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Features . . . Bee Culture . . . The Rest

Maryland Helping Beekeepers In Africa

After college, Anne Schultz joined the Peace Corps and headed off to Lesotho, Africa. While I have never actually met Anne, she is friends with my daughter from college days. After getting her feet on the ground Anne reported back that among other things she hoped to start a beekeeping activity in her small remote South African village. My daughter passed this information along and I thought a few American Beekeepers might like to help with the donation of some equipment. I approached the members of two local MD beekeeping clubs that I am associated with, the Carroll County Beekeepers Association and the Howard County Beekeepers Association. Members of both clubs made donations for this project.

My plan was to send some veils and gauntlet style gloves. This way the folks tending bees would at least have some decent protection as they learn the craft of keeping bees. Armed with the knowledge that sometimes items sent to faraway places never actually make it to their intended destination, these generous beekeepers reached deep into their pockets. They were willing to help beekeepers they will likely never meet, half way around the world. Next, I got a large box from the post office and took it over to Jim Frazier at the MD Honey Company to see how many pairs of gloves and veils he could stuff in it. Jim was able to squeeze in four pairs of gloves and four veils. By the way, the postage to Lesotho cost about as much as it did to purchase the gloves and veils. After several weeks I got a reply back from Anne that the box had arrived at the Peace Corps address she advised I send it to and our donation was now with her. Then a few months later, she sent this response:

I cannot express how much your gift meant to me, and to the people of the Ha Rankakala community. Thanks to you and your groups' generous contributions, not only were the men and women of the Kopanang Basotho Support Group able to begin their own beekeeping project, but they were also motivated to host a Beekeeping Skills Workshop in their community! The workshop was facilitated by representatives from the Lesotho Ministry of Forestry, and allowed for other support groups and motivated community members to learn about the environmental, health and economical benefits of beekeeping. By giving the groups necessary equipment, you also instigated their sustainable connection to local resources.

As a result of the community-wide Beekeeping Skills Workshop, the Kopanang Mens' Support Group, consisting of all young, single, adult men, stepped forward, trapped their own hive of bees, and have since initiated a so-far successful bee project of their own. This is an especially large achievement in our community as young men in Lesotho are especially vulnerable to contracting HIV, and are difficult to reach in prevention and mitigation efforts. In addition to helping the men's support group provide financial assistance to HIV affected families in the area, this beekeeping project has helped them to build organizational capacity and teamwork among group members. Working together on this project has allowed a safe, positive venue for discussion and intervention. The group has begun to support one another, and other members of the community, in topics such as HIV/AIDS prevention and treatment, sexual health, life skills, and even gender equality. When I left my village in August, they were planning an HIV testing event in the community to target other young, single men who may be at higher risk for the disease.

I can safely say, that without the beekeeping uniforms, none of these life-changing events would have taken place. Your gifts had a lasting ripple effect, spreading motivation, and the desire to pay it forward and help others. Words cannot express our thanks.

The views and opinions expressed are my own. They do not reflect the position or policy of the Peace Corps.

Anne Schultz, Peace Corp
submitted by Allen Hayes

Yellow Jackets

Thanks for a very informative and entertaining magazine. *Bee Culture* is very useful to a novice beekeeper like me. I call myself a bee*keeper*, not just a bee-haver, because our little darlings made it through our last Wisconsin Winter very well. So now we're facing Winter number two, with an additional hive.

Your articles are great, and I read each issue cover-to-cover. At least I try to read all the articles – even the hard ones that make my head hurt (Yes, I'm talking about you, Dr. Collison!).

A very interesting article in your November issue was "A Yellow Jacket Adventure," by Jessica Louque. I have some personal experience with these little devils because of an incident in August 2013 in my backyard. I was trimming some weeds about six feet from my beehive and turned over an old log and WHAM! Out poured the yellow jackets. Never having been in exactly that situation before, I suddenly discovered that once you are in that situation, there is exactly nothing you can do about

it! You just have to let the little monsters have their way with you until they get tired. Fortunately, I only suffered about 40 stings, which caused me significant discomfort for more than a week.

But *here's what I'm really writing to tell you about*: From the very moment I received all that yellow-jacket venom, my old, arthritic knees have felt far less painful than at any time in the last 20 years or so. And it's been long-lasting; more than a year later, the improvement is still there. Mind you, I still have twinges, but nothing like the pain I used to endure. I do not recommend this method of therapy to anyone else, but isn't it wonderful how the Lord can turn something bad into something good?

Keep up the good work and I'll keep reading *Bee Culture*.

Larry Sommers
Madison, WI

Yellow Jacket Revenge

I was 12 and sneaking forbidden green apples from Grandfather's orchard, (they'll give you a belly ache, I was warned, but they never did). This time I jumped from a Jonathan tree right onto a yellow jacket nest.

As I lay in bed that night, my legs burning and throbbing from many stings, I angrily fantasized about revenge.

My sleepless night went on and my bladder filled. "That's it, here's revenge," I thought. With flashlight in hand I found that yellow jacket nest and you know what I did.

The next day the yellow jackets had moved to parts unknown and I've been using this revenge on yellow jackets for nearly 60 years. It works.

Henry Hamilton
Otisfield, ME

Bait Hive Trial

I've written before about putting "Decoy" Hives out to pick up swarms.

I'll tell one of the fastest "catches" I've gotten. It was the 4th of September 2014 as I approached several hives I was aware of a swarm issuing from one. It's hard to tell where they are going, but then I saw quite a bit of activity around an alder limb about 15' in the air, sure enough they picked that limb, I had no hives in my truck because its way past swarming season. I had one single hive that had a drone laying queen, which was going to die. I picked it up and set it down about 30 feet away. Then one by one I took the frames back to the old stand and shook them off, there were only two frames that had many bees on so it didn't take long. I did see the queen, she looked good but all the brood was drone.

After this I now took the bee-less hive about 80' away from the hanging swarm and set on an old boat, about two feet off the ground. Right away I saw a bee, then another; I thought they probably were the ones I shook out. I watched for a couple of minutes and then left, I came back about 15 minutes later and there was a large number of bees, seeing as it is September, they could be robbers but they acted like scouts, I sat for another 20 minutes, when all of a sudden I heard bees sure enough they were leaving the alder limb and the sky was full of bees as I stood by the hive, I became aware of a lot of noise. Sure enough they went in after landing on the hive and the boat. I was surprised that before they came there were still a lot of bees at the decoy. They have always disappeared or went back to the cluster before. I figured they were so close they were all doing the round dance, which signifies the target is close.

Anyway the whole procedure took less than two hours. After most bees had gone in I put the hive back where it had been. There were very few bees from the drone laying bunch, so I didn't know where they went?

The next day everything looked good, these bees probably won't make it seeing as its September. But last year I got a swarm on the last day of August and they came thru the winter on the weak side but then exploded into my best hive. I've taken two supers off so far and will get at least one more, so who knows?

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Photo by Robin Jordan of Nowata, OK.

UNFINISHED BUSINESS

Peter **Sieling**

Dick's widow, Alice, called me on the first of September about a bee swarm. She probably thought of me because I had attended Dick's calling hours in the Spring. They must call it "calling hours" because you stand in a line for hours. The line extended out of the church and into the parking area. I didn't recognize anyone. There was a slideshow that played through several times as the line crept forward at the pace of a garden slug. There's little Dick sitting in his wagon, young Dick in a Navy uniform, a mature Dick with wife and children, Dick in his veil beside a colony of bees, an elderly Dick surrounded by grandchildren, and finally, there is a professional slide of Dick with Alice. A lifetime compressed into 10 minutes. I introduced myself to the family and made a quick escape.

Alice took me out to the barn to show me the swarm. It was on the wall at ground level. The air was cool and windy, and the bees were a bit sparky. After a couple stings I put on my veil and gloves. Dick had kept some empty hives behind the barn. I took one and tried to persuade them to enter by brushing them down against the hive entrance. They refused. Dick hadn't actually had bees for several years. He had told me he hoped some wild swarms would occupy the vacant hives, but year after year they remained empty. I don't understand it. If I have ten empty hives in April, I'll have eight new swarms by mid July, and I live only seven miles away. At any rate these bees wanted nothing to do with this hive.

What do you do with a Fall swarm? They won't survive the Winter without feeding, but the same bees in the Spring are worth over hundred dollars plus the cost of picking them up half way across the state. I told Alice I would return late in the afternoon with my bee vac. To myself I thought, "They already know where they are going and will be gone before I return and I'll save myself the time installing them in a box and feeding them through the Fall only to have a dead hive in Spring."

They were up under the eaves when I returned, about 10 feet up. Alice said there was a ladder in the barn and she gave me a key. I unlocked the door, found the electric box and turned on the power. All the lights turned on at once. The last time I was here was over a year ago when I bought Dick's ancient extractor. Everything was as I remembered it – the work bench made from boards laid across hive supers. The honey room door was open and the new stainless steel extracting equipment gleamed under the electric lights. The tractor was still spread out in pieces on the main floor. There was the new riding mower. The old one blew up last year. I remembered the spot in the yard under the apple trees. It looked like a miniature nuclear explosion and Dick had described how he ran for the fire extinguisher (he was on his third pacemaker by this time). "Never buy a mower with the gas tank between your legs," he told me. The new mower's tank was under the seat. Either way, I thought, you are blown to Kingdom Come. I almost expected Dick to walk in the door. He left right in the middle, almost as if he went in to dinner and would be back out to put the tractor together this evening.

I found the ladder, propped it up under the swarm and vacuumed the bees, then put away the ladder, shut off the power and locked the door. On the way home I remembered the last time I had talked to Dick. We had sat together at the last Steuben County Honeybee Association banquet. He had unbuttoned his shirt and showed me where his pacemaker protruded from under his skin. His first pacemaker, he told me, was a "seven year", the second was a "five year" and this one was a "two year." I had joked that if it quit he could lean against an electric fence. They provide an intermittent jolt, about one per second, and could keep you alive until the paramedics arrived. It doesn't seem as funny now.

In spite of the unfinished business, Dick seemed to have finished well. Maybe leaving jobs incomplete is part of finishing well. Instead of "whoever dies with the most toys wins," maybe it should be "whoever dies with the most unfinished business wins." I've attended five beekeeper funerals, and helped widows and families clean up after three of them. Someday it will be my turn.

There's little Peter sitting in his wagon, young Peter driving a forklift, a mature Peter with wife and children, Peter in his veil beside a colony of bees, an elderly Peter surrounded by grandchildren, and finally, there is a professional slide of Peter with Nancy. That's my life compressed into 10 minutes.

At home there are still two lively hives in the driveway, one occupied bait hive on the porch roof, a dead battery on the bee fence, a dumpster load of dilapidated beehives, and a young beekeeper sorting through my unfinished business. BC

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

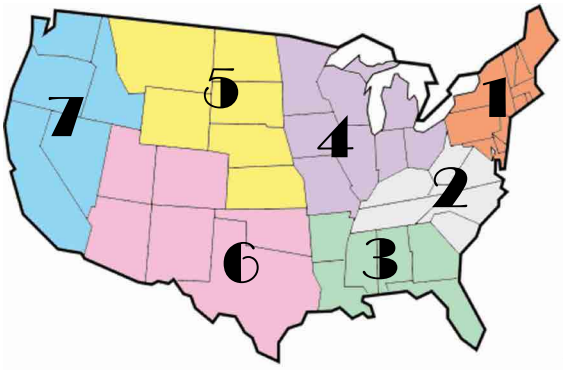
Follow Randy Oliver's discussion of every aspect of honey bee nutrition from best diets, how, when and how much to feed, and feeding in preparation for pollination events, wintering, dearth and everything inbetween. Nutrition has become the least understood aspect of producing healthy bees. Fix that here.

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

Next, listen in as John Miller and a select group of commercial beekeepers who are in the business of serious honey production share their secrets, their skills and even their mistakes so that they consistently make as much honey as their bees can, every year. And now so will you.

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

JANUARY – REGIONAL HONEY PRICE REPORT



Keeping Bees Healthy And Well Fed

For reasons not well understood, there continues to be controversy about medicating and feeding a colony of honey bees. Presented here is eight years data following these trends from our reporter's monthly survey each January. It's the center column you want to look at…the Never Have, Never Will column. But that data is balanced by the information in the 'Only If Needed' column, which seems a prudent approach to keeping bees healthy. If the numbers in the Never column go down, it would appear that treating, for instance for Nosema, is becoming more regular, yet the Every Year number doesn't support that. Rather, the treat as needed number increased this year, indicating that our reporters are becoming more flexible when necessary. A fixed regime seldom works all the time.

Feeding HFCS however, breaks this mold. Every year is up, never have is up and only when necessary is up. We can't figure that one out at all. What is heartening however, is that protein feeding is being recognized for the necessity it is. Every year is up, never is down, and when necessary is up. That is good news for the bees, but speaks loudly for the need of more forage.

The use of organic acids (actually, only formic acid is registered, but rumor has it that oxalic is almost here as a legal, safe and effective control), is up on every year, down on never and up on when necessary. This is a healthy and sane approach it is believed, right is step with the large increase in those who never use hard chemical *Varroa* controls.

And finally, the number of reporters using small cell as a *Varroa* control has shrunk to the near negative numbers – reporters and most rational beekeepers – so we have removed it as a viable alternative for *Varroa* control.

Percent Using . . .	Every Year Needed Or Not								Never Have, Never Will								Only If Needed							
Medication	08	09	10	11	12	13	14	15	08	09	10	11	12	13	14	15	08	09	10	11	12	13	14	15
Nosema - Fumigillan	17	34	32	39	34	21	30	26	14	13	13	10	14	8	18	14	54	52	54	51	52	40	43	60
AFB Treatment	45	31	37	20	37	18	30	29	14	14	11	9	15	8	11	11	42	56	52	70	51	47	55	60
Feeding Carbs																								
Sucrose	24	37	42	29	20	21	21	13	11	12	14	20	39	6	18	16	35	51	43	51	41	30	38	42
HFCS	20	18	28	15	12	9	9	21	24	46	44	51	56	25	36	44	18	36	28	23	34	18	25	36
Blend	8	15	17	9	8	4	9	16	24	59	58	60	68	30	38	51	15	27	24	31	38	9	4	32
Honey	–	–	–	–	–	–	13	20	–	–	–	–	–	–	21	33	–	–	–	–	–	–	38	47
Other - Fondant, etc.	8	18	19	23	17	11	12	47	17	44	34	26	21	9	16	17	20	38	47	51	53	33	40	30
Adding Feeding Stimulant	–	–	27	22	31	13	27	43	–	–	38	38	33	16	14	15	–	–	34	41	35	22	32	42
Feeding Protein																								
Commercial Substitutes	15	27	48	47	44	26	38	51	60	40	22	20	21	17	20	10	25	35	30	33	36	21	30	39
Pollen	–	18	18	12	7	9	5	15	–	61	44	50	63	21	29	53	–	21	38	38	30	14	20	32
IPM																								
Oganic Acids, *Varroa*	18	23	23	23	20	15	23	38	42	44	40	45	47	20	23	20	38	33	37	32	33	19	27	42
Registered Chem. Treatments	57	37	6	8	18	17	5	6	14	14	34	32	41	19	48	65	32	49	28	59	41	19	16	24
Drone Comb Removal	31	22	17	23	15	11	16	29	38	43	30	33	37	14	27	35	31	34	52	45	46	20	38	37
Essential Oil Treatments	–	22	29	20	26	13	32	33	–	43	27	23	30	21	14	29	–	27	51	37	44	23	29	38
Old Comb Removal	34	40	57	43	42	30	60	60	–	17	4	9	7	7	2	4	66	42	39	49	52	20	39	35
Screened Bottom Boards	–	50	42	42	43	30	39	62	–	30	27	31	39	11	29	27	–	26	27	27	17	11	14	11
Small Hive Beetle Traps	–	–	13	3	15	17	25	23	–	–	44	47	46	16	23	29	–	–	42	50	38	18	25	48

All categories DO NOT total 100% because all reporters did not answer all questions.

REPORTING REGIONS	1	2	3	4	5	6	7	SUMMARY Range	Avg.	$/lb	History Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.25	1.93	2.28	2.39	2.25	2.19	2.35	1.80-2.80	2.24	2.24	2.27	2.13
55 Gal. Drum, Ambr	2.00	1.86	2.08	2.40	2.16	2.07	2.25	1.60-2.74	2.15	2.15	2.14	2.04
60# Light (retail)	206.29	206.67	178.75	196.60	171.00	182.75	245.00	150.00-300.00	199.96	3.33	190.09	175.88
60# Amber (retail)	212.00	199.00	177.50	191.20	205.67	165.00	265.00	150.00-275.00	198.83	3.31	191.15	175.52
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	84.21	84.50	78.00	58.50	51.84	88.80	100.00	48.00-104.40	80.25	6.69	75.69	67.46
1# 24/case	122.87	95.00	111.24	97.80	106.32	109.60	144.80	42.00-172.80	116.53	4.86	113.61	101.25
2# 12/case	112.29	90.00	94.68	92.16	97.44	100.80	112.00	72.00-144.00	103.48	4.31	101.40	96.81
12.oz. Plas. 24/cs	101.04	82.67	86.40	82.28	74.40	108.00	103.35	64.80-134.40	93.77	5.21	86.78	84.93
5# 6/case	129.60	95.00	126.00	104.40	102.30	105.60	125.00	84.00-175.00	118.02	3.93	116.40	103.40
Quarts 12/case	169.81	122.67	117.88	144.60	125.64	135.30	141.00	84.00-202.80	134.84	3.75	130.63	125.31
Pints 12/case	96.15	85.88	65.80	138.00	89.04	73.20	95.33	48.00-138.00	85.08	4.73	85.06	82.72
RETAIL SHELF PRICES												
1/2#	4.72	4.12	3.50	3.38	3.03	3.40	6.00	2.25-7.25	4.16	8.33	4.08	3.78
12 oz. Plastic	5.98	4.91	4.88	4.90	4.01	6.06	7.05	3.50-8.99	5.45	7.26	5.18	4.77
1# Glass/Plastic	7.26	6.75	6.69	5.62	6.15	6.44	9.66	4.30-10.99	6.91	6.91	6.52	6.22
2# Glass/Plastic	12.77	12.00	10.14	10.56	10.23	9.26	16.00	7.29-18.00	11.60	5.80	10.75	10.40
Pint	10.61	8.62	7.00	21.00	8.17	9.25	12.13	4.00-21.00	9.51	6.34	10.02	8.50
Quart	16.31	14.25	12.58	18.17	15.66	15.30	17.60	7.00-25.50	15.24	5.08	16.24	13.84
5# Glass/Plastic	26.92	23.10	25.56	22.58	23.89	19.55	30.00	14.89-38.00	24.68	4.94	23.72	22.84
1# Cream	8.75	7.90	8.80	8.92	7.22	9.50	9.00	6.00-12.00	8.61	8.61	7.91	7.59
1# Cut Comb	10.57	9.00	6.50	7.13	8.50	9.50	14.50	4.50-15.00	9.47	9.47	9.21	8.85
Ross Round	8.33	6.25	8.38	10.00	8.38	9.25	8.38	5.00-12.00	8.25	11.00	7.26	7.59
Wholesale Wax (Lt)	7.15	5.08	4.80	5.98	6.00	4.00	4.95	3.20-10.00	5.81	-	5.59	5.22
Wholesale Wax (Dk)	6.34	4.73	3.66	6.10	5.01	2.83	4.50	2.00-8.00	5.03	-	5.14	4.49
Pollination Fee/Col.	94.63	63.25	53.75	66.00	80.00	129.00	105.00	30.00-185.00	81.78	-	76.00	77.51

INNER COVER

There are few things I enjoy more than attending a beekeeper's meeting. It's a place where everybody thinks like I do, likes mostly the things I do, gets the same jokes, has the same problems, and has mostly the same aches and pains I do for the same reasons. I'm pretty much at home when I'm sitting with a bunch of folks who deal with live, venomous, stinging insects on a routine basis, and enjoy the job as much as I do.

You know the conversations that go on, some in the halls, some at the bar, some with the guy sitting next to you that you didn't know until a few minutes ago…how many, how much, lost any, did'ja read, what'r the latest prices and costs, heard about that new supplier and more new rules and it's all about next season. They're all different, but they are all so much the same.

Some, those newest to the mix tend to stay on the edge, just listening, thinking what could I add to the noise that anybody'd be interested in. You can see them over there, maybe two or three or five or six all thinking the same thing, feeling a bit left out but soakin' it all in, just soakin' it all in. But the urge to ask just one of the million questions they have shows in every move they make…where they are, how they stand, how long to get back in the room, how many vendors they visit and twist arms with about which is best and how to do it right this time. And lookin' and touchin'. One of them points to the old guy in the middle of a bunch of other old guys… all graying, dressed kind of nice for a beekeeper's meeting, maybe cowboy boots and a sport coat, kind of a weathered face from decades outside and gnarled hands from a million stings and long hours workin' bees, ridin' the truck and the 'cat, and sortin' and stackin' and kickin' and swearin'.

At the higher-up meetings there's usually several of those old guys. All told they've got centuries of experience, thousands of miles, most with more good years than bad, tons and tons and tons of honey, years away from homes far away…and one good man back at the warehouse who keeps everything in shape…in the shadows. He may be a veteran, a long-timer with bees of his own, almost as much experience as the boss but not quite the risk or responsibility. Still, he suffers as much when things go bad even when he's not the reason, and doesn't quite get the same rewards when things go right. Maybe he's family - a son, brother or nephew who grew up in the business with a knack for the bees or trucks or people and likes those more than the meetings and socializing. But even a family guy gets similar rewards…good, but not the best.

A good friend, one of those old guys, once said that it's always good to see the top bees at a meeting, but too seldom do you see the guy who's mostly always back home keepin' it all together, most all of the time. And who needs to know what's going on at the meetings? The old guy? Or the guy makin' it work…

*

I don't know how much you use the Monthly Honey Report we put out each month. If you're a regular reader you noticed that it changed this month. Change comes slow to our honey report. In over 40 years we've only changed the map twice from the original.

Back in March of '86, when I started, we had nine regions (and had had that many for decades) but when I got here there were not enough reporters to fill all the prices in every region every month, so sometimes there were gaps. We fixed that in a hurry by enlisting many more reporters in every region so that now there is always data for every product in every region. You should be impressed that there are several reporters in every region that produce Ross Rounds or sell pints of honey. You should be more impressed that these good folks do all this work every month for only a free subscription. Thank you again good people.

In May that same year we started doing a bit of analysis for each product by offering the range – from lowest to highest across all regions – of prices for every product plus the average price of each product across all prices for all regions. You may think that's not especially useful, but that 'average' price is the single best predictor of how that particular commodity is doing over time. The biggest value of our report is the 'trends' you see over time as opposed to the exact price each month in any one region. Is the price going up, down or remaining about the same? Watching that will tell you much about the honey market in general. And, watching those trends in your particular region will tell you the same, but a bit closer to home.

Another way we make it easy to watch those trends is to provide historical data each month for every product, which began in February of 1990. We were already providing the 'average' price of that product for the current month, but then we added the 'average' price of the product from the previous month, and from the same month from the previous year. So for the past 23 years you have been able to get an ongoing picture of what that product is doing in the market place now, last month and last year in one place at the same time. As automated

Old Guys.
Honey Report.
Invasives.

as spreadsheets are and databases have become, it still takes about a half day to gather, sort, figure and analyze all that data every month.

In January 1991 we redrew the map after analyzing the prices in every state and finding that the markets were consolidating as fewer suppliers were making contributions to the market, mostly in the Northeast and Southwest. We went from our original nine regions to eight, kept the range and average price analyses columns and settled in. Over the next several years the products we measured changed with the market. We removed the 2.5 pound jar and added quarts and pints at both wholesale and retail prices. For a time we offered a price index by analyzing the prices for every product in a region and developed a weighted average and assigned the region with the highest average a value of 1.0. We then compared every other region to the highest and came up with a percentage figure for each region compared to the highest. We kept that for a bit, but found it to be of little value in the long run so discontinued using it. And there it stayed for quite some time. We added and replaced reporters on a consistent basis making our pricing data more robust and fine tuned. Plus, we do a year end to end comparison so you can see how much things have changed in a 12 month period for every product in every region.

What did change was the survey we sent our reporters each month. Because our reporters, by design, represent a very good cross section of the beekeeper population as a whole – hobby, sideline and commercial, and packers, plus a large enough sample size of each in every region – we feel fairly confident not only about the pricing data we have, but about our survey results when we ask about beekeeping practices, marketing ideas, pest and disease controls, and all the other topics we cover.

Our survey results offer a good overview of what's going on across the nation relative to management and marketing and pricing. So good, in fact, that the National Honey Board uses our data on their web page for prices. And now that the BIP folks have some depth in their data, we are beginning to look at how our reporters, though a much smaller sample size compared to BIPs sample are able to predict certain issues in US beekeeping and honey bee management. Time will tell, but early on we are encouraged by the results.

The next addition to our data was to offer the price per pound column to our chart. Begun just 12 months ago, each commodity has a price per pound value shown that enables you to make a wiser decision on which product to sell. Obviously honey in the barrel offers the least price per pound, while the retail price of half pound and comb honey products offer the most. They both have their respective costs so you can figure out which is the best, easiest and most profitable for your operation. But we give you the numbers you need to do the math. You won't find these figures anywhere else by the way. Just so you know.

And now, another change. Looking at the map this month you'll note there are only seven regions. From nine to eight to seven. This represents again a redesign configured by looking at pricing for every state compared to every adjacent state, using that weighted index we used some time ago. And again, consolidation has resulted in some predictable changes. Even though the geography may seem a bit odd, the honey selling practices and prices are more similar in each region than in other regions, hence the groupings the way they are. It's not perfect, but we are comfortable with the new design.

Even if you don't sell honey we encourage you to review that page every month. There's good beekeeping information offered there by experienced beekeepers from every region, and even more importantly there are good marketing tips and tricks offered there too. Plus, the monthly historical data is valuable so you can see how much things have or haven't changed in your region, and across the country every month.

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So, about the hats. This month we give a 'Tip of the hat' to TSC, the Tractor Supply Company, that sells a lot of our magazines from their magazine racks across the country. We have a TSC store here in Medina and they sell out every month. Go figure. But in recent issues you've seen hats from Boise (ID) State, Maxant, (with a particularly attractive design on the side), Blue Sky Bee Supply with a catchy new logo on the front, and Mann Lake Bee Supply, with a good looking design. But, here's where this is going. There's all manner of attention-getting bee-themed hats out there. From beekeeper associations, businesses, wherever and whatever. We'd like to share your design with the rest of the thousands of *Bee Culture* readers. So here's what we'll do. Send us a photo of your hat, and we'll take a look. We'll pick some and let you know, and then you can send us a (new, please) hat and we'll show it off here. Send the photo to me via email, at **Kim@BeeCulture.com**, and we'll see what we'll see. I already have a collection of nearly 100 hats so we'll be using some of those on occasion too, but for now send us your best work, and Good Luck.

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I've been to California enough to see clearly some of the things that California agriculture must deal with. Specifically, I've been looking at the plant and animal pests and diseases they want to keep out of the state. Greening in the citrus growing area is a good example. That disease has pretty much destroyed the honey/beekeeping marriage of the Florida citrus industry. Finding orange blossom honey is a lot harder today than five years ago and it's added greatly to the cost of growing those crops. And that's just one.

Think fire ants. California has them in some places…from nursery crops mostly I'm told, but they don't want more, that's for sure. And what about yellow starthistle…a wonderful honey crop, but a bane to pastures grazed by cattle. And they don't want small hive beetles, either.

In fact, California so doesn't want so many things they have set up inspection stations at the main border crossing highways to check and make sure nobody brings in anything they don't want. This has proved difficult for trucks carrying beehives on pallets because all

Continued on Page 56

It's Summers Time –

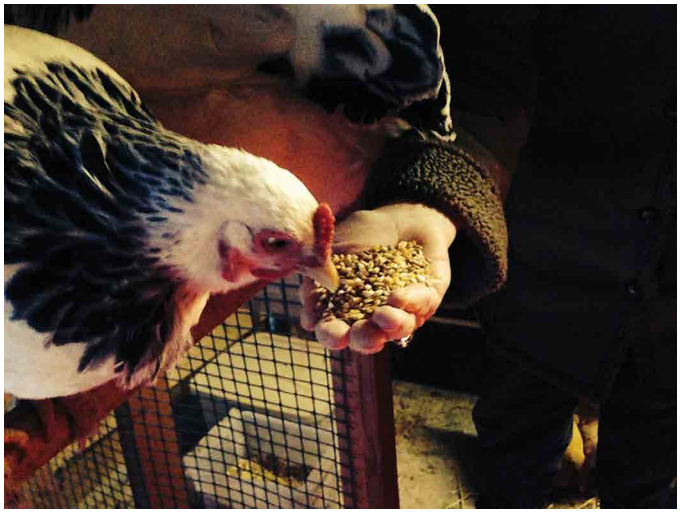
Calendar, Chickens and Winter

If you are one of our regular subscribers you have just received your 2015 Annual *Bee Culture* Calendar. I couldn't remember exactly how long we had been doing this calendar so I searched the back issues and this is the 10th calendar we have done. Over the years we have received thousands of pictures from hundreds of readers. We hope that you have benefitted from the information over the years and enjoyed being a part of it. We certainly have. Over the years we've had lots of themes – honey, beeyards, bees on flowers, queens – it's a different theme every year. Check the back of this year's calendar for the details for the 2016 calendar. If you have some ideas for future calendar themes please pass them along to us. Here's hoping you have a wonderful 2016!

We're in the midst of our third Winter with the chickens. And we are having just as much fun as ever. There are still 11. We haven't lost anyone lately. We've repaired the windows in the coop, cleared out the old straw and put down new, so it's nice and clean for them. We also place several extra bales around the perimeter of the coop for extra warmth. That gives them different places and levels to sit since they spend a lot of time in there in the Winter. We had a few very cold nights in November and it stayed right around 20° at the lowest in the coop. The girls are very happy in there.

Twice a year – Spring and Fall – I do a major purging. I clean out all of the straw that has been accumulating and toss it on the compost pile. A few weeks ago when I was doing this it was a fairly nice Saturday – sun shining so the girls could easily be outside. As I'm cleaning though there are several that wander back in and stand and talk to me, almost like they're saying "What are you doing?" They are so funny. We still have a couple of them that don't really like to be touched or held – but every once in a while I just grab them and hold onto them. They don't really fight me, they just sort of grumble the whole time. We have a cat like that too. She doesn't like it when I pick her up and hug her, just grumbles at me.

This past year we've noticed a great increase of mice in and around the chicken coop. So we started setting traps and decreasing the population. When I was doing my cleaning I unearthed a bunch of mice and now they seem to have relocated.



Have you ever seen a chicken with a mouse? This is a little disturbing but they love to eat them. A chicken can catch a mouse quicker than you can imagine and then they just tear them apart. Who knew? I certainly didn't. But I watched one chicken catch a mouse and then be chased around the pen by her friends trying to take it away from her. I guess if you think about it, it makes sense. They eat worms and bugs and it's all protein and fat. Right?

Here's the plan for the Spring. We're going to get chicks – maybe six or eight – get them through Spring and then get them integrated into the flock. I have a thought that I think will work as far as getting them acquainted safely. From what I've read and been told it can get a little crazy trying to work the younger ones into the existing group. It's kind of like putting that new queen in the beehive – you've got to keep her in that cage for a while or bad things happen. We have a fairly large dog crate from when my son's dog was a puppy and it seems to me that is an easy way to do this – put the 'babies' in the crate and put the crate in the pen. They can all look at each other, smell each other, talk to each other and get used to each other, at the same time keeping the young ones safe. I'll let you know how it goes.

I'm still thinking about the ducks also. I've got a "Raising Ducks" book ordered that I'll read this Winter and make a decision. But what I've read and heard from others so far, it seems that chickens and ducks do quite well together.

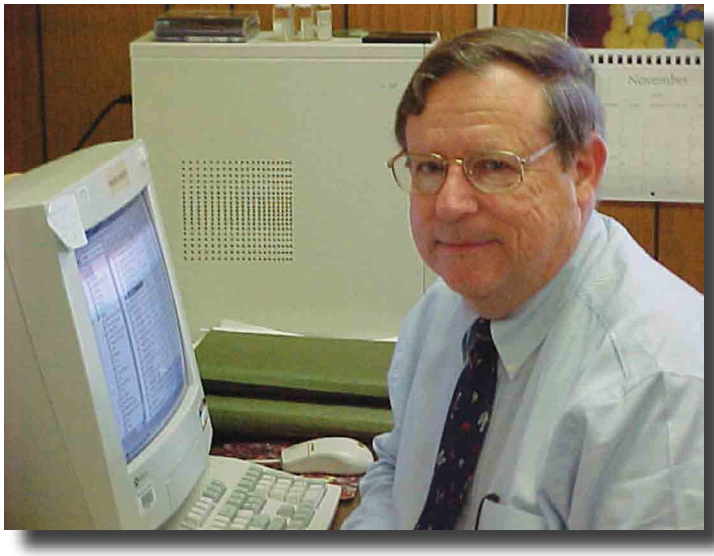
So far – it's mid-December as I write this – Winter has been predictable. Cold, some snow, not too bad yet. But the predictions are for another like last year that just goes on and on. I did the bell ringing for the Salvation Army for a couple of hours this morning and my toes were cold by the time I got done. It's mid-30s and cloudy here today.

My son Matt has been living in California for three years now and he discovered this year that his body has adapted to that climate. He and his brother used to tease their Uncle Tommie about being such a sissy when it came to cold weather. He lives in southern California and when it would hit about 55° he'd be looking for his big coat. Matt says now he's that guy too. It was down to 40° out there a week or so ago and it was killing him. So he won't be teasing Uncle Tommie anymore.

Kim, Peggy and I will be heading to southern California in January (pray for good flying weather) to the two big meetings – American Honey Producers and American Beekeeping Federation. Hope to see some of you there. It's January in southern California. How much better can it be. Plus, I'll get to see my brother and his wife.

Here's one last wish for a Merry Christmas and a very Happy New Year.

Happy Summers



A Closer LOOK

SALIVARY GLANDS

Clarence **Collison**

Salivary glands are involved in digestion,cleaning, softening foods, metabolism, growth, labor transition, brood pheromone and hormone regulation, saliva synthesis and even silk production.

Honey bee salivary glands are important exocrine glands (chemical products are secreted to the body exterior). Salivary glands, also known as labial glands, are composed of two parts, the cephalic salivary glands or post-cerebral glands located in the head behind the brain and the thoracic salivary glands in the ventral part of the thorax, all of which connect through a common duct to the mouth (Figure 1). The two pairs of salivary glands open into a narrow sac or salivarium behind the posterior flange of the hypopharynx, by means of the common duct (Goodman 2003) (Figure 2). The adult cephalic and thoracic salivary glands begin to develop during the pupal period and progressively increase in size from the newly emerged workers to foragers, reaching their maximal size when the workers begin to forage (Katzav-Gozansky et al. 2001). Thoracic salivary glands are large in queens and workers and small in drones. Cephalic salivary glands are also large in queens and workers but vestigial in drones. The cephalic glands of queens increase in activity when they start egg laying.

In the worker each head gland consists of a loosely arranged mass of small pear-shaped bodies with individual ducts that unite irregularly with each other and eventually come together in a single duct that joins the common median duct from the thoracic glands (Figure 2D). Each thoracic gland consists of a mass of many-branched glandular tubules opening into short collecting ducts that unite in several major ducts which end in a sac-like reservoir at the anterior end of the gland (Figure 2E). The final outlet duct proceeds forward from the reservoir and is joined by the ducts from the glands in the back of the head (Snodgrass 1956).

The thoracic and cephalic salivary glands differ in protein expression, producing different kinds of secretions that have different functions, even though they have a common embryonic origin and excretory duct (Poiani and Cruz-Landim 2010). The secretion of the thoracic salivary gland is an aqueous solution of digestive enzymes that are involved in honey and sugar digestion as well as pollen and wax moistening (Simpson 1960, 1963). The adult cephalic salivary gland produces an oily substance involved in wax manipulation and mouthpart lubrication (Simpson et al. 1968). Salivary glands show a gradual increase in activity until their production peaks at about 15-25 days, after which they rapidly decline with the shift to guarding and foraging activities (Winston 1987).

Worker honey bees dissolve dry sugar, clean their queen's body, and possibly also soften or lubricate materials being chewed, with the watery secretion of their labial glands. The small amount of oil produced by these glands accumulates in them and what little is discharged adheres to the tongue hairs and is not mixed with the food; its function is obscure (Simpson 1960).

The thoracic gland of the worker, the largest exocrine gland of the honey bee, was investigated by dissection, light microscopy, scanning and transmission electron microscopy (Schönitzer and Seifert 1990). The glands are paired and each lateral half consists of two parts, a smaller external and a larger internal lobe. The lobes are composed of densely packed secretory tubes and ducts, the tubes of which often show ramifications. A reservoir is packed within the anterior medial part of the gland. The secretory tubes are composed of two types of cells, secretory cells, which are most

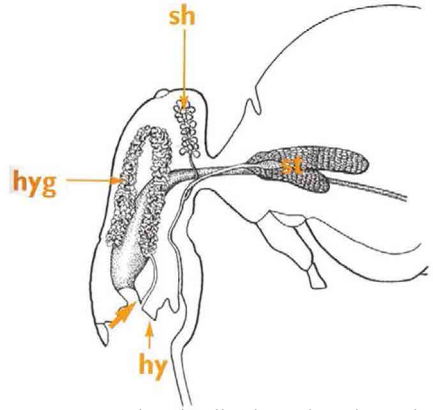


***Figure 1**. A longitudinal section through the head of a worker showing the position of the hypopharyngeal glands (hyg) and the post-cerebral salivary glands (sh) and thoracic salivary glands (st). Hypopharynx (hy). (Goodman 2003).*

frequent, and parietal cells. Secretory cells are characterized by a basal labyrinth (an intricate structure of interconnecting passages), abundant rough endoplasmic reticulum, dark secretory vesicles, light vesicles of different sizes, and apical microvilli (microscopic cellular membrane protrusions that increase the surface area of cells). Parietal cells are smaller and have a characteristically lobed nucleus and no secretory vesicles. Between the cells there are intercellular canaliculi (a narrow canal or tubular passage). In the center of each tube there is an extracellular space with a central cuticular channel. The abundance of rough endoplasmic reticulum and the rare occurrence of smooth endoplasmic reticulum implies a saliva with proteins but rarely with pheromones. Between the secretory tubes there are frequently neuronal profiles which are partly in contact with the secretory cells. Thus, they demonstrate that this gland is controlled by the nervous system, in contrast to findings of previous investigators. The axonal endings contain dark neurosecretory vesicles as well as light synaptic vesicles. Large parts of the glands are surrounded by a thin tissue sheath which has a smooth surface towards the secretory tubes and shows irregular protrusions towards the outer side. This sheath is considered to be a tracheal air sac, and due to its large extension is probably of importance for the hemolymph flow through the thorax.

Fujita et al. (2010) performed a proteomic analysis of the honey bee salivary system. Although most (31-35) of the major proteins from the post-cerebral gland and thoracic gland were housekeeping proteins, the spot intensities for aldolase (enzyme that helps break down certain sugars to produce energy) and cetyl-CoA acyltransferase 2 (enzyme involved with fat metabolism) were stronger in the post-cerebral salivary glands than in the thoracic glands in the 2-dimensional gel electrophoresis. Immunoblotting confirmed that the expression of these proteins was stronger in the post-cerebral than in the thoracic glands, whereas expression was almost not detectable in the hypopharyngeal gland, suggesting that carbohydrate metabolism is enhanced in the post-cerebral salivary gland. In addition, imaginal disc growth factor 4 (IDGF4) was synthesized in the honey bee salivary system. Immunoblotting indicated IDGF4 expression was very strong in the post-cerebral gland, moderate in the thoracic gland and very weak in the hypopharyngeal gland. A considerable amount of IDGF4 was detected in royal jelly, while less was detected in honey, strongly suggesting that the salivary system secretes IDGF4 into royal jelly and honey. This growth factor might therefore affect the growth and physiology of the other colony members.

The molecular basis of how salivary glands fulfill their biological duty is not fully understood. Proteomics and phosphoproteomics of cephalic salivary glands and thoracic salivary glands were compared between normal and single-cohort honey bee colonies. Single-cohort colonies are artificially established colonies that are composed entirely of the same aged young bees, without appropriate aged nurses and foragers. This allows one to investigate the functional flexibility of salivary glands of workers by comparison with the same aged workers of their parent colonies (normal colonies). Of 113 and 64 differentially regulated proteins and phosphoproteins, 86 and 33 were identified, respectively. The salivary glands require a wide spectrum of proteins to support their multifaceted functions and ensure normal social management of the colony. Changes of protein expression and phosphoproteins are key role players (Feng et al. 2013). The post-cerebral salivary gland triggers labor transition from in-hive work to foraging activities via the regulation of juvenile hormone and ethyl oleate levels. The stronger expression of proteins involved in carbohydrate and energy metabolism, protein folding, protein metabolism, cellular homeostasis and cytoskeleton in the thoracic salivary gland, supports the gland to efficiently enhance honey processing by synthesis and secretion of saliva into nectar.

The salivary secretions of adult females are functionally different from larvae. In the honey bee larva, the post-cerebral salivary glands are not yet developed. The thoracic salivary glands are represented by a pair of long, slender, tubes extending back to the sixth abdominal segment, which are also the larval silk glands (Snodgrass 1956). The silk glands run a convoluted course through the body beneath the gut and above the nerve cord and join together in the head to open at the spinneret situated on the combined labium

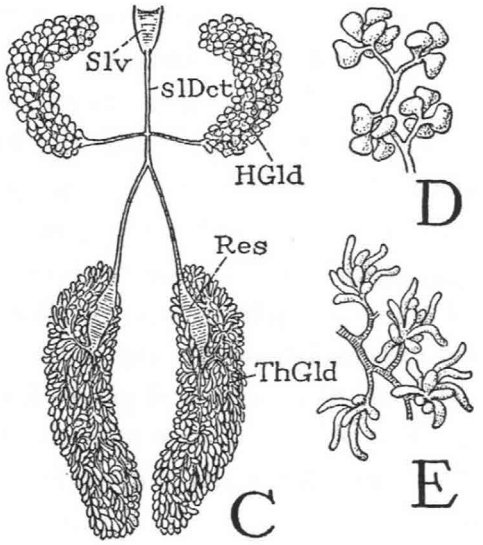


Figure 2*- Salivary gland system of adult worker honey bees. Head or post-cerebral salivary glands (HGld), thoracic salivary glands, common salivary duct (slDct), salivarium (Slv), thoracic salivary gland reservoir (Res). D, detail of head gland. E. detail of thoracic gland. (Snodgrass 1956).*

and hypopharynx (Figure 3). These glands are the forerunners of the thoracic salivary glands of the adult, into which they develop during pupal metamorphosis (Morse and Hooper 1985). The silk glands of the bee larva attain their highest development just at the time the larva is ready to spin its cocoon. When finished, the glands rapidly degenerate during the first part of the pupal period: the cells lose their outlines and become irregular masses of vacuolated protoplasm, in which the nuclei break up into fragments that quickly degenerate (Snodgrass 1956).

In the salivary glands of the larval honey bee, silk is produced in the 5th larval instar (developmental stage between each molt) (Silva-Zacarin et al. 2007). According to Silva and Silva de Moraes (2002) and Silva-Zacarin et al. (2003), at the beginning of the 5th instar, the salivary gland lumen (inside space of a tubular structure) is filled with a homogeneous secretion that is synthesized before silk production. In the mid-5th instar, these glands produce silk proteins that are released from the secretory cells as a homogeneous substance, which subsequently polymerizes in the lumen to form silk fibrils. By the end of the 5th instar, the gland lumen is filled with a compact fibrillar secretion. When the silk is released to spin the cocoon at the end of the 5th instar, the secretion that remains

in the lumen loses its compaction and its macromolecular organization. Ultrastructural analysis of the larval salivary glands has revealed that after the peak of protein synthesis, the secretory portion of the gland undergoes histolysis (the breaking down of tissues) following construction of the cocoon, within the larva during metamorphosis.

Le Conte et al. (2006) found that the larval salivary glands (silk glands) have at least one additional function prior to silk production; the release of a brood pheromone composed of 10 fatty acid esters. This study showed that the salivary glands of the larvae can be considered the reservoir for the fatty acid esters that constitute brood pheromone. A blend of ten fatty acid methyl and ethyl esters produced by larvae have been shown to possess pheromone releaser effects, like the capping of the cells (Le Conte et al. 1994), and the recognition of the larval age and needs (Slessor et al. 2005). The esters also have primer effects stimulating hypopharyngeal glands of nurses (Mohammedi et al. 1996) or inhibiting ovary development of the workers (Mohammedi et al. 1998). The full blend of 10 esters (brood pheromone), modulates the behavioral development of young bees and stimulates workers for pollen foraging (Slessor et al. 2005).

No traces of esters were detected on the posterior part of the larvae. They were detected only in cuticular rinses of the anterior section of the larvae. Sections of the larval mouthparts of the head contained traces of the esters suggesting that ester secretion occurs at or near the mouthparts. The digestive tract and the salivary glands are the only two structures known to be connected to the mouth of the larvae. No esters were detected in extracts of the digestive tract. The salivary gland extracts contained significantly more ethyl and methyl esters than extracts from the rest of the larval body. The total amount of esters per larva was significantly different in the salivary glands (321±87 ng) compared to the rest of the larvae (87±23 ng). Dissection of larvae has revealed that the salivary gland is the reservoir for the brood pheromone esters (Leconte et al. 2006). BC

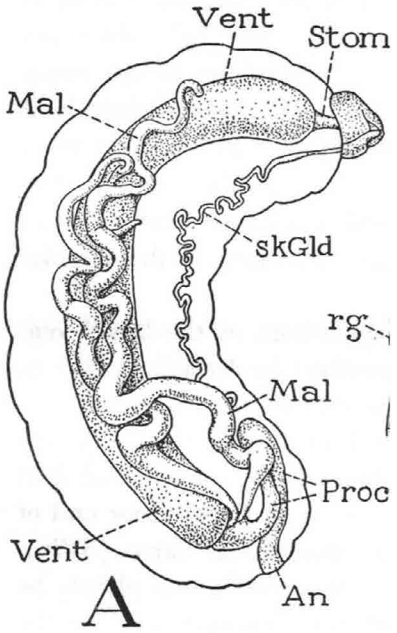


Figure 3 *- Alimentary canal of the honey bee larva. Silk Gland (Salivary Gland) (skGld), Malpighian tubules, proctodaeum (Proc), ventriculus (Vent), stomodaeum (Stom) and anus (An). (Snodgrass 1956).*

References

Feng, M., Y. Fang, B. Han, L. Zhang, X. Lu and J. Li 2013. *Novel aspects of understanding molecular working mechanisms of salivary glands of worker honey bees* (Apis mellifera) *investigated by proteomics and phosphoproteomics.* J. Proteomics 87: 1-15.

Fujita, T., H. Hiroko-Hata, Y. Uno, K. Nishikon, M. Morioka, M. Oyana and T. Kubo 2010. *Functional analysis of the honeybee* (Apis mellifera *L*) *salivary system using proteomics.* Biochem. Biophys. Res. Commun. 397: 740-744.

Goodman, L. 2003. *Form and Function in the Honey Bee.* International Bee Research Association, Cardiff, UK, 220 pp.

Katzav-Gozansky, T., V. Soroker, A. Ionescu, G.E. Robinson and A. Hefetz 2001. *Task-related chemical analysis of labial gland volatile secretion in worker honeybees* (Apis mellifera ligustica). J. Chem. Ecol. 27: 919-926.

Le Conte, Y., L. Sreng and J. Trouiller 1994. *The recognition of larvae by worker honeybees.* Naturwissenschaften 81: 462-465.

Le Conte, Y., J-M. Becard, G. Costagliola, G. de Vaublanc, M. El Maataoui, D. Crauser, E. Plettner and K. N. Slessor 2006. *Larval salivary glands are a source of primer and releaser pheromone in honey bee* (Apis mellifera *L.*) Naturwissenschaften 93: 237-241.

Mohammedi, A., D. Crauser, A. Paris and Y. Le Conte 1996. *Effect of a brood pheromone on honeybee hypopharyngeal glands.* C.R. Acad. Sci. III 319: 769-772.

Mohammedi, A., A. Paris. D. Crauser and Y. Le Conte 1998. *Effect of aliphatic esters on ovary development of queenless bees* (Apis mellifera *L.*). Naturwissenschaften 85: 455-458.

Morse, R.A. and T. Hooper 1985. *Larva In: The Illustrated Encyclopedia Of Beekeeping.* E.P. Dutton, New York, pp. 233-235.

Poiani, S.B. and C. Cruz-Landim 2010. *Morpological changes in the cephalic salivary glands of females and males of* Apis mellifera *and* Scaptotrigona postica (Hymenoptera, Apidae). J. Biosci. 35: 249-255.

Schönitzer, K. and P. Seifert 1990. *Anatomy and ultrastructure of the salivary gland in the thorax of the honeybee worker,* Apis mellifera (Insecta, Hymenoptera). Zoomorphology 109: 211-222.

Silva, E.C.M. and R.L.M. Silva de Moraes 2002. *Cell and secretion functional differentiation of* Apis mellifera *silk glands.* Naturalia 27: 29-45.

Silva-Zacarin, E.C.M., R.L.M. Silva de Moraes and S.R. Taboga 2003. *Silk formation mechanisms in the larval salivary glands of* Apis mellifera (Hymenoptera: Apidae). J. Biosci. 28: 753-764.

Silva-Zacarin, E.C.M., G.A. Tomaino, M.R. Brocheto-Braga, S.R. Taboga and R.L.M. Silva de Moraes 2007. *Programmed cell death in the larval salivary glands of* Apis mellifera (Hymenoptera: Apidae). J. Biosci. 32: 309-328.

Simpson, J. 1960. *The functions of the salivary glands of* Apis mellifera. J. Insect Physiol. 4: 107-121.

Simpson, J. 1963. *The source of the saliva honeybees use to moisten materials they chew with their mandibles.* J. Apic. Res. 2: 115-116.

Simpson, J., I.B.M. Riedel and N. Wilding 1968. *Invertase in the hypopharyngeal gland of the honeybee.* J. Apic. Res. 7: 29-36.

Slessor, K.N., M.L. Winston and Y. Le Conte 2005. *Pheromone communication in the honeybee* (Apis mellifera *L.*). J. Chem. Ecol. 31: 2731-2745.

Snodgrass, R.E. 1956. *Anatomy Of The Honey Bee,* Comstock Publ. Assoc., Ithaca, NY, 2nd ed.

Winston, M.L. 1987. *The Biology Of The Honey Bee.* Harvard University Press, Cambridge, MA, 281 pp.

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Elina Niño

New U.C. Davis Extension Apiarist

M.E.A. **McNeil**

The new staff at the UC Davis Laidlaw Honey Bee Lab includes, left to right, Elina Niño, Extension Apiarist, Doctoral student Cameron jasper, Staff Research Associates Billy Synk and Bernardo Niño. photo by Maria Tuccori

The quest started years ago, when Eric Mussen began to contemplate retiring from his job as the only fulltime extension apiarist west of the Rocky Mountains. But it was not a job search; it was a struggle to keep the job itself. The breadth and importance of Mussen's work was widely appreciated; the danger of his position disappearing was just as widely dreaded. Everywhere in the country extension programs were being gutted, if not snuffed. The decision makers at U.C. Davis were faced with making heavy budget cuts, and extension was on the chopping block.

California is the state with the largest beekeeping industry, where more than 50 varieties of orchard and field crops as well as seed crops are being pollinated, where most of the Mainland queens are bred, where large numbers of the nation's migratory hives come for almond pollination, and where commercial beekeepers are outnumbered by backyard beekeepers. California once had an expanded apiary program that included bee inspectors: Mussen was the last full-time person directly serving beekeepers, a "one man show", as bee broker Joe Traynor respectfully described him.

A typical month for Mussen could include a university lecture, media interviews, science editing, technical assistance to commercial beekeepers, participation in studies, review of scientific literature for a bimonthly newsletter, talks to beekeeping groups from local to regional, evaluations and recommendations for pesticide labeling, and fielding calls from the public – like the man covered in bees who turned out to be on a bad meth trip. The State could use a platoon to do his job. Yet with Mussen going, it looked like his appointment would go too.

"If it made sense to have an extension specialist in bees, this would be the place," Mussen said, when he was faced with the potential demise of his job. "Our state produces half of the queens and bulk bees sold to the rest of the beekeepers in the U.S. Practically all the commercial bees on wheels have to be out here for almonds. I can write all that down, but it doesn't matter."

As he approached the end of his career, it helped that Mussen was landing on his feet, after 38 years of negotiating wildly diverse interests. A flood of letters arrived at Davis in support of preserving his role from every enterprise that had been touched by his work – from those managing vast apiaries, breeding queens, doing research or keeping a couple of hives in a backyard.

What helped preserve the position in the end was that response, its volume and its diversity. And it is that diversity, so often at odds with itself with passionate discourtesy, which makes the job so difficult. It attracted a wide pool of well-qualified applicants. At first glance, some stakeholders blinked when the choice for that tough gig turned out to be an amiable young woman just finished with her post-doc work and expecting her first child. But the typically undemonstrative Eric Mussen could not have been more delighted with the choice of Elina Lastro Niño.

Smiles could well have rippled through the labs of female entomologists nearing the end of their careers; they have lived through a seismic shift in the attitudes that once permeated their field. The Cornell bee program, in their memories, did not admit women, and their own positions were hard to come by. Diana Sammataro, recently retired from the USDA, once remarked, "What did they think, that we couldn't lift a bug?"

That, it seems, is history. Niño's credentials are what matter. "Elina is a very accomplished scientist," said Mussen, who is guiding her smooth and informed transition into his role in the Davis Department of Entomology and Nematology.[1]

The two turn out to share an uncanny similarity of character: It is not easy to put a finger on it, but each has what could best be described as an implacable core. Mussen, who gets along with about everyone, came by the skill as a child, when his father and brother talked politics. "We had ultra-right versus ultra-left at the dinner table. I couldn't side with either of them – I respect people's opinions. I'm not telling anybody they are right or wrong. I am happy to talk about consequences of decisions they make."

If a verbal fracas was enough to forage Mussen's central anchor, consider that Niño grew up in Bosnia-Herzegovina, a small nation where conflict raged with gun battles in the streets, sabotage, and retribution against sympathizers of rivals. The area, between Croatia and Serbia, has been disputed since the 14th century: In the 1992-95 conflict, over 100,000 died and 1.8 million were displaced. Among the displaced was Niño's family. For their safety, they retreated to their vacation cottage in the country where they had to grow their own food and

Elina Niño, PhD is tne new UC Davis Extension Apiarist, replacing Eric Mussen, sitting on her right. photo by Kathy Keatley Garvey

insulate the house against cold. When Niño was 17, she moved to New York to live with her aunt and uncle. Her parents still live in Bosnia.

Her path to apiary science was guided by mentors that she chose by taking exploratory positions. At Cornell, she initially wanted to become a vet and got a BS in Animal Science. Work with two veterinarians changed her mind because she found the days repetitive. "I like a variety of things to work on," she said.

In looking for a more challenging goal, she said "It sounds a little silly, but at the time I was watching forensic shows on television, CSI type stuff, and I said hey, I want to be a forensic scientist." Her advisor at Cornell suggested the emerging science of forensic entomology. "I thought, "What does entomology have to do with forensics?" A lifetime of investigation, she soon learned.

As an undergraduate, she worked in the lab of veterinary entomologist Phil Kaufman. "That was pretty much it, I was hooked! You get to study bugs, and it's actually applied, and it's useful for agriculture." She worked on studies in poultry houses, pig farms, and dairy farms on darkling beetles, mosquito collection, and flies.

"Both times before I started a graduate degree, my Masters and my PhD, I worked with the [professor] for some time before starting the program. I think that is a good thing for students to do," she said. She was directed to the graduate program of Wes Watson in veterinary entomology at North Carolina State University, where she worked in his lab and did applied research for her Master's degree: She examined the effects of an insect growth regulator on dung beetles, which are useful in recycling the nutrients from manure back into the soil.

"It was a great experience," she said. It stimulated her curiosity; but to dig deeper, she realized that she would have to go beyond applied research to underlying basic research – down to the molecular level. Once again, she chose a mentor – Christina Grozinger who was at NCSU at the time. Grozinger was working on the genomics of chemical communication in honey bees as well as collaborating with David Tarpy on understanding honey bee queen post-mating changes. "I was hooked once again," she said. "I thought, 'Bees are awesome, this is what I want to be doing'."

When Grozinger went to Penn State University, Niño followed her mentor to finish her doctoral work. "It was the spring of 2007, right after the whole CCD thing was identified. It was the beginning of a great honey bee hub".

Niño's doctoral research can prove important in her work at Davis. She studied queen bees, which she described as "egg-laying, pheromone-producing machines" whose pheromones regulate the social organization of the hive. Although it was known that social context in the colony regulates social behavior, little work had been done on the genes involved.

In her research, she examined a chain of events: post-mating changes in queens, their effects on worker behavior and physiology, and how they alter colony social organization which can, in turn, influence colony productivity and survival.

It's a relevant pursuit. As late as 1996, Mussen reported in his newsletter, "From The UC Apiaries" that requeening every two to three years was adequate. But by 1998, he reported a 30% annual turnover in queens, and he continued to follow a downward trend, with yearly requeening for some beginning to seem like the good old days.

Niño's credentials are what matter. "Elina is a very accomplished scientist," said Mussen, who is guiding her smooth and informed transition into his role in the Davis Department of Entomology and Nematology.

"Knowledge of the fine details of reproductive processes can be harnessed to improve queen quality to extend their longevity and productivity and therefore the productivity of the entire colony," wrote Niño in the September/October UC newsletter.[2] At Penn State she had begun to assemble clues to how that might come about. She studied changes in mated queens on different levels as they reached ovary activation – behavioral, physiological, and molecular -- in order to understand the interrelationships of flight behavior, pheromone changes and gene expression. She examined various possible influences on these post-mating changes: oviduct manipulation that mimics natural mating, volume of semen, and insemination substances as well as instrumental insemination anesthesia with carbon dioxide (CO_2).

The results helped define some pieces of the puzzle. At the gene level, oviduct manipulation triggered greater changes in brain gene expression, while insemination substance and volume produced differences in the gene expression of the fat body, a place where egg-yolk proteins and proteins involved in immunity are synthesized. With instrumental insemination, CO_2 caused queens to stop attempting mating flights and prompted egg production.

Niño and her colleagues also studied queen mandibular gland pheromone, which mediates reproductive dominance of queens – its absence prompting the activation of worker ovaries. They found that physical manipulation, insemination substance and volume have long lasting effects on queen mandibular pheromone profiles. They used microarrays to examine genome-wide expression patterns in the queen mandibular glands of virgin and mated queens, as well as queenright and queenless workers with or without activated ovaries. They found approximately 2554 transcripts differentially expressed among these groups, and determined that caste and social context were the main regulators of gene expression patterns, which, in turn, shape social environment. Workers were found to be sensitive enough to these differences to form a greater retinue around slides smeared with mandibular gland pheromone in paired samples: semen vs saline and high vs low volume insemination.

They also found that instrumental insemination triggers changes in Dufour's gland, presumably signaling a queen's mating status. In addition, they uncovered genes that help explain disparate biosynthetic pathways for queens and workers as well as other genes that suggest that the queen mandibular gland has broader functions than pheromone biosynthesis.

Niño investigated another aspect of queen fecundity as a USDA-NIFA-AFRI post-doctoral fellow at Penn State. She used evolutionary and functional genomics to conduct further investigations into which specific seminal fluid components are involved in regulating which specific changes in mated queens.

She credits Grozinger for actively supporting her research. For example, she sent Niño to a conference in Israel to confer with international researchers – particularly to understand how to model her honey bee work on what had been developed in Drosophila (fruit flies). Understanding the seminal fluid in fruit flies makes it possible to silence genes so that pests cannot reproduce, but Niño had another purpose.

"With honey bees, I'm hoping to use what I learned about seminal fluid proteins to improve queen quality," she said. "This is a project in its toddlerhood now, I wouldn't call it infancy anymore. I worked with Christina [Grozinger] and David Tarpy on first characterizing the post-mating changes in queens, starting to parse out specific seminal proteins that might be driving these changes: Changes in pheromone production, changes in gene expression, behavioral changes." Those changes in queens include the cessation of mating flights, initiation of egg laying and the transformation from sexually receptive to non-receptive. "My goal is to start narrowing down potential candidates in the seminal fluid that are driving which behaviors." For now, she sees the possibility of using this knowledge to enhance instrumental insemination. "Down the road I can see it working with naturally mated queens as well."

"What I've learned from my research is that what we have learned about pheromones is not the whole story." She cited the examples of the queen mandibular pheromone and queen retinue pheromone, thought to contain five and nine components respectively. "But when I looked at the pheromones, I found not only five or nine; there were not a limited number of components – a lot more than what we are using." She mentioned one use by beekeepers: queen-presence pheromones used to temporarily stabilize a hive if, for example, it is queenless, making it easier to introduce a new queen. And, she conjectures, there may be other applications for enhancing pollination.

"What difference does it make if you know which proteins are driving which behaviors?" Niño asks. "It's always good to know what you're working with, you want to know what's happening. For example, when we figure out what is going on – it could be any component – we can maybe add it to the insemination process which might boost queen fecundity. This is why basic science is really important. We still really don't know. Fecundity is related to longevity: a queen would not necessarily produce more eggs, but produce eggs for a longer period of time. It's not a heritable trait, so it would not affect her daughters; she would just have more daughters. So if, for example, you are doing a breeding program, and you have a queen with qualities that you want, she could produce more daughters.

Grozinger summed up Niño's findings: "She showed that queens signal their mating status and mating quality to worker bees through their pheromones, and workers preferentially respond to well-mated queens."

For her work at Davis, Niño said, "There are a lot of potential venues for connecting basic research and applied research. A lot of the work that I have been doing so far with queens was basic – genomics, gene aggression, pheromone production – and a lot of more applied studies. You really need basic research to drive live research. It goes hand in hand."

One unforeseen asset to Niño's arrival is the interest Christina Grozinger has shown in creating a consortium with Penn State, Davis, and the University of Illinois.

Niño arrives trailing laurels. Among many: Several prizes for distinguished conference posters including the ESA President's Prize; Outstanding MS Student of the Year from the North Carolina Entomological Society; numerous scholarships and fellowships including those from the Foundation for the Preservation of Honey Bees and Center for Pollinator Research and the prestigious USDA-NIFA postdoctoral fellowship; many travel awards including those from the Entomological Foundation and the Women in Science and Engineering Institute; and recognitions of excellence such as the Comstock Graduate Student Award from the Entomological Society of America, The Student Recognition Award in Insect Physiology, Biochemistry, Toxicology, and Molecular Biology from The International Congress on Insect Neurochemistry and Neurophysiology.

Niño comes to the Davis program with her husband, Bernardo Niño, whom she met in the entomology graduate program at North Carolina State. He worked with social insects, both on wasps as an undergrad and termites for his Master's degree, and focused on honey bees for the last five years in the apiary at Penn State. He has taken on a mix of duties: among them managing the Harry

H. Laidlaw Honey Bee Research Facility and teaching extension classes. He shares the title Staff Research Associate with Billy Synk, who also manages and does outreach. Doctoral student Cameron Jasper has joined the team as well, and a student from the Netherlands is scheduled to come for research.[3]

Another of Niño's post-doc projects is germane to her work planned at Davis. Her goal, "to aid breeding efforts necessary for developing disease resistant and hardy bee stock," will be pursued in multiple ways. In addition to her queen fecundity research, she will continue to study molecular mechanisms that underlie responses to specific honey bee pathogens in order to help inform beekeeping practices. Thus far, she has examined the effects of Israeli Acute Bee Paralysis Virus, Deformed Wing Virus and Nosema.

Toward the same goal, she plans to work toward the understanding of synergistic effects of pesticides on honey bee health and to collaborate on research evaluating alternative Varroa mite control. For policy issues, "It would be very important to be involved in conversations to drive regulations that can make or break the honey bee."

At PSU, she conducted a survey to assess the needs of local bee breeding programs and subsequently developed a queen rearing workshop, which she held successfully for four years and will offer at Davis. [4] She participated in a cooperative program with Pennsylvania beekeepers to evaluate bee stocks with the aim of selecting bees better acclimated to their conditions; she hopes to be in conversations about such efforts in California. "I think it's possible. Micro environments may govern success, but you have to stick with it. It's very complicated. Your genetics can be diluted. This process has to be done over and over. The limiting factors are time and money."

Niño's many goals are also limited by time and money, a fact that has not escaped her. She plans to multiply her efforts, in effect to extend extension throughout the State through a Master Beekeeper Program. It would certify trained, knowledgeable beekeepers who could become mentors and sources of reliable information.

One unforeseen asset to Niño's arrival is the interest Christina Grozinger has shown in creating a consortium with Penn State, Davis, and the University of Illinois. She has written a white paper to propose it and is moving forward with plans. Niño sees it as a way to strengthen all three programs by sharing research and creating a platform to drive governmental policy changes on pollinator health.

"We have been in a rebuilding mode for the past few years," said Michael Parrella, professor and chair of the Department of Entomology and Nematology at Davis. Niño will join several colleagues who work with bees: Neal Williams, who specializes in pollination ecology and bee biology; Brian Johnson, who works in genetics, behavior, evolution, and health of honey bees and Robbin Thorp, emeritus professor of entomology who studies bumble bee behavior and systematics. Mussen will keep his office and continue in an emeritus role.

Niño is learning on the job. "There's a lot that grad school doesn't prepare you for," she said. "I don't think they prepare you enough for being a manager." But Mussen has proven to be a valuable mentor, and she is making her way – already planning, speaking, organizing a 70/30 extension/research schedule.

She is reaching out to stakeholders for their concerns and ideas as she formulates plans to address their needs. "I think that a lot of the issues that are affecting the commercial and small scale beekeepers are very similar. We want to work together with the beekeepers across the State of California."

"I know, I know, I have some big shoes to fill, but I'm thinking I have the next 38 years to do so. So we're getting started." BC

M.E.A. McNeil is a journalist, organic farmer and Master Beekeeper. She can be contacted at ***mea@onthefarm.com****.*

References

[1]For a list of Niño's research papers see: **http://entomology.ucdavis.edu/Faculty/Elina_L_Ni%C3%B1o/**

[2]"From the U.C. Davis Apiaries" see: **http://entomology.ucdavis.edu/Faculty/Eric_C_Mussen/Apiculture_Newsletter/**

[3]The Niño Lab website is: **http://elninobeelab.ucdavis.edu/**
The Facebook page is: **https://www.facebook.com/elninolab**

[4]A workshop schedule will be posted on the Lab website: **http://elninobeelab.ucdavis.edu/**

THE BEEKEEPER'S VOICE

This voice cannot be left to someone else.

Michele **Colopy**

The knowledge of 40, 50, and 60 years of beekeeping is valuable. Beekeeping knowledge passed across two, three, and four generations qualifies as long-term research. For research is observation, cause and effect, analysis of actions which is typically practiced by beekeepers, and especially those across decades and generations. An academic degree does not make an expert. Forty years of experience is akin to an experiential PhD in the academic world. The beekeeper's voice needs to be stronger, and heard much more often.

The bee industry can lead the way on issues and policies of concern to beekeepers. However, the bee industry needs the support of beekeepers to show wide-spread support of beekeeping issues and policies. Just because the bee industry sends a letter to EPA, USDA, or Congressional policy leaders is not the end of the beekeeper's voice. Members of each national beekeeping group need to follow-up the bee industry support with their individual support to regulators and policy leaders. One comment letter, one support letter typically represents ten letters not sent. Your one letter can represent ten beekeepers; ten letters can represent one hundred beekeepers. Letters, emails, petitions and similar advocacy for honey bees and beekeeping is important to educate your local policy makers about the issues affecting honey bees and beekeeping. The mission of every beekeeping group is to educate about beekeeping. Beekeepers must educate their policy leaders (local, state, and federal), and they must educate regulators (County and State Agricultural Depts., USDA, EPA, etc.) about the issues affecting beekeepers. When the beekeepers are not "at the table," rules get enacted stating pollinators do not forage when it is less than 55 degrees, or that they stop foraging after 3:00 p.m. A few beekeepers cannot make needed change for all of us. It takes all of us to make the needed change. While your honey bees may not be suffering pesticide bee kills, other beekeepers are experiencing these losses. While your city applies mosquito controls to protect pollinators (applying chemical controls at night, only if West Nile virus or EEE has been found in mosquitos), other communities make blanket applications as a preventive, and apply the products during the day when bees are foraging. Beekeepers need to be involved in more than just their local beekeeping group, but also their local Farm Bureau, County Health Board, and State beekeeping association. Beekeeping groups must work together for a united voice, and then they can act as the local expert on bee issues. When beekeepers are not involved, non-beekeepers become the "voice for beekeeping." The bee industry cannot rely on just a few voices to speak for them. Even those voices will often say, "I don't speak for the industry, this is just my experience having kept bees for 50 years."

The Pollinator Stewardship Council supported the beekeepers' voice during 2014, facilitating support for their local and state issues. As a national organization we can lend our national name supporting your local and state beekeeping issues (according to our mission). For further support we can help you connect your beekeeping members with their state and federal policy makers ensuring the beekeepers' voices are heard. Want to tell your legislator you support a license plate that will fund honey bee research? We can help you. Need to garner support for state legislation supporting pollinator habitat in your state? We can help you. Need to encourage policy makers to pass legislation to protect honey bees from the impact of pesticides? We can help you. The state or local bee group keeps the issue local, you define the solutions, we can help you gather support through on-line petitions and support letters. Our advocacy can be State, regional, or national for you, and for the bee industry. All politics are local. What happens locally, affects beekeeping at the State level, which affects the national policy. It takes all of us. Your local beekeeping club leaders need the support of their members to educate and protect beekeeping and beekeepers. Your State beekeeping associations need the support of local clubs and their members to effect protections for pollinators across your State. National beekeeping groups need the support of local and State groups showing the national policy makers what works at the State and local level, and expanding those successes to the national level. The Pollinator Stewardship Council wants to help local and state beekeeping groups educate their policy leaders about your beekeeping concerns. Visit our "Take Action" page on our website (**http://pollinatorstewardship.org/?page_id=2538**) for more information, and to take action for honey bees and native pollinators.

The beekeeper's voice cannot be left to someone else. You are a beekeeper. You have a voice; let it be heard! BC

Introduction

Hive Tracks is beekeeping software created by beekeepers for beekeepers with the goal of improving the quality and experience of beekeeping for everyone. It is a web application, which simply means you can access the Hive Tracks software through a web address, hivetracks.com, using any internet enabled device including smart phones and tablets. The vision for Hive Tracks was born in the minds of two beekeepers who live and keep their bees in the Blue Ridge mountains of North Carolina, an area rich in beekeeping tradition and well known for tasty honey varietals including world famous sourwood honey. These two beekeepers, Mark Henson (above right) and me, James Wilkes (above left), dreamed of utilizing cutting edge technology to build easy to use tools and services to help beekeepers, ourselves included, have healthy and productive honey bee colonies. Our hope is that by maintaining information like records of inspections and events in hives and beeyards, every beekeeper will be equipped with the information needed to make wise management decisions for their bees. Whether you have a couple of hives in your backyard or a couple of hundred in varietal honey production or several thousand colonies for pollination, knowing the current state of your bees is essential to being a successful beekeeper. This article gives a brief backstory of the development of Hive Tracks.

Founders

The story of Hive Tracks is full of coincidence or divine providence or whatever you want to identify as the cause of events that come together in just the right way. One example is how the creators of Hive Tracks found each other.

Mark Henson is a professional software engineer with 30 years experience in software development and a masters degree in computer science. He lives in Boone, NC, with his wife and daughter and telecommutes to work very early in the morning with a software team in Great Britain. He has been a backyard beekeeper for eight years with a hive count varying from a few to more than 10.

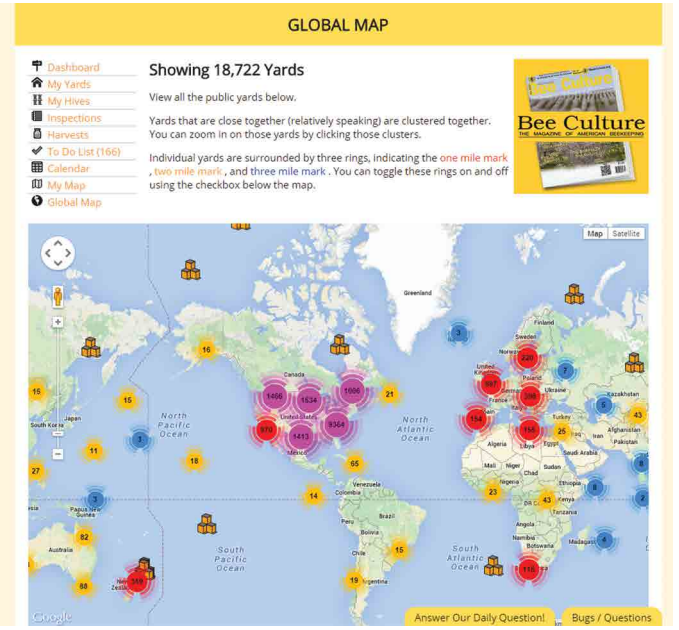
I am a Professor and Chair of Computer Science at Appalachian State University in Boone, NC, where I have been teaching for 23 years and I have a PhD in computer science. My wife and eight children and I live in Creston, NC, which is very close to Boone, on Faith Mountain Farm. We are sideliner beekeepers as part of our farm business with about a 100 hives, although we had about 40 hives when Hive Tracks was born.

Mark and I moved in the same beekeeping circles, namely the Watauga County Beekeepers Club and as honey sellers at the local farmers market, so it was no surprise when Mark and I were considering our nascent ideas for Hive Tracks that mutual acquaintances suggested we get together. So, on a snowy afternoon in late February 2009, Hive Tracks was born over a lunch meeting.

Early Days

From the beginning, our ideas were very similar. I was standing at a hive in my beeyard that previous summer of 2008 ready to perform an inspection. I scratched my head trying to remember what I observed the last time I was inspecting this hive. Ever done that? In a moment of clarity, I caught a glimpse of what it could be like – walking up

Home page.



Global map.

to a hive, a handheld mobile device (smart phones were not so smart back then) recognizes the hive being inspected and shares information with the beekeeper that will help with this inspection, like the health or strength of the hive, the queen status including her age, any unusual observations at the last inspection, medications or feed that should be checked, honey flows in the region, tips on what to look for at this time of year, etc. I saw the future, but did not see how to make it a reality.

Mark's innovation came to life in a conversation with his wife on a long car trip home during Thanksgiving of 2008. With two years of beekeeping under his belt, Mark's interest in improving his own beekeeping combined with his software expertise resulted in him being driven to create a prototype hive information system being in place by Christmas of 2008, a month after his initial brainstorm. It was this prototype that he showed to me at our first meeting, bringing life to ideas that previously lived only in my head.

Mark had already shown the prototype to Shane Gebauer of Brushy Mountain Bee Farm at a bee meeting and later we showed it to David Tarpy from the Entomology Department at NCSU at the North Carolina state bee meeting. Shane and David have both encouraged us and have been supportive of Hive Tracks over the years.

Launch

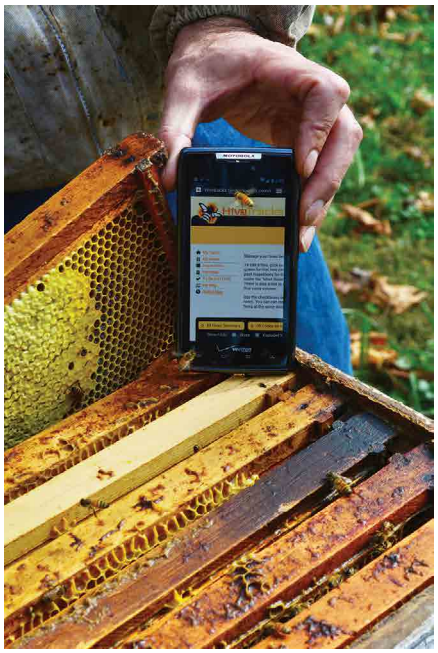
Ideas are relatively easy to dream up, but implementing them is the real challenge. In the case of Hive Tracks, a plan was made to develop the first production version of the software with a launch date of August 1, 2010 coinciding with the 2010 Eastern Apicultural Society Conference, which happened to be held in Boone, NC that year. One of those happy coincidences referenced earlier. The first production version of Hive Tracks was created during the year preceding the conference with innovative features including a digital representation of each hive in an apiary based on the hardware components of the hive and graphical indicators of hive health and queen status. The first of its kind (that we know of) hive editor allows the beekeeper to maintain the proper hive configuration as it changes throughout the season. Mark never knew how many different components beekeepers used until trying to represent them all! Components are still being added to this day so send us your favorite non-standard component to add to the list. Just kidding! Following the initial launch, we were excited to see 400+ users signed up by the end of August.

Growth

By the end of 2010, 800+ people had registered accounts with Hive Tracks with no real marketing other than a favorable review in *Bee Culture* and word of mouth through bee club presentations. Growth in user accounts has always been steady with over 6000 users by the beginning of 2013 and continuing to this day with our current list of more than 13,000 users. Most of this growth has predictably been in the United States and more specifically in the eastern half of the U.S. where there are more backyard beekeepers who make up the majority of our users. The average number of hives per user is around five, but we have a surprising number of sideliner and even commercial beekeepers who are finding it useful for their operations (more on this aspect later!).

International

A fascinating aspect of our growth has been the number of Hive Tracks users around the world; a great illustration of the interconnectedness of our world via the internet. We now have users in over 130 countries, with the top numbers being in United Kingdom, Canada, Belgium, Greece, Australia, and New Zealand. Numerous users have offered to translate Hive Tracks to their native language, which we expect will happen in time. And then there is dealing with the variety of beekeeping practices around the world including different hardware types, queen breeds, treatment strategies and products, and even the reversed calendars of the northern and southern hemisphere. So, although there is great commonality among beekeepers worldwide in their love for bees and the desire to keep them well, providing software that is relevant to them all without making it unwieldy is a challenge! However,



Mobile app.

Global stats.

we are facing head on by developing a strategy for engaging more fully in regional beekeeping markets by creating "localized" versions of Hive Tracks built specifically for local beekeeping practices.

Tanzania

The example in which we are most advanced in working out this plan is in Tanzania. To get us to Tanzania, I must relate to you another installment of a "what a coincidence!" story. I travelled to Kiev, Ukraine in October of 2013 for the Apimondia 2013 conference representing Hive Tracks with the simple goal of gaining a better understanding of the international beekeeping market. Before I left on the trip, a business friend suggested that opportunities tend to come from unexpected places and to be on the lookout. So, it should not have surprised me when I looked across the big vendor hall with thousands of people milling about and see a familiar face of a lady I had only seen through facebook on her Follow the Honey business page. I approached her and said "Are you Mary?" and she replied, "Yes, who are you?" After the introductions, she immediately whisked me over to the Tanzania vendor booth where I was warmly welcomed by the government contingent and David Camara, the owner of National Beekeeping Supplies, Ltd, from Tanzania. David and Mary and the Tanzanian government are working to market and promote honey from Tanzania. Hive Tracks was recognized as a useful tool to accomplish their goals by helping individual beekeepers be organized and more productive. We have partnered with David to make Hive Tracks a part of the beekeeping landscape in Tanzania and Africa.

Free Helps Growth

Hive Tracks is free (you can also pay, but more on that later!). How can it be free? We are generous and want to share this tool with everyone, but it is not that we are independently wealthy and do not need to make money. No, we made an early business decision that we would always provide a free version to make it as easy as possible for all beekeepers to have a great tool for record keeping and to fuel the growth of our user base. We may have set the bar too high on how much we are giving away (like I said, we are generous), but our strategy is in line with many other cloud based software providers like Google, Survey Monkey, and Mail Chimp to name a few. The thinking is that once you have a large user base, you can then figure out ways to monetize through advertising and offering premium services to the users who already find value in your free tool.

From early on we accepted donations, and a few users did donate which helped with some of the costs, but mostly expenses were out of our pockets along with a healthy dose of sweat equity (funny, that sounds a lot like beekeeping to me). About a year and a half ago, we added a business partner with the goal of advancing the development of Hive Tracks into a sustainable business. Toward that goal, in December of 2013 we released a completely rewritten version of Hive Tracks with better graphics, more features, and faster response.

Shortly thereafter in March of 2014, we released Hive Tracks Pro, a subscription based paid version with very modest price tag. After three and a half years of users telling us what new features they wanted and based on our own needs, the Pro version includes a number of value added features including additional hive types like nucs, uploading of photos and videos, a hive hardware inventory, integrated calendar and todo lists, group sharing of data, and recently an Android mobile app for offline work.

We also do some advertising and expect that to increase. We do plan to make money, but also want to make it accessible to as many beekeepers as possible. Trying to find that balance is the challenge. We hope people will see Hive Tracks as their "digital hive tool" and make it a necessary part of their beekeeping practice and will choose to support us.

Tip of the Iceberg

As the realization of the vision we had more than five years ago continues to take shape, we believe the fun has just begun in terms of what is possible with only the tip of the iceberg exposed so far. Hive Tracks is built on a solid foundation of fundamental data of yard, hive, and inspection information that is important to all beekeepers no matter the size of their operation.

Building on this foundation, much more is technologically possible including collecting data from instrumented hives (sensors for

and audio), connecting beekeepers through social media, forums, and information sharing, analyzing the combined data of beekeepers (big data for beekeepers), and an endless list of cool features including any number of reports like honey production per hive or per yard, longitudinal queen performance, hive success when started from a nuc vs. split vs. package, etc.

The area of instrumented hives has always been one of high interest to us since combining observational data from Hive Tracks with instrumented hive data yields incredibly valuable information for a beekeeper. Perhaps even more importantly, this combination of data from a world wide network of beekeepers would be a very strong data set for honey bee research. In the past three years, there has been rapid development of commercial solutions for the hive scale problem with multiple vendors in the market now with one of the most extensive monitoring systems being offered by Arnia (featured December '14 and this issue in *Bee Culture* articles), which includes weight, temp, humidity, and sound, as well as analysis of the data to detect hive events.

Future

The potential benefits to our beekeeping experience offered by technology are endless and exciting to consider and pursue, and I invite you to join your fellow beekeepers and us at Hive Tracks as we strive to be better beekeepers by equipping ourselves with the right tools and information to make wise hive management decisions. Hive Tracks is committed to pursuing excellence in beekeeping and will continue to work to add native features and functionality useful and affordable to all beekeepers. In upcoming articles, I will dive into more details of how Hive Tracks works and what value it can add to your beekeeping experience. In the end of course, the most important part of your beekeeping is still to be in the bees! BC

http://www.hivetracks.com
http://www.facebook.com/hivetracks

James keeps his bees in too many yards in the mountains and foothills of northwest North Carolina.

Jack Garrison *Nicholas Weaver* *Nathan Beach* *Brett Nolan* *Jennifer Berry* *Phillip Quinn* *Ben Rouse*

Meet The UGA Bee Lab

Jennifer **Berry**

Over the years, I've received numerous inquiries about the "behind the scenes" functioning of the UGA bee lab. In spite of my continued attempts at side-stepping in lieu of what I think would be MUCH more interesting topics for the *Bee Culture* audience, folks persist in wanting to know it all: the layout, process, activities, stories, etc. But, the truth be told, the ins and outs of our operations are singularly ascribed to the amazing people we have on staff who, despite all the practical challenges, scientific puzzles, and bureaucratic hurdles thrown their way, continue to pull off nothing short of minor miracles in achievement and excellence with every undertaking. To know these individuals is to have an understanding of how the lab functions, results are obtained, and departmental laurels are earned. I can't think of a better gift to those interested than a brief yet colorful rundown of our "usual suspects!"

Dr. Keith Delaplane

Keith Delaplane is Professor of Entomology, Walter B. Hill Fellow, and Director of the Honey Bee Program at the University of Georgia. His introduction to beekeeping happened at age 13 in Indiana when his father bought a beginner's beekeeping kit for him. It may have been prophetic that those first bees were a package shipped from Georgia. His beekeeping enterprise eventually exceeded 50 colonies, and he produced honey at semi-commercial scales in Indiana and Georgia. Following degree programs at Purdue and LSU, he joined the faculty of the University of Georgia in 1990, where he is now responsible for teaching, research, and continuing education on bee biology and honey bee management.

Keith's research and his students focuses on pollination and sustainable honey bee health management. The centerpiece of the program's outreach efforts is the Young Harris Institute; it has been held every year since 1992 in cooperation with Young Harris College, and it serves as the administrative stage for the Georgia Master Beekeeper and Welsh Honey Judge programs. Dr. Delaplane and his associates have distinguished themselves as researchers, lecturers, and authors on many aspects of bee biology and management. Between 2008 and 2012, Dr. Delaplane served as the National Director of the Managed Pollinator Coordinated Agricultural Project (CAP) program, a $4.1 million, USDA-funded, 17-institutional consortium of researchers and educators dedicated to reversing honey bee decline. In 2014, HM Queen Elizabeth II recognized Dr. Delaplane as an honorary member of the Most Excellent Order of the British Empire in recognition of a decade's worth of research and educational contributions in beekeeping to the United Kingdom.

Brett Nolan

Brett Nolan is our current PhD student. Born and raised in Seneca, South Carolina, Brett's colors are orange and purple – not red and black. He earned two science degrees from Clemson University: a Bachelor of Wildlife Biology and a Master of Entomology. While working at the Clemson bee lab during his undergraduate studies, he became interested in bees. During his graduate studies, he focused on the control of small hive beetles (*Aethina tumida*) in honey beehives, specifically in trapping techniques.

While working on a joint UGA-Clemson research project, Brett was introduced to our UGA Honey Bee

Program, and, upon finishing his master's degree, moved the 60 short miles to Athens to continue his education in honey bees at our bee lab. His current research focuses on the host-parasite relationship between honey bees and varroa mites (*Varroa destructor*). In particular, he is looking at the transmission and virulence of varroa between honey bee colonies as related to colony distance and apiary density. In addition to his own studies and research, Brett regularly makes time to help with general fieldwork, lab work and brainstorming sessions.

Brett is married to Emily Nolan and has three daughters: Lucy, June, and Camille. His hobbies and interests involve being outdoors: hiking, camping, fishing, and hunting. In his younger years, Brett played soccer; today, he coaches his five-year-old daughter's soccer team. And, when he can get a break from the harsh schedule of graduate school, he enjoys grilling or smoking anything on the barbie and deep-frying delicious, dry-rubbed turkeys. Along these lines, over the years, Brett has spoiled our taste buds here at the lab with an assortment of tasty treats. Brett is an all-around, exceptional member of our team and, when the time comes to move on (graduation), will be greatly missed.

Nicholas Weaver

Nicholas began working with the University of Georgia in the Summer of 2007 while an undergraduate at Gainesville State College. In 2012, he became the full-time project supervisor and is now responsible for over 300 colonies maintained by the University.

Born and raised in Georgia, Nicholas has always been interested in agriculture. He began keeping honey bees at his parents' home in Cumming, Georgia at age 13 when a family friend introduced him to the hobby. Shortly after he began keeping bees, Nicholas attended his first Young Harris Beekeeping Institute, where his interest in honey judging and beekeeping certifications began. At the time he received it, Nicholas was the youngest person in the world to have achieved the Welsh Honey Judge certification. He also earned the highest score of anyone to take the GA-MBP Master Beekeeper written exam.

A strong advocate for honey bees, Nicholas gained attention in his hometown when the local code enforcement office cited him for having hives on his property. His story was published on local, state and national news, and an online petition in his favor received over 2,500 signatures from all over the world. Nicholas gathered supporters and honey bee advocates from throughout the state to attend public hearings with the Board of Commissioners in Forsyth County, resulting in a vote to allow honey bees – without any restriction – in every zoning district throughout the county.

At home, Nicholas maintains a few hobby hives with his four-year-old son, Zachary, whom he hopes will become the youngest person to ever pass the GA-MBP Certified exam. He also performs structural and swarm removal jobs in the northeastern Georgia area, and is available for presentations and honey judging to local bee clubs.

When Nicholas first started at the lab, he would adorn himself with a full bee suit including what we call, big boy gloves. But, now, when working bees, he's out there with just a veil and short sleeved shirt. He's come a long way from when I first met him; he is now a husband, father, and worker the lab could not live without. He consistently proves himself through his work ethic and is truly respected by his staff. I hope that we (the bee lab) will have him on board forever.

Ben Rouse

Ben is our lab tech II here at the bee lab and aids in both lab and fieldwork. Born in Alpharetta GA, Ben became an eagle scout and member of the Phi Beta Kappa honors society. After high school, he ventured to Brigham Young University to pursue degrees in both public relations and psychology. Seeking a change in environment, he later returned to the southeast to finish his degrees at UGA, where his focus shifted to the broader perspectives of sociology with the idea of becoming a professor and writing on the topic of "the chemical society." Since graduating in May of 2011, Ben has also taken a strong interest in honey bees. He has chosen to balance this new interest with his long-term passion in art; this is particularly noticeable in much of his recent artistic work that captures aspects of his experiences here at the lab. He has developed a duality of raising public awareness of bee decline though the fine art world. He recently exhibited his work in New York and hopes to pursue art on a full time basis one day.

Ben came to work for us without the slightest idea of what he was about to get into. Within the first week, he had been stung so many times that I didn't think he would stick with it, but he did. I attribute this perseverance to Ben's attitude; he is one of those folks who never has a bad day. Through Ben's proverbial lenses, the sun is always shining and his glass is always half full. Working with him just puts a smile on your face each day. Ben is very talented, and I know that his future lies in painting and photography. It will be a sad day when he moves on to become famous. But, at least I'll be able to say "I knew him when he was just one of us at the lab…."

Philip Quinn

Philip Quinn is a certified GA Master Beekeeper from Atlanta, GA. He maintains multiple apiaries in the Atlanta Metro and Athens areas made up largely of feral bee colonies. He obtains these regularly by carefully removing

live bees from homes, offices and other buildings through his private company, Quinn Environmental.

Philip is a two-term past President and "2011 Beekeeper of the Year" of the Tara Beekeepers Association in Forest Park, GA. He is a current member of the Georgia Beekeepers Association and Eastern Apicultural Society. Over the years, he has presented various public beekeeping courses and workshops, and is a highly regarded instructor at our annual UGA-Young Harris College Beekeeping Institute. He also speaks to beekeeping clubs, garden clubs, schools and other groups on various honey bee, beekeeping and pollination-related topics.

At the UGA Honey Bee Lab, Philip manages our website, edits and contributes to professional publications, compiles and analyzes research data, as well as develops and administrates project management software. His other duties include coordinating the annual UGA-YHC Beekeeping Institute, grading the associated Georgia Master Beekeeper certification exams, and maintaining the historical GA Master Beekeeper records. Philip works in the apiaries on large-scale initiatives such as queen rearing, moving bees, splitting hives and setting up new research projects. He has contributed directly to the collection of research data over the years through fieldwork and lab work, including dissections and microscopy.

Philip is one of those people who, when you hand him a job, will not only get it done, but will do it very well. He is one of the most conscientious people I know when it comes to his work and it shows, which is probably why we rely on him for so much. Philip also has a wicked sense of humor and a deep, hearty laugh, which are greatly appreciated here at the lab. Now, if we could only get him to move from Atlanta to next-door-to-the-bee lab, we would be able to get him to do even more stuff for us!

Nathan Beach

Nathan was born in Maryland. He spent his childhood in Texas and his young adulthood in South Carolina. His interest in honey bees was sparked at a young age. While in England, his family visited an apiary, where little Nathan observed bees at work in an observation hive and learned about all the beneficial products and services bees provide to humans. After that experience, he knew that he wanted to become a beekeeper - at least as a hobby. At age six, he tried to start a bee colony by baiting bees into a jar with honey, but all he caught were yellow jackets. While that experiment might have failed, he has come a long way in his knowledge of bees since then.

Later, Nathan saw a beekeeper's exhibit at the state fair and his beekeeping desire grew. After moving to South Carolina and attending a beginner beekeeper course hosted by the Aiken Beekeepers Association, he and his mom started their first hive. Nathan joined the association and, after about a year, was elected Secretary; he helped to revise their newsletter and establish their website. He next served as vice president for two years. During this time, he ran two beginner and one intermediate beekeeping courses. He was awarded the SC Junior Beekeeper of the Year award for his efforts.

Nathan put his beekeeping endeavors on hold while he attended Bob Jones University and received a Bachelor of Science degree in Business Administration. He worked for two years at a marketing agency in Greenville, SC. In the Fall of 2013, he married his best friend, Tori. The following year, he sensed that the "ad man" life was not what he wanted, and he started exploring opportunities to work with bees again. Nathan has recently joined the UGA Bee Lab, and, from what I have seen, shows great potential for a successful entomology career!

Jack Garrison

Jack is our resident student worker at the bee lab and assists with just about everything that needs to be done, from making sugar syrup and assisting in the fieldwork to counting mites on sticky screens and other lab duties. Jack hails from Madison County, GA. He grew up on the family chicken farm; so, hard work is not a foreign commodity to him. Currently, he is enrolled at North Georgia University as a Biology major, but he looks forward to transferring to UGA and completing his scholarly pursuits here. If we can have our way, he will soon be a graduate student here at the lab!

The work with honey bees appeals to Jack's interest in Biology and has proven to be a valuable scientific experience for him. When not working, going to class, or studying Chemistry, his time is spent outdoors: biking or backpacking the many trails in the Appalachian Mountains. Jack finds peace and relaxation in the highlands. He also enjoys wakeboarding and other watersports.

I actually met Jack while he was working as a cashier at Publix supermarket. He asked what I was up to. You know – it was the typical grocery checkout aisle chitchat. When I told him that I work with honey bees, his eyes lit up and a cascade of questions followed. Eventually, the question, "How can I work there?" came up. His excitement was engaging. I told him that, by coincidence, we were looking for more help at the lab, and, if he was interested, he should give me a call. Two days later, we hired him. Jack is eager and energetic. We are lucky to have added another team member with true passion for honey bees.

Trey Watkins

Trey is a senior at Madison County High School, the middle linebacker for their football team, and also a member of their track team. Upon graduation, he plans to enlist in the United States Navy, where he hopes he'll have the opportunity to try out for the Navy football team. Trey's other passion is engineering, and he plans

to pursue a degree. We've tried over the years to sway him toward entomology, but his heart just isn't in it. I suppose that engineering will be ok, too.

This past Summer was Trey's second year working at the bee lab. He's a neighbor of mine, and he started working for me on my bee farm years ago. I noticed quickly that he was a hard worker. He showed up on time and didn't sit around toying with the cell phone (not my typical experiences of teenagers . . .). That's why I asked him to come to work at the UGA bee lab over the Summers. Self-initiative, which Trey has lots of, is very important around here since there is so much going on each day. Hopefully he'll be able to work for us one more Summer before he ships off towards his future.

Jennifer Berry

Bees weren't always in my life, but, if I had been paying attention back in high school, maybe they would have entered much earlier. My first "real" job was at Burger Queen in the thriving and booming, tomato growing metropolis of Ruskin, Florida. Burger Queen was the first fast food diner to arrive in town. Hence, every high school kid wanted to work there. When I first applied, I was too young. So, once 15, I reapplied and got a job. The manager informed me to arrive first thing Saturday morning and to be ready to take on the breakfast rush.

Ruskin is a small town south of Tampa Bay with a disproportionate representation of retired folk. So, on weekends, the biscuits and gravy plate was a huge success. The fried chicken plate was the hit on Wednesdays. And, of course, practically everyone asked for the senior citizen discount. Anyway, I was so excited to start my new job. I couldn't wait to wear that gaudy, orange and white polyester uniform with matching garrison cap. I envisioned all my friends seeing me at the cash register or dropping a basket of fries into the deep fryer. But if I was lucky and the stars lined up perfectly, I might just be given the best job of all: the drive-thru window operator! Not only did you get your very own station, with a sliding window and cash register, but, coolest of all, you got to wear the fab headset. The drive-thru person was queen for the day. Unfortunately, I became a different kind of queen.

Since the stars did not line up perfectly, or even show up for me that first day (actually, my first week), I was denied work at the counter, deep fryer, or the window; instead I spent it inside the "Burger Queen Bee" mascot costume (complete with a large, plastic, suffocating, honey bee head, with a gold crown, and a pair of wobbly antennae, a furry, oversized, barrel-shaped bodice, yellow and black tights, and huge, clown-like, black shoes). No, I'm not making any of this up. Yet, the worse part of all was the attached gold tipped stinger. Really?!?

As I adorned myself with ridiculousness, the other employees attempted to console me by saying that this was a regular "right of passage for 'newbees.'" Everyone, at some point, had to wear the costume. So, long story short, I guess that you could say that my first job DID actually have "something" to do with bees - since I was one, standing on the side of a busy highway, in full sun, in Florida, in a ridiculous costume, praying people didn't recognize me as I waved at the multitude of cars driving by. Oh, the shame of it all . . .

Eventually, I graduated from high school, left Florida and tried my hand at acting in college and afterward. After my Hollywood dream was crushed (another story for another day), it was back to school for me, and I found my way to UGA. I entered graduate school and joined the bee lab. What can I say? I love my job. Not only do I get to work with bees every weekday at the university and every weekend with my queen-rearing and nuc business, but I also get to work with the awesome crew I've just introduced you to. And, when I get to travel out of the county, state, or country to speak to earnest entomologists and beekeepers, life is good. So, I guess the stars did line up for me; it was just not on burger alley or Hollywood Boulevard, but instead in the bee yard.

Be good to you and your bees! BC

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

Making Meetings Successful

Having Good People Is Key To A Good Meeting!

Larry **Connor**

Between speaking invitations and serving as a vendor selling Wicwas Press books, I have attended a large number of state and local beekeepers' meetings. They are all different, but I have developed a number of strong opinions on why some beekeeper meetings draw larger crowds while others disappoint the organizers with a lack of attendance. Here are a few observations about club meetings that might help you plan your next meeting or you can influence those who do.

Education is Key

Since the publicity surrounding the 2006 Colony Collapse Syndrome, attendance at most major beekeeping meetings has grown tremendously. This does not mean, however, that those beekeepers will come to a state or large regional meeting. Many new-generation beekeepers are very happy sitting in front of their computer watching YouTube clips and checking out discussion groups about bees and beekeeping. One way to get this new generation of techno-friendly beekeepers (or wanna-beekeepers) into the seat at a beekeepers meeting is to offer them a top quality educational experience.

Some of these wanna-beekeepers will make it a point to attend meetings that will feature one of their Internet Superstars. Many experienced beekeepers, however, may not know who these speakers are and will not be drawn to a meeting where they are featured.

It is important to know who your potential audience will be as you plan a meeting. Established presenters with a word-of-mouth reputation may fill the seats at your meeting. Will you be drawing in a large number of people from urban and suburban areas that might imply a bit more computer sophistication? Is your meeting going to be held in an area where the potential audience is just starting with bees and beekeeping and have less communication on the Internet?

Many bee clubs are going through a rapid change in the makeup of their membership and the demographic of the beekeepers who attend their meetings. Some state beekeeping organizations have, in the past, focused on commercial beekeepers and large sideline producers. This de-emphasizes the introductory topics and puts greater emphasis on topics such as hive pest control, state and national trends, university and government speakers sharing research results, and other areas of similar importance.

Compare this with the meeting focused at new beekeepers: These people want and need the information that gives them the essential training as new beekeepers. They want to know how to get bees and keep them alive. Talks about chemical mite treatment, legislative action and politics are of reduced interest to them. They are not concerned with honey sales and promotion unless the speaker is giving them techniques and ideas that they can apply directly to their own beekeeping practice. There is a great deal of Me-Me-Me in all beekeeping meetings, but the focus for new beekeepers is greater than those who are attempting to help their industry.

So how does a meeting planner for a local or state organization set out to cover these split interests? Here are a few thoughts on the subject:

Offer split sessions

More and more groups offer a selection of speakers and topics for beekeepers to choose from during the same time slot at a meeting. There may be a beginner session, a session on basic management, a session on honey promotion and a session on something advanced in nature, such as bee genetics. When you split the group, you will need a larger facility to provide enough space for multiple groups, adequate sound and projection equipment for each room, and good advanced publicity so people will know which speaker to look for. Failure is not acceptable in any of these areas.

I have seen some of these split sessions fail because there are too many sessions and very small numbers in rooms. The presenters are often a bit put off when they only get five or 10 people in the room when they expected 50 or 100. As an experienced presenter, low attendance on occasion no longer phases me, but it does indicate that my time could be more efficiently spent elsewhere or on a different topic.

Stay with keynote speakers

Find speakers who can offer a topic of interest to a wide range of beekeepers. If you bring in big-name

Having experienced and willing volunteers is key to running a good meeting.

please do not ask them to speak about something that is not of interest to the group or to the speaker. Before you invite a keynote speaker, discuss with him or her what topic will appeal to both the speaker and the audience. When you know you will have a mixture of newbees and experienced beekeepers in the auditorium, make sure that the speaker is informed so the presentation can be catered to both cover the basic needs of the newbees and also provide valuable information for the experienced group.

Respect the audience member's time and investment to attend

It is disrespectful to attendees when beekeeper talks do not focus on beekeeping-specific topics. It bothers me when the majority of the day focuses instead on a smaller number of beekeepers by discussing procedural behind-the-scenes, non-beekeeping topics. The best club programs do NOT discuss club business at these talks but instead change their bylaws so that the technical decision-making is done by the board of directors prior to and after the meetings. Perhaps only the annual election, if there is one, would be held briefly.

Avoid down time in between speakers and programs. Again, respect the time and cost of the participants to attend. Many have taken time off from work, have traveled considerable distances and are paying for hotels and prepared meals. Compress the meeting as much as you are able without adding stress to both presenters and attendees. I think it is fine to take evenings off, but do not be afraid to schedule something social or fun. Most beekeepers like mixers, meet-and-greet sessions and ice cream in the evening, giving them a chance to socialize. A chance to socialize provides an opportunity for participants to form social connections that will bring participants back, improving cohesion, and give groups a sense of identity.

Keep in mind that not all beekeepers care about honey queen programs. I find that meetings that feature honey queen candidates as a major part of the program have a much smaller attendance than those that do not support such a program. I have long believed that beekeepers should give up honey queen programs and develop honey ambassador programs that are based on training in promotion of beekeeping and open to any age or background. I realize that many clubs use their honey queen programs as a centerpiece of their meetings, but if they only have attendance of one third of nearby organizations, I wonder why they continue to support these programs. Part of my dislike of the queen program stems from the extensive fund-raising needed to finance the program. Hours-long auctions and continuous soliciting to buy quilt tickets take time and focus away from the information and education in which the attendees, who have already paid to be at the program, are actually interested.

What works best?

Single-day programs are extremely successful. They provide focus, and attendees are more attentive. Two-day programs work well, too, as long as the content is solid and there is little down time in between events, as mentioned earlier. Beekeepers are looking for the best educational return for their time and money spent, and a one or two-day program serves them well. Beekeepers like a little fun at these events, but not too much because they are focused on bees and beekeeping.

Offering seven or eight hours a day of speakers, workshops and educational programs gives the participants many hours of thought-provoking information. Split sessions will allow folks to select which topics they will attend. I enjoy hearing couples and beekeeping partners debate who will hear which speaker, which has the combined effect of doubling their information intake! While people complain at the end of the program that their brain hurts from so much information, I feel that this is exactly what people want.

You should have one or two keynote speakers for each day, starting in the morning and perhaps a second keynote speaking again in the afternoon. The keynote speaker(s) is (are) able to run breakout sessions after their main program. Breakouts are then ideal at different levels, but be careful there are not too many. Also, make sure you do not schedule key presenters against each other as they should each get full support from the audience.

Vendors are crucial to a successful program. Make it easy to participate as a vendor. Provide adequate facilities for setup, a good loading/unloading area and plenty of space for people to mingle. Never separate the vendors from the meeting area. While they should not be in the same large room as the speakers, they should be in close proximity to the speaker area. When the vendor area is organically accessible from any section of the venue, more people will have more time to look at products.

Do not gouge anyone for give-away door prizes. This

undermines the products' retail value and delays or, more likely, negates sales to hopeful participants. Instead, ask for one or two major items for a fundraiser (see below). Put at least one vendor on the planning committee to help influence the choice of the facility and program structure.

Even for tech-savvy beekeepers, a good vendor selection offers the appeal of hands-on product interactions, chances to interact with experts on the products' use and the chance to stock up on supplies for the new project that they've just learned about while sparing themselves the cost of shipping. You will find that advanced sign up will give you time to publicize who will be at the meeting so participants can plan to pick up their orders without having to pay shipping costs. At some meetings, I have seen vendors bring a second trailer filled with orders that they intend to deliver at the meeting. Vendors, for the most part being beekeepers themselves, are members of the greater beekeeping community. Clubs that restrict access to vendors only hurt their membership in the long run!

Include a luncheon in the registration fee, offering a choice of either sandwiches or main entrée. Not only does this simplify getting everyone fed but it also keeps people in the building (rather than going out to search for food). Make sure that the refreshments are in the vendor area. This will encourage all participants to interact, further developing the relationship between new beekeepers, experts, vendors and other facilitators. As for the menu, avoid the budget fried chicken dinners and subways and upgrade the food to a level of professionalism that you want. Pay a dollar or two more per person and put on a good meal that people will not only appreciate but remember in future meetings (because the food was good). If there is an opportunity to make participants happy, take it.

Have a group of volunteers signed up to help move the vendors into and out of the area. Registration goes so much smoother when there are trained people there to check-in paid participants and collect money from walk-ins. I recommend a lower fee prior to the day of the event so you have a better idea how many people will attend. Add 10% for your expected count to allow for walk-ins. Quite often, the walk-ins cannot order a noon meal the same day as the event, but you can always order a few extra meals ahead of time for these people so they do not have to go out at noon and miss out on socialization with their peers.

At the end of the day or during the last break, do something special with food. In the warm weather you can serve honey ice cream. The rest of the time, it is fine to break out some honey-based snacks (cereal mixes or cookies) that everyone will enjoy. Not all places will let you bring in food, so negotiate this in advance. This will remind participants why they're there in the first place (to learn about bees).

Breaks should be at least 30 minutes. This allows people time to use the bathroom, get a cup of fluids and socialize. Never shorten the break because a speaker ran over – speakers must be on a tight schedule so they start and stop according to schedule. This ties directly into the professional tone of the event and the respect to the attendees and everyone involved.

Funding options can be fun!

While I strongly dislike time-consuming auctions during meeting time, silent auctions have their place. I am an advocate of fund-raisers at meetings to support the cost of the speakers and room rental as well as provide something that goes toward recycling or repurposing beekeeping items. My favorite fund-raising option is the tea-cup auction.

The tea-cup auction is when vendors and attendees bring in items that are bee-related or food and farm products to put on a table with a small container in front of it (the tea cup). People purchase tickets in quantity (arm's length for $10 or $20) and put half of their ticket into the cup. At the end of the day, one ticket is pulled from each cup and taped to the item. People check the tickets and leave with the items if their ticket matches an item. This requires someone to monitor the tables, sell tickets to the participants and pull the winning tickets. Be mindful of all volunteers as these folks rarely get a chance to attend any of the meeting sessions.

Silent auctions are my second favorite. Instead of a tea cup, a sheet of paper is put in front of each item and people sign their name and the amount they will pay, at a value several dollars higher than the previous bid. This requires someone to monitor the tables and cash people out at the end of the day.

Well-run teacup and silent auctions can earn several thousand dollars during a meeting. This money can be used to reduce the registration fee and/or cover the cost of speakers expanding the quality of the program. BC

2015 takes Dr. Connor to meetings in Alabama, Ohio, Virginia and Grenada. Check the ***www.wicawas.com*** *website for details as the dates approach.*

arnia

Using Remote Hive Monitoring Data

Huw **Evans**

The Benefits of Electronic Data Collection

When compared with manual collection, electronic hive monitoring offers scientists a less intrusive means of collecting more objective data at much higher resolutions, several times per minute if required. Multiple parameters can be simultaneously measured and recorded. The measurements are more consistent as probe positions and settling times do not vary. Remote monitoring simplifies data management; the data is automatically collected and stored in a database saving a huge amount of work while minimizing any potential 'mix ups'. The data can be graphed from within or downloaded from a single user interface accessed from any Internet enabled device. Which measurements are taken and how often can be configured remotely from anywhere in the world with Internet connectivity. The same user interface allows beekeepers to enter inspection data such as hive manipulations, diseases, *Varroa* counts and treatments.

Bees do Nothing Invariably

One of the issues facing scientists researching bee health is that "bees do nothing invariably", as we say in the UK or "bees, its like herding cats" as is more commonly used in the U.S. That's certainly the case with my bees. On good years I think I'm a great beekeeper, on bad years I think I must have done something horribly wrong. The truth is despite doing the same thing every year I get very different results. OK, I'm not saying that there is not a correlation between how well you look after your bees and how well the bees do, but the health of my bees is a multi factorial thing and I'm only one of those factors. Our suggested approach to this problem is 'Big Data' supplied by thousands of monitors. Not only does the sheer amount of data provide buffers to variance, (or buffers to deviations encountered on smaller scale data samples) it can also reveal trends when correlating bee health geographically with potential environmental stressors and different beekeeping practices.

Environmental Effects

Agricultural practices, be it the use of Plant Protection Products (PPPs) or the landscape picture being dominated by vast monocultures, have been implicated as one of the major causes of pollinator decline. Effects of different PPPs, presence of wildflower margins or the proximity to wooded area could all be considered statistically on a wide scale. Similarly, correlations could be drawn with different habitats, urban or rural, managed and unmanaged. The data could also be used to identify trends between bee health and the proximity of things like electric power lines, mobile phone masts, wind farms, electric trains or even motorways.

A recent study at Southampton University has shown that diesel exhaust, in particularly nitrous oxide, rapidly degrades floral odours used by honey bees for the recognition of floral nectar sources such as Canola (Oil Seed Rape). This could have a negative impact upon a honey bee's foraging efficiency and the pollination services that the bees provide.

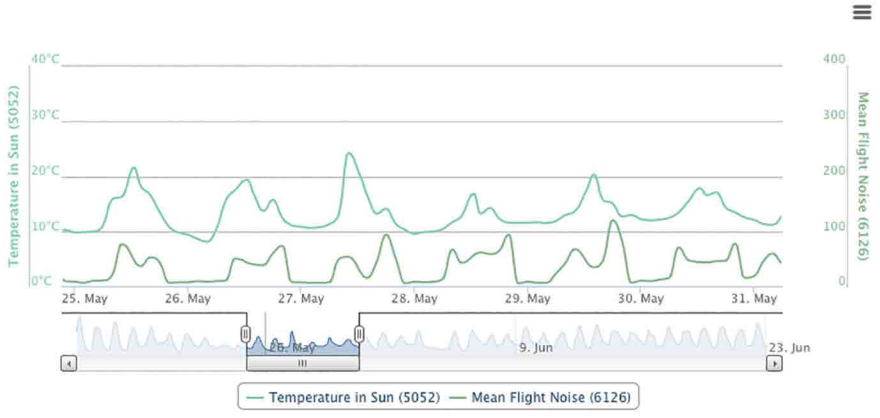
Beekeeper practices

Beekeepers ultimately have bees' interest at heart but making correct management decisions is not always straightforward. There are no hard and fast rules, there are recommendations but experience shows quite different results. *Varroa* treatment is an obvious example, do different treatments disrupt normal colony behaviour and if so how badly?

What effect does breaking the brood cycle have on long term survival? Does queen age affect colony's future prospects? What type and amount of supplemental feed should the beekeeper provide? There is plenty of circumstantial evidence but surely a large mass of data collected over long periods of time over a wide geographical area will identify real trends and help clarify these and many other bee husbandry issues.

Suitability of Bee Breed

One species of honey bee, *Apis mellifera*, has evolved to survive in widely varied environments and climates, which has through the course of evolution led to the emergence of a number of locally adapted subspecies. However, man has moved bees about the planet without giving much thought to the consequences. Most of us believe that local bees do better than the imported bees, but still there are plenty of queens and packages of bees being shipped around the world. Others argue for greater genetic diversity.



of different subspecies in different climatic conditions could provide the necessary empirical evidence to help better understand bee breed suitability or even to be used for legislative purposes.

Queen Health

In recent years there has been a lot of debate regarding factors effecting queen health and fitness. As shown in the previous article, instability in brood temperature data can reveal when a queen fails or stops laying. The benefits of being able to trend queen failure geographically are obvious as we would know with considerably better precision when, where and in what order queens were failing. However, in a similar but opposite way, monitor data can also show when queens start laying, which in turn gives us a pretty accurate idea when they mated. For most beekeepers this is currently a bit of a guess as we are trained to leave virgin queens undisturbed for several weeks to mate. Bad weather at the time of mating has been implicated as a potential cause of drone laying queens. Our system also records weather conditions that can be correlated with mating times, even retrospectively.

Hive type

A myriad of hive types exist and new ones are being developed continuously using new materials and technologies which can effect, for example, thermal insulation and humidity. Wide scale mapping of, for instance, hive humidity levels against hive type in different climatic conditions may help recommendations to beekeepers for more efficient housing of their bees.

Daily flight profiles

The importance of taking measurements regularly and simultaneously should not be underestimated. Using acoustics, we can economically plot daily flight profiles on a scale and at resolutions that would be practically impossible by human observation as flight profiles vary widely throughout the day. An example of this is shown in fig 1 where we can see that following a flurry of flight activity in the morning there is a lull in activity around lunch time. There is then a second wave of flight activity in the afternoon, which could well consist of foragers, young bees learning to fly in groups or even bees preparing to accompany the queen on mating flights. The 'character' of the flight profile therefore changes throughout the season.

Statistical consideration of daily flight profiles could provide a valuable insight into colony behaviour and potentially identify quite subtle trends in relation to exogenous and endogenous factors. Not only could the profile be correlated with other parameters such as what temperature they get going in the morning or how willing they are to fly in light rain, but also how this behaviour may be influenced by other environmental factors such as exposure to PPP's or in-hive treatments.

Furthermore, an observer moving from one hive to the next throughout the course of the day could mistake a moment of inactivity for an inactive colony; a colony strength assessment would be perverted in a similar way. Therefore, simultaneous data collection is the only way to objectively compare different scenarios.

Forage Efficiency

Weight of the hive is a pretty clear indicator of that colony's productivity, both in terms of colony size and stores. Typically, the slope of the weight increase is proportional to the abundance of and the distance to the forage source. This information becomes more valuable when combined with measurements such as flight activity and meteorological data, as seen in fig 2.

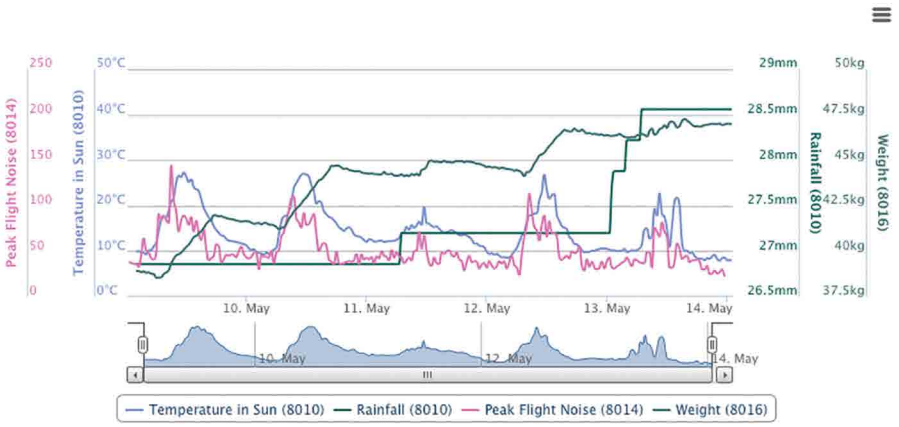
The amount of flying necessary to bring in a certain amount of nectar can be considered a measure of 'forage efficiency'. Typically, flight activity is proportional to the net weight increase, however we can see that following morning rain, despite an increase in flight activity, there is little nectar brought in. Fanning activity can be added to indicate nectar processing, showing when it takes place and to what relative degree. Like the daily flight profile, this gives us further insight into bee behaviour and even potentially useful circadian rhythm information.

Moreover, tracking weight over longer periods also offers insights into the occurrence and availability of forage. Hive weights were used by Dr Wayne Esaias to draw up maps of flowering vegetation, which in turn have shown the effect of urban warming on the timing of flowering. When there is dearth, the resulting drop in weight is a useful indication of the colony's metabolism, in other words, how much energy the colony requires when there are no external sources of nectar are available.

Black Box

Electronic hive monitoring can also help explain sudden and unexpected colony loss. When a plane crashes, all flight data preceding the crash is saved on a flight recorder or 'black box'. A lack of 'black box' data often makes it difficult for scientists to establish the cause of colony collapse. In the last article we demonstrated that by considering a sudden drop in weight with a sharp increase in flight activity successfully diagnosed robbing as the cause of a colony's failure.

Recently a beekeeper was transporting bees a relatively short distance, on arrival the weather was bad so he returned 24hrs later to open the colonies and discovered one of the hives was full of dead bees. Luckily that colony was being monitored, so we had a look to see if we could work out what had gone wrong. From Fig 3 we can see the day started with a nice healthy colony with a stable brood temperature. There was then a sudden increase as



the brood temperature rose sharply to 46°C. Initially we suspected some kind of hornet attack, however using acoustics we were able to include fanning activity at which point the cause became obvious.

It was a warm day and the bees could have done with a little bit more ventilation. As they began to warm up, they began to fan which generated more heat and this positive feedback cycle lead to self-destruction. From that point on the brood temperature follows ambient temperature with a small lag as the temperature sensor is inside the hive. Using the monitor data we could pinpoint both cause and time of death, without this data we would still be guessing what had gone wrong. This is indeed a tragic tale, however it did furnish us with a new 'overheating when being transported' alarm feature.

Conclusion

It is not the intention of this article to be prescriptive about how the data may be useful to a scientist. However, the benefits of wide scale data collection with its ability to deal with variability and trend bee health appear obvious.

When compared to taking measurements manually, electronic monitoring offers less intrusive and simultaneous data collection at much higher resolutions. Sceptics may fear that relatively uncontrolled data may lack 'quality'. However, this is where we can turn to 'crowd' or 'collective wisdom'.

This data has benefits beyond bee health, "If the world is our coal mine then bees are our canaries". Bees can be considered an indicator species, with a forage range of 10km^2 they make perfect bio sentinels. A lot of good science has already used bees' data to help to map air pollution, toxins in the environment and even global warming.

So how do you persuade thousands of beekeepers to start strapping hive tech to their hives? You simply offer them a useful beekeeping tool! arnia's monitoring system brings benefits directly to the beekeeper which both aids recruitment and maintains beekeeper participation in wide scale long term field trials.

Large scale data collection is underway in the U.S. under the auspices of the Bee Informed Partnership. Arnia is one of the registered suppliers of equipment for this project.

As with the application of electronic monitoring to bee husbandry, the true value 'big bee data' can bring to scientists will continue to evolve over time. BC

Huw Evans is the co-founder of arnia, a research and development company that designs and builds hive monitoring equipment. arnia hive monitors are currently for sale in the U.S., for more information contact ***sales@arnia.co.uk.***

HONEY TASTING

So you want to be a honey sommelier?

Marina **Marchese**

Raffaele lifted the glass of honey to capture the sunlight that illuminated the classroom. He took note of its unmistakable egg-yoke color and firm, compact crystals. Using a white spoon, he used brush-like strokes to spread the honey around the sides of the glass. Without hesitation he stuck his nose inside, took a deep sniff then scooped up a dollop and let it melt on his tongue. The words he chose to describe the honey were delicate, not excessively sweet with flavors of cooked fruit, marmalade, green vegetables, dry hay and fresh bee pollen. Resembling everything he knew about the sensory qualities of a sunflower honey.

There's a quote by Kurt Vonnegut that goes "You can't just eat good food. You've got to talk about it too. And you've got to talk about it to somebody who understands that kind of food." Over the last few years I spent some time in Italy with people who understand honey and talk about its sensory qualities paralleling that of a wine sommelier. They are The Experts in the Sensory Analysis of Honey who have perfected the art and science of identifying Italian honeys by floral sources and regions simply by tasting it. Sound impressive? I can tell you from experience that practice along with a really good memory and tasting notes can make perfect. I should also mention that most of these honey experts also produce wine and olive oil as well as honey, so this gift runs through their veins most likely for generations.

So it makes perfect sense that Italy has a national register of honey tasting experts and offers honey-tasting courses. Also in true Italian style, these courses are held somewhat randomly in various cities around the country. There's one more catch, besides securing your passport and airfare, you'll have to brush up on your Italian as the courses are only offered in their native tongue. If you're still intrigued, read on as I share with you what I learned from the Italian honey tasting experts.

I became obsessed with the notion of honey tasting during my visit to the National Honey show in London back in 2003, the judges tasting skills were mesmerizing and upon my return I promptly sent myself to The University of Georgia for an introductory honey judging class. Ultimately, I concluded that in order to become a truly accomplished taster, it would make sense to immerse myself into the world of wine so I scored myself a position working under a master somm.

It was while wandering the vineyards of Montalcino, Italy, that I serendipitously stumbled upon a honey festival where I would sit in on an impromptu honey tasting demonstration. The universe works in strange ways and not too long after my return home, I received an invitation to join a honey tasting group on LinkedIn from Raffaele, where he posted the dates for an introductory honey tasting course he would be teaching on the island of Sardinia.

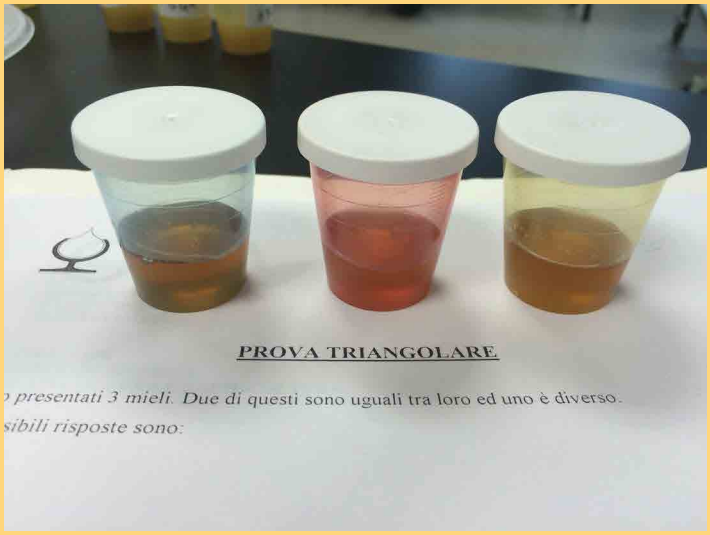
I was not a stranger to Sardinia. A few years earlier I attended their annual honey festival then spent some time visiting beekeepers, so a honey-tasting course was an excellent excuse to return. Once I landed in the capital city of Cagliari, I rented a car and drove almost two hours west up the coast to the small town of Guspini. Navigating parts of the island can be full of surprises and it's not uncommon to find yourself driving alongside grazing goats or hugging dirt roads at the edge of a mountainside. Sardinia's pristine beaches and traditional *seadas,* an over-sized, fried ravioli stuffed with local cheese and honey is not to be missed.

In the photo – left to right Lucia Piana, Marco Valentina, Marina and Gian Luigi Marcazzan – experts and teachers in Sensory Analysis of Honey.

The course was four eye-opening days of sensory training and honey tasting. Class size was limited to 25 people including beekeepers, food and health industry professionals, all from around the island. Surrounded by our notebooks, score sheets, plastic biodegradable tasteless spoons, bottles of water and green apples for palate cleansers, we were absorbed in hours of tasting, talking and note taking about honey. Sensory exercises began with recognizing and identifying the basic taste sensations: sweet, sour, bitter, salty and umami (Japanese for savory). Humans are only capable of tasting the sweetness of honey on our tongues and flavors like jasmine, strawberries, nutmeg or camphor are recognized by our olfactory bulb in our nose only while inhaling with honey on our tongue mixed with a good amount of saliva. This is why we cannot taste chicken soup with a stuffy or pinched nose and why it is important to smell your honey before fully tasting it. The tasting flights consisted of 20 uni-floral Italian honeys in which we learned a wide range of aroma and flavor terminology from the Italian honey tasting wheel to describe each one. The exercises began with a procession of pushcarts filled with perfect rows of honey samples in transparent stemmed glasses. Surprisingly, not one glass of honey was labeled since it would be up to us to identify each by smell and flavor only. Our instructors always tasted with us and we would compare our impressions and tasting notes at the end of each exercise. A few tasting notes that I found to be memorable were for Corbezzolo honey (Arbutus *unedo* L.: Strawberry tree): bitter, persistent, smoky and ashtray, Tarassaco honey (Taraxacum *officinale* Weber: Dandelion): floral, feet, barn stall, intense with a short finish and Tiglio honey (*Tilia* spp. –Tiliaceae: Lime tree): medium intense, balsamic, medicine cabinet, tannic and camphorous. The tasting notes for every Italian uni-floral honey have been pre-established and agreed upon by a panel of experts. No doubt, it was a monumental task getting beekeepers to agree on something. In between tasting exercises, there were lectures about bee and honey topics related to bee anatomy, honey making and harvest, plants and their regions, pollen id, labeling requirements, understanding various aspects of crystallization and identifying defects and adulteration.

During the entire course the class used close to 10,000 tasting spoons, hundreds of tasting glasses and tasted close to 50 pounds of honey! Afterwards, we were awarded certifications from the mayor of Guspini at the honey festival in Montevecchio. I was touched when my fellow classmates gave me a small charm made in the traditional silver lace-work of Sardinia as a reminder of the time we spent together. Upon my return back to the states, I received a tasting kit of unmarked honeys to self-test in order to retain the sensory memories I had created until the next course.

This past October I returned to Italy for the advanced honey tasting course, this time held in Bologna at the National Institute of Apiculture. Bologna is the antithesis of Guspini, a lively city and home to the University of Bologna one of the oldest universities in the world. The historical center is where you'll find bustling piazzas that lead to Bologna's historic towers, endless shopping and restaurants tucked under medieval porticos and some of the best gelato ever. This trip I decided to arrive a few days early so I could adjust to the time difference as jetlag will suck your energy and dim your senses. Attendees must

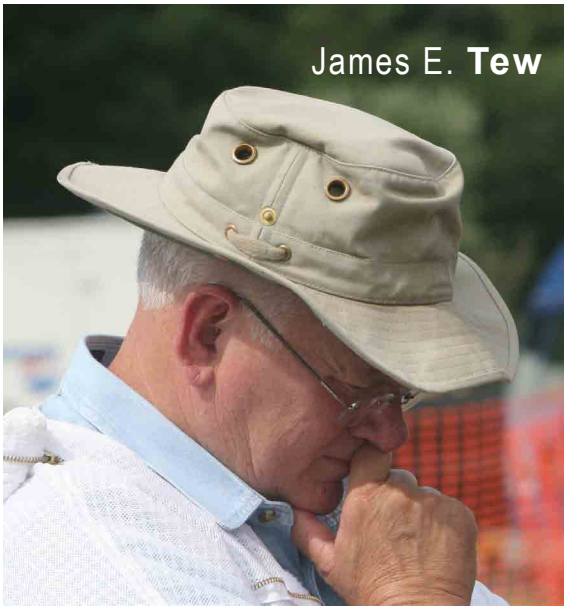


have completed the introductory course before applying for level l. Class size is limited to 15 and for three entire days we were challenged to recognize and identify honey samples at a quicker pace. At 9:00 our senses were at their sharpest so each morning we jumped right into blind tasting tests to identify the floral sources of 10 uni-floral honey samples. This is where your notes on flavor profiles along with your senses would be the only thing you had to rely on. We tasted liquid as well as crystallized samples and learned a complete vocabulary to describe every sensory aspect including crystal size, quality, texture and viscosity. Advanced exercises consisted of identifying honey in amber tinted jars by aroma only and in another we were given groups of three unmarked samples in which we had to decide which two samples were similar. Perhaps the most merciless challenge was to identify the two predominant floral sources in samples that were deliberately mixed in pre-determined proportions then calculate the percentages of each. Our individual responses were tallied up and plugged into a database then compared with those of other classes and the experts. I never imagined there could be so much involved with learning how to tasting honey and left Bologna with new friends, another certificate and a deeper reverence for the skills and training needed to be a honey sommelier. No one is born an expert, the skills required to master these sensory exercises can be acquired through thoughtful repetitive tastings. Eventually aroma and flavor memories are created, some come quicker and lasted longer than others. It's essential to keep notes on every sample you taste and continue working on a regular basis. In March 2015, I return to Bologna for another advanced course – I have lots of tasting and studying up to do. In the future, I hope to bring some of these honey experts to the U.S. to teach but in the meantime, I will be sharing my honey tasting education by offering Introductory Honey Tasting Courses for individuals and organizations through The American Honey Tasting Society. BC

Marina Marchese is the designer and beekeeper behind the beloved brand, Red Bee Honey and the co-author of The Honey Connoisseur: Selecting, Tasting, and Pairing Honey. She is a leading expert on single – origin honey and the founder of The American Honey Tasting Society. For more info about honey tasting education visit ***americanhoneytastingsociety.com.***

Well . . . Why *Does* A Colony Need Water During Cool Weather?

Hang on – this is not just another how to water-your-colony article.



Bees need water – I get it. What else have you got?

Bees and their warm weather water needs have been the subject of numerous articles that many others and I have written in recent years. Primarily, my pieces centered on the concerns that my near neighbors had about water foragers at birdbaths and how the bees were keeping the birds away. At times, swimming pools were involved in the complaints.

Initially, I defended the bees to my neighbors, but over time and after viewing many water-foraging episodes, I was forced to admit that my bees were keeping birds from watering at my neighbor's device. At any given time during the warm day, there could be hundreds up to a few thousand bees gathering water.

Just for a quick review of these past articles, I put out my own watering devices. I never let them run dry. I asked you what you were using for watering devices. You responded with many interesting suggestions. In general, a good discussion was had during the following months and the topic seemed finished. Indeed, my neighbor finally just gave me the birdbath that my bees loved so much, and she got a new one. All of you who have kept bees for a few years know how that aspect of the story ended. Regardless, that part of the bee water story is not what interests me right now. This water-need subject seems to have a lot of unanswered questions. Maybe written more appropriately – this water-need subject seems to have many questions that have never been asked.

Why do bees collect water?

The current best concept is that a colony needs water for honey dilution for brood feeding, for cooling the hive, and for individual bees that are thirsty. As far as this traditional information goes, I agree. But over the past few years, it would appear that there is more to this water question that has been addressed.

They show up abruptly at the watering device

As I write, it is mid-November. On typical days, gentle wind, partly cloudy, at 42-44°F, foragers suddenly begin showing up at the watering source. There is precious little brood in my colony. I can't imagine any water is needed for brood? The hive that houses the colony is certainly not overheated. There is no obvious reason for cooling the hive. Are these just individual thirsty foragers? What about all the nurse bees and young bees back in the colony? Is this collected water to be shared with them? Why would some bees be thirsty and others not? I contend that the general reasons that are offered as to why bees need water begin to (somewhat) fall apart.

A cool season water forager on the job.

Not like warm weather foragers

These water foragers are alike in some ways, but very different in other ways. On occasion, a few warm weather foragers have stayed at the water source overnight[1]. Additionally, on hot days, they are there by the thousands. Clearly, there is a need for abundant water to feed brood and to cool the hive. So what are these cool weather water foragers up to? Rather than 1000s, there are hardly 25 foragers gathering water. Plus, please consider that these bees are flying while the temperature is in the low 40s(F). That is very chilly weather for a honey bee. Then, by 3:00 or 3:30 PM, it is all over. These bees have either drowned or supposedly gone back to the hive.

Obviously, this is a dangerous trip

As is so typical, we have no way to know how many foragers are searching for water and how many are successful. I can only see the few dozen at my watering sources. These

1Truth be told, I did not mark the "overnight" foragers so that I cannot say that they were the same bees. What I can say is that there are a few water foragers already at the water source around dawn.

bees are flying on the very low side of their temperature range. Some really interesting methods of heat production must be underway that help the flying bee deal with wind chill as it flies through the cool air. I would expect them to be clumsy as they approach the water source and hover searching for a proper landing site, but they appear to be fine.

Then these bees take on a load of 40°F water. If the bee is able to carry about 25mg of water (up to 50mg), then how can a bee that only weighs about 50mgs herself, maintain her own internal body temperature with that great of a cold load? I weigh about 200 pounds (yes, I have been told numerous times that I should lose to 165 or so. I know I should. I plan to work on it.). If I were able to consume 100 pounds of 40°F water, I certainly feel that I would not be in a healthy state. I can say with certainty that my core body temperature would drop. Yet, I watch water foragers – all the time – depart from the water source as if nothing has been going on. Maybe it is nothing more than the fact that the cold water is in her abdomen and has little effect on the flight muscles in her thorax.

But the cool weather bees seem to stand around a lot. In fact on typical cool days, only about 50% of the bees may be actively imbibing. Are these other foragers warming up in the sunlight?

Bees routinely drop into the drink

I have worked out a little procedure that I use when I am so inclined. Bees commonly fall (drop? slip? tumble?) into the water source. I have tinkered with these clumsy bees and brought many back to life. It usually seems to go like this: once in the cold water, the bee struggles for a while and then – being coldblooded – becomes chilled and immobile -- but not frozen. They float near the surface in this stupor state for several hours before sinking. Once they sink, they are waterlogged and do truly seem to drown. But, if I scoop those that are not yet waterlogged out of the water, bring them into my heated shop, and place them on a paper towel, they will usually recover in five to 10 minutes. I hold them in a container, and once they are buzzing about, I simply release them to do whatever they have planned for the remainder of their lives. From that point, I have no idea what happens to them.

Unsuccessful foragers in my neighbor's birdbath.

Is this high accident rate common?

I routinely see bees that are dead at very shallow water sites. I do what you do, I guess. Pesticides? Old, aged bees? It is just not uncommon to see from one or two up to several dead bees around nearly any water site – especially one commonly used by numerous bees.

Or is this death rate partly due to my water-feeding source? Do bees have problems flying over the reflective surface of the pool? Bees frequently tussle with each other and one (or both) will fall in the water. Most seem to get out, but a meaningful number do not make it.

Some dissociated thoughts and comments

This is a cool weather behavior. Every food producing plant has finished. The bees are still foraging for water, and they will readily rob from each other. Everything else has finished for the season. Some individual comments follow.

Are we doomed to have roaming water foragers?

As beehive managers in urban situations, are we doomed to have to deal with pesky honey bees at neighboring water sources? I am now in a frame of mind to guess – *"yes"* – we are. Having struggled for about four years to keep my water foraging bees at ***my*** water sources, I am now guessing that water foragers will always assume that the current source will dry at some point. As with nectar, I'll bet that they are always going to be interested in multiple sources. From their standpoint, it would make survival sense. I feel that the bees are going to be serious about knowing where ***all*** the water sources are in their foraging area – just in case. My provision of a water source in my yard does not mean that all the bees will abandon the one in my neighbor's yard and happily depend on mine alone. *(It would appear that my bees know me very well.)*

A humidity thing?

This desperation water foraging behavior would seem to be a colony humidity thing. Don't you think? I just can't accept that these seemingly specialized foragers are making death-defying trips simply because they are individually thirsty. Alternatively, compared to the Summer water foragers, the foraging results of these few hundred bees would not seemingly be able to be able to seriously affect the conditions inside the colony. Why are these bees performing this behavior? It clearly has colony value?

Tousling, jostling cool water foragers

At the water source, individual bees will occasionally groom each other, feed each other, and occasionally, expose their scent glands. Additionally, they will frequently brawl with each other resulting in one or both going into the water.

I don't know what all this mixed behavior means. While traditional

A water forager that managed to fall into the cold water.

beekeeping commonly puts too many colonies too near each other so that robbing and drifting commonly results, the same cannot necessarily be said of water foraging sites. While I am aware of the three spots on my property where bees can commonly be found gathering water, there must be many, many other spots in my general area where other such small pools are available. I must assume that there is a similar interaction of foragers from different colonies coming in close contact with each other. As it were, bees meet at the common water holes – somewhat like animals coming to water holes on the African plains.

Varroa on the move (possibly)

Earlier in this piece, I described my attention and concern about drowning bees at the water source. Last week, I gathered about 10 soggy, cold-water foragers and brought them in for warming and releasing. There it was – just as plain as day. There was a *Varroa* mite on of one of the cold, wet bees. I have no idea if the mite was on the same bee it came to the water on, or if it had managed to change bees at the water site. Either way, as has been reported in the literature, the potential for transfer was there. It was intriguing to see *Varroa* biology in motion.

This is what is nagging at me

Our efficient methods of wintering bees have not overstepped humidity issues within the wintering colony – right? The bees propolize everything tightly, and in order to release "moisture-laden" air from the wintering colony, we routinely break that natural seal. Are the bees just confused with all this propolis collecting process or are they responding to bee biology issues that we are presently unable to appreciate.

Alternatively, is the modern hive configured in such a way that the bees are not able to practice their natural biology within this artificial nest cavity? Beekeeper-assisted procedures may now be required.

So, back to the foraging behavior of cool-season bees – are we putting some kind of stress on the colony as it prepares for Winter to such an extent that bees are scrambling to re-adjust the internal hive environment? Natural nests are not necessarily highly ventilated, but it should also be said that many natural nests fail each year. I don't know that anyone has ever been able to delineate what ventilation/humidity features make up a perfect feral cavity for a colony. We have accumulated many years of perfecting bee management in traditional equipment but seem to know little about natural nest ventilation characteristics.

In 1901, when wintering assistance was taken more seriously than it is today, chaff cushions were put on top of the wintering cluster to absorb excess moisture and prevent mold growth within the hive. As the weather warmed, the absorbed moisture was available back to the colony as needed. We know now that silken cocoons in old, black combs absorb moisture (approximately 11%) and provide a similar buffer as the cushions. The humidity level must be maintained one way or the other – either from internal hive water sources or from bees eating honey to generate metabolic water. Are we helping or hurting this biological need?

Our bees talk to us

In their own way, our bees frequently communicate with us, but we are not always able to understand. Washboarding behavior is an example. Late season swarms are another instance of bees' behavior that baffles us. Making death-defying cool season water foraging trips is yet another behavior that seems strange to us. We have learned a great deal about our bees, but there is oh so much more that needs to be learned. Keep watching. Keep learning. BC

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Varroa *on a wet water-foraging bee.*

SCORCHED EARTH

Italy and Small Hive Beetles

Andrea **Quigley**

Italian beekeepers are in despair with the discovery that small hive beetle ('SHB', *Aethina tumida*) has arrived on their shores. On 5 September 2014[1,2], Prof Vincent Palmeri[3] found adult small hive beetles in a bait hive at the Department of Agriculture, the Università Mediterranea, Calabria, near the port of Gioia Tauro in Southern Italy. On 11 September[4, 5], the outbreak was officially confirmed by the team lead by Dr Franco Mutinelli of the National Reference Centre for beekeeping of the Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe). On 7 November[5, 6], beetles were found in Sicily. These outbreaks are not the first assault made on Europe by SHB which previously was found in Portugal in 2004. That time it was successfully and speedily eradicated. This time the situation is not so hopeful.

No one is absolutely certain, but it is thought that the beetle arrived on rotting fruit imported into the port of Gioia Tauro[2]. On confirmation of the infestation, the Ministry of Health in Rome[2,4] immediately issued control orders to restrict all movements of hives within a 20km (12.4 miles) radius immediately surrounding the university. A monitoring and surveillance zone with a radius of 100km (62.1 miles) was also set up.

Beekeepers and local veterinarians are now required to monitor all apiaries closely and to contact Bee-net, the national Italian bee monitoring system should they suspect the beetle is present. The first bait hive was fumigated and frozen[2]. At all the subsequent discoveries of SHB, the soil surrounding the affected apiary is fumigated and the colonies burned with a view to eradicating this pest.

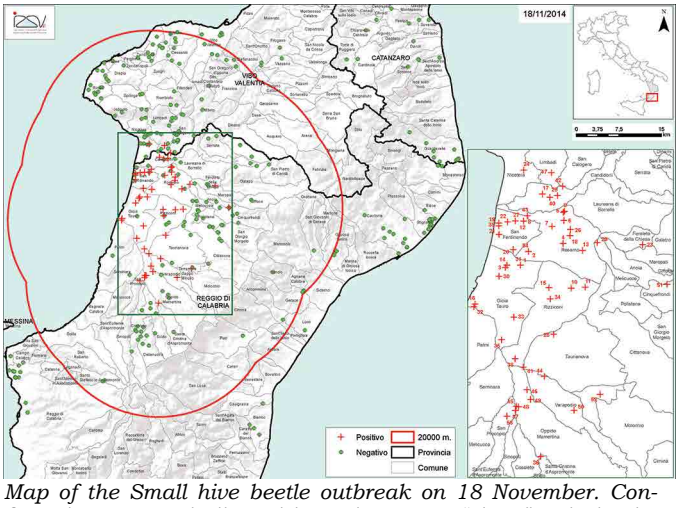
Beekeepers whose apiaries have been destroyed have not yet been offered any compensation but a ministerial order is at last in the hands of the Italian Court of Auditors for approval[7]. It is probable that an announcement will be made after this article is written.

The maps provided by the IZSVe national reference laboratory for Beekeeping in Italy show the site of the initial outbreak in September. Two months in, the map includes Sicily. The red marks were sites where affected apiaries were found and destroyed. After two months 56 infested apiaries had been confirmed. In some cases, a second case has been reported at what was considered to be a treated site. This suggests the eradication is not always as effective as hoped[5,7]. It is a huge undertaking. By 28 October, over 12,000 hives had been inspected in some 463 apiaries[8] and the number of apiaries inspected continues to rise. Many apiaries have been confirmed as clear of the pest (shown on the maps as green dots). The control areas are also shown on each map, the inner ring being the protection and control zone, and the outer being the surveillance zone where increased monitoring is taking place.

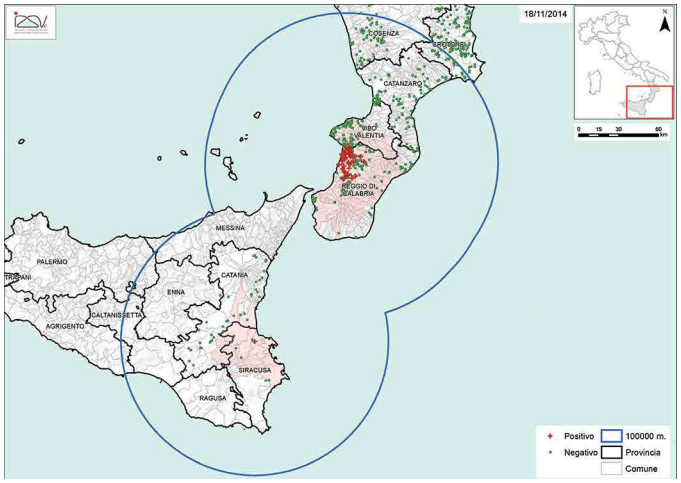
Franco Mutinelli[9,10] has reported directly to the European Commission on the cases found. His team has been working with the European Reference Laboratory for bee health at ANSES (Agence Nationale de Sécurité Sanitaire de l'Alimentation, de l'Environnement et du Travail or French Agency for Food, Environmental and Occupational Health & Safety) Sophia-Antipolis, France, to develop health measures provided under EU law. To satisfy EU safeguards and the law, the Italians have also measured the extent of the outbreak, tracing all hive movements and sales of bees. The EU is drafting a ban on movements of bees and hive products from Calabria for a minimum of eight months[9].

Italian beekeepers have benefitted from U.S. expertise with wide circulation of a training video from prof. Jamie Ellis, University of Florida[11], together with in-depth interviews with prof. William Hood, Clemson University[12], and Jeff Pettis, ARS- USDA[13]. Jeff Pettis has also worked closely with the Italian authorities and given guidance on use of diagnostic aids[14].

The Italian *ligustica* strain of *Apis mellifera* is thought to have originated in Italy and northern Sicily. Famous for its productivity and gentle nature, and benefitting from the warm Mediterranean climate, the Italian bee industry was valued by the Federazione Apicoltori Italiani in 2008[15] as exceeding €1 billion (about US$1.24 billion using today's rates). Italian beekeepers supply queens and package bees throughout Europe as well as honey and hive products. Calabria is a region with numerous beekeepers who migrate their colonies to fulfil pollination contracts as well as having (until now) bee breeders who supplied queens and package bees.



Map of the Small hive beetle outbreak on 18 November. Confirmed cases are indicated by red crosses, "clean" apiaries by green spots. The 10 km control zone is shown. Source - National Reference Centre for beekeeping of the Istituto Zooprofilattico Sperimentale delle Venezie (ISZVe)



Map of the Small hive beetle outbreak on 18 November including Sicily. Confirmed cases are indicated by red crosses, "clean" apiaries by green spots. The 20 and 100km control zones are shown. Source - National Reference Centre for beekeeping of the Istituto Zooprofilattico Sperimentale delle Venezie (ISZVe)

Luciano Scandian[16] is an Italian beekeeper and member of the honey bee research team in the Laboratory of Apiculture and Social Insects at the University of Sussex, UK. He returned from a vacation with his beekeeping family in Veneto, North East, Italy, shortly after the outbreak was announced. While there, he attended a number of beekeeping meetings and gave lectures on *Varroa* control at two of them. He told me the beekeepers he met ranged from being "scared stiff" to "extremely worried" and the general consensus was "it is only a matter of time" before the beetle makes its way across Italy. There was widespread concern that a block on all hive movements throughout Italy might become necessary.

In nearly all cases only adult beetles have been found. Using the latest available data[17], only four colonies held larvae and only one contained pupae out the 58 known cases. Prior to the discovery of the beetle in Sicily, Franco Mutinelli said, "Our inspections have shown us that the beetle is found in strong bee colonies as well as weak ones, in freshly made combs as well as old ones, and in nucleus colonies as well as full colonies. However, until now the infestation appears limited to this area of Calabria region[18]".

Yet many Italian beekeepers are fearful that (1) the beetle was present before September and (2) not all Calabrian beekeepers honoured the standstill order when it first came into force.

Notwithstanding the fears and rumours, *Varroa* is a major problem for Italian beekeepers without any definitive controls available. Many Italian beekeepers are unhappy that as well as coping with *Varroa*, they now need to rely on traps to find the beetle but have no real idea what to do should they find it, other than to call the authorities who will destroy their apiaries. Many beekeeping groups have covered SHB in their recent meetings and newsletters. As Luciano Scandian said, "A lot of it is fear of the unknown. Small Hive Beetle is yet another problem for beekeepers with no real treatments available. In truth, we simply don't know what is going to happen[16]."

In the quest to eliminate the beetle, every single colony in an infested apiary is burned, even if it only one colony has SHB. 2,123 colonies and three wild swarms had been destroyed by 28 October[9]. Since then, that number has risen as more cases are found. Not surprisingly, many Calabrian beekeepers are concerned that their industry is being destroyed systematically. Beekeeping groups[19,20,21,22,23] and the Calabrian Ministry for Agriculture and Forestry[24], together with other interested parties like the Slow Food movement[25], have written to the government in Rome calling for formal acceptance that establishment of the pest in their region is now inevitable. They demand the control measures should shift from eradication to those enabling beekeepers to retain their colonies as they need to learn to live alongside small hive beetle. An independent group called "Salviamo le api" ("Save the bees") claim more than 3,000 hives have been burned and, like the other groups, they want the burnings to stop[26]. In addition to the bee keepers, the Slow Food movement[25] and other environmental organisations have voiced their fears that the loss of bees will create a pollination crisis in southern Italy.

Meantime the members of international honey bee protection network COLOSS have set up a special task force on SHB[27]. President of COLOSS, Prof. Peter Neumann said, "The COLOSS association is greatly concerned about this discovery, which probably represents the permanent arrival of this pest into Europe. There is therefore a risk that it will spread to other European countries, but we cannot yet predict what its effects on the beekeeping industry and other bees might be. COLOSS members will work together to bring scientific results into practice for the benefit of beekeepers to help them fight this serious pest[18]." I understand COLOSS is planning with the International Bee Research Association to hold a workshop in Italy early in 2015[27].

The spread of this pest was hoped to be contained in Calabria but on 7 November it was confirmed that beetles had been found in nearby Syracuse district[4, 6]. Syracuse is on the island of Sicily, less than 75 miles (119 km) from Calabria. The authorities hope that the increased monitoring will mean this is the only case ever to be found on the island. No other cases have been found to date in Sicily other than those on another part of that infested apiary[7]. Notably, the beekeeper with the infested Sicilian apiary is based in Calabria where he keeps other bees.

At present, the rate of new cases seems to be tailing

off. It is hard to tell whether this reflects the effectiveness of the "scorched earth" policy being followed or is merely a reflection of the time of year. Of some concern is the spread of the hive beetle to wild honey bee colonies and to bumble bees[9]. So far, only three infested feral honey bee colonies have been found and destroyed. Yet as in the U.S., Europe is passing into winter so this is not a time of year when swarms are abundant and swelling the number of wild colonies. In Calabria, the beekeeping season starts in January as the orange trees bloom. Should the Italians fail to have the small hive beetle eradicated before the New Year then the incidences of beetle will likely start to increase. BC

References

1. Palmeri, V; Scrito, G; Malacrino, A; Laudani, F; Campolo, O (2014) A new pest for European honey bees: first report of *Aethina tumida* Murray (Coleoptera Nitidulidae) in Europe. *Apidologie* (in press).
2. *A.tumida*: Il piccolo coleottero dell'alveare è in Italia **http://www.federapi.biz/index.php?option=com_content&task=view&id=1257&Itemid=0**
3. *A. tumida:* Rogo totale, si bruciano gli ultimi alveari **http://www.federapi.biz/index.php?option=com_content&task=view&id=1290&Itemid=0**
4. *A. tumida:* Epidemiological situation **http://www.izsvenezie.it/index.php?view=article&catid=119%3Abeekeeping&id=1731%3Aaethina-tumida-epidemiological-situation&format=pdf&option=com_content&Itemid=629**
5. Mutinelli, F; Montarsi, F; Federico, G; Granato, A; Ponti, A M; Grandinetti, G; Ferrè, N; Franco, S; Duquesne, V; Rivière, M-P; Thiéry, R; Hendrix, P; Ribière- Chabert, M; Chauzat, M-P (2014) First report on the detection of *Aethina tumida* Murray (*Coleoptera*: *Nitidulidae*.) in Italy. *Journal of Apicultural Research* 53(5): (in press). **http://dx.doi.org/10.3896/IBRA.1.53.5.08**
6. *A. tumida:* Dalla Calabria alla Sicilia, parassita nomade aethina tumida 2014 **http://www.federapi.biz/index.php?option=com_content&task=view&id=1299&Itemid=0**
7. *A. tumida*: Focolaio Siciliano "Chiuso", Calabria negativa 2014 **http://www.federapi.biz/index.php?option=com_content&task=view&id=1301&Itemid=0**
8. *A tumida*: Report di F. Panella su incontro a Catanzaro **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81666-atumida-report-di-fpanella-su-incontro-a-catanzaro**
9. Presentation: *A. tumida* (Small Hive Beetle) notified in Calabria region, southern Italy

Franco Mutinelli, Brussels, 19 September 2014 **http://ec.europa.eu/food/committees/regulatory/scfcah/animal_health/docs/20140919_aethina_italy.pdf**

10. Presentation: *A. tumida* (Small Hive Beetle) outbreaks in Calabria region, southern Italy

Franco Mutinelli, Brussels, 6 October 2014, **http://ec.europa.eu/food/committees/regulatory/scfcah/animal_health/docs/2014100607_aethina-tumida_italy.pdf**

11. *A. tumida*: un video per spiegare cosa è e come si controlla 2014 **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81651-2014-10-06-18-55-04**
12. *A. tumida*: intervista al prof. Hood 2014 **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81655-aethina-intervista-al-prof-hood**
13. *A. tumida*: il CRT Patologie Apistiche intervista Jeff Pettis 2014 **http://www.mieliditalia.it/index.php/mieli-e-prodotti-delle-api/notizie-prodotti-delle-api/81641-aethina-il-crt-intervista-jeffery-s-pettis**
14. Bande diagnostiche per monitorare *A. tumida* 2014 **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81640-bande-diagnostiche-aethina-tumida**
15. Appicoltura poco seria? La FAI scrive al ministry Tremonti e Zaia 2008 **http://www.federapi.biz/index.php?option=com_content&task=view&id=524&Itemid=164**
16. Luciano Scandian, personal communication
17. Centro di Referenza Nazionale per L'Apicoltura. Casi confermati di *A. tumida* Situazione aggiornata al 25/11/2014 **http://www.izsvenezie.it/images/stories/Pdf/apicoltura/aethina-tumida/2014-11-25/2014-11-25-casi-confermati-it.pdf**
18. Press release: The small hive beetle is in Europe to stay COLOSS 2014 **http://coloss.org/announcements/the-small-hive-beetle-is-in-europe-to-stay**
19. A. tumida: ConApi /Unnapi lettera alle autorità 25/10/14 **http://www.mieliditalia.it/images/Aetina/Lettera_Unaapi-Conapi_Aethina_Tumida.pdf**
20. Lettera di FAI-Calabria **http://www.federapi.biz/images/Aethina%20tumida/scarafaggi%20e%20FAi%20Calabria.pdf**
21. *A. tumida*: Un chiarimento sulla Lettera di FAI-Calabria **http://www.federapi.biz/index.php?option=com_content&task=view&id=1302&Itemid=0**
22. Lettera di FAI 13/11/14 **http://www.federapi.biz/images/Aethina%20tumida/FAI_Posizione_Ufficiale_Aethina.pdf**
23. *A. tumida*: il documento con la Posizione ufficiale FAI 27/11/14 **http://www.federapi.biz/index.php?option=com_content&task=view&id=1303&Itemid=0**
24. Dipartimento Agricultura e Forests Regione Calabria - Aethina tumida: lettera alle autorità 23/10/14 **http://www.mieliditalia.it/images/Aetina/Nota_direttoriale_18842_DGSAF_Aethina_tumida.pdf**
25. Slow Food: che ne sarà dell'impollinazione se si sterminano le api per Aethina? 2014 **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81675-2014-11-11-10-02-20**
26. Dagli apicoltori di Calabria (CHIARO E FORTE): FERMATE I ROGHI D'API! 2014 **http://www.mieliditalia.it/index.php/sanita-degli-alveari/81693-dagli-apicoltori-di-calabria-chiaro-e-forte-fermate-i-roghi-dapi**
27. Norman Carreck, personal communication

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Missouri writes:

What is in the flowers' nectar that makes honey light colored (typically Spring flowers) and other times (typically late Summer) that makes darker honey?

Phil replies:

When I was in college, more than a few years ago, my circle of friends included two young women named Rita and Shelly. Both were extremely health and diet conscious, exercising and eating lots of whole grains and raw vegetables. At one point, carrots became a major constituent of their diet. I'm certain it was a very healthy thing to eat, but they experienced a side effect from the beta carotene which gives pumpkins, apricots, sweet potatoes, and carrots their distinctive orange color. The skin of both girls acquired a decidedly tawny tint. They were disconcerted by the attention and comments they attracted, and perhaps also by the orange-hued reflections in their mirrors. It wasn't long before they reduced their immoderate carrot consumption and their complexions returned to normal. The teasing from their friends took a little longer to fade away. As Rita and Shelly discovered first hand, you really are what you eat.

The color and flavor of honey is largely the result of what the bees consume, or in other words, the type of plant from which they gather the nectar to make the honey. That is quite correct as far as it goes, though geography, climate, age of the honey, and method of storage also have some effect. But, as your question indicates, that answer still leaves a lot unexplained. I was curious too, and did some research. The composition of honey is 96% water and various sugars. Other ingredients are responsible for only 4% of the volume, but almost all of the color, flavor, and healthful properties. These other ingredients number close to around 200, but until recently, they have not been given much study. A renewed interest in honey's medicinal qualities, and efforts to assess environmental quality by analyzing trace pollutants in honey, have led to more research into its minor components in the last several years.

The 4% consists of minerals and various chemical compounds, including amino acids, enzymes, polyphenols, acids, and carotenoids, all of which can affect color and taste. At least 27 minerals have been identified in honey, including calcium, iron, zinc, potassium, sodium, and magnesium. The most common is potassium, though other minerals predominate in some varietals. Minerals in food are sometimes referred to as its ash content, meaning the inorganic residue left after organic material has been removed through heating. Generally, dark honeys have a higher ash content than lighter ones, but there is more to honey color than minerals.

Polyphenols are one of the reasons that honey is being studied more closely in recent years. They comprise a class of organic compounds sharing certain structural elements. There at least ten sub-categories of polyphenol compounds, two of which are found in honey: phenolic acids, and flavonoids. Each sub-category includes thousands of compounds. Phenolic acids are organic acids, meaning that they are acidic and include carbon in their chemical structure. They are similar to alcohol in structure, but have properties that result in their not being classified as alcohol. Phenol compounds are produced in nature, by plants and microorganisms in response to attack by insects or disease. Honeys with high phenolic content are darker in color. Flavonoids, the other group of polyphenol compounds found in honey, play a direct role in the yellow, red and blue colors in plant blooms, which aid pollinators in finding nectar sources. Some of them are found in all honeys, but are more concentrated in those of lighter hue. You have probably been reading and hearing a lot about flavonoids in the last few years. They are responsible for the antioxidant properties of foods such as fruit, tea, wine, and chocolate. Current scientific thinking is that antioxidants may play a role in preventing conditions as diverse as heart disease and cancer. Hence some of the research into the components and properties of honey.

Another class of antioxidants, unrelated to polyphenols but which are also found in honey, is carotenoids. These are organic pigments found in plants, where they influence color in the yellow, orange, and even red spectrums. They appear in higher concentrations in light honey, and are probably partly responsible for amber and light amber shades. The most well known carotenoid is beta carotene – remember Rita and Shelly? They had the right idea. People who eat lots of fruits and vegetables

and other foods high in antioxidants tend to be healthier and suffer less from chronic illnesses. But maybe they should have eaten fewer carrots and consumed more honey instead!

A beekeeper in Ohio writes:

In an earlier column you said that the European honey bee is the only honey bee in this country but I keep reading and hearing about Italians and Russians and Carniolans. Aren't these different kinds of bees that are here? I am a new beekeeper and I am totally confused. Can you help?

Phil replies:

It's a confusing subject, in part because taxonomists (biologists who classify animals) aren't always in agreement. I personally classify all taxonomists into two subspecies: the splitters and the lumpers. The splitters tend to subdivide groups of animals into separate species based on fairly minor differences; the lumpers place them into larger, more diverse groups under one species name. When a group of animals lives and breeds in isolation (typically confined by a geographic barrier, such as a mountain range, desert, or ocean) through many generations, it develops distinct physical characteristics and genetic differences which distinguish it from close relatives outside the group. Determining at what point those differences are significant enough to declare the existence of a new species or subspecies is a judgment call, and therein lies the ambiguity. Although classification is subjective, and non-scientists sometimes muddy the waters even further by stirring in non-scientific names or misusing scientific ones, I will try to bring as much clarity to the topic as I can.

	Apidae	Apis	Mellifera
European honey bee:	Family	Genus	Species

All bees belong to the family *Apidae* which includes bumble bees, carpenter bees, orchid bees, cuckoo bees, and honey bees. Honey bees are members of the genus *Apis* within the *Apidae* family. Depending on who is doing the classifying, and when, the *Apis* genus is made up of five to eight species, all but one native to Asia. The lone exception is the European honey bee, *Apis mellifera,* native to the continents of Europe and Africa. Though no honey bees are indigenous to the Americas, *A. mellifera,* which was brought here by European settlers, is the one I often refer to as "our" honey bee. There are 28 recognized subspecies within *A. melifera.* It might seem surprising that taxonomists can be specific about the number of subspecies within *Apis melifera,* yet disagree on how many *Apis* species exist. It all boils down to money. Honey bees are the most studied insects in the world, but not just because they are such fascinating little creatures. It's their value as pollinators and honey producers which justifies all the research dollars lavished upon them. Asian species, on the other hand, have much less economic value. Some are relatively poor honey producers, and others nest outdoors and are not adaptable to being managed in man made hives at all. Perhaps due to this reduced research attention, the Asian bees are less well understood and their classification more subjective, which is the reason for the lack of consensus on the number of Asian species.

The subspecies of honey bees are sometimes referred to as races, but that is an archaic term, and I prefer to say subspecies. The first to be introduced to North America by colonists in the early 17th century were German, or Northern European, dark bees, *A. mellifera mellifera.* (Mellifera is the name for both the species and subspecies, appropriately enough since "mellifera" means honey bearing and these bees are doubly good producers.) The German bee was, and still is, known for its defensive behavior, and is said to be susceptible to certain diseases, including American foulbrood. As other subspecies of bees became available through importation, the dark bee faded in popularity and was not maintained by breeders here. Interestingly, though, there are widespread reports, likely true, that remnant populations of this bee still exist in the Appalachian Mountains and elsewhere in the east, as feral colonies in trees. While I was Kentucky State Apiarist, beekeepers in the eastern Kentucky mountains often told me of catching swarms of little black bees as mean as snakes. That characterization may be unfair, as I find snakes pretty well behaved unless provoked. I've never been chased by a snake, but I have had honey bees chase me home, bent on stinging me at every step. The beekeepers, though, seemed willing to put up with the grumpy behavior after they saw their first honey crop come in.

The mid-nineteenth century saw a revolution in the form of hives with removable frames, and a consequent expansion of American beekeeping. Along with the introduction of innovative equipment, such as smokers and extractors, came the importation of new subspecies of bees, this time by bringing in queens instead of whole colonies. The first to enter the U.S. marketplace, and the hives of beekeepers, were the Italians, *A. m. ligustica,* in 1859. Italian bees, with their gentler disposition, and attractive yellow coloring quickly became the favorites of American beekeepers. Others soon followed, including the Carniolans, *A. m. carnica.* They were brought to our shores in 1887 from the area of Romania, Hungry, and the former Yugoslavia (now Serbia and Bosnia.) Carniolans never became quite as popular as their Italian cousins, but their habit of cutting back on brood rearing when nectar flows ebbed, allowed them to overwinter well in cooler climates. They continue to have a following today, and are this writer's choice when buying new queens. The Caucasians, *A. m. caucascia,* were first imported here in the 1880's, from their home range of the Caucasus Mountains in the Republic of Georgia, near the Black

highly popular, but are still available from a few queen producers, valued for their very gentle behavior. They are also known for their copious production of propolis, and their slow winter buildup.

Some of the late eighteenth century introductions never caught on at all, and were not maintained by breeders. One was the Punic bee, from North Africa, *A. m. intermissa.* The subspecies of Africa all exhibit a tendency to walk on the defensive side of the street, and this bee is not an exception. Another dud, in terms of finding a niche in the new world, also due to its cranky behavior, was *A. m. Cypria.* Its original range was the Island of Cyprus, in the Mediterranean Sea. The Egyptian honey bee, *A. m. lamarckii*, whose home range can be deduced from its common name, was brought here in 1866. Its bad behavior was a factor in its not catching on, but I have also read that it did not acclimate to modern beekeeping equipment. The Egyptian honey bees were maintained by beekeepers in Egypt for thousands of years. There they were kept in skeps and moved on the Nile in barges, where they may have been used in the earliest migratory beekeeping operations.

The trial and error approach of bringing over various subspecies of honey bees to see which ones would stick, so to speak, ended with the 1922 Honeybee Act. The act, an attempt to prevent the introduction of tracheal mites, prohibited further importations of honey bees into the United States. The quarantine worked until 1984, when a mite apparently smuggled itself across the Mexican border inside an infested honey bee. As a result of the ban, most subspecies of honey bees bred in the U.S. are genetically descended from stock introduced in the eighteenth and early nineteenth centuries. Although they may not quite be mutts, as a friend of mine once described them, all of our honey bees have a mixed lineage - even when breeders carefully select traits in an attempt to keep the original subspecies as pure as possible.

Recent events have introduced new honey bee genetics within our borders for the first time in decades. The best known, unfortunate, and unplanned instance was the incursion of the Africanized bee, a hybrid of *A.m. scutullata,* the highly defensive subspecies from South Africa. After escaping from a lab in South America, Africanized bees, like tracheal mites, slipped across our southern border sometime prior to their detection in Texas in 1990. (Though perhaps I'm dating myself by referring to an event of 25 years ago as recent.) More recently, and much more positive for bees and beekeepers, the government has approved the importation of honey bee semen by U.S. researchers, specifically semen from Carniolan and Caucasian bees. These introductions promise to increase genetic diversity among stocks here, and will, I hope, result in the reemergence of Caucasian honey bees as a choice for beekeepers. Another very successful effort has been the importation and introduction of honey bees from Western Russia, as part of the varroa resistant Russian honey bee program at the U.S.D.A. Baton Rouge lab. However, Russian honey bees are not a subspecies, but are a variety or line of honey bees, and that is another topic, for another column. BC

Beepocalypse Inspired Activism

Bees are struggling and there are many ways to help

Ross **Conrad**

Ever since the first public announcements of colony collapse disorder (CCD) came to light in 2006, beekeepers, especially commercial beekeepers, have seen their yearly colony losses just about double from an average of around 10-20 percent before 2006, to an average of roughly 20-40 percent today. Not only are these colony losses extremely difficult for beekeepers (the bees in the average hive are worth about $200), bees help to pollinate crops to the tune of more than $15 billion a year. In the midst of this beemaggeddon, numerous groups, businesses, and individuals have stepped forward to help defend the bees.

The Merriam-Webster online dictionary (m-w.com) defines activism as: *a doctrine or practice that emphasizes direct vigorous action especially in support of or opposition to one side of a controversial issue.* Rather than take on the form of civil disoBEEdience, bee related activism tends to take the shape of either holding actions (trying to stop something and buy the bees time), analyzing causes and pointing out potential alternatives, or activism designed to educate and raise awareness.

Why is this recent explosion of honey bee activism so important? Not only is it a sign that much of society has finally come to recognize the importance of honey bees but I would submit that what we think of animals and the stories we tell about them tell us much about ourselves, our culture, and how we view the world. An example of this is the story of Theodore Roosevelt, who while on a hunting trip could not bring himself to shoot a bear that his handlers had cornered and tied to a tree while the President was on a lunch break. The toy industry and their PR firms took hold of this event, created a story around it and used it to build the multi-million dollar teddy bear industry that still thrives today. Today's bee-inspired activism is serving to help raise awareness of many issues that impact honey bees and provide individuals with concrete actions they can take to help bees and other pollinators.

Beekeepers Mobilize

In the case of colony collapse, it was beekeepers and the beekeeping industry who were the first to raise the alarm over CCD and call attention to the cause. The need for more bee-related research and the importance of preventing the USDA honey bee research labs from being shut down as a result of budget cuts were among the major focuses of early beekeeper actions.

As beekeeping groups greatly increased their demands for more research they also stepped up to the plate and organized their own donations to help fund the research needed to address the problem. In a rare display of political muscle, pressure from beekeepers and beekeeping groups around the nation helped to convince Congress to provide increased federal funding for bee research as part of the 2008 Farm Bill. Many of these provisions were reauthorized and expanded in the Agricultural Act of 2014, also known as the 2014, U.S. Farm Bill. Outside the farm bill debate, a house bill (H.R. 2692) would suspend neonicotinoid registrations and ban new registrations of any pesticide for use unless the EPA determines that the product would not cause unreasonable adverse effects on pollinators, including honey bees.

On the local level, beekeepers across North American have gone on to organize new clubs and associations and have worked to legalize beekeeping in many cities and municipalities throughout the country that had either prohibited the practice, or simply had not addressed beekeeping in their regulations and ordinances before. One of the most recent efforts to be launched is Bee City USA, a program that "endorses a set of standards, defined in a resolution, for creating sustainable habitats for pollinators" in cities across the country.

Many of the individuals who in unprecedented numbers have decided to get involved in beekeeping in recent years, have made the craft of caring for bees their own personal form of activism. This has served to rejuvenate many beekeeping associations and clubs, boost attendance in beekeeping schools and classes, and increase the market for backyard beekeeping supplies and equipment. Individualized actions have included beekeepers who have focused on the use of alternative

hive styles and designs (Top Bar and Warré hives for example), accelerating the transition to not using treatments for mites or diseases, creating honey bee sanctuaries, and in some cases all of the above.

Established beekeepers meanwhile have moved to file petitions and lawsuits in an effort to get the U.S. Environmental Protection Agency to remove from the market neonicotinoid pesticides that have been linked to instances of honey bee collapse.

Activist Authors

Some beekeepers were out in front of CCD working to establish disease resistant colonies, develop treatment-free management techniques, and raise mite tolerant bees well before the latest wave of wholesale hive collapse became common. For example, the first book to be published in the U.S. on organic beekeeping, *Natural Beekeeping: Organic Approaches to Modern Apiculture* that I authored, was first released in 2007 just as CCD was capturing the national consciousness. I began work on the book three years earlier, and the primary thrust of the book is to rely less on toxic chemicals, antibiotics and artificial diets and thus reduce the sub-lethal stresses such management techniques impose on hives in favor of more natural and organic approaches like those discussed in its pages. Once the phenomenon known as CCD became well established, other authors wrote books specifically about Colony Collapse, explored its probable causes and pointed to potential solutions such as *Fruitless Fall* by Rowan Jacobsen, and *A Spring Without Bees* by Michael Schacker.

The plight of the honey bee has also been enlisted in the effort to slow and eventually reverse climate change caused by green-house gasses. The changing and unpredictable weather patterns, acidification of the world's oceans, and global warming trend which is relatively rapid in terms of geological time, all combine to threaten pollinators as much as human health and well being. Bill McKibben, author, environmental activist, and co-founder of 350.org published *Oil and Honey,* which recounts both his global efforts and his localized personal involvement in finding solutions to preserve a sustainable planet. To date, McKibben's efforts have resulted in civil disobedience actions and arrests, as well as the largest climate protest in U.S. history with approximately 350,000 people marching in the streets of New York City in the days leading up to the U.N. climate summit this past September. In his book, McKibben balances the hectic and sometimes stressful activities associated with taking on some of the largest, wealthiest and most polluting corporations in history with the relatively calm and grounded work of occasionally assisting Kirk Webster with his bees in Vermont's Champlain Valley…an activity that I suspect helps to keep him centered and balanced in the midst of his challenging work.

Scientists Activate

Since 2006 researchers in academia, government and industry have developed numerous approaches to supporting beekeepers in the field, from new mite and disease control measures to nutritional programs designed to boost hive health. Work on developing bees with improved genetics has shifted into high gear: with the importation of Russian Bees and the establishment of the Russian Honey bee Breeders Association; the development of Hygienic bees at the University of Minnesota; the study and promotion of *Varroa* Sensitive Hygiene (VSH) stock; the acquisition and importation of new honey bee germplasm in an effort to increase honey bee genetic diversity led by Susan Cobey of U.C. Davis and Washington State University; and the growing trend that focuses on the breeding and development of regional strains of queens and bees that are better adapted to local conditions.

Some researchers are making extra efforts to bridge the gap between scientific research and practical application, such as Marla Spivak, who founded the University of Minnesota Bee Squad. This program seeks to emphasize and develop a regional intelligence that addresses Minnesota beekeeping in particular, and help newbees bypass the trial and error stage and jump straight to the most efficient and successful beekeeping management practices.

Another example is the Bee Informed Partnership (BIP) led by Dennis vanEnglesdorp currently at the University of Maryland. The BIP is a collaboration of numerous universities and agricultural research labs, supported by the U.S. Department of Agriculture and the National Institute of Food and Agriculture. This partnership collects and shares large quantities of data on hive management techniques from and with beekeepers all around the country in an effort to identify the most successful beekeeping practices.

Environmental Groups Target CCD

Meanwhile, organizations that have long opposed the use of toxic pesticides have found in the honey bee a new poster child for their cause. The Neonicotinoid family of pesticides has been a major focus of activism since this relatively new family of pesticides have been linked

to sub-lethal impacts on pollinator navigation, fertility, and immune function. Friends of the Earth International is one organization that is focusing on the plight of the honey bee as a way to further causes they have long championed. Friends of the Earth authored the report 'Gardeners Beware 2014: Bee Toxic Pesticides Found in "Bee Friendly" Plants Sold at Garden Centers Across the U.S. and Canada.' This report outlined how major retailers such as Lowes, Home Depot, and Walmart sell "bee friendly" nursery plants that have been treated with neonicotinoid pesticides, which due to the fact that they are highly attractive to pollinators, act as a source of harmful sub-lethal pesticide exposure for bees and other pollinators.

Friends of the Earth also published the report "Follow the Honey: seven ways pesticide companies are spinning the bee crisis to protect profits." Covered in the September 2014 issue of *Bee Culture*, the report reveals how tobacco industry-style tactics are being used to divert attention from, and cast doubt on industry complicity in pesticide's role in the current pollinator decline, while at the same time spinning PR and buying credibility in an effort to be perceived as champions of pollinator health, rather than a major source of their woes. Friends of the Earth is calling for a moratorium on neonicotinoids until additional studies can be done on them.

Not to be outdone, a ban on pesticides in one form or another is also being called for by the Sierra Club, Beyond Pesticides, The Center for Food Safety, Public Employees for Environmental Responsibility (PEER), The Pesticide Action Network, and Occupy Monsanto among others.

Film Makers Zoom In on Beekeeping

A number of documentary-style movies have been released with the majority focusing on the beekeeping industry and the current health challenges facing the honey bee. Titles include: *The Last Beekeeper* by Jeremy Simmons, which follows the lives of three commercial beekeepers (from South Carolina, Montana, and Washington state) over the course of a year as they struggle with the impacts of CCD; *Who Killed the Honey Bees* by James Erskine, a BBC documentary that explores the causes of CCD; *Queen of the Sun* by Taggart Siegel, which looks at CCD from multiple angles while exploring the historical and contemporary relationship between bees and humans; *Vanishing of the Bees* by George Langworthy and Maryam Henein which reveals some of the struggles that commercial beekeepers David Hackenberg and Dave Mendes face as they strive to keep their bees healthy in the age of colony collapse; *Nicotine Bees* by Kevin Hansen that focuses on the role that pesticides play in threatening the health of honey bees and our food supply; and *More than Honey* by Markus Imhoof that looks at the relationship between humans and honey bees through the juxtaposition of the small family run and the large industrial scale beekeeping operation.

Businesses Focus On CCD

By associating their name to efforts to help the bees, businesses and corporations are helping the bees and finding that it can be good for business at the same time. Since 2008 the Häagen-Dazs ice cream company developed a Vanilla Honey Bee flavored ice cream and has donated more than a million dollars to honey bee research. The company also supports the Häagen-Dazs Honey Bee Haven, a bee friendly demonstration garden on the UC Davis campus.

Numerous other businesses have set up programs to help the bees, including: the "buy a bottle, help a bee" initiative developed by the Honeydrop Beverage Company in Brooklyn, NY. The company partners with local beekeepers and donates 1% of sales of their honey sweetened beverages to helping the honey bee; Cascadian Farm's Bee-Friendlier campaign that contributed 50 cents for every code redeemed online through the end of 2014 to support bee research and habitat creation. In addition, they contribute $1 from every box of Buzz Crunch Honey Almond cereal to the Xerces Society dedicated to the conservation of invertibrates and their environment; and wine maker Jean-Luc Colombo's Bee Helpful program that directs a percentage of proceeds from retail sales of his "Les Abeilles" wine to support research to help save the bees.

Activism's 100th Birthday

Activism of many shapes and sizes is alive and well when it comes to the world of bees and beekeeping, this despite the fact that the word "activism" itself appears to be a fairly new word in the English language. The first known use of the word activism appeared just 100 years ago (1915), according to the folks at Merriam-Webster.

Today people from all walks of life are taking up the cause of the honey bee and pointing out the many ways we can help the bees survive. Whether it is by filing a lawsuit, changing our beekeeping practices, eliminating pesticide use, planting more forage for pollinators, supporting beekeepers and bee research, buying local honey or eating ice cream, the plight of the honey bee appears to be something that most everyone can rally around in one form or another. BC

Ross Conrad authored the revised and expanded 2nd edition of Natural Bbeekeeping published in 2013 and will be leading a symposium on natural beekeeping for the Philadelphia Beekeepers Guild on Sunday February 8th. Visit phillybeekeepers.org for more information.

Photos by Chris Harp.

Rapeseeds As Bee Plants

Connie **Krochmal**

The various rapeseeds are also known as rape. They have been in cultivation since 2000 B.C. or so in Asia. Grown much like grains, these bee plants are members of the cabbage or crucifer family. Different types of rapeseed are grown specifically for various purposes, although the plants are quite similar. This is a profitable crop for growers more so than Winter wheat in some locations.

The oil is used for cooking, fuel, and industrial purposes, while the seeds and seed meal are fed to animals. In the U.S., these were widely grown during World War II. In the late 1980s and 1990s, they were a popular crop in the South.

In recent years, the oil from the various canola varieties of rapeseed has been touted as being heart-healthy. The first canola varieties, which were hybrids of mustard and various rapeseed species, were bred in Canada beginning in 1974. These are called 'double lows,' since they're low in erucic acid and glucosinolates, which are harmful to humans and other animals. 'Double-low' European varieties were later released.

General Description

Generally, rapeseed pretty much resembles mustard. These broadleaf, slender, erect, vigorous plants are usually grown as hardy annuals. Although rapeseeds can vary somewhat in height according to the species, variety, and planting time, they're typically three to five feet in height. These feature long taproots and fibrous root systems that are close to the soil surface.

Covered with a waxy bloom, the much branched plants form a thin stand. The foliage initially emerges as a thick rosette very close to the ground. For Fall-planted crops, the plants go dormant as temperatures drop and resume growth the following Spring.

Rapeseed blossoms are quite similar to those of mustard. A field of rapeseed in full bloom is spectacular. With four petals and sepals, the flowers form flat topped clusters. The two whorls of stamens can vary in length within the flower.

Fall planted crops, which need a Winter chill in order to flower, typically bloom around April or so in most locations. In Florida and California, this can occur from February to March.

The Spring planted varieties can begin blooming about 39 to 41 days from planting time. Flowering usually takes place during June or so for about a month. A small number of blossoms, usually around five, open daily per plant.

The pods or capsules contain several small, brownish-yellow or brownish-black seeds, about the size of poppy seeds. The lower pods develop first. The seeds typically contain around 20% protein, and 30 to 45% oil, depending on the variety and growing conditions.

Where Grown

In the U.S., much of the rapeseed is grown in Idaho, the Plains, the Pacific Northwest, Upper Midwest, and the Southeast, including Florida. The crop is also cultivated in Minnesota, Wisconsin, Missouri, North Dakota, Kansas, Oklahoma, Montana, Alabama, Virginia, Kentucky, and Tennessee. This is often grown as a niche or specialty crop, such as organic food for poultry and "farm-to-table" restaurants with the cooking oil being recycled for biofuels.

Growing Conditions for Rapeseed

These crops prefer cool, moist growing conditions and well drained, fertile soils. Adapted to most soil types

except heavy clay, they do best in medium textured soils or silt loams. Generally a slightly acid to alkaline pH is suitable. Their adaptability to very acid soils seems unclear. The plants have some tolerance for salt.

Although the crop can grow at 32°F, the best growth occurs when the soil temperature is around 50° or so. The minimum temperature for germination is around 40°F. Intolerant of drought, the crop needs 11 to 18 inches of water during the growing season. Adequate moisture results in an increased yield.

Planting Rapeseed

There are different varieties for specific soil types, various regions, growing conditions, and planting times. Some are more tolerant of frost than others. Herbicide tolerant varieties are available.

This can be planted during the Spring or Fall, depending on the location. Generally, the soil is tilled to create a smooth, well-prepared surface in order to minimize weeds. Once these quick growing crops germinate, they can suppress weeds. The seeding rate varies according to the variety, location, soil type, planting time, and planting method. Generally, about three to five pounds of seeds or so are sown per acre.

For bee gardens, plant ½ ounce of seed per 100 foot row or about six to nine seeds per square foot. If broadcasting, use a rate of three ounces per 1000 square feet. For larger areas, standard agricultural equipment or a grain drill can be used. Seeds should be planted from ½ to an inch deep, depending on soil type. Germination occurs in four to ten days.

Fertilizer is normally applied at planting time based on growing conditions and soil test results. This can include nitrogen, phosphorus, potassium, and sulfur. Additional nitrogen is needed for Spring-planted crops in some locations.

Problems of Rapeseed

Aster yellows and blackleg occur in some areas. The most common disease is sclerotinia, also called stem rot or white mold, which typically appears in cool, moist areas after flowering has taken place. Disease resistant varieties are available.

Deer browse the plants. Insects are uncommon on the Winter crop. Flea beetles can sometimes strike as soon as the seedlings of the Spring-planted crop emerge. Diamondback moth caterpillars are most prevalent during dry weather. Cabbage moths, stink bugs, and lygus bugs can occur on the Spring-planted crop.

Rapeseeds can be grown organically. Conventionally grown fields are sometimes treated with pesticides, which can pose potential risks for bees.

Acreage, Harvest and Expected Seed Yield

Rapeseed acreage fluctuations are largely due to weather conditions and crop prices. The average is around 1.5 million acres, although this has been as high as 1.77 million at times.

Maturity time and yield are influenced by the variety, weather, location, growing conditions, planting time, and growing practices. Harvest usually occurs from 80 days to 125 or so from planting. Pods are ready to harvest when around 40 to 50 per cent of the seeds in exposed pods are reddish brown. The average yield per acre is around 1400 to 2500 pounds or so, although yields can be somewhat higher in the Southeast, particularly in Florida.

Species of Rapeseed in Cultivation

Various species of rapeseed are grown in North America and elsewhere. Some of these have also naturalized,

Bird rape (*Brassica rapa or Brassica campestris)*

Also known as turnip rape, the plant was introduced from Eurasia. This cool season annual, biennial, or perennial has long been cultivated. It has naturalized in all regions of the country. Bird rape occurs as a weed in cultivated fields. The oil, known as rape oil, is used for soap, fuel, and as a lubricant. The roots are edible.

This erect, slender plant is one to three feet or more in height. It is usually branched. The foliage is bright green. The stem leaves, three to six inches long, are soft. The prickly, toothed, lower leaves, reaching a foot in length, can be lightly bristled.

Bird rape blossoms emerge unevenly, beginning in April in most locations. This has slightly smaller flower petals than some species. The pods are up to 2½ inches long. This species yield lots of yellow pollen. The amount of honey differs from one location to another.

Indian mustard (*Brassica juncea)*

Originally native to Eurasia, this has been grown for centuries. Also known as brown mustard, the widely variable plants are sometimes grown for the edible leaves, which are used as a vegetable. This species has naturalized in all regions.

It typically occurs as a weed in cultivated fields. Indian mustard dislikes coarse textured soils. The plant adapts to drought, salt, and various pH levels. Unlike most rapeseeds, this one is suited to partial shade.

This erect, slender, very variable, much branched annual or perennial is two to four feet in height. The stem leaves, three to six inches in length, are soft and prickly. The basal leaves can be large – over a foot in length. The edges are scalloped or notched. The small, bright yellow blooms, 3/8-inch long, open on a sparse cluster. These can be seen from June through September. The pods reach 2½ inches in length.

Rape or turnip (*Brassica napus)*

This much branched annual or biennial of unknown origin was introduced from Eurasia. It has naturalized in all states except the Dakotas, Minnesota, Nebraska, Wyoming, Utah, Arizona, Texas, Florida, and Pennsylvania. Rape is typically found in waste ground.

The plant grows from two to five feet in height. The lower stems can be purple. Sometimes, the stalked, lower leaves are bristly. The light yellow blooms, ¾ inch wide, can open unevenly over a period of time, generally from May to June.

The pods are two to four inches long. One particular variety, *Brassica napus var. oleifera,* yields rape oil, which is grown for edible and industrial purposes. The seeds also serve as bird and poultry feed.

Pollination and Bee Value

There appears to be disagreement regarding

pollination. Some say this is a requirement for rapeseed, while others consider it non-essential but beneficial in terms of higher yields and crops that ripen evenly. The May 2013 issue of *Bee Culture* published a study on insect-pollinated crops that listed canola and rapeseed. In Canada, Bayer and others use bees to pollinate canola grown for seed.

Normally, most rapeseed farmers in North America benefit from the presence of nearby hives rather than contracting for pollination services. Around two to three hives per acre are recommended.

Rapeseed flowers, which are rich sources of nectar and pollen, are sure to attract bees, which will travel for several miles to reach the blossoms. The flowering season can be extended by planting both Spring-planted and Fall-planted crops or by choosing varieties with different maturity dates. In some cases, the Summer-blooming crop can provide bee forage when little else is available.

To derive full benefit from the nectar and good quality pollen, strong colonies are needed. The crop has been a major nectar and pollen plant in some regions, including the Plains, Idaho, and Wisconsin.

In general, the nectar at the base of flowers is quite accessible to bees. Most desirable of all is that from two nectaries at the base of the short stamens for this nectar contains a higher sugar content than that elsewhere within the flower. Each trip, a bee can visit 300 rapeseed flowers. A blossom can provide two to four mg. of nectar daily.

The nectar flow is so heavy that colonies have been known to add 20 pounds or so per day, usually enough to fill two supers. Rapeseed has a moderate honey potential of 60 to 100 pounds or so per colony although this can vary somewhat, based on the plant species and variety.

Normally, this is a premium quality, opaque honey with a mild, delicate, pleasing flavor that can vary somewhat among the different species and varieties of rapeseed. In some cases, it has a wine-like flavor. These honeys are often mixed with stronger tasting ones. Usually non-dripping, the fine grained, smooth, firm textured honey is quite easy to spread.

The color, quality, and aroma are influenced by growing conditions. This is especially true for heavy soils, which sometimes yield a honey with a less pleasing aroma and flavor.

In general, the color is often white or water white. However, it can also be clear, whitish-gray, pale buff, cream colored, pale or bright yellow, golden, or light amber. This honey is unsuitable as a Winter food for bees as it can cause dysentery.

One important characteristic with regard to this honey is the fact that it crystallizes extremely quickly due to the high glucose content. It should be removed from the hive as soon as the blooming period ends.

Crystallization can occur within days or even 12 to 24 hours in some cases. It usually happens within a week. Stored frames can granulate within a month. However, the honey from certain canola varieties doesn't crystallize quite as swiftly. BC

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

Photo courtesy of U.S. Canola Association.

Wait, How Much Water?

Frank **Linton**

In Winter, bees generate warmth by 'burning' the honey they have stored, i.e., by digesting it and using the resulting energy to flex their flight muscles, which give off heat. Also, they form a tight cluster to keep the heat within; they do not heat the hive, only their cluster.

For many beekeepers it is standard practice to put a thick layer of something atop the hive, on the inside, to 'absorb the moisture' that is produced by the bees' respiration during the winter. The purpose of this absorbent layer is to prevent water condensing on the ceiling of the hive, dripping down and wetting the bees, cooling them, and destroying the colony by freezing it.

The water comes from the 'combustion' of the honey; the products of combustion being carbon dioxide (CO_2) and water (H_2O). The water is exhaled as vapor and condenses on the cold walls and ceiling of the hive.

It is my contention that so much water is produced by the bees' digestive process over the winter that no reasonable amount of absorbent material could contain it. Instead, what is happening, I contend, is that the thick layer of 'something' acts as insulation, preventing condensation on the top of the hive, so that condensate forms only on the walls of the hive, where it either freezes or runs down the walls, harmlessly, in either case.

Photo by Fred Gimeno

OK, so how much water *is* produced when a super of honey is digested?

We can compute the answer: Let us assume there is 40 lb. of honey in the hive for the colony to consume.

40 lb. x 18% is 7.2 lb. of water; nearly a gallon (8.3 lb.)

Of course, the hive has some ventilation during the Winter, which provides the bees with oxygen and carries off excess CO_2, for example, and it is reasonable to assume that some of the exhaled water vapor will leave the hive by way of this ventilation. But let us focus here on the quantity of water produced.

So our question is, for each pound of honey consumed by the bees, how many pounds of water are produced?

The formula for both fructose and glucose is $C_6H_{12}O_6$. Digesting (burning) the honey requires additional oxygen; six O_2 molecules, to balance the chemical equation:

$$C_6H_{12}O_6+6O_2 = 6CO_2 + 6H_2O$$

To put this into plain English, one molecule of sugar ($C_6H_{12}O_6$) and six molecules of oxygen (O_2) yield six molecules of carbon dioxide (CO_2) and six molecules of water (H_2O). After removing the water, the 40 lb. of honey is 32.8 lb. of sugars.

To compute the amount of water produced we first have to convert the molecules of sugars to moles. Do you remember your high school chemistry? I did not. I had to look this up. I also had a chemist check my work.

First, you look up the atomic masses of the atoms involved:

- Atomic mass of carbon is 12
- Atomic mass of hydrogen is 1
- Atomic mass of oxygen is 16

Then you can compute the molecular mass of the sugar:

- 6 carbons x 12: 72
- 12 hydrogens x 1: 12
- 6 oxygens x 16: 96

The sum of these is the molecular mass of the sugars: 180.

That is, one mole of the sugars is 180 grams.

We see from the chemical equation above that each molecule of sugar produces 6 molecules of water. Computing the molecular mass of water:

- 2 hydrogens x 1: 2
- 1 oxygen x 16: 16

The molecular mass of water is 18, but recall that six water molecules are produced for each molecule of sugar. Multiplying:

- 6 molecules of water with molecular weights of 18 each, total: 108

That is, one mole of the water is 18 grams, and the six moles of water that form from one mole of sugars is 108 grams.

Now we can find the weight of the water produced by digesting honey by using proportions:

The proportion is:

Molecular weight of the water / Molecular weight of the sugars = pounds of water / pounds of sugars

Putting in the numbers from above

108 / 180 = '?' / 32.8

Solving for the '?' yields: 19.7 pounds of water - from 'burning' the sugars.

Adding the 18% water to this:

7.2 + 19.7 = 26.9 pounds of water

That is, 26.9 pounds of water are generated from our 40 pounds of honey (and the added oxygen from the air).

Given that a gallon of water weighs 8.3 pounds, *our colony will produce over three gallons of water* as it

consumes its winter stores. A big sponge would be required to absorb this much water.

Keep in mind that this water is produced as vapor, over several winter months. Presumably, much of it is removed from the hive on departing air as it is replaced by fresh. However, if the water vapor should contact a cool inner surface before it exits the hive, it will condense, liquefy, and perhaps freeze.

The inner surface of the hive is cold in winter; there is no preventing it, and water vapor will condense on cold surfaces. If that cold condensate drips down onto the winter cluster it will be their end. You can prevent this by providing a small vent hole near the top of the hive to let moisture-laden air escape, and by heavily insulating the top of the hive so that moisture condenses on the hive walls, not at its top. BC

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NAPPC: The Collaboration Continues Long After The Conference Ends

Toni **Burnham**

All over North America, and probably the world, beekeepers like you are having wonderful ideas and are trying creative and inspiring projects to help honey bees and other pollinators. Mostly our reach is local and though we hear about important academic research, and the occasional corporate commitments to helping honey bee health, we may not feel or act in connection with it, or have the far-reaching impact that pollinators need. The North American Pollinator Protection Campaign (NAPPC) Conference is an annual two-day event where efforts like ours coalesce: bringing all sorts of players, ideas, resources, and momentum together to take these efforts to a whole new scale: one with potential for changing the entire game.

The NAPPC Conference takes place each year in October in the Washington, DC area: this year, hosted by the U.S. Department of Agriculture right on the National Mall. Past meetings have been hosted by the U.S. Environmental Protection Agency and even the U.S. State Department. These relationships and locations have been one of the keys to ensuring the long term and substantive presence of national leaders in the work to protect pollinators.

I participated in the conference for the first time this year, and would like to share both information and individual impressions from this event, believing that what is discussed and planned here will influence the activities and opportunities around beekeeping across the continent in the year to come.

A conference of many parts

Before the meetings, there are the awards, which provide a powerful introduction to NAPPC's interest in finding, supporting, and promoting original initiatives that protect and promote pollinators. The list of recipients included a lawyer from Florida, an architecture firm in Toronto, farmers from South Dakota and Alberta, and a scientist from Mexico who worked on issues ranging from creating tax incentives for bee habitat to hotels for native pollinators, breaking up our monocultural plains for sustainable farming and pollinator forage, and saving the home grounds of the Monarch.

Like most things at NAPPC, an award is not just an award, it is a catalyst: one recipient of the Pollinator Advocate Award, Julie Zahniser, of *American Bee Project* to use tax incentives to increase the habitat available to honey bees, tweeted: "[At NAPPC] A woman from the U.S. Forest Service came up to me – and said that she had received a call that morning from the White House – They think our bee project is an idea that has the potential of preserving hundreds of millions of acres of land for bees and want to collaborate with us!" Zahniser shares this award with Canadian firm Sustainable.TO, who developed a network of bee condos in Toronto, and Mexican Pollinator Advocate Dr. Pablo Jaramillo who has worked with local farmers to restore the Oyamel forests for overwintering monarchs. South Dakota farmer Sam Heikes and his daughter Heidi received the Farmer-Rancher Award for innovations that brought sunflowers, sustainable farming, and a bee-supported CSA to the monoculture-dominated Great Plains, and the Coens of Alberta's Grassroots Family Farm, who wove permaculture and pollinator forage into pastures for cattle to receive the Pollinator Conservation Award.

Later on, during the members-only meeting, NAPPC attendees learned about the outcomes of another kind of award, Honey Bee Health Project funding for innovative and important work to understand and promote genetic stock improvements, understand and promote best management practices for commercial beekeeping, and promote forage opportunities for colonies on public and private land. 2014 grantees looked for new tools to research winter hardiness by analyzing hemolymph, potential exposures to neonics in fluids released by corn (even though it is not a bee pollinated plant), how the behavior and level of work performed by bees is affected by poor nutrition and drought, citizen science use of nematodes to control small hive beetle, and the value of pollen diversity to bumble bees. These studies brought new research tools and methods, as well as new perceptions of known threats, to a community of empowered advocates in a position to do something about them.

The mention of the non-public sessions highlights another feature of the NAPPC conference: most of day one is devoted to public presentations that illustrate the state of the effort to promote pollinator health today by government, science, and industry. The rest

of the conference is a member-only conclave devoted to delivering future tools and insights.

The public session is free (registration required, though and they set the tone for both parts in important and exciting ways: this year, the June 20 Presidential Memorandum bringing federal action to bear on collaboration, science, practical management and research goals visibly animated many of the government-side presenters and participants: opening up new resources in habitat, project planning, and investment across the nation. Among the directives that open up federal lands, mandate pollinator plantings on government property, assessing the affects of neonicotinoid pesticides on pollinators, educating the public about pollinators, and more on an agency by agency basis.

A presentation by Peter Beesley of Pacific Gas and Electric (PGE) seemed to me to demonstrate (in a most inspiring manner) the direction which some of these actions could take. PGE is one of the founding members of "Business for Bees," creating a network of businesses taking action to foster the recovery and sustainment of pollinators and their habitat and bringing a "pollinator ethic" to land management. What does this mean? PGE is turning its right of ways into pollinator forage, and re-landscaping real estate, with the help of native plant and pollinator specialists (and employee volunteers), to reduce water use, decrease erosion, and increase the green impact of their holdings. Exactly what the White House is asking agencies to do on a national scale.

I was deeply interested in taking a look at the role of the corporate participants in the conference, since their sponsorships are important to the effectiveness of the effort but findings about pollinator health might come out contrary to business goals. Talking to many participants, it seems typical that the corporate side is not a lot different from the participation of bureaucrats and even beekeepers. There are many that are there, like PGE, out of sincere interest and an openness to real solutions, and others which are there for PR and the promotion of particular goals and opinions. The conference is unusual in getting stuff done anyway.

And the neonicotinoid issue was certainly on the program. Talking to Dr. Jeff Pettis of USDA/ARS, "Over the years, the discussions of declining pollinator health at the conference have consistently included a role for pesticides, among multiple factors. But today pesticides have moved up the list in those considerations. NAPPC brings multiple government players to the table as that happens."

The beekeeping industry concurs: Tim Tucker of the American Beekeeping Federation also touched on this, mentioning that "we need to get back to IPM, but a ban is not realistic: We must provide crop protection but we must be wise." And it needs to be noted: the EPA's positive and sincere participation in the area of honey bee health has only increased, both at NAPPC and across the board, and this would not be the case if there was not a significant reason to look at pesticide impacts on losses.

The heart of NAPPC

The factor that distinguishes NAPPC from any other conference I have attended is not that it has both public and private sessions, but that there is a unique reason for the latter and how they are used to build the tools and pollinator protection coalitions of the future.

At its heart are task forces created by the board to take on specific pro-pollinator projects. The gorgeous posters and helpful brochures that you may have used in classrooms or in outreach, as well as efforts to improve pollinator forage or science originate in these short-term, cross-discipline, and highly specific teams.

This article will not discuss the conversations or work of any individual task force, because their confidentiality provides the freedom for participants to comment, collaborate, and brainstorm with maximum effect.

Confession: arriving at my first NAPPC conference was a little like joining an action movie about 20 minutes in because of these ongoing projects: almost all the players know each other, have an agenda, and need to get something done…it takes a while to come up to their speed. This is how I think it works.

Many conferences provide the opportunity to network and brainstorm: at a NAPPC conference they ask you to sign up to do something meaningful and specific, they provide you critical tools to get the job done, and then they stay with you to make sure it happens. One task force participant shared with me that "No one wants to get to the next conference with little or nothing done. And everyone is busy. So you break it down: one person chases down a metric for how much of something there is out there, another person drafts a text, everyone delegates and volunteers and delivers, and important things get done." Everything from a pollinator stamp to a reliable assessment of the status of North American pollinators to better forage to an improved understanding of the vectors of honey bee diseases. And those gorgeous posters and brochures.

As a longtime local activist, the powerful realization for me was that this task force put me in the room with folks who were either doing or had connection to similar projects across the continent, and instead of duplicating or overlapping, we were being provided a chance to reinforce and to scale nationally. I had a ton to contribute, but at least as much to learn (and to bring home).

A conference that doesn't actually end?

I'd like to close this article where most pieces about NAPPC begin – it is a collaborative group of over 130 organizations and individuals that seek to encourage the health of all pollinating animals in North America, and the annual conference is the largest single project of the organization. The NAPPC Conference is 14 years old, and attracts several hundred attendees from beekeepers to bureaucrats to grad students to the heads of government agencies to understand and work on pollinator health. By cleverly placing the conference geographically, scientifically, politically, economically and strategically at the crossroads of where pollinators and the people who manage, depend on, and study them need to be, and then keeping them in contact with ongoing tasks, NAPPC creates a dynamic conversation and collaboration that goes on long after the lights are turned off in Washington DC. BC

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

Why We Keep Bees?

Joe **Traynor**

Ask a beekeeper – commercial, sideliner or hobbyist – why he/she keeps bees and the answer could be any or all of the following.

1. The opportunity to be outdoors – to commune with Nature
2. Fascination with observing the organizational skills and inner-workings of honey bee colonies
3. Setting yourself apart from the crowd – delving into a vocation or avocation that few would consider
4. Producing honey
5. To earn a living
6. For the therapeutic value of bee stings (or for masochists)
7. For the relatively independent life-style
8. You inherited a bee farm

One or more of the above answers probably fits many beekeepers, but from a five year stint running 500 colonies + 30 years of observing commercial beekeepers, I have concluded that the major reason people keep bees is difficult for them to articulate because it is so embedded in the fabric of the endeavor that it doesn't stand out and is therefore not readily apparent – a "*can't see the forest for the trees*" phenomenon.

Here's my take (and I certainly won't argue with anyone who feels differently): the main reason we keep bees is to experience the highs and lows that come with the job. What other occupation can provide so many highs and lows?! – not only from year to year, but from month to month, day to day or even hour to hour as one tends hive after hive during a working day. The dour German philosopher Arthur Schopenhauer has stated "*To overcome difficulties is to experience the full delight of existence*" Welcome to the world of beekeeping Professor Schopenhauer!

For a commercial beekeeper, going from one apiary site to the next can be a roller coaster ride – exhilarating if all the colonies are packing in nectar and pollen, depressing if one finds disease or pesticide damage or that another beekeeper has parked a semi-load of bees across the road from your location.

Beekeeping highs and lows can also be experienced in a single apiary site on a given day as one goes from a robust colony to a failing colony only a few feet away. When spending a day in an apiary of about 100 colonies – re-queening, medicating, feeding, if necessary – many beekeepers have learned to end the day with a top-producing colony, thus allowing a pleasant ride home and a restful sleep that night. Ending the day with a sick colony can put one in a dark mood followed by a silent supper and a restless night of sleep. For the backyard beekeeper with only two hives, it may be more difficult to wind up the day with a gang-buster colony – add two more colonies to improve the odds.

The highs and lows of beekeeping usually fall into a seasonal pattern.

Few things are more depressing than having to trash equipment.

As colonies build up in the spring and happy, busy workers communicate ever expanding flower sources, the beekeeper can't help but catch the mood of the colonies and feel that all things are possible. An occasional cool spell in late spring or early summer can trigger a nosema outbreak for the unprepared beekeeper but the Summer months are generally happy months for both bees and beekeepers as nectar flows continue and extensive brood-rearing keeps colonies well ahead of any visible damage from omni-present *Varroa* mites. In contrast to Spring, the Fall months, and certainly the Winter months, can be tough as colony populations shrink and beekeepers face the onerous, often depressing task of culling out or killing weaker colonies that might not make it through the Winter or that will require expensive feeding and medication to meet February almond pollination standards (usually eight frames of bees).

When honey bees are thriving, the beekeeper enters into an unspoken pact with his charges: *you help me, and I'll help you.* Or, as some beekeepers have put it: *if I take care of my bees, my bees will take care of me* (a basic axiom of commercial beekeeping). A silent, cooperative bond develops between bees and beekeeper when the bees are thriving, so one can understand why a beekeeper might feel betrayed when he enters a beeyard in the Fall and robbing bees inflict multiple stings during his attempts to service their colonies; the beekeeper might mutter under his breath: *ungrateful so and sos – after all I've done for you this year, you treat me like this?* It's as if your always-friendly, always-loyal dog snapped at you when you fed him instead of licking your hand in gratitude. The beekeeper inherently knows that such thoughts are not rational – that bees respond to environmental cues and have no concept of any relationship with their keepers – but it's still difficult for a beekeeper not to feel resentment if/when their bees become aggressive in the Fall. Taking the bees' point of view, they may feel that the friendly giant that worked side by side with them in the Spring has turned into a menacing intruder that must be repelled in the Fall.

In his detailed scholarly article,

The Fall and Rise of the Honey Bee, Peter Loring Borst reminds beekeepers that the 30+% winter losses currently incurred by U.S. beekeepers are no different than the losses reported during the 100 years prior to the introduction of *Varroa* mites to the U.S. and to the later finding of *nosema ceranae* here. It is a tribute to the skill of today's beekeepers that they can continue to hold Winter losses at historic levels. Certainly, shrinking bee habitat and the efforts needed to control *Varroa* and *nosema ceranae* have made beekeeping far more difficult today than in past years but overcoming these difficulties can provide the "delight" envisioned by Schopenhauer.

. . . while few things in a beekeeper's life are better than a 'Honey High.'

Bee colonies in temperate climates cope with Winter by reducing their metabolism to remain young and to preserve resources (much like hibernating bears). Although hibernation is not an option for beekeepers some have adopted another honey bee strategy: repairing and upgrading equipment. Bees plug cracks and holes in their homes with propolis as winter sets in. Beekeepers sort, replace and repair old combs and supers. Keeping busy is a proven antidote to the winter blahs.

The extreme contrast between the euphoric days of Spring and the somber, shorter days of Fall and Winter sets a beekeeper up for mild to severe manic-depression. Little wonder that more than one commercial beekeeper has been diagnosed as manic-depressive (aka bi-polar) and that many more lie along a continuum from mild to moderate manic-depression. Many individuals in the general population are also susceptible to depression during the shorter winter days, but most are isolated from nature's cues. For beekeepers, the silent, dormant state of honey bees in the winter is a constant reminder that things aren't quite right. The highs of beekeeping are much higher than those experienced by the general public, and the lows probably lower as the bees transfer their moods to beekeepers during the year. A future psychiatry journal may well contain an article: *Transference: Explaining the above normal incidence of manic-depression among beekeepers.* A number of drugs are available for those with clinical manic-depression but it can take time to arrive at the proper combination or dose for a given individual. Some manic-depressives quit medication because they miss the euphoric highs of past years – they have also discovered that they can get twice as much work done and require very little sleep during their high or manic intervals. An understanding spouse is probably better than medication in treating manic-depression (here's to the long-suffering wives of manic-depressives!); the camaraderie enjoyed with fellow beekeepers at winter bee meeting can also pull one out of a depressive cycle and for California beekeepers, a wet winter can be uplifting.

Knowledge and patience are tools that can be used by beekeepers that suffer from Winter depression: knowledge that the days get longer after December 21st and that Spring always has and always will follow Winter; patience to hold on until almond bloom starts in February. Here's a sure-fire cure for beekeepers that suffer from winter depression, especially suitable for those that store their bees in controlled-temperature buildings in December and have a competent person monitoring the storage facility: Schedule a trip to the southern hemisphere – Australia, Chile, New Zealand, South Africa – and poke your head into a few bee hives while you're there. When you return in time for almond bloom you will enjoy a seamless re-entry and be better able to cope with that picky almond grower or bee broker who complains that your bees aren't working like they should (the remedy: suit him up and open a few hives for him).

Beekeeping can be one of the most rewarding of all professions if one can overcome our current challenges. Pity the poor accountant, bank teller, bank CEO, stock broker or government bureaucrat who must endure day after day of the same old monotony. Relish and retain the highs of beekeeping and develop coping mechanisms for the inevitable lows, buoyed by the certain knowledge that the highs will surely come again and may well be just around the corner.

Note: This article is not meant to imply that most beekeepers suffer from any degree of manic-depression – many are totally immune from the malady. As one who has been hit by the depression demon from time to time, the intention here is to ensure affected beekeepers that they are not alone and that measures exist to minimize depression. Those that have depression-immunity may have wasted their time reading these words but if their immunity has a genetic basis they might well consider volunteering for a DNA analysis by Monsanto in the hope that as DNA data accumulate, Genetic Modification will eventually cure depression in everyone. BC

Joe Traynor is an almond pollination broker and long time contributor from Bakersfield, CA.

INNER ... Cont. From Page 19

manner of creatures can hide between pallets, under pallets, and in, on and around the hives. After all, they've been sitting outside for months and plants and animals and seeds and fungi and whatall can and will hitch a ride.

Nobody compares to California's level of enthusiasm for this. They cooperate with several states in an "ant free" certification program where the colonies are inspected and guaranteed to be ant free by the sending state. To qualify, hives and pallets must be high-pressure washed so all equipment is clean of dirt, plant material or other debris. Ant infested hives and rotten or broken equipment must be removed. At the same time they are also looking to see if invasive weeds are growing on the bottoms of those pallets. If they find something, there's a delay until they ID it...and that may mean taking a photo and sending to an ID expert... during regular business hours, by the way. And they are zealots about this. They don't want strangers from a strange land calling California home.

So, what about your state? How much enthusiasm does your Agriculture department show when a truck full of colonies on pallets crosses your state border? Do they do anything at all to keep out those out-of-state beasties that ride along on pallets and beehives out-of-state? Or do they assume the sending state already checked and things are fine? But what if the sending state either doesn't care, doesn't check, or doesn't even know the truck left in the first place? Or has your state simply thrown up its hands and said we can't afford to look?

So who knows if Asian Longhorn Beetles are living in the pallet? Or if Brown Marmorated Stinkbugs or Emerald Ash Borers are hitching a ride? Who checks the truck bed for bunches of fire ants riding along? And is anybody at all checking the trunks of the family car to make sure there's no plant or animal contraband lurking under that suitcase? All in all, the official list of invasives that could be riding on that truck... including amphibians, arachnids, plants, insects, pathogens, reptiles and mollusks, not to mention nemotodes, birds, crustaceans, mollusks, and fish, is 2,826 species long. And counting.

We all know most states have mostly given up on these types of inspections. The Ag community isn't strong enough to push it, and the urban community doesn't care and doesn't want to pay for it. Another bug, so what? Isn't that flowering weed in the river pretty? When the pet snake gets too big, just let it go in the swamp. But by then it's too late and the bugs have killed all the trees on a hundred city blocks and those pretty flowers have clogged the river and caused a stink and the snakes are eating family pets. Then it's spend a bunch to clean it up. Plant new trees. Dredge the river. Spray the weeds. Hunt the snakes.

What about those things that come along and find your hives? Varroa didn't walk here from Asia. African bees didn't fly here from Africa. Is anybody protecting your bees from the nasties of the world? Yes, it seems they are, but only if you live in California. For the rest of us, it's keep your eyes open, your ear to the ground, and go look over the hill to see who's moved in and brought who knows what with them and couldn't care less about sharing. It's every bee for herself out there.

•

It's January. It's already started out there. Be ready. Be careful.

Which Came First?

Timothy **Norray**

Tim Norray here from a little town of Berne, New York (Albany County). My father Jack has kept bees for over 60 years and we try to maintain around 30-40 hives. Like most beekeepers, we often get calls for cutouts in houses, sheds or old barns, but this Fall we had two swarms which were found on the branches of trees. Not so unusual I guess, but this one clung to a birds nest in a sumac tree. I know, its the end of October and awful late in the season to be catching swarms, but the homeowners never knew it was there or so close to the house until the leaves fell off and there it was. October 28th we cleared out the grape vines and much to our surprise, the birds nest still had eggs in it. So which came first?

The whole thing fits in an empty double deep, and we had an extra box full of honey we put with them to give them a chance to make it through Winter. I think we are going to try to keep this together and find a special place for it next year.

It's not a big story but my kids thought it was sure cool and said I had to send it in to you. BC

BIGGER PICTURE

Jessica **Louque**

New Year's Resolutions, 1

For most people, January instills the need to make resolutions of some sort that are supposed to make something better about your life. A lot of people use this as an impetus to diet/lose weight/exercise. The few times I've done this, it's ended by February. In the last few years, I've tried a different tactic, and it seems to be working a little bit better. I'm proposing that everyone try to add something to the start of their new year that makes them live a little more self-sufficiently in the future. For me, that means adding a defined amount of fruit trees to the property, growing a certain amount of vegetables or expanding the garden, creating something with our produce, or just general additions to the farm. I'm hoping my list will help inspire at least some of you to try the same thing each year, starting in 2015.

I know that some of these are not going to be relevant or possible for some people, and some of them are beyond our capabilities at the moment – that isn't to say we won't try to implement them in the future. Some things can be cost or time prohibitive, or take up too much space. It's up to you to do some additional research on the topics that interest you and figure out what can fit into your life. These things don't have to be held into a specific time frame except for initiation during the year. If I get a project started in the year of the resolution, I consider it a success. Here are some of my past, present, and future ideas to help spark some of your own. I've tried to give some annotations about cost, time, and space in relation to the size of my project to help with the decision-making process: $-$$$$ for cost, #-#### for time, and @-@@@@ for space.

2011: Chickens

I had not really been exposed to chickens before, but I love to cook and I love eggs so I thought it would be a good idea. I am sometimes on the bandwagon of buying things premade rather than building from scratch. In this case, I bought a pre-fab chicken coop that was basically a small storage building converted for chickens. The fence was a painstaking labor that seems to be an ongoing project even to this day with repairs and rebuilding. The chickens are awesome and I still love having them, but it is daily work, and it can be painful at times to lose a favorite chicken to a predator. Bobby's favorite rooster, Dom, who was mentioned in an earlier article of mine, died from a raccoon fight protecting one of his ladies. After killing the raccoon (he couldn't figure out how to get back out of the chicken pen as he had snuck in a hole in the hawk net), we blew it up with tannerite as a revenge of sorts for Dom. The chickens all came out and watched, and none seemed to be bothered by the explosion. I wouldn't trade them for anything but they are never going to pay for the cost of raising them without charging $5.00 per carton of eggs (We charge $2.00).

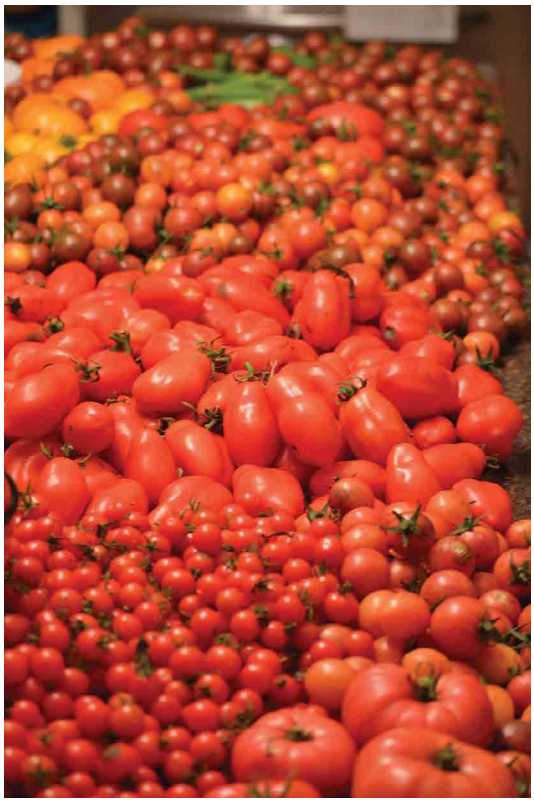
Cost: $$$$ Time: ### Space: @@

2012: Hive expansion

My resolution for 2012 was to expand my colonies to more than 40 hives by the end of the summer. I started with around 12 for the year. It took a lot of work, but I ended up with around 46 hives by the time I took off my last supers for honey. I was extremely pleased with the outcome, but I realized by the end of the year that my work schedule was too demanding to continue with this level of intensity in my beekeeping. It also took a lot more space for storing equipment than I was expecting. Cost: $$$ Time: ### Space: @@@

2012: Fruit tree additions

In continuing the homesteading adventure, I wanted to add a lot more fruit trees to the property. This resolution was advanced by my mother, who contributed more than half of the trees that I was requesting to complete this task (15 total planted by the end of the year). I ended up with two nectarine trees, two apricot trees, two peach trees, two pomegranate trees, two cherry trees, another plum tree, six apple trees, another persimmon tree, three pawpaw trees, and an additional fig tree. The downside of this was that a lot of the apple trees were heirloom varieties that did not survive due to disease (and some negligence). Some of the trees were planted at the beginning of the year and some were planted in the Fall, and the Spring trees took a lot of watering and care. In the end, the persimmon trees died, the fig tree died, half of



OK, so we had too many tomatoes . . .

one cherry tree died, and many of the other trees took a pretty hard hit over the late frosts and ice storms. All of the trees were purchased under the guise of being tolerant to the local Winter conditions. They were from the farmers' market, the local garden store, the big chain garden store, the small scale nursery down the road – all different places and all had varying degrees of success.

Cost: $$$ Time: ##-### (depending on spring or fall planting) Space: @@@

2013: Rabbits

I had the expectation to build a chicken tractor that housed rabbits so that they were constantly on the ground but safe from predators with a built-in hutch for nesting. I was going for the meat rabbits, and had set up to buy a breeding pair. In the end, I had so many changes during 2013 that I lost track of this particular project and after the house damage, loss of electricity, and the Great Chicken Massacre of 2013, it was probably a good idea that this was tabled for the time being. I do intend on bringing this back up at a later time.

Cost: $$ Time: ### Space: @@

2014: Garden Expansion

This year, the plan was to implement a much larger garden space and be able to utilize at least some of the produce. Unfortunately, we went way overboard. I just can't seem to stop myself with tomatoes, and ended up with hundreds of pounds of tomatoes that went to waste. We had a lot of marinara sauce that was absolutely delicious, but I will be a little more discerning about choosing my varieties in the future. We had amazing corn, more tomatoes than we could pick, zucchini and squash until we couldn't eat any more, eggplants in multiple colors, peppers everywhere, and okra stalks as tall as my head. The time restraints for a garden this size are too much for us during that time of year when work is the busiest, so we wasted a lot more food than I care to admit, although we had a good time growing it. We will try to reconsider our methods next year and hone in on what the kids will eat and what we use the most. Considering what we grew, it really didn't take up that much space.

Cost: $$ Time: #### Space: @@

2015: Ebola Goats

With the panic of Ebola setting in around the country, the idea of self-sustainability has made us much more aware of our limitations. If this were truly a threat in the U.S., would we be able to survive in isolation out here? The answer of course, is no. We need a natural water source, and more available food. To me, this was the perfect excuse to get goats. Not because I think we're all going to die of Ebola, but because it opened my eyes to the dependence we have on stores for most of our food. If we have some dairy goats running around, we will have about a quart of milk a day (more than we drink now) and can make butter and cheese. I don't know where I think the time is going to magically appear to milk goats twice a day plus make butter and cheese, but I think we'll give it a whirl. The only thing standing in the way of this is our work schedule. If we get positioned to travel any more during 2015, we may have to postpone the Ebola goats for a bit longer.

Cost: $$$ Time: #### Space: @@

Alternate Ideas/Future Plans

If you want to go smaller, you can always work with vermicomposting, which is inexpensive and low on time and space. Or, make a resolution to can a certain amount of food for yourself and family. You could try making meals in a jar for a week's worth of food, and then use it to eat later in the year just to see what it's like. For us, we will hopefully be moving to a larger farm in the next two years. With this upcoming change, I am hoping to:

- install solar panels on the house we build
- use a wood furnace to heat our water and the house
- use radiant heat in the floors
- have a larger garden
- raise pigs, goats, and rabbits with the chickens
- buy a tractor
- have an easily accessible water source
- produce 15% of our income on things we raise/grow

These are not going to be cheap or easy, and some of them may not come to fruition. I am hoping that we can end up with at least half of these in place in the next four years, and that we will be able to keep them going. Best wishes to everyone in the new year, and good luck on your resolution endeavors to lead a more self-sustaining lifestyle! BC

. . . but the bees are doing OK. There's just too many of them.

2015 RESOLUTIONS II

Do Some Of These This Year

Ann **Harman**

It's January! A New Year! Hang up your brand new *Bee Culture* 2015 bee calendar! You spent New Year's Eve making some New Year's Resolutions. Their normal lifetime is usually a few weeks. However, today it is time to make some New Year's Beekeeping Resolutions. Now these you need to keep throughout the year if you are gong to be a Better Beekeeper in 2015.

So let's start: **I resolve to –**

Read the Christmas present beekeeping book. Well, you asked Santa for it because it would give you the latest information and is well-illustrated. If you read it during the dull days of Winter you can be ready for building your colonies up to honey production level without swarming. One problem with all beekeeping books is that the information presented does not quite fit every part of the country. Beekeepers in the warm areas of the South will start bee work much sooner than those in Minnesota. But you can easily adapt your new information to your part of the country. Pay attention to the section on successful requeening so you can try out some new techniques this coming year.

Perhaps the book you wanted and received is about plants so that you could help not only your bees but also other pollinators. Remember that the relatively few plants in your garden will not make a honey crop but they will provide an assortment of nectar and pollen for a bee's balanced diet. Go ahead and show your neighbors your plant book and explain that these plants provide good nutrition for healthy pollinators.

Be a mentor to a beginning beekeeper. To teach is to learn. You will not be doing the newbee's bee work but acting as a guide and answering questions. Looking into a beehive is always educational (why did this colony put drone cells *there*?) and fun (just look at that perfect brood pattern!). Newbees need reassurance that all is well. They also need support if the queen dies. If you can quickly provide a queen or a frame with eggs and young larvae you will have saved a colony and prevented the newbee's disappointment. Your local beekeepers club will be pleased that you became a mentor.

Have a plan for opening a hive. You have your veil on, hive tool in hand and are lighting your smoker. Stop. Ask yourself: Why am I going into this hive? Think. Am I looking for disease, food, brood? Or am I 'just looking?' Bees function best when not disturbed. Even if you are careful in pulling out a frame you may have scraped open some honey-filled cells. Housekeeper bees will have to clean up and repair comb even if the damage is small. Cool air may be entering the hive and house bees must hasten to protect brood. If you have small hive beetle infestation, any disturbance may encourage the female beetle to lay more eggs, thus increasing the population. With a good plan in mind, then open and disturb as little as necessary. If a problem were found then that would be a perfectly good reason to return for observation or correction.

Keep some sort of records. Yes, you can use the 'brick method' of indicating 'all is well,' or 'bad queen.' But we are all perfectly capable of forgetting which hive has a two-year-old queen or if 'that hive' has a bad inner cover or is it that hive over there? Although the hive inspections result in sticky fingers or gloves, our phones and pads make handy record keepers. Either protect them from sticky honey and even stickier propolis or protect your fingers with exam gloves that can be removed easily. We can enter brief comments – 'feed #4' or 'make nuc #6.' Add the date of your notes and now you can do something with those hives without disturbing any others. Keeping records of queens can help you decide which are worth keeping and which need requeening now or before Winter. Keep records but don't make them so complicated that you won't use them.

Be a Weather Watcher. Endless drought in California and endless rain with flooding in another part of the U.S. are all reported on radio and TV. Bees have had to cope with weather as long as they have been on earth. And they managed as best they could. Today we are stewards of our bees and thus have the responsibility to make sure they have good living conditions and sufficient food. Our weather patterns are definitely changing. Our apiary sites may become more prone to flooding, especially flash floods that suddenly sweep away not only cars but also beehives. Apiary sites are limited, even in rural areas so escaping floods may not always be possible.

However drought is something we need to notice. Weeks, even months without rain affect our bee pasture. So have you noticed that your colonies are short of food? We

Keep some sort of records.

Learn something new.

our vegetable garden and water the wilting plants. However, checking all colonies for food supplies is just as important. It is simply easier to see a wilting tomato plant than a hungry colony. During severe drought you may get a reduced honey crop or none at all but you do need to keep your colonies alive until weather conditions improve.

Be a Plant Watcher. Yes, plants can be good indicators of weather conditions. Too much rain can cause some plants to have excessive growth but little flowering. The nectar in those flowers can be more dilute or even washed out. In drought conditions have you noticed that wild plants are not growing as well? You don't even have to search out bee plants. Just observe any flowering plant, not artificially watered. Is it smaller than usual? Fewer flowers? Smaller flowers? The plant can only grow and produce flowers with good growing conditions. Let plants reinforce your weather observations.

Other plant information can enter into your beekeeping. Can you really keep track of what is going on in those 18,000 acres around your beeyard? You can't see over that hill; you never go down that road. Farmland that was supporting bee pasture for years is now a housing development or is growing wheat. Your bees lost a food supply. It may be difficult but try to keep track of your surroundings.

Another good reason to be a Plant Watcher (and a Weather Watcher, too) is the approach of blooming of your honey crop plants. You have your honey supers ready but when to put them on? The plants will let you know.

Control those pests, *Varroa* and small hive beetle. This would be a good time to review just how well your controls of varroa and small hive beetle have been working. Perhaps it is time to review what is available from the equipment suppliers for both of these pests. Now is the time new products come on the market that may be more effective or easier to use. Here is where you can think back – and review your records (if you kept any). If you had happy, healthy colonies perhaps you do not need to make a change. However, if you notice something new in the catalogs, go ahead and try it on a colony or two. Then, provided you are keeping records (see above), you can decide to make a change or not.

Try making something new. You have been making beautiful candles that sell very well. However have you ever made lip balm or lotion bars? What about making mead or honey beer? Look at the books and equipment available in the equipment suppliers' catalogs for doing any of those. It's Winter now so you are not very busy with bees. It's a good time to get out of a rut.

Learn about other pollinators and other stinging insects. We know our honey bees are in trouble, but so are bumble bees and the numerous 'pollen bees.' You have probably had questions about carpenter bees and been called about capturing 'those bees' that turned out to be yellowjackets. Even if you live outside the range of Africanized bees you probably have been asked about 'Killer Bees.'

We think about the environmental problems our honey bees have but those problems also affect other pollinators and predators, such as wasps and yellowjackets. As beekeepers we need to give good information about them when asked questions. Can you give the same useful information about bumble bees –their yearly life style, different sizes (species), and why they need to be protected?

This Winter is a good time to become knowledgeable about all these critters and their value. Much information can be found on the Internet and in some books. A fairly new, small, inexpensive publication, *Wasp and Bee Management*, by Jody Gangloff-Kaufmann, has concise information about various bees and wasps. It can be ordered from PALSpublishing@cornell.edu.

Participate in local and state association activities. These associations bring speakers to provide beekeepers with new ideas and new research results. At large meetings equipment suppliers will be happy to bring you pre-ordered supplies to save you freight costs. Meetings are a good place to share beekeeping information – what worked and what didn't.

If you have been attending these meetings are you one of those who arrive at the last minute and leave immediately when the Chair said 'meeting adjourned?' Perhaps you could help in some way, either before, or during or after the meetings. Help could be as simple as putting away a few chairs or tables, arranging door prizes or bringing some refreshments. Associations, large or small, are always better with more participation.

Bee Prepared. Get organized! Mend, repair and paint equipment before it is needed. Buy supplies before they are needed. Have honey supers ready before the blossoms burst. Rotate out old comb. Keep apiary clean. Make sure bear fence is working before the bears wake up. Plan management strategy before the bee season starts.

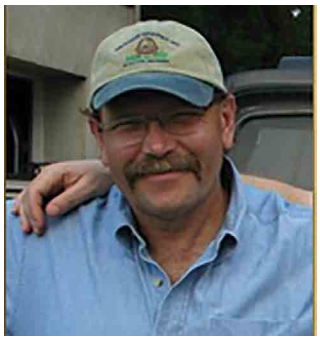
Read something in every issue of *Bee Culture*. If your excuse is 'don't have time' then read the list of articles and authors to pick out the ones that seem most important at the moment. Don't forget the editorials and Book Reviews (you might find an idea for a birthday present), Look at the advertisements – you might see something you forgot to order. If the football game is more important, read during the time outs and commercials. Be informed to be a Better Beekeeper! BC

Ann Harman makes and keeps her New Year's Resolutions at her home in Flint Hill, Virginia.

GLEANINGS

JANUARY 2015 • ALL THE NEWS THAT FITS

OBITUARY

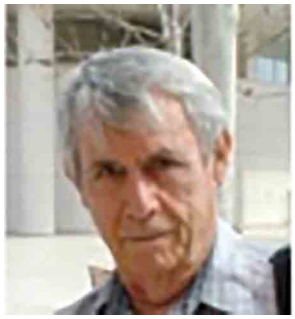


Dennis Clark Keeney, age 60, of Dillsburg, PA passed away October 14. Born November 11, 1953 in Lebanon, he was a son of the late Clarence I. Keeney and Ruth E. (Frantz) Keeney of Rehrersburg.

He was employed at the PA State Farm Show Complex for over 25 years, and for several years was a PA State Bee Inspector. He was the owner/operator of Keeney and Ziegler apiaries, Bethel. In 1987 after his uncle Paul Ziegler suffered a heart attack, Dennis took over the management of the apiary.

He graduated in 1971 from Tulpehocken High School, where he was active in music and sang in District Chorus. He later studied at Elizabethtown College where he sang with the Concert Choir and at West Virginia University, graduating with a degree in Agronomy. Dennis was an experienced beekeeper, a breeder of queen bees and was named Beekeeper of the year in 2003 by the PA State Beekeepers Association. He was a member of the Carlisle Church of the Brethren, Eastern Apicultural Society, PA Beekeepers Association and the Berks and Schuylkill Beekeepers Association. Dennis had a great appreciation for nature and enjoyed hunting.

OBITUARY



Kenneth Tucker, retired entomologist, died October 17, 2014 at the age of 90.

A school teacher in Santa Barbara got Ken interested in keeping honeybees when he was a boy, an interest that he continued through his teenage years. He enrolled at the Riviera campus of Santa Barbara College for a term, then transferred to the University of California at Berkeley, where his brother John was a graduate student in Botany. Ken transferred to the UC-Davis campus as a graduate student in the Honeybee laboratory, and graduated with a Ph. D. in entomology.

After obtaining his Ph.D., Ken worked as an extension entomologist at the University of Minnesota, taught biology at Lake Forest College in Illinois, and then worked for many years as an apicultural scientist at the federal Honey Bee Laboratory in Baton Rouge, LA. Ken worked on Africanized bees in Venezuela and other South American countries before they advanced to the U. S. His wife Shirley was a professor of Botany at Louisiana State University in Baton Rouge. They enjoyed travel to many parts of the world. They both retired in 1995, and moved to Santa Barbara. They have been ardent advocates for the Santa Barbara Botanic Garden, and have endowed a staff position for a plant systematist there.

UK HONEY PRODUCTION UP FROM 2013

The British Beekeepers Association (BBKA) says better weather and better beekeeping have upped honey production. Beekeepers across Wales have reported an average yield of 26lbs of honey per colony this year according to the annual Honey Survey. That's an increase of almost a fifth on the 22lbs per colony reported by beekeepers in Wales in 2013, and is a far cry from the 10lbs per colony in 2012.

Conducted by BBKA amongst 2,000 beekeepers across the UK, the annual Honey Survey explores the current year's honey yield and the factors affecting honey bee colonies and honey production. It shows a rise in British production. Meanwhile, beekeepers across Suffolk have been left buzzing by the bumper crops of honey they have harvested this year – with the east coming out on top of the country's productivity tables. Our region just pips the south east into first place by less than a pound with its total of 36.6lbs per hive. That is 4.4lbs above the national average and 7.9lbs up on last year's total when the east also led the way.

The figures came from the British Beekeepers Association's (BBKA) annual honey survey which were released today. Paul White, swarm coordinator for the Suffolk Beekeepers' Association, said consistent weather over the summer had boosted bees' productivity.

"The long hot summer has helped them develop quite strongly," he said. "The thing was the spring came very, very early and the warmth carried on and we did not have any of the previous year's mixture of rain and sun.

"It has been a fairly consistent year. The crop we get will depend each year on the weather. Last year we had a fairly damp spell. As a beekeeper I don't really look after the bees, they look after themselves and I nurture them. This year the sun has helped me nurture them much better. The quality of honey was good as well."

The BBKA's Director of Public Affairs Tim Lovett said: "While this increase is great news for beekeepers and honey bees the historic average is 40lbs plus per hive so there is still some way to go if we are to return to our most productive. But beekeepers in the East of England are doing especially well. Beekeeping has enjoyed a resurgence in popularity in recent years and it is crucial that we do not lose the momentum. Honey bees are essential pollinators and vital contributors to food production."

Despite the good news for this year it is reported climate change could threaten future honey production.

Research from scientists at Queen's University, Belfast have found that Nosema cerene which targets bees could be set to flourish in northern Europe as the plant continues to warm up. Co-author of the study and adjunct reader at Queen's School of Biological Sciences, Professor Robert Paxton said: "This emerging parasite is more susceptible to cold than its original close relative, possibly reflecting its presumed origin in east Asia.

"In the face of rising global temperatures, our findings suggest that it will increase in prevalence and potentially lead to increased honey bee colony losses in Britain."

Co-researcher Myrsini Natsopoulou, from the Martin-Luther-Universitat Halle-Wittenberg in Germany, said: "Our results reveal not only that Nosema cerene is a better competitor than its original close relative, but that its widespread distribution and patterns of prevalence in nature depend on climatic conditions too."

My gal Marilyn is such a schemer. I told her, "The Medina County beekeepers want to fly me to Ohio to give a talk."

"Fly you?" she shot back. "What am I supposed to do? Stay home and feed the chickens?"

Twenty-four hours later she had a plan. "Look, let's take a train trip. We'll get an eight-stop, 15-day Amtrak pass. We can get off in Cleveland for your talk. Whatever it would have cost them in airfare, have them just give you the money, and we'll use it for train tickets."

I told you she's a schemer.

In October we boarded in Grand Junction, Colorado. The California Zephyr comes right up the Colorado River valley past our house. You can see it from the train. When I caught a glimpse of my big New Castle bee yard, I momentarily panicked and wondered if I'd turned on the solar electric bear fence.

We got off in Glenwood Springs to stretch our legs, and the conductor warned us to stay on the platform. After a few minutes, Marilyn said, "I'll be right back," and disappeared.

I thought nothing of it and went back to the observation car. When the train left the station, I didn't see Marilyn, but she can take care of herself, right? At first I didn't worry. I had her cell phone. But after a few minutes, I headed back to our coach seats, just to be sure. I asked the woman across the aisle. No Marilyn. I checked downstairs.

When I approached the conductor, he lectured me about staying on the platform during "smoke break" stops. Lectured me! About then a helpful assistant conductor cut into his harangue and offered to make a PA announcement.

"We have a missing passenger. Marilyn Gleason, please check in with your traveling companion in the observation car," she announced. The train instantly pulsed with excitement. A passenger left behind?! I tried to stay calm as I wondered how I'd kill a day in Denver waiting for Marilyn to catch up. Everybody was looking at me.

A minute later when Marilyn showed up beet-red, the observation car broke into applause. She'd made a new friend in another car, that's all, and you know how it is when you get to talking.

We woke up the next morning in Iowa, where corn is king. I reflected that all those corn stalks came from seed dipped in neonicitinoid systemic pesticides, and that with corn prices that topped out at $8/bushel, a lot of pollinator habitat got converted to corn.

We got off in Cleveland, which is close to Medina. Of those two towns, Medina is by far the cuter and friendlier one. The Medina beekeepers put us up in the charming but haunted Spitzer House bed and breakfast. The B&B was filled with antiques and dreamy Midwestern landscape paintings that make you yearn to be young again and smoke a corncob pipe and head off down the river with Huck Finn and Jim.

Medina is the Holy Grail of American beekeeping. It was here, about 1865, that jewelry manufacturer A.I. Root paid a man a dollar to catch a passing swarm of honey bees and became so intrigued with the little darlings that he founded a beekeeping empire. In short order, this beginner beekeeper progressed from honey producer to manufacturer of then-revolutionary Langstroth woodenware, smokers and centrifugal honey extractors. He initially wrote how-to articles for the *American Bee Journal*, before creating his encyclopedic *ABC of Bee Culture* (later *ABC and XYZ of Bee Culture*) and founding his own beekeeping periodical, *Gleanings in Bee Culture*. You're holding a copy in your hands.

Today the Root Company centers on publishing and candle-making. *Bee Culture* magazine editor Kim Flottum showed us through Root's candle-making factory, housed in a new building next to the factory A.I. Root built by a railroad hub over a hundred years ago. This operation employs robots but also flesh-and-blood Americans. Made in Medina, not Shanghai.

Later in the trip, in the Marie Reine Du Monde Cathedral in Montreal, Marilyn picked up a votive candle. "I think this is a Root candle," she said.

I talked to the Medina beekeepers about sideline beekeeping. May I summarize? Control your mites. Don't put all your eggs in one basket. Don't sweat the petty stuff. Embrace failure, the greatest teacher. Don't quit your day job. We all sang a song about honey bees, and then Marilyn and I slipped away into the night. We talked about Medina for the rest of our trip, because how often do you get treated like royalty?

Next stop: New York City, where the rich are very thin indeed. Marilyn showed this country bumpkin around. We walked in Central Park, lunched in Harlem, dined with old friends. Kim gave us the name of a rooftop beekeeper enthusiastic about showing us how they do it in the city, but our trip was too brief, our planning too pathetic. Jim was just leaving town. He offered to buy us a drink, anyway. This beekeeper comradeship made me feel all warm and fuzzy.

The train was thick with Amish. They can be outgoing with strangers, even chatty, when they're not on their cell phones. On the trip back I met a lanky Amish young man who farms 20 acres with horses and whose "favorite thing in life" is snowboarding. He also works for an Amish contractor installing automated feeding systems for factory hog and chicken farms. He was on his way to hunt elk in Telluride. Beekeeping piqued his interest. He asked how much I make on 100 colonies.

We arrived home in Colorado at the end of an October heat wave. Bees were busy devouring their winter honey stores. Vacation was over. Back in the saddle, again.

Ed **Colby**

An Amish Snowboarder