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The Magazine Of American Beekeeping

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Mark Cameron took this photo of his wife Randa Cameron. She got this tattoo in 2012 on her left arm.

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Suggestions

Comments

Pollination

I just read (p. 13 December issue of *Bee Culture*) "Dr. Calderone . . . and those that do not require pollination but that are grown from seeds that result from pollination (think cotton), plus . . ." How long are we going to continue to repeat this myth? Cotton is self fertile. Honey bees do not collect pollen from cotton blossoms. Nor do they utilize cotton pollen as a protein source to support the colony.

It is time to abandon the myth that honey bees pollinate cotton! I've spent 70 years observing honey bees visiting cotton blooms to collect nectar. I've extracted tons of cotton honey. But I've never seen honey bees forage for cotton pollen. Upon leaving a cotton bloom, honey bees will do everything they can to get rid of any cotton pollen grains that collected on their bodies. I do not know if it is the morphology of the cotton pollen or if they sense that the pollen is nutritionally void of any value as a protein source for the colony.

Have you ever seen (even a picture of) a honey bee with a pollen pellet in the pollen basket on the hind legs? Can you name one honey bee researcher, beekeeper, cotton breeder or anyone else who has seen a honey bee collect cotton pollen?

I've trapped pollen from honey bee colonies that were located in the middle of large, extensive cotton fields in the High Plains and have *never* found a single pollen pellet composed of cotton pollen! I spent over three years working with a large team of cotton breeders, seed companies, cotton producers, et al. trying to produce cotton hybrids – involving male sterile lines, flood-

ing the fields with honey bees (5+ colonies per acre), etc. This interest was motivated by money. Most things are. Call if you are interested in details.

I did write Roger Morse when he first published his economic studies on pollination value of honey bees, et al. I never heard from Roger. I recognize the enormous value and huge challenge of compiling all this information. I use much of it many times each year. I just don't want any one to challenge the validity of the study and use the Cotton data to prove his/her point. Dr. Calderone has credited honey bees as adding \$1.17 billion to the value of this crop. Where is this benefit realized? Who actually realizes this benefit.

I hope you can help me learn more about the cotton-honey bee relationship that I do not understand. I will readily admit that my experience is almost entirely with upland varieties. I have limited pima experience.

John Thomas
Texas

What Kind Of Bees??

First off please let me tell you how I enjoy all of your publications. I refer all persons interested in beekeeping to your *Backyard Beekeeper* book.

As a hobbyist keeper of bees of over 40 years, I continue to find interesting and unusual happenings. The latest occurred on August 25, 2012. Upon checking my bees out back I noticed a volleyball sized swarm on one of my favorite swarm bushes. In hiving these bees I noticed that 60-75% were totally black. The balance were dark grey with three or four dark bands. The queen was also black, very large and had a yellow marking on her thorax. This year's color coding. Most likely a purchased queen.

I have no clue as to where they came from. Other beekeepers in a two to three mile radius all got their start up bees from me. Like myself none of these people buy queens or package bees. What I want to do is identify them. I've done a google search, looked at page after page of black bees but none look like the ones I had. Any ideas???

The goldenrod flow was early

and heavy. The air pungent with nectar being ripened. I think that smell may have attracted that swarm. I was taking off mid-season honey and adding supers to support heavy goldenrod flow. This evidently created a robbing situation for I found out later that other bees had ganged up on my new hive. I had them in a eight-frame deep hive, hive entrance reduced to about one inch but not small enough for them to defend their home. Most times if robbing is going on I'll close them completely. But it was hours later after extracting I went down back to find the dirty deed over and done. I had lost my unique prize. These bees were so unusual. I would like to find their origin and purchase a package or mated queen. Again, any ideas would be much appreciated.

Kim, thanks so much and keep those books coming. If you revise any books could you consider more on hiving swarms, feral bees removal, bait boxes, etc. for newer beekeepers.

Deo Hurlburt
Henrietta, NY

Editor's Note: *Without seeing one, first guess is one of the Carniolans from the many producers in Northern California. Strange time for them to swarm though, and it may have been a colony that absconded due to Varroa. But that's a guess. Thanks for the kind words, and the good suggestions.*

Summers Time!

We really enjoy It's Summers Time. It's a nice addition to the magazine.

And driving in the snow and ice is almost like working the bees – go nice and easy, no sudden movements – there's a good chance you won't get stung.

Pat Diters
Mechanic Falls, ME

Oops!

December's edition was informative, academic and erudite in so many ways it would take too long to enumerate them. In addition to the continuing correspondence on water for bees I especially liked Alan Harman's recap of the Canadian

work on genetic recombination of the behavior genes in worker bees. This parallels genetic modification work in humans, though I think the mechanism is not the same, as there is some evidence in humans that this occurs after a person is born as a result of environmental and behavioral influences. The breadth and depth of research that is done on bees never ceases to amaze me.

The only stumble in the December edition (and it may have been a simple typo) was in Larry Connor's article on *Pollen, Nectar and Propolis* where he writes that honey is only about 18% sugar and the rest water; I believe the proportions are reversed – at least that is what the hygrometer tells me (and everybody else, the Ed.).

Keep up the good work. I learn something new from each edition.

Norris Childs

Land Grant Colleges

M.E.A. McNeil provided a fine historical overview for the 150th Anniversary of the Land Grant Colleges and the USDA. I am a long-time beekeeper and emeritus college dean, a graduate of Michigan State University, the first Land Grant College. My dissertation in the College of Education had no direct reference to agriculture or bee keeping. However, my thesis was rooted in the educational philosophy fostered by Seaman Knapp focused on 'demonstration learning.' This praxis philosophy has had a tremendous educational 'value added' across multiple disciplines in the curriculum of high schools, colleges, universities, and theological seminaries.

Robert Hough
Beaver Falls, PA

Two Cents On DDT

I'm following your discussion about pesticides and its effects on environment through several of your recent *BC* issues. With different pro/contra voices it was very interesting to see where we are in understanding of what is happening around us. Though this voice in my opinion is crossing the line – I wish good luck to your reader and no "sudden" onsets of cancer which he will be "trying to find cure for" or

this pesky COPD developing in late age (just a late age disease).

I don't think that voices like this are helping in understanding slow, cumulative process of environmental degradation with subtle but undeniable effects on us all. We are so happy – just like you reader to say: "scare from CRAZY(!) lady" and like tobacco companies (yes the same your reader is praising) – put dirty facts deep into CEO's drawers and call for "More research!"

I thought higher about your ethics – publishing this anyway wrongly prevailing opinions doesn't seem to do much good for me.

Joanna Miscavige

Editor's Response: *There was a discussion here on that – ignore it, or let that opinion be expressed – to see the light of day, and to be examined. Without discussion, disagreement, and ongoing factual input, less is discovered, we believe. Cleaning dirty laundry is a necessary, and ongoing task. Our final opinion was that it had less to do with ethics, and more to do with the dangers of uninformed behavior.*

Beekeeping In Kenya

We know that beekeeping involves an outlay of capital and most of us – hobbyists for whom selling honey is a side benefit rather than a matter of personal survival – are able to purchase a reliable smoker and experiment with varying types of fuel and different techniques to keep it burning.

This is not the case for many beekeepers for whom such a purchase is a considerable expense. In Kenya for example, which is where I have a little practical experience, 75 % of the population exist on subsistence farming, more than half of whom live below the poverty level. To supplement their meager income and to provide a little much needed cash these rural farmers have several options. One is charcoal, the production of which unfortunately destroys much needed vegetation. Another is beekeeping, in the course of which not so much as a leaf is destroyed; indeed through the act of pollination the cycle of life is continued.

Clearly the latter is the preferred alternative but it is not widely practiced as a cash crop for



several reasons, one of which is the capital outlay needed to produce honey of a marketable quality.

The challenge became clear on the long drive from Nairobi to Mombassa in July of 2011. Several roadside stalls had one or more beekeepers behind a table with honey bottled in a variety of containers, selling for what we would regard as low prices. And when we arrived at our destination on the coast of the Indian Ocean, a delightful hotel that attracted Europeans in particular, we were welcomed by a beautiful display of South African wines at exotic prices. South African wines? My first question was why not display Kenyan honey in attractive jars with appealing labels and provide a much needed source of income for local beekeepers?

The reason was not one I had anticipated. Smoking a hive is vital for a Kenyan beekeeper because of the well known traits of African bees. But because they cannot afford a smoker local beekeepers most often use a simple brush torch. It works but ash that is blown into the hive ends up in the honey.

There are several solutions. Improve the quality of straining during extraction. A second is send smokers to these beekeepers, but besides the expense it is not a global solution. The third is to see if we could design an alternative smoker that could be made from inexpensive local materials by beekeepers in Africa, Asia and South America, if not even further afield.

Only 2% of hives in Kenya are Langstroth in design; 3% are top bar hives and the remainder are log hives. Why? Despite their limitations log hives are inexpensive and can be made quickly and locally. One beekeeper we met estimated that she could make three log hives per day at a cost of US\$3 each, whereas a top bar hive and a Langstroth deep cost her US\$55 and US\$70 respectively.

"Every time you have a problem," according to David Feld of Geese Peace, "you have energy." Scattered across the U.S. we have a wide range of expertise in a broad ↗

range of fields related to beekeeping, as well as a concern for our fellow apiarists across the globe, as articles in this journal and others confirm. The challenge is, can we harness that energy to change the paradigm of the conventional smoker and come up with something that can be made of local materials by beekeepers who have limited access to the tools and resources we take for granted?

Small beginnings can have huge consequences. Can we impact the quality of life of millions of people across the globe?

If this intrigues you and you would like further information or somewhere to share ideas, please contact me at honeybeewhisperer@gmail.com.

Jeremy Barnes
York County, PA

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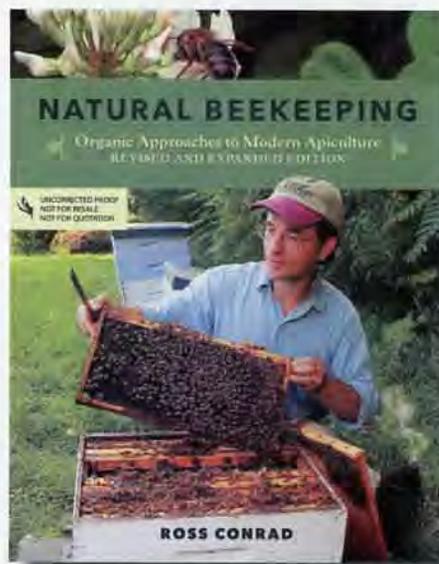
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New For 2013 —

Natural Beekeeping, by Ross Conrad, Revised and Expanded. ISBN 9781603583626. 8" x 10", 304 pages, color throughout. \$34.95. Published by Chelsea Green Publishing, 85 North Street, White River Junction, VT 05001. Available April 1, 2013. www.chelseagreen.com.

Ross Conrad, who is a regular contributor to this magazine generally looks at beekeeping practices common to the Northeast part of the U.S., flavored with his impressions of what Natural Beekeeping practices should include. He's left of center when it comes to Natural (and has included this time info on urban beekeeping and topbar hives), salted with common sense, admission of other practices and freely shares his experiences. Not extreme, but that he definitely practices what he preaches is a common thread in his life, leaving as small a foot print on the land as possible. His revised book is not a radical departure from his first edition, and the additions are helpful and if you enjoyed the first edition, you will find this one both useful, updated, with some additional material added. Updated and improved management techniques,



more info on CCD and more recent pest controls, and biology, marketing, industrialization of honey bees, and beekeeping issues, and more on simple organics in the trade. There's a Spiritual and Personal relationship with the bees you will recognize from his Bee Culture work, and his gentle, even tone remains. Ross isn't the other side of beekeeping, but he's another side, and you'd do well to be aware of what he's about, which is why we like having him around.

Kim Flottum



Portable Planting

Specifically designed for balconies, apartments, small yards, courtyards and urban beekeepers. Mobilegro portable garden carts offer a large growing capacity in a very small footprint. The deep pans allow for multiple rows of vegetables, flowers, herbs and myriad other edibles. Customizable to match any decor, these containers are useable inside and outside.

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- convenient and easy to use

Check your local suppliers for availability as these strips are not yet available in every state.

Apivar is the only amitraz-based apiary product to treat not just one generation of *Varroa* mites, but several generations. Apivar's controlled-release technology distributes Amitraz over a minimum six week period, ensuring healthy and productive hives when used as directed.

Apivar's active ingredient has not been shown to encourage bio-resistance when used as directed. Apivar has been used more than 15 years in France, and is now authorized in more than 10 other nations, including Canada, New Zealand, Japan, and many European countries. Apivar users world-wide have been unable to detect any resistance to Apivar's active ingredient.

Eco Bee Box

In the Spring of 2011 the prototypes were made and tested. Stainless steel was the first option, but was expensive, heavy and retained heat. After a few tries, evolution of the Eco Bee Box with its variety of hardware was created. The international patent was filed.

My engineer is a novice beekeeper, with expertise in Solid Works, auto-cad software. Each bracket took months to produce, test and re-engineer, and retest. I visited a number of supply companies and field-tested the product. It was exciting to ship to Iceland, Serbia, Macedonia, Egypt, Australia, and to get calls from many beekeepers but each call, voiced frustration over the limitations and design of current boxes.

BUT, in the meantime, they would do something for me. The Governor's office would submit a request to the USDA to inspect and approve my Eco Bee Box. This sounded fantastic. On August 9th, 2012 I received a call from the Director of the USDA here in Utah, while still on the phone I emailed him a prepared email and we discussed the images and possibilities. He was impressed with the copper cedar hive with observation windows.

It is hard to promote a new product. Many people see new things as threats to "old ways." I have always been open to change, but many new products do seem inferior to their predecessors. The Eco Bee Box is by far superior to anything currently in the bee industry. The biggest challenge is price. A typical wood deep super is about \$12-\$25, not including shipping. My goal is to create a superior maintenance free deep (9-5/8" x 20" x 16 1/2") super for less than the current standard products. The trade-shows in San Diego and Hershey displayed this elusive product.

The Bee Box Features:

- Ability to buy additional parts and replace broken sections
- No cut area where water penetrates into the wood to cause damage verses a strait cut
- No paint needed to protect and prolong life
- Many options for box materials
- No limitations in box sizes, so the beekeeper gets what he needs
- Limitations in thickness and

weight of boxes is based on the lumber and the need to have a finger joint corner

- The natural tendency for wood to warp due to heat and moisture inside and elements outside the hive
- Weakened corners (once assembled and used) can break easily due to nails or screws being inserted like a pin cushion into weak end grain
- We offer many sizes and styles, as needs vary throughout the industry.
- Varying sizes and styles - Our parts come in lightweight aluminum, which does not attract heat. There are basic and deluxe styles. The basic style bracket allows a box to be built by simply making straight cuts on all sides. This bracket screws together quickly, into strong side grain. Allows for a deeper box if desired. The deluxe bracket differs from the basic, as it has a top and bottom lip that prevents hive tool damage on corners of the box, and allows for unglued laminated lumber.
- Locking clips - Locking clips became a great, added feature, holding the hive completely together from top-cover to bottom-board. This clip is small and made of stainless steel. It anchors into the corner brackets with existing screws.
- Frame rails - The rabbet edge the frames sit on has always been a weak area of the hive box but



now they are made from durable aluminum.

- Cedar now available and cheaper than traditional - A new development for hives came to me when last spring at a Lowes store. I eyed a pallet of thin 5/8" cedar fencing planks and wondered if a box could be built with them. Planks were 77 cents each, two forming a deep super. A new bracket was engineered that fits this lumber, and has its own frame rest. It worked!! This is a cedar hive in deluxe brackets, with metal frame rest, holding 11 frames **with a cost of less than \$10 per deep super**. Cedar is lighter and withstands the elements better.
- Protective coating instead of paint
- Panels can be easily repaired
- Side grain fasteners - Box fasteners anchor into the lumber's side grain, which consists of multiple layers of tree growth. Each bracket is secured on both the inside and outside of the box, holding the lumber like teeth in a jaw.
- Any lumber including local supplies can stimulate local markets
- Will sell commercially in volume at a discount
- Can use a clear observation window
- There are many different sizes of brackets
- Product is available now in aluminum and copper - The traditional beekeeper needs a simple box with no frills that will hold up with little to no care. The new backyard beekeeper is changing and desires an attractive hive to fit with the decorative surroundings. Trends show many people wanting to get involved in beekeeping. They lose desire when they see what the hives look like or will look like in a year or two. Interesting change in sales of the cedar copper hive, some sales are just to sit in as yard decoration!! **Imagine that.** Cities that have imposed restrictions for beehives, how does that relate to people with decorative hives and no bees?

Visit www.EcoBeeBox.com or check your local bee supply dealer.

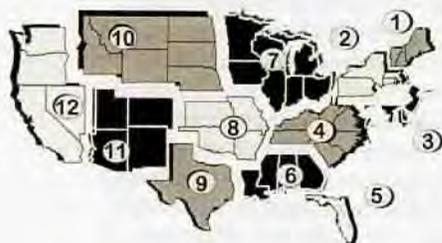
FEBRUARY - REGIONAL HONEY PRICE REPORT

Again this year we polled our reporters on where they sell their honey. We've been doing this for several years, and the pattern is fairly predictable. Our reporters are primarily sideline or small commercial beekeepers, with a few larger outfits represented that tend to be producer/packers.

If you are interested in expanding your honey (and other hive product) sales, look over this list of possible outlets. There are most likely some you are missing now and could investigate. Price is not the key to more sales so don't undersell your product. *Rather*, increase your exposure by increasing where your honey is sold.

By far the majority - over 70% - of our reporters sell some of their honey from home, either an inside or outside stand. Interestingly, however, the amount of their honey they sell there increased this year dramatically. I suspect, but can't prove that this is price driven, because if you look at what venues have done since last year the trends becomes more clear. Farm markets have remained steady since last year...and with farm markets come price increases. Home sales have little investment in time...you're not standing all day talking, but farm markets have the advantage of one on one sales, encouraging repeat sales and meeting lots of new customers, plus a healthy price increase from those at-home sales. If you are just starting out, remember that if you are selling honey from home, your insurance may need tweaking since you are operating a business there. More businesses are requiring beekeepers to have some sort of liability insurance if they wish to sell honey at that outlet. Businesses don't want your problems to become their problems.

The big issue this year will be labeling contains pollen - or not, and local, or not. Contains local pollen should be gold, don't you think.



Where Do They Sell Their Honey?

% of Reporters Selling at these locations					% of Their Honey Sales at these locations					Locations Honey Sold at
2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	
82	81	71	77	27	40	43	51	36	73	Home (inside or roadside stand)
20	13	17	16	19	34	14	26	19	34	Local community - sponsored farm market (i.e. Sat. & Sun. sales)
26	23	19	29	28	26	27	31	40	31	Local Farm Market business that's seasonal (Fall only, for instance)
26	32	26	29	26	36	38	34	33	35	Local Farm Market business that's year-round
8	9	8	4	5	29	34	24	33	19	Flea Market
39	37	35	39	35	26	19	18	24	20	Health Food/Organic store
11	8	12	10	7	11	37	9	8	6	Gift Store
20	19	13	16	17	16	22	20	21	17	Bakeries/Food Establishments
15	13	17	14	5	15	13	13	28	5	Local High-End Retail Outlets (gourmet stores)
37	37	30	31	27	16	19	22	16	27	Local, Small 'Mom & Pop' Retail Outlets (grocery & gas)
16	13	14	17	4	30	26	32	35	13	Local Small Packer or Producer/Packer
3	0	5	2	3	63	0	42	100	67	Huge Packer, they pick up
8	9	13	11	9	42	30	38	41	51	Wholesale only to larger stores, you deliver to warehouse
13	11	14	11	5	6	3	4	9	5	Breweries/Beer or Mead makers
10	4	6	10	6	8	8	6	10	5	Internet, direct retail, mail order
22	17	29	41	41	15	11	20	21	18	Work, direct retail
8	8	8	6	16	8	25	8	6	16	Local/State Fair, with club

*Total percentage of sales does not come out to 100% because of multiple outlets.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.99	2.10	1.99	1.63	1.95	1.90	2.12	2.00	1.85	2.00	1.90	2.13	1.56-2.50	1.95	1.95	1.74
55 Gal. Drum, Ambr	1.91	2.03	1.91	1.60	1.90	1.78	2.06	2.00	1.55	1.90	1.76	2.00	1.50-2.40	1.87	1.82	1.67
60# Light (retail)	160.00	182.00	150.00	154.00	160.00	163.33	170.00	155.00	120.00	162.00	116.00	211.67	100.00-240.00	164.50	165.22	157.30
60# Amber (retail)	177.50	161.67	150.00	164.00	160.00	158.33	169.75	143.33	125.00	155.91	105.00	192.50	90.00-215.00	159.31	161.11	152.13
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	71.65	76.51	48.00	64.30	68.13	56.25	58.78	68.13	68.13	49.92	75.84	88.00	43.20-96.00	66.66	67.22	70.41
1# 24/case	103.26	104.58	104.80	89.80	117.00	100.86	93.00	92.00	72.00	110.53	113.88	120.32	72.00-156.00	103.67	103.25	93.44
2# 12/case	95.33	89.31	77.70	85.00	84.00	72.83	83.97	96.00	71.50	88.08	144.00	100.70	61.66-144.00	89.11	89.74	83.25
12.oz. Plas. 24/cs	88.64	96.20	65.15	79.75	72.00	70.70	72.12	80.80	66.00	64.08	88.08	82.48	48.00-125.00	79.80	76.31	74.37
5# 6/case	119.73	100.66	94.50	87.85	96.00	86.00	94.54	97.20	72.00	88.98	140.00	111.50	52.00-140.00	99.64	98.62	94.28
Quarts 12/case	147.00	179.44	134.35	119.50	96.00	94.25	135.78	106.00	134.35	131.65	115.74	138.50	56.00-230.00	125.70	115.35	118.22
Pints 12/case	88.00	87.65	99.00	84.33	72.00	67.25	89.23	59.70	52.00	111.00	67.20	80.00	42.00-120.00	80.36	74.96	76.17
RETAIL SHELF PRICES																
1/2#	4.94	4.48	4.36	3.62	4.88	3.50	3.23	2.29	4.88	3.60	4.04	5.00	2.29-9.19	4.01	3.72	3.56
12 oz. Plastic	4.69	5.16	3.93	4.42	5.25	4.41	3.98	4.00	3.99	4.08	4.57	5.35	3.06-7.50	4.51	4.50	4.22
1# Glass/Plastic	6.20	5.78	6.24	5.71	6.63	6.31	5.07	5.28	4.99	5.80	5.88	8.00	2.75-9.98	5.95	5.87	5.53
2# Glass/Plastic	9.94	9.12	11.16	9.25	10.00	9.57	9.30	9.31	8.00	9.57	9.14	12.30	5.55-16.00	9.82	9.85	9.20
Pint	8.50	8.99	10.00	7.46	6.50	7.19	9.66	6.32	5.00	7.75	8.09	9.49	4.00-13.50	8.12	7.65	7.99
Quart	13.33	15.99	11.49	12.25	12.00	12.13	13.56	11.94	14.13	13.86	11.24	16.87	7.00-23.00	13.27	12.89	12.44
5# Glass/Plastic	23.50	17.00	22.73	22.05	25.00	24.98	21.73	20.33	18.99	19.00	21.33	25.00	16.00-36.00	21.17	20.50	21.33
1# Cream	9.00	7.62	8.10	7.00	7.42	5.50	6.49	5.59	7.42	5.95	8.60	8.25	4.90-10.00	7.40	6.94	6.48
1# Cut Comb	9.17	7.98	8.60	8.00	8.88	8.25	8.28	11.25	8.88	8.00	9.50	10.60	7.50-16.00	9.01	8.55	8.31
Ross Round	10.00	6.48	8.19	6.13	8.23	7.00	7.50	6.75	8.23	8.23	11.25	7.20	5.00-12.00	7.96	8.04	7.42
Wholesale Wax (Lt)	5.17	4.73	4.25	4.75	3.50	5.92	5.10	5.50	5.00	6.00	3.40	4.00	2.20-8.00	4.80	4.64	4.30
Wholesale Wax (Dk)	4.50	4.82	4.25	4.38	3.25	4.50	4.96	6.00	4.51	4.51	3.50	3.75	2.00-7.50	4.26	4.17	3.88
Pollination Fee/Col.	88.33	97.50	80.00	55.00	80.00	85.00	59.67	80.00	89.39	60.00	90.00	103.80	35.00-165.00	78.77	75.28	79.86



INNER COVER

I've been at this now long enough that you'd think some things would become more regular than not, and that I'd not be surprised. But I am, every time, and I'm glad I am. When I'm not surprised by new stuff I run into in this business, it's time to hang up the hive tool and look for other work. Or maybe no work at all.

A bit ago I talked about the folks at HiveTracks and their vision of beekeeping in the 21st Century. They've got way neat stuff going on, and from what they tell me they've got more on the way and they're looking to expand to bigger, faster, better stuff. Don't

blink because the future just passed you by.

Ok, that's something you'd think you'd get used to...the future passing you by. But please take a look at the articles in this month's issue. They're all about the future. It's passing us by faster than I can even blink...which is good, because that way I actually get to see some of them.

Jennifer Berry revisited the HoneyBeeNet program she looked at a bit ago to see what's changed. NASAs a part of this. NASA – the space people, the people who walk on the moon, send SUVs to Mars, and worry about storm systems in the Pacific and sunspot interference on the internet. They have a boatload of satellites watching what's going on and instrumentation that gives instant analysis about ongoing weather and ecosystem changes and what it means for bees and people and shorelines and when sourwood blooms. I don't know what you think about climate change but you can't argue with this data and you better be ready to do some things differently. It's getting warmer sooner every spring and you and your bees had better be ready. And other folks are getting involved with this. It's real and you can be a part of it. Get a hive scale, be part of the action....act, don't just react or pooh, pooh the scientists. It's not those folks making the changes...but it's us folks who are experiencing them. Get involved.

OK, That's one. Jim Tew tells the tale of his electronic education history. It started, like many of us, with a good camera, 35mm slides, an extra bulb and a projector. Those of us old enough to remember what those are could go anywhere and do anything, as many times as we wanted, as long as we had a slide carousel and an extension cord.

But digital cameras, digital projectors and computers changed all that. Now all I needed was a jump drive, a computer, a projector and I was off. Soon, not even a computer, just a drive and projector. Soon, just pull it off my web page, and what's next I'm not just exactly sure, but I'll bet it's smaller, easier to use and more expensive.

Jim tells of making videos. We did both Beta and VHS tapes here at the Root Company more than 30 years ago and were the first I think to sell them. Quality... maybe C+. But part of the future – A+.

VHS won of course, and Jim and his crew at Wooster did miles of film for months and months showing everything you could get on film...in several countries and many places in this country. He also mentions Bob Smith, who we teamed up with here...Bob was a step ahead of Jim's analog crew (real tape in the machine, with edits and splices and such), because Bob had digital, but it was still stoneage compared to the two apps, the camera and the storage I have on the smart phone I have now. But Jim and Bob and Dave did a bunch of those. I still see some at meetings in the video rental box. We'll live forever on those things. That's OK. It's the future taking a break.

This past summer, at the EAS meeting in Vermont, some of the more fu-

ture minded folks from several places got together and, in the words of a long past singer...imagined.

What they imagined, and what they already have, is what keeps me excited in this job. Imagine, if you will, a smart phone you hold in front of a colony...it'll tell you how many mites, queenless or not, Nosema, how much weight gained since last time, small hive beetles, or not, or how many. How old is the queen... the ratios of the many pheromones she's putting out...gonna swarm? Yes? When.

Then that smart phone sends all that data from that colony either back to your home computer, or the laptop in the truck, or simply stores it, so you can do something about it. Oh, Siri, take a note. Number 13's cover is falling apart, make sure we get a new one. And whoever weed-whacked here last time did a terrible job. Find out, and give 'em heck for goofing off.

Or how about a less complicated thingy. Stick a probe in front of the hive...queenless or not? Beetles or mites or wax moth or not? Costs about \$100. You'd pay for it in two weeks, maybe less. Buy 100 of them for every employee who deals with bees in the field and a few extra and they'd be about \$40....the price of one good queen.

Take a good look folks. The future is already here. Use it. Make it better for your bees.

Did you hear the one about the Maple Syrup in Canada gone missing? It's a great story in *Bloomsberg Businessweek* in January. Seems the

Continued on Page 75

Counting Your Barrels. I've Seen The Future, Again.

It's Summers Time —

Change

Change is seldom easy – for humans, cats or chickens. We were in the feed store buying our semi-monthly supply of chicken feed, scratch and dried worms. We always stop to look at what other interesting items there are that our chickens at home might enjoy. Kim spotted this block of different seeds stuck together with molasses and other ingredients. We asked the girl who was helping us about it and she said “My chickens love it! It gives them something to peck on since they really can't be outside right now! It's great!” So we bought one, I couldn't tell you how much it cost, lugged it home – it weighs about 20 pounds, put it on a plastic tray (the girl at the store suggested this to keep it dry) and put it in the chicken coop. They ran for the corner and huddled there, scared to death. They wouldn't touch it. I picked up one and sat her right on top of it and she just looked around and then jumped off. A second one sat on it and then jumped off. The third girl I tried to sit on it freaked and I had to cuddle her to settle her down as she buried her face in my chest. I left it there overnight thinking they'll get used to it. The next morning, chickens still staying on the other side of the coop not even getting close to this very odd, dark object (think Borg, if you're a Star Trek fan) that had been placed in their space. So I move it up onto the platform where the food is stored where they can see it, but it's not actually in their space. I'll let you know how that goes.

I put up the Christmas tree when cats weren't in the room. I had it lit, everything looking nice. Chloe, our black cat walked into the living room from wherever she had been for a couple of hours and literally stopped dead in her tracks, staring at the tree. It must be odd to be a cat and have no control over your surroundings. You walk back into a room and everything is different than when you left just a short time ago.

My son was here for two weeks from CA and the other cat Sophie normally hides in the basement or upstairs, depending on where she is, when anyone enters the house besides Kim and I. OK this could make for a tough two weeks – this kid is between me and the food and the cat box and the door that gets me outside. It took her a couple

of days to figure out that he's going to be here awhile. By the time he was ready to leave she was sleeping on the foot of his bed at night.

With the January issue of *Bee Culture* you saw something new – a poly bag with your 2013 calendar. This is the first time ever that *Bee Culture* has used a poly bag. We hope you like it – not having to wrestle with getting your calendar out of the magazine. And, hopefully, no torn covers. Let us know what you think. We won't be using a poly bag every month, but it certainly opens the door for lots of opportunities. One of the downsides to poly bagging is all of that plastic, so we are wrestling with that issue.

Bee Culture has been going through other changes, too, over the last several years. We feel they have made things better – hopefully you feel the same. We are now

on newsstands across the nation and in Canada. *Bee Culture* is in Wal Mart – I'm told one of the biggest book and magazine sellers in this country. This is exciting for us at *Bee Culture*.

Our *Bee Culture* staff has changed a bit in the last year or so and is changing again. We are adding a new sales person who will focus on advertising exclusively. Peggy's been a beekeeper for 11 or 12 years, she has sales experience in other fields and has owned several other businesses in the pet and animal world for many years. We feel she will be a great asset to the *Bee Culture* staff. If you are an advertiser, or would like to be one, you'll be hearing from her.

With this issue Kim is pretty much back full time at his desk and looking forward to starting several more books. He finished one just before he went in for surgery. We're also looking toward a good bit of travel

in 2013. By the time you read this we'll be back from the American Beekeeping Federation. In March we're going to the 150th Anniversary celebration for Dadant and Sons in Illinois (this'll be a once in a life time experience, so go if you can). In April we've been invited back to London, Manchester and Northern Ireland, so we'll be gone for a couple of weeks. Anyone want some chickens to look after? And hopefully we'll see many of you at the HAS meeting in TN in July and at EAS in PA in August. Looks like a busy year for us.

I hope you are all enjoying some down time and making your plans for the Spring. It will be here before you know it. Stay warm and happy.

Kathy Summers





A Closer LOOK



NASONOV PHEROMONE

Clarence Collison
Audrey Sheridan

Production of Nasonov pheromone varies with the bee's age and with the time of the year. Newly emerged workers have little or no secretion in their glands, maximum levels are reached in foraging-age bees.

The Nasonov scent gland of the worker honey bee lies on the dorsal surface of the seventh abdominal tergum and consists of a mass of large glandular cells which secrete pheromone through 600 or so minute ducts into a groove or canal between the 6th and 7th terga (Snodgrass 1956). The Nasonov gland and canal is usually concealed by the overlapping part of 6th tergum and the bee exposes them by flexing the tip of its abdomen downward (Free 1987). During exposure the bee usually stands with its abdomen elevated and fans its wings, drawing air over the exposed gland and canal so facilitates dispersal of the Nasonov pheromone. The gland is absent in queens and drones.

Production of Nasonov pheromone varies with the bee's age and with the time of the year. Newly emerged workers have little or no secretion in their glands, maximum levels are reached in foraging-age bees. In Winter, the level of secretion is also low, until foraging is again resumed in the Spring (Morse and Hooper 1985).

Seven components have been identified from the nasonov pheromone: geraniol, nerol, (E,E)-farnesol, (E)-citral, (Z)-citral, geranic acid and nerolic acid (Boch and Shearer 1962, 1964; Pickett et al. 1980). Of these geraniol, nerolic acid and (E,E)-farnesol are present in the highest proportions; however, a mixture of all components in equal proportions is as or more attractive than a mixture of all components in natural proportions (Free et al. 1984). Approximate natural proportions of (Z)-citral, (E)-citral, nerol, geraniol, nerolic acid, geranic acid and (E,E)-farnesol are 1:1:1:100:75:12:50 (Pickett et al. 1980). Comparative analysis of the gland secretion and of air above workers releasing pheromone, show that composition is maintained during release despite different volatilities of the components (Morse and Hooper 1985).

The major component in the Nasonov secretion is geraniol, but the most attractive components in both field tests and in the magnitude of antennal electrophysiological responses are (E)-citral and geranic acid. This apparent discrepancy in composition and efficacy of Nasonov pheromone can be explained by a highly specific enzyme system in the Nasonov gland which converts the major component, geraniol, into the more attractive (E)-citral

and geranic acid. Each component, however, contributes to the attractiveness of the blend and the strongest responses generally are induced by the full mixture of compounds (Winston 1987).

Workers expose the Nasonov gland and disperse the odors by fanning in a number of orienting situations, including nest entrance finding, forage marking and swarming. At the colony entrance the Nasonov scent is important in guiding workers into the colony such as incoming foragers, workers on orientation flights and workers disoriented following colony disturbance (Butler and



"Workers also release the Nasonov pheromone when foraging for water, at artificial dishes containing sugar syrup and very rarely, at flowers."

Calam 1969; Winston 1987). Workers which perceive this pheromone expose their own Nasonov glands and thus augment the signal.

The Nasonov dispersing behavior at colony entrances can be induced by many colony odors, among them empty comb, honey, pollen and propolis, as well as by one of the queen produced pheromones, 9-HDA (9-hydroxy-2-decenoic acid) (Ferguson and Free 1981). The Nasonov pheromones themselves induce exposure of the Nasonov gland, which explains the rapid increase in the number of scenting bees that occurs as workers cluster, enter a new nest site, or enter the nest after temporarily being denied access.

Synthetic (E)-citral, geraniol, nerolic acid and geranic acid components of the Nasonov gland pheromone induce worker honey bees to release Nasonov pheromone at their hive entrance. Mixtures lacking any one of these 4 components stimulated pheromone release less effectively, but absence of nerol or (E,E)-farnesol increased effectiveness (Free et al. 1983a). Of the components tested singly, (E)-citral, geraniol, nerolic acid and geranic acid increased Nasonov gland exposure relative to the control colonies with E-citral being the most important component. The first three components induce honey bees to join a cluster (Free et al. 1981a, 1982), but the fourth, geranic acid, diminishes the attractiveness of a synthetic mixture to clustering bees (Free et al. 1981a). Therefore, although geranic acid may lessen the initial attraction of a lure to swarms, by encouraging the bees to release their own Nasonov pheromone it may have a positive overall effect; so costly removal of geranic acid from nerolic acid used in lures prepared commer-

"Two Nasonov pheromone components, geraniol and nerolic acid, have been shown to confuse Varroa mite orientation."

cially for attracting swarms is unnecessary (Free et al. 1981b, 1982).

Workers also release the Nasonov pheromones when foraging for water, at artificial dishes containing sugar syrup and very rarely, at flowers (Free and Racey 1966; Waller 1970; Free and Williams 1970, 1972; Free et al. 1983b). At water collection sites release of the Nasonov pheromones provides an odor to assist incoming water foragers in orienting to a relatively odorless resource. The presence of Nasonov pheromone at a source of forage does not encourage attracted bees to release further pheromone (Free 1968); this helps to avoid over-exploitation. Workers can be induced to fan and release Nasonov scents at artificial food dishes containing sugar concentrations greater than those of most flowers.

"Scout" honey bees searching for forage were attracted to the odor from the Nasonov gland of previous foragers. Foragers did not usually expose their Nasonov gland until after the first few visits to a food source, even when this was abundant and attractive (Free 1968). Some foragers exposed the gland more often and for longer than others did. Most of the bees that released their scent had exposed their Nasonov gland before they landed at a dish of syrup and continued to expose them for a few seconds afterwards, but others exposed the glands momentarily only, usually soon after alighting.

Extensive release of Nasonov pheromone occurs during different stages of the movement of a swarm from its parent colony to its new nest site (Morse and Boch 1971; Avitabile et al. 1975). After leaving its parent colony the swarm clusters nearby on a tree branch or other support. The first bees to settle expose their Nasonov glands and this attracts other bees still airborne to the site. Once the swarm has clustered, scout bees continue to search for a permanent nest site. Sometimes they may locate potential nest sites before the swarm leaves the parent colony. Scout bees which have discovered a nest site return to the cluster and perform direction- and distance-indicating communicative dances. They then go back to the new nest site, release Nasonov pheromone near its entrance, and so attract more scouts to investigate the site. When most of the scout bees agree that a particular nest site is suitable the swarm leaves its temporary clustering site and flies to the new nest. Scout bees lead the swarm and release Nasonov pheromone en route. Some scouts are already at the nest site releasing Nasonov pheromone while the swarm is airborne, Nasonov pheromone is released by most bees in the swarm as they land at the nest entrance and while walking into the nest.

When a virgin queen is about to leave her hive to mate, many of her workers assemble at the hive entrance and release Nasonov pheromone, this probably serves the purpose of guiding the virgin queen to the entrance and helping her find the hive on her return (Ruttner 1956). It is well known that if a colony is examined about 24 hours after its queen has been removed,

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many of the worker bees release Nasonov pheromone and fan (Free 1987).

The Nasonov gland is normally only exposed on the exterior or outside of the hive. Al-Kahtani and Bienefeld (2012) have found evidence that the exposure of the Nasonov gland may be involved in selecting individual larvae during emergency queen rearing. They observed that some workers presented their Nasonov glands after inspecting larvae that were offered to queenless colonies in artificial queen cups. Exposed Nasonov glands occurred within the hive when worker bees exposed their glands while standing on the queen cups. Exposed Nasonov glands were found exclusively at cells containing brood suitable for queen rearing. Fanning seldom occurred following gland exposure; however, significantly more bees were recruited around the cells within seconds of the gland being exposed. A highly significant concentration of exposed Nasonov glands were observed at cells that subsequently developed into queen cells.

Two Nasonov pheromone components, geraniol and nerolic acid, have been shown to confuse *Varroa* mite orientation (Hoppe and Ritter 1988; Pernal et al. 2005). It is believed that *Varroa* mites may detect relative concentrations of these components in order to discriminate between adult bee hosts, and preferentially parasitize nurse bees over older workers in honey bee colonies. Such a preference for nurses may increase mite reproductive success as the parasite has a higher probability of being moved in proximity to or contact with brood cells at the right age for invasion.

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When a hive is opened, field bees fan their exposed Nasonov glands to help guide home young, naive bees who have not yet been exposed to the outside world.

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A beekeeper from Kentucky writes:

I started out as a beekeeper last Spring with two hives. They both made it through the Summer, but I fear they went into the Winter without enough stored honey. Can I feed them sugar syrup in the Winter?

Phil replies:

First of all, any Winter feeding should be considered EMERGENCY feeding, as in, "I think the bees will starve if I do not do something." That said, it's possible to use sugar syrup in Kentucky during the Winter, where you can expect some warm periods in which the temperature reaches the 50s during the day. In locations where it does not get that warm, bees will not leave the cluster to seek food in a feeder, so winter feeding with liquid syrup is of limited value. Top feeders and frame feeders work best in cold weather, because they put the syrup closer to the cluster. The down side of using syrup is the introduction of additional moisture into the hive – always a consideration, but especially in Winter. To minimize this problem, use only as much syrup in the feeders as the bees can take in during a brief warm spell, and make it thick (two parts sugar to one part water.)

If you think your bees are in danger of starvation and you have no alternative to Winter feeding, another method to consider is bee candy, or fondant. Placed over the inner cover or directly on top of the brood frames with a spacer or empty honey super to contain the candy, it is more accessible to the bees and avoids the moisture problem. Bee Candy is cooked on the stovetop and is not complicated to make. A small-batch fondant recipe uses: two cups granulated sugar, 1.5 cups of water, two tablespoons corn syrup, and 1/8 teaspoon cream of tartar. Stir these ingredients in a sauce pan over medium high heat until the sugar dissolves, then continue to heat without stirring until the mixture reaches 238°F. Use a candy thermometer. (If you use bottled corn syrup from the grocery store, make sure it is labeled "light", not "dark." Dark corn syrup has molasses in it, which should not be fed to bees.) Beat the candy until it is thick and pour it into a thin container or mold, like a cookie sheet lined with wax paper, to harden. Cooking to the correct temperature and beating are the keys. The candy can then be broken up and pieces placed over the inner cover of the brood box. To make it easier to reach, an empty honey super can be put on top of the brood chamber and the candy placed on stick supports on the brood top bars. Some beekeepers even make special fondant feeders, similar to inner covers but deeper (about 1 inch inside), and designed to suspend the candy over the brood frames. The candy can

be poured into this feeder and placed over the brood box upside down. Other recipes and tips on feeding methods are available on the internet – just search for "beekeeping" and "bee candy" or "fondant".

As a last resort, a very old and very simple Winter feeding method is to place dry granulated sugar on the inner cover. This is clearly a desperate measure, but beekeepers have told me that using it has saved hives from what they thought was certain Winter starvation. Be aware that most hive losses from starvation actually occur in late Winter or even early Spring as the hive starts to rear brood and runs out of food stores. Keep an eye on your hives and their food stores as Spring approaches.



*Candy Board
on hive.
Inset - Candy
Board with
candy.*



A beekeeper "to bee" from Tennessee writes:

For many years I have wanted to become a beekeeper. My plan is to start next Spring. I've attended a local beekeeping meeting and a beekeeper has offered to sell me a hive, complete with bees. Other beekeepers say I should purchase a "nuc" in the Spring - I'm really not sure what that is. I also read about ordering a package of bees. I'm confused and not sure what to do. PLEASE HELP!

Your advice would be much appreciated!

Phil replies:

Buying a full size, existing hive, which may contain 40,000 bees or more, requires active management from day one – a task for which most new beekeepers are not prepared, and one which can quickly become overwhelming. Better to start with a package of bees or with a nuc, both of which contain fewer bees - about 12,000 each. That way the new beekeeper's skills and knowledge can

develop as the new hive grows in population.

What is the difference between packages and nucs?

Starting a hive with package bees is starting from scratch. Package bees are shaken from frames of hives, usually by commercial beekeepers in the southern U.S., into a shipping box – the package. A queen in a protective cage is placed inside, and the package is ready for sale or shipping. The beekeeper receives the package and installs both bees and queen in a new hive containing only frames and foundation. Once in their new home, the bees free the queen from her cage by eating through a sugar candy plug. If all goes well, the queen begins laying eggs as soon as the bees have drawn out enough comb and, about three weeks later, new bees begin to emerge and the colony gradually builds up. A nuc (short for nucleus hive) can be thought of as a starter hive, smaller in size and with fewer frames and bees than an established colony, but complete with all the elements of a hive. A nuc is created when an experienced beekeeper removes several frames – along with bees, stored honey, pollen, eggs and developing bees (called brood) from a strong hive and places them, along with a queen, in a box half the size of a regular hive body. He or she should maintain the nuc for a short time – usually two or three weeks before offering it for sale – to ensure that the queen is laying and that the nuc is off to a good start. The new beekeeper transfers the frames and bees to an empty hive where, under his or her care, it will grow into a full size colony in a couple of months.

Which is better?

There are advantages and disadvantages to both. In purchasing a package, a new beekeeper does not have to worry about starting out with certain disease and pest problems from which nucs are not immune. Packages also provide an opportunity to watch the entire process of the development of a hive, from the first steps of drawing out comb and the emergence of the queen to the establishment of a mature colony, while postponing some management issues like treating for disease and dealing with swarming. On the other hand, whereas transporting bees is stressful for them whether in packages or nucs, the mailing of packages presents special problems (such as time and temperatures in transit.) Look for sources that truck the bees to you directly, or pick them up yourself. The most common problems with package bees involve the queen. For a variety of reasons, the bees will sometimes

reject and kill her which can be frustrating and confusing for a new beekeeper (or even an experienced one). The great advantage of a nuc bought from a reputable source is that it already contains a proven and accepted queen along with eggs, larvae, brood, and some food stores. However, in purchasing a nuc, the new beekeeper is purchasing a small, but fully functioning hive. That includes any pre-existing disease or parasite problems and comes with management issues similar to those of a full sized hive. Also the supply of nucs – especially local nucs – is usually limited, and those that are for sale may not be available until later in the Spring. Package bees are shipped starting in April. The best way to find a reliable source, whether you are buying packages or nucs, is to ask for recommendations from beekeepers in your local association. If you don't belong to one, join – it's a great resource. Best of luck.

A beekeeper from Ohio writes:

Last Summer I lost two hives. The bees died and I have no idea why. I stored these hives in my basement and used paramoth to protect the comb from wax moths. My question is – can I safely re-use this equipment in the Spring and how should I sterilize it?

Phil replies:

It is true that some diseases can be spread through re-use of old equipment, but most of the time you can continue to utilize it without risk. Parasites and pests, including mites, will die when the bees in the hive die. Wax moths can continue to be a problem in drawn comb, but you have already treated with Para-moth (brand name for paradichlorobenzene), which should take care of future wax moth damage. If it doesn't, you will know before Spring.

When we talk about diseases hiding in used equipment (and this also applies to purchased, used equipment), our major concern is for the drawn comb and frames. Old equipment such as hive bodies, bottom boards, and covers can easily be refurbished by scraping off the old wax and propolis (where diseases might lie dormant) with a putty knife and, if needed, re-painting the outer wood surfaces. The risk with drawn comb is the possible presence of spores from bee diseases such as American foulbrood (AFB), European foulbrood, nosema and caulk brood. Spores are the method of reproduction for many diseases caused by microorganisms – think of them as disease seeds. If you are reasonably confident that the bees in your dead hives were not infected with these diseases, you can re-use those frames without fear. Keep in mind that brood comb which has been in use for more than three or four years should be discarded irrespective of concerns about disease. The same applies to poorly drawn comb, comb with lots of holes (over time the bees often eat holes into comb), and comb with more than about 10 percent drone brood. Re-use only frames with more recently drawn out comb with a regular appearance, and give your bees a good start on next year. **BC**

Phil served as the KY Dept. of Agriculture's State Apiarist from 1999 through 2011. He is a graduate of Oberlin College in OH and the University of KY. A native of the mountains of Eastern KY, he now lives out in the sticks in the Bluegrass Region of KY near Lexington with his family, a very old dog, and some beehives.



Nucs. (photo by Mary Parnell Carney)

Managed Pollinator CAP Coordinated Agricultural Project

Germplasm For Honey Bee Breeding

Steve Sheppard



To Supplement U.S. Bee Breeding Populations We Are Collecting And Introducing Several European Honey Bee Subspecies.

Under the broader goal of incorporating pathogen- and disease-resistance traits into U.S. honey bee populations and increasing the genetic diversity available for bee breeding, the Managed Pollinator Coordinated Agricultural Project (CAP) includes an objective to characterize our current honey bee genetic resources. U.S. populations are primarily derived from honey bees introduced during a very active period of importation that occurred between 1859, when the first Italian honey bees (*Apis mellifera ligustica*) were imported, and 1922, when the U.S. Honey Bee Act restricted subsequent importations of honey bees. This federal legislation, originally put in place to prevent the introduction of adult honey bees infested with tracheal mites, was later expanded to restrict the importation of honey bee germplasm in the form of eggs and semen (after the arrival of Africanized honey bees in South America). To some extent the Honey Bee Act served its purpose, as tracheal mites did not reach the U.S. until 1984. Following the introduc-

tion and widespread establishment of tracheal mites and then *Varroa* mites (1987), both managed and feral honey bee populations experienced major colony losses. Prior to these heavy losses, the feral population had been shown to be genetically diverse (relative to managed honey bees) and represented a possible breeding resource for U.S. commercial bee breeders (Schiff et al., 1994).

As part of an ongoing effort to supplement U.S. bee breeding populations with additional genetic diversity from Old World source populations, researchers at WSU, in collaboration with colleagues in the USDA-ARS and USDA-APHIS, are involved in the collection and introduction of germplasm from several European honey bee subspecies. The story of our initial importations can be found in a previous Honey Bee CAP article (February 2012). The continuation of this story, including updates on the use of semen cryopreservation in stock reconstruction form the basis of this current article.

For a number of animals of ag-

ricultural importance, cryopreserved semen and instrumental ("artificial") insemination are widely used in breeding and selection programs. In 1944, an average dairy cow produced less than 4,600 pounds of milk per year, while in 2007 the average dairy cow produced over 20,000 pounds per year (Capper, 2007). Although no single cause was responsible for this astounding "per cow" increase in milk productivity, a significant portion can be attributed to breeding improvements and progeny testing made possible by the widespread use of cryopreservation and artificial insemination. Overall, these reproductive technologies have been estimated to provide a four-fold increase in the rate of genetic improvement in dairy cattle, relative to natural mating (VanVleck, 1981). Cryopreservation and artificial insemination also play a role in breeding efforts in other agricultural animals, including turkeys, sheep, pigs, horses, and beef cattle. In honey bees, instrumental insemination has been widely used in genetic research and for the production of some breeder queens provided to commercial queen producers. These instrumentally-inseminated breeder queens are then used as grafting mothers by queen producers for specific commercial strains (such as New World Carniolan and Minnesota Hygienic) or as sources of traits of special interest to breeders for crossing (such as *Varroa*-sensitive hygiene (VSH)). Cryopreservation of honey bee semen has been an elusive target, although recent improvements in methodology now provide the means to incorporate this reproductive technology into both breeding and conservation efforts for honey bees (Hopkins et al., 2012).



Preparing to collect drones from an apiary in central Italy near Lake Scanno (L' Aquila).

Italian Honey Bees – *Apis mellifera ligustica*

Our research group made collections of fresh semen from this honey bee subspecies in Italy in 2008-2010. The semen was then transported to the U.S. and used within a week of arrival to inseminate virgin queens of “Italian” honey bee strains provided by U.S. queen producers. Following release of the germplasm by USDA-APHIS, these queens were overwintered and provided to several cooperating queen producers for evaluation.

In 2012, several members of the WSU bee research group (S.W. Cobey, B.K. Hopkins, W.S. Sheppard) again traveled to Italy and, with the assistance of Professor Raffaele Monaco (University of Bari) made collections of honey bee semen from the apiaries of a number of beekeepers in central Italy. In addition, we visited the National Institute for Apiculture in Reggio-Emilia, Italy, where Drs. Marco Lodesani and Cecilia Costa are involved in a project to genetically characterize the endemic honey bees of Italy. They are collaborating with beekeepers and queen producers from around Italy to characterize local and regional populations of the Italian honey bee and to conserve these honey bees in the face of Italian importations of other European honey bee subspecies. Under European Union rules, honey bee subspecies and selected strains or hybrids (such as Buckfast) can now be sold throughout much of Europe, regardless of their genetic origins (<http://www.buckfast.dk/en/global.html> or <http://www.buckfast.dk/en/bq-flash.html>).

At the National Institute for Apiculture, we were able to make an extensive collection of honey bee semen from drones taken from their apiaries (Figure 2, 3). In addition to collecting fresh semen for immediate use upon our return to WSU, we also cryopreserved aliquots of the semen for use in the near or distant future (Figure 4, 5).

Caucasian and Carniolan honey bees – *Apis mellifera caucasica* and *A. m. carnica*

Our collection of semen from these two subspecies prior to and including 2011 was previously described in a Honey Bee CAP article (February 2012). Given that only

semen was allowed for importation, the initial expression of *A. m. caucasica* genetics from these imports was through insemination of daughter queens derived from a U.S. Carniolan strain in 2010, yielding mated queens who produced colonies expressing 50% Caucasian genetic background. In 2011, virgin daughters of these crossbred queens were inseminated with fresh imported Caucasian semen, resulting in colonies that expressed a 75% Caucasian genetic background. In 2012, daughters produced from these queens were inseminated with previously cryopreserved *A. m. caucasica* semen, resulting in queens yielding colonies expressing an 87.5% Caucasian background. A number of virgin daughters of these queens were then produced and allowed to naturally mate in a semi-isolated area where an apiary incorporating Caucasian genetic material is maintained. These naturally mated queens are being overwintered in 2012 in several locations and will be evaluated in Spring 2013. A number of these overwintered queens will be selected as queen mothers and backcrossed to cryopreserved *A. m. caucasica* semen in 2013. From these queens, daughters will be produced in summer 2012 and naturally mated to the Caucasian pool to produce the queens and colonies that overwinter in 2013.

Queens that are instrumentally inseminated with fresh semen can be established in full-sized colonies and overwintered normally. However, although queens inseminated with cryopreserved semen can produce normal worker brood and serve as grafting mothers to produce a subsequent generation of queens, their useful life as a “head of state” for a colony (i.e. through a full Winter in northern climates) is somewhat less certain, probably due to the limited amount of cryopreserved semen used for each insemination and possible cryo-damage that affects long-term sperm survival within a queen’s spermatheca.

Of the three subspecies for which we have been able to import semen for breeding purposes over the past five years, *Apis mellifera carnica* has been the most utilized, with progeny from instrumentally inseminated breeder queens being overwintered and tested by collaborating queen producers. At present, several queen



Portion of a research apiary at the National Institute for Apiculture

producers in California are selling stocks that include some measure of genetic material from our 2008-2011 importations.

The reasons for the rapid adoption of imported *A. m. carnica* genetic material, relative to *A. m. ligustica* are multiple. First, the Italian honey bee has been the most popular strain with U.S. beekeepers for over a century and U.S. queen producers have developed their commercial strains over a long history serving beekeeper demand. They are prudently cautious to evaluate any outside source material, both for apicultural traits they want to be expressed in their stocks and for the combining ability of these imported stocks with their own. Secondly, given the number of queen producers that maintain Italian honey bee strains, they have been able to trade queens (i.e. genetic material) among themselves, when they felt the need to incorporate additional diversity in their breeding lines. In



An excluder used to collect returning *A. m. ligustica* drones outside the hive (Reggio-Emilia, Italy).



Aliquots of honey bee semen ready for cryopreservation. Note the red and yellow internal rods used to mark samples during cryo-storage. The semen is the tan liquid near the bottom of each tube.

addition, hundreds of thousands of queens of Australian sourced "Italian" strains of honey bees were imported into the U.S. between 2004 and 2010, with unknown effects on U.S. breeding populations.

In the case of Caucasian honey bees, the requirement to reconstruct this strain in the U.S. through an initial cross with Carniolan bees has

already been noted. The initial importation of *A. m. caucasica* semen was made only in 2010 and, thus, we have had only limited time to evaluate the Caucasian honey bee within our breeding program. However, based on the interest expressed by a number of beekeepers and queen producers, we anticipate some release of this material to queen producers in 2013.

Honey bee breeding and a germplasm repository

As we look to the future of agriculture, it is vital to recognize that current agricultural production methods are highly dependent on honey bee pollination and migratory beekeeping. Almond production alone requires the annual pollination services of well over half of the managed honey bee colonies in the U.S. in late Winter/early Spring. Given the climatic requirements of almonds (over 80% of the world's production occurs in California), it is unlikely that almond production will ever move to other locations throughout the U.S. Thus, in almonds, the need for honey bees, transportation and high density planting is likely to continue to be a driver of the com-

mercial beekeeping industry. If and when agricultural production in other crops shifts toward less monoculture and small-scale producers, non-Apis bees and non-migratory honey bees will likely play a larger role in the food and forage crop pollination story, just as they already do in home gardens and small farmstead agriculture. However, at present, the critical issue of honey bee colony health remains of paramount importance to agricultural production, and beekeepers, researchers and industry continue to struggle to find sustainable, safe and effective means to keep honey bee colonies alive and thriving.

Among 28 subspecies of the honey bee, there exists extensive genetic variation across their Old World homelands, as a result of the diverse environmental and climatic conditions faced by this species over many thousands of years. Thus, honey bees adapted for northern Europe, the Mediterranean coastline, the Caucasus Mountains and sub-Saharan Africa have all accumulated specific genetic differences that underlie traits adaptive within their own particular history. In many cases, some of these traits are more or less "desirable"



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Cryopreservation in action. Semen samples are in the small black unit in the liquid nitrogen filled "cryobath" on the left. The computer is used to control the freezing rate.

from the standpoint of beekeepers managing colonies in the U.S. Thus, while the tendency for high rates of reproductive swarming and "defensiveness" in Africanized honey bees (derived from sub-Saharan African *A. m. scutellata*) is clearly not a desirable trait for most U.S. beekeepers, their ability to co-exist with parasitic *Varroa* mites without chemical treatment or intervention by beekeepers would be seen by most as a most welcome trait (Martin and Medina, 2004).

Although it remains an elusive target, one of the primary goals of bee breeding is to move toward the development of managed honey bee populations that are productive and useful from the standpoint of human needs, while also maintaining traits that allow them to thrive and sustain themselves without excessive inter-

vention by beekeepers in the form of insecticides and drugs. The re-collection of original source populations that were the bases for early U.S. honey bee introductions provides additional genetic material for beekeepers to evaluate for traits leading to that end. Likewise, cryopreservation provides a means to more fully utilize these genetic resources without the limitation of the very short "shelf-life" of fresh semen.

As we look to the future of bee breeding, the establishment of genetic "repositories" for honey bee germplasm will provide the means to cryopreserve the genetic diversity existing within particular honey bees subspecies or selected top tier "strains" of domestically selected honey bees. In common with genetic repositories that are maintained for other agricultural species, a repository for honey bees would provide the means to more easily conduct progeny testing, whereby the "outcome" of specific crosses can be evaluated and then the parental sources can be retroactively "scored" as to their value for future breeding. A honey

bee germplasm repository would also allow queen producers to cryopreserve samples of their current honey bee stocks and bring them out many years later for the purposes of backcrossing or stock reconstruction. Repositories also permit easy transport and exchange of honey bee genetic material among queen producers across the country or around the world (following proper regulatory oversight). In a sense, cryopreservation and the establishment of genetic repositories provide the means to breed across "time and space," allowing honey bee germplasm to be conserved for years or decades and then thawed for use as breeding needs dictate. **BC**

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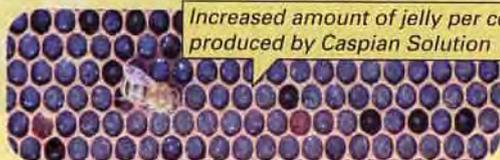
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The Voice Of The South Is Sometimes A Soft Cussin' Under The Breath



Jeff Harris

When I first learned about choosing good apiary locations, the emphasis was almost always on wind breaks, alignment relative to sun and shade, drainage and availability of adequate forage throughout the year, and so on. But growing up in central Alabama there was always an added caution from my mentors to avoid placement of colonies near agricultural lands at all costs. This was especially emphasized for cotton (*Gossypium* spp.) to which frequent applications of insecticides were needed to control the Boll Weevil and other pest insects like the Pink Bollworm. The warning extended to other row crops like soybeans (*Glycine max*) for which growers used pesticides to control pest insects like stinkbugs and Soybean Loopers. I quickly learned that various agrochemicals (pesticides, herbicides and fungicides) were routinely applied to row crops, and many of these chemicals posed significant risks to honey bees.

As a teenager with little experience in farming, the world of pest management in row crops was foreign to me. I simply avoided putting bees near cultivated crops, in much the same way someone might avoid traveling in dark allies at night where unknown dangers may be lurking. I was easily convinced to avoid agricultural lands because 17 of my first 25 colonies had died from arsenite poisoning. The bees had collected contaminated water from a drainage canal in my suburban neighborhood, which was an area that should have posed a relatively low risk of poisoning bees. That loss was heartbreaking, and I simply did not want to experience anything like that again in my life.

During the last decade or so, there seems to have been an

increased use of row crops as bee forage in the southeastern U.S. One reason is that the use of pesticides has been greatly reduced in the farming of cotton as a result of the Boll Weevil Eradication Program that eliminated the pest from the southern U.S. A key factor allowing reduced insecticide use was the advent of genetically engineered (GE) cotton to which the gene for a natural insecticidal toxin from the bacterium *Bacillus thuringiensis* (Bt) had been inserted. The Bt toxin has a fairly narrow range of activity; it readily kills the developmental stages of beetles, moths and butterflies, and some flies, but it is harmless to other organisms. The Bt cotton expresses the toxin in the plant tissues, and beetle grubs and moth larvae that are major pests to cotton are killed after feeding on the plants. Similar strategies with GE soybeans and other cultivated crops are currently used, and the overall rate of insecticide use has been significantly reduced in major agricultural areas.

The use of Roundup Ready (RR) cultivars of many row crops, including cotton and soybeans, has also been credited with helping reduce the need for insecticides. Glyphosphate is a broad-spectrum herbicide (Roundup) that targets a specific enzyme system found in plants. There exist chemically different forms of the targeted enzyme, and some of these forms are immune to the toxic effects of glyphosphate. When the gene for a non-reactive form of the enzyme is engineered into crops, the plants become completely resistant to the herbicide. The use of RR cotton and RR soybeans is credited with improved soil conservation, presumably because of changes in tillage practices that

had been used to combat weeds, increased yields, and reduced time and money in controlling weeds. The need for insecticides is decreased in RR crops partly because residual pest populations have fewer places to hide after herbicide treatment. It should be noted that although overall insecticide use has been reduced, there probably has been an increased application of glyphosphate in agricultural lands.

Whatever the cause, many beekeepers purposely place apiaries in proximity to soybeans and cotton, and they report annual yields of 90-100 lbs. per colony from these crops. Honey bees obtain nectar from the small flowers of soybeans, but generally, foragers gather nectar from extra-floral nectaries at the base of cotton blossoms and not from the floral nectaries inside the flower. In most cases, honey bees simply avoid going into the cotton blossom.

In Mississippi where I live now, cotton begins blooming and producing nectar at the beginning of July, and it flowers for several months throughout the Summer into



Soybean blossom.



Sub-bracteal Nectary

the Autumn. Similarly, soybeans flower during the warmer months of Summer depending on the type of soybean planted. Two types of soybeans are grown here. One type is planted in early to mid-April, and these plants often have a prolonged blooming period well into August. The second type is planted after the wheat harvest in mid- to late May, and the bloom period is somewhat shorter than in the early varieties. Regardless, both soybean varieties and cotton provide nectar to honey bees during the hottest and driest period of the year when there are no other significant sources of nectar available to them. I have spoken to a few beekeepers who credit the availability of soybeans in drought regions of the Midwest as the primary reason for the very survival of their beekeeping operations this year (and in some cases, the last few years).

Given my childhood aversion to putting bees near farmland, I became quite curious about the successes and failures of beekeepers that routinely place bees into these environments for honey production. During the last few months, I have informally asked about 15 beekeepers from several states (North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana and Texas) about their experiences in cotton and soybeans. My interest was especially piqued by living so close to the Delta, which is a fertile agricultural area within the historical flood plain of the Mississippi River in portions of Arkansas, Mississippi, Tennessee

and Louisiana. I fully expected to hear about a continuous tug-of-war between annual losses of bees killed by insecticide drift and high honey yields from colonies surviving the environment. I imagined that during each growing season every beekeeper lost whole apiaries that were located in heavily cultivated farmland.

My basic premise going blindly into these conversations was that although Bt cotton and Bt soybean may be protected from beetle and Lepidopteran larvae, the Bt toxin is not very effective toward secondary pests of these crops like stinkbugs, aphids and plant bugs. Plant bugs (Family: Miridae) in particular, can become quite problematic in both of these crops during the Summer. Therefore, although the need for insecticides may be reduced for the control of primary pests, the presence of injurious secondary pest insect populations still requires periodic pesticide applications to control them. Therefore, the risk to

almost all colonies in the affected apiary either by drift of pesticides directly onto the hives, or by forager collection of contaminated pollen or nectar from flowering plants that presumably had been treated. All of these beekeepers felt that the benefits of having a reliable annual honey yield outweighed the negative impact from the periodic loss of whole apiaries. I was amazed at the grit and nonchalance of these men as they spoke about managing substantial risks in business by relying on experience and logic, even when the periodic loss seems so devastating.

During September of this year I investigated my first bee kill in the Delta. Ironically, the beekeeper who experienced the loss was one of the commercial beekeepers that I had interviewed about bees in row crops. He had lost bees in the distant past, but in recent years he had not lost any apiaries. He called me and asked me to visit the site to draw

All of these beekeepers felt that the benefits of having a reliable annual honey yield outweighed the negative impact from the periodic loss of whole apiaries. I was amazed at the grit and nonchalance of these men as they spoke about managing substantial risks in business by relying on experience and logic, even when the periodic loss seems so devastating.

honey bees of exposure to pesticides is not zero, and in some years, the risk could be very high with multiple pesticide applications to control a series of pest population outbreaks. Given that most pesticides are applied aerially by crop duster, the risk of drift onto whole apiaries seemed relatively high from my inexperienced vantage. I have more recently learned that pesticide applicators do many things to minimize drift to off target sites, and the incidence of drift is fairly low.

Surprising, only three of the 15 beekeepers that I had interviewed reported losses of any colonies. Each man reported losing colonies only during one or two events during the most recent five years. When they did lose colonies, they tended to lose

my own conclusion about what had happened to his bees. When I asked him about any conversations with the farmer or pesticide applicator, I could almost hear the soft cussin' under his breath as he expressed his frustration about the loss. He had told the farmer about the monetary value of the lost colonies (>\$15,000.00), and the farmer awkwardly apologized without offer of compensation.

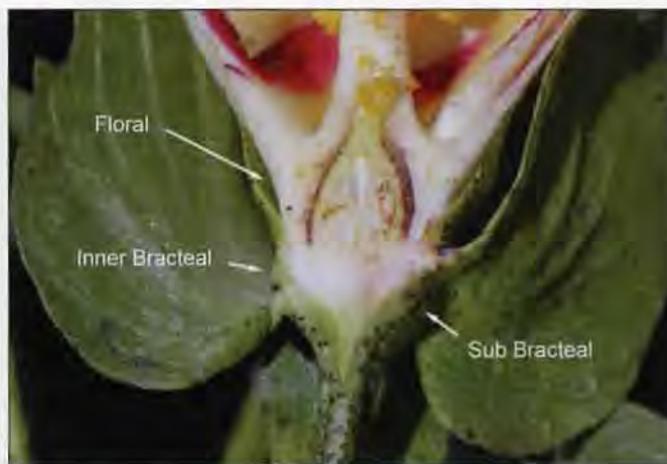
I drove to the site of the bee kill and quickly concluded that the hives most likely died from pesticide drift during the aerial application of acephate, which is extremely toxic to honey bees. The farmer was most likely trying to control an outbreak of Tarnished Plant Bugs in many hundreds of acres of soybeans

that surrounded the apiary. The soybeans were not in bloom. In fact, the beans were yellowing and had mature bean pods visible, so collection of contaminated nectar or pollen by foragers seemed unlikely. All 60 colonies in the apiary had been poisoned, and the entire apiary was a stinging chaos of robbing bees amongst piles of thousands of dead bees at every colony entrance (Fig. 4). It sickened me too see so many dead bees as the old emotions of my teens briefly flooded back to me.

After regaining my composure, I looked inside of every colony and found the loss to be total. Not a single viable colony remained. The apiary was precariously placed on a service road between two extremely large fields of soybean. There was probably not more than a 50-70 foot break between the edges of the field and the apiary, but this was greater than the 25-50 feet of buffer distance that is recommended to farmers. Although it cannot be proven, I could easily see how a pesticide applicator might have passed directly over the apiary without shutting off the sprayers. Even if the applicator had done everything by the book, the hives were exposed and vulnerable to accidental drift.

I also examined a second apiary owned by the beekeeper that was 0.8 miles from the site of the bee kill. Amazingly, not a single colony exhibited signs of poisoning despite being surrounded by the same sea of soybeans that had been treated with acephate. The entire apiary was in good shape, and almost all colonies had a significant honey crop in the supers. What was the difference? All of the colonies in the second apiary were protected by an extensive canopy of trees and shrubs (Fig. 5). This little grove probably protected the bees in at least two ways. First, the canopy simply shielded the hives from droplets falling on them from above. Second, the grove of trees presented an obstacle that had to be avoided by the aerial applicator. He had no choice but to fly around the grove of trees, which kept the pesticide away from the bees.

The use of canopies and tree lines as windbreaks is frequently presented as one of the best management practices that beekeepers should consider when locating apiaries in agricultural environments. I



do not want to summarize all of the best management practices suggested for beekeepers and pesticide applicators because others that are more knowledgeable have already done so (see "How to Reduce Bee Poisoning from Pesticides" at <http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf>).

However, I want to reiterate a couple of major points that are often presented. First, most farmers and pesticide applicators do not intend to harm honey bees. Bee kills result from mistakes that are made in either the application process, the choice of pesticide used to control pests, or application of pesticides when plants are blooming. Second, beekeepers need to develop relationships with farmers that go well beyond getting permission to put bees on the land. For example, if a grower must use a highly toxic insecticide, or one with a long residual time (> four hours), the beekeeper should be warned so that the bees can be moved or

otherwise protected. The farmer needs to know which compounds are most threatening to bees, and the beekeeper can supply a short list of compounds that would warrant him to protect his bees prior to the application. The farmer will need access to contact information (cell phone number; email, etc.), and this information should be given to the farmer and it should be posted on signs in front of every apiary.

One interesting recommendation is that there should ALWAYS be a contract in place between growers and beekeepers when bees are used in pollination service. Of course, this is most useful in crops like almonds, apples, cranberries, etc. in which yields directly benefit from bee pollination. It is very unlikely that growers of cotton or soybean would ever sign a contract containing clauses that protect beekeepers. The reason is simple, there seems to be little direct and consistent influence on yield by honey bee pollination in these crops. The farmers don't appear



Dead hives.

to benefit from bee pollination. Here it is up to the beekeeper to foster an understanding of his vulnerability to the cotton or soybean grower. And there lies the rub. The farmer may become alarmed when informed of the potential risk that his pest management activities could have on the beekeeper, and rather than deal with potential problems, the farmer chooses not to allow the beekeeper on his land. Who needs the added headache; farming is already tough.

Interestingly, the tension from the beekeeper's vantage can limit his reaction to bee kills to just soft mutterings under his breath. I asked the beekeeper who had experienced the bee kill in September if he had planned to pursue a formal complaint to the Bureau of Plant Industry (BPI) in the Mississippi Department of Agriculture and Commerce. He chose not to do so. He explained that a holding yard and several other apiaries were located on land owned by the farmer or relatives of the farmer. The beekeeper feared a reprisal in the form of being asked to remove all of his bees from apiaries and holding yards that had become integral to his business over many years. There was no way that he would risk losing these resources. I asked officials with BPI on the frequency of official bee kill complaints reported to them, and they said that none had been reported in years (maybe even a decade). They also said that they knew of several unreported kills. Almost certainly, bee kills are routinely under reported.

So, it appears that an interesting social tension has developed between beekeepers and farmers of cotton and soybeans. Beekeepers clearly benefit from the availability of nectar, but they risk poisoning of their bees in these environments. Although the

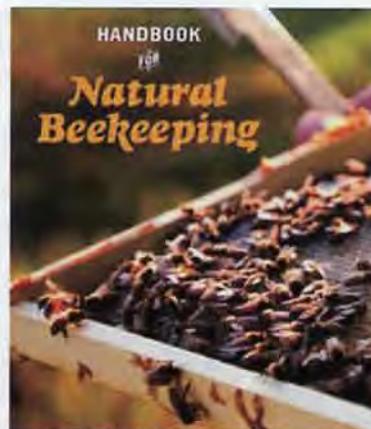


farmers apparently do not benefit from the presence of bees on their land, a general understanding of the value of honey bees as pollinators in agriculture probably overrides any thoughts of the apiaries as a nuisance. It would be interesting to watch these dynamics change if a consistent increase in yield of soybeans or cotton could occur when honey bees are present, a concept voiced by Mr. Richard Adee at our Mississippi Beekeepers Annual Convention in October.

Meanwhile, I admire the risk takers from a distance. I will always

be haunted by the bee kill of my youth and could never routinely take the same risk. Commercial beekeeping is not for the squeamish, and that is why I am in academics. **BC**

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



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Understanding Queen Pheromone?

Larry Connor

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

Last month we reviewed the pheromones of the honey bee colony. In the field section, we described an activity to study the workers' attraction to the queen pheromones. Now it is time to concentrate on the pheromones of the queen honey bee.

Classroom

What are the queen's pheromones?

Information about the queen bee's pheromones is growing, and we will concentrate on these chemicals and their impact on bees. The queen mandibular pheromone (QMP) is often called the *queen substance*, a term given to it by Dr. Colin Butler in 1954. The primary component is 9-oxydec-2-enoic acid, commonly called 9-ODA. This chemical was isolated from the mandibular glands of queen bees. These glands are connected by a duct that connects to the mandibles of the queen. There are two glands, one for each mandible.

The chemical we call queen substance is actually 17 different compounds that have been isolated from mandibular glands. Dr. Dewey Caron, in his textbook *Honey Bee Biology and Beekeeping*, lists five molecules as the "most important". These five molecules work together, and the removal of any one of them cuts the level of "excitement" by half. The first three molecules are acids, and the last two are aromatic compounds:

9-ODA	9-oxydec-2-enoic acid
9-HDA	cis-9-hydroxydec-2-enoic acid
9-HDA	trans-9-hydroxydec-2-enoic acid
HOB	methyl-p-hydroxyenzoate
HVA	4-hydroxy-3-methoxyphenylethanol



Queen without a well formed retinue of worker bees, common when a queen is active on the comb.

These molecules and their role as pheromones were discovered in a series of research projects conducted since 1961. Work continues to discover other ways these molecules are utilized as part of the queen pheromone blend.

Queen retinue pheromone

A laying queen honey bee apparently performs two major functions in the colony. Ideally, she will oviposit about 200,000 eggs into worker and drone cells over a year, serving as the biological mother of all the bees in the hive, passing her genes to her daughter queens and her drone sons. Second, she is the producer of pheromones from glands in her body.

In 2003 we learned more about the concept of the queen retinue pheromone, which allows other molecules from the queen's body to contribute to the behavior we see in bees that visit, groom her, feed her, and receive her pheromone in the process. Most beekeepers have watched the queen when surrounded by her retinue of nurse worker bees. This occurs when the queen is resting from egg laying. During active egg laying the retinue does not exist or is poorly defined. The bees in the retinue are constantly changing, some only make brief contact with the queen with their antennae, during which pheromones are passed from queen to worker. These workers are then in an "excited" mode, carrying the pheromone throughout the hive to other workers. This spreads the chemicals throughout the colony so all bees are aware of the queen's presence even though most of them have not had physical contact with her.

Other retinue workers lick the queen's body and obtain pheromone, while others feed and others remove her feces. The queen rectum produces pheromone and pheromone-loaded feces are found in other animals. This includes the only mammal with a queen, one that suppresses her daughters reproduction by pheromones in her feces, the naked mole rat of Africa.

At Simon Fraser University, researchers measured the amount of these different chemicals produced by mated, laying queens. They call this blend of pheromone a *queen equivalent* (Qeq):

Chemical	Amount
9-ODA	~200 micrograms
9-HDA (both forms)	80 micrograms
HOB	20 micrograms
HVB	2 micrograms

A queen secretes one Qeq every 24 hours. She moves the pheromone to other parts of her body by her self-grooming and by worker grooming. Virgin queens produce significantly less 9-HDA, HOB and undetectable amounts of HVA. As a result, virgin queens are much less attractive to worker bees. Once mated and laying eggs, the queens are fully attractive to the bees in the colony. This helps us understand how virgin queens are relatively free to move around the colony until they are mated. Since they do produce *some* of the Qeq, beekeepers must treat them much the same as a mated queen; they cannot be dropped into a foreign colony and be expected to survive.

Genes control queen pheromone production

Queens differ in their queen mandibular pheromone due to different genes they possess. Breeders selected for high or low producers of the queen mandibular pheromone and the high QMP strain produced nine times more pheromone than the low strain.

In the strain with low QMP production, the bees still responded to the queen in a normal manner, suggesting there are other molecules produced by the queen that added to the queen retinue response by worker bees. Pheromones were moved from the head to the tergite gland in the top of the queen's abdomen.

Four new retinue molecules

As other researchers examined the queen retinue pheromone, they found four new molecules that work in synergy with QMP to excite workers. The nine compounds do not combine to provide the same retinue response of queen extract at higher doses, suggesting that still more molecules are yet to be discovered. The four new molecules are:

methyl oleate methyl (A)-octadec-9-enoate
 Coniferyl alcohol (E)-hydroxy-3-methoxy-4-phenyl)prop-2-en-1-ol
 Heyadecane-1-ol
 Linolenic acid (Z9,Z12, z15)-octa-dexa-9, 12, 15-trienoic acid

These pheromones are produced in different glands in the queen's body, and their production may be influenced by the metabolism of each gland. Some molecules are found on the queen that previously were found on honey bee brood, suggesting that the queen works to control worker physiology and behavior,



Notice the worker bees antennal closeness as they detect and receive pheromone from the queen bee.

and regulates retinue bees in the amount they lick, antennate, and groom her. This implies that the queen controls more of the behavior of the bees than previously thought, at least in getting someone to pay attention to her. *From Bee Sex Essentials*

Field Activity

Set up two nucleus hives in four or five frame colonies, if you have them. At least one frame should be worker brood. The second frame should be a frame of food, pollen and honey. Fill the remainder of the hive with empty drawn comb or frames with foundation or starter strips.

In one of the nucleus hives, install a laying queen in a cage with a candy release. Leave the second hive queenless.

On the fourth or a later day, examine each hive using no smoke or just a minimal amount to settle the bees. Examine and document the behavior of the bees for each of the following:

Number of bees that fly into the air (estimate)

The sound of the colony: Quiet to Noisy

Behavior of the bees on the comb: Quiet on the comb or running on the comb.

Do the bees drip off the comb or fly into the air at the same rate as you inspect each colony?

Have each student write a paragraph describing the differences between the two colonies, if any. Encourage their use of expressive language to best and most accurately describe what they have observed. Share the essays

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with the rest of the class.

Observation Hive Activities

Establish two observation hives. In one, install a newly emerged virgin queen. In the second observation hive, install a mated queen that has been laying viable worker eggs for at least one month. This could be a queen from spare nucleus colony you have established during the season.

In a series of timed observations, compare the two queens for their general behavior patterns. Once the bees in the observation hive have settled, record the comb area that the two queens cover in a two minute period. This may be expressed by the travel distance the respective queen covers in the two minute period, or the percentage of comb that the queen covers during this time period.

Also observe the behavior of other bees toward the queen, by counting the number of worker bees that make contact with the queen with their antennae. We think that this antennal contact is critical to the spread of certain pheromones by the mated queen, so it is useful to see how many workers respond to the virgin queen.

Instruct the students to track one or more of the bees that antennate the queen as they leave the retinue and move about the comb. Are they different from other bees? Do they share food contents? Do other worker bees antennate them? Look for indications that these bees are messenger bees, spreading the queen's pheromones as they work the hive in an excited state.

Have each student describe the behavior of each queen, using as many descriptive words as they can. Then make comparisons between the two queens. For example, one might find that the virgin queen is 'fast' on the comb, while the mated queen is 'slow' or 'slower.' Have fun with these comparisons.

Finally, have each student study the laying queen as she searches for empty cells to deposit eggs. Have them count the number of attendant or retinue worker bees around the queen every fifteen seconds, and note the behavior of the queen during this process. Is the queen laying eggs, walking on the combs, quiet and resting or what? Again, let the students develop the descriptive language for these observations.

At the end of the session, list the words and phrases the students have developed to describe the behavior they have seen. Discuss the words that are solid descriptive terms and those that may project some value or anthropomorphic view of the queen bee. Turn this lesson into a unit on making good descriptive statements rather than opinions or value judgements. **BC**

Vocabulary

queen retinue pheromone, egg laying behavior, queen mandibular pheromone, QMP, queen substance, 9-ODA, two functions of the queen, excited mode of worker bees, antennation, queen's presence queen rectum pheromone, naked role rat, queen equivalent, genetic control of queen pheromone production, nucleus colony setup, sound of a hive, bees dripping off combs, behavior of virgin queens, behavior of laying queens, scientific observations, descriptive language, anthropomorphism

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A good beeyard location can make all the difference between hives that are vibrant and flourishing and those that constantly struggle. Whether you are expecting to get your first hives in 2013 or hoping to expand your colony numbers and need a new location for the additional hives, you will want to survey the area for a location that is most desirable. There are eight factors that I like to take into account when deciding on a bee yard location: the features that one might consider are necessary for the *ideal* place to keep bees.

Good Forage Access For The Bees

This is perhaps the most important factor to take into account when choosing a beeyard. If possible, choose a sight that will provide nectar and pollen bearing plants throughout as much of the season as possible. By keeping your bees well nourished, it will help them build up a strong population, resist disease, and prevent starvation. Bees also require a good steady water source. Unlike nectar and pollen sources, it is relatively easy to provide water when necessary. If there are no ponds, streams, rivers, lakes or other potential water sources within a mile of a bee yard, water should be provided by the beekeeper. Plan on providing water year around for your bees if you are considering an urban area.

Convenient Easy Access For The Beekeeper

If your apiary site is difficult to get to, the chances are that the bees will not be well tended and that they will develop problems that could have been avoided through timely and conscientious care. The ideal site will allow for access 24 hours a day, seven days a week, all year. This also means that colonies are set up with adequate room around the sides and back of the hive so there is ample room for the beekeeper to work safely and comfortably.

Good Drainage

Apiaries should be fairly dry all year long. Not only is this necessary for vehicle access, but a high moisture environment has been linked with increases in certain diseases such as chalk brood. Given the dramatic increase in severe weather activity beeyards that are not located in flood plains or too close to ponds,

lakes, streams, rivers, and seashores have become more desirable.

Sun Exposure

In the cool northern latitudes apiaries that are exposed to a lot of sunlight tend to be the most desirable. This typically means a location that is open to the south and/or east. Increased sun exposure has been found to help colonies deal with a number of disease and pest issues. Apiaries located in southern regions of the U.S. however, often benefit from partial shade during at least part of the day.

Windbreak

The ideal apiary site will have a windbreak of some kind on the side of the beeyard facing the direction of the prevailing winds. Whether it is a hedgerow, a fence, or a building, a windbreak can help colonies maintain heat during cold weather and protect hives from damage during severe wind events.

Vandalism & Theft

It is an unfortunate fact that vandalism and theft are issues that must be considered when choosing an apiary site. Positioning a bee yard within sight of a home rather than in an isolated, out-of-the-way place that is out of view is perhaps the best way the apiculturist can discourage criminal or mischievous behavior. Additionally, branding or otherwise marking your hive bodies,

Apiary Sites

Choosing & Maintaining A Good Apiary Site

Ross Conrad



supers, and frames can aid greatly in establishing ownership of hives and equipment that have been stolen. For greater piece of mind, high-tech options offered by companies such as Bee Alert Technology of Missoula, Montana, include such gadgets as radio frequency transmitters that, when embedded in a hive, can identify a specific hive from distances of up to 1,500 feet away with special equipment. Other security systems are able to sense when a hive is being moved and will automatically place a call to a pre-specified phone number to alert the owner to any potential hive-rustling situations.

A novel approach to deterring the theft of frames of honey was administered by beekeeper David Fretz of Rutland, Vermont. After experiencing the disappearance of frames from his hives, David took a lumber crayon and wrote in bold letters on the top of each colony "CAUTION: Cyanide Experiment - Poison Honey." David reports that thefts from his apiary stopped abruptly after that.

In cities, vandalism and theft can be largely mitigated by disguising hives as air conditioners, or other features of the urban landscape.

Legal Restrictions

Municipal and state laws must be considered. Regulations that address the distance that hives must be from property lines and other apiaries are among the many restrictions that various cities and states have enacted. Check with city hall, your state bee inspector, or your agriculture department for the laws that are in force in the area you plan on using for a beeyard.

Toxic Chemical Exposure

Recent research has highlighted the importance of reducing the opportunity for chemical exposure by hives and foraging workers. While conventional agricultural fields and orchards are obvious causes of concern, attention must also be paid to other areas such as industrial sites, landfills, and golf courses. Even colonies surrounded by organic farms can be at risk from the many organically approved pesticides that are in use. Talk to farmers near your apiary and be sure they know that bees are nearby and they take this into consideration when spraying crops.

Closely following pesticide label directions, applying chemicals during times when crops are not in bloom, when temperatures are cool or during the evenings can go far in helping to prevent contamination of hives and bee losses from chemicals.

These are the eight features of the ideal apiary location – and then there is the location where you are going to keep your bees. It is unlikely that the site you choose is going to meet all these requirements. That is OK. With the exception of illegal or highly toxic environments, bees are incredibly resourceful and hardy and they are usually able to adapt to whatever conditions they find themselves in. I have seen hives go through Vermont winters in the middle of an open field without any protection from the wind and do fine. I have also seen hives kept on the north side of a tall fence with no direct sun what-so-ever that survive.

Apiary Maintenance

Once established, your apiary must be maintained. This means cutting and trimming any brush or trees that may encroach upon the bee yard. Large tree limbs that hang above hives should also be removed as they can prove deadly if they break and fall during wind, ice, or snow

storms. Grass and other vegetation needs to be kept from growing up and blocking hive entrances. This means that either regular mowing will be required, bees are placed where not much is growing such as an area covered in gravel, or that grass and plants are smothered in front of hives with pieces of old carpeting, plywood, or other items. Ideally the beeyard will not be situated in a patch of poison ivy or other potentially dangerous plant growth.

Be A Good Neighbor

If the apiary location is not located on your own property, you will need to keep on good terms with the property owner. This means that an effort should be made to prevent your vehicle from creating ruts in the driveway or tearing up the lawn. Hives should be located away from high traffic areas so as not to create problems for the property owner. If bees must be placed near traffic areas, placing hives so entrances face away from the traffic or in front of a tall fence so that the bees are forced to immediately fly up above people's heads when the leave they hive. This will help to reduce the potential for unfortunate interactions between bees and people. The well established practice of sharing some of the honey harvest with the property owner is always a welcome offer and will go far in helping to offset any inconvenience the bees or your hive visits may cause. Following the incredibly poor honey harvest of the 2011 season, I have learned not to promise a specific amount of honey to a landowner where my hives are located. However, when there is an abundance of honey, I am happy to share. I leave it at that.

In many parts of the country, good apiary locations are extremely hard to find. This makes those that you do find very valuable. Sometimes beekeepers will buy out another beekeeping operation just so that they can take possession of the other person's beeyard locations. If you have found a good location, take good care of it – it is more valuable than gold. **BC**

Ross will be teaching a two-day intensive on Organic Beekeeping for Beginners in Lincoln, Vermont on March 30-31, 2013. For more information visit dancingbeegardens.com or call 802-349-4279.



TATTOO CULTURE

Bee Ink Is More Popular Than You Thought!!

Jessica Lawrence

Aided by Bee Culture Staff and The Dozens of Folks Who Sent In Photos

When my mother first realized I had a tattoo, calling her reaction “unhappy” would be an understatement. When she realized I had more than one, she was convinced that I had turned to “the dark side” and she was right, as mothers usually are. I am currently sporting 12 tattoos, but that doesn’t mean that number will even be correct by the time this article is published.

In a world where everyone can be fleetingly famous, thanks to the internet and smart phones, more people are looking to individualize themselves and express their interests and passions in a more permanent manner than their ever-changing Facebook status. A few even find mainstream celebrity status, thanks to TV shows like “LA Ink.” Now that one of every four people have a tattoo (based on my completely biased perspective of my 25-35 age range of friends, plus family and coworkers), the older generations are starting to look at us less like we may steal their personal belongings, and some are even joining us in our tattoo revolution.



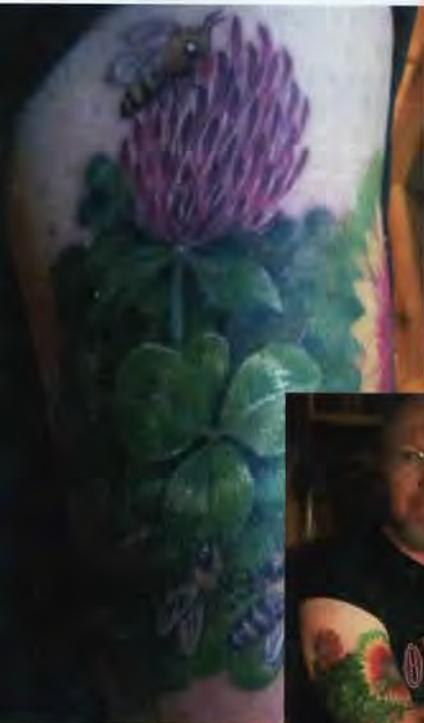
Phil Ewing wanted a bee hieroglyph because it represented the kingdom of Lower Egypt and importance to the Egyptians, as well as homage to the origins of beekeeping.



Tyler



Juli



I have wanted a bee tattoo for some years now but for one reason or another never got around to it, but when I turned 50 I thought its now or never. So I got one little bee girl put on my arm. It was the first tattoo parlor I came to and it turned out looking not so good. The guy said he had done a bee before but my Guess is he is like most people they don't know their bees from their wasps I went about a year but Couldn't take it , I wanted to show off my passion to people but beekeepers always told me it doesn't look much like a bee. So after carefully selecting my next tattoo artist I took another stab at it. He not only fixed the old bee but he suggested adding a wild flower to give her something to do. I chose an Indian blanket flower, it's the state flower of Oklahoma

It turned out great so good that I couldn't stop there
Now I needed a band around the arm to set up my next piece. Pestuning bees, perfect for a band. Which by the way is a great tool as well to teach people about some of the neat things bees do. Now I could move on to finishing my 1/2 sleeve Clover seemed the natural choice so I started with a field of clover and a red clover on top. I thought mabe some Dutch clovers next and a masterpiece bee on top of that Well I am not quite at the finish line yet but should be close by the end of the year.

What do you think? - Rick Schantz

Sarah became a beekeeper about two years after getting her tattoo.



Jess



Terry



Jessica Martin



This tattoo belongs to Editor Kim's sister Julie. It's on her shoulder blade. Julie is an artist and lives in Milwaukee.



Gina



My sister and I are Z's Bees in Norfolk, VA so when I finally settled on my tattoo I used a quilt pattern for the skep and had them add the 'Z' for our business. When I went into the place I told them I wanted a skep, they were completely puzzled and replied, "A what?", I just told them "I brought pictures!"

Originally I was going to put a bee on my hip and call it my 'hip-bee' but then a friend suggested I get a 'boob-bee' instead!! You got this one which is located on my lower leg. Can't wait to see what else other people have. Thanks for thinking of this fun and creative idea. - Karen Zablocki



Here's a picture of my son's bee tattoo. His freckles make it look like they have mites in them. Andy Johnson has worked for his dad and grandfather for 15 years. His grandfather, Elmer Yaddof, started the business 59 years ago and his dad, Ray Johnson, has also worked with the bees for 39 years. He married into the business and Andy was born into it. We're beekeepers from Preston Iowa. - Chris Johnson



Edith Stearns



Daniel Stearns



A friend of mine, from Cleveland, that just this year became a beekeeper. The initials below the bees are her great grandfathers who was a Master Beekeeper. - McKinnon, SCBA



This Queen bee tattoo belongs to Jessica Flottum, daughter of our Editor. It's in the middle of her back.

How do you pick a tattoo? People change as they age, and you don't want to look at a permanent reminder of your embarrassing obsession with seahorses when you were 18. However, you have to have a fluid personality to purposely change yourself permanently and be okay with it. You will need to be able to accept that in 20 years, you may not have the same taste, and look at it as a reminder of where you were in your life to decide on that design. I personally see my tattoos as a road map of my adult life, and any tattoo that is not one of my favorites is due to the quality of the art, not the content.

As most of my life is focused around insects, they are the choice target for my renderings. Almost two years ago, I began collecting honey bee tattoos. They are the driving force behind my career, my photography, my cooking and

really most of my spare time in some form or fashion. Each one tells a story of where I was at the point in time that I decided on the design.

I was attending my first NABC meeting in Galveston, Texas. I didn't really know any of the beekeepers on such a large scale, and I had only been working professionally with bees for a year. This was my first season that started with planning for the bees first above all other insects. I was always enamored of the Queen (I think everyone is), and I thought it would be funny to have a tattoo of one where I could ALWAYS find her. So, to commemorate my first NABC, I went to a nearby tattoo parlor and picked up a queen bee on my wrist. She is not anatomically perfect, but you always love your first . . . and someday I may take the time to make her "prettier."

Again attending a bee conference, this was my first EAS meeting in Warwick, Rhode Island. The crowd was open and friendly, but I was mostly excited because I won blue ribbons for my photography. A photograph that I didn't enter (and I wish I had!) was an 8X10 of a queen with eggs beneath her. Since it was still in my possession, my EAS tattoo was an artist's rendition of this photograph. As it stands now, it is my second favorite tattoo (only second to my very first tattoo).

My first California project landed me in an alfalfa field working with the bees in the San Joaquin Valley. This was really my first extensive trip into the area, and I have to say that it wasn't what I was expecting. I always had a vision in my head of majestic redwoods and sequoias making one big forest, straight out to the sandy beaches where cool California surfers rode the iced waves of the Pacific. In my fantasy geography, Los Angeles and San Francisco were the only cities in the state (the airport and growing up watching "Full House") so I was surprised to be landing in Fresno. I will say that Fresno's airport is now my favorite but for their lack of Pepsi for sale, and my love of Ansel Adams drew an instant connection to Yosemite. During this trip, my tattoo came from the Tower District and is the outline of the state of California with a bee flying over the valley.

By this time, I am a master traveler to the state of California. My journey took me to my first real interaction with almond blossoms, and my longest period of time away from home. I spent 24 nights in the valley working in the almonds with my bees, talking to major beekeepers, and I even had a chance to meet Kim Flottum and Kodua Galieti for lunch with my work crew. I have

a picture from the event of me showing off my tattoos in the Blossom Trail Café to anyone who would look. This meeting is the conception of the idea of this article if I remember correctly, as well as the birth of my next tattoo idea. For the second time in the history of my tattoos, I went back to the same tattoo shop as my last bee. I was a little startled when I realized the artist did not know what an almond branch looked like (living in Fresno, this seems strange to me still), so when I went back to the shop I took a whole branch with me. I also made him give my bee a pollen basket. If I'm going to have a worker bee, she had better be working!

What's next in line? Perhaps an old-school vintage drawing of a worker, queen and drone? Or, a worker bee anatomy with all the pieces labeled? Someone recently suggested that I needed a tribute to North Carolina among my California memorabilia, so maybe that could be an option too.

Do you have a story to go with a honey bee tattoo? If so, send me a high-quality photo and a back story of what your tattoo means to you and your history with bees. You may see it in Bee Tattoo Part Two! Jessica@heckmateapiaries.net. **BC**



These are just a few of Jessica Lawrence's tattoos.



Have You Hugged A New Beekeeper Today?

Tim Moore

People new to beekeeping are often surprised by the number of generous, knowledgeable, experienced beekeepers willing to help them. Beekeepers are genuinely nice people. The problem is that every beekeeper has a different opinion on just about every topic of beekeeping. Add beekeepers together with monthly magazine articles, online forums, and the information from the speakers at beekeeper association meetings – the information overload, much of it conflicting, makes your head swim.

“Believe nothing, no matter where you read it, or who said it, no matter if I have said it, unless it agrees with your own reason and your own common sense.” – *Siddhārtha Gautama*

A Buddhist Monk wrote this passage at around 400 BC (maybe a beekeeper?). I often recall the wisdom of that quote when I’m confronted with conflicting information from multiple sources. I think we all seek reason and common sense – at least some form of reason and common sense that we can live with. Reason and common sense evolve over time based on one’s own experience and knowledge. Knowledge is gained from learning. Experience is gained from doing.

The joke about getting twenty different opinions from ten different beekeepers is no exaggeration. Every beekeeper’s opinion is a product of their personal

combination of knowledge and experience. Some beekeepers are very knowledgeable – obsessively reading and learning, but have little experience; some beekeepers have years and years of experience but little knowledge. Most of us fall somewhere in between the two. No two beekeepers are going to have exactly the same combination of experience and knowledge, hence the difference of opinions.

Don’t believe that because you are new to beekeeping that your opinions and ideas don’t count – or have less value than anyone else’s. When a relatively inexperienced Bill Gates, Steve Jobs, Mark Zuckerberg, and a multitude of other newcomers had an idea, they didn’t let themselves become shackled by the conventional wisdom of their time. They marched to the beat of their own drum.

Be prepared to change your opinion as you gain experience and knowledge. Don’t become so steadfast in your opinions that you cripple your own growth. More importantly, don’t become so steadfast in your opinions that you don’t hear what others have to say – or discourage others to have their own opinions. It’s easy to fall into a belief that only some of us have an exclusive right to reason and common sense. There’s a lot of comfort in thinking that only our opinion counts – because it takes so little effort.

The new ideas that are going to solve the beekeeping problems that we are dealing with now and in the future are probably going to come from new beekeepers. Chances are very good that those answers that we seek but haven’t yet discovered to save beekeeping will have always been in full view of all of us.

New beekeepers should get experience by trying different ideas and different combinations of ideas. Average beekeepers doing whatever average beekeepers are doing, thinking about whatever average beekeepers are thinking are guaranteed to get average beekeeper results. **BC**



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Making Syrup

Ed Simon

Making Syrup

It's that time of the year. Your bee packages have been ordered. Your equipment is in good shape waiting for the new bees and last year's bees look like they are going to make it through the winter. (Well at least some of them.) You now have to concern yourself with the feeding of last year's bees so they will be ready for the dandelions. The new packages will also need feed so they can survive and grow until nectar becomes available.



2:1 or 1:1 Yep, that's what they said. But! What they didn't tell you is whether the ratios are by volume or weight. Actually it doesn't really matter. I use the ratio as a volume because it's easier. For small volumes it is just one quart of sugar to one quart of water (1:1). For larger volumes reference the enclosed chart. Keep in mind that the numbers are approximate. They don't have to be exact.

So what is the easiest and least messy to mix your syrup? Please note that I did not say a clean way to mix the syrup as it's almost impossible to keep the syrup in the container. Whether you are mixing with a spoon or with a mixer, it is still messy.



Equipment

1. Five-gallon pail with lid
2. Sugar
3. Water
4. Heat source
5. Garbage can
6. Mixing device

Mixing Pail

The best investment I made for syrup making is a modified five gallon pail with a cutout lid and a small pouring hole. To reduce splashing more, cover the hole with a flat piece of plastic. This is a piece of a pail lid cut to fit in the mixing pail lid with a hole in the middle for the mixer shaft. Even with these devices there is still a lot of sugar water that escapes. To reduce the mess further, I place the mixing pail in a garbage can. The end result is that now all I have to do is clean the inside of the garbage can.

Once the setup is out of the way, the mixing of the syrup is easy.





Step 1: Pour the sugar into your mixing container while you are heating the correct amount of water to a boil.

Note: Consult the following chart to select the amount of water needed. Remember the volumes are approximate.

Sugar Syrup

1:1 - Light Syrup

2:1 - Heavy Syrup

Sugar (lbs.)	Water (pints)	Resulting		Sugar (lbs.)	Water (pints)	Resulting	
		Volume (pints)				Volume (pints)	
10.00	12	16		10	6	11.0	
5.00	6	8		5.0	3	5.5	
1.00	5	6.5		4.0	2.4	4.4	
		Light	Heavy				
Sugar cost per pound		0.60					
Syrup cost per pint.		0.37	0.54				
Syrup cost per gallon.		2.99	4.34				

Step 2: Pour the water into the pail and mix.

Step 3: Let the mixture sit for a until the water cools and then mix it again.

Step 4: Allow the mixture to sit overnight. This will allow the unmixed sugar to settle to the bottom.

Step 5: Pour the solution into your dispensing container.



Note: If you are making a 2:1 solution there may be a significant amount of sugar in the bottom of the pail. Do not try to mix this sugar into the solution. It will eventually settle out and clog up your feeders.

Note: The buildup of unmixed sugar on the bottom of the pail can be used by adding some more hot water and remixing the solution.

Conclusion

Mixing the syrup is easy. Cleaning up after the mixing is a pain in the neck. Make your life easier by containing the mixture as much as possible and making the cleanup a snap. **BC**



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Treat Your Speakers Right

Linda Tillman

The mission of most bee clubs is education. While short courses and discussions among club members serve this function well, the speaker who offers the program at a bee club meeting is a very valuable resource that a bee club offers its members. Treating the speaker with care and nurture really makes a difference.

In Georgia, once the Young Harris Beekeeping Institute is over and the list of new Master Beekeepers is posted on the UGA website, bee clubs all over the state start calling. Every bee club wants new energy and ideas so the Master Beekeeper list offers possibilities for new and different speakers. As soon as my name went up on the list, I began getting calls from bee clubs in Georgia and the surrounding states. Now that I've given at least 30 talks in the last two years to bee clubs and other groups, I've become very aware of the importance of nurturing the speaker.

Generally when a speaker comes to talk to your members, much energy has gone into the speaker getting to your club. People like to see what you are talking about so I always put effort into packing "show and tell" equipment to demonstrate my topic. When I talk about harvesting honey without an extractor, I bring the simple objects involved in crush and strain so the club members can see how easy it is. When I talk about making lip balm, I bring the items needed because each ingredient is interesting to know and see.

Your speaker has driven to your meeting. This represents a cost to the speaker in time, energy, as well as money, gas for the car both ways and missing work.

While many speakers (including me) have talks on PowerPoint that they have given more than once, I always revise the talk before each presentation and often write a completely new one to fit a new topic. Making PowerPoint presentations is a lot of work: good slides creating a talk that is the right length.

Some clubs take the speaker out to dinner ahead of the meeting. Every club doesn't have the budget to do that, but I would gladly buy my own dinner and get to eat with other beekeepers before the meeting than eat alone, as I have in many a town on a night when I am speaking to a club. Having dinner with members of the group allows the speaker to enjoy some personal connection to those particular people.

Make sure the budget for your club puts a high priority on funds to pay your speakers. Even your own club

members who are asked to do the program for a meeting have put a lot of effort into sharing their information. Recognizing this, the Metro Atlanta Beekeepers pay their own member speakers as well as visiting speakers. Because members don't incur the gas and travel time expenses, local speakers are not given as large an honorarium as is given to visitors. But MABA pays an honorarium to every speaker because the club is deeply committed to education for the members.

When the talk is over, have someone in your club walk the speaker to their car. It's a way to give the speaker some positive support ("I can tell that our members really enjoyed your talk"). And when all is said and done, write your speaker a thank you email or note to give him/her feedback. It's really special when you can say, "The members are still talking about your example of XXXXXXXX."

Now that I've spoken at bee club meetings all over Georgia, as well as in North and South Carolina, I can say that every club takes a different approach. My worst experience occurred at a club two hours away from Atlanta. I arrived on my own, drove through a fast food restaurant's pick up window, and carried in all my own equipment. The person introducing me said, "Our speaker tonight is . . . what is your name, Hon?" When I was done, as I gathered up my things to go to my car to drive the two hours back home, a member handed me a tube of lip balm that one of their members had made as their sole gesture to thank me for my time and effort.

Driving home tired and worn out, I felt frustrated with myself for not asking for an honorarium *when I agreed to speak there* and promised myself that I would not go there again.

My absolute best experience occurred when I was invited to speak to the Macon County Beekeepers Association in Franklin, North Carolina. Tom Hill, the president, and his wife Janet invited me, along with Bob and Suzette Binnie, to his mountain home to enjoy his delectable mead before dinner. This was lovely after my 2½ hour drive. Afterward we went to a nearby Thai restaurant where any member of the bee club was welcome to join us for dinner. About 10 of us had dinner together and chatted about bees. When the meal was over, I stood up to pay my check, but the club

had treated me to dinner! And at the end of my talk, they gave me a cash honorarium. Later Tom wrote me an enthusiastic "thank you" email.

I felt very valued and knew that it was worth the effort to go there.

We have so many ways to learn from each other as beekeepers. The bee club provides a forum for discussion, a resource for beginners, and most importantly, speakers to bring direct knowledge and beekeeping experience to your members. Treat your speakers well and your club will be a group where good speakers love to present their talks. **BC**





HOW I DO IT -

Using Present-day Technology To Teach You Beekeeping

James E. Tew

Please don't show me the trick

I'm always somewhat annoyed when a media production – maybe a TV show – just can't wait to show me the “*behind the scene*” events that went into making a scary scene, un-nerving makeup, or how a car crash was staged. I thought the entire purpose of the movie was to escape for a few minutes – to become someone else...or to marvel at what super heroes can do. Yet, here they are – breaking the code, showing me all their secrets, taking away all the mystique that they had so carefully built up. In my own way, if you continue to read and to explore the links that I will be offering in this piece, I will discuss my efforts in video and DVD work over the years. Producing edited videos is not unlike making sausage. Times have really changed. Anyone now with a smart phone is potentially a videographer.

It started with photographic slides

Though I did have a few of the antique glass slides, the photographic slides of my life were always 35mm Kodak slides. A Kodak Carousel projector, an extra bulb, and a coin to unjam a slide tray were my audiovisual equipment travel list. I was good to go. All I needed was an audience. While I have presented hundreds of presentations, ironically, I don't remember the *very last* slide presentation I gave before converting completely to digital slide shows.

I still have my old high quality mechanical cameras (Nikons and Canons) that are in perfect working order but essentially useless due to the unavailability of film and film processing facilities (*plus I love digi-*

tal technology). I have thousands of photographic slides that I individually convert to digital as I need to, and I am not special in this regard. Anyone in this line of work for 40+ years has the same backlog of old stuff. For your review, I present one of the oldest slides that I personally have. I realize there are pictures much, much older, and not in color, but look at the clarity and the Kodachrome soft colors¹. Each of these old photos brings up questions. Why are the colonies directly on the ground? Are those Dadant-depth deeps? Compared to the supers, the deeps look just a bit too deep. Or are the supers shallow or even section supers (which are exactly half of a deep super).

The beekeeper was using Excel-sior outer covers and the front row of colonies had recently been moved judging by the dead grass spots. The beekeeper is working bees in a collapsible cage. It is safe to say that robbing was problem even then. I would bet that this was a university research yard, and I have reason to suspect that it was on the grounds of Iowa State University.

For years and years, this photographic slide procedure was the norm. There was nothing else. As a University Extension professional, I was encouraged to make stark, drab slides with *ONLY* my information

and absolutely no glitz. Many of my early slides were of blue backgrounds with white lettering. The darkened background made it easier for my audience to sleep. Tape-based video was out there, but I rarely made use of it – and never without professional help.

Audio taping

An improvement on this *point-and-shoot* slide photography was the addition of an audio tape. Viewers would now need both a slide projector and a tape recorder. Normally, slides had to be manually advanced when an audio cue was presented. This slide/audio procedure and 35mm film strips were the height of technology. It's all so quaint now.

My video birth

The very earliest commercial video work that I ever did was with John Root, CEO of the A.I. Root Company. I don't have copies of that early work, but it was true, gritty work. In the Root beeyard that is now a parking lot, we did *one-take* shots on a host of bee topics. There was no sound crew, no remote mikes, and no edits – not even a tripod was used. As if to make it worse, it was beside a heavily traveled road. But we showed beekeeping procedures in a moving picture format with audio that any-



An early 1940s beeyard – probably in Iowa.

¹I did minimal Photoshop retouch work. I removed some scratches and brightened the sharpness just a bit.



My videographer covered in bees and hot protective clothing. In Venezuela.

one could watch with a modern-day VCR unit. We thought that this was cutting edge stuff.

In one of the presentations on Queen Production, my toddler daughter – Robyn – now herself a mother two times, was unexpectedly stung. She let out a shout but then covered her mouth continuing to yell. The VHS recorder dutifully recorded the off-camera audio excitement. I wish I could find that VHS tape just for that episode. I suppose Root tried to market these early productions. I don't recall that they changed anyone's life – financially or otherwise.

My Ohio State video birth

During the 1990s *Killer Bee* hype



Robert Smith, at the Great Wall of China, on a beekeeping trip.

was rampant. Indeed, it was not all hype. The arrival of these bees into the U.S. would fundamentally change beekeeping in warm parts of this country. News crews routinely videotaped the evolving saga for the evening news. In my Ohio world, I convinced the OH State university video people that this was a proper topic of concern and got small funding to produce some early productions.

The video crew, normally three people, all had to be profoundly suited up with duct tape over everything. Wearing heavy gloves and shooting through a wire veil made it difficult for the cameraman to control the smooth video transitions. On one event, I carefully cut a hole in the veil front and we improvised a way to get the video camera eyepiece through the veil. The movies we produced were some of the first visual productions of the aggressiveness of the Africanized honey bee (AHB). In retrospect, it was probably too much. It was too shocking for beekeepers who had never encountered these hyper-aggressive honey bees. While it educated, it also frightened and un-nerved the beekeeping public. I'm not sure what I should have done differently. We shot truthful scenes that some beekeepers did not want to see.

I don't really remember now, but possibly one reason that I acquired more video funding was for a beekeeping training series that could help off-set some of the frightening video that the AHB series had unintentionally caused.

Satellite technology

In the mid-1990s, satellite technology was coming into its own. Having respect and eagerness for this new mode of educational communication, I built on my experience videotaping Africanized honey bees and asked for funding to produce a live, satellite-distributed, beekeeping class with information for every level of beekeeping. It was to run for 15 weeks and would be approximately fifteen edited hours of video production. Some of the trips we took to acquire video footage were to: Mexico, the USDA lab in Beltsville, Maryland, the USDA lab in Tucson, Arizona, Honey Acres in Wisconsin, and Wilbanks apiaries in Claxton, Georgia. Additionally, we shot many "video

moments" that were used to make a point or show beekeeping events that were not always readily viewable. I have posted one of these clips at: <http://goo.gl/o0Fcz>. I have made no effort to edit this piece. I simply ripped a short clip from the lecture entitled: *The Honey Bee...Inside and Out*. The entire series was called, "Beekeeping – A Unique Industry."

Give me a moment here – neither I nor the video crew and producers realized what a workload that was to be required to complete this project. It took video and editing equipment worth hundreds of thousands of dollars. Even today, for each minute of finished video, approximately one hour of pre-production is required. Our 15 hours of finished video required about one thousand hours to produce (about 25 weeks). It was a spectacular assemblage of equipment, procedures, shots, editing, and voice-overing that I will never do again. Though much of this 1996 video is still very relevant today, due to the VHS tape format, the series has essentially passed in oblivion. There are no copies available of which I am aware. This was the work of young men. I will never do anything of this scope again.

Everything passes

Indeed, the satellite age took a set-back during the late 1990s. I'm not sure of all the technical reasons, but apparently several satellite launches were unsuccessful resulting in satellite time becoming expensive and scarce. What I had thought would become a major way that I would teach and distribute beekeeping information quietly diminished to become nearly inconsequential. But the video component of my life was evolving. Sony and other companies were producing smaller, cheaper film-based cameras that both consumers and professionals could readily use. Extensive (and expensive) editing equipment was still required. Once again *Bee Culture* and the A.I. Root Company came into play. Robert Smith, a local public television executive (and beekeeper) had retired and started his own small retirement business – shooting and editing tape-based video. There were fewer people and less equipment required but the quality was still essentially the same. During this period of time, numerous videos were produced on many

aspects of beekeeping. Ironically, I don't have many of them.

From this experience with Robert Smith and Kim Flottum, editor of *Bee Culture*, I learned to work with smaller crews and smaller budgets but still produce high quality video. Also, the productions were shorter in length – hardly half what the earlier productions had been. A short clip on queen introduction with Jim Tew and Kim Flottum can be viewed at: <http://goo.gl/Kajst>.

The changes have been staggering

The changes in video production and hosting technology during the past 10 years have been nothing short of staggering. What used to take three professionals and 300 pounds of highly technical equipment can now be accomplished by one person – with limited ability – and a video camera so small it will fit in your shirt pocket. The changes are just staggering, and the changes are not all related to video production aspects only. As we have all become web-browsers, our patience has shortened GREATLY. A video is no longer 55 minutes long, but now ranges from three to 10 minutes. And I must confess that for several reasons, I like short clips better, too.

At this point in my career

At this point in my career, I have increasingly moved to video and web-based streaming video concepts more and more. The demands on my aging body are so much less when I can sit in front of a camera for a few minutes rather than travel for several days. Plus, such video can be captured and viewed time and again (so don't say or do anything that can't be edited out).

John Grafton preparing to discuss laying workers.



The former Ohio Department of Agriculture State Apiarist, John Grafton, and I just completed the components of an educational grant for a general beekeeping video session. Since many beekeepers are reluctant to pay for this kind of production, it is posted – free – at: http://www.ohiostatebeekeepers.org/beekeeping_class/ (In fact, many years ago, my Dad said of the big VHS series that we did that, "He did not want to buy it, but he just wanted to look at it." Somehow, that made sense to him.)

The on-line class is composed of 34 short segments that cover many, but not nearly all, aspects of modern day beekeeping management schemes. This is my first effort at shooting, editing, compiling and hosting a video series. In recent years, this has been a very enjoyable process to learn and develop. Now, having said that and though I have learned a lot, I am only a child when it comes to this kind of technology. John and I improved our audio ability as we shot video. We finally accepted the fact that every day sounds like airplanes, garbage trucks, and lawn mowers are now natural sounds. Wind blowing on microphones, batteries dying, and the FM microphone rubbing John's veil, are all examples of things that drive one crazy when trying to edit raw video. Tim Arheit, Vice President of the Ohio State Beekeepers Association (OSBA) was a critical contributor in cataloging and hosting the series on the OSBA website.

Most oddly of all

If you have read this far and you are a devout beekeeper, you are tough. The odd thing is that I (and so many others) use this technology to produce and distribute beekeeping information in a way that appears modern. However, learning an editing program on my Mac or calibrating white balance on my camera has nothing to do with beekeeping directly. These final results are supposed to be a seamless medium that you watch for a beekeeping experience without ever having to consider all the technology that went into making it. I hope you get a chance to watch some of the most recent clips. Don't be too harsh on our efforts. After all, when all is said and done John and I are only beekeepers with too many cameras. **BC**

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Jim Tew – bee man trying to be camera man.

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Jennifer Berry

HONEYBEENET

NASA, Honeybeenet and Bee Informed measuring change, saving bees.

The weather in 2012 had a considerable impact on much of the U.S., which seems to be the trend lately. For instance, it was either too wet, too dry, too hot, too cold, (too windy even), and when you mix too hot, dry and windy, disastrous events can occur. For instance, these exact ingredients came together causing massive wildfires across the western states. The Colorado wildfires, specifically the Waldo Canyon fire that threatened Colorado Springs, was the one most folks witnessed. Remember last summer when hundreds of homes burned to the ground and thousands of acres were scorched? Even though wildfires are common in Colorado and the west, this particular fire was the state's costliest because of the number of homes destroyed.

As the western skies glowed red, the Midwest experienced the warmest and driest summer on record (1895-2012). Excessive heat and lack of rain in the Midwest caused extensive crop failures in those areas. Plus, all time record highs were recorded in the southeast. Here in Georgia we experienced a week long stretch of scorching temperatures. One day while in the field working bees, the mercury rose to 112°. The bees, along with ourselves, were miserable, but as long as there was access to water, we survived.

When it came to the "too wet category" let's turn our attention to Florida. Prior to Memorial Day, 2012, about 84% of the state of Florida was in a moderate to extreme drought. Just a month later, the "Sunshine State" was rain soaked with some areas receiving up to 28 inches of rain in a couple days. It only took two tropical storms, Beryl and Debby, to eliminate the rain-starved area. But, with all that instant rain, streets, homes and businesses were flooded. So, how is all this crazy weather affecting our bees? Well, there are scientists trying to figure that out right now.

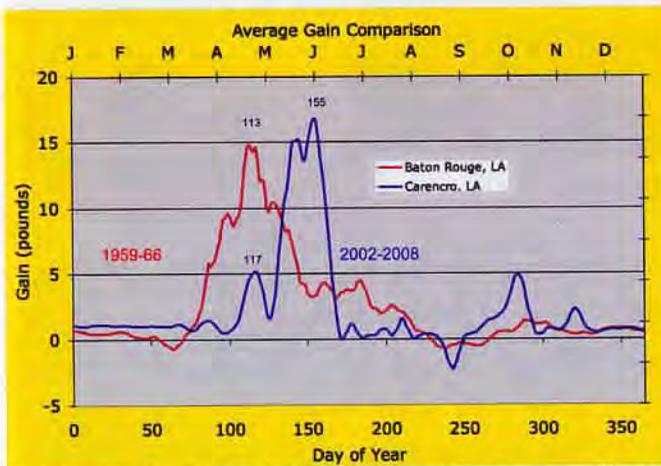
Back in 2009, I wrote an article about Dr. Wayne Esaias and his scale hive project. I felt his project was worth exploring and believe so even more today. At that time, Dr. Esaias was employed at NASA as a biological oceanographer at the Goddard Space Flight Center in Maryland. His earlier work examined the abundance and occurrence of phytoplankton in the oceans and how this related to climatic systems. But all of that was about to change. In 1992, Dr. Esaias became a beekeeper when his son's Boy Scout leader had to find a new home for several hives. Life with the bees was easy at first. Then numerous swarms weakened the colonies, which eventu-

ally perished. Blaming himself for being a bad beekeeper, Dr. Esaias couldn't get a handle on what he was doing wrong. Had he not read every book he could get his hands on about bees and beekeeping? Hence, he began to apply his scientific reasoning to come up with possible causes. That particular season in Maryland had been much warmer and wetter than normal-typical of an El Nino year (unusually warm ocean temperatures in the Equatorial Pacific). Were the bees simply reacting to the unusual climatic changes? Warm, wet spring seasons (precursors to earlier nectar flows) can trigger colonies to swarm sooner and more often.

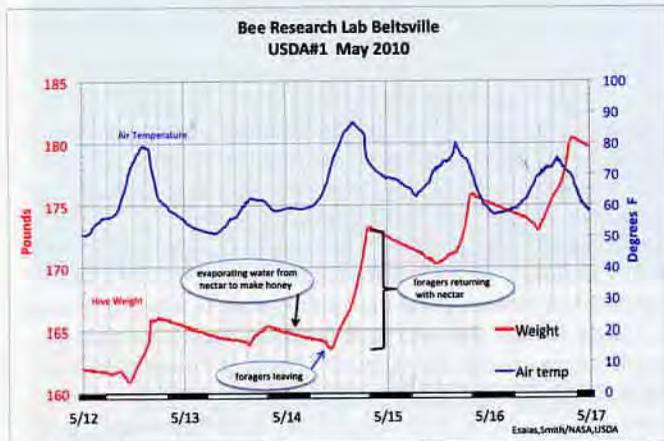
Then, an idea came to him. Could honey bees be utilized as climate-impact data collectors? Bees are already excellent environmental samplers; they're already doing the work for us. So, one just needs to tap in on this tremendous resource. But how??? Then, it dawned on him: **SCALE HIVES!** By weighing colonies each day (positioned continuously on industrial scales) scale hive data, over time, can illustrate the relative abundance, timing and duration of seasonal nectar flows. But, one might ask, how does this tie into climate change? Dr. Esaias made the transition from sea to land in order to investigate the very possibility of a correlation between nectar flows and climate change. Funded by a grant from NASA, he has been trying to put these pieces together through his current work as an adjunct professor at the University of Maryland in the Entomology department. He has been coordinating with Dennis vanEngelsdorp, who is in charge

C. Vorisek uses a fairly new manual platform scale. Manual scales, some dating to the early 1900s, are the major type used by volunteers. (C. Vorisek photo on Honeybeenet)





Data taken by E. Oertel in 1950s in Baton Rouge and by C. Harper in the 2005 era show a major difference in nectar flow, most likely due to the invasion of Chinese Tallow during the intervening 50 years. It would be interesting to have modern data from Baton Rouge for a comparison.



Electronic scales recording data every 10 minutes at the Bee Research Lab in Beltsville, MD reveal changes in colony behavior and nectar collected on sunny (higher temperatures) and overcast (lower temperature) days. Other interesting examples compiled by Paul Vonk can be found at hivetool.org under Hive Management.

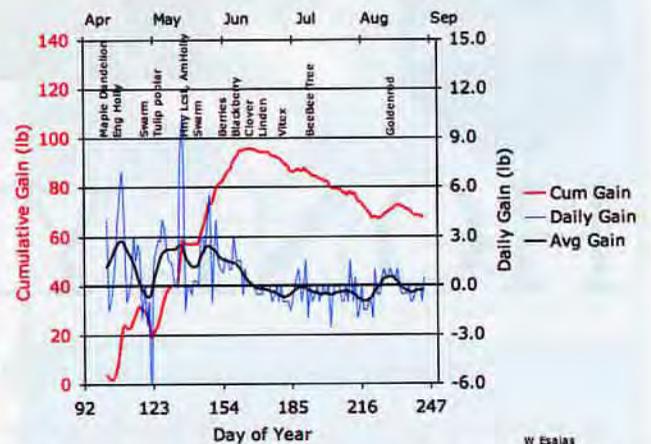
of the Bee Informed Project (<http://beeinformed.org/>).

NASA, the National Aeronautics and Space Administration, is a US agency that's responsible for the nation's space program, aeronautics and aerospace research, including earth remote sensing. These are pretty broad topics, but one of NASA's objectives is to understand how climate change impacts the earth. The physical climate, such as temperature and rainfall, is simply measured over time. So far, data shows that significant change has been occurring. How do these physical changes impact the earth or more specifically earth's ecosystems? Further, how do these changes affect plant and pollinator interactions? And finally, how does this affect humans on the planet?

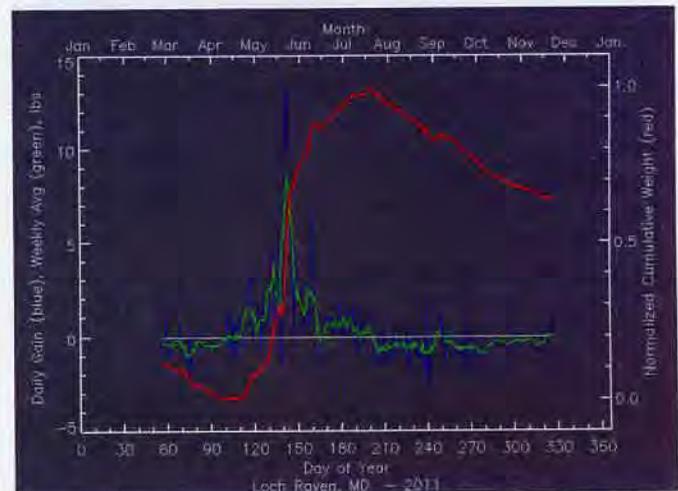
As a former NASA employee, Dr. Esaias had wonderful resources available to him. Because his question is sought to unravel something so complex, he felt that large-scale satellite data would be needed to help. There are just too many plants, too many pollinators, too many different ecosystems all interacting and not enough hours available in someone's lifetime to explore each one.

So how is all this data collected, correlated, analyzed

D. Smith - Church Hill MD - 2008



Plot of data provided by D. Smith in Church Hill, MD gives blooming information for some sources to accompany his manual scale observations.



Sample plot provided on Honeybeenet site for Loch Raven, MD, shows the Daily Gain in pounds/day on the left axis and green line, the weekly averaged Daily Gain (black line), and the relative increase during the active season (red line). The total gain was 149 lbs, not counting Spring and Fall syrup, supers added, and honey harvest. This overall shape is typical of Eastern tree dominated nectar seasons. Plots and digital data are available for all sites and years. The peak date has advanced by roughly a month since 1970 in central Maryland.

and then understood? Let's start by looking to the skies. Sensors, such as MODIS (Moderate Resolution Imaging Spectroradiometer) located on NASA's Aqua and Terra satellites, are continually snapping detailed images of the planet. Along with these there's NPOESS Preparatory Project (NPP), NASA's newest polar-orbiting environmental satellite. Because of the orbits of these satellites, within days (some areas may be under cloud cover) an entire image of the earth is available. Overtime these recorded images show the earth "greening up" (when the earth wakes up from its long winter slumber and vegetation begins to sprout new leaves) and then "browning down" (when vegetation loses its leaves). Terrestrial scientists have discovered that spring green-up was arriving earlier on average, due to warmer winters. Dr. Esaias takes these space satellite images of the earth's greening and compares them with the nectar flow data collected from

the scale hives. They corresponded nearly perfectly. But recently something unusual was detected; it seems the Northern US is "greening up" a half a day earlier each year, and the dates of the nectar flows in the north east US are staying right in sync. "In total, since the 1970s, it has moved forward by about one month in Maryland" says Esaias.

At this point, Honeybeenet has 147 data collection sites, scattered across 34 states, including DC and 2 provinces and over 400 individual annual records. The south, however, is especially void of these experimental sites. Unable to be at all 147 sites each day, Dr. Esaias and Honeybeenet depends on a network of citizen-scientist-beekeepers across the country, who volunteer their time to collect hive weights. The data is sent to Dr Esaias via email and winds up on a web site set up specifically for this project: HoneyBeeNet (honeybeenet.gsfc.nasa.gov). As the data flows in, scientists are able to better understand how climate is affecting the dynamics of incoming nectars. So how does this information help me, the beekeeper?

By placing colonies on a scale and weighing them each day, data records the ebbs and flows of the season. A rapid increase in hive weight indicates nectar intake, a steady decrease in weight indicates a nectar dearth since a colony loses weight as food stores are being depleted. So far the most weight Dr. Esaias has seen a colony gain in one day is 25 pounds. As a colony gains weight brood is being reared, comb drawn out, and honey stored. But something else may be happening as well. Colonies may be preparing to swarm. If all of a sudden a colony loses 3-8lbs in a day something has obviously happened: a swarm perhaps? Many beekeepers aren't aware that their colony has swarmed, but with this sort of data it would help reduce the amount of time the colony is queenless which would be a great help in hive management.

Such data could also help us forecast when or if Africanized honey bees (AHBs) will be encroaching upon an area. At this point, theoretical models, which are too unstable and unpredictable, project AHBs advancing all the way to Canada. But based on climate and vegetation patterns are these northern areas suitable for AHBs? There are two factors largely responsible for keeping AHBs contained to the western part of the US and Florida: temperature and food availability. For instance, when AHBs crossed the border into Texas they headed north then tracked west, barely making it in to the state of Louisiana. The most likely reason: no fall nectar flow. From east Texas to Georgia plants and nectar flows are dramatically different. However, Florida and Arizona both have fall nectar flows, which resemble nectar flows in Africa. Scale hive data in those regions may be able to determine if AHBs can survive.

This data will also be beneficial to commercial beekeepers. A certain percentage of commercial beekeepers move colonies to follow nectar flows. They may be moving south for the winter to take advantage of early blooming crops or north to the Dakotas for clover. With climate change comes a whole host of issues, which impacts blooming dates, which in turn affects nectar flows. They may come earlier or later. They may be more or less productive. With this information at hand, areas predicted to be less productive could be avoided while more productive areas can be accessed. It could also help beekeepers know

Example of an electronic scale in use. This scale at Loch Raven, MD has withstood three Winters and three hurricanes. Data must be retrieved manually every three to six months.



when they should be feeding to avert colony starvation. Overtime such data would provide a more reliable idea of when to expect a nectar flow in a given area. It could help us predict good years, or bad years and on a larger scale, agriculturally speaking, it could predict possible times of crop failure leading to famines.

Yet the question most beekeepers ask; wouldn't it be beneficial for the bees if winters were warmer and nectar flows earlier? Perhaps, but lets explore the downside to this. If plants are blooming earlier each year, will the pollinators be able to keep up with this forward motion or will they fall out of sync with the plants? Overtime pollinators and plants have become in sync with one another since they both rely on the other for survival. Most plants need pollination in order to produce seeds and they accomplish this by luring the pollinator in with nectar. Both benefit and both survive. But, if plants bloom too early when the pollinators aren't there, the plants lose the benefit of pollination and when the pollinators finally do arrive the flowers are no longer in bloom and they get less nectar and pollen. Hence, system failure.

Other issues that we've observed here at the horticulture farm are required chilling hours and late frosts killing early blooming fruit trees. Particular plants, especially fruit bearing trees, need a certain amount of hours of cold in order to bloom or properly bloom; without which, they exhibit a loss of yield. Also, fruit trees fooled into early blooms by warm Winters and/or early Springs are often caught off guard by late frosts; again, the results are significant crop losses.

As climate changes, how are our bees/pollinators coping with these phenomena? Scale hive data is focusing in on this pollinator/plant interaction, which to a degree has never been explored before. By having this data it gives us a picture so that we may be better prepared in the future. Climate prediction models know very little about blooming dates and how they relate to nectar yields as a function of climate. As climate change continues ranges will shift. First the most obvious is when the nectar flow begins and ends. With this information scientists can

extrapolate when the nectar flows are occurring across the nation in accordance with the wall to wall ubiquitous coverage of satellite imagery. Secondly, as the climate shifts, the plants and trees present in an area may find themselves in poor conditions in the southern portion of their range, and may not produce as much nectar. The same species growing in the northern extents may become much more productive. This may be a reason why tulip poplar honey, once the mainstay of many Mid-Atlantic beekeepers, has now become relatively rare compared to black locust. Scale hives may be able to give us a piece of the puzzle into what is going on.

How do I become a volunteer?

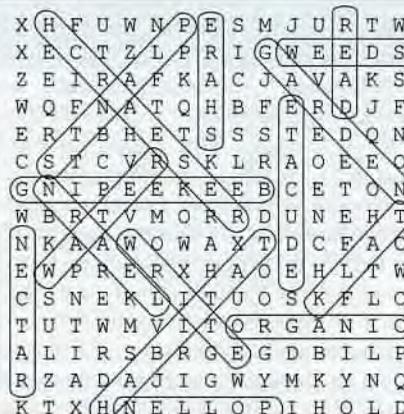
First you go to the HoneyBeeNet web site and download the "How To Do It Protocol" under the Site Data. Then you will answer a short questionnaire and put in your GPS coordinates and email that back. Citizen-scientist-beekeepers will need to purchase an industrial-sized scale on which to keep a strong healthy colony, and weigh their colony each day. Data is then entered on data forms and sent directly to Dr. Esaias through the HoneyBeeNet site. The best possible scenario is if the colony could be weighed each and every day. But we all have lives and sometimes are not around to take such measurements, and some gaps are OK. Since these scales cost around \$400 new (used from \$25 up at farm auctions), I think it would be an appropriate use of local or state beekeeper's association funds. If a local/state club set up a scale hive the members could rotate responsibilities weighing the colony so no one person is carrying the entire burden. Beekeeping clubs would greatly benefit by having the local nectar flow data, so it may be something that should be encouraged throughout the region. Several regional networks have even developed in Europe.

Electronic scales for use as hive scales are now coming on the market. They tend to be much more expensive but may make a big difference. They have the advantage of recording and storing the weight daily, hourly and even every 10 minutes. Some send the data thru the internet, or directly to a home computer. Some examples can be seen at <http://hivesensors.com>, <http://hivetool.org>, Swienty.com and at some of the sites pictured on the HoneyBeeNet site. Beekeepers with good computer and electronic skills can put together their own data collection systems, as Paul Volk and colleagues have done with the Rabun Gap Nagoochee School and other sites in north Georgia and North Carolina. The NASA crew is also working with BIP (Bee Informed Project) and other groups to transition the Honeybeenet activity to a more permanent home in the bee research community.

With milder Winters, the eastern U.S. is experiencing earlier spring nectar flows and longer summer dearths. However, yields from the spring nectar flow are not greater (since no increase in bee forage) and are often less (colonies are not yet at maximum strength). And, the fall nectar flows are now unreliable and weak. This is a problem. Since bees use much more energy (honey) when the weather is warm, the honey they make during the spring nectar flow has to last them up to two months longer now than it did back in 1970s. Colonies often run out in late August-September, just when they are trying to make lots of winter bees, and this can lead to increased winter losses if beekeepers are not paying attention. In the Mid Atlantic and the southern states, beekeepers are now told to start feeding syrup in August. Other regions, like the Mid West, can have very different nectar flow seasons and the bees may respond to climate change differently than what's been experienced in the east. That is why more scale hive sites are needed in order to establish the relationship between nectar flow timing and intensity, with satellite vegetation and climate images. Since honey bees are managed pollinators, we can adjust our management techniques in response to these slow changes if they can be identified. Another goal of this project is to come up with a map of the northern US with nectar flow dates and variability. Right now the resolution of this information is very course but as more data is collected and analyzed the clearer the picture will become.

If you can contribute past scale hive records, from any year, for North America, please contact Dr. Esaias and make arrangements to get the information to him. It would be a shame to have that data lost forever. **BC**

Jennifer Berry is the research director at the University of Georgia Honey Bee Research Lab.



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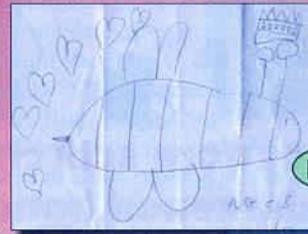
Bee B. Queen Challenge

Bee Mine!
Bee B. Queen

Make a snow bee and send me a picture.



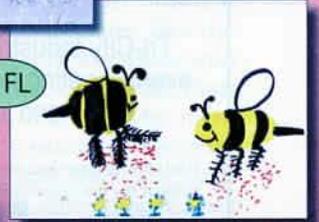
Saniya, 8, TX



Yuvia Rodriguez, FL

I M 4 B's

Raechel Simpson, 8, AL



We Love Bees

Everyone is talking about the challenges our friends the honey bees are faced with. Diseases, poisons, stress, malnutrition, public fear, and Colony Collapse Disease all add up to make the life of a honey bee difficult. You may ask, "What can I do to help the bees?" Here are a few things you can do as a "Bee Buddy."

Plant a Garden

Bees need the nectar and pollen that plants provide as food sources. A garden could be one potted plant or an entire field. Some bee friendly plants include sage, oregano, lavender, bee balm, sunflowers, and rosemary.



Beekeeping

Be a beekeeper. Many of you have parents and grandparents that are beekeepers. Help them inspect the hives and extract the honey. Ask questions. Join a local beekeeping organization.



Cool Clear Water

ALL living things need water including honey bees. You can provide water for bees in many ways. Fill a birdbath, dishpan or any other container you may have. The key is providing them with some kind of footing so they do not drown. Some ideas:

- Float sticks or bark on the water
- Put in some pebbles or stones that rise out above the surface
- Drape a clean towel over the top of the container to suck up the water.



Learn

Take time to learn more about bees. Read books, ask questions, talk to beekeepers, and do research on the Internet.



Let There be Weeds

Let some blooming weeds grow in your yard or wait to cut them down until after they bloom. Some plants that bees love, but some humans consider weeds, include dandelions, goldenrod and clover.



Go Organic

We don't want to poison our flying friends so avoid using pesticides in your garden and yard. Some pesticides can kill the bee before it returns to the hive. Other pesticides get carried back and can harm the rest of the hive. You may not know this but many lawn fertilizers have harmful chemicals in them. There are a ton of books and websites to help you learn more about organic gardening.



... BEE kid's CORNER

Produced by Kim Lehman -www.kim.lehman.com

www.beeculture.com

February 2013

Glad You Asked

How much does a bee weigh?
Oscar, 11 CA

A worker bee weighs about 90 milligrams which is around 1/300 of an ounce. It would take about 11 bees to make the same weight as a dollar bill or a paper clip. In other words, a worker bee does not weigh very much. A drone weighs a bit more, about 160 milligrams.



Bee Mine

Create this simple, easy to make valentine for your friends. First, find yellow candy wrapped in cellophane for the bee bodies. Take a permanent black marker and draw stripes. Glue on googly eyes. Make a valentine out of paper. Write a special message. Tape the candy bees to your valentine.



Bee Buddy

The family beekeeping bug all started three years ago when Rich Jacob from Michigan began keeping bees. Now his son-in-law and granddaughters are also keeping bees. Anna, age five, was so excited when she got her bee suit



Sara and Anna Levendoski

that she did a little bee dance. Anna loves inspecting the hives. She stuck her head right into the hive and whispered, "Make honey little bees!" Older sister Sara also helps with the bees in between dancing, playing violin and acting.

Help is on the Way Word Search

Here are some ways to help bees. Can you find these words? The solution is somewhere in this magazine.

BEEKEEPING
EDUCATE
GARDEN
HABITAT
LEARN
NECTAR
ORGANIC
PLANTS
POLLEN
READ
RESEARCH
SHARE
TALK
WATER
WEEDS
WRITE

X	H	F	U	W	N	P	E	S	M	J	U	R	T	W
X	E	C	T	Z	L	P	R	I	G	W	E	E	D	S
Z	E	I	R	A	F	K	A	C	J	A	V	A	K	S
W	Q	F	N	A	T	Q	H	B	F	E	R	D	J	F
E	R	T	B	H	E	T	S	S	S	T	E	D	Q	N
C	S	T	C	V	R	S	K	L	R	A	O	E	E	O
G	N	I	P	E	E	K	E	E	B	C	E	T	O	N
W	B	R	T	V	M	O	R	R	D	U	N	E	H	T
N	K	A	A	W	O	W	A	X	T	D	C	F	A	C
E	W	P	R	E	R	X	H	A	O	E	H	L	T	W
C	S	N	E	K	L	I	T	U	O	S	K	F	L	O
T	U	T	W	M	V	I	T	O	R	G	A	N	I	C
A	L	I	R	S	B	R	G	E	G	D	B	I	L	P
R	Z	A	D	A	J	I	G	W	Y	M	K	Y	N	Q
K	T	X	H	N	E	L	L	O	P	I	H	O	L	D

Spread the Word

Talk to anyone who will listen about the importance of bees. Present a program to your scout group. Contact other organizations like 4-H. Speak to other classrooms or clubs at your school. Set up an educational booth at community events or ask a beekeeper who has a booth at a farmer's market if you can come talk about bees with others. Even though you are young, you can make a huge impact on honey bees and the environment by being involved.



Become 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.

Bay Area Beekeepers –

Spencer & Helene Marshall's Honey Farm

Judith Adamson

If you find something that you love to do and it's a positive thing in the world, do it in a smart, positive way.

The Beekeeper: I was born in McMinnville, OR. My parents were both offspring of many generations of family farmers. If there was a crop to farm, I believe they farmed it. I know they at least farmed wheat and grain, raised turkeys and cattle. Grandma loved bees and had a few hives on their Yam Hill Farm. I remember watching her working the hives, and I was very curious. My family eventually moved to Acampo, near Lodi where they raised grains and started a harvesting business.

I moved away from the farm, went to college, and had various jobs teaching, gardening, producing videos and running a career development agency. My father was seriously injured in 1983, and I was needed to run the harvesting operations at the Acampo ranch. While I was living at the ranch, I started up a few beehives so I'd have something of my own to develop. I learned about beekeeping strictly by trial and error, and the more I learned, the more there was to learn.

Pollination is a big business in California's central valley. The almond crop is totally dependent on honey bees for pollination, and there was a need for more hives. I saw this as a good way to make enough money back then to pay for my slowly growing bee operation. I signed a few pollination contracts and started moving my bees to the almond groves, the cherry and apple orchards and the clover fields of the San Joaquin Valley. I used money earned from pollination to buy used equipment and hives from beekeepers who were giving up beekeeping, and this is how I began to develop apiaries in several locations. I alternated between taking care of my dad, running the business and doing carpentry and remodeling jobs. The bees, however, became an obsession. I wasn't happy just having bees in the Central Valley; to satisfy my yearning, I started up a few hives in Marin County where I lived.

The Beekeeper's Wife: I'm a city girl, born and raised in San Francisco. The last thing I ever thought would happen to me would be to have a beekeeper for a husband. I had studied art and sculpture at Berkeley

and had been introduced to bees and beekeeping by a forestry professor at UC Berkeley. I had moved to the East Coast where there was always a beehive in my yard, but I was not a beekeeper. I decided to move my family and my business back to California and bought a commercial building on Sir Francis Drake Boulevard in Marin to be the home of my art-chime business. A year after I moved, a mutual friend introduced me and Spencer, telling me beforehand that he was a beekeeper. When we met, the first thing I asked him was, "Do you have Italians or Carniolans?" "Carniolans," he said . . . and that was the beginning of a sweet relationship and Marshall's Farm as we know it today.

The Beekeeper: At the time we met, I was dreaming about doing farmers' markets to sell my honey. Helene had been in the gift business doing craft fairs and gift shows in all the big cities for so long that doing a farmers' market didn't seem like such a big deal. She thought it would be a lot of fun.

One day, by accident, I left a hive full of bees in Helene's van. She was going to a craft fair to sell her chimes near Placerville. When she got there, she found the hive (not yet buzzing) and a bucket full of canning jars filled with honey. She set the hive out as part of her display and put the honey out – for sale – next to the hives. As the day heated up, the bees buzzed, signaling they were getting ready to go forage, and she put the hive back in the van. She sold \$20 worth of honey that day and drove back to the ranch with a van-full of flying, buzzing bees. I greeted her, probably with a smirk on my face. She said, "Here's some money, honey!"

The Beekeeper's Wife: Spencer is a passionate beekeeper. He loves to mess around with bees. There's nothing that makes him happier than sticking his head or bare hands into a beehive. He manages the hives, and I manage the business doing sales and marketing, designing labels, packaging and brochures and managing the finances. I've always run my own small business, and I love it. We're totally opposite from each other – a perfect match!

What we've accomplished takes two different personalities to work the different aspects of our business. As I say, he gets the honey; I get the money. We've been married for a long time now. We work together, we live together, but we're each doing our own thing within one superstructure, so to speak. Kind of like a mini-beehive. He's doing what he's passionate about; I'm doing what I'm passionate about, but one without the other, this honey business wouldn't have happened.

There are so many beekeepers who are just into



Helene and
Spencer Marshall.

pollination of mono-crops or producing drums of honey, whereas we're bringing local urban honey to the public in a way that they normally wouldn't be able to get it. Our honey is in specialty grocery stores and local farmers' markets and used by many upscale restaurants and celebrity chefs, but we also ship all over the country.

The Beekeeper: We have a hand-crafted approach to traditional honey production. We specialize in local honey, harvesting small quantities of superior quality honey in the very special microclimates of the San Francisco Bay Area. Much of our honey is wildflower, but we also produce many different varieties. I search out locations that support only a few hives but produce exceptional tasting honeys. The diverse and constantly changing seasonal blooms of the Bay Area – eucalyptus, star thistle, wild blackberry, sage, orange and others – produce nectars and pollens that differ greatly in taste, texture and color. I harvest after each bloom, isolate the honey harvested from each apiary, and thus create the special flavored nuances and wonderful color variations in our honey.

The Beekeeper's Wife: Our business specializes in artisanal production, and we're very proud of it. We're very low tech. We're not using a lot of power. In the honey house, we have only two pieces of electric equipment, the uncapper and the extractor. Everything else is done by hand. All the bottling is done one jar at a time – filling it with honey, labeling it. There's no assembly line here, and that way we can bring small quantities of a large variety to our honey fans. The honey's unfiltered. It is certified Kosher – the ultimate symbol of purity. If you look closely, you can see natural pollen particles floating in the honey. Honey is a healing, healthful, fat-free food with minerals and vitamins. We use it every day – in tea, on toast, in baking, in dressings, marinades and sauces and on salads, fruits, veggies and meats. It's great as a sweetener and flavor enhancer, and even better right out of the jar.

The Beekeeper: Basically, beekeeping hasn't changed very much for hundreds of years, other than the invention of extractors and uncappers and things like that. If you've got a certain amount of knowledge, you can survive. We're in a new ballgame now with all of the viruses and parasites, so you have to stay on top of it. There are some scientific journals that come out every month, which I read from cover to cover and talk to other beekeepers about what they're doing. The way we're doing it, folks, is not going to work anymore. We've got to change our ways.

A couple of years ago we installed some hives on the roof of the Fairmont Hotel in San Francisco. I love that they're bringing awareness of the plight of the honey bees to the public. It's crucial to get people involved in understanding how important honey bees and all the other pollinators are to our survival.

The Beekeeper's Wife: I jumped at the invitation to put hives at The Fairmont. I spent many nights after high school proms and parties at The Fairmont,

The Fairmont Hotel.



exactly where our hives are now.

The Beekeeper: We have a lot of problems in this country and in the world. People are still like children; we haven't really woken up to our full potential or what we should be doing. I think being an adult means taking care of business, being smart in how you interact with the world, and building a social network with people. If you find something that you love to do and it's a positive thing in the world, do it in a smart, positive way. That's what I feel I'm doing in my beekeeping and I'm grateful for being able to work at something I love.

A good friend of ours described my typical day: "He takes the bees to the flowers in an air-conditioned SUV (it's air-conditioned because it's a flat-bed truck!). When the bees are finished working the chosen flowers, he whistles to gather them up and bring them home! Now there's a great day at work!" www.MarshallsFarmHoney.com BC

Story excerpted from Backyard Beekeepers of the Bay Area by Judith Adamson www.BackyardBeekeepersBayArea.com.

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Communication

Ann Harman



Where it's been, and a glimpse of where it's going.

The presence of man on earth has been divided into a succession of Ages. In the Stone Age we find man about 5000 B.C. saying "ugh!", meaning "I just hit my thumb with a rock." By the Iron Age, starting around 1200 A.D., man was more articulate, saying "ouch," meaning "I just hit my thumb with a hammer." Moving into the Steam Age, during the 19th Century, we hear man saying "ouch!", meaning "I just burned my fingers with the teakettle." Now we have arrived at the Electronic Age where man is still saying "ouch," meaning he is suffering from texting-thumb tendonitis.

Beekeepers, sometimes a slow-to-change group, are now making much use of electronic gadgets. After the arrival of computers and clever telephones, the number of these gadgets in various forms has snowballed accompanied by the addition of many new words to our language.

Our United States Postal Service now delivers "snail mail," still a very useful service. This snail mail may well carry to us various bits and pieces of information that belong to the Electronic Age. The sheet of stationery enclosed in a snail mail envelope will contain email address, cell phone number and (maybe) fax machine number. Telephones that sit on our desks now are called "land lines" to differentiate them from "cell phones" or the more up-to-date Smart phones. But these "phones" are now multi-function, taking the place of old-fashioned gadgets as well as new electronic ones. Yes, you can still make a phone call to someone.

Beekeeper associations, national, regional and local have newsletters to keep the members informed about meetings, beeyard activities and news items. Not too long ago these were printed on paper and mailed. Today the majority of newsletters are emailed to members. Websites

of the associations frequently contain the newsletters, usually in a section that can be opened by members only using a password. We may find a few snail-mailed in areas of the country without high-speed Internet. (Yes, they do exist – I know, I live in one – rural, mountainous and sparsely populated.)

We have become a world of passwords. These open up an endless list of sites, each with different requirements for establishing the password: capital letters, a minimum of characters, must include numbers, etc. Our passwords have become so numerous that we must use various means, including our computer, to keep track of them. Many of the honey bee words are already in use. Therefore you will have to be creative in password selection.

Once upon a time, not too long ago, we had portable phones resembling ordinary (or should I say old-fashioned phones). We then rather quickly moved to small cell phones. These were just telephones. With these phones a beekeeper could stand by a hive, call a friendly experienced beekeeper and report that "some whitish wiggly worms are in my hive, what do I do now?"

Jump to the present. Here is the beekeeper with the "white wiggly things" using the cell phone as a mini computer. Open up the Internet and look up bee diseases and pests. A flood of information is literally held in one hand. However, what in this flood is pertinent, important and, above all, helpful? Well, the friendly experienced beekeeper can always be phoned.

However since the phone can now take a photo of the white wiggly things our beekeeper can now send the photo to experienced beekeeper mentor who takes a look, diagnoses wax moths and advises on the problem via the phone sill in the beekeeper's hand.

However to keep up-to-date and have a useful phone,

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- High Fructose Corn Syrup

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it is necessary to acquire "apps." Here is a new word for the Electronic Age and new apps are appearing every day. In any group of people you will find someone showing off their new app and all the clever operations it can do on the cell phone. Somehow the term "cell phone" needs to be replaced with a generic word for the small handheld gadget that has become essential to our existence.

Back inside the house our beekeeper can now sit comfortably at a computer and open up the Internet. By simply typing in "honey bee" enough entries can be found to occupy days and days of information on anything and everything relating to honey bees. Is all of this accurate? Very hard to tell, especially for beginning beekeepers. For them all the information is interesting, challenging and very possibly useful. Perhaps the beginning beekeepers should have guidance from a mentor before believing every single word that appears.

Associations, as well as individuals, can have websites. These exist around the world, but not always in English. Nevertheless a beekeeper can spend a pleasant evening searching out websites, admiring the photos and learning something about beekeeping in another state, area of the country and elsewhere.

Once we used the term "Pen Pal" for correspondence with someone with our same interests. Letters, using pens, took weeks to travel to far-off lands. Somehow that term did not change into "Email Pal," as we now correspond instantly with beekeeper friends half a world away.

However beekeepers can use Facebook to "friend" a beekeeper that half a world away. Photos of bees, hives, flowers and other pertinent items can be sent and received with a short message. But Facebook is not the only form of correspondence. A beekeeper can always Tweet, a message sent via the Twitter message service. A Tweet has a limit on what you can say – 140 characters. With a bit of ingenuity a beekeeper can get a quick message sent.

Although texting seems to be most popular with the young generation, sending a text message can also be useful to a beekeeper. The Text Language is a new one with text abbreviations being coined every day. All the usual text symbols do not seem to contain ones appropriate for beekeeping. Therefore beekeepers must devise their own. So if a beekeeper wants to say "my hive swarmed" it could look something like this: HV SWMD. Whether that will be understood by the recipient is not certain. Perhaps beekeepers need to create their own texting dictionaries. Yes, texting dictionaries do exist. :-)

Perhaps our Electronic Age beekeepers would prefer to use Blogs. Here our beekeeper can post a running commentary, by date, on a beekeeping topic of interest, such as "my hive swarmed." The choices of communication seem endless today.

Here is our beekeeper now sitting in a comfy recliner, cat in lap, dog at feet, honey cookies close at hand. Click. The flat screen TV that almost fills the wall lights up. This evening our beekeeper will be participating in a "Webinar." Another new word for our Electronic Age dictionary! This word is obviously coined from "web" meaning a website and "seminar" meaning a teaching or lecturing session.

A website or email from a company or organization will announce the date, time, topic and the presenter for the Webinar. Our beekeeper will be invited to sign up for this and will be sent instructions, via email of course,

Webinars, Smart phones, Internet, web pages, texting, Facebook, Twitter - what's a beekeeper to believe?



about opening up the Webinar site. The Webinars are a very useful way for professionals to reach out to beekeepers scattered around the country. Not everyone can attend large regional or national beekeeper meetings to hear presentations from the professors and scientists.

We cannot neglect the tablets and e-readers. These are presently undergoing some changes. The e-readers were once exclusively for reading books, usually popular ones. Tablets, similar to gadgets like iPhones but in a larger format, are becoming very popular. With an appropriate app you can now read a book on your tablet. However, at this time only a very few beekeeping books are available in either an e-reader or a tablet. If you visit Amazon.com and look for beekeeping books you will see that a few are available for Kindle®. The number of books will certainly increase, especially now that tablets can open books.

Articles like this one, once typewritten or even handwritten, and mailed to the beekeeping journals have been sent by email for a number of years. The journals themselves are being composed on the latest versions of publishing programs. Color photos and colorful formatting are now the norm. Digital versions of the journals have appeared and can be enjoyed on our computers and tablets and phones.

Bees themselves now belong to the Electronic Age. I have a poster photograph showing bees with barcodes firmly glued to the thorax. As the bees enter their hive, the barcode is read by an electronic reader fastened in the hive entrance. Now the scientists can find information on foraging activity without actually chasing after the bee.

Miniaturization has provided scientists with tiny tracking devices so bees are flying with a tiny transmitter, complete with tiny antenna, to send information back to the laboratory. These devices have saved the scientists from stumbling over rocks and plowing through brambles only to lose sight of a bee. The Electronic Age is surely giving us a glimpse into the hitherto unknown life of honey bees.

What does the future hold? Perhaps those actually working in the electronics industries know better than a beekeeper what the next app or gadget will be. Don't assume that the phone you hold in your hand and the computer on your desk will be doing the same tasks tomorrow that they do today. We are probing into the honey bee's life inside the hive, attempting to determine the status of the colony so that we become better stewards of our bees. We will certainly continue to reach out to beekeepers around the globe since, in this Electronic Age, we want to share the enjoyment that the bees give us no matter where we live. **BC**

Ann Harman keeps bees and communicates with the world from her home in Flint Hill, Virginia.



DOWNTOWN

Sometimes, the exhortation to “get out there and do outreach” is about as appealing as one of those doctor’s appointments that concentrates on increasing fiber and decreasing waistlines. Many times, when I get up early to chase a queen and load an observation hive and all the other boxes, tools, and props used for a Summer camp or an elementary school presentation, it seems crazy to spend yet another half day on such a foggy agenda, and to put my bees through an event which will cost the hive some individuals and undercut important colony activities. It’s a gesture of hope, kind of like clicking my heels and hoping to end up in Kansas. Experience tells me, however, it is can be better than a free ticket to Oz.

Beekeeping in the city has changed my life, and little by little it has a chance to change the lives of children (and their parents), helping to build a better future both for them and for the honey bees. And it always seems to load me up with hope and energy and a little pride. Without acceptance for the bees and encouragement for the beekeeper, it is hard to ensure a place for urban beekeeping after the first wave of novelty passes. Educational outreach is a wonderful way to make that happen.

Urban beekeepers know that *at least* a bit of our motivation is just how interesting and counterintuitive it seems. We pursue an agrarian activity in “the concrete jungle,” and

peacefully bring tens of thousands of insects that many view with fear into a place that is thick with humanity. Our neighbors could fairly ask, “What were you thinking?!” Perhaps we should tell them, eh?

Goal one is creation of a community whose first reaction to the introduction of a new beehive is “How incredibly cool!” rather than “Are you out of your mind?” As fun as it is to be an outlier, we really do need to defeat the image of eccentricity and strangeness. We can do this by demonstrating the way our bees fit in, the way they make the many vibrant green spaces downtown flourish, and the way they replace fear of the natural world with participation and connection. And if we start with the kids, before they adopt the fears and disconnection to the environment that happens to so many adults, we can bring the whole human clan back into the light. Or it can feel that way after a fun day out with the obs hive and the kids!

Judging from what other beekeepers often say, walking into a room full of kids is one of the most terrifying things an adult can do. Don’t worry, we can help. Whether that classroom is uptown or downtown, in the city or in the suburbs, the kids’ eyes will greet you with the same two questions: “Do you *really* care?” and “Are you interested in connecting me up with that?” And your answer is certainly “Yes!”

I work with two dramatically dif-

ferent youth populations, for the most part, though they all end up being curious kids at heart. Kids are not stupid, and they are not patient, but they are interested and energetic and lovely, sincere advocates for things they believe are right and true. Honey bees can use friends like that.

My downtown kids usually put me through an “Are you serious?” drill, where they basically need me to prove two things: that I know what I am talking about, and (more importantly) that this is coming from a place of real caring and passion. They are used to people from posh neighborhoods bearing prescriptions about what they should be doing with their lives, and seem deeply interested in whether I am going to share something meaningful to me as a human or to lecture on like a public service announcement.

The first time I worked with the Washington Youth Garden, the observation hive leaked bees, which caused a fair amount of silliness and chaos. But all that stopped when I (at a loss) just started picking up escapee bees, and holding them. Children who wanted to stomp bugs very quickly turned into curious little people who wanted to hold them, and learn about their lives. Together we looked at them really close and saw just how fuzzy and delicate and gentle they are, even with the stinger. I think my downtown kids know more about danger than most of the others, and understand that risk is real, but sometimes really worth it. And something that is small and precious and in a fight to survive is something to which they can relate.

The suburban kids are also skeptical in their own way. They usually have some previous exposure to the

City Bees Need City Kids

Toni Burnham



subject matter, and want to know whether I am wasting their time, in this case with stuff they already know. It can actually be a little difficult to regain control of a presentation when a well-informed elementary school student attempts to demonstrate how much they know during my 45-minutes-including-Q&A slot! But using an obs hive to demonstrate life going on in 3-D before their very eyes – and real examples of just what a trip pollination is – are aces in the hole.

One time in Fairfax County, I called on a smallish second grader who was almost out of his chair with an energetically-raised hand. I asked, “Do you have a question, little boy?” To which he answered, in a tone appropriate to any court of law, “Not so much a question as a comment.”

Many of these kids have learned that being clever and informed is very important, and their parents and teachers have worked hard to make sure that they are both. We should, too. I would argue that these kids have just as much a deficit of connection to the wonder of the bees as kids who never get to a science museum. I am more likely to deal with kids who are actually afraid of nature in the ‘burbs: it is an oversimplification, but folks who have worked so hard to get their kids to the safest and the “best” have often transmitted a sense of general worry about things that fly, buzz, or grow outside a planter. Children accompanying me to an apiary have left the group in order to step on every insect they see around them, saying “It’s what my mom does.”

But the bees make pretty short work of that. Bring a populated ob-

servation hive into a group of kids and you will soon have preteens glued around the box – and they are usually better at spotting queens and drones than we are (and I make sure that they know it). Hold up a pumpkin or a watermelon or a strawberry and get the kids to think about how every single seed in or on them was once a grain of pollen carried by a bee, and how flowers simply would not have future generations unless they could rely on species to which they are not even remotely related.

You have to watch your wording on this one, but I often ask kids how human parents would feel if they had to check in with a local praying mantis or grasshopper if they wanted to add another son or daughter (and bugs are more closely related to us than plants are to bees!)

In our region, Summer is the only time I can really do live-bee outreach: by the time schools get rolling in the Autumn, my girls are beginning their Winter shutdown and are both vulnerable and less cooperative. In the Spring, the insects-that-pollinate unit in the curriculum may take place before the weather is safely warm enough to move queens and brood.

But there are Autumn and Winter opportunities to present bees to the public, and I recommend that beekeepers consider putting together, individually or sharing in common, a “teaching super” (an idea from another beekeeper) that can be brought into almost any location. My teaching super is a deep box that contains both deep and medium frames, including bare foundation of a couple of kinds, the arc of the brood nest (often with left over pollen or capped brood),

queen cells, drone cells, extracted honey frames, dark and light comb, and a foundationless frame on which the bees have begun to draw. This stuff is often accumulated during culls throughout the season, though it helps to have this project in mind as you work in general.

Bring veils and tools and a smoker, though leave the lighter at home. I like to bring a skep, too, and ask the kids what I would have to do to get the honey from the bees in a structure like that. They usually express indignation and a new appreciation for movable frame beekeeping. Not bad for first graders, eh?

Outside of a school setting, and when the audience has a lot of adults, I consider adding in a honey tasting, making sure that local honey gets contrasted with both clover and whatever varietal is completely different. Many folks think they can’t tell the difference between one honey and another: you can expand their experience!

There is almost limitless demand for this material. When first getting started, I used to take requests for presentations that came into my local club. Once I got some presentation chops, I started calling places that were near and important to me to offer presentations. After understanding of CCD went viral, folks started calling on their own. People began to understand that bees were important and they needed advocates, but they needed to know how to help. We can do even better than that, however. We can share the joy as well as the worries!

City beekeepers, you can really give the people what they want, and make endless friends for bees with just a couple of sessions every year. Bees are important to community gardens, to High Holidays religious celebrations, to environmental advocacy groups, to food access activists, to garden clubs, to elementary schools, and on and on. If you have not been asked, please consider reaching out to an institution in your neighborhood if they would like an hour of your time, sharing something you love. Together, you will build a community which is better for both people and bees. **BC**

Toni Burnham keeps bees, goes to schools, Summer camps and makes friends all over her city.

BIGGER PICTURE

Better Food

Jessica Lawrence

The Cans, And The Can'ts – This Year Our Fruit Canning consisted Of Strawberries, Blackberries, Blueberries, peaches, Apples, and Even Pomegranates – See Where The Bees Come In?

My work has me traveling often. Approximately eight to 12 weeks a year I am in another place, having my suitcase constantly checked by TSA because my German hive tool looks more like weaponry than a beekeeping instrument, or because someone in security heard me arguing with the counter that I should be allowed to bring a peahen on the flight as a “lapdog” (it never ends well). I am forever bringing random weird things on the plane.

On a recent trip to California, I met a man with an “unused” pomegranate tree. He said his grandmother used to make pomegranate jelly, but he didn’t even try to pick them anymore. I thought this was silly, because look at all those tasty fruits going to waste! I found a copier box and went back out to pick my newfound bounty, only to discover that there were massive thorns on the tree, and I could barely wrench the stems off! Robert, a native Californian, was with me . . . not helping. He thought the whole thing was hilarious, because he knew better. Finally, he decided to get out of the truck and help – probably because he was getting hungry and it was almost lunch.

Now, my dilemma was to get them back to North Carolina. I checked with the various delivery services available, since I had around 30 pounds of pomegranates. It was going to be a minimum of \$65 to ship the fruit home, and they probably would not be tasty by the time they arrived! I took them back to the hotel, and realized I had maybe a suitcase full of pomegranates, and also a suitcase full of clothes. Not to be stymied by this unfortunate turn of events (I love my clothes, can’t leave those!), I picked through and collected the best of the best, ate a couple, and left the rest for the hotel staff (they are always excited to see me come, since I travel with “free honey”). I ended up with about 15 pounds in a Hello Kitty bag. Let me tell you, carrying that through an airport felt a lot more like 40 pounds!

When I finally made it home safely with my new “children,” I started making jelly. I was able to make a few good pints, and it is the prettiest jelly I’ve ever seen. To me, it tastes like candy. We are a canning family, making apple butter, strawberry jam, blackberry jam, spiced peach jam, or any other fruit jam that doesn’t get immediately eaten in the house. The pomegranate jelly was an exotic new “species” for us. I am easily excited, so I was bragging about canning something that’s not common in my area. I had various reactions, ranging from confused (some people didn’t know what a pomegranate was) to volunteers for being a taste tester, to somewhat condescending. This last group of people seemed to think that canning was

a waste of time, and that I must not be doing anything worthwhile to have enough time to preserve food when I have a grocery store. I had this response a few times, and let me say it makes me angry.

When I think of wasting time, I think of piddling on the internet, watching TV with glazed eyes, or watching the trash until it takes itself outside. To me, things like beekeeping, gardening, composting, canning . . . these are what contribute to a lifestyle that makes you appreciate how much it takes to fuel a person. They are all hard, but enjoyable work. There is nothing better than having a fire on a cold Winter day, heading to the pantry and seeing your Summer garden lined up in mason jars like soldiers. Eating your own canned food is like having a piece of Summer to remind you to plan the next garden. Each jar is a trophy of a gardening accomplishment, and a successful canning experience. It’s also a signal of a healthier lifestyle. It doesn’t take a lot of energy to buy groceries, but you’ll feel it the next day when you spend a hot Summer afternoon weeding for a few hours! When you can produce any percentage of the food you need through the Winter, it is accepting responsibility for at part of your place in the world.

My favorite homegrown fruit/vegetable is the tomato. Pablo Neruda, a Chilean poet from back in the day, has a poem called “Ode to Tomatoes (www.soupsong.com/ftomato2.html).” It has always been one of my favorite things to read, because I felt like he understood the “soul” of a tomato . . . which I believe is lacking in the supermarkets these days. I think you’d be better off to buy a red water balloon than a grocery store tomato. At least you wouldn’t dull your knife cutting into it. The produce section at most convenient places to buy groceries is, in my opinion, seriously lacking. The nutritional quality as well as flavor have went out of fashion as it has become more important to ship well and have “pretty produce.” I’m

Pomegranate jelly – beautiful!





Jessica, center, with friends, family and better than store bought food.

not one to get into an argument with anyone about GMO food, pesticides, or organic growing, but if I have a choice, I will always be going to the local guys who grow crops "traditionally" over the organic food from Argentina. Supporting local agriculture is my primary goal when buying produce that isn't grown at my house. Having something to eat year-round that doesn't taste like garbage is a close second. I dare anyone to tell me that grocery store jelly or jam tastes better than homemade.

We have a neighbor that has a strawberry farm. Every year, it's a "u-pick or we-pick (for more money) strawberries" where you can buy a pound of local berries for a dollar less than the grocery store. I can't possibly produce on this scale, because I don't have the time or the resources. However, I can support the neighbors, who come and buy my honey, and I can give delicious strawberry jam to my friends and family for presents. I've never had anyone turn down that kind of homemade gift!

I see the need to have commerce in all areas and work on an international level, but in the end, we have to take care of ourselves first – and to me, that includes my community. Those organic growers down in Argentina might be completely dependent on their agreement with the U.S. in order to support their business and their family, but my neighbors have the same problem, and they are the same ones supporting me by buying honey so I can afford more bee boxes.

I don't want to give you the idea that I am totally self-reliant and would be fine if I couldn't get to the grocery store, but I am working toward that goal. Canning is a small step in that direction, but an important one. If you can't preserve the food you produce in a way that makes it safe to eat in the future, you will be wasting a lot of food and time and effort. I am not a big fan of eating in

restaurants, which is a major factor in my liking to cook at home. I am a ketchup snob and a Pepsi addict, so if a restaurant does not offer both of those things, I am not likely to be a repeat customer. I have been known to favor a few local places, so I take my bottle drink with me, and I usually have ketchup packets in my bag. In my opinion, I can make my own ketchup, have Pepsi in my fridge, and make the food better in my own kitchen rather than having to waste the gas and pay someone to make something I can do better at home. There are some exceptions to this, but then, there are exceptions to every rule, right?

There are many things that we take for granted buying in a bottle that you can easily make at home, and you'll know everything that went into the finished product. If I can't pronounce it, I'd rather not eat it. Take barbecue sauce, for example. My sauce is mostly tomatoes, vinegars, honey, molasses, chili powder, garlic, salt and pepper. There might be a few other bits and pieces that go into it, but I have yet to find a store-bought version that I like better. I'm not so arrogant to think that some sauces aren't better than mine, but I cook what I like to eat. This isn't a particularly seasonal item, assuming you have tomato paste around, but you can make it in large batches while the canner is sitting out and have it ready whenever you want it. I am hoping within the next two years to be able to produce all of the major ingredients (like making my own vinegar and growing garlic. I have had poor success with my garlic thus far).

This year, our local fruit canning consisted of local strawberries, blackberries, blueberries, peaches and apples, and the awesome pomegranates. I consider them "semi-local" since I picked them myself, even though they were from California. Everyone on my Christmas list got some assortment of these, along with honey, honey BBQ sauce, pysanky eggs or candles, depending on the size of the present. We also set up a booth at a bazaar in my home town, and did extraordinarily well. There was some curiosity over the pomegranate jelly, but the honey BBQ sold out in an hour. A lot of sales were from community and family support coming to buy my things because they knew me, or wanted to have local honey/products. We made a nice profit, and sold a lot of people good things to eat. It is a good feeling to know you have sold people a quality product that is as locally-produced as possible. **BC**

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



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maple syrup federation warehouse in that Province got robbed. 60% of their inventory vanished. That's six million pounds by the way, worth \$32 a pound. It came to \$18 million worth of the sticky stuff, wholesale. It's the largest agricultural theft ever I hear. Bigger than the 860 head of cattle rustled in Queensland Australia last spring. Even bigger than the football sized potato fields dug up and removed in British Columbia this Summer.

To steal that much Maple Syrup would have taken 100 tractor trailers. 100. That's a convoy. That's a traffic jam. That's incredible.

Just so you know, maple syrup is 66% sugar, and in 2012 Quebec's 7,300 producers boiled down 96.1 million pounds of the stuff, with a wholesale value of \$270 million, two thirds of which comes to the U.S. The producers in that part of Canada have trade groups, marketing plans, quotas, rules for production and 35 million maple trees tapped for production. Conglomerates, monopolies and thugs all create the same kind of problems, and there are always people who think they have a better way, a better product, and aren't going to be told what to do by a bunch of bureaucrats, elected, appointed or just regular maple syrup producers.

There's more, of course. The Federation was trying to control the maple syrup supply, thus the price. Apparently they upset someone who thought that kind of control was inappropriate, and, it seems there were, and are several who dispute that kind of power and control. Barrel Rollers they're called...moving syrup illegally...or at least against the Federation's wishes at prices they don't agree with and selling to buyers who know it's either stolen or illegal.

A two tier system evolved, where producers who didn't want to play by the rules of the federation began selling to other folks at prices not quite what the federation had in mind. And, it appears, some of them were involved in the theft and some of that syrup is already here in the U.S.

Does any of this sound familiar?

Pancakes, anyone?

Tom Holman

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Smokers, hive tools and much more.



The otherski patrol Ed and I sometimes do avalanche routes together, because, in his words, "Two Eds are better than one!" Having once been completely buried in an avalanche, and having seen it all in my long life, I'm naturally reluctant. Don't confuse me with young guys who get a thrill doing this work. I'm just trying to get 'er done and get down in one piece.

Yesterday morning, December 9, Ed and I set out for the Bear Paw Glades, a steep little shot with scattered aspen trees and a couple of ditches that cross it.

We made long, fast ski cuts across the slope in order to test its stability and set off avalanches. This can be a more accurate test than setting off explosives, although we often do both. I know – all this sounds dicey -- but this is what ski patrollers do, so that you can enjoy safe skiing.

We'd just received a big snowfall following an excruciatingly dry November, so the other Ed and I were ski-cutting a foot or more of new snow on top of half-bare ground.

Suddenly the snow "fractured" like a sheet of broken glass around me, and I got knocked off my feet. "No! Not again! Please, God!" I implored, as I struggled not to get swept away by the snow coming down on me from above. I never said I was brave, but I will tell you that prayer sometimes works.

Afterwards, the other Ed acted nonchalant. "You were fine," he chuckled. "I had you in sight the whole time." Then, "You know, if you get killed in an avalanche, you lose your overtime for the week."

My best honey customer is a self-employed Aspen auto mechanic. He's an old dog with a young wife and a toddler. You wouldn't believe how many quarts they go through!

Night before last – before that big snowfall – the mechanic, his wife and daughter, and a friend jeeped up the back side of Aspen Mountain. Then they hiked a couple of miles to a primitive cabin outside the ski area, where they spent the night. Of course next morning their world had been transformed into a winter wonderland! At mid-day they hiked down via Lud's Lane, through a closed portion of the ski area, and directly under three of the deadliest avalanche slopes on the hill.

This was the talk of the patrol room. A couple of hours later that same day, the other Ed and I did avalanche control work on one of the slopes my friends crossed under. The ensuing snow slides covered part of Lud's Lane ten feet deep.

I called my mechanic this morning, just to tip him off that he might be getting a phone call from one of the company higher-ups. I don't care how bad his judgment might have been. I didn't want him to get blindsided.

And I hope he learned his lesson. No one should depart Earth in an unspeakably awful, completely avoidable way. This is a most charming family. And they're really good customers.

The mechanic's mother lives in the Bahamas, and on his last visit, he took her two quarts of my honey, packed in glass. He had it all bubble-wrapped and padded with newspaper, so it should have made the trip OK. Unfortunately, the TSA people got curious, and they're better at unwrapping than they are at re-wrapping. My friend arrived with a suitcase full of honey and broken glass. "Fortunately," he said, "honey is water soluble."

I try to give my bees some ventilation in the Winter – but not too much. A small-to-medium-sized opening at the bottom board, and an inner cover opening at the top. This allows water vapor to escape, which is a good thing.

I have a bunch of wooden hive entrance reducers that came



with my bottom boards – they have multiple openings, so you can choose the size entrance you want. I never use them. Instead, I cut strips of heavy-duty tarpaper and tack them over the hive entrance, or at least most of it. This works even on warped or odd-sized bottom boards, where you can't wedge in a standard entrance reducer. And the work goes really fast, if you use a hammer tacker. You don't even have to light a smoker. By the time the guard bees figure out how to get out of the hive, you're on to the next one.

In the grand scheme, hive ventilation probably isn't critical. Winter is the winnowing time. Strong hives survive, and weak ones perish. That's the way it is.

Maybe it's late January as you read this. Maybe the roads are still slippery. Take it easy. Don't drink and drive. Don't go off the road. Life's short enough already. You could lose your overtime for the whole week.

Ed Colby

**Don't Lose
Your Overtime.**

BOTTOM BOARD