have a look at the literature for yourself.

Using dry leaves to generate bee smoke

"The smoke from burning leaves contains a number of toxic and/or irritating particles and gases. The tiny particles contained in smoke from burning leaves can accumulate in the lungs and stay there for years. These particles can increase the risk of respiratory infection, as well as reduce the amount of air reaching the lungs. For those who already suffer from asthma and other breathing disorders, leaf burning can be extremely hazardous.

Moist leaves, which tend to burn slowly, give off more smoke than do dry leaves. These moist leaves are more likely to also give off hydrocarbons, which irritate the eyes, nose, throat and lungs. Some of these hydrocarbons are known to be carcinogenic.

Carbon monoxide is an invisible gas that results from incomplete burning, such as with smoldering leaf piles. After inhaling carbon monoxide gas, it is absorbed into the blood, where it reduces the amount of oxygen that the red blood cells can carry. Children, seniors, smokers and people suffering from chronic lung and heart disease are more susceptible than healthy adults to carbon monoxide effects[2]."

Is this a smoking gun?

Concerning my wood chips that I frequently use

"The tiny airborne specks of pollution known as particulate matter, or PM, produced by wood-burning stoves appear to be especially harmful to human health. Small enough to penetrate deep into the lungs, they carry high levels of chemicals linked to cardiopulmonary diseases and cancer, and they can damage DNA and activate genes in hazardous ways comparable to cigarette smoke and car exhaust.

Exposure to the particulates in smoke irritates the lungs and air passages, causing swelling that obstructs breathing. Wood smoke can worsen asthma, and is especially harmful to children and older people. It also has been linked to respiratory infections, adverse changes to the immune system, and early deaths among people with cardiovascular or lung problems".[3]

This is not a "cause" for me

I only did a quick literature check on using pine needles as a smoke source, but the literature was vague and most citations focused mainly on burning pine wood;

[2]B. Rosie Lerner, 1997. Purdue Extension Consumer Horticulture Specialist. Please Don't Burn Your Leaves. http://www.hort.purdue.edu/ext/burnleaves.html

[3]Cheryl Katz and Environmental Health News. March, 2011. Scientific American. Wood Smoke Wafts Up Health Concerns http://www.scientificamerican.com/article.cfm?id=wood-smoke-health-concerns

but absolutely, it was not easy to find ***good reasons*** for breathing pine needle smoke. Terpenes in pine needle smoke seemed to cause the problems. I tried to find sources for reasonably safe smoke sources but so far, I have not found anything – not a thing. Again, my comments in this article do not represent science and I am not promoting vanquishing the smoker to the ash pile; but I sense that this longtime, universal smoking procedure may have a darker side.

What effects does smoke have on bees?

To my knowledge, that question has no definitive answer. If I am able to readily find health references on harmful effects on humans and animals, why would it not logically follow that smoking bees has some harmful effects on bees? As I discussed above, we all have our favorite smoke sources, but no one has ever ranked those sources for bee safety. Why would they? It's only smoke! If bee colonies are frequently smoked (commercial colonies), are those colonies sicklier than *"unsmoked"* colonies. I have no idea.

As long as there has been human civilization, there has been fire (and smoke). Bee colonies have been smoked millions of times and life has gone on for a long time, but how significant are the effects of smoke on our bees? I suspect the harmful results of hive management would be much greater if the colony was not subdued some before manipulating.

I doubt that smoking bee colonies is good for the colony

But overall I really doubt that smoking the colony is good for its health but I simply don't know how ***bad*** it is for the health of the colony. Clearly, if there are any effects they must be chronic in nature for it is a rare colony that has been literally smoked to death. If there are chronic harmful effects, wouldn't that be interesting? Really interesting?

My new plan?

I really don't have a different plan other than using the least amount of smoke possible. I've already been doing that for years. But every time my bees and I breathe smoke, I will suspect that it really is not a great health benefit for either of us – but I'm just an old complaining beekeeper trying to catch my asthmatic breath. BC

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

Varroa Control With Formic Acid

David **VanderDussen**

Varroa mites were first found in Canada in 1989, they got through the quarantine zones that were set up and hit my outfit in Ontario in 1996. At the time Apistan® was the only registered product (active ingredient: fluvalinate, a synthetic pyrethroid), but even then resistance had emerged as a concern. Bayer® was the intellectual property holder of the other three main known off-the-shelf acaricide active ingredients: coumaphos (an organophosphate formulated as Perizin® and CheckMite+®), Flumethrin (also a synthetic pyrethroid, formulated as Bayvarol®) and Amitraz (a formamidine, IP rights went to Arysta Life Sciences in 2005. It is formulated for use in beehives as Apivar® strips).

As president of the Ontario Beekeeper's Association I had contact with representatives from Bayer. There was little interest from Bayer to register these products for what was expected to be short effective life spans. Beekeepers were casting about for alternatives. For me, formic acid showed the most potential, the question was how to harness it effectively with minimal side effects.

In 1997 NOD Apiary Products Ltd. was formed to bring sustainable mite control products to the marketplace, and we did. 2002 was the last year any active ingredient other than formic acid, now carefully formulated and tested, was relied upon to control mites in my outfit. 2012 marked a decade of relying on Mite Away® technology. [Photos from May 4, 2012.] While other outfits often struggled with *Varroa* control during this time my bees thrived, and selling nucs or just frames of brood in the Spring was the first harvest of the year.

Within the United States and Canada the law requires pesticides to be registered. Full registrations were granted in 2005 for end-use products Mite-AwayII™, and in 2011 and 2012 for Mite Away Quick Strips® (MAQS). MAQS, with the help of the University of Hawaii researcher Dr. Ethel Villalobos and dedicated personnel in the State Department of Agriculture, was made available to the beekeepers of Hawaii earlier under a special State registration, so the organic honey production certification held by beekeepers there could be maintained.

Varroa as a Brood Disease: Targeting *Varroa* Reproduction.

The *Varroa* mites reproduce and feed on the pupating honey bee larvae developing under the brood caps, transmitting viruses that cause deformities and weakens the bees, one by one until thousands are affected, leading to colony collapse.

When brood is present, 70 to 80% of the female mites are out of sight under the brood cap, engaged in reproduction while feeding on the honey bee larvae. Historically *Varroa* treatments have relied on catching the female *Varroa* between reproduction cycles, while she is out on the adult bees. This time of exposure is called the phoretic stage, and is only for the female *Varroa* as the male mites do not leave the cell.

With MAQS the formic acid molecule was made sticky. It penetrates the brood cap and is very effective at killing both male and female *Varroa* there, targeting reproduction. It is also effective at killing the phoretic *Varroa*. Therefore MAQS is effective against all stages of the *Varroa* life cycle. However, the developing bee under the cap appears to be unharmed by the treatment. By targeting *Varroa* feeding on developing bees under the brood caps, retarding virus transfer, MAQS is treating *Varroa* like the brood disease it truly is.

What is MAQS?

MAQS is a combination of free-formic acid and slow-release formates in a saccharide gel strip, made thin enough to fit into the bee-space. The gel strip is wrapped in a specially formulated compostable wicking paper developed with BASF. It is placed on the frame top bars in the brood rearing area of the hive. No rim or any other extra equipment is required.

MAQS technology, combined with the response of the bees, provides a fumigation treatment that takes place over a seven-day period. Formic acid is naturally occurring in hive air at levels of one to five parts per million (ppm), so is part of what bees smell like. I love the warm scent of healthy bees. When the treatment is applied the formic acid levels quickly elevate until the bees gain

Pre MAQS treatment, June 8, 2011

One hour after MAQS application, same hives now bearding, June 8, 2011. 93°F.

May 4, 2012, hive unwrap 4 years MAQS.

control of the formic acid level by movement of air. It is very important that the colony has adequate access to fresh air. The bees are quite comfortable functioning at 40 ppm and even higher; amounts greater than 20 ppm are toxic to the mites. Typically the bees will hold the formic concentration around 40 ppm level for three to four days, before dropping off to the naturally occurring level of one to five ppm a week after application. With MAQS the bees assume control of the mites.

Side Effects

With MAQS all the effects are acute, there are no long-term chronic or residual effects. There is a wide range of colony responses, even in the same beeyard. Bearding behaviour is not uncommon [insert before and after photos], but many colonies, even in the same yard treated at the same time, do not. Some colonies have some initial egg and young brood loss, others do not. Some bees, including queens, that are fragile for reasons from age to disease loads, are more susceptible to formic acid vapours. In some colonies, especially where supercedure or swarming was initiated by the colony pre-treatment, mother and daughter queens may be found post treatment. Where queen cells are found pre or post treatment they should be left alone for the young queens to emerge and mate. In short, the best approach with MAQS is for the beekeeper to apply the treatment after making sure there are good food reserves and good access to fresh air across the width of the hive, and then let the bees manage their affairs! Under warm conditions the beekeeper can validate the colony being queen-right one month after treatment as part of standard beekeeping practice. It should be noted that in the north in the Fall colonies may naturally shutdown brood-rearing for a period but there should be a healthy-sized cluster going into Winter.

Formic acid vapours are corrosive to ferrous metals, but not aluminium or most stainless steels. Some queen excluders get a white powder on them and will show rust around the edges over time. Plastic excluders are not affected; there are now some good ones available.

Residues??

Honey itself is naturally acidic, with formic acid being one of the naturally occurring acids making it so. When bees are treated with MAQS the level of formic acid in honey stays within naturally occurring levels. Formic acid is not lipophilic, so it will not be absorbed into the wax.

Adoption by the Industry, Testimonials.

Sustainable *Varroa* control is an on-going issue for many, due to concerns over residues and sub-lethal

California 2013, showing bottom board. (Woodworth photo)

California, Feb 2, 2013, spent MAQS strips from fall 2012 application. (Woodworth photo)

effects of other treatments. Although these issues are overcome with MAQS, treating bees with MAQS is a different approach, with an interactive response from the bees. There is a learning curve.

For the November 2012 California State Beekeepers Association Annual Meeting some members had requested that a panel of people whom had tried MAQS for a couple of years share their experiences as part of the agenda. The organizers agreed and a panel was arranged, made up of Frank Pendell from Stonyford, CA, a queen breeder and past-President of the CSBA, Bob Miller, Watsonville CA, of the CSBA Research Committee and a commercial beekeeper, and Randy Oliver, of Grass Valley CA, a commercial beekeeper and author of **www.ScientificBeekeeping.com**. From the presentations and questions asked there did not seem to be any concern over whether or not MAQS worked, the main subject of discussion was the effect on queens:

Frank Pendell shared some of his professional background and explained that, prior to using MAQS he was replacing and rebuilding over 40% of his bees every year. Treating with MAQS has reduced that, his bees are doing better and he is in better control of his queen replacement timing by using it. He also told a funny story about some spent strips. Frank likes to keep his bee yards tidy so he takes the spent strips that are removed from the hives as they work the bees, and dumps them behind the barn to compost. In the morning he was treated to the sight of wild deer, having found them in the night, eating them like candy, with the strips flapping from their mouths as they ate.

Bob Miller said that beekeepers needed to keep an eye on their queens and to be ready to replace them if they thought necessary. He had no trouble with acceptance of queens after treatment, so suggested beekeepers can just work the timing of treatment into their management practices.

Randy Oliver had been testing MAQS in various ways since 2010, and had had a lot of beekeepers calling him about it. Many callers preferred to use a single strip for a half-dose treatment (a standard dose is two strips), especially if they had permanently reduced entrances on palletized bees. Randy had not experienced queen loss issues himself, with either a full dose or a half dose, and speculated that his bees may be more use to treatment with fumigants because he had a history of using formic acid and thymol products rather than conventional products.

After questions and in summary, all members of the panel said they planned to continue to use MAQS in their outfits. They liked how the bees rebounded after treatment and the queen issues were manageable, with overall queen health and colony strength improved.

Migratory beekeepers Brent and Bonnie Woodworth

The Woodworth's keep bees in ND for the Summer, stage them in Idaho late Fall, and then take them into California in January to be prepped for the almond pollination. They were dedicated users of Mite-AwayII and were upset when the decision was made to transition to MAQS, taking Mite-AwayII out of production. In the initial use of MAQS in June of 2011 they estimated that they lost 10% of their queens and carefully kept an eye on things. As the summer progressed they had an excellent honey crop and the bees looked great yet they were leery about a Fall treatment. However, with some experimentation in the Spring they found the bees could handle the treatment with ease by off-setting the second brood chamber back far enough for the bees to come and go the full width of the hive. The bees came through Winter very well and were power units for pollination. Last year (2012) the honey crop was down due to the environmental conditions but the bees looked good. They again had treated with MAQS in the Spring and the Fall while the bees were in ND. The bees arrived in California in January in great shape overall. Here is their frank assessment:

February 3, 2013:

Some of the bees are light, so they are feeding. A couple hives on the first load had starved which is hard to believe considering how heavy the semis were when they hauled them to Idaho in November. The third load that just got there Brent was really pleased with, very few bad ones and very even in strength.

They have been shaking bees out of the really strong hives and evening up the few that need bees.....

..... All I am hearing is horror stories about losses. Major losses. The word is they will be short hives for almonds. Everyone is looking for more hives to fill their contracts and there aren't many anywhere. XXXXXX had a major loss, I heard he bought all 20,000 singles that XXXXXXXX had for sale in Florida. Many beekeepers have lost 60% of their hives. Frankly, Brent is one of the few smiling right now.

*Katie Lee will be doing the rounds in California checking the hives again. She will be even more impressed this round.**

**author's note: Katie Lee is part of the national Bee-Informed Project.*

Bonnie added February 10, 2013:

I would like to state in your article that we have used formic since it became available and we have not experienced any significant losses in those seven years. We did have some minor issues with Nosema, but now we treat twice a year with Fumigillin and have not had losses of field bees since we began regular treatments.

*Although it (*this treatment regimen*) is more labor intensive and more expensive than some treatments beekeepers have been relying on, the results are dependable and worth the effort and expense.*

Other treatments may seem inexpensive, but the cost to rebuild dead colonies must be factored in. Loss of honey production is also an issue that can be overlooked. Spending six dollars to treat a hive seems negligible when you can rent that hive for $150.00 for almond pollination. Now that the University of Minnesota has established the Bee Informed Partnership, we will have data to prove the effectiveness of MAQS. Get into a regular treatment program twice a year with MAQS and your bees will be as they should be, healthy and thriving.

There are many challenges to developing and bringing an effective varroacide to the marketplace. NOD Apiary Products is continuing to do research and development, and plans to have an extended shelf life formula available to the beekeepers in a couple more years. In the meantime, we will continue to share what we have learned to assist the beekeepers that want to transition to MAQS to have the healthiest and strongest colonies possible. BC

Grandevo™ - A New Biopesticide

prepared by **Marrone Bio Innovations**

Grandevo®, manufactured by Marrone Bio Innovations, is a new *biopesticide* with broad-spectrum control of various insects and mites, such as Asian Citrus Psyllids (*Diaphorina citri*), Twospotted Spider Mites (*Tetranychus urticae*), Beet Armyworms (*Spodoptera exigua*), and Sweet Potato Whiteflies (*Lycopersicon esculentum*). The active ingredient is a newly discovered *bacterium* that is effective in controlling pests by repellency, oral toxicity, reduced reproduction and egg viability. It is labeled for use on several agriculture crops, such as: Alfalfa, Cole crops, Bushberries, Citrus, Cotton, Cucurbits, Buckwheat, Fruiting Vegetables, Pome Fruits, Most Herbs.

While Grandevo has shown no effects on most beneficial insects, honey bees had yet to be tested in field conditions. Many of the labeled crops are pollinated or visited by honey bees. Therefore, a study was developed by Eurofins Agroscience Services, Inc., to determine the effects of exposure of honey bees to Grandevo. The study took place in summer 2012 and was directed by Jessica Lawrence in central North Carolina.

The study was designed with three treatment groups; Grandevo, applied as pre-flowering spray and again seven days later during full bloom and bee flight (Treatment T), a toxic reference treatment of dimethoate (Treatment R) during full bloom and bee flight, and a water application (Treatment C). The application rate was three pounds per acre of Grandevo for Treatment T and 1 Liter of product per hectare of dimethoate for Treatment R.

Each treatment was tested by spraying a plot of buckwheat (Approximately 20' x 90') that was in an enclosed mesh tunnel, with 3 plots per treatment. The buckwheat crop was grown with no other chemicals used in the field. Grandevo was applied to the treatment T plots during pre-bloom. Honey bee colonies were placed in the tunnels at beginning of flowering, four days before the second application of treatment T and the only application of treatment R (dimethoate) and treatment C (water). Mortality of the bees in front of the hives was recorded over four consecutive days inside the tunnels up to the application of Treatments C and R (second application of T). The mortality, foraging activity and behavior of the bees were checked over seven days after the start of exposure inside the tunnels. The condition of the colonies and the brood development were assessed once before and four times after set up of the colonies in the tunnels. The influence of the test item was evaluated by comparing the data from assessments of the treatment group T to the reference item group R and the control C.

Honey Bee Mortality

Mortality was observed by using dead bee traps in front of the hives, as well as a mesh layer inside the tunnel that included the first five feet inside the tunnel, a two-foot wide strip down the center of the tunnel, and a five-foot strip at the back of the tunnel. Dead bees generally accumulate at the ends of a tunnel, so the mesh strip placement would account for bee mortality. Each time bees were counted, the traps were emptied and the mesh was cleared of dead bees.

On the day of the start of exposure after the application in treatments T, C and R (corresponding to seven days after the initial application in T) the mean mortality in group R (dimethoate) was higher compared to the treatment and control groups with 30.0 bees/colony in C (water), 24.1 bees/colony in T (Grandevo) and 1808 bees/colony in R (dimethoate).

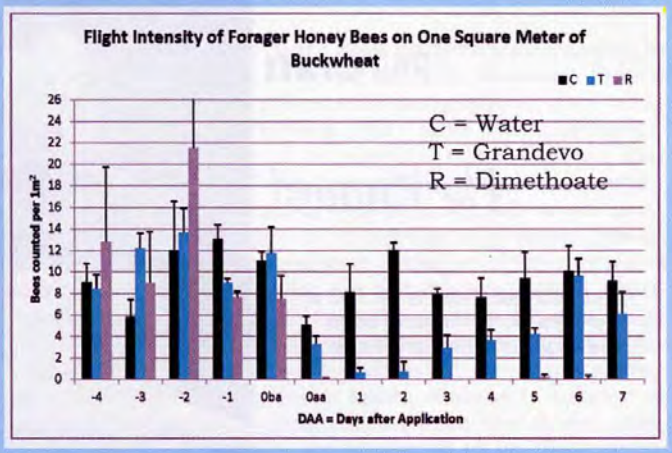
Honey Bee Flight Intensity

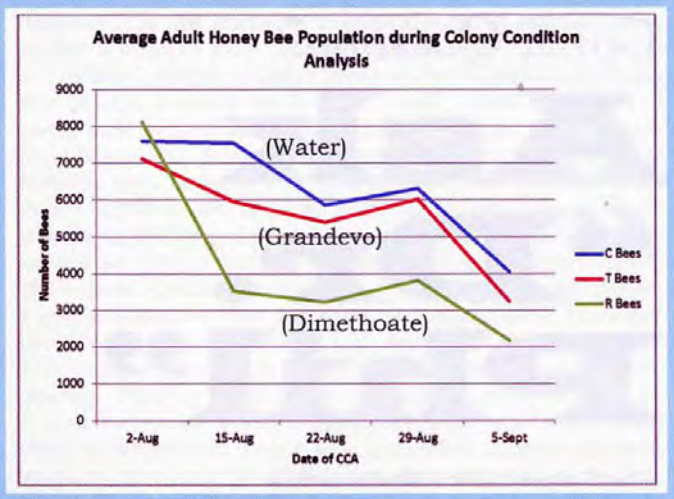
Flight intensity was recorded by monitoring a small section of buckwheat blossoms (approximately $1m^2$) for 30 seconds and counting the number of foragers present. During the first few days after exposure the flight intensity was temporarily reduced in the test item (T) group. On 4 (DAA = Days After Application) DAA2 flight intensity started to recover in the T group and by six DAA2 was similar to flight intensity in the C group, indicating a temporary repellency effect of bees. For comparison, the flight intensity in the reference group was significantly decreased compared to control during the entire exposure period. The mean flight intensity after the application was 9.1 bees/m^2 in the C (water) group, 4.0 bees/m^2 in the T (Grandevo) group. Flight intensity was 0.0 bees/m^2 in the R (dimethoate) group.

Condition of the Colonies

Colony Condition Assessments were conducted at five points in the study to monitor the overall effect on the hive. These assessments call for observations of the percentage of area covered by bees, open brood, capped brood, honey and pollen, and the presence or absence of pests and diseases in the hive. The percentage is then used to determine the overall area in the hive by calculating with one side of one frame being 100% = 860 cm^2. Each side of the 10 frames was observed. Overall strength was determined by the adult bee population.

The strength of the colonies in the control decreased over the course of the study. In the test item treatment group the number of bees per hive decreased during the exposure, but mirrored the patterns of the control hives throughout the study, although there was a slightly stronger impact during the exposure. In the reference item group the number of bees per colony decreased by





over half during the exposure period, but there was less than approximately 1,000 adult bees as the difference in population numbers in all three groups by the end of the study.

The number of cells containing brood decreased during the enclosure in the tunnels until DAA2 15 in all treatment groups. From 15 DAA2 onwards until end of the study at 28 DAA2 the proportion of brood increased in all treatment groups. No differences between the control and the test item treated colonies were observed.

Conclusions

The test item Grandevo was applied at pre-bloom, and again seven days later at full bloom during bee flight, at the which time the other two treatments were also applied. Grandevo was applied at a nominal rate of 3 pounds per acre to achieve the maximum label rate and usage.

The water treated control and reference item were applied during daily bee flight at full flowering of buckwheat. All applications were carried out with a spray volume of 9.35 L water/plot.

There was no effect on the bees of buckwheat pre-treatment with Grandevo three days prior to transfer of the bees to the treated tunnel. No effects on bee mortality or behavior compared to control were identified. No statistically significant increase in mortality was observed during the post application period for the test item treatment group.

A temporary decline in flight intensity was observed during the exposure period for the test item treatment group, which indicates a temporary, but non-lethal repellency effect of the test substance.

No unnatural decline of colony strength and brood development was observed in the test item and reference item groups and the control throughout the study. BC

For more information about Grandevo® bioinsecticide visit ***www.marronebioinnovations.com.***

Got A Question?

Ask "Dr. Phil"

Phil **Craft**

He Knows!

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

A beekeeper in New Mexico writes:

I am getting my bees this April and I live in a dry area with some flowers, but not much that blooms before May. Do I need to be worried about my bees not having enough flowers to forage on when I first get them, and is there anything I can do to help them? Thanks for any advice.

Phil replies:

Every beekeeper that I know of feeds packages of bees when they are first installed and nucs when they are first transferred to full size hives.

Before installing the bees, make some syrup by mixing equal parts of hot tap water and granulated sugar. (See the article on sugar syrup in the February issue of *Bee Culture*). This ratio of water and sugar mixes up very easily. There are a variety of feeding methods, but I like to use jars of syrup, with small holes punched in the lids. I set them on two small sticks over the hole in the inner cover, inside an empty hive body, and place an outer cover on top. The bees come through the inner cover to get at the syrup - very simple and cheap. I like cheap. Some beekeepers purchase top feeders, some use division board feeders (which take the place of a frame), and some use feeders which fit into the hive's entrance. All are effective, but if you have other hives or feral colonies near yours and there is not much nectar around, entrance feeders are not the way to go. Because they are so exposed on the front of the hive, they are prone to being robbed, meaning that bees from outside the hive steal the syrup. Once they start robbing, they do not stop at taking syrup from the feeder, but will invade the hive and strip it of stored honey, fighting with and killing the bees inside in the process. Robbing is not as likely if a nectar flow is on – meaning an abundance of natural food sources for bees – but that may be difficult for a new beekeeper to ascertain. If there are no other bees around you, entrance feeders are fine, cheap, easy to use, and easy to check and refill.

Continue feeding until the comb is all drawn out in the brood boxes. In my part of the country, we have a good nectar flow in the spring when packages are installed, but beekeepers still feed new hives. Feeding enables the bees to build comb faster and the colony to increase in numbers more quickly. When a nectar flow is on, bees may prefer natural nectar and will cease taking syrup that is offered to them, but keep the syrup on as long as they take it and are drawing comb. It is important to stop feeding before you add honey supers. You want only natural nectar in supers.

A beekeeper in Georgia writes:

Hi Phil, I have a hive that superseded in December. There is no brood, pupae, or eggs in the hive, but there is a queen, only she is small. The workers are bringing in pollen and nectar. Can she just run around the hive until we get drones and she can get mated or should I combine the hive? I live in southeast Georgia and the weather has been warmer than normal for the last week and a half. (80s). The other hives are starting to buildup. I have six hives total and am a hobby beekeeper. Any advice will be appreciated. Your Ask Dr. Phil column in Bee Culture is much appreciated. Thank You.

Phil replies:

A newly emerged, virgin queen will begin her mating flights within two weeks after emerging. During this time she is maturing and preparing for the flights. Once she is mature enough to begin the mating flights, she has only about three weeks in which to mate successfully. Delays would be weather related. Queens who do not mate during this three week window will often start laying unfertilized eggs which will produce only drones.

If it has been more than four or five weeks since your queen emerged, it is unlikely that she will mate. In that case, you should plan on combining it with another hive, or re-queen it when you can obtain a queen. You will need to kill the current queen before using either approach.

A beekeeper in Minnesota writes:

I have a question that I've never seen addressed in print as of yet.

If an open-mated Carniolian Queen mates with Carniolian Drones & Italian Drones, and the workers are a mixture of bees with Italian and Carniolian lineage, would the hive winter with Italian characteristics or Carniolian characteristics? I'm thinking specifically of honey consumption, Winter cluster size and brood rearing.

Photos on this page by Mary Parnell Carney.

Phil replies:

Let me first state that I have no advanced training in bee genetics, nor am I a queen breeder. However, I know something about the process of raising queens from reading and talking to breeders, and I have personal experience as a consumer of commercial queens. From that perspective, I think I can give you an educated answer.

Breeding pure strains of queens for sale is not easy, requiring queen producers to have isolated mating yards or to really flood the area with drone producing hives of the desired race. Queens are not discriminating about the drones they mate with, and will mate with as many as twenty or more. In natural mating areas, called drone congregation areas, drones of different races may gather from colonies several miles apart, making it difficult to control the genetic contribution from the drone side. Some queen producers are equipped to do this, or say they are. Many others are not. These comments apply to open mated queens, which are the kind commonly sold to beekeepers, and which your question concerns. Open mating means naturally mated as opposed to instrumentally inseminated. By artificially inseminating the queen, a breeder can control both sides of the genetic equation and obtain a pure strain. However, because of the time, skilled labor, and specialized equipment involved, this process is only to produce breeder queens (expensive queens used to produce more queens), in the breeding process and in research. The queens we buy for our hives, like the queens reared by our own bees, are open mated. Therefore, even though the queens have a pure lineage, their offspring might not.

I like Carniolan queens and often purchase them. I have bought both queens sold as Carniolan (presumed to be pure Carniolans mated with Carniolan drones) and queens described as Carniolan hybrids. The bees from queens I've purchased as Carniolan hybrids, have behaved like Carniolans. They Winter well, in smaller clusters, and build up rapidly in the Spring. In the Summer, during drought periods when no nectar is available, both the pure Carniolan and the queens described as hybrids reduce their egg laying – another trait typical of Carniolan stock. I have been quite happy with my hybrid queens, and I appreciate the honesty of the producer from whom I purchased them in labeling them as hybrids.

I often tell beekeepers that the quality of queens, which is a result of the skill and experience of the beekeeper raising them, can be as important as the genetics. Good genetics combined with a very good job of rearing (lots of young bees in cell builders, plenty of food and pollen available to the bees making the queens) will produce better queens than pure bloodlines and a poor environment for rearing. That's something to keep in mind when choosing a queen producer.

A beekeeper in Kentucky writes:

I have already lost three of my 10 hives this Winter and we've got several more weeks of cold weather to go. I only harvest the Spring honey and leave the Fall flow for them to stock up. I also offer sugar water in October. The hives that I lost had several full frames of honey in the hive. I have attached a couple of photos of dead bees. I didn't treat for mites last Summer/Fall. My thought was "it's been a great year for honey and the hive was boiling full of bees, surely I don't have a mite problem." Looking back, I can't rule out mites.

Phil replies:

Sorry you lost the bees; Winter is rough on them. When I look at your photos, two things stand out. One is dead bees with their head down in the cells. Dead bees in that position indicate starvation, even though there was stored honey elsewhere in the hive. The other is a very small, baseball sized cluster of dead bees. I'm certain that the low population contributed to the colony's final demise. It is not unusual to see clusters of starved bees, in the Winter or early Spring, inches from honey.

When I speak to beekeepers in the Fall about helping our bees get ready for Winter, I talk about numbers of bees, food stores, and colony health. As the colony goes into Winter, it needs to contain a strong population of healthy bees to survive until the warmth of Spring brings flowering and nectar flows and the colony can produce new bees. Having enough bees in the hive in cold weather is crucial. The larger the Winter cluster, the more easily the colony can raise temperatures to a survivable range. I tell beekeepers that we want at least 20,000 bees per hive in late Fall (about one full, deep box), but no matter how many bees begin the Winter, some will die before Spring. During Winter, the cluster must constantly be fueled by stored honey to produce heat, and they must move to additional honey as it is needed. A small cluster, such as the one in your picture, often does not make this move. It sounds as though you had a good population to begin the Fall *(boiling full of bees)*, and adequate honey stores, so why did your colony end up with too few bees to survive in the end?

I think that you are right in suspecting *Varroa* mites. We know that bees which suffer from parasite or disease problems do not live as long as healthy bees. I hear over and over again from beekeeping researchers and extension specialists that *Varroa* mites are still the biggest threat to the health of honey bees. Not only are they a threat in themselves, but they also exacerbate other disease and pest issues and even other problems such as pesticide exposure. I still see lots of *Varroa* mites, both in my hives and in those of beekeepers I visit. When beekeepers come to me with questions about colonies which have died for unknown reasons, I always ask whether they treated for *Varroa* mites. If they did not, did they monitor for *Varroa* and determine that it was not an issue? Almost invariably, the answers I get are no and no. They generally assume, as you did, that a hive strong in population does not have a *Varroa* problem.

I always assume that *Varroa* is present unless sampling indicates otherwise; it seems a logical conjecture based on my experience. At one time, professionals recommended that beekeepers automatically treat for *Varroa* in the Spring and Fall. Later we became concerned about over use of the toxic miticides which were the only treatments available at that time, so we advised beekeepers to monitor for *Varroa*, and to treat only when numbers were above a certain limit which we call the economic threshold. In the last few years, I have become concerned that this recommendation of treating only when necessary has become a practice among many beekeepers of not being concerned about *Varroa* at all and not monitoring their levels. We now have several newer and less toxic *Varroa* control products available – some produced from natural materials. My suggestion, unless you are confident that *Varroa* is not a problem based on regular monitoring and testing, is to treat to control *Varroa* in the Fall, using one of the less toxic products now on the market. BC

Dead bee cluster. (photo by Mark Adams)

Full and Part Time Income From Bees And Beekeeping

Larry **Connor**

Eleventh In A Series . . . Examine How These Materials Are Used In The Hive

In this session, we will examine the different ways people use bees and beekeeping as a source of income, from the once-a-year honey sale at a community fair, to commercial queen rearing or honey production. What does it take to have beekeeping as part of your income?

Classroom

Do what you love, for profit

There are unlimited rationales or excuses for getting into beekeeping, but what if you are interested in is a career, second income, retirement income or just something rewarding to do to get out of the house? Humans are remarkable in their ability to find ways to make money with things they like doing, and some say that is the best way to approach anything you do – become active and do what you love.

Honey

Honey bees produce honey in surplus often enough that humans can put on their bee suits, remove honey from the hive and sell that honey to other humans while still leaving enough honey to get the bees through Winter. Perhaps they instead harvest nothing until the late Winter, waiting for a seemingly inevitable colony death that leaves behind extra honey in the hives (an indication of high varroa mite levels). Or perhaps they may feed and medicate their colonies in order to harvest most of the honey in the nest in the late Summer and Fall.

Honey is sold in three popular sized containers. The 55-gallon drum is standard of the commercial beekeeper. This is the wholesale honey price listed in this journal in the *Regional Honey Price Report.* In the January 2013 *Report,* the average price reported for a 55-gallon drum was $1.95 per pound, up from $1.74 a year earlier. That was for light honey. Amber honey is a bit darker and sells for less most of the time. It was $1.82 last month and $1.67 a year ago.

The second popular container size is the 60-pound bucket. These were tin but are now white, food-approved plastic honey buckets. Last month, light honey sold for $165.22 per bucket, or $2.75 per pound. The same bucket with amber honey sold for $161.11 or $2.68 per pound.

The third unit of sale is a range of smaller containers from the half-pound (or some times smaller) jar to a five-pound jar. Here we see how the effect of container size, regional source of the honey, price and product competition and honey quality all interact to affect both wholesale and retail prices. If we look at just one size, the one-pound jar (glass or plastic), the average retail shelf price was $5.87, and $5.51 a year earlier, but when we look at the twelve regions used in the *Report,* we see a low of $4.82 in Region 7 (Great Lake states, Minnesota and Iowa). The highest average price for a one-pound container was $7.89 in Region 12 (West Coast States plus Nevada). What is always amazing to me is to look at the price range for this same product, from $3.00 to 9.79, for an identically sized container.

Who sells a pound of honey for $3.00? My limited experience indicates that this price will be found in very rural markets where there is strong pressure to keep prices low for loyal customers. These may be roadside sales outlets (even using the old honor system) or a lingering Mom and Pop market at the sole stop sign in the village. There is unpredictable variability in quality, attractiveness of the package and label, and marketing skill. Shut your eyes and see a sticky bottle of dark honey with the price marked on the lid with a large felt pen. Is the label made of strips of masking tape?

Competition is not really a factor that drives honey prices down in most markets. Given two equal-quality jars of honey from local producers,

An attractive display of pure beeswax candles at a commercial beekeeper's sales shop in Indiana.

Bees provided by a sideline beekeeper in apples. These colonies are on pallets, requiring a truck and pallet moving equipment both in the home apiary and the orchard. It takes a lot of colonies to justify this expense before any profit is realized. Hand-moving colonies is hard work.

many buyers prefer the jar with the higher price, thinking it is somehow better. This balances the buyer who always gets the lowest priced item. This put price competition at a net zero impact.

Who is able to sell a one-pound container of honey for $9.79? I find that easier to answer: sellers in upscale markets where the label conspicuously mentions the honey's local origins. They often sell by floral source AND zip code. I have seen this in Anchorage, San Francisco, New York City and other fancy city and country markets. I have also seen this at destination sites, such as beach communities, ski resorts and fancy shopping districts. The honey is more likely produced in small quantities, is of high quality and gets good taste feedback from customers. The container is clean, the honey bright, and the attractive label straight on the jar. There may be a small map showing the location of the hive or hives where the bees were located to produce this honey.

Honey comes in various forms: liquid, creamed (finely granulated), comb, chunk and in combination with pollen and other materials. Ask around and see how people buy honey in your area. *This is where you start your marketing program.* Go from market to market and find out which store or shop has what kinds of honey. Do you think some honey marketing could expand the demand of a particular product like creamed honey?

If you are going to sell honey, remember to calculate in shrinkage. This is the jar you open as a taster, or the sampler you keep on the kitchen table. Or the jar you broke in a hurry to pack up. Unfortunately, it is also the jar of honey that walks away without payment.

You can develop a healthy, local honey sales operation with the help of a good mentor; someone who has experience in selling hive products, or just sales in general. Many small business owners will share their experiences even if they do not market honey.

But if you want to go commercial and drive a big truck to different nectar sources, you are best served by going to work for a commercial honey producer for a few years. There is no substitute for industry experience, so ask to see all parts of the business. Remember to interview the beekeeper while the beekeeper is interviewing you!

Beeswax

How do you take a product that sells wholesale for between $2.25 to $8.00 per pound (and is produced from a healthy apiary in abundance) and create hundreds of dollars of sales from it? If it is beeswax, put it into lip balm in the Burt's Bees tradition. There is also an undeniable market for honey and beeswax creams, salves, burn and bruise ointments and more. Taking a few pennies' worth of beeswax, add in some base and essential oils, and you have a great product. You must calculate these materials, and any special equipment and packaging, into the formula.

There are all sorts of beeswax candles: rolled foundation, molded, dipped and fancy forms. A few years ago, candles were an easy sell everywhere, though much less so now. People's moods and habits change. If a potential customer already has a few candles at home, unburned, they probably will not buy a new one unless you have it formed into something unique and very timely, like the logo of a local sports team. That idea comes from Rich Weiske, Royal Oak, MI, who last fall sold a beeswax candle in the shape of the Detroit Tiger's logo. He sold hundreds.

Beeswax is a byproduct of honey extraction and comb recycling. Get the right equipment to produce quality beeswax, clean and without much dirt and contamination. Nobody wants a candle that blows up when they burn it! That equipment must be factored into the cost of your final products.

Pollen

Weiske also sells pollen that he traps from his hives. He sells it plain or in a mixture with honey, along side propolis as well. Collect bee pollen with the help of some of the good pollen traps on the market. Learn when and how to collect pollen, either from your mentor or your pollen buyer. Don't overlook local sales. Ask to put a few jars of fresh pollen next to the honey butter in the deli case? It is worth a try.

Propolis

If you keep bees for very long, you will discover that propolis is a challenge to overcome as it gets on you and your equipment. The hive's natural antibiotic, more and more beekeepers are collecting bits of propolis and making ointments and elixirs from the sticky stuff. Soaking small chunks of propolis in Everclear alcohol or another high alcohol product produces a powerful tincture for a variety of injuries. When I visited France several years ago I was impressed by a product soaked for six months in French cognac.

Pollination services

This goes with the truck driving honey producer, but local farmers may want to rent bees every year for certain crops. Evaluate the risk from pesticide exposure and from poor nutrition compared to the benefits of the big paycheck and a possible nectar crop. Keep in mind that most crops that need pollination are not always reliable for nectar and pollen production. Crops like blueberry are linked with European foulbrood due to the stress of pollination.

Bees

Sell extra frames of bees and brood as a method of reducing swarming. Who buys frames of bees

and brood? One group of buyers is people trying to make up increase nuclei hives and mating nuclei. Don't want to sell your frames? Then shake packages of nurse bees to these same people. Who said you had to get packages from Georgia or California?

Nucleus colonies

Look at the adverts for nuclei in this magazine. What do you see? $100? 125? $150? Try to shift from being a bee buyer to being a bee seller, as that will make a nice change in your cash flow. Learn how to produce a quality nucleus hive, one people want to get again to expand their business.

Queens (cells, virgins, mated queens)

To some beekeepers, there is a daunting learning curve to learning beekeeping and how to properly raise queen bees, yet I have seen teenage kids successfully pickup the grafting tool and manage nucs without prior bee experience. Remember, you could be selling a single bug for $25 or more.

Start out by producing queen cells from strong overwintered (survivor) colonies. Work with someone who has done this before. Take a class to develop your skills.

Start by selling queen cells and move up the skill ladder. Do not try to do everything in one year. Go into business with a 15-year old saving for college.

The claims you make, and staying out of trouble

Don't sell any product with a claim for which you may be held liable. Never make a claim about your product with regards to guarantees for a person's health, or other claims that could land you in hot water. Obey local laws concerning zoning, honey processing, and product safety. If your business takes off you will need to get insurance, see a lawyer, hire an account, and hopefully, retain an investment broker to handle all the money you make. Pay taxes.

Activities

Make something to sell

Select a product that you and your classmates agree can make you money. This might be as simple as rolling beeswax foundation into candles and selling them to classmates or other members of your bee club. Maybe you can get a table to sell these materials at a member's church's summer or holiday market.

Buy and Resell

How about buying a case of half-pound jars of local honey at wholesale from a local beekeeper (*Report* average of $67.22 per case of 24), and selling them for $5.00 each to friends and family. Buy at $2.80 and sell for $5.00, for a $2.20 profit per jar or $52.78 per case. This will let you know if there is a market for this product at this price point, and tell you if you have any skill selling honey. If a class project, use the profit to pay for something for the club apiary.

Bee business visit

Make arrangements to visit a sideline or commercial beekeeper who provides products and services as a base of their annual income. Make a list of the items this beekeeper uses as an income source, and try to determine the amount of time each activity takes and the percentage of profit it contributes to this person's net income.

Discuss with your peers or write out the strategy you saw in place to figure out how to adapt this beekeeper's business plan, or even how it might be improved. How much of the beekeeper's activities are determined by luck – the size of the honey crop, the amount local growers will pay for pollination services. Evaluate the concept of the only way to make money is not to play (take risks). What does that mean? When is it still worthwhile to carry on a for-profit enterprise when there is little chance of making a profit? BC

Vocabulary

Wholesale, retail, profit margin, costs of sale, shrinkage, honey in surplus, 55-gallon drum, *Regional Honey Price Report*, 60-pound bucket, rural markets, zip-code honey, liquid honey, creamed honey, comb honey, chunk honey, rolled foundation candles, molded candles, dipped candles, comb recycling, fresh-frozen pollen, European foulbrood, swarm reduction, survivor stock, skill ladder

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Rooftop Bees Part 2

Beekeeping a story or more above grade may not be unique to urban beekeeping, but it is one of the more common and more recommended practices here than elsewhere. This is the second article (of two) meant to help beekeepers thinking about setting up or managing an existing rooftop apiary. Previously, we talked about access and safety for bees and beekeepers, structural concerns, and neighbors. This time structural concerns, neighbors, bringing in a high elevation harvest, moving a hive off of a roof, pest issues, how elevation impacts the bees, and Winter preparations.

The Rooftop Beekeeping Top Ten:

1) Access
2) Beekeeper Safety
3) Honey bee Health and Safety
4) Structural Safety
5) Neighbors, Vandals and Other Third Parties
6) Honey Harvests On High
7) Moving a Rooftop Hive
8) Pest Management Issues
9) High Altitude Habitats
10) Wintering on the Roof

Number Three: Honey bee Health and Safety

Roofs are actually fairly groovy places to be a bee. Dr. Tom Seeley tells us that they would prefer to be at least 40 feet up in a tree anyway, and in places where trees are their main forage, rooftops are like front row seats.

Nonetheless, some roofs hold unnatural hazards for honey bees. Mine has air conditioning units and satellite dishes, bigger buildings have all this at a far larger scale, with additional ventilators for things like kitchens and furnaces and labs that may not be honey bee friendly.

If you have a choice, try to site your bees far from any roof edge, but also a good distance from machines that vibrate or blow fumes. Windbreaks make all the difference in long term hive vitality, and you can try to provide one (shrubs, cement blocks, hay bales) if you want to experiment.

On your initial site survey, keep an eye out for equipment that leaks (especially air conditioners) or other pools of suspicious liquid that might prove tempting to a thirsty bee. Make sure there is something better, like a really murky tray of algae filled water that you provided, if you think this might be an issue.

Some beekeepers have reported that pools and fountains have created honey bee problems, for different reasons. Fountains that run all winter do that by using antifreeze – hazardous to bees as well as family pets – and some of the more luxurious apartments or hotels have them.

On the benefit side, it appears that pests like Small Hive Beetle have a relatively harder time completing their life cycles on roofs (though they can continue to fly in) and *Varroa* and wax moths are rumored to struggle a bit more in this more highly ventilated environment. Bees in North America do not seem to mind the hotter and colder temperatures, though I have used fans that help cool the hives on the hottest days.

Number Four: Structural Safety

If your potential rooftop apiary is on a private residence or an older public building it pays to have a look at, and account for, the structural strengths and weaknesses of the roof.

My roofer advised me to place my hives as close to the bearing walls as possible, and directly over roof joists that he identified for me. For townhomes, bearing walls are often the party walls between units, and they often jut above roof surfaces. This provides a double benefit of a windbreak and visual barrier from neighboring structures.

He also provided me with a protective roof walkway pad that I could place over the roof membrane itself in the places I would be traversing most frequently. These are available online in 30' rolls – consider splitting one with a friend.

If your roof surface requires a hive stand, place its supporting members on joists and near bearing walls if at all possible, and try to spread the load, especially if your stand will hold more than one hive. It might not be a bad idea to use a skid proof pad here, too.

Try to watch the loads placed on your roof by numbers of visitors or the kinds of activities you undertake up there. I once terrified a fellow beekeeper by jumping around on his antique roof, trying to dislodge a swarm from an overhanging tree branch. Duh.

Educate yourself about the strengths and weaknesses of the roof surface you have been dealt. I found out the hard way that I needed to be more careful where I put down my lit smoker. Prepare to be honest with yourself if your roof needs significant repair before it can take on such a role, or if it's just not the right place for you or your bees.

Number 5: Neighbors, Vandals and Other Third Parties.

Probably the main benefit of urban rooftop beekeeping is the extraordinary solitude and separation from the ground level hubbub it brings, but even here other people do play a role. In the city, there is a strong statistical likelihood that you will run into someone who does not want bees and does not want to hear about it. Roof apiaries tilt the odds in the bees' direction!

Hiding in plain sight is just good policy for a home apiary in dense environments. It means that the people paying attention to your bees are more likely to be on the lookout for them because they appreciate them. While I am lousy at keeping them secret (I write about bees in magazines, for example) about half of my neighbors still have no idea what I am doing up there. And we are both happier that way. My apiary is visible from an apartment building about a block away, so I painted the hive bodies the same color as the trim of my house. Most times, I think the hives look like additional HVAC gear.

We have had sad conflicts where rooftop beekeepers here have had to remove hives in adverse conditions due to neighbor threats and complaints, and I do believe this could happen to anyone. The roof can protect you from a lot, but not from stupid or angry. You can do a lot

to prevent the latter with good hive management, but there is no cure for the former. Try to manage your risk by lowering your profile and figuring out, in advance, with whom you are going to share.

Rooftop vandalism is rare, but if other people use the roof, make sure you post a sign that indicates that the bees are there, and that they are beneficial, but that unauthorized visitors place themselves at risk. It is a good idea to communicate in advance with other roof users to prevent inadvertent interactions, and to build channels of communication that might come in handy if a swarm emerges or a weather event or accident topples your hive.

In summary, if its your roof, it's your business, but if you are sharing premises, be prepared to share information and expectations.

Number Six: Bringing in an Elevated Harvest

Rooftop bees are widely reputed to be wildly productive, and the ones I have at tree-top level support that. Even though I leave two mediums plus of honey for wintering, we still average 50-75 or 100 pounds of extracted honey per hive. At ground level, averages are more like 35-60 here. Michael Thompson of the Chicago Honey Coop (CHC) shares a similar observation, pointing out that their roof hives yield more than the 60 other hives they maintain at five ground-level locations around town. He says, "All roof hives seem to produce more honey than ground level ones and they over-winter slightly better in my mind." A non-CHC-hive on the roof of Chicago's City Hall hive has brought in 200 pounds in a city where 40 is the norm! In any case, harvesting honey will likely require the second truly heavy hauling work (after installation) of your rooftop beekeeping life.

Therefore, all the safety advice mentioned holds extra-true here. Make sure your access is stable, and bring a helper if you can. Bring a charged cell phone if you can't. Keep your workspace clear and watch your footing. It's likely to be hot: bring some water.

But what can you expect after all these preparations? Are all elevations created equal? Can you always just listen to what the neighbors are harvesting and grab that and a bit more? You need to think about it.

Before you decide how much honey you can harvest from your rooftop apiary, remember that all beekeeping is local, and that in a city "local" can vary from one block to the next, and certainly from two stories to 10. If you can swing a rooftop hive scale, you can collect a lot of tremendously valuable information about your nectar flow and how much of it is being stored, and compare it with others who do the same (check out **www.honeybeenet.org** for more information on hive weights and nectar flows). You can also break your honey harvest into several visits, or just take a few frames at a time, like some of the approaches below.

If your rooftop has relatively safe and easy access, via a few stairs or an elevator, and a full-sized door, the actual mechanics of performing the harvest may be very similar to any ground-level site in your area. In cases like this, the limiting factors may only be how much you can carry, and what sort of spaces you need to carry it through.

At my house, I have discovered that I can carry up to a deep's worth of honey without assistance (but with some hyperventilating) down the spiral staircase that leads to our roof. Stacking even well-covered boxes of pulled frames tends to attract unwanted attention, so I bring each down to the kitchen right away and then return to continue. This would be a real workout in a 10-story walkup!

Also, no newly pulled box of frames ever seems to be truly bee-free, and you won't always catch the hitchhikers on the back of your suit, either. When we harvest boxes at the Fairmont Hotel, we have to bring them through a corridor of hotel rooms. So we bring a hospitality cart up to the roof ("Ding-dong! Roof service!"), load all the boxes of honey frames at once, cover them carefully and watchfully, leave our bee suits upstairs, and bolt down that hall to the service elevator.

If your roof apiary is hosted at a business, or even your employer, you really have to plan that harvest around possible stinging risks. Saturday access might be a really good thing, or another daylight time when fewer people are around. If you are moving boxes through areas containing non-beekeepers, let folks know so the allergic and the terrified can take appropriate measures. Be sure folks know there may be some bees bouncing at the windows later, and that you can come back to catch them.

The USDA People's Garden Apiary here in DC had a different approach the first time they harvested from their hive: they did it right there on the roof of the Whitten Building! On July 15, 2010, Wayne Bogovich – co-beekeeper – and his helpers from USDA/ARS, USDA/NRCS and USDA/FSA pulled frames and brought them to the opposite side of the roof, where they had set up a portable extractor and a mosquito tent. They harvested as long as they could in the open, 100-degree air, and then moved inside the tent when enough bees discovered their location.

They also used the occasion of the harvest to install a hive scale, which is used to monitor the hive and inform for future honey harvests!

Harvesting the Less than Perfect Roof

If you have to access your roof through a small hatch or a ladder, you will find harvesting to be more challenging than hoisting up or assembling empty gear was. Before you start, determine how much you can handle, by both size and weight, though the entrance you are using. Most openings that can handle a person can handle a five-frame nuc box. I recommend that you acquire one or ⇨

By All Means

The beekeepers of Washington DC received a huge gift in December 2012 when the City Council unanimously voted in favor of a bill legalizing beekeeping in DC. On January 16, the Mayor signed the bill, effectively changing the game for honey bees in DC and the folks who look after them. You can do this, too.

The short version of the new law is that beekeepers are allowed four hives per ¼ acre, and must maintain a setback of either 15 ft. or six ft. with a flyway barrier provided. If you can't do either of those things, you can get the permission of immediate neighbors. Both TBH and Langs are fine. Beekeepers are expected to practice swarm prevention and provide water. Reasonable, though still not perfect. The full text of the Sustainable DC Act of 2012, featuring the Sustainable Urban Agriculture Apiculture Act of 2012, is at http://dcclims1.dccouncil.us/images/00001/20130124112432.pdf

Under earlier laws, beekeepers here have been variously instructed to move hives, to alter Certificates of Occupancy to include apiaries, to "cease and desist," or to install hives at community gardens and recreation centers, among other options. Life was like a box of chocolates.

Historically, most beekeepers chose to stay anonymous and simply gave up on any idea of influencing government and changing the law. That was probably a rational response, as environmental and health concerns took a distant back seat to development and crime issues. But the past 10 years have seen a resurgence of demand for sustainable urban living here, complete with community gardens and city homesteading, and that shift was led by people who had not given up on having their voices heard. In short: new beekeepers. Not just one, lots.

Over the past 10 years, downtown beekeepers have become less and less reticent to let friends and neighbors know they keep bees. In some of our cases, it's because we had safe havens should the hammer came down.

And demand for bees was there, and showing up in the darndest places! In the case of Charlie Brandts on the South Lawn of the White House, his whole apiary was the most public safe haven in the world, under Federal jurisdiction and clearly no threat to anyone (least of all the thousands of children who roll eggs past the hive each Easter). We also had two or three cases of local beekeeping businesses and non-profits opening up which needed to publicize their presence and the importance of their work. DC had beekeepers in the Washington Post (multiple times); with YouTube channels; in student documentaries, CNN and the

two of these (the cardboard ones are lighter, but won't put up with much of this), and practice lowering them through your entrance. In your situation, it is more important than ever to do this with a helper, perhaps someone to whom you can hand down the capped frames! If you are using a ladder, do not attempt to climb down carrying a full box or nuc of honey: find some way, via rope or hive crane or some other ingenious beekeeper gizmo, to lower your frames to the next, safer level.

Or consider an approach used commonly across Europe: instead of doing one or two major harvests a year, you can pull a couple of frames from time to time to consume as you go. If you use thin surplus foundation or go foundationless, you can make beautiful cut comb and serve it right at your table like our not-so-long-ago forebears did.

Number Seven: Moving a Rooftop Hive

If you thought harvesting was a challenge, just wait for this one.

Moving any hive is heavy work: moving from on high requires logistics, collaboration, and sometimes the loss of a lot of bees.

I've moved intact hives onto and off of my roof a couple of times, and have learned that the most successful moves require start-to-finish thinking through, in the company of your helpers (you will need them), and at least a week or more lead time.

If you can plan your moves well ahead, choose the season when they are lightest and when you have the best potential to recover from potential queen loss. If this is an emergency, try to find the least stressful way to reduce your colony's size by removing empty boxes and repositioning the minimum possible stores, removing all the resources you can (you can put those back later). I like to swap out a wooden inner cover for a screened one, and carry the tele cover separately during the move.

If you have plastic bottom boards, you really need to swap them out for wood at the time you strip down the hive. This is a lesson learned about the flexibility of plastic in the middle of a spiral staircase with a full sized colony.

Many of the usual techniques for moving a hive plug in here. Secure entrances with nailed on screening the night before or before dawn. Secure boxes with hive staples or better, two ratchet straps. Try to move the boxes with the entrance of the hive facing forward, so the frames inside don't rock so much.

When moving a hive downstairs, I find it helpful to have a full sized human carrying on both sides, and one backing down ahead to help steady, spot foot placement, and warn passersby.

For a narrow staircase or an industrial ladder, we have used a high quality hand truck for moving hives up and down. Choose a very sturdy cart with nice rubber tires, secure the boxes well to each other and to the cart, and practice maneuvering the hand truck with empty hive bodies a couple of times before taking this on. Use two really big strong people above to lower (using ropes if necessary), and one or more below to spot and guide, though NOT directly below the hive as it comes down. Remember to prioritize the safety of people over that of the colony at all times.

Some disassembly required?

If your hive boxes won't fit through your entryway, you are going to have to take your hive apart to move it. Don't bother closing entrances or buying ratchet straps, you're just going to have to lose a bunch of bees.

Much like when you harvest, you will need to reduce your hive in advance and get some nuc boxes. You will need to match the number and depth of the boxes to the amount of bee-carrying frames you intend to move. If you have a choice, please perform this maneuver when the bees are not likely to be in cluster.

I advise attempting this in mid-afternoon, when the maximum number of foraging bees are in the field. Have your nuc boxes nearby with the lids open and the entrances closed. Start as if you were performing a regular inspection: go frame by frame until you find the queen, place her frame in the first nuc box, provision her well with frames of nurse bees and some pollen and honey, as if you were making a split. Mark that box and move it with loving care to the next, safer level downstairs.

Then begin packaging up the rest of the frames. Try to keep frames that were neighbors in order in the same nuc box, and label the boxes of frames that came from the same hive body (so you can reunite them later). Try to work quickly but carefully, and don't try to move all the boxes

local news; on news radio and NPR; in neighborhood newsletters and the Huffington Post. We, en masse, were kind of lovably unavoidable.

General outreach activity does not craft a law, however, and this is where beekeepers elsewhere can learn from our mistakes. Though beekeepers here have undertaken individual projects with public schools, the parks department, the transportation department, our local council members, and other agencies, none of these sponsored the law. Instead, successive mayors of DC have sought to further the city's green credentials, and current mayor Vincent Gray launched an initiative, "SustainableDC," which, in the end, almost beat us to the punch unawares. Beekeepers did not end up informing the provisions of the law until almost the final hour, and could have lost TBH and rooftop beekeeping as a result.

What should we have done in DC? We should have thought about whether beekeeping was appropriate subject matter for any of the legislative committees, and should have met individually with the committee staff as well as the members and their chiefs of staff. (No, email is not good enough.) When SustainableDC was launched, we should have fallen all over ourselves to meet the people in charge. Beekeepers in every ward of the city should have shown up to at least one of the constituent "meet and greet" sessions held by council members and the mayor on a regular basis, and should have just asked one question, "Can you help me?" And a little honey wouldn't hurt!

These activities are easier to pull off if you have even a loosely organized beekeepers association or meetup in your city. If you don't have such a meetup, consider shouting out for one: many local churches, rec centers, or even coffee bars are happy to host, often for free.

Once you get something going – in our case, an amendment that saved the day – write letters and emails like crazy – say "Thank you! Thank you!! Thank you!" and try to get non-beekeepers to write, too.

And don't stop there. Now that DC has passed a pro-beekeeping law, regulations, fees and fines are needed, a process expected to extend over several months. Beekeepers need to be at that table to ensure that madness does not reoccur. We also need to keep an eye on the horizon – through lively connections with relevant politicians and agency officials – to make sure that new opportunities and obstacles are not a surprise, and to make with our own two hands the sustainable future for beekeeping that our communities deserve.

right now. The idea is to get this done before the bees completely lose their cool. Good luck with that.

Carefully lower your boxes of bees one by one, take them gently to their new hive site (transport them with entrances forward as above), and try to put them back together in as close to the original order as possible. I am not sure there is much science in that, but it makes me feel better.

To minimize bee loss, reserve a frame (preferably an empty brood frame) and nuc box with an open entrance to remain at the site of the old hive's stand. With some luck, many foragers who were away when you deconstructed their home will return somewhat confused, and congregate inside. Come back after dark or (better) before dawn to close the entrance and take them to the new site. Mist them with sugar water, dump them in, and hope for the best.

Number Eight: Pests at Higher Altitudes

When I started, some beekeepers thought that rooftops would be hard places for *Varroa* to thrive. In my experience they do just fine, but the environment may be tilted just enough towards extremes of temperature, good ventilation, and low humidity (compared to the ground) that the bees enjoy a bit more advantage. The truth is that you cannot take the healthfulness of a rooftop apiary for granted, and we could really use more experiments in this area. In Chicago, Michael Thompson also speculates that that ventilation, dryness, and lack of predators may boost rooftop honey bee health. Wax moths seem to have a much harder time getting started, and I have never seen chalkbrood on a roof.

The one provable advantage may be in cramping the style of Small Hive Beetle. Though SHB routinely fly into rooftop sites, and each adult can lay thousands of eggs, the hatched larvae are unable to complete their development because they must exit the hive and burrow into surrounding soil in order to pupate. These crazy tough larvae are able to crawl quite a long way, and could potentially get off of your roof, but roof surfaces are often too hot, and survivor numbers are certainly much lower. Therefore, SHB are hampered in building up exponentially, and your bees have a better chance to manage them. I still recommend the installation of the hive beetle trap of your choice to further throttle the little $#@&^s!

I have never seen a rooftop mouse, but do not discount the possibility, especially in older buildings or apartment buildings with kitchens on every floor. I use mouse guards made of hardware cloth to inconvenience the bees as little as possible.

Finally, if you use chemical interventions to manage *Varroa* or other pests, make sure you know the temperatures on your roof and the guidelines on the package, and pay attention to possible interactions with your roofing surface or the activities of people in adjoining areas.

Number Nine: How High is Too High?

Being on the high ground certainly has the advantages of security, productivity, protection from pests, and more described elsewhere here, but beekeeping teaches that everything is a tradeoff. At what point do the costs of being on a cool urban rooftop start outweighing the benefits or challenging the viability of the colony itself?

When asking these questions in the past, I have turned to Jim Fischer of New York City Beekeeping, **www.nycbeekeeping.org**. Jim teaches the absolutely free bee course at Central Park Headquarters from January to May, then follows that up with hands-on workshops until the Fall.

Jim shared some rules of thumb: in his experience, wind velocity and turbulence can be a problem for the bees at 12 stories or more, but it is better to learn the actual situation your bees will face. Cities are not all created alike. Randall York & Joanne Young of Cloister Honey, who keep bees at the Ritz-Carlton in Charlotte, NC, have faced few such issues at 19 stories.

An anemometer, especially the kind that tracks and transmits data, can give you a good feel for wind speeds at your prospective site (I use a VantagePro2 that publishes to the Internet). If that's not in the cards, you can find maps of weather station locations near you at WeatherUnderground (**www.wunderground.com/wundermap** – includes elevations! I'm KDCWASHI37). He also suggests asking people familiar with the site or located at nearby roofs how strong gusts can get.

As in real estate, "location-location-location" only gets more important the higher up you go: a hive near a parapet wall is much more

productive than a hive smack in the middle of a roof, as the bees get a less gusty takeoff/landing area. Conditions at the entrance may influence decisions to forage or stay home, though this has not yet been tested scientifically.

In NYC, and potentially other dense urban centers, the rectilinear grid of tall buildings tends to accelerate winds and cause them to swirl as they come off the downwind corners of buildings. The "terrain" effects – man made cliffs and canyons – can make some lower and seemingly well-shielded areas into "no-fly-zones" for bees

Michael Thompson in Chicago recommends that you check for drafts before installation, "though I find that honey bees can compensate for these. We have one, especially large air current caused by a giant nearby skyscraper and the bees struggle to land and take off nearly every day. Still, the affected hive has survived (mostly) and produces well."

Wind worries don't center as much around chilling the hive as they do the ability of the foragers to overcome its energy. You can place an observation hive or a nuc at your proposed location, open it up, and count the bees leaving and returning over several hours, hopefully on more than one day. Fischer relates, "I once put an observation hive 25 stories up, and had zero foragers return out of several hundred outbound sorties, so I ended that test after three hours." Another approach would be to once again take advantage of a hive scale, measuring daily over a period of a week or two. Nectar is heavy enough to make accuracy less important than the general trend of "gain" or "loss."

To evaluate the wind and turbulence effects at your particular elevation, it might help to understand a bit how your bees travel. Honey bees like to fly slightly above what they perceive as treetop level, and in areas they perceive as clearings, somewhat below that. For a city bee with a hive stationed at 10 stories or more above ground, the fairly uniform four to six story surface of residential townhome or brownstone roofs becomes a flat clearing, and only rarely do they venture down below roof level to forage on smaller trees. Outbound from a 10-story hive, a bee will gradually drop down to perceived treetop height above that. On the way home with a full load, the bee will perform the familiar upward spiral to get a fix on the sun, and fly at about 10 feet above perceived terrain. The bee will change altitude to fly over tree tops, but will drop back down after. For years, Fischer has watched his 10-story bees fly in this manner around 5th Avenue, into the Park, and east over other buildings!

The higher you get, the more seriously you should consider a system for strapping or lashing your hive in place. Remember that hive stands can tumble, too, and that the material your straps are made of needs to be weatherproof and resistant to sun damage.

Even more, Fischer emphasizes attention to the bees' high-level habitat. If you can, paint dark roof surfaces white so they don't "cook" in summer, and try to address building mechanicals that make noise and vibrations. He says, "new belts are cheap, easy to install, and solve most of these problems, but the well-prepared urban beekeeper is ready to oil the squeaky wheel, pulley, or fan, as they can certainly annoy the beekeeper, even if not the bees."

Number 10: Winter on the Roof

Two of the lessons it can be hardest to learn for new beekeepers apply even more strongly on the roof: "Take your losses in the Fall," and "Bees do not freeze to death, they starve." Managing hive height is also important, as well as knowing how your bees are going after their stores.

If you are running Top Bar Hives on your roof, I strongly suggest that you skip my advice and go directly to a local or national expert on this technique (there are some great new books, too). Wintering is the premier challenge for TBH in the Northern tier, and you should take particular precautions here.

Roof hives will be subjected to higher winds and will have to generate more heat as a result. Initially, I believed heat rising from the building below would moderate this effect somewhat, but my weather station informed me (at least at three stories and relatively recent insulation) this was not the case. In this area, most beekeepers don't wrap their hives for Winter, and I have considered doing this on the roof, but have opted not to so far. Michael Thompson echoes this: "We don't wrap hives on roofs in Winter but have considered it. May try it this year, maybe not. As a BBC broadcaster said "..whatever happened to Winter?"

Jim Fischer points out that it may be crucial for higher elevation beekeepers to wrap any area under the hive with pallet-wrap or roofing paper in Winter to create "dead air" under screened bottom boards to block wind passage that can suck warmth and moisture from the cluster.

My roof bees seem to need a larger population and a well-placed food supply in order to survive. Therefore, I have to be pretty hard hearted in the Fall, and combine colonies that do not have enough bees to cluster effectively. It pays to know your bees' genetics if you can: my Carnies are viable at softball-size (and seem to insist on it) while my mutts and Italians need bigger families.

It's heartbreaking to find one of those big families starved out. Even with good-sized stores, bees can "stovepipe;" eat a small passage of honey straight up, and end up above their stores. It seems (more science needed here) that bees can follow the "chimney effect" of the heat they have generated, perhaps magnified by leaving too many boxes on a wintering hive. Therefore, just knowing that you've left a lot of honey or sugar on the hive is not enough: try to figure out how quickly the cluster is moving up by taking a peak on a warm day or knocking and listening during long cold snaps. I am a maniac for feeding fondant in January and February, when brood rearing restarts.

In the Spring I will even position a new rooftop hive in a less optimal way – facing south, for example, instead of southeast – if I think that it will be better sheltered from winter winds. I use extra entrances during Spring and Summer that I close by October, and I reduce any entrances that do not face a windbreak. By November, I close my screened bottom boards, watch them kick out the last few drones, and hope I have done what is best for my girls.

Your bees' best hope is that you will be tuned in to the rooftop habitat to which you have introduced them as well as to their particular needs, strengths, and frailties. Get as much advice as you can, but pay even more attention to them, to the weather, to the available forage, and – eventually – to your gut sense of what is going on up there. I'd encourage you to discard preconceived notions and instead receive, undiluted and on high, brand new insights and connections to your urban environment. BC

Buying Nucs

How To Buy, And Sell, A Nuc

Daniel **Berry**

The resurgence of interest in honey bees almost everywhere is generating not only a new crop of backyard beekeepers in urban and rural settings, and with that a noticeable increase in the number of small and sideline apiaries now operating across the U.S. I view the rise of these small operations as one of the most heartening signs for beekeeping today. Aside from the prospect of providing many families with an added income stream; small and sideline apiaries stand to add resilience to the industry by diversifying our stocks of bees genetically and geographically, bolstering the production and appreciation of local honeys, and producing local queens and bees sold for apiary increase.

Every emerging enterprise, however, faces its own set of hurdles and growing pains. A noticeable consequence in the appearance of these young apiary businesses is their varying level of quality control, especially in regard to the sale of Spring and Summer nucleus colonies (nucs). The following account illustrates what can happen when bad nucs change hands, emphasizing the need for both sellers and buyers of bees to better understand the potential benefits and liabilities of this complex product.

Expanding with Purchased Nucs

In December 2012, with a few seasons of enthusiastic backyard beekeeping behind me, I made the decision to expand my apiary from three to thirty hives in the span of one year. I projected my inputs and outputs, drafting a work plan in which these thirty hives would become the seed stock for a modest, one-hundred hive honey production operation that I hoped to have up and running by 2014.

I made the decision to carry out this expansion with purchased nucs rather than package bees, reasoning that, though I'd be paying more for each nucleus colony and installing it about a month later than a package of bees, I'd also be getting a more solid start with five deep frames of drawn comb filled with brood, honey, pollen, and three or more pounds of bees. Most importantly, I'd be acquiring a well-established unit of bees led by a vetted, laying queen with desirable characteristics.

A few days of internet research and price-comparing led me to a small apiary in New York state, which was located just two hours away from my home base and seemed to offer many of the attributes I was looking for in bees:

> "Our queens are specially bred from hygienic stock that has been selected for honey production, wintering ability, and ease of manipulation."

> "I never use chemicals on my bees and never plan to, so you'll be getting bees that are strong and well worth the money."

> "We test each queen for laying ability and production..."

A phone conversation with the apiary's proprietor—who emphasized the multiple prizes his honey had received and his experience as a third-generation beekeeper – closed the deal and confirmed the availability of the bees next Spring. We settled on an order of 21 nucs scheduled for pickup in mid-May. I felt hopeful and glad to move on to the next steps of purchasing and preparing equipment for the season ahead.

Early Problems: Tardiness and Missing Queens

The first in a long line of problems I experienced with my nuc seller and his product was a delay in the availability of the bees. Due to a cold snap coupled with prolonged rains in late April, the apiary had been unable to properly breed their first round of queens, so orders would start two weeks late. This seemed reasonable enough to me, knowing the effect that fluctuations in the weather can have on bees. But the two weeks turned into a three, four, and ultimately five week delay – a period in which I wondered if the bees would materialize at all.

The next surprise appeared the day after picking up the nucs. Despite having randomly inspected several of them prior to acceptance and found them satisfactory, I was displeased to find while installing them that 20% of the units were in fact queenless. Of these, several already showed capped supersedure or swarm cells – a clear sign that the nucs had either swarmed prior to their date of sale or experienced a queen failure, which the bees were now well into the process of trying to replace.

Old and damaged frames culled from the nucs I purchased this Spring, prior to being burned. The central frame is apparently 28 years old, and several frames bear markings from beekeepers unaffiliated to the nuc seller. How many chemicals and pathogens has such wax been exposed to?

Small hive beetle larvae feeding on pollen patty removed from a nuc.

Queens among dark lines of bees can be especially hard to spot in a crowded hive. Marking makes finding them much easier, and lets you know if she has been replaced (the replacement won't bear a mark). This photo shows my breeder queen, purchased from Glenn Apiaries in California. Her marking is so bright that I can often spot her on a comb without even removing it from the hive.

Calls and e-mails to address this situation went unanswered by the apiary for days, such that I was ultimately forced to deduct the cost of the missing queens from the final payment and left to replace them on my own. Monitoring the acceptance of these new queens, as well as suppressing the ongoing swarming impulse that had already taken place in many of these nucs, resulted in many additional visits to my outyards – a considerable outlay of time, fuel and money that would have otherwise been unnecessary.

Late Problems: Pests, Sick Comb and Disease

No sooner had I stabilized my nucs from the missing queen fiasco than I encountered the next problem accompanying my purchased colonies of bees: small hive beetles. Though common in much of the southern U.S., small hive beetles are not a regular feature of the New England landscape and I have never before seen them in my own hives or those of any other beekeeper in my county. Yet here they were, suspiciously present in the colonies I'd purchased but nowhere to be seen in my own overwintered hives.

Since I'd never confronted their kind before, dealing with these creatures entailed a sharp learning curve. I quickly discovered that female beetles are delighted to lay eggs in and around pollen patties, and that commercial traps hung between frames and filled with oil proved largely ineffective. Ultimately, the only way I found to manage these pests without recourse to chemicals entailed conducting lengthy inspections throughout the Summer to find and remove each of the adult beetles in a nuc. (Only time will tell how successful my efforts were, as adult small hive beetles are good at hiding and can survive harsh winter temperatures by burrowing deep in a cluster of bees.[1]

Then, as if I hadn't yet experienced enough complications, around the end of September four of the nucs in one yard suddenly crashed under heavy mite and viral loads (no other colonies in my operation experienced this), while a fifth nuc in another yard developed clinical symptoms of American Foulbrood (AFB). This last discovery was particularly worrisome to me, given the highly infectious nature of this disease and its potential to devastate an entire operation if left unchecked.

Since my bees are isolated from other beeyards and I have never had a case of AFB before, I can only conclude that it entered my apiary by way of the old, contaminated comb included with my purchased nucs. To keep the disease from spreading, I immediately destroyed the affected hive and its contents, conducted a widespread inspection to ascertain if other colonies in the yard showed similar symptoms (they didn't), and began a prophylactic antibiotic treatment of every hive under my care. As an additional preventive measure, I removed and burned every frame of dark, questionable comb supplied by the nuc seller – 30 deep frames in all, the oldest of which turned out to be 28 years old!

After reviewing my season's records, conducting final inspections and combining weak colonies in early October, only 11 of the 21 nucleus colonies I purchased remained viable in my operation. So much for a good return on my investment.

Other Scams

While they are more the exception than the rule, there are unfortunately many ways in which unscrupulous beekeepers can cut corners at the buyer's expense when selling nucs. Perhaps the most common, already outlined above, is to include old, damaged (and potentially diseased) frames in nucs. In this way the seller literally gets paid to get rid of old comb, which any responsible apiary would instead be rotating out at intervals of five years or less at their own expense.

Another notorious practice is to outfit nucs with non-productive, second-year queens that have been culled from production hives due to subpar performance. This saves the beekeeper the trouble and expense of producing and mating fresh spring queens, or of parting with his younger set of productive, over-wintered queens. In recent years there's been reports of nucs originating from the south being sold in New England whose queens were

[1]See Connor, Larry. "Update, Burr Comb, and Breeding Lines" in Bee Culture, August 2012.

questionably Africanized, and of attractively priced summer nucs assembled from heavily medicated, stressed-out migratory colonies whose performance ultimately disappointed their customers.

Some operations will raise nucs for sale in waxed cardboard boxes for up to eight weeks. Though cheap and convenient for transportation purposes, these containers are unsatisfactory for long term field use because they are poorly ventilated, will absorb moisture and consequently promote mold and fungal disease (Chalkbrood). The devil is in the details, as the saying goes, so be sure to ask plenty of questions and understand your seller's practices before you commit to a purchase.

Practical Advice for Buyers and Sellers

Given the lack of anything but an informal code of ethics among beekeepers governing the sale of nucs, the best lines of defense we have as beekeepers are the same time-tested principles that apply to any sustainable agricultural enterprise: be informed, use common sense, and permeate your work with care and attention to detail. In this spirit, I offer a few recommendations which might help buyers and sellers of nucs achieve success with their transactions.

Buyers:

1. *Understand the pros and cons of purchasing a nuc.* Acquiring a lousy nuc is a potential liability which will at best not pay for itself, and at worst jeopardize your entire operation. Conversely, a good nuc purchased from a reliable source will be not only problem-free, but a delight to work with and a simple way to improve or expand your apiary.
2. *Network to evaluate vendors.* Fellow beekeepers are your best resource in vetting sellers. Do not purchase nucs from anyone unless you can confirm positive experiences on past transactions by beekeepers that you personally know or trust. Do not purchase nucs based purely on information described in ads, hearsay, or websites. Ask the seller for references long before you buy. If possible, talk to the inspecotr in the sending state.
3. *Personally inspect your nucs before accepting them.* You have both the right and obligation to inspect a nuc before accepting it. If buying five or fewer nucs examine each to confirm the presence of a queen, eggs, brood, pollen, honey, clean comb, and at least three frames of healthy bees. If buying six nucs or more, randomly examine 30% of the colonies.
4. *Learn to recognize problems early.* Whether it's a disease, pest, or queen issue, you should be able to diagnose and recognize problems early. If in doubt, seek the help and advice of fellow beekeepers and/or your county bee inspector.
5. *Be vocal.* Reputation is critical to every beekeeping business, so share both your good and bad experiences among your peers. In doing so, you will bolster reputable beekeepers and weed out the hucksters.

Sellers:

1. *Know your strengths and limitations.* Do not attempt to sell nucs or queens unless you've spent ample time refining your practices, and are confident in your capacity to deliver a high quality product on a timely basis. Count on the fact that your good work – or any slyness – will not go unnoticed.
2. *Mark your queens, date your comb.* It doesn't take much time to do and saves customers a bundle of trouble – they will find and keep track of queens with greater ease and be reassured about the age and quality of the comb you provide them with.
3. *Charge what you deserve.* A top quality nuc takes a great deal of skill, labor, and resources to assemble, so charge accordingly! If you're providing fresh comb, an established and productive queen, three to four frames of brood and bees, plus one frame of honey and pollen, a nuc may command a price in the $135-165 range.
4. *Educate your customers.* Just as your bees and honey are a crop, think of your customers as a crop too. Ensure their success by providing support materials that they can refer to as they care for their nucs. Consider offering a free "short-course" on pickup days to groups of buyers, as well as keeping a few "office hours" each Spring to answer questions and offer practical advice.
5. *Register with the Better Business Bureau.* Doing so brings a great deal of reassurance to your clientele about your practices; it also offers valuable arbitration services should any business-related disputes occur. BC

Ropey test confirming the presence of American Foulbrood in a failing nuc.

A BEAR FENCE THAT WORKS

Completed fence.

Bees and Bear can coexist. Here's a fence that works.

Bob **Ball**

My wife and I live in an area infested by Black Bears. It is in the middle of about one and one half million acres of forested area in the White Mountains of New Hampshire. I use the word "infested" in a positive way. We really enjoy having all the wildlife around our home. Watching a female bear forage with her cubs is a really quite a treat.

But when we decided to go into backyard beekeeping a few years ago, we were apprehensive about putting an apiary in the middle of all this wildlife. Getting started, even for just a very few hives, was expensive and labor intensive. We had heard many stories from local beekeepers of Black Bear destruction. The thought of a hungry bear ripping apart a hive, box by box and frame by frame is enough to make you think twice about spending all the time and money to get an established colony. And the realization of what might happen to the bear is also troubling since it typically is assigned a title of "nuisance bear" and has to be relocated or even killed by wildlife officials.

So, when we decided to move forward with our backyard apiary, it was important to us to find a way to allow the bees and bears to coexist. It would be a win-win for everyone. Certain plants, like wild raspberries, blackberries, and blueberries are critical for the bears survival. These plants are also pollinated by the bees and they enhance the crop for the bears. These fruits are good sources of pollen and nectar in the early season for the bees. And then, we get some great honey from the bees. Everyone wins! All we needed to do is find a way to reliably keep the two separated. We needed a super reliable barrier, a bear-proof fence.

Before designing such an apiary fence, I decided to learn more about Black Bear behavior. After attending a talk given by a wildlife biologist at our State Beekeepers Association meeting, I talked with one of our local New Hampshire Fish and Game Bear Biologists and invited him to come look at the apiary and provide suggestions. I learned that Black Bears . . .

1. are really intelligent. They have excellent memories, for both good and bad experiences.
2. can smell a honey beehive a long distance away and are mainly interested in the brood in the hive as a protein source, although they also enjoy a good frame of honey for dessert.
3. establish routes for their foraging for food and can

Detail showing the corner bracket, stretching bar, and stretching clamp.

Tee bracket for vertical pipe on panel.

Gate detail.

Clips to hold chain link top and bottom.

Base board with plastic insulator board.

remember good, successful food spots along the way for weeks at a time. It is almost like they have a built-in GPS receiver with locations set of good food sources. Or, who knows, given their intelligence they may use little post it notes in their dens to document the locations of all the goodies they have located.

Fence Requirements

With this in mind, I started looking at several fencing arrangements being used by beekeepers. Many beekeepers just use simple wire fences around the apiary. But I concluded in our location, the fence must be more robust and meet the following requirements to be effective:

1. It had to be completely electrified in such a way that a bear would get enough shock to remember it on the first touch of any part of the fence. First impressions are important to Black Bears. If our bear had a bad experience on the first touch, it would probably not return to try again. So, the fence must have sufficient charge. Our local NH Fish and Game Biologists indicate that 6000 Volts is usually adequate. This sounds like a lot of voltage but it is important to realize that the current supplied is also important. The current must be high enough for the bear to experience the charge but not so high to damage the bear. Most modern fence chargers automatically limit the current value to a safe amount.
2. It must work in our soil type in both wet and dry conditions. This means it must have a good grounding system to insure enough current to be effective.
3. The fence must be easily maintained. Weeds that grow into the fence can provide an alternative path for the current and reduce the current to the bear. The bear then quickly learns of a failed fence and places the apiary high on the list of places to visit on the next trip.. another post it note on the den wall.
4. It has to be mechanically strong enough to withstand the first push by the bear. If the bear can easily push the fence to the ground, the fence will short out and be rendered useless. Then the bear will probably put the apiary back on the "revisit" list.
5. The fence has to be movable and expandable. My wife and I might want to move or grow our apiary at some time and thus we need a fence that can move with the hives.

Design

A picture of our resulting apiary fence is shown in the photo. I decided to make it of chain link panels that are completely electrified and are constructed from readily available components. The panels are very strong and can be bolted together by standard brackets to get the size and shape required for our apiary. Then the entire set of connected panels are electrified by the charger. These connected panels are then installed over a wooden/plastic barrier that serves two purposes. It insulates the fence from the ground and also keeps vegetation from shorting out the fence. The panels and base boards can also be disassembled and moved if necessary.

Building the Fence

My first step in building the fence was a trip to the local building store to buy the hardware for the panels. Both of our local big box home improvement stores had a section that sold all the standard fencing components I needed. I purchased the following for each panel:

1. A top and bottom rail. The rails come standard as 1-3/8 inch outside diameter and are 188 inches long.
2. End and middle vertical rails. These are cut from the same 1-3/8 inch tubing. I cut mine to 44 inches long to accommodate a standard gate, also available with the fencing supplies.
3. Corner Fixtures. These connect the top and bottom rails with the vertical end rails. Three bolts are then tightened to lock in the rails.
4. Tee Connectors. These connect the vertical support pipe to the top and bottom rail.
5. Enough chain link fabric to cover the length of the panel. This comes in rolls. I bought an entire roll but local fencing companies would probably sell it by the foot.
6. A stretching end bar with bracket and attaching bolts for each end rail.

7. Clips to hold the top and bottom of the chain link fabric to the rails.
8. A preassembled gate for one of the panels to allow access.

I also purchased these materials for the base:

1. Enough 2 by 5.5 inch pressure treated boards to place on the ground under the fence.
2. One 1.25 by 5.5 inch plastic decking board that will be cut and used as an insulator for the fence.
3. A section of 1.75 inch PVC S40 electrical conduit that will serve as an insulator to the metal vertical support stake. One PVC cap is also needed for each vertical support post.
4. Four ground rods and enough number 14 wire to lay under the base.

One Joule fence charger.

Insulated support pipe.

Construction

Panels

Once I had purchased the supplies, the construction was pretty straightforward. I built four panels, but you could do more if you want a larger area. The steps I completed for each panel are:

1. Cut four 44" pieces of the 1-3/8 inch pipe(two for the ends and two for the vertical center supports).
2. Bolted the top and bottom rails to the end rails using the corners brackets (shown in photo)
3. Installed two vertical braces using the Tee brackets (see photo). On the panel with the gate, I installed the second vertical brace at the right distance to accommodate the gate (see photo).
4. Cut a section of chain fabric the length of the panel, pulled it tight and fastened it using the vertical stretching bar and clip. Next, wire clips were installed (see photo) on the top and bottom to snug up the fabric.

Base

Construction of the base consists of 5.5 inch wide boards that are laid on the ground and fastened together at the joints with an insulating board, made of 5.5 inch plastic decking board (see photo). The ground board raises the fence slightly off the ground and prevents plants and grass from shorting out the fence. I then:

1. Determined the section of ground where the fence was to be installed and marked the boundary with a spray can.
2. Installed one ground rod on each edge of the fence. This will insure an adequate charge to the bear even under the poorest, driest ground conditions. The rods are then connected to each other via #14 copper wire and brought to the location of the charger. I use a one joule charger (see photo) that is powered by a 12 volt deep cycle battery, although a AC powered charger with similar energy capacity would work as well.
3. Placed the base boards over the ground rods and connected the corners with decking screws using a short section of the plastic decking boards. The decking screws can be removed if the fence is ever moved or resized. The fence corners and mid points of the fence panels will rest on these plastic boards, insulating them from earthen ground.

Putting It All Together

I then set the constructed panels on the base and used the corner clamps (see figure 2) at the corners to securely bolt everything together. The chain link panel was set near the inside edge of the base so that I could install a metal support post to keep the bolted panel from being moved off the base.

I made the vertical metal supports from more of the 1-3/8 inch tubing. They were driven in the ground near the inside edge of the frame. I then slipped a section of PVC tubing and cap over the metal pipe and used a metal tractor clamp to connect it to the vertical pipe on the panel (see photo).

I also painted my fence with a light coat of black spray paint. This is a optional step since all the fencing components are protected against rust. But, it does give the fence a better appearance. The painted fence still provides an adequate charge through the painted surface.

Results

The fence I have described here has been in use for three years. While is unwise to ever understate the power of a bear and say a fence is completely "Bear Proof," our 10 hive apiary is routinely visited by bears and none of them have elected to cross the fence. Many of them have left piles of droppings in the vicinity of the apiary to remind us we are living in their territory. We have watched many bears walk up to the fence, take a good whiff of the apiary and then walk away after hearing the clicking charger and remembering that first bad encounter they had with the fence. This fence appears to be doing well.

There are certainly less complicated and cheaper fences available to beekeepers, but to me, putting extra resources in the apiary fence is the only fair thing to do for the health of your bees and the bears. Yes, I believe it is possible for Black Bears and Backyard Beekeepers to coexist. BC

Plan Your Field Day Now!

Ann **Harman**

Is your local association going to have a really fascinating field day in Summer – or one cobbled together at the last minute? That last minute plan that is supposed to include the team of Fred and Liz and their useful demos isn't going to happen. They went on vacation.

If you had done your planning now – look at the calendar – in April, you could have had Fred and Liz because you could have chosen another date. So let's think about planning that field day now. Decide how weather will affect the date. Will a rain date work? Consider intense heat and thunderstorms.

Many urban bee clubs would like to have a field day but urban locations may mean someone's small backyard with three hives. You don't want people to be bumping into your small plot of tomato plants. Perhaps it is time for your urban, or even rooftop, bee association to ally with a nearby large-acreage suburban or rural bee club. A day in the countryside and having a good time with bees would be appreciated by beekeepers living in a city. After all, bees are bees no matter what their address.

You can call it a Town and Country Day. Newbees from both clubs are to be especially invited with open-hive work planned just for them. Since open-hive demos are a feature of a good field day ALL who attend must wear veils. Other protective clothing can be the attendee's choice. Those opening the hives and giving instruction are included in the word 'ALL.' Make it clear both in the announcement and on the day – no veil, no entry to the bee area.

Where to start? Well, how many came to last year's field day? How many do you think will come if you plan a really spectacular – and different – field day? That number can help you decide where it will be possible to have your exciting and informative afternoon. Although this day is not a family fun day – it's a learning day – who has room for all those beekeepers and a place to park all those cars and pickups?

A successful field day will have a program. Planning it and doing it are an effort. So for that day to be successful tasks need to be assigned. Perhaps members of the urban group could bring some snacks and plenty of bottles of water. The two clubs can decide about other drinks. Everyone should remember that bees could be attracted to foods containing honey or jars of honey for tasting. You don't really want to start a 'bee event' or a robbing frenzy so perhaps the food should at least be stored inside. You can decide where to eat. Perhaps honey tasting could be saved for a cold-weather indoor meeting.

Since the Country beekeepers are supplying the venue and doing some of the open-hive demonstrators, ask the urban group to participate in planning the program. Displays and presentations from a combination of both groups mean a different program for all.

With the increasing interest in novel hive design, such as top bar, Warré and others, it would be nice to include those in the day's activities. However such hives, even empty, are not easy to transport so the two clubs can try to find a way to include such in the program. With some advance notice (remember this is being planned in April) perhaps a poster with many photographs could be displayed and the owner of the hive could give a short talk and answer questions.

Beekeepers love making gadgets. Invite the members to bring a gadget they made and have them on display. If the use is not immediately apparent, either the gadget-maker can be available to describe it or the maker can print out a description and have it available to be read by those interested.

At the time of year of the field day probably everyone has equipment catalogs so there would be no need to request a supply of those. But the National Honey Board (honey.com) supplies recipe brochures and the two beekeeping journals can send some sample copies. If both the urban and the country club have newsletters these could be shared. Yes, many newsletters are electronic but if some copies could be printed for distribution it would be nicer than just handing out slips of paper with a website scribbled on. Some club newsletters are available only for dues-paying members so a website won't help for the Town and Country Day.

Does someone have a very peculiar-looking piece of bee equipment, perhaps some antique or homemade gadget? If so it could turn into a contest. Put it on a table with a sign 'What is this?' or 'What is this for?' Leave a pile of small sheets of paper and a few pens. One guess per guest. If someone guesses correctly a small prize can be given.

Prizes could come from equipment suppliers. Tell them it is a Town and Country Field Day and explain briefly how and why the day is being planned. Give a brief description of some of the contests you are going to have. Since your field day has a different approach perhaps you will receive a number of items for prizes.

Now you need to have some more contests. You could have a honey label contest – have everyone bring one honey label. Pin or tape these to a poster board, number them and

Everybody has a veil, room to park, and good food later.

give out slips of paper. Everyone votes for his or her favorite and the owner of the label with the most votes gets a prize.

Here's another fun contest. Take an inner cover and put on it a number of pieces of beekeeping equipment – capping scratcher, a hive tool, a spur embedder, whatever else you can think of. Cover it with a cloth. Those that wish to participate gather around; the cover is removed for one minute then covered again. Everyone writes down as many things as they remember. Oh – there is a catch – the inner cover is one of the items. The winner is the one who named the most items.

A smoker-lighting contest – everyone brings smoker and fuel. At GO! contestants stuff and light smoker, with a time limit, and then set it aside for a given time. At the end of that time the smoker should still be lit and delivering sufficient smoke after a given number of puffs. This contest is not recommended if it would be a fire hazard.

Those who are courageous enough to catch workers could have this contest. Participants get a jar with lid. The jars could actually be one-pound honey jars so that all the jars are the same. Each contestant (wearing a veil!) goes to a hive and tries to capture as many bees as possible in a given time, one minute for example. The bees have to be caught going or coming at the entrance. Not fair scooping bees off the front! The winner has the most bees in the jar.

You can probably think of other contests. Swarm capture stories can be fun. However, now we have to think about the bee activities for the afternoon. Since you are planning the field day in April there is time to question both associations about some demonstrations they would like to see. You will have plenty of time to find out if some suggestions are not practical. In addition some may be more popular than others so the attendees may have to take turns at a demonstration.

Depending on the number of newbees, one or two hives can be set aside for some general inspection. Encourage questions! Let a newbee describe what she saw and could not figure out. Ask questions of the newbees to focus on things they need to know. These colonies do not need to be perfect. In fact if one has a problem, it could be even better than a strong one with a spectacular queen.

Making and using nucs is popular but some beekeepers have not tried it yet. Nuc-making can be a demonstration without bees by using empty equipment and frames with labels stuck on top of the top bars. The frames do not even have to have comb. Beeless nuc boxes and hives would be nicer for the bees. The hive boxes and nucs can be left open for a long time, frames pulled and put (even dropped) with no bees to get smashed or brood to be chilled.

The outdoors is a good place for some beeswax demonstrations. Cleaning wax, making candles and ornaments are all good demos. But the wax must be heated in a water bath, a double boiler. A camp stove can be substituted for hot plates and electricity. However, think the beeswax demonstration through carefully. You do not want spilled wax and fire as dangers to attendees.

Queen rearing is in demand by beekeepers who wish to raise a few for themselves or a small quantity for sale. A good demonstration should include several ways of raising queens. Some beekeepers will be interested in grafting, a technique that needs lots of practice. Can someone demonstrate cell punching? That is a method gaining popularity. Choose one or two other ways so that the beekeepers can see that there is no one way to raise some queens.

If the sun is hot perhaps a canopy type of tent could be used for the grafting demonstration. Although initial attempts of grafting can be discouraging, it is important to let people try. Since the two clubs will be giving advance notice of the field day if queen rearing will be in the program encourage beekeepers to bring magnifying glasses so they have a good look at the size of larvae.

Now for some miscellaneous things. Don't forget nametags! The combination of two clubs makes nametags really important. Sticky label badges and a collection of pencils and pens that actually write will be needed for nametags and the contests. Perhaps the cost of paper plates and utensils could be shared between the two clubs. Tell everyone to bring a chair. This field day is not recommended for an assortment of young children who are not beekeepers. They can come on a Family Fun Day picnic. Try to recycle water bottles and other appropriate trash.

At the end of the day, **everyone** will help clean up. Give a resounding thanks to the host and to those who did the demonstrations, brought things, and made the Town and Country Field Day a success. It could become a yearly event. BC

Ann Harman has been running and helping to run meetings all over the country for many years. She lives and keeps bees in Flint Hill, Virginia.

All The Buzzz in...

Hello Friends,

April showers bring May flowers with lots of great nectar and pollen for the worker bees to take back to the hive.

Bee B.Queen

Bee B. Queen Challenge

Create a tongue twister.

Olivia, 8, PA

Aryandra Lebo, 9, PA

Brandon Zeager, 7, PA

"Bee Hive"
Iley Polstan, 3, PA

Andrea Yoder, 12, GA

"Snow Bees"
Emma Jorden, 6, LA

The Wonderful Worker Bees

In the bee hive you will find one queen, a few drones, and a whole lot of workers.

The worker bees do many different jobs in the hive.

The youngest worker bees clean out the cells and cap the brood with wax. Slightly older workers take care of the brood and tend to the queen.

The wonderful worker wished the windy wet weather on Wednesday would whoosh away.

There are plenty of jobs for the middle-aged bees. They keep the hive clean by carrying out the dead bees and other bits of dirt and debris. They help to handle the food by packing pollen in cells and receiving nectar. These worker bees build the comb using wax they make from a gland on their abdomen.

The oldest bees in the colony help keep air moving through the hive by fanning their wings. They also guard the hive. These foraging worker bees leave the hive and bring back four things that the entire hive depends on: nectar to make honey for food, pollen to make baby food, propolis to help seal up the hive and keep the hive sterile and water because, as you know, all living things need water to survive.

When you see a honey bee on a flower you can say "she" because worker bees gather pollen and nectar and the worker bees are female.

Photo by Mark Wieland

As you can see, worker bees stay very busy. They can accomplish much more by working together than by working alone. For instance many bees can build a home much faster than one bee by herself. Everything they do is for the good of the entire hive. We can learn much from our small flying friends.

... Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
April 2013

Working Workers Song

Tune: I've Been Working on the Railroad.
Words: Kim Lehman

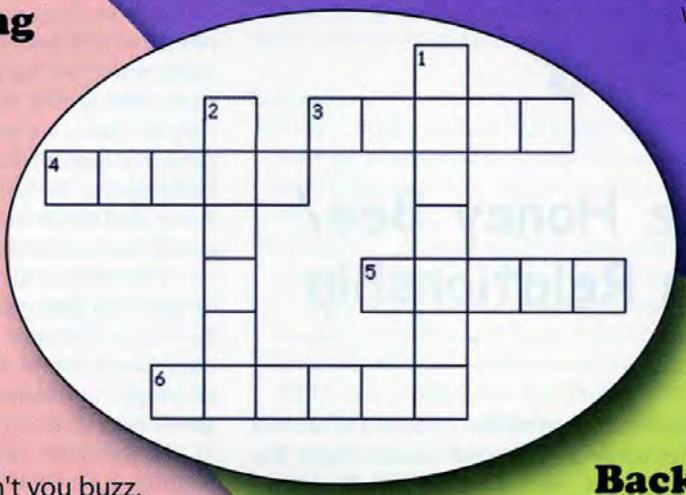
Workers working in the bee hive.
All these nice warm days.
Workers working in the bee hive.
In, oh, so many ways.

Building comb and feeding babies,
Fanning wings, cleaning out the hive.
Guarding, foraging and flying,
To help the hive survive.

Workers, won't you buzz. Workers, won't you buzz.
Workers, won't you buzz around, around.
Workers, won't you buzz. Workers, won't you buzz.
Workers, won't you buzz around.

Someone's in the field finding flowers.
Someone's in the field I know.
Someone's in the field finding flowers.
Looking for a nectar flow and singing,

Flee, fly, flittery-i-o
Flee, fly, flittery-i-o
Flee, fly, flittery-i-o
Looking for a nectar flow.



Loki Rucca, 5, PA

Logan Thomas, 4, PA

Back to the Hive Crossword

Across
3. The name for the baby bees in a hive.
4. The number of days a worker bee is in the egg stage.
5. This is the place where the queen lays the eggs.
6. The male bees in a hive.

Down
1. A beehive consists of a queen, a few drones and a whole lot of ____.
2. The foraging worker bees bring back pollen, propolis, water and _____.

Kaitlyn Smith, 12, PA

Alexandra Podhajsky, PA

The Development of a Worker Bee

Photo by Kim Flottum

The worker bee begins as an egg laid by the queen bee.

Egg: After 3 days the egg shell dissolves.

Larva: For 6 days the larva is an eating machine. She then spins a cocoon.

Prepupa: The worker still has a larval skin and looks like a larva for about 2 ½ days.

Pupa: The pupal stage begins when the larval skin is shed. The pupa has the features of an adult bee and changes from white to a blackish color in 8 days.

Adult: The pupal skin sheds, the wings expand and adult chews away the cell cap in about a half a day.

Total: About 20 days

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Answers: 1. workers, 2. nectar, 3. brood, 4. three, 5. cells, 6. drones

Thoughts & Feelings

On The Honey Bee/ Human Relationship

Ross **Conrad**

In the December 2010 issue of *Bee Culture*, I broached the idea that as beekeepers we could benefit from the cultivation of our personal relationship with the honey bee. I maintain that cultivating feelings of love, appreciation and gratitude for the colonies in our care rather than depending solely on science and rational thinking, may allow us to become better beekeepers.

There are good reasons to suspect that our thoughts and feelings toward bees do in fact impact their health and well-being. While this concept does not enjoy scientific consensus, it is important to remember that despite what some people may think, science is not the last word on everything. At its best, science is simply our best guess on the nature of reality based upon what we know. Since what we know is constantly changing, so is our best guess of the nature of reality. At one time the scientific consensus held that the world was flat, that margarine made from hydrogenated oils was healthier for us than butter, that climate change would proceed at a slow pace, and that *Varroa jacobsoni* was responsible for massive honey bee losses.

Then there is science's blind spot: feelings like love. Not being a tangible object, scientists are not able to measure, weigh, or quantify such feelings in any meaningful way. In effect, to science there is no such thing as love, and yet even the most hardened scientist will admit to the existence of such feelings. With the exception of the field of psychology, feelings and emotions have became the domain of spirituality and religion and as a result, science and religion have come to been seen as irreconcilable antagonists. This is unfortunate because it has prevented us from fully understanding the power of feelings like love and utilizing their energy to the greatest benefit.

Albert Einstein recognized that while science can tell us what is, it takes the morality and spirituality of religion to tell us what should be. This apparent conflict between science and spirituality is illusionary however, as the two should go hand-in-hand as Einstein himself notes: "Science without religion is lame and religion without science is blind."[1]

In our scientifically focused materialistic world, one's feelings and personal experience is looked upon with suspicion. This occurs despite the fact that the mind can lie to us and lead us astray, but our feelings never lie. If something does not feel right, then things are not right. It is that simple. Yet we often deny the value of our personal experience and allow our rational mind to over-rule what our heart may be saying. This despite the fact that all of us experience occasions where the logical or rational mind has deceived us, while our gut instincts and feelings could have been counted upon as a true guide. With this realization, it becomes evident that the best decisions are made when we combine our hearts and our minds rather than letting one rule over the other. Another aspect of this is that as a culture we need to learn to honor the personal experience of the individual. As individuals and beekeepers, we stand to benefit greatly by placing more value and trust in our feelings and intuitive flashes and could use societal support.

This idea is all the more important given that money or political interests can corrupt the scientific process. To make matters worse, true scientific advances are often available at least initially, to only a small number of people, preventing the bulk of humanity from taking advantage of them.

Meanwhile, the value and power of trusting in our feelings has been demonstrated over and over. At the Eastern Apicultural Society (EAS) conference in Burlington, Vermont last Summer, author Jacob Rowan pointed out in his keynote address the experience of Edward Bach. Bach was a physician who in the 1930s developed Bach flower remedies that were intuitively derived based upon his psychic connection to plants, as opposed to being based upon medical research using the scientific method. When he felt an undesirable emotion, he would find a plant that when close by made him feel better and he would attribute the ability to heal that emotion to that plant. He eventually developed the technique of suspending the plants flowers in water while exposing them to sunlight in order to transfer the healing power of the flower to the water. Bach flower remedies are still in use and available today.

Homeopathic remedies are based upon a similar model and employ the concept of "like cures like," where a substance that causes certain disease symptoms in healthy people will cure the same symptoms of disease in sick people. Remedies are prepared by diluting a substance in alcohol or water often to the point where not a single molecule of the original substance can be detected. While some research has shown homeopathic remedies to be very effective,[2] many other studies have found the remedies ineffective[3] and much of the scientific community regards homeopathy as a sham. Advocates of homeopathy suggest however, that water has memory and the process of mixing a substance into water leaves a vibrational memory in the water even when the mixture is highly diluted.

Research by Masaru Emoto has sought to document water's memory by photographing frozen water crystals after the water has been exposed to various aspects of human consciousness.[4] Through his photos, he maintains that the crystals formed when water is frozen are effected by the thoughts, feelings, and words that the water is exposed to prior to freezing. Photos of water exposed to the words "love and gratitude" for example, show a beautifully intricate fully formed crystal, while water exposed

to the words "you are a fool" failed to form a crystalline structure at all. Emoto believes, and uses photographic evidence to back up his claims, that since water takes on the resonant energy that it is exposed to polluted water can be restored through the power of prayer and positive visualization. The scientific community tends to consider Emoto's work as pseudoscience and has criticized him for publishing his work without the rigors of the peer review process.

The reluctance of the scientific community to accept the idea that our thoughts and feelings can directly impact the world around us and that water may reflect a memory of human consciousness is curious given that science has already acknowledged that such potential exist. The mind-body relationship is well established. The medical profession recognizes the power of the placebo effect and it is widely used in medicine and medical research. Science acknowledges the existence of the observer effect that refers to the changes the act of observation will have upon a phenomenon. The science of quantum mechanics has demonstrated that it is not possible to observe a system without changing the system. Subatomic particles will behave differently when someone is watching them, than when they are not observed. As a result, the observer is considered part of the system being observed. A similar phenomenon is reflected in the use of blind studies in the scientific process, in which the subject being studied does not know if they are being given a placebo or a treatment. In fact the height of today's scientific method depends upon the double blind study where neither the subjects nor the researchers know who is receiving a placebo and who is not.

Look around you. Chances are, every single thing you can see right now began as a thought and that thought led to words and/or action. Someone had to create this magazine, chair, or carpet in their mind before it could be materialized in the physical world. When one considers the apparent power of the human mind to impact the physical world in very direct and real ways, the supreme importance of one's thoughts and feelings become apparent.

Now it appears that our thoughts are incredibly powerful and can impact the physical world even when not followed by words and actions. My own experience indicates that the power in our thoughts can be accentuated when backed with strong feelings and emotions. Not convinced? Then I invite you to try the following experiment. Take three similar cuttings from the same plant and place them each in a vase of water from the same water source (three jars with rice or lentils can be substituted for the plant cuttings). Now place each jar in a different corner of the same room. At least once a day, visit the vase in one corner and spend a minute sending the cutting (or jar of rice) thoughts, feelings and words of sincere love and gratitude. Then visit the second vase and spend a minute directing mean, angry, and hateful thoughts and words at it. Ignore the vase in the third corner. As the weeks wear on, you will be amazed at the difference in how each of the cuttings in the three vases wilts (or degrades and grows mold in the case of rice or lentils).

Considering that the human body is made up of approximately 70 percent water, what do you think the result may be when we think of ourselves, or others with hate, anger, irritation, or other undesirable emotions? Given the facts outlined above, one can expect that beekeepers who treat their bees simply as a resource to produce profits may end up with colonies that are not as healthy, vibrant, and resilient as colonies that are revered and respected by their keeper. The beekeeper who loves the bees can be expected to perhaps be a little more attentive and responsive to their needs than the beekeeper who is motivated primarily by financial concerns. Now there's something to think about. BC

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4Masaru Emoto, *The Hidden Messages in Water*, (2004) Beyond Words Publishing, Inc., Hillsboro, Oregon

Ross Conrad will be teaching an Organic Beekeeping For Beginner's Class in Lincoln, Vermont on May 18th and 19th, for more information visit dancingbeegardens.com, call him at 802) 349-4279, or email **dancingbhoney@gmail.com.**

BIGGER PICTURE

Jessica **Lawrence**

Chicken Frenzy

When I was growing up, everybody in the family would head over to my grandpa's house for Easter. Most of the family lived in the same area, including his brothers and sisters. I remember going to visit my grandpa's brother Ray one Easter Sunday, just up the road, and getting bantam eggs. I thought they were mini-eggs, like I was a mini-person! It took me awhile to figure out that they weren't just "baby" eggs that weren't big yet. As we come to that time of year again . . . it's time to buy more chickens!

Keeping chickens seemed like a natural thing to do after the bees were settled in. I've always just thought the two go together, along with gardening. It's all about the high-quality food that each of these produces, and the symbiosis involved. Think of the deliciousness of a honey-glazed chicken with a side of garden veggies, all raised on your own farm. It's a nice feeling to know that the ingredients on your plate are only the ones you chose.

I am already in a "chicken frenzy" hovering on the chicken websites, filling up my online shopping cart with eggs and chicks to see the shipping dates and prices, calling around locally to see what I can find . . . it is clear that I have forgotten all of the bad parts of raising chickens.

If you are a beginning fowl enthusiast, let me give you a few tips from my own bad ideas. First, I like to raise the chicks indoors. I can easily control the temperature, keep an eye on them, play with them while I watch TV, etc. This is a terrible idea after about the second week because the dust will coat everything in your house. Our last batch went outside the week before Christmas, and I am still getting the dust out. The last round was only six chicks, and normally you will be raising more than that at once. Nasty little creatures – I assure you, they are much cuter outside.

Next, make sure their water is off the ground. I have heard wondrous stories of the use of nipple waterers, and how they reduce the dirty water that happens so easily in a box of baby chickens. At the very least, raise it up off the floor in relation to the height of their beaks. Try to do the same with their food, or they will do their best to scratch it all out into the floor and then they will pretend it's not food anymore.

Speaking of food – once or twice, I thought it would be hilarious to feed them something like mealworms or crickets to watch the chicks go crazy eating them. They were slow, at best, and then I had a houseful of crickets, or went back in and picked out the mealworms for more deserving chickens.

If you decide to play with them, don't do it in nice clothes, or at least have a towel in your lap at ALL TIMES. They are little poop machines. Good for compost, bad for lap, funny for head. When they get to about three weeks, this is not so common, but by then, you probably won't want to hold them as much, either. That's about the time the novelty wears off for me, unless I have a favorite, who usually turns out to be a rooster because I have poor taste in chicks.

Now that we've gotten past the bad part, do you still want chickens? YES OF COURSE YOU DO. CHICKENS ARE AWESOME. Let's back up a bit to the part where you pick your awesome chickens. I didn't realize when I started just how many chicken breeds there are. You can get all sorts of little weirdo chickens that are some combination of feather size and type (frizzles, Polish, Silkies, etc), or the mini-chickens (bantams) or some other variation that changes the appearance of the chicken. If you're looking for backyard pets, this would probably be important. I like a little variety in my flock, but my biggest desire was multi-colored eggs.

Eggs are awesome. They are delicious in so many areas of the kitchen. Farm eggs are even better because they have a ridiculous shelf life (mine have lasted at least six weeks, but they are usually "deployed" by that time, so I have no data past six weeks). You can use a bit less than normal in your cooking if you want, and the yolks will be different color based on your chicken diet. I like all of this, but what I really wanted was pre-dyed eggs like a year-round Easter basket. Some people don't like brown eggs, or think the blue eggs are better for you . . . I'm here to say that an egg is an egg is an egg. The shell color depends on the breed of chicken, and what's on the inside depends on what you feed it. If you feed your chickens nothing but strawberries for a few days, you'll have bright orange yolks. If you feed them scratch grains, you'll have that "common" light yellow color. If they are free range, they'll probably be a bold yellow to an orange, depending on what's available.

I chose all of my chickens based on their egg colors. I wanted a little bit of everything. Somehow, I only ended up with only two blue egg layers, and they are the most finicky chickens in the flock! They did not lay a single egg from November to January. It would be normal for them to slow down in the Winter time and speed up in the Summer, so instead of giving them a heat lamp, I figure I'll just let nature take its course. The other ladies are still giving enough for weekly cooking, so there are eggs available . . . they're just not blue.

Recently, I realized that I am missing vital colors in

I Love My Chickens, And I Love To Eat My Chickens!

my egg population. Where are my olive eggs and chocolate eggs? I am hoping to find a nice few Cuckoo Marans to add in, by egg, chick or laying hen. I have learned that there is always an "s" on "marans" because these are French chickens from the city of Marans. I want these birds because they lay the coveted chocolate eggs. The problem is that you need to find reputable people, because if you don't know the difference, you could be getting a plain Jane chicken and won't know until it starts laying eggs for you. This is why I am hoping to find a local source for chicks. They won't have to go through shipping, and I can see what's going on in the nesting box for myself.

I have also learned that when people want to sell you an "Easter egger" but they aren't guaranteed to lay the pretty eggs, they spell it "Americana" instead of "Ameraucana." Ameraucanas are a crossed version of the South American Araucana. They are tailless chickens, and up here in North America, we thought that was ugly so we made a version with a tail, hence the Amer-aucana hybrid name. I have purchased Americanas several times, only to be disappointed when I end up with pinkish or brownish eggs. Maybe you guys will have better luck in your hunt.

The next chicken I plan to add is an "Olive egger" mix. I discovered that this category is a successful breeding program between the Cuckoo Marans and the Ameraucanas, so the traits together produce a beautiful olive egg. Since they are hybrids, there's no breed name to associate with them, and it makes them a little difficult to locate. I am still hopeful to find someone nearby to sell me F1 chicks or eggs. As I understand it, they hatch from blue eggs when they are successful, and the hens from those eggs will be the first olive layers.

A lot of people become attached to their chickens as pets more than food. This is understandable, because they are hilarious little clowns, all with different personalities. If you raise them by hand, they will remember you. Whenever the girls see people, they always run to them – in reality, this is probably because they associate people with tasty food like kitchen scraps. I, on the other hand, love the chickens, but I also love to eat chicken. I have to think of the bigger picture – I might be eating my babies, but they had a great life up to that point, which is a stark contrast to the lives of most chicken meat you would purchase. They get to run, socialize, have a boyfriend, eat bugs, and have a nice little chicken life.

To help you see your future with the chickens, I am including a southern recipe that even the non-chicken eaters can enjoy in an egg/honey combo.

Cast Iron Cornbread

Dry Ingredients
1.5 cups cornmeal
½ cup flour
1.5 tsps baking powder
½ tsp salt

Wet Ingredients
1.5 cups buttermilk
¼ cup unsalted butter (melted)
¼ cup dark honey
2 eggs
1 tbsp canola oil

Preheat the oven to 400°F. Pull out your seasoned cast iron skillet and let it warm up either in the stove or on a medium heat burner. Mix the dry ingredients in one bowl and the wet ingredients in another, then slowly add the wet to the dry. Just like normal bread, don't over mix or it won't set up correctly. Slather around a little canola oil in the skillet and pour the batter in. Sit it in the oven for about 30 minutes, depending on your stove. Check it like you would a cake with the toothpick test in the middle and make sure nothing "sticks to the stick" before you pull it out of the oven. It should come out of the skillet easily. BC

Jessica Lawrence is a Research Entomologist for Eurofins Scientific, an avid gardener, beekeeper and tattoo collector.

GLEANINGS

APRIL, 2013 • ALL THE NEWS THAT FITS

BAYER LAUNCHES BEE CARE TOUR

A national Bee Care Tour will encourage growers, beekeepers and researchers to focus on the myriad of factors causing the decline in honey bee populations, said Robyn Kneen, Bayer CropScience's North America Bee Health Project Manager.

Bayer's mobile Bee Care Tour is launching this week in Orlando, FL, and will travel to university agriculture schools and farm communities across Corn Belt states over the next three months. Tour stops will include The OH State Univ in Wooster (register here to attend); Univ of IL in Urbana; IA State Univ in Ames; The Univ of NE in Lincoln; and Univ of MN in Minneapolis.

"There's a lot of misinformation out there, and that's why Bayer is taking a proactive approach toward dealing with this issue," Kneen said, regarding speculation on CCD.

"This has been used to refer to all honey bee losses," Kneen said.

However, "researchers have reached a consensus that this is a complex issue." What is labeled by some as CCD is actually the result of a variety of problems, including poor bee nutrition, varroa mites, fungi and stewardship, that are impacting honey bee colonies, she said.

Epstein noted that colony collapses have been documented as early as 1869, adding that the most detrimental impact to today's honey bee is the varroa mite. According to Kneen, honey bee losses increased since the introduction of the *Varroa* mite in the mid-1980s.

"There is good research to show strong correlation between honey bee health and the mite," she said.

Although research suggesting a direct connection to colony collapse is sparse, Epstein noted that the EPA is under increasing public pressure to further regulate or ban insecticides, particularly neonicotinoids.

"There will be changes in the ways labels are on pesticides, as well as best management practices and mitigation strategies that are going to be put forth in next five to ten years," Epstein predicted.

Although the sharp honey bee decline in 2006 caused widespread speculation and some misinformation in the public, "If there's anything good to come out of this, there's been a ton of research since 2006," Epstein said. "And with the description of the honey bee genome there's been a ton of answers."

The Bee Care Tour Bayer is launching will attempt to provide some of the new information as well as raise awareness of the health challenges impacting honey bee populations.

The Bee Care Tour is part of Bayer's overall Bee Care Program, which includes a Bee Care Center

Continued on Next Page

HONEY ANTI-DUMPING CASE IS ONE OF THE LARGEST IN US HISTORY!

Five individuals and two domestic honey-processing companies have been charged with federal crimes in connection with a U.S. Immigration and Customs Enforcement (ICE) Homeland Security Investigations (HSI)-led investigation surrounding illegal importations of honey from China.

The charges assert that the Chinese-origin honey was misdeclared as other commodities upon importation into the United States and transshipped through other countries to evade anti-dumping duties. Altogether, the seven defendants allegedly evaded anti-dumping duties totaling more than $180 million.

According to industry experts, anti-dumping circumvention schemes like the one announced today create a divergent market which negatively affects legitimate business. To combat this, HSI and U.S. Customs and Border Protection (CBP) have stepped up efforts regarding commercial fraud investigations that focus on U.S. economic and health and safety interests.

The charges represent the second phase of an investigation led by HSI. In June 2011, an HSI undercover special agent assumed the role of the director of procurement at Honey Holding I Ltd., which by then was cooperating with the investigation.

Honey Holding, doing business as Honey Solutions, of Baytown, Texas, and Groeb Farms Inc., of Onsted, Mich. – two of the nation's largest honey suppliers – have both entered into deferred prosecution agreements with the government. Honey Holding has agreed to pay $1 million and Groeb Farms has agreed to pay $2 million in fines. Both companies have also agreed to implement corporate compliance programs as part of their respective agreements.

"These businesses intentionally deprived the U.S. government of millions of dollars in unpaid duties," said ICE Deputy Director Daniel Ragsdale. "Schemes like this result in legitimate importers and the domestic honey-producing industry enduring years of unprofitable operations, with some even being put out of business. We will continue to enforce criminal violations of anti-dumping laws in all industries so American and foreign businesses all play by the same rules."

The individual defendants include three honey brokers, the former director of sales for Honey Holding, and the president of Premium Food Sales Inc., a broker and distributor of raw and processed honey in Bradford, Ontario.

In December 2001, the Commerce Department determined that Chinese-origin honey was being sold in the United States at less than

Continued on Next Page

BEST ORDER EVER!

It is the beekeeper's dream – the ultimate off-the-street order.

Australian beekeeper Peter Davis, who owns Island Beehive on iconic Kangaroo Island eight miles off the South Australian coast, is expanding his packing after a walk-in order from a Chinese buyer.

The businesswoman visited the Kangaroo Island business several weeks ago and bought several hundred dollars worth of honey.

Two days later she returned and after negotiations Davis had an order for more than A$30,000 (US$30,589) worth of honey with half the money paid upfront.

Davis tells *The Advertiser* newspaper in Adelaide the buyer indicated interest in ongoing orders.

The honey will be exported under the Island Beehive brand and Davis says he'll have to invest in the business, or seek a government grant, to expand its packaging facilities.

Island Beehive produces about 100 tons of honey from its Ligurian bees and buys from eight other producers on the island.

His bees are believed to be the only pure strain of the Ligurian honey bee in the world.

The company extracts its organic honey under the stringent guidelines of National Association for Sustainable Agriculture Australia certification. – *Alan Harman*

Bayer ... Cont. From Pg. 77

research facility, expected to be complete in 2013, at the North American Bayer CropScience Headquarters in Research Triangle Park, NC.

"Through our mobile Bee Care Tour, Bayer will foster interaction directly with supporters of bee health across the U.S. to heighten discussion, increase awareness regarding good stewardship practices and encourage sharing ideas," Kneen said.

ANTI-DUMPING ... Cont. from page 77

fair market value, and imposed antidumping duties. The duties were as high as 221 percent of the declared value, and later were assessed against the entered net weight, currently at $2.63 per net kilogram, in addition to a honey assessment fee of one cent per pound of all honey.

In 2008, federal authorities began investigating allegations involving circumventing anti-dumping duties through illegal imports, including transshipment and mislabeling on the supply side of the honey industry. The investigation resulted in charges against 14 individuals, including executives of Alfred L. Wolff GmbH and several affiliated companies of the German food conglomerate. The defendants were charged with allegedly evading approximately $80 million in anti-dumping duties on Chinese-origin honey. Authorities seized and forfeited more than 3,000 drums of honey that illegally entered the U.S.

The second phase of the investigation, announced today, involves allegations of illegal buying, processing and trading of honey that illegally entered the United States on the demand side of the industry. Some of that honey was adulterated with antibiotics not approved by the Food and Drug Administration (FDA) for use in honey. None of the charges allege any instances of illness or other public health consequences attributed to consumption of the honey. The investigation is continuing.

"Trade fraud can have significant implications for the U.S. economy and consumers," said CBP Chief Operating Officer Thomas S. Winkowski. "These products take jobs away from American workers and frequently violate U.S. health and safety standards, potentially endangering the public. CBP is committed to fighting these fraudulent actors alongside our government partners."

The government is being represented by Assistant U.S. Attorney Andrew S. Boutros in the Northern District of Illinois.

"We applaud the efforts of HSI, CBP, and other agencies involved in this complex, long-term investigation to enforce the laws that exist to protect U.S. consumers and the honey market," said Gary S. Shapiro, U.S. attorney for the Northern District of Illinois.

The HSI-led National Intellectual Property Rights Coordination Center (IPR Center) assisted with this investigation. The IPR Center is one of the U.S. government's key weapons in the fight against counterfeiting, piracy, and commercial trade fraud. Working in close coordination with the Department of Justice Task Force on Intellectual Property, the IPR Center uses the expertise of its 21-member agencies to share information, develop initiatives, coordinate enforcement actions and conduct investigations related to intellectual property theft. Through this strategic interagency partnership, the IPR Center protects the public's health and safety, the U.S. economy and the war fighters.

To report IP theft or to learn more about the IPR Center, visit **www.IPRCenter.gov.**

To report commercial fraud, contact CBP at **https://apps.cbp.gov/eallegations/.**

You may also visit us on Facebook, Twitter and YouTube, or access this news release on your mobile device.

American antidumping duties on honey from China are to remain because domestic beekeepers and packers would suffer material injury if the tariffs were lifted.

The U.S. International Trade Commission (USITC) in a unanimous 6-0 decision again determined that revoking the existing antidumping duty order on honey from China would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time.

As a result, the existing order on imports from China will remain in place.

Antidumping duties were first imposed on Chinese honey producers in 2001.

The duties range from 26% to 184% of the honey's import value with the value decided by the U.S. Commerce Department as a way to counter Chinese producers selling their product in the U.S. below the cost of production.

The vote followed a five-year review process required by the Uruguay Round Agreements Act.

The commission voted in October to conduct an expedited review. All six commissioners concluded that the domestic group response for this review was adequate and the respondent group response was inadequate and voted for an expedited review.

The commission generally does not hold a hearing or conduct further investigative activities in expedited reviews. Commissioners base their decision in expedited reviews on the facts available, including the commission's prior injury and review rulings, responses received to its notice of institution, data collected by staff in connection with the review and information provided by the Department of Commerce.

An overview of Dr. Gene Robinson's Sting Safety Program

Earlier this year on a rainy Saturday in June, I learned firsthand about the importance of taking safety precautions while working with honey bees.

I had just completed the second week of my first field season as an undergraduate researcher in Dr. Gene Robinson's lab at the University of Illinois at Urbana-Champaign, and I was charged with the task of disturbing a colony of bees that we were using to study aggressive behavior. This disturbance involved picking up and dropping each frame 10 times each.

As I walked toward the colony, I was excited to prove myself as the next great bee researcher; this was, after all, the first time that I was going to do the disturbance by myself.

I opened the colony up and picked up the first frame. The bees were not thrilled that someone was messing around with their home, and the rainy weather did not help their moods. They began flying toward my hair and face, and it was in that moment that I realized in my rush to avoid the next bout of rain, I had neglected to put a veil on.

I quickly finished the disturbance, but not before one aggressive bee had stung me on the forehead.

I removed the sting and poison sac, then went home for the day. Nothing looked abnormal until the next morning when I woke up with a swollen face that marked my first encounter with a large local reaction.

This reaction did not endanger my life, and my face deflated back to its normal size within 24 hours. However, if anything out of the ordinary realm of sting reactions had occurred, I am glad to know that the Robinson Lab Sting Seminar that I had attended a few days prior would have prepared me to take the appropriate action.

The Sting Seminar is part of the UIUC Sting Safety Program at the Robinson lab that began in response to a series of anaphylactic reactions that a few undergraduate and graduate students experienced in the first few years of the lab's existence. Dr. Robinson says that those reactions were "very alarming," and did not appear to be happening by random chance.

Various studies provide support for Dr. Robinson's impression. According to the Allergies Sourcebook (Sutton, 2011), these systemic reactions, unlike the local reaction that I had, cause symptoms in areas removed from the original sting site. The typical markers of a systemic reaction are hives, flushing, constricted airways and anxiety. However, systemic reactions can lead to anaphylaxis, which is marked by difficulty breathing, nausea and low blood pressure, and can lead to loss of consciousness or death.

Beekeepers that are infrequently stung are more prone to systemic allergic reactions. In a 1984 study by Bousquet and associates published in the Journal of Allergy and Clinical Immunology, 45% of beekeepers with fewer than 15 stings per year experienced these reactions, while no beekeepers with more than 200 stings per year did. These reactions occur most often after the first sting of the field season in both seasoned and novice beekeepers (Müller, 2005).

The reason that more experienced beekeepers have a smaller chance of developing a systematic reaction lies in their immune systems. An allergic reaction occurs when a relatively harmless external substance is misinterpreted by the immune system as harmful, and in this situation, that largely harmless substance is bee venom (Sutton, 2011). The first time the venom enters the body, some of the immune system's white blood cells bind to the proteins of this allergen, causing the cells to become "sensitized." Some of these cells create IgE antibodies.

In most non-allergic people, IgE production will be suppressed (Sutton, 2011). However, in allergic people, IgE causes another type of white blood cell, the mast cell, to become sensitized as well. The IgE can remain bound to the mast cells for months or years at a time. With another exposure to the allergen, the IgE's of the already sensitized cells bind to the allergen, causing the release of histamine, a compound that causes blood vessels to leak their fluid and the smooth muscles of the airway to contract. It is the release of histamine that brings about the symptoms of a systematic reaction.

Seasoned beekeepers that have been stung more frequently have lower levels of IgE than novice beekeepers (Müller, 2005). Their long-term bee venom exposure, in turn, causes greater production of another antibody called IgG. The IgG is thought to be a 'good' antibody that keeps the 'bad' IgE antibody from sticking to mast cells. This reduces histamine release and prevents allergic reaction. In other words, a smaller amount of IgE and a larger amount of IgG makes a person more resistant to systemic reactions, and this occurs among those who are more frequently stung.

Most of the researchers at our lab are stung only a few times during the Summer field season because as Dr. Robinson says, their experiments require "subtle manipulations" that

Sting Safety

1) Always wear at least a veil when working with bees. Wear a bee suit for greater protection.
3) Wear gloves, especially if you are allergic to bee stings.
4) Always carry a cell phone when working with bees.
5) Make your bee yard's coordinates known to local EMT's.
6) Always carry an Epipen; make sure it is in code.
7) Know the difference between local and systemic reactions so you know if you need to contact emergency personnel.
8) Make sure somebody knows where you are.
9) If in doubt, take a buddy along.
10) Work slow, easy and stay calm.

usually do not result in many stings. Therefore, their immune systems are more likely to be sensitized to bee venom. It is this increased risk that makes it essential for the members of our lab to understand the symptoms and protocol for dealing with a severe allergic reaction.

This education is ensured through the Sting Safety Program that Dr. Robinson has developed over the years. This year at the Sting Seminar, the members of the lab gathered to hear Emergency Management Service Educator Dan Bowton from the Carle Foundation Hospital in Urbana, Illinois, talk about the ways we can keep ourselves safe while working with the bees.

Mr. Bowton highlighted the steps that our lab has taken to ensure the safety of our researchers. He said that all of the ambulance services in the area know the GPS coordinates of our beeyards, and assured lab members that, "you're not out there all by yourselves by any means." Mr. Bowton emphasized the lab's rules that researchers bring a cell phone or a buddy to off-campus areas in the case of an emergency.

Mr. Bowton also delved into the differences between a local and a systemic reaction and how to know if a sting requires medical attention, saying, "not every sting warrants the use of epinephrine," but, "any time you have difficulty breathing and you sort of hear yourself breathe," and "you feel respiratory stress is imminent," it is time to go to the hospital.

The presentation concluded with a hands-on training session on the way to use an Epipen, as each bee researcher at the University of Illinois is required to carry one. Due to the higher risk of systemic reaction, each researcher receives his or her own Epipen for free at the beginning of the year so that they can always feel safe when working with their bees.

The Sting Safety Program is a unique part of the Robinson Lab that was developed after a few students experienced systemic reactions. However, these precautions and the safety knowledge our lab members have gained are absolutely essential for every beekeeper to have. If beekeeping clubs and other university research labs take similar steps in developing their own sting safety programs, I am sure that the benefits will reap sweet rewards.

My rainy Saturday sting left me with a comically swollen face for a day, and although I couldn't go out in public during those 24 hours, I am certainly glad that I wasn't subjected to a systemic reaction. I am even happier to know that because of the Robinson Lab Sting Safety Program, the next time I disturb a colony, I will be prepared for any suspect situation that buzzes my way.

Acknowledgements

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The Coldest Day

Ed **Colby**

Last month you might have read my column about administering stings to my gal Marilyn, to keep up her immunity. I had to submit that piece by January 10th, at the height of a cold snap here in western Colorado.

Nine hundred words fills the back page perfectly – or 800, with a photo. I liked the idea of a bee sting picture, so I opted for the latter. Marilyn was game.

The idea was to show my gnarly ol' fingers holding a bee stinging Marilyn's arm. That's two people tied up. Who's going to take the picture?

Kelly made his fortune in the sports photography business. I keep bees on his ranch. Perfect! All I needed to do was get the three of us together, indoors, during daylight hours, in January, with some live honey bees.

Kelly's more than an apiary landowner. He's an old friend, and now he's in love, this time with an heiress. He can't stop talking about her.

She has her own ranch, up the valley right next to his. Two ranches, two valleys, two lovers! They're just over the hill from each other, but it might be 10 or 15 miles to drive down and around. They reportedly visit all the time.

Toni's passion is chickens, and Kelly's passion is Toni, so he has a girlfriend, and an egg route. I don't remember how many chickens she owns, but Kelly runs eggs 60 miles all the way to Aspen.

I owed Kelly a case of quarts for my beeyard rent. He kept telling me he'd pick it up at the farm when he made his egg deliveries, but then he never did. So when I called the last time, I said, "I'm going to drop off that honey at your place, and by the way, I need a photo of a bee stinging Marilyn's arm, like today. I'm under deadline."

This piqued his interest, and he understands deadlines. He told me to get up there pronto, because as soon as he finished his chores at Toni's, he had to do his own, and then he had to hit the road. It was egg delivery day.

So on the morning of January 10 I cracked a beehive and knocked about 30 bees off the underside of the inner cover and into a wide mouth mason jar. The thermometer read five degrees. I didn't really want to do this on the coldest day of the year, but I was pretty quick. And I had a deadline.

When Marilyn and I pulled into Kelly's driveway 45 minutes later, we were 1500 feet higher in elevation. It was just as cold, or colder, than it was at home.

The bees got all excited from the warmth of the car, so I set them on the walk outside Kelly's house to cool them down. Kelly greeted us at the door, and he put on the Earl Grey tea, which I normally can't stand. But this was *Twinings* Earl Grey, which, Kelly took pains to explain, is superior to all others. This was the original 1720 Earl Grey blend. He said it goes down better with my honey, which is true. It has just the right *bergamot*, the spice that gives any Earl Grey its distinctive flavor.

All this tea talk, plus looking at photographs of Toni, took some time. The bees were still outside.

They cooled down all right. When I checked, they appeared to all be dead, but I wasn't fooled. I brought them inside. In five minutes they were buzzing merrily, so I put them outside to cool down again.

This time I stayed outside and waited until they'd barely succumbed to hypothermia. Then I opened the jar. Cold bees are easy to catch, but they won't sting. I rubbed them repeatedly against Marilyn's arm, to no avail.

This is so simple in the summertime. I just open a hive, pick up

a bee, and back her up to Marilyn's bare skin. Marilyn loves the attention.

But this was not summertime. I brought the bees inside yet again, and when they were just beginning to stir, I took them outside and opened the jar. Whenever I tried to pick one up, she flew away! I only had 30 bees! They were flying faster than I could reach for them. On the coldest day of the year, poor little darlings!

Of course I finally caught one that agreed to sting, before they all got away. Marilyn gave a little cry, as the poor darling tore herself apart disengaging herself from her stinger. All the while, Kelly snapped photos.

We remembered to give Kelly his honey, and we knew when to leave. He had eggs to deliver. I had a deadline.