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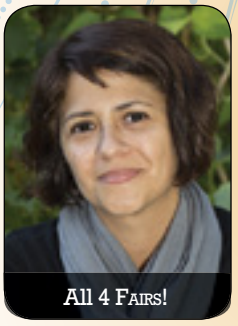

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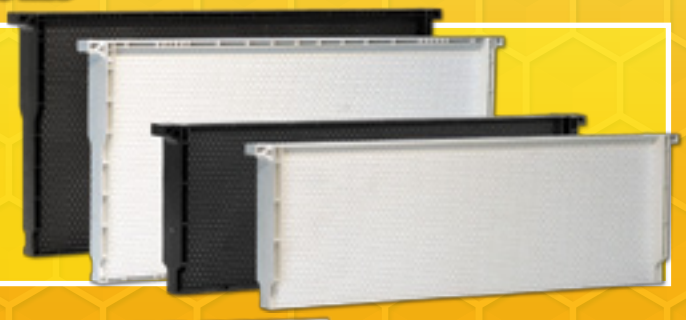

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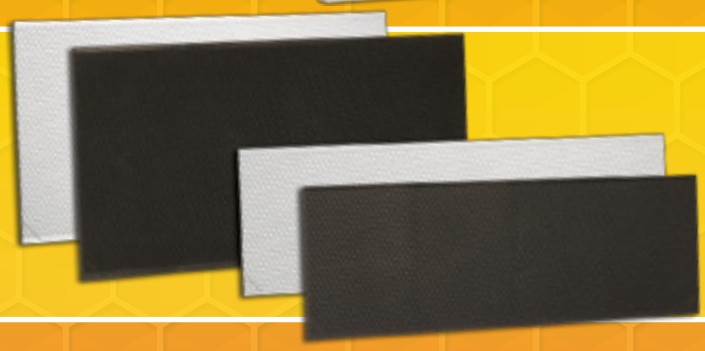

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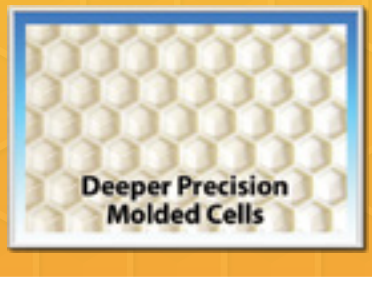

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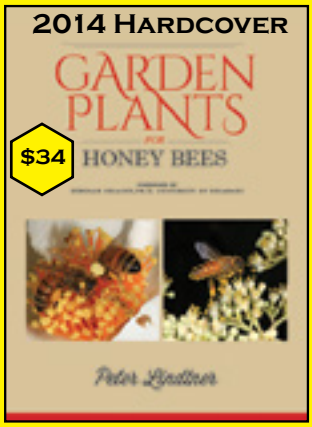

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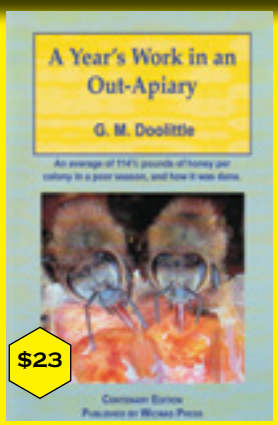

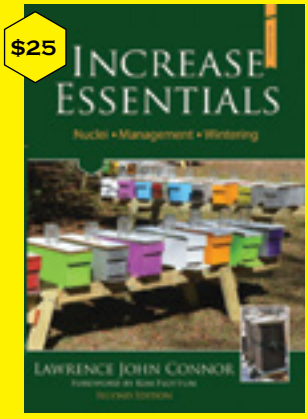

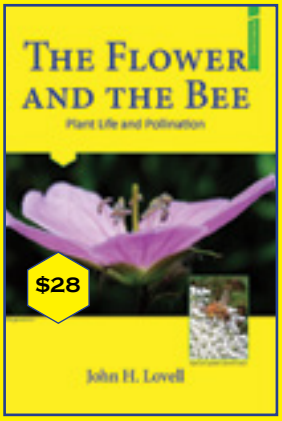

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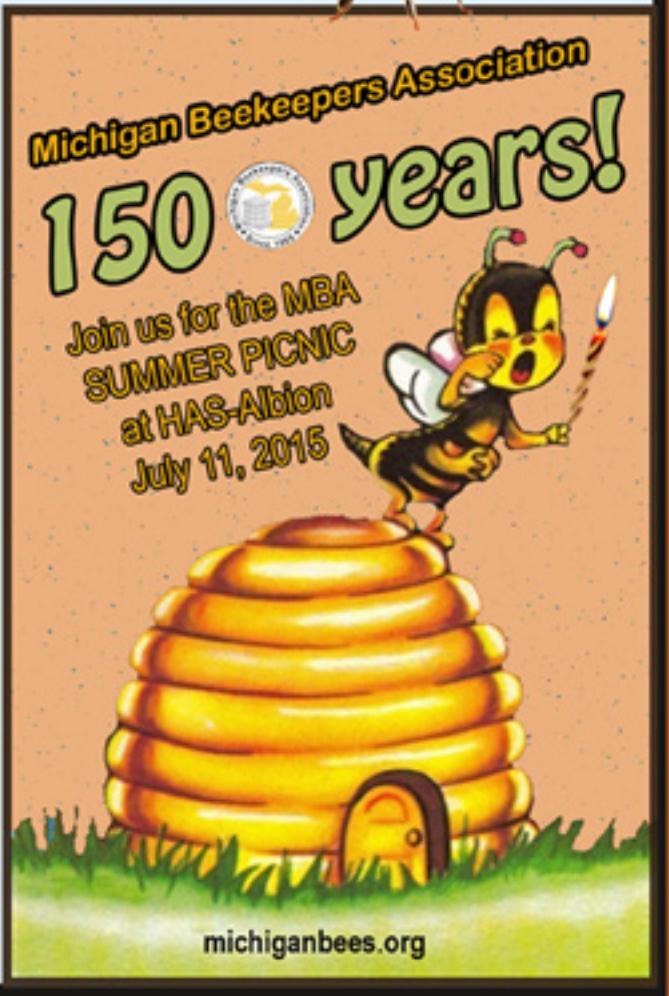

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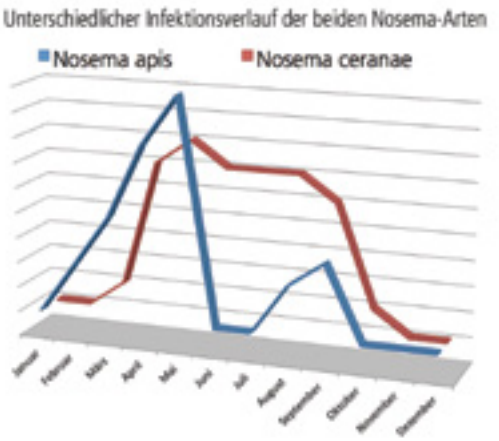

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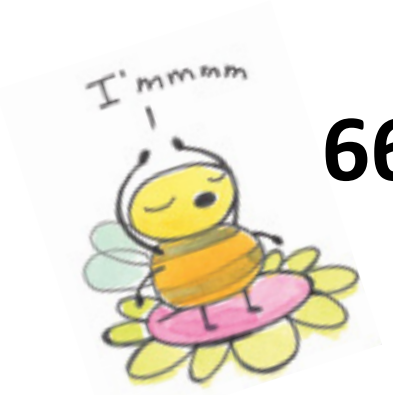

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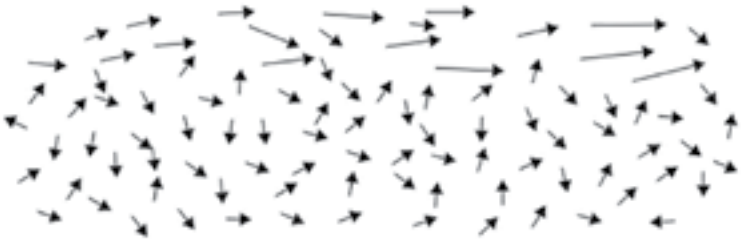

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Mentoring

Jim Tew likes to reminisce about the old days of beekeeping. I'm sure he and most of your readers remember when beekeeping was about sharing and helping newbees and others in need of advice. Unfortunately that era seems to be coming to an end.

Here in NC, we have a supplier in Raleigh who wants to milk the hobby for all he can get by offering mentoring for $50 an hour. In my opinion, this is shameful and belies all that the hobby stands for. I hope that the Wake County beekeepers association will provide as many mentors as possible and put an end to this unconscionable practice.

Burt Millette
NC

Thank You, Ross

In your article, "Need A Beekeeping Mentor? Why Not Ask The Bees" *Bee Culture*, April 2015

You stated, "The bees don't care if the hive is top bar, Warre, uniquely custom built, or a standard Langstroth model." Adding ". . . it doesn't matter what kind of hive you keep bees in, what matters is how you care for them." I've been preaching that for years to anyone who would listen. I keep bees in Langs, Warres, Top Bars, and hives I build combining aspects of all three styles. Through each style of hive may have different methods of management, they do however require management. Over the years I've had some level of colony loss in every style of hive I've kept bees in. In my presentations for any style of hive, one of my standard statements is; "In my opinion, it is short sighted to believe you do not or will not ever have a *Varroa* mite problem based solely on the style of hive you keep your bees in." When I am asked about Hands Off beekeeping, I reply, "As romantic as it sounds, you will pretty much get exactly what you put into it." And although the debate may go on, commercial management or natural management of any hive style. I have not found any strong evidence that *not* caring for the bees in any particular style of hive is a healthy method of management.

Ernie Schmidt
Olympia, WA

Hive Beetle Thoughts

I'd like to add to Charles Linder's article in the March 2015 *Bee Culture*. At the TN Beekeepers Annual October Conference in 2013, there was much discussion on Hive Beetles. Early research was showing that ground applications (D.E., lime, and Guard Star) were not very effective and the beetle larvae was being tracked on the surface for over 100 feet before burrowing into the ground. Studies were also indicating that the in hive traps were also not having much effect. The use of migratory (screened inner) covers were showing promise as the beetles seemed to avoid hive tops, possibly because of the light being allowed into the top. One comment was that it appeared the Freeman Beetle trap (and the similar West trap) was proving to be the most effective trap for beetle control.

Having lost several hives that Summer to hive beetles, I purchased several traps from Jerry Freeman and ordered a similar amount of screened top covers. The Beetle Baffle was mentioned as something to investigate.

In 2014, I added the trap, baffle, and top cover to several of my hives, followed Jerry's video on sugaring the hive, and the traps were filled with beetles. Following a 21 day brood cycle, another sugaring, showed very few beetles. Other local bee keepers reported similar results, and other experiments with no baffle, or baffle and no trap, or no screened top cover, etc, showed varying amounts of beetles.

Probably the most gratifying test was when I was given two hives by a frustrated keeper in early July. The hives were saturated with beetles and on the verge of collapse. Setting the supers on the trap and baffle, placing the screened cover on top, and sugaring the hives, produced a trap tray layered in beetles. A second sugaring two days later produced far fewer beetles. A third sugar application a week later indicated only ten beetles. Both hives rebounded and survived our East Tennessee Winter.

Several of the beekeepers from the two local associations have switched to this method of control with similar results. Several benefits are also noted. Beetles are reduced in the hive, beetle larvae are trapped and do not reach the ground, the larger screen on the top cover allows better ventilated and reduces the chance of robbing through the top, and by sugaring the entire hive, the mite population in the hive is reduced. Several sugaring times are being tested by our group, to determine if the mite population and beetle can be further reduced or controlled.

I view this method as an effective control of the beetle, not a method of elimination. I would love to hear from others who try this method.

Plant wildflowers, the pollinators are starving.

Joel Hausser

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I am not selling Bee Busses, but am bringing them to your attention to create a demand for them that will make them widely available.

I hope that you will look at them and feature them in the new product section of *Bee Culture*.

Gregory Stoddard

Editor's Note: *We did a new product review of the Bee Bus in our March 2014 issue.*

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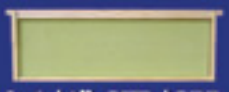

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Tree Hives And Fungi

I tried to reread the tree hive colony article again (March, 2015) but got lost in all the technical language. What I did get out of it was the distances involved in each experiment. Do you suppose the fungi was present in the forest but not in the open land? A good counter move would be to swap places, in other words, put the forest bees on the ground and elevate the others. I guess you could put them on poles, but I'd hate to work bees like that.

Jim Cowan
Aberdeen, WA

Note To Advertisers

I am a beekeeper who communicates with pen and paper, or face to face. I don't have a phone, or connections to the internet. So how can I contact those good people who advertise in your magazine that do not provide a mailing address in their ads? I would expect the majority of your readers use either the phone or the internet to contact those advertisers. However, I think there might be a possibility of increased business if only I could get in touch with them because they provide a mailing address in the ad. I imagine some business consider it impractical to open envelopes and to use snail mail, but for those of us who still find it practical, we would be pleased to do business with you if you provided a mailing address. Now, this is not written to offend anyone, it's just my opinion of the situation.

Benjamin Hershberger
Caneyville, KY

Prairies?

For those with an interest in restoring prairies, I would recommend contacting (and joining?) the Prairie Enthusiasts organization.

www.theprairieenthusiasts.org/

Jon Kutz

Splits

Most information on making splits indicate to take frames of honey. A capped frame of honey can be used but there must also be frames of uncapped nectar or to feed 1:1 syrup. What is lacking for the new beekeeper is an explanation of why this is necessary.

A swarm takes foragers and new bees from the original hive because new bees supply wax to draw comb for the queen to start laying eggs and subsequent honey storage. Swarm foragers are bringing in nectar that is being used to generate wax.

Splits use only nurse bees so a split does not contain any foragers. If any forager inadvertently gets in the split they are already "programed" to return to the original hive and won't remain with the split. If a split only contains frames of honey, new bees can't make wax from the low moisture honey. Bees need high moisture nectar or 1:1 syrup to make wax. It's important to include frames containing nectar or feed a 1:1 sugar solution to a split in order for all those young bees to start drawing comb to build up hive foundation. Otherwise, there will be a long time delay until the new split bees transition to foragers to supply nectar for comb building. Depending on the timing for late Spring splits, they may miss the nectar flow so the bees are stuck with only the initial frames of drawn comb from the original splits until a Fall nectar flow starts. Reason why some splits make it and some don't.

Dean Downs

Liquefying Honey

Just read your column concerning crystallized honey in plastic in the May issue. We too had our honey crystallize quickly this past Fall. I needed 24 plastic upside down bottles in March and had to put them in hot water to liquefy – took two days and they deformed as yours did. A local old timer told me he puts his in the south facing window to liquefy it. That didn't work in March-April but may work in the summer.

In mid-April we went to Oregon to visit our son. I took a few bottles of crystallized honey (less likely to spill out in the luggage and figured he could liquefy it as needed). While we were they I laid the bottles on the black cover of the outdoor grill, in the sun, temperature in low 70s.

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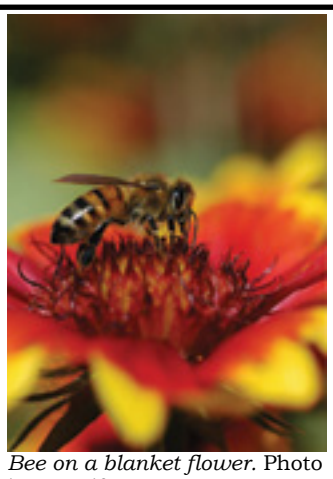

Bee on a blanket flower. Photo by Jennifer Berry.

Within three hours it was liquid, no deformity. So, depending on where we live, there should be at least a few months a year when we can use some solar energy to liquefy our honey.

Dave Edwards
Cooperstown, NY

•

First, keep up the good work with the *Bee Culture* magazine. My hubby enjoys each issue.

I have to admit I was chuckling at your dilemma with crystalized honey in plastic containers. I have been there more times than I care to admit with the misshapen bears and containers that are bendy and twisty coming out of the hot water bath. If you really were looking for ideas I wanted to share our new method of de-crystallizing our packaged honey. We have found that a garden mat used to start plants in early Spring works wonders. They warm up enough to melt the crystals but keep the honey cool enough not to destroy all the good stuff. Line up your jars on the mat and place a towel over them to keep in the heat. It usually takes one to three days depending on the size of the containers but we haven't lost a jar yet. Had some eke out a bit of honey if they were overfilled but none have warped. Give it a try!

Anastasia Ridgeway

My May *Bee Culture* arrived yesterday. I have a suggestion for your plastic bottle issue. I had the same problem until I started using the dishwasher. Run your plastic bottle with crystallized honey through a dishwasher cycle including the drying cycle. It helps if there is no label on the bottle as the label will fade and probably come off. I think there's something about the water spraying on the bottle and the humidity in the drying cycle that saves the bottle from misshaping. I also put the bottle on the top shelf of the dishwasher which gets it away from the heating element. It works for me. If it doesn't all liquefy the first time, run it through again. I do it with the dishes, detergent and all.

Wilbur Shirey

Editor's Note: *Thank you for the good suggestions on how to not ruin my plastic jars. I will give them a try, except for the dishwasher idea. Kim is our dishwasher. Hopefully others will get some help with this problem.*

New For Summer –

Grow A Living Wall. Create Vertical Gardens with Purpose. Shawna Coronado. Cool Springs Press. ISBN 978-1-59186-624-4. 160 pgs. 8.5" x 11". Color throughout. $24.99.

I've had the good fortune to not only read this book, but to listen to the author give a presentation about the subject matter. She knows what she's talking about, and what she's talking about is how to grow almost anything almost anywhere there isn't room to grow almost anything. Think vertical, not horizontal. Think a couple of square feet instead of square yards. Think living walls, because that's what you can do when you don't have room for a garden, for a pollinator garden, for anything green at all. Now you do. Patios, balconies, tiny backyards, two step porches – all become fertile playgrounds for all manner of pollinating insects, herbs and veggies. Chapters include information on growing walls with cactus, ferns, hydroponics, shade plants, using bookshelves, vertical vegetables, a kitchen garden, saving water, plus solid information on maintenance, resources, and hundreds of photos showing how to and what to. If you are space challenged and have an incurable green thumb – this is what you've been looking for. And, no small thing, your bees will love you. *Kim Flottum*

The almond and the bee. The spacial relationship of the orchard, bee and dwelling through time. Stephanie Hsia. Self published, available from **http://www.blurb.com/b/6036154-almond-and-the-bee**

ISBN 978-1-32-091030-9. 6" x 9", 92 pgs., color throughout. $9 ($2 donated to Project apis m).

Stephanie is a graduate student at Harvard, and this book was, initially, a Landscape design project she was involved in. This is not a typical beekeeping or horticultural tome, but rather an artistic to some degree, but certainly practical way to explore the history of keeping bees and where they were kept, orchard development and the introduction of bees to that environment, and then the present, and future relationship of people, bees and orchards. Because of their dominance in the bee world, she uses almond orchards as the model, but other orchard crops fit too. The graphics are simple and easy to relate to, and the photos are a good addition to understanding the study. In the end, it has to do with getting enough good food to bees, all of the time. That's a story that needs to be read by people including beekeepers.

Kim Flottum

ATAGO USA is a world-leading optical instrument manufacturer based in Bellevue, Washington. We have been specializing in refractometers since 1940 and our products have been acclaimed for precision, user-friendliness, and rugged durability. The RePo-4 unit to determine honey purity is no exception.

The RePo-4 is your total solution for honey analysis by taking objective measurements of fructose, honey sweetness (Brix), optical rotation, and honey moisture percentage with the press of a button. Since honey contains fructose, glucose, and other sugars in trace amounts, the RePo unit can improve quality control in just three easy steps: fill up the sample stage, press the start button, and read your results on a digital screen. The Automatic Temperature Compensation feature ensures that even hot samples read accurately. Create your own upper and lower boundary limits for quality with results indicated as pass or fail by a green or red light.

This instrument can help determine honey purity and serves as an important tool for many honey producers and buyers to check the quality or grade of incoming and outgoing honey. With its water-resistant sample stage, cleaning is a breeze.

ATAGO also manufactures benchtop and in-line refractometers for related applications such as Brix measurements, high precision testing, multi-scale measurements and so much more. We are also featuring our 'Pocket' refractometer, the PAL-22S, which has been our mainstay digital refractometer for honey moisture for ten years, alongside the classic analog MASTER- Honey, a long-standing industry favorite and the PEN-Honey, an innovative solution to quick honey measurements.

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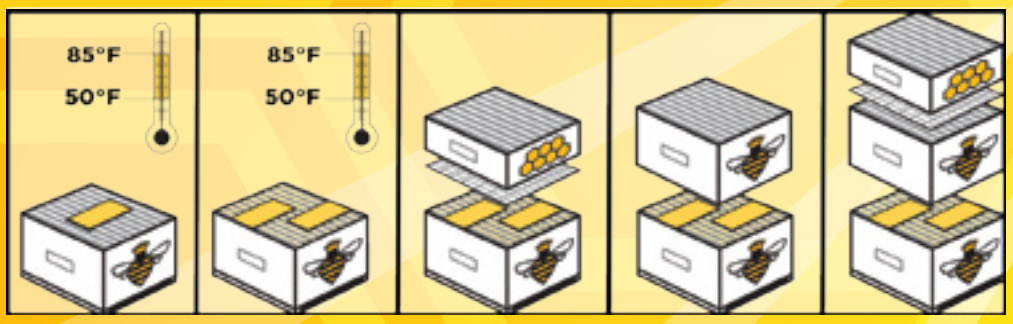

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HEALTHY BEES. HEALTHY PLANET.

Slovenian Beekeeping Co. is the only U.S. importer of the traditional Slovenian (AZ) Hive. The company also offers beekeeping tours in breathtakingly beautiful Slovenia, the homeland of the Carniola bee.

HIVE: The two level hive is fully assembled. It has two front entrances and one rear door. The hive is managed standing or sitting at the rear door. Inside the rear door is a screened "window" for each level. Frames are handled individually like books on a shelf. The queen resides in the level below the (removable) excluder. The upper level is for honey storage. No honey super is required. Brood production occurs in the lower level. Interior metal spacers keep frames orderly. Frames rest and slide across three stainless rods. Frames can be turned upside down to encourage build-out of nectar or brood.

The Slovenian hive eliminates all lifting. It is perfect for everyone, but especially for children, women, elderly, disabled and mobile beekeepers. Spruce construction is cabinet quality: dovetailed, glued and has metal hardware. Included: 20 spruce frames w/o foundation, IMP Board, queen excluder and interior syrup feeder. The hive is $285 FOB Cape Cod.

Bee Tours: A Slovenian Beekeeping tour is an excellent way to learn about beekeeping and the Slovenian hive while enjoying spectacular alpine scenery. Slovenia is 60% forest, has 4000 miles of hiking trails and 10,000 miles of pollution-free rivers and streams. 85% of the population lives in rural villages. Their traditional food and wines are appreciated throughout Europe. Slovenians are friendly, welcoming and unspoiled.

The iconic and colorful Slovenian bee "houses" are located in forests, villages and the rural countryside. Slovenians have been keeping native Carniola bees for hundreds of years. To be Slovenian is to be a beekeeper. It is normal to meet three generations of a family living in one home and working their bee houses. One in every 250 citizens is a beekeeper. Although Slovenia is only the size of New Hampshire it has over 7000 beekeepers! English is spoken everywhere.

ApiTours is the Slovenian company that organizes the tours. Visits are made to exceptional beekeepers, bee museums and bee product vendors. The agenda includes visiting castles, the Adriatic coast, small shops, Europe's largest cave system and the picturesque headquarters of the Slovenian Beekeeper's Association.

Tours are designed for groups of 15-20 people to maximize learning from experienced beekeepers. Each day substantial time is set aside for visiting beautiful and interesting sites for the non-beekeeping companion. Tours can either be joined or organized for your group. The optional second week is relaxing and offers more beekeeping, hiking, adventure activities while living in a village under a stunning Julian Alps mountain.

Mark Simonitsch and Suzanne Brouillette keep bees and sell hives and tours. Suzanne lived in Slovenia and Mark visits his Slovenian relatives frequently.

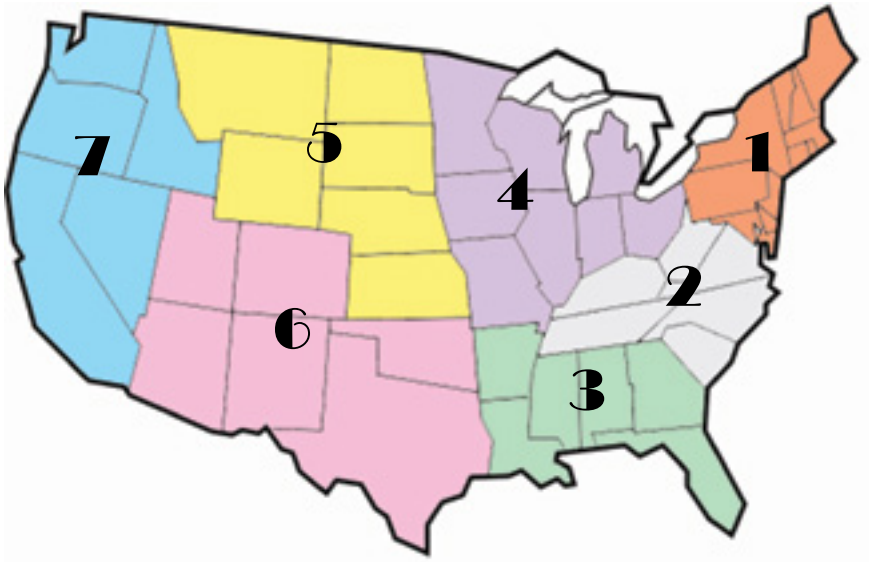
Visit **www.slovenianbeekeeping.com** or contact **beeslovenia@gmail.com**

Announcing –

Honey processing equipment and beekeeping supplies is now available in the U.S. from Lyson. Lyson is an award winning Polish manufacturer of beekeeping equipment. They offer a full range of equipment including automatic extracting lines, uncapping machines, wax extruders, and polystyrene hives. In addition, honey creamers, uncapping tanks, bottling machines, and much more equipment is available. Many Lyson items are in stock and most others are available for special order. Six frame nucs and 10 frame hives will be in stock this Summer. The extractors all have a welded stainless steel honey gate mounted flush with the bottom cone of the extractor for easier pouring. The variable speed motors are digitally controlled and some models offer programmable extracting cycles. The basket can be rotated manually for easy loading and unloading.

Visit Betterbee's website (**www.betterbee.com/lyson**) to learn more about Lyson equipment or give us a call at 1-800-632-3379.

JUNE – REGIONAL HONEY PRICE REPORT



Winter Losses and Spring Weather

We asked our reporters this month about Spring weather and Winter losses. Both were tough this year, but some tougher than others. Interestingly, the BIP people finished their survey at about the same time, so we can compare numbers again this year and see how we're doing. All of this of course being reported in April – months and months ago when it comes to work to be done, but the losses are still losses.

Region 1. Cold, cold, cold and snow wet all Winter, with just enough to a bit too much rain this Spring. And because of the rain, way behind in Spring chores. Winter losses ranged from 0 - 100%, but the overall average Winter loss was 44%. A tough Winter.

Region 2. A very snowy wet and cold Winter for them also. This Spring, way, way too much rain, which means everybody was behind in chores. Winter losses ranged from 0 – 80%, with overall average of 29%.

Region 3. It was a wet Winter in the south and gulf area but depending on where you were it was either cold, or in some places a bit dry. Of course cold is relative, remember that. Spring rains were extensive in most places slowing things down a bit, but it dried up and most got caught up in time. Winter losses, as might be expected, were significantly lower that the cold north this year, with a range of 0 – only 38% with an overall average of just 15%. Almost like old times.

Region 4. The Midwest got clobbered this year with a Winter even colder and snowier than last year's struggle. And Spring was late and cold with lots of rain. Too much rain it seems. In early May most places were seven to 10 days behind schedule with blooming plants and even grass needing mowing. This caused some significant delays in getting chores done, but not too bad, especially in the more southern areas. Winter losses ranged between 1 - 100%, with over all the region losses averaging 43%.

Region 5. A drier than normal Winter that was cold, but not extreme, and not enough rain over much of the region all Spring, which allows folks to get things done on time, or even ahead of schedule. But it was a tough Winter. Losses ranged from 20 - 90%, with overall loss for the region averaging 53%. We know the BIP folks found about half of this, so we're looking into why the difference.

Region 6. The southwest was mostly cold, by their standards and very, very dry. This didn't change much for Spring with far below average rainfall. But, the up side is that Spring chores get only a little behind, but not too bad. Winter losses range from 0 – 70%, with an average of 36%.

Region 7. The west is still dry, dry, dry. All Winter, and all Spring, with no end in sight. Water regulations will get tighter and who can grow what and where is going to be the future, at least until it rains again. Spring chores got done on time or early, and Winter losses ranged from 8 - 75%, with an overall regional average of 35%.

REPORTING REGIONS								SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.11	2.11	2.33	2.38	2.27	2.44	2.38	1.90-3.00	2.30	2.30	2.29	2.22
55 Gal. Drum, Ambr	2.00	2.11	2.00	2.35	2.31	2.33	2.31	1.85-3.00	2.19	2.19	2.18	2.08
60# Light (retail)	220.67	185.73	178.75	191.11	171.00	187.00	196.46	119.40-280.00	193.22	3.22	198.38	190.62
60# Amber (retail)	212.38	180.87	186.67	181.25	191.25	183.00	191.25	115.20-270.00	189.90	3.17	195.99	181.42
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	91.81	75.70	60.00	59.50	51.84	86.40	87.59	48.00-140.00	81.18	6.77	77.53	76.60
1# 24/case	128.78	108.55	111.54	98.13	127.08	108.30	103.20	45.00-192.00	114.47	4.77	112.68	113.70
2# 12/case	113.37	95.67	96.39	90.97	97.44	94.20	114.00	72.00-163.20	102.16	4.26	99.37	97.90
12.oz. Plas. 24/cs	108.75	81.00	86.40	83.31	74.40	92.64	104.80	48.00-153.60	93.91	5.22	89.18	85.01
5# 6/case	125.98	104.50	114.00	103.00	102.30	105.20	117.33	84.00-158.00	113.67	3.79	117.89	114.33
Quarts 12/case	176.09	122.23	123.21	141.30	145.98	122.52	132.00	60.00-240.00	136.69	3.80	132.47	134.07
Pints 12/case	111.24	83.67	67.80	103.40	110.88	66.60	96.00	42.00-144.00	87.86	4.88	90.67	98.02
RETAIL SHELF PRICES												
1/2#	4.95	4.00	3.50	3.28	3.90	4.24	4.77	2.90-7.75	4.22	8.45	4.24	4.13
12 oz. Plastic	6.11	4.41	4.70	4.38	5.07	5.35	6.73	3.00-8.99	5.18	6.91	5.17	5.07
1# Glass/Plastic	7.06	6.83	6.58	5.55	7.11	6.46	10.50	3.00-12.99	6.78	6.78	6.68	6.43
2# Glass/Plastic	12.47	11.16	10.20	10.34	11.67	10.21	14.00	6.00-18.25	11.35	5.67	11.04	10.65
Pint	11.09	9.00	7.58	10.95	12.60	7.44	12.20	4.00-25.00	9.63	6.42	9.53	8.84
Quart	17.40	15.33	13.43	16.09	16.61	14.33	13.20	5.50-26.00	15.42	5.14	15.75	14.62
5# Glass/Plastic	25.76	23.71	28.00	23.66	23.89	25.58	25.02	8.15-42.00	24.96	4.99	25.21	24.00
1# Cream	8.48	7.75	8.07	6.17	7.21	6.32	9.00	5.00-12.00	7.64	7.64	7.70	8.07
1# Cut Comb	9.89	9.31	6.50	9.39	8.00	9.50	14.00	4.50-15.00	9.40	9.40	9.32	9.07
Ross Round	8.99	6.67	8.12	9.58	8.12	7.60	8.12	4.00-12.00	8.23	10.98	9.14	8.56
Wholesale Wax (Lt)	6.63	4.60	4.44	6.14	6.00	4.70	5.00	3.00-11.00	5.62	-	5.75	5.57
Wholesale Wax (Dk)	5.43	4.32	4.08	5.80	5.04	2.83	5.04	2.00-8.50	4.84	-	5.28	4.58
Pollination Fee/Col.	85.55	66.67	58.33	68.33	80.00	93.00	50.00	35.00-120.00	74.10	-	81.39	81.60

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, Andy Card** and more 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.

INNER COVER

We judge ourselves by our best intentions and our most courageous deeds, but we are judged by our last worst act. Whether that's fair or not is beside the point. The point is don't do anything you are not willing to be remembered for.

Michael Josephson

Each of us, I think, is a bit guilty of both of those sentiments on occasion. I know I am. Especially and most recently the first.

We've addressed this to some degree before, but months ago we undertook a subscriber software, digital magazine, and web page change of significant scope and scale. We wanted something we didn't have. Each of these, it turns out, was an undertaking far greater than we imagined. That we did all three simultaneously qualifies us to be certifiably insane.

But we signed on to this (these?) believing full well that each was easily doable, and the end result would make for a far better experience for the good people who wanted to read our magazine each month, whether on the web, your mobile phone, or by evening lamplight in your easy chair. We judged ourselves by our best intentions.

It didn't go as planned, mostly. Connecting these brand new technologies with our existing, not so brand new technologies was our first issue. It was like the three prong plug-in on your new toaster trying to go into the two-prong receiver on your kitchen wall. So we had to fix the two-prong receiver before we could even plug it in. OK, fixed that, plugged it in, and found out the toaster was wired differently and it either didn't work, or worked way too well, so our toast was, well, toast.

Fixed the toaster and the plug and thought, OK, the subscriber system seems to be working, what's next? And next it was the digital edition… which is, if you are a subscriber, way, way different than it was. It works quite well on your IPhone or similar device, on your tablets, and on your desk top computer. But it's not like it was, and to make it work well on everything, some things had to change. Our best intentions are good intentions, but things changed and they aren't the same. You can still get the archives, and you can get something similar to the old flip page digital edition if you want, but the best way to enjoy the digital version on a desk top is to get the app that makes it look like it does on your mobile phone. That's our best intention but it is judged, by some, as our worst last deed. But it works well if you let it.

The web page wasn't much of a problem. It's different – way, way different, and it will take you a bit to find the things you are looking for. There is lots of new stuff, lots and lots of new stuff. And some of the stuff that was there isn't right now, but will be soon. It, too is a very good intention, and we hope you judge us by those good intentions. Take a look. Snoop around. Turn a few pages and see what's underneath. It's all good stuff.

I poked around the web page for a bit of the guy whose quote leads this off after I found out who he was (I originally heard a TV actor, playing the role of a Police Commissioner say it without crediting the author and wanted to find its origin), and I found this there also…If You Want To Get Something You Don't Have, You've Got To Do Something You've Not Done. Well, that sits right up front, doesn't it?

So our transition has been bumpy. Marrying technologies is always a challenge. Changing technologies is always an adventure, and adding new technologies can be daunting. Our best intentions, for better or worse, are to bring you the very best information on bees and beekeeping, using the best means possible for the most efficient cost in the easiest manner available. All this so you can access everything you need to do the best job possible for you and your bees. Those are our very best intentions. And now we have something we didn't have, and we got it doing something we hadn't done before. There you have it.

•

Isn't that an attractive hat? Though the acronym – NEOBA – may throw you off, its easy-to-read style and simple obviously-a-honey bee graphic speak louder than most of us when it is worn in public. There's a story about two good people behind that hat. I'd like to share it with you.

After I had been in this chair only a couple of years I was invited to speak at the annual meeting of The American Honey Producers, one of two national beekeeping groups in the country. There had been a single one – the American Beekeeping Federation – but their focus was on several aspects of the industry – honey producers certainly, but honey packers, equipment dealers and manufacturers, honey queens, the beginnings of the National Honey Board, some national political actions, a ladies group and a few other things were also on their agenda. They were, and still are, all things beekeeping.

Too spread out, and too many hats some in the group thought and wanted a lot more attention on just the honey production part of the business, so they started the American Honey Producers, with membership based on income from honey production. Glen Gibson, a small scale honey producer from Minco, Oklahoma helped start the group, with the help of a lot of much bigger honey producers. And I was a guest

Good Intentions. Winter Losses.

at one of their early meetings.

Glen wanted to make sure this new Editor knew what the politics of the industry were about, so he invited me to visit several Congressmen, Senators and USDA officials with him on a trip to DC. He worked both sides of the Isle depending on who favored beekeeper-friendly rules and regulations and was well known all over town because of his gifts of honey bears for the people who guarded the doors of the powerful and famous, who never really got any of his Oklahoma cotton honey. He had a lot of friends in the right places and got to talk to a lot of people who otherwise might have ignored him. The trip went well, I learned a lot and still have all the photos he managed to have taken of me with all those Senators and Congressmen.

We talked quite a bit after that, and later that year – 1988 I believe – he began writing a regular column entitled *Politically Speaking*, about the goings on in Washington, and what beekeepers should be doing to influence the outcomes of certain votes, who was and was not powerful and more like that.

OK, the hat. Glen was also one of the officers of the Oklahoma State Beekeepers Association, and was responsible for inviting speakers to their annual meeting in the Fall. One of the problems Glen had noticed almost everywhere was how to organize a beekeeping group, and we had discussed this at length. I'd had some experience and knew folks who were good at it and he thought it a good topic for his state meeting, so there I was.

There, too, were Carl and Euvonne Harrison from Tulsa. Beekeepers, though small, they wanted to get their local group energized and helpful for new beekeepers and were having no luck at all. Like many groups, it had become more of a social club for long-time members rather than a teaching and helping instrument for new beekeepers. So they took the trip to Oklahoma City to listen to this new guy who supposedly had all the answers. And listen they did. And asked questions, and stayed after to ask more questions and took notes and asked more questions. And then they went home and did all the things they heard, plus some they thought up, and found a new place to hold the meetings and enlisted the county extension office to help and the North East Oklahoma Beekeepers Association took off. Big time.

The next year they started something called The Big Bee Bash, and invited beekeepers from all over the state to come for an all-day meeting to listen to several national speakers, partake in a delicious lunch, win some door prizes and even touch base with a couple of local vendors. Using this as a spring board, their monthly meetings took off also and soon membership filled the new room, and after only a few years an even bigger room was needed, and the group was busting at the seams. I was invited to several of those Big Bee Bash Saturdays over the years, and every time there were more people helping, more attending, more wanting even more. It was always a good time in Tulsa. And it was always good to visit with Euvonne and Carl and hear about all the growth, the changes and the adventures they were having.

It's been a few years since I was in Tulsa, but the last time there they gave me this hat. It's a good looking hat, given to me by a great group of beekeepers, and I'm proud to wear it. Thanks NEOBA.

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If you haven't already, take a quick look at the monthly honey report. It isn't the price of honey that's most interesting this month, though prices continue to improve, and may actually challenge some beekeepers who pollinate to stay home and concentrate on how much honey they could make if they actually stayed home. Rather, it's the Winter losses for each region they report. It was a long, cold, wet Winter almost everywhere but the west coast area, and bees and beekeepers took a beating…at least our reporters did. You can see where it was the worst – in the north. Region 1 - 44% loss average, move south a bit to region 2 - 29%, and further south yet to region 3 - 15%. Back north to region 4 - 43% and worst of all region 5 - 53%, with 6 and 7 in the mid-30's. Over all regions, Winter losses amounted to about 36%, very similar to last year's losses here of 34%. The BIP survey was about 10 points below that, and I'm told it's just about the same this year – in the mid-20's. Unfortunately it's difficult for us to compare apples to apples this year/last year region to region from our reporters because we changed regions since then.

By the time you read this we will have published BIP's numbers so you can compare over-all, and regional figures. Of course they have a much larger data set than we do, but we have, for the most part, a smaller contingent of full time commercial and serious sideline beekeepers who are in the business of keeping bees alive and putting food on the table because of the work they do. It is a smaller data set, and a very focused group.

If you haven't already, read the article by the Pollinator Stewardship people on page 33. They are involved in a program using a large sample of hives for an extended time testing for a variety of problems…pesticides, pathogens, virus, mites. The data will be extremely useful for beekeepers. You can help support this. Read the article. Use the data. Send some money.

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It's Summers Time –

Bees, chickens, more chickens and now ducks

Spring finally arrived in Northeast Ohio and it is a beautiful time here. Maybe Spring is why we tolerate the cold and brutal Winter, because there is something wonderful to look forward to.

Magnolias, crabapples, daffodils, tulips, phlox – there is color everywhere. And it might be my imagination, but it seems like more folks are letting the dandelions go and not being so anxious to mow them down. We've had a couple of weeks of nice weather and lots of things blooming so the bees should be doing well.

Last week Kim was in CO for the whole week, and wouldn't you know that's when the packages arrive – we ordered six. Five for ourselves and one that will go in the observation hive at the Root Candle Store. It made it through February this year before dying off. So we have a package building up in a nuc on the front porch and shortly Root customers will be able to visit the bees again while shopping.

I had the most divine afternoon installing the six packages. It was a beautiful sunny, calm day – not too hot, absolutely perfect. I arrived at Queen Right Colonies – about 20 minutes down the road – around 2:30 and was there about 10 minutes. About 1700 packages had arrive the night before. It's a busy place, but I got there at just the right time.

Once I got home it took me an hour and a half to install the six packages. It was the most pleasant afternoon I've spent in a while. All went smoothly. Over the weekend we checked the queens and we had lost one.

Last month I told you about the new chicks – 12. One little tiny Amerecauna didn't make it. The 11 remaining are doing just fine and growing like mad. They are about two months old and today we put them outside for the first time. And put is the correct term. We had to literally force them to go outside. It's a big scary world out there. We kept them separate still from the big girls – in the same pen but in their own separate little fenced area. There doesn't seem like there is going to be any aggressive behavior, but we just want to make sure nobody gets bullied or hurt in the process.

We also have ducks. We weren't expecting the ducks quite this soon, but we have ducks. About two weeks after we got the chicks and got them settled we got a phone call – your ducks are here.

Well first of all I thought I'd have more time. I was originally told the ducks would be here the end of May. I thought, that's great – gives us time to get the chicks settled in and some growth on them and then we can deal with the ducks.

I also thought that I could put the ducks in with the new chicks. But the lady at the feed store said "Oh no, don't do that – not until they're all adults."

So we had to scramble a bit to make a place for the ducks, but they were so tiny it was easy to do. And they are so darn cute! And that's exactly what everyone says when they see them. And, I haven't even finished reading the book.

Spring is in full swing here in Medina County. Kim has about 24 flats planted, averaging 18 plants per flat with everything from tomatoes, basil (all different kinds), catnip, marjoram and chervil – I'm not exactly sure what you do with chervil, but I'll find out by the time it gets big enough. And lots of other stuff.

We've made a couple of trips to the big garden centers and that is like heaven to both of us. It's usually at least a half day event. In Northeast Ohio we have Pettiti's Garden Centers – I'm not sure if they are in other states. But it is an amazing place, about five acres of plants, greenhouses and growing areas. If they don't have what you want, you might not find it any place else. And we always buy more than we planned, but fortunately we both think you can't have too many plants or too many books. We have lots of both.

I'm hoping for a pleasant Summer and wishing the same for you. I know that some of you live in places where Summer is hard. My brother lives in southern CA and water is the big issue right now for him. But wherever you are enjoy the season.

A Closer LOOK

SOCIAL IMMUNITY

Clarence **Collison**

Individual honey bees of all ages and castes have developed mechanisms to limit the impacts of their pathogens.

Insect social life is generally associated with increased exposure to pathogens and the risk of disease transmission, due to factors such as high population density, frequent physical contact and reduced genetic variability (Baracchi et al. 2012). The stable, high levels of humidity and temperature of their brood nests, result in suitable environments for the development of microorganisms including pathogens (Baracchi et al. 2011). Honey bees are attacked by numerous parasites and pathogens toward which they present a variety of individual and group-level defenses (Evans and Spivak 2010). Behaviors that reduce colony-level parasite and disease loads are termed "social immunity."

Individual honey bees of all ages and castes have developed mechanisms to limit the impacts of their pathogens. These mechanisms involve resisting pathogens, by building barriers to infection or mounting defense responses once infection has occurred or tolerating pathogens, by compensating for the energetic costs or tissue damage caused by either these pathogens or the bee's own immune responses. Mechanical, physiological, and immune defenses provide the classic route for resisting pathogens (Evans and Spivak 2010). Mechanical barriers include the insect cuticle and epithelial layers, which in many cases prevent microbes from adhering to or entering the body. Physiological inhibitors to microbial invasion can include changes in the pH and other chemical conditions of the insect gut (Crailsheim and Riessberger-Galle 2001). Honey bees are known to mount an induced immune response to wounding or pathogen exposure (Evans et al. 2006).

Most physiological immune responses are internal and targeted at organisms that have invaded the body. Responses to the pathogen may include producing antimicrobial peptides and lysozymes that either inhibit the growth of microorganisms or kill them. Similarly, their blood cells phagocytose single-celled parasites, whereas larger invaders are encapsulated in a layer of blood cells that are melanized, sealing off the invader from the host's body. These are examples of personal immunity in which the challenged individual is the main beneficiary of the immune response (Cotter and Kilner 2011).

"Social immunity," describes how individual behaviors of colony members effectively reduce disease and parasite transmission at the colony level (Cremer et al. 2007; Simone-Finstrom and Spivak 2010). These behaviors range from more common acts like grooming of nestmates and removal of dead material from the main nest area (undertaking behavior) to "social fever" in honey bees that is used to kill pathogens (Starks et al. 2000) and the detection and removal of pre-infectious diseased or parasitized brood (hygienic behavior). Hygienic behavior is an antiseptic behavior and differs from undertaking (the removal of dead adult nestmates) and grooming (the removal of foreign objects and pathogens from oneself (autogrooming) or from another adult in the nest (allogrooming) (Wilson-Rich et al. 2009).

"Another example of a behavioral disease resistance mechanism is the collection and use of plant resins."

In contrast to individual immunity, social immunity describes colony-level anti-parasite/pathogen protection, achieved by the cooperation of all colony members, collectively avoiding, controlling or eliminating infections and reducing parasite load. The nature of these defenses are that they cannot be performed efficiently by single individuals but depend strictly on the cooperation of multiple individuals (Cremer and Sixt 2009).

The most virulent, colony killing, bacterial agents are *Paenibacillus larvae* causing American foulbrood (AFB) and European foulbrood (EFB) associated bacteria. Besides the innate immune defense mechanisms, honey bees have developed behavioral defenses to combat these infections. Foraging for antimicrobial plant compounds plays a key role for this "social immunity" behavior. Secondary plant metabolites in floral nectar are known for their antimicrobial effects. Yet these compounds are highly plant specific, and the effects on bee health will

depend on the floral origin of the honey produced. As worker bees not only feed themselves, but also larvae and other colony members, honey is a prime candidate acting as self-medication agent in honey bee colonies to prevent or decrease infections. Erler et al. (2014) tested eight AFB and EFB bacterial strains and the growth inhibitory activity of three honey types. Using a high-throughput cell growth assay, they showed that all honeys have high growth inhibitory activity and the two monofloral honeys appeared to be strain specific. The specificity of the monofloral honeys and the strong antimicrobial potential of the polyfloral honey suggest that the diversity of honeys in the honey stores of a colony may be highly adaptive for its "social immunity" against the highly diverse suite of pathogens encountered in nature.

Another example of a behavioral disease resistance mechanism is the collection and use of plant resins. Honey bees forage for plant-produced resins with antimicrobial properties and incorporate them into their nest architecture. These resins are brought back to the colony where they are mixed with varying amounts of wax and utilized as propolis (Simone et al. 2009; Simone-Finstrom and Spivak 2010). This use of resins can reduce chronic elevation of an individual bee's immune response. Since high activation of individual immunity can impose colony-level fitness costs, collection of resins may benefit both the individual and colony

"Honey bees maintain elevated temperatures in the brood nest to accelerate brood development and to facilitate defense against predators."

fitness. Simone-Finstrom and Spivak (2012) presented evidence that honey bee colonies may self-medicate with plant resins in response to a fungal infection. Self-medication is generally defined as an individual responding to infection by ingesting or harvesting non-nutritive compounds or plant materials. They showed that colonies increase resin foraging rates after a challenge with a fungal parasite (*Ascophaera apis* which causes chalkbrood). Additionally, colonies experimentally enriched with resin had decreased infection intensities of this fungal parasite. If considered self-medication, this is a particularly unique example because it operates at the colony level. Most instances of self-medication involve pharmacophagy, whereby individuals change their diet in response to direct infection with a parasite. In this case with honey bees, resins are not ingested but used within the hive by adult bees exposed to fungal spores. Thus the colony, as the unit of selection, may be responding to infection through self-medication by increasing the number of individuals that forage for resin.

As the antimicrobial venom peptides of *Apis mellifera* are present both on the cuticle of adult bees and on the nest wax it has recently been suggested that these substances act as a social antiseptic device. Baracchi et al. (2011) confirmed the idea that the venom functions are well beyond the classical sterotype of defence against predators. The presence of antimicrobial peptides on the comb wax and on the cuticle of workers represents a good example of "collective immunity" and a component of the "social immunity," respectively.

Several bee pathogens are sensitive to temperature, and the individual bee or the colony may create a "fever" to kill nosema (Martín-Hernández 2009; Campbell et al. 2010) and chalkbrood (Starks et al. 2000). Behavioral fever is a common response to an infection in many animals. Honey bees maintain elevated temperatures in the brood nest (Seeley 1985) to accelerate brood development and to facilitate defense against predators. Honey bees engulf invading hornets in defensive balls, which they heat to lethal temperatures (Ono et al. 1995). Starks et al. (2000) also identified an additional defensive function of elevating nest temperature: honey bees generate a brood comb fever in response to colonial infection by the heat-sensitive pathogen *Ascosphaera apis* (causative agent of chalkbrood). This response occurs before larvae are killed, suggesting that either honey bee workers detect the infection before symptoms are visible, or that larvae communicate the ingestion of the pathogen.

Social life is generally associated with an increased risk of disease transmission, but at the same time it allows behavioral defense at both the individual and collective level. Bees infected with deformed-wing virus were introduced into observation hives; through behavioral observations and chemical analysis of cuticular hydrocarbons from healthy and infected bees, Baracchi et al. 2012 offers the first evidence that colonies can detect and remove infected adult bees, probably by recognizing the cuticular hydrocarbon profiles of sick individuals. They also found that health-compromised colonies were less efficient at defending themselves against infected bees, thus facing an ever increasing risk of epidemics. This new antiseptic behavior was interpreted as an adaptation at the colony level and one which should be considered as an element of the social immunity system of the bee hive.

Rueppell et al. (2010) challenged honey bee foragers with prolonged CO_2 narcosis or by feeding with the cytostatic drug hydroxyurea. Both treatments resulted in increased mortality but also caused the surviving foragers to abandon their social function and remove themselves from their colony, resulting in altruistic suicide. A simple model suggests that altruistic self removal by sick social insect workers to prevent disease transmission is expected under most biologically plausible conditions. Altruistic self-removal appears to be a potentially widespread mechanism of social immunity.

Le Conte et al. (2011) identified a set of genes involved in social immunity by analyzing the brain transcriptome of highly *Varroa*-hygienic bees, who efficiently detect and remove brood infected with *Varroa* mites. The function of these candidate genes does not seem to support a higher olfactory sensitivity in hygienic bees, as previously hypothesized. However, comparing their genomic profile with those from other behaviors suggests a link with brood care and the highly *Varroa*-hygienic Africanized honey bees. These results represent a first step toward the identification of genes involved in social immunity. BC

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Flight Guidance Mechanisms Of Honey Bee Swarms

How They Get Where They Are Going

Tom Seeley & Ann Chilcott

Anyone who observes a swarm of bees launch into flight and move off to its new home is presented with a mind-boggling puzzle: how does this school-bus sized cloud of some 10,000 insects manage to fly straight to its new dwelling place? Its flight path may extend for several miles and traverse fields and forest, hilltops and valleys, and even swamps and lakes. What is most amazing is the precision of the flight guidance, for the swarm is able to steer itself to one special point in the landscape, e.g. a specific knothole in one particular tree in a certain corner of a forest. And as the swarm closes in on its destination, it gradually reduces its flight speed so that it stops precisely at the "front door" of its new home. The mystery of how the thousands of bees in a swarm accomplish this magnificent feat of precisely oriented group flight has been carefully probed in recent years using sophisticated radar tracking, video recording, and image processing technologies. In this article, we will review the main findings of these investigations.

First, let's define the problem a bit more precisely. Several studies (Seeley et al. 1979, Seeley and Buhrman 1999) have revealed that only three to four percent of the bees in a swarm have visited the new home site in advance of the swarm's move to it. This small minority of well-informed bees consists of all the scout bees that visited the chosen site during the swarm's process of choosing its dwelling place (reviewed by Visscher 2007, Seeley 2010). Therefore, when a swarm flies to its new home, it relies on a relatively small number of informed individuals – some 300 to 400 individuals in an average-size swarm of 10,000 bees – who must lead all the rest to their destination. How does this system of leaders and followers work?

Figure 3. *Kirk Visscher, left and Tom Seeley in 2006, watching a test swarm move into a bait hive on appledore Island, in the State of Maine.* (photo by Peter Essick

One possibility is that the leaders provide flight guidance by means of the attraction pheromones produced in the Nasonov gland that is part of the scent organ at the tip of a worker bee's abdomen (Fig. 1). The leaders might discharge these pheromones along the front of the swarm cloud to attract, and thereby guide, the other bees to move in this direction. This hypothesis was tested in a study (Beekman et al. 2006) with three swarms – each consisting of a queen and 4000 workers – in which every worker bee had her scent organ sealed shut with paint. Each swarm was tested for its ability to perform a well-oriented, full-speed flight to a bait hive in the center of an open field. As a control, three other swarms of the same size were prepared in which every worker bee had a dot of paint applied to her abdomen but without sealing off her scent organ. Their flight abilities were likewise tested. Both treatment and control swarms flew directly and quickly to the bait hive, but the treatment swarms took much longer than the control swarms (20 min vs. 9 min, on average) to move into the hive once they reached its location. This experiment showed that the leaders in a swarm do not provide flight guidance using the Nasonov gland pheromones, but that they do use these pheromones to help the followers find the entrance of their new home.

A second way that the leaders could provide flight guidance is by means of visual signals. One way they might do so is by repeatedly making high-speed flights through the swarm cloud. They could do this by shooting forward in the top of the swarm cloud until they reach its front and then by flying slowly to the rear of the swarm along its bottom or sides (Fig. 2). Martin Lindauer, the German researcher who pioneered the study of house-hunting by swarms, reported seeing several hundred "streaker bees" shooting through the tops of flying swarms, and he speculated that they were signaling the flight direction (Lindauer 1955).

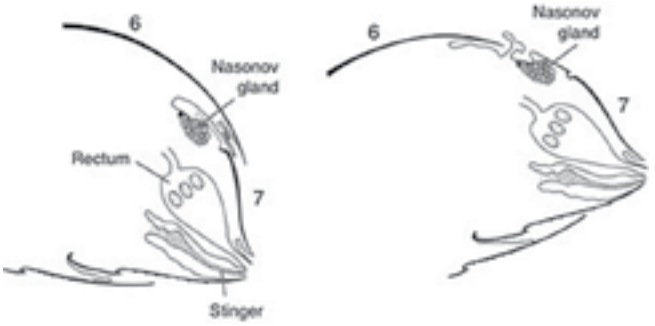

Figure 1. *Sections through the abdomen of a worker bee showing, left, the scent organ close in the rest position and right, the scent organ exposed by raising the abdomen and tipping the last abdominal segment downward.*

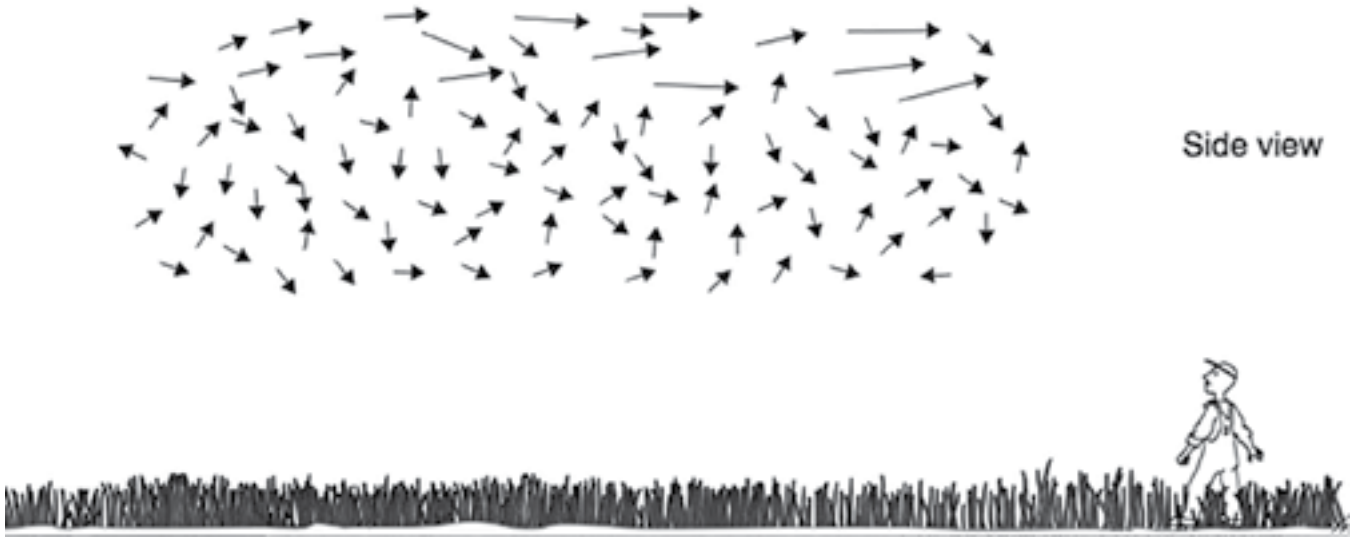

Figure 2. *Schematic view of the flight patterns of bees in a swarm flying to the right. Lindauer reported observing streaker bees mainly in the top of the swarm cloud.*

Lindauer's observations have recently been confirmed in a study that used harmonic radar tracking of the flight paths of individual leaders (scouts) during the takeoff and first few minutes of flight of two swarms (Greggers et al. 2013). Only one of two swarms observed in this study flew all the way to its destination, and in this swarm just two leaders had their flight maneuvers tracked, but both bees displayed the streaker-bee behavior. High-speed flights were made in the direction of the swarm's destination and these were separated by slower rearward flights and stationary loops. The slow-speed maneuvers of the leaders moved them to the rear of the swarm cloud, hence to the right place to start another high-speed flight forward through the swarm. The results of this study support the streaker-bee hypothesis for swarm flight guidance.

Further support for the streaker-bee hypothesis comes from a study in which the movements of thousands of individual bees in a swarm were tracked simultaneously, and measurements were made of each bee's position, flight direction, and flight speed (Schultz et al. 2008). The goal was to get information on the movements on all the bees in a flying swarm to see if, as predicted by the streaker-bee hypothesis, the high-speed fliers in a swarm are indeed shooting toward the swarm's new home. This study also aimed to check Lindauer's report that streaker bees are seen mainly in the top of a flying swarm. This makes sense since this location would render these bees conspicuous – as dark objects against the bright sky – to all the rest of the bees in the swarm, but it still required to be checked.

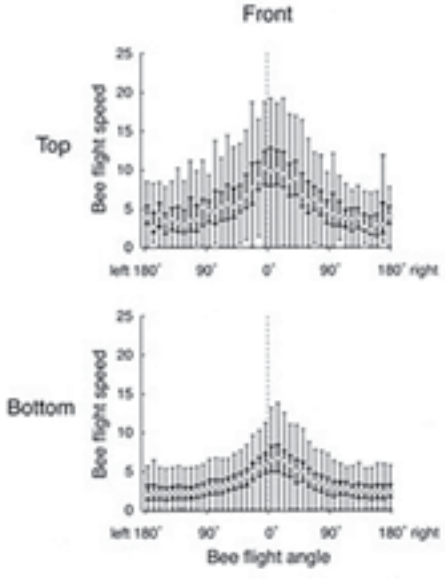

Figure 4. *Flight speed vs. flight angle for the bees in a flying swarm when it had flown 50 feet from its bivouac site. Bees with a flight angle of 0° were flying straight toward the new home; all the rest were flying at some angle to the left or right of the direction to the home site. The measurements of the flying bees are shown separately for the top and bottom layers of the swarm cloud. The units of flight speed are bee lengths per video frame.*

The study began by having a swarm fly over a high-definition video camera. The camera was equipped with a wide-angle lens so that it could "see" the full width of the airborne swarm. The camera also had an extremely high shutter speed – one ten thousandth of a second – so that within each frame of the video recording each bee appeared as a short, ellipsoidal blob rather than a long streak. To have the swarm fly directly over the camera, the recording was made on a treeless island six miles out in the Atlantic Ocean where the only desirable home site was a bait hive positioned 820 feet from the swarm (Fig. 3). The camera was positioned 50 feet from the swarm's bivouac site along the swarm's flight path to the bait hive. The same swarm was forced to make two complete flights to the bait hive, and each time (thankfully!) it flew squarely over the video camera.

With these two recordings of swarm flyovers "in the can," the next step was to use point-tracking algorithms invented by engineers working on computer vision to make three-dimensional reconstructions of the individual bee's flight movements within the flying swarm. The procedure involved examining each ellipsoidal blob (bee image) in a given video frame and then pairing it up with the blob on the next video frame that represented the same bee. This process was repeated with the blobs of the second frame being paired with blobs of the third frame, and so on, to build up, frame by frame, detailed trajectories of individual swarm bees as they flew across the video camera's field of view. The size of each blob indicated the height of the bee above the camera, so the bees in the top and bottom portions of the swarm cloud were distinguished.

The most important finding revealed by this

painstaking analysis of the video recordings is that the fast-flying bees were indeed streaking in the direction of the swarm's flight, i.e., toward the nest box. And, as is seen in Fig. 4, which shows the individual bee's flight speeds in relation to flight direction, the speediest bees were flying directly toward the new home while the slowest ones were heading in the opposite direction. By comparing the plots for the top and bottom portions of the swarm cloud, we can also see that the speedsters were mainly found in the top portion of the swarm. It was further revealed that not only did bees that flew in the direction of the new home tend to fly with the highest velocities, but that they also tended to accelerate (increase their velocities) as they moved from the rear of the swarm cloud to its front. It seems likely that some of this rise in flight speed came about as some follower bees "latched on" to the leader bees, boosting their speed by chasing after the leader bees. If so, then the information about flight direction probably spreads from the informed bees (leaders) to the nearby ignorant bees (followers) who, through their own faster flights, will start to influence other ignorant bees. This chain reaction of informed bees begetting more informed bees could lead to a widespread induction of bees to fly toward the swarm's destination and to fly faster. This can explain the increase in swarm flight speed over time that is shown in Fig. 5, and that is so impressive to any beekeeper who has tried to follow a fugitive swarm to its new home by running along beneath it.

Many questions remain unanswered about the remarkable flights of honey bee swarms. How does the moving group "apply the brakes" when it is within 90 m, or about 300 feet, (see Fig. 5) of its new residence? Also, how exactly do the informed bees make their repeated streaker flights through the swarm cloud? Do they tend to stop when they reach the front and let other bees fly past, or do they usually fly rearward underneath the swarm, where they may be nearly invisible against the dark vegetation below? And how is it that virtually all the scout bees who have visited the chosen home site, and so can steer the airborne swarm to it, leave the future dwelling place and assemble back on the swarm shortly before it launches into flight? It certainly makes sense for

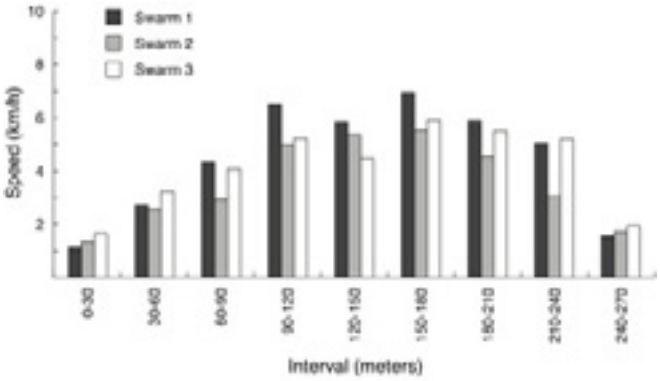

Figure 5. *Flight speeds of three swarms as they flew 270m (880 feet) to a bait hive. Their top speeds were 5-7 km/h (3.0-4.2 miles per hour). When swarms perform longer flights, they can reach speeds of nearly 12 km/h (7.2 miles/hour).*

all these scout bees to return to the swarm before it takes off, for we have seen how only three to four percent of a swarm's membership know its flight plan. And with such a small minority of navigators, it must be important to have as many as possible on board. Do scouts lingering at the home site fly back to the swarm in response to feeling, seeing, or smelling some "Time to leave!" signal produced by scouts that have sensed that the swarm's liftoff is imminent and then have made a special trip to the home site to recall everyone? We wouldn't be surprised if the bees possess some secret gadgetry for ensuring that a swarm about to take flight is well stocked with the informed bees who can pilot it safely to its new home. BC

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REPORTING PRE-LETHAL BEE LOSSES

The real-world of our honey bees needs to have real-world testing.

Michele **Colopy**

In the May 2015 issue of this magazine, as part of the Honey Bee Health Coalition, an article detailed the process of reporting an acute bee kill. However, not all bee kills are acute evidenced by a large pile of dead bees scattered in front of the hive. Honey bees will die away from the hive if stricken by illness or the effects of pesticides. Their very nature guides them to protect the colony, and die away from the hive if ill or suffering from toxins. The question that arises, though, is how to report bee losses that are *not* Winter losses, and are not acute bee kills? How do beekeepers report an unusual dwindling of the hive? These are not acute kills, but bee losses caused by sub-lethal, or pre-lethal exposures to toxins in the honey bees' forage area.

A slow-dwindling

A honey bee's boundary is its flight range, from one to six miles, as it searches for pollen and nectar. Honey bees do not restrict themselves to just the crop right in front of them, nor to property lines or fence lines. Neighboring crops, wildflowers in bloom along field edges, generally any blooming thing in forage range is sampled by honey bees. An adult forager bee may not be affected acutely by toxins in and on the pollen and nectar, however, the brood in the hive may be affected. When the life cycle of the hive organism is disrupted through the feeding of tainted pollen and nectar to brood and house bees, a sub-lethal situation is created starting a downturn in the health and sustainability of the honey bee colony. Nurse bees feed brood what they are supplied. When it is toxic, brood dies. Until incoming resources "clean-up" the hive it will shrink. Even after incoming contamination ceases, and the hive appears to recover, it will suffer later due to eating contaminated stores.

Honey bees do not restrict themselves to just the crop right in front of them, nor to property lines or fence lines.

Warning signs of a pre-lethal situation in your hive *may* include:

- agitated honey bees
- unanticipated decrease of adult population (not due to swarming)
- a few weeks after pesticide exposure a spotty brood pattern is observed (brood of all ages intermixed)
- house bees removing brood
- some entombed pollen
- three weeks post exposure abnormal queen supercedure occurs
- a few months post exposure hive populations are small, some are deadouts
- Unanticipated levels of pests and pathogens precipitated by the bees' weakened immune systems, and the colony's reduced population that causes stress across the hive organism

Many of these symptoms are difficult to test as to causation. Research has shown pesticides in the foundation can travel from one cell to another, spreading the toxins throughout the hive. You may see only one of these warning signs, you may see a number of them. You may not even notice a slow dwindling of your hive until it is too late. However, if you enter a bee yard and your bees are agitated for no exterior reason it would be a good time to collect samples of pollen, wax, and possibly live bees. Remember pesticides degrade quickly, so collect samples as soon as possible. Collect any live bees showing abnormal behavior into a ziplock bag. With tweezers collect freshly pulled larvae into a separate bag. Observe incoming pollen foragers and attempt to locate the section of the frame that matches: remove a three inch square and place that in a separate plastic bag. If the bee kill has been in progress for a while, some bees may have entombed some pollen. Locate this, remove a sample of the entombed pollen and place in a bag. Always freeze your samples immediately. Make arrangement to have the samples analyzed. You can find a list of labs at our website, **http://pollinatorstewardship.org/?page_id=1342**.

An acute bee kill in Florida.

Bee losses while pollinating watermelon. Neighboring field is a cotton crop.

Increased losses while pollinating crops

Beekeepers sometimes suffer losses while pollinating a crop. One beekeeper stated he experiences 10-25% losses of adult forager bees weekly from pesticide exposure in agriculture from July 1st to August 30th. Not all farming areas feature a single crop, but a variety of crops adjacent to each other. Many of these crops may be treated with pesticides in a constant and ongoing manner, such that the bees do not get any relief from the mix of pesticides. Honey bees will experience a myriad of pesticide products on crops, as individual applications, as well as tank mixes of a variety of chemical products.

Those beekeepers pollinating individual crops may not see the pre-lethal effects until weeks after pollinating that crop. Beekeepers who remove their bees from a contracted crop pollination site, may discover in two weeks or a month the hives crashing, brood being pulled out, and or the queen has stopped laying. Whether the beekeeper has moved their bees to another crop to be pollinated, or they placed them on native ground to produce a honey crop, the bees are now showing pre-lethal signs of toxic exposure. Determining which toxin caused the current pre-lethal situation can be difficult and expensive.

So how does a beekeeper report this type of bee loss? An acute bee kill is relatively easy to acknowledge and report: an inordinate amount of dead bees in front of the hive. Pre-lethal losses, such as a hive full of honey, but lacking honey bees; a reduction in adult foragers, and an imbalance of castes demanding bees take on a task before they are ready; a loss of a brood cycle, or two, a queen who stops laying are all difficult to evaluate as to the specific cause. These types of losses are not being tracked, not being counted, and yet these losses are prevalent in the real-world of our honey bees.

Beekeepers pollinating individual crops may not see the pre-lethal effects until weeks after pollinating that crop.

Lab testing of pollen and other hive products is necessary to determine hive level concentrations. Concentrations that may not be at a lethal dose level, or even at a level of concentration, but the level is still causing damage to the organism that is a colony of honey bees. If we are to fully protect pollinators, funding needs to be available to support laboratory analysis of pollen and other hive products for not just pests and pathogens, but pesticide exposure as well. Beekeepers should not have to bear the full burden of the cost of lab tests on acute and pre-lethal bees and their hive products. To obtain this definitive analysis of the toxins in the hive, the toxins in the pollen and nectar collected by honey bees, scientific lab analysis is needed. The lab analysis needs to be funded by those entities supporting agriculture and apiculture at the federal and state levels. EPA seeks the data of pesticides in the real-world. They collect data on bee kills, and prefer lab analysis to validate "anecdotal evidence." Funding then needs to be provided to those entities who could assist with lab testing. Cost-sharing programs for lab testing have worked well with some University Extension Programs, but more programs need more funding.

Real-world of Honey Bees

Research shows tank mixes of pesticides are more problematic than single use exposure of a pesticide. The real-world of our honey bees needs to have real-world testing. The EPA needs the data concerning actual pesticide exposure to honey bees to determine re-registrations, and/or adjustments to pesticide labels to protect human health and the environment. Lab testing of all hive products of a hive suffering inordinate losses would contribute to the research data sought by the EPA. As an indicator species, honey bees are an environmental beacon we should support by taking every opportunity to collect all the needed data in order to protect human health and the environment.

Several factors are implicated as primary causes of bee declines, most notably pesticides (insecticides, fungicides and herbicides) and pathogens (mites, viruses, bacteria, fungi). The Pollinator Stewardship Council (PSC) is part of a collaborative project with the Pesticide Research Institute, Inc. (PRI). Together, with commercial beekeepers, we seek to better understand how these different stressors compromise the health of bees. This research will follow 60 beehives, making measurements of:

- Pesticide residues in pollen, wax, and honey (180 different pesticides)
- Pathogen levels (in collaboration with Montana State University scientists)
- Varroa mite loads
- Hive strength, queen performance, disease, bee mortality, and any abnormal bee behavior

We started the work in January 2014, and four out of five sample sets have been collected. We have made hive strength measurements and observations at regular intervals over the course of the year. The preliminary results are tantalizing. We now must finish analyzing the samples for pesticide residues and pathogen levels, and then do the statistical analysis. Visit the project page (**http://pollinatorstewardship.org/?page_id=2843**)

to find out more, and see how you can support this important work of the real-world of our honey bees. Our research on the hive tracking is a collaborative project involving our science partner PRI, the Flenniken Lab at Montana State University performing virus diagnostic testing of our samples, and commercial beekeepers pollinating a variety of crops. As government budgets are cut, the bulk of research of honey bees falls to university researchers, and non-profits. Valid research is research that is replicated and reviewed by others, and then validated by their research peers. Collaborative research such as our Hive Tracking Research project will be shared with the other research scientists and the beekeeping community. We must use these precious sources of funding wisely, funding projects that are collaborative, and most importantly peer-reviewed.

Reporting Bee Kills: Acute and Pre-lethal

Because all bee kill incident reporting currently is fixated on the presence (or lack thereof) of dead adult bees it is difficult to report bee kills which are sublethal to adult bees. This must change. All effects which diminish the health of pollinators must be acknowledged and addressed. The Pollinator Stewardship Council helps beekeepers through the reporting process. We encourage you to follow the ten steps to reporting a bee kill as defined in the May issue of *Bee Culture* magazine. Whether it is an acute bee kill, or a pre-lethal loss of your honey bees, the information about these losses is important. It is devastating to you as a beekeeper, but it is important information for EPA's data collection and analysis. Even if lab analysis of hive products was not conducted, *report these pre-lethal losses*. The Pollinator Stewardship Council can help you report this data to the EPA. For more information about reporting bee losses visit our website at **http://pollinatorstewardship.org/?page_id=934** or call us at 832-727-9492. BC

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Practical Beekeeping

Beekeeping with the 'new' parasite

Wolfgang Ritter

Until a few years ago the occurrence of diarrhoea and crawling bees in Spring was regarded as typical for *Nosema* infestation. Since the turn of the millennium, this has changed fundamentally. Today, *Nosema* is rarely accompanied by diarrhoea, but crawlers can still be found, and now throughout the year. A 'new' *Nosema* species originating from Asia has everywhere replaced the former one. The fact that the *Nosema* pathogen is now classified as a fungus and no longer as a bacterium is of less practical importance.

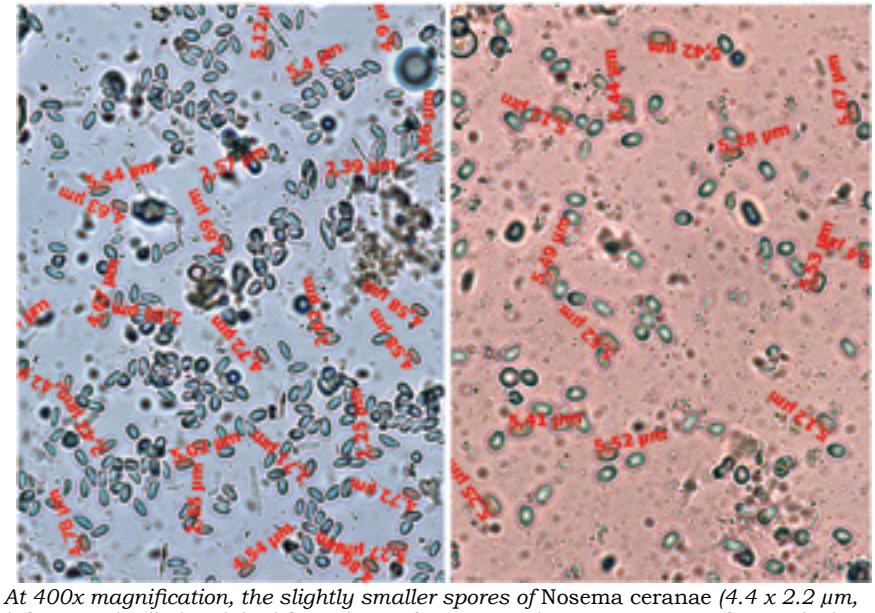
Host change in Asia

Nosema apis is the original parasite of the Western honey bee *Apis mellifera.* It multiplies in the cell walls (epidermis) of a bee's midgut and obstructs protein production. The Asian honey bee *Apis cerana* is exclusively affected by *Nosema ceranae.*

In China in the 1970s *Nosema ceranae* was found for the first time in newly introduced *Apis mellifera* honey bees. Since 1998, this 'new' parasite has spread all over the world, and within a short time has nearly eliminated *Nosema apis*. According to our examinations in Southern Germany, the replacement took place within one to two years from the beginning of 2003. In places with higher bee density, change was more rapid.

Similar but genetically different

Under the microscope with 400x magnification, the slightly rounder and generally smaller spores of the Asian *Nosema* can be distinguished from the spores of the original endemic species, but only after meticulous measuring of a large number of spores followed by statistical evaluation. A clear identification is possible only with molecular genetic methods with Polymerase Chain Reaction (PCR). This method enables easy recognition of multiple infections. *Nosema ceranae* can be identified



At 400x magnification, the slightly smaller spores of Nosema ceranae *(4.4 x 2.2 µm, left) are only distinguished from those of* Nosema apis *(5-7 x 3-4 µm) after meticulous measuring.*

in other bee organs, such as the Malpighian tubules and different glands. As these examinations are not available for *Nosema apis,* it is unknown whether this is typical for the 'new' species, and is of any practical importance.

Temperature survival

Both *Nosema* species multiply best at the normal brood temperature of 34°C. Above 37°C, *Nosema apis* can no longer develop, whereas *Nosema ceranae* still completes its full cycle. Many spores can survive above 60°, when *Nosema apis* has been killed. Below 34°C, *Nosema cerana* develops less favourably. After 24 hours of frost, the majority of spores are dead, while *Nosema apis* maintains its pathogenic power for longer. This is why we can store *Nosema apis* deep-frozen spores for years for use in examinations.

Clinical symptoms

Traces of diarrhoea inside and in front of the hive are typical for *Nosema apis.* Weakened bees often crawl at the entrance hole. Gradually the colony became weaker and most often died. Also with the 'new' *Nosema ceranae*, crawling bees are seen in front of the hive, but visible diarrhoea occurs rarely, and spots of excrement are infrequently found. The colonies are weakened throughout the year and do not develop properly. The total losses with empty hives (after all the ill bees had left their colony) experienced in Spain and other Mediterranean countries have not so far occurred in Germany. Obviously, this is due to *Nosema ceranae's* poor tolerance of cold and its better multiplication capacity in warmer climates.

Perennial symptoms

Nosema apis multiplies sufficiently only in olderbees. Strong infestations by *Nosema* spores therefore appear in spring and to a lesser extent, also during harvest, at the time of rearing longer-living Winter bees. Problems with *Nosema* mostly occur after years of poor forage conditions and with long-living bees. In general, this seems to be true also for *Nosema ceranae.* However, this species can multiply well in shorter-living summer bees, and thus causes typical symptoms, especially crawling bees, throughout the year.

Increase bee turnover

With *Nosema apis* it was important that the bees in the hive are not too old and that infested ones are replaced by younger ones as soon as possible. As *Nosema ceranae* causes damage more rapidly, you should ensure that there is a regular bee turnover throughout the year:

- Colonies should be placed where the bees can leave their hive for honey flow as early and as frequently as possible.
- Colonies should not be placed on the ground to avoid ill bees, especially crawlers, getting back in to the hive.
- Colonies should be offered good foraging possibilities, as often as possible, thus preventing summer bees getting too old.

Optimise food supply

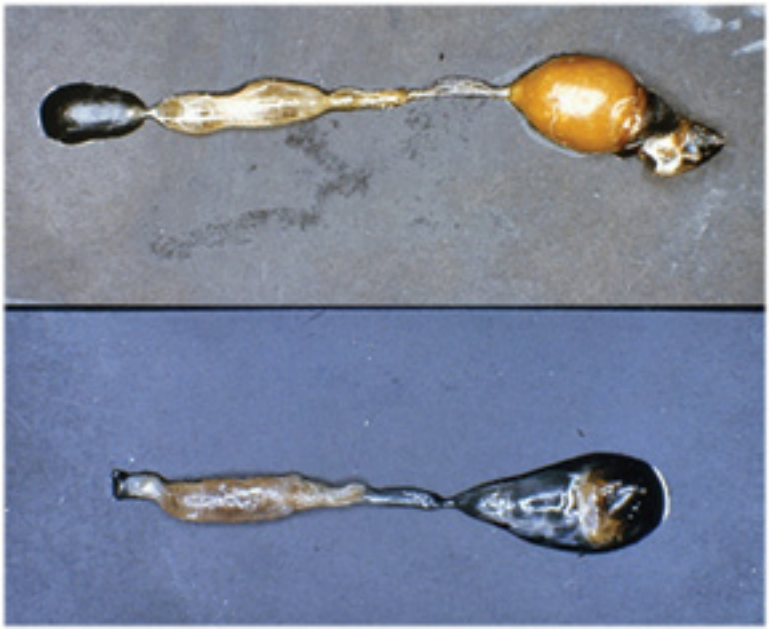
Sufficient food supply has always been important for bee colonies. In many countries, commercial enterprises offer restoratives for *Nosema* control. We have not tested all of them. The effects of some have been controversially discussed.

Disinfect combs and comb equipment

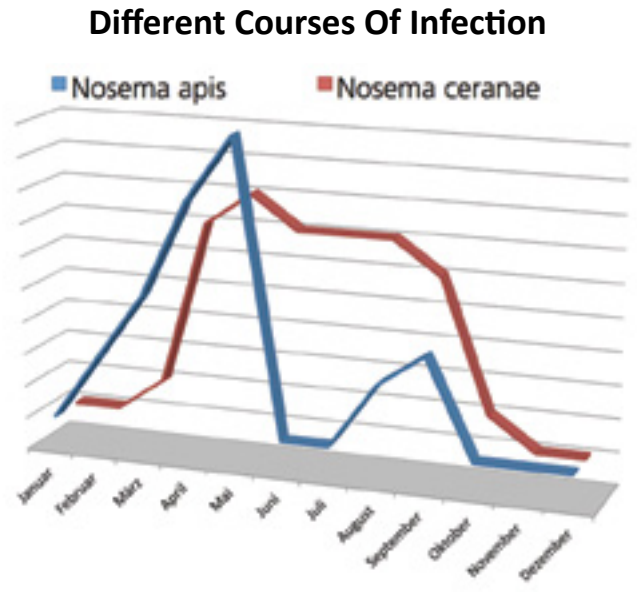
Nosema spores can be found everywhere in the bee colony. Bees pick them up during cleaning and distribute them. To support self-healing, the number of pathogens has to be reduced, therefore eliminate as many sources of infection as possible:

- Combs of dead colonies are treated with 60% acetic acid over absorbent materials, such as sponge cloth and felt plates (for 10 combs you need 120 ml of 60% acetic acid).
- Deep-freeze BC food combs for at least 24 hours.

First published at ***www.diebiene.de****. Translated version published in Bees for Development Journal,* ***www.beesfordevelopment.org****. Contributions and comments welcome.*



For examination the intestines are extracted together with the last segment of the abdomen. Top: infested. Lower: healthy transparent midgut. (Source: Ritter, W. (2012) Bienen gesund erhalten (Keeping bees healthy). Ulmer Verlag. Stuttgart, Germany in German)



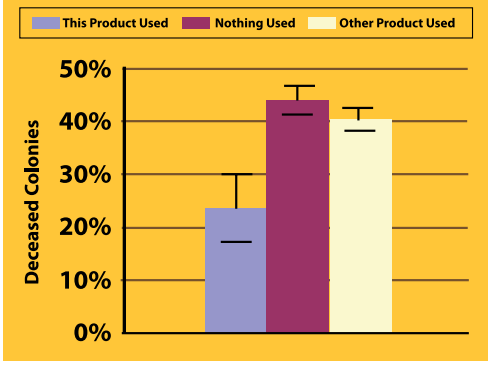
Unlike endemic Nosema apis*, imported* Nosema ceranae *appears throughout the year and is able to multiply in short-living, Summer bees.*

To disinfect combs, place a sponge cloth impregnated with 60% acetic acid between the supers.

Bee Informed Partnership (BIP) Management Survey produced astounding results. Here is a comparison of average winter colony mortality among beekeepers who reported ***treating with ApiLife Var****, ***not treating with any known varroa mite control product***, or ***not treating with ApiLife Var***, at least once, between April 2012 and March 2013.

* This information is for educational purposes only and references to commercial products or trade names do not imply endorsement by the Bee Informed Partnership or its members.

ApiLife Var Use *(Southeast)*



OXALIC ACID

Effective & Easy On Bees, But . . .

Jennifer **Berry**

Years ago, while still working on my graduate degree, I met Dr. Marion Ellis, a professor of Entomology at the University of Nebraska. I was still very "green" because it was my second year as a beekeeper. I am sure, as either newbies or seasoned beekeepers, that you remember what it was like when you first entered into the beekeeping fold. Do you recall your first hives? Do you remember your excitement at going to your first meetings or lectures, and the resulting 5,862 questions that you asked? There were the magazine articles you perused, the books you read (and re-read), and the catalogs you poured over. The contraptions pictured in the catalogs left me wondering, "What in the heck do you use that for?!?" Remember ordering your first equipment and trying to sound intelligent while doing so? "Yes, I would like a brood excluder please, and I need one drone and some of that comb frames with wired boards, I mean bars." Do you remember the good ole days when you stumbled around the bee yard in awe of the activity level and slightly intimidated about interfering with their important comings and goings by opening the hives?

Well, that's how I was when I met Dr. Ellis. He definitely has a special place in my old memory banks since, when we first met, he said to me, "Oh, we've met before because I recognize you." I told him that this was not possible as I was new to the beekeeping world, academically and socially. But, throughout our two days working together at the Young Harris Bee Institute, he occasionally stopped me and repeated, "I know that we've met somewhere . . . maybe it was at a bee meeting?" "No," I corrected him, "The only bee meeting I've attended so far has been the Georgia Beekeepers Association meeting in Macon, and I know for a fact that you weren't there." "Hmmmmm," he pondered, "You just look so familiar to me. I could swear we've met somewhere before."

The mystery continued until the end of the last day. While our crew was packing up and getting ready to leave, Dr. Ellis came over and said, "I just figured out where I have seen you. You used to be a comedian, right?" I shyly admitted that, in my previous life, I had tried my hand at comedy. He asked if I had ever performed in Chicago, with an improve team, and I confirmed, "Yes." Then, he clapped his hands together and exclaimed, "That's it! I saw you perform at a comedy club in Chicago." Finally, the mystery had been solved – and none too soon. I was beginning to worry that I had an identical twin running around out there, from whom I had been unknowingly separated at birth, who I could soon be facing at any given moment if I continued to attend beekeeping events.

I was ecstatic that he actually had been at one of my shows and REMEMBERED me! We chatted about the show and how much fun he had. Meanwhile, I was constantly looking over my shoulder to see who might have been listening to all of this. Up until that point, I hadn't really revealed much about my past to my new peers; I wasn't sure how the academia of UGA would take it if they knew that, at one point, I had been an actor/comedian. But it's all good now.

Once again, long story long, but there is a point – I promise. So, over the years, when I would run into Dr. Ellis at a meeting, we would tell whoever was around, or willing to listen, about how we had been introduced (though, not actually met) a long, long time ago. At one meeting, Dr. Ellis gave a lecture about the benefits of using oxalic acid for *Varroa* control, and I listened with great interest. At the end of the lecture, someone from the audience posed, "Where does one purchase this 'oxalic acid?'" Dr. Ellis replied, "At your local hardware store. It's wood bleach." From the back of the room, I could hear some of the comments rising over the crowd, such as, "Wood bleach? Is he kidding us?!? I'm not putting wood bleach on my bees. It'll kill them, for sure!!!"

I was right there with them, thinking to myself how horrible it would be for the bees. Afterward, I sat down with Dr. Ellis, and we chatted about the research that he and his graduate student Nicholas Aliano had conducted. They tested various application methods (drip and vapor) and treatment concentrations. Their results showed that oxalic was not harmful to the bees, but that it did do a number on the mites. Following that discussion, we tried it at the UGA bee lab, and we experienced the same outcome. Oxalic killed mites by the thousands! As a result, I started inquiring into getting oxalic acid registered for use as a miticide in the US, but quickly found out it was NOT going to be easy. It hadn't been easy for the Canadians either.

Getting a pesticide approved

takes a lot of time and money. It took six years from the time that the Canadian testing was completed for the registration process to move at a glacial pace through the proper channels. But, finally, the Canadian Honey Council officially registered oxalic acid in November 2010.

This brings to mind a conversation I had with Steve Forrest, former president and owner of Brushy Mountain Bee Farm, when he was trying to get Api Life Var (thymol) registered. Not only was there an incredible amount of legwork involved, but, like I mentioned previously, there's also a huge amount of money required for testing, research, data analysis, labor, etc. Fortunately, the company that produces Api Life Var paid the costs and it was successful.

However, this was not the case for oxalic acid – a widely available, generic chemical. Think about it. Now, I'm just going to make up numbers here, but let's say that it costs $500,000 to get a typical miticide registered by the EPA/USDA for use in bee hives. When a proprietary formula is invented, trademarks and intellectual property right protections can be obtained to secure such an investment to get the chemical approved and marketed. But who is going to put up big bucks to have a ubiquitous product approved for use in a bee hive when such an investor would have no control over its ultimate distribution, and, therefore, have no ability to recoup her/his investment? Today, anyone can stroll down to their nearest hardware store and purchase enough oxalic to treat 200+ colonies for just a few bucks.

In the mean time, the bees need our help. *Varroa* mites aren't going away, and, without every safe and effective remedy at our disposal, our bees are suffering. The latest research suggests the economic threshold for *Varroa* is now three mites per 100 bees. In the old days, before the recently introduced viruses, small hive beetles, rising stresses from limited nutrition and growing toxin levels in the environment, upwards to 15 mites per 100 bees was considered tolerable.

So, in accordance with President Obama's 2014 initiative on pollinator health, the EPA expedited the review on the registration process for oxalic acid. The EPA collaborated with the USDA and the Health Canada's Pest Management Regulatory Agency to move as quickly as possible on the evaluation of oxalic acid. It takes years to research and evaluate product toxicity, exposure risks, environmental impact and transport-related issues along with effectiveness data. All of these concerns need to be addressed, analyzed and the resulting data deemed accurate and favorable before a product can be registered for safe use in the US. While these assurances are certainly good things, it just takes time - lots of time - which is why the president stepped in and said, "Ok, folks. Let's figure out a way to speed up the process to get beneficial products to those who need them." And that's where Canada helped out. They had already completed the years of testing and, as part of the NAFTA "work share" agreement, they could share their data with the EPA risk assessors and managers to speed up the process; it saved years. We didn't have to re-do all the same research. We built on what the Canadians had already accomplished. And, once all the data was reviewed, the conclusion was that oxalic acid should be registered for use in the U.S.

What is Oxalic acid? It's an organic acid found just about everywhere in the environment including in plants and vegetables. It is bitter to the taste and irritating to the eyes, mouth and skin. It is a natural plant defense against herbivores. It is also found in honey. Since it is not fat soluble (a lipid), it doesn't build up in wax comb. Back in 1957, it was registered as a pesticide (disinfectant/sanitizer), but, by 1994, the renewal of the product registration was cancelled.

There are risks involved if you plan to use oxalic acid. Given its caustic effect on the eyes, skin and respiratory system, it's labeled with the highest degree of toxicity, "Category 1." So, as with all pesticides, caution must be taken when handling it.

How can oxalic be applied? Oxalic can be applied several ways: drip (trickle), vaporization and spraying. It can be used on existing colonies, packages or swarms. The two most popular are the trickle and vaporization method. The trickle or solution method is taking the acid and mixing it with a warm 1:1 sugar-to-water solution. Next, the solution is drawn into a syringe and 5 ml is trickled (scientific term for "dribbly drop") down the seam between each frame and directly onto the bees; the maximum dose is 50 ml per colony (5mls per seam). It doesn't matter whether it is a nuc or a hive with a single or multiple brood chamber, but reduction in dosage for smaller colonies obviously.

The vaporizer method is only to be used on colonies outdoors. And, what ever you do, do not inhale the vapor! Basically, you use a vaporizer which is a metal wand with a plate at

one end and a cord which connects to a battery at the other end. One gram of oxalic acid is placed on the metal plate. The plate is then slid into the entrance of the colony. The entrance opening and any other cracks and crevices are then sealed with the vaporizer in place to avoid the gas from escaping. Once connected to a battery, the heat from the plate causes the oxalic crystals to melt and turn into a gas (sublime). The vapor will permeate the hive. When it contacts the mites, it kills them. Each vaporizer is different. Some take only a few minutes to activate the acid, while others take a little longer. Since you don't have to open the colony in order to treat, this seems to be the easier of the two methods to implement, especially on cold, rainy days.

You can also spray (mist) packages or swarms. Over the last few years, we've followed this protocol to ensure that we're starting our research projects with mite-free bees. Once the packages arrived, we placed them in a cool, dark location in the lab for 24 hours to cluster the bees. Several hours prior to applying the oxalic solution, we spray the bees with a 1:1 sugar solution to fill their honey stomachs and reduce ingestion of the upcoming oxalic treatment. Next, we mix the oxalic acid in a 1:1 sugar water solution and evenly apply the solution to the bees.

Why use oxalic? It works. It has been used for years in Europe. According to numerous studies, it's 90-99% effective at killing the mites with minimal damage to the bees and brood.

Does trickle or vaporization work better? A recent study at Sussex University examined the effectiveness of different doses and application methods on mite and bee mortality. The experiment involved 110 hives. The results showed sublimation (vaporization) was far better at reducing mite populations and showed no increase in bee mortality.

Is Oxalic perfect? No; it only works on phoretic mites, i.e., those mites crawling around on the frames or adult bees. The mites breeding under the cappings of the brood cells are unaffected by oxalic administrations, as well as most other miticide products. Therefore, applications are most effective when no brood is present. At beekeeping meetings, when chatting about this product to others, I've heard folks say that they are applying oxalic once-a-week for three weeks during the Summer months. This isn't really advisable since it's not very effective and can be detrimental to the bees. But there may be a way to still treat during the Summer months.

A few months ago, a group of commercial beekeepers came over from Italy to learn about small hive beetles. Apparently the beetles have crossed the border and are starting to be a problem there. During our discussion, we also talked about *Varroa* control and what beekeepers do in Italy. They said that they treated twice-a-year with oxalic acid vapor. They treat once in the Winter when colonies are naturally broodless, and once again in the late Summer after inducing an artificial state of broodlessness by caging their queens for 21 days. At first, I thought this was nuts, but, after we talked a bit more, it made sense.

The Italians explained that by August or September, the nectar flows are over and the colonies are about to start producing Winter bees. If mite populations are high, then the related virus loads that cause Winter mortality will be high, as well. Plus, by caging the queen, the foraging population (no longer needed) drops faster, and more colony resources (needed for Winter survival) are conserved. Why maintain a pipeline of replacement bees to sustain a large foraging force after the nectar flow is over? A hive full of bees eats regardless of whether or not there is work to be done. So, interrupting the brood cycle not only knocks down the mites (and the viruses vectored) prior to the Winter bees being reared, but reduces bee populations as well. Fewer mites equals improved health, and fewer bees equals less food consumed; both circumstances contribute directly to improved Winter survival. Yeah, I know that it is a bit of work to first cage and later release each queen, but think about the money and work it will save by Winter or next Spring!

Ok. So, now what? Brushy Mountain Bee Farm has been authorized by the EPA to be the sole distributer of oxalic acid for use as a miticide on honey bees. What does this mean? Well, in order for any application of oxalic (in beehives) to be legal, it must have the EPA approval label on it; Brushy is the only distributor registered to use the EPA label. It may seem silly, but it really is there for a reason. If you start searching the internet for oxalic acid application in bees, there's a whole host of information out there on recipes for taking 100% oxalic acid down (wood bleach) to the 2 or 3% recommended application concentrations. Some advice may be sound, but other advice can be reckless and dangerous to you and your bees. Certainly, you don't want to get hurt or inflict undue stress on your bees. The EPA label assures you of what you are receiving and gives you the applicable instructions to follow so that you can safely achieve the results desired without the risks of winging it after watching a YouTube video.

Be good to you and your bees.

See ya! BC

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

Lessons Learned

Michael **Magnini**

1 The message was clearly seared into the flesh of my face and chest. With my left eye swollen shut, I stared into the bathroom mirror through one watery eye. My hands were shaking as I plucked hot bee stingers from my cheek, forehead, eyebrow, and across my bare chest. My only thought was, *I really didn't see that coming.*

Later my neighbor recounted the incident with an odd sort of chuckle. "All I heard was (the) thumping pounding of feet pass my kitchen window. I looked up and out, and there he was – running like the devil himself was chasing him. Then, by-the-jezz, I heard the bees. Hundreds and hundreds of 'em. And angry they were chasing the poor lad. He zigged and zagged, runnin' through the woods and tripped over a stump. Then he rolled, waving his arms about and hurled himself down into the river. It was the craziest thing I did see here in a long time."

So, this I learned the "hard way," is what happens when you push your gas-powered lawnmower past the front step of a big, busy beehive on a hot and sunny afternoon. The path to good beekeeping is often paved with stingers.

On the good days it is so easy to forget that bees have stingers. The young woman was eager to see the honey bees in her new boyfriend's yard. He wanted to impress her with the 'magic' of beekeeping. Together they walked into the yard on a typical sunny Summer day. Why wouldn't the bees be happy and friendly? The clover and wildflowers were in bloom and the nectar flow was good. As they approached the four hives in a neat row they could hear the pleasant hum of their foraging. Streams of bees were flowing to and from the hive entrances. Calmly, hand in hand, and without veils over their faces they walked through the meadow flowers. She smiled at the lovely pastoral scene. It was then that a few guard bees took exception to the young lady's long *black* hair. Whizzing like bullets they drove their stingers into her scalp and forehead. She screamed and attempted to fly away like a frightened bird by waving her arms rapidly at her sides. Her former boyfriend didn't even have his smoker lit. The good beekeeper is mindful of the sharpness of the little bees' stinger, and eyes.

2 Sometimes at college one can be heard to say, "Oh, I missed that class." Or the overeager newbee might have skipped that chapter in the textbook. Such was the case when visiting a beginning beekeeper at his new apiary overlooking the beautiful Bras' d Or Lake. His 10 hives were very busy and full, foraging steadily on that mid-Summer's day. He was attempting to make adjustments to his brood chambers as I arrived for a visit. My experience at beekeeping often leads to many inquires for advice on this topic or that. I parked my car and walked over to a small group of busy beekeepers. The hives were in various stages of disassembly, frames here and there and hundreds of bees flying every which way. The newbee had placed several medium depth honey supers on a nearby picnic table. A vast cloud of bees was circling the stacked supers emitting a loud buzz as their feeding frenzy expanded.

"I can't get the bees to go back to their hives," he said with a heavy sigh.

"You can't leave your honey supers out like that,' I told him, "even on a good day. The robber bees will steal all your honey."

"*Bees* steal honey?" he said as sunlight gleamed from his sweat-laden forehead. Understanding the basic nature of the *Apis mellifera* provides a calm and efficient manner to the good beekeeper's efforts.

3 The practical beekeeper keeps the hive bodies of his colonies in fine repair and prime condition. However, some beekeepers do not see the need or have an inclination towards upright hives that are stable and well protected. One winter's day, I visited a beekeeper neighbour who had a rather manic/depressive relationship with his bees. On this particular day in February he was quite excited about the bees and the coming season. In his exuberance he led me outside to "examine the bees." We trudged through the snow in -5°C (25°F) clear air and sunshine until we reached his closest hives. As he delivered a continuous monologue of beekeeping theories and organic methods he removed an outer lid, then popped the inner lid with his hive tool. Looking down onto the clearly disturbed Winter cluster he continued to expound his ideas of 'better beekeeping'.

I said that the colony would not be able to reseal the lid due to the lack of propolis and the cold conditions, and he replied, "They'll be okay. There're tough."

Later that Spring he was much less optimistic about his bees' health. The simple moral here is that bees work in the Summer, and rest in the Winter – let them be.

4 Sometimes the beekeeping fever compels people to jump into the 'deep end'. I recall an enthusiastic newcomer to the beekeeping trade. I asked him, one day, what type of beekeeping he intended to develop. "I'm going to do everything!" he announced confidently. I inquired as to his plans. "I'm going to build up to 50 hives the first year. Then, I'll rent out the hives to the farms for apples and blueberries. Then, I'll move them to the 'honey fields' and sell specialty honey in gift boxes."

Really? "Oh, yes. And next year I'm going to produce queens for sale too."

Are you keeping your regular job? "Yah, I have to – I just bought a new 4x4 with extra heavy duty package to haul my beehives around."

I wished him luck and went back to work in my apiary. By the end of the year I had heard that he had actually moved one hive (in his extra heavy duty truck) to an apple orchard some 30 miles from his house. I heard this when the owner of the apple orchard called me to ask what he should do about the large swarm in his apple tree.

The good beekeeper learns his craft and *grows* his business.

5 Then, sometimes, a beekeeper likes to show off to the uninitiated or uninformed. Such was the case when I met a young person at the local farm market. She and her friend brought my attention to a lovely bumblebee resting on a railing. They of course were excited and nervous. To demonstrate the bee's gentleness I coaxed it into my hand and showed the amazed girls its charms. Once the demonstration was over the youngsters scampered away and I was needed at my table. So, to dismiss the bumblebee I casually blew a gentle stream of warm air from my mouth against its backside. The bumblebee casually stung me in the finger and flew away. The simple lesson here is *never blow up a bee's butt.*

6 And sometimes, what comes from a person's mouth is not the same as what his hands are doing. One fellow beekeeper insisted on the importance of using 'organic' and natural methods of beekeeping. His rules included: must not feed sugar to bees, only honey, and no artificial hive parts, only wax foundation (that you should make yourself), and no treatment for mites and pests.

Thus, was I most stunned to see him stuff baler twine (the kind that is soaked in rodenticide) into his smoker, light it and generously smoke his hives as he gave me a tour of his natural bee colonies.

7 Stacks and stacks of bee boxes leaning to the left and to the right seldom makes a good apiary. So, it was on a Summer's day that I paid a visit to a neighbouring beekeeper. It was my intent on that day to add to my database of the Honey Plants of Eastern Canada. I met the beekeeper at the back door of his country house, and spoke to him through the screen. "Would you mind if I took photographs of your bees?" I asked him. "Oh, no. Go ahead. I'll be out in a little while to work on them," he replied.

I searched some of the conspicuous flowers for foraging bees and found many, mostly honey bees. A few interesting photos were taken of bees on mint and basil flowers blooming in his wife's garden. I then made my way down the sloping pasture to his apiary tucked into the bottom corner of the field. It was a stunning view. Hundreds of bees were flying from multiple holes in the sides, fronts and backs of the dozen or so Langstroth hives in his yard. Many had broken bottom boards and

were leaning precariously forward, and to either side. I thought, *Has there been an earthquake?*

Living in Nova Scotia, Canada clearly ruled out that possibility, although it is very stormy here. However, I could not believe that this was caused by one or two rainy days. These hives simply have not been moved since they were first set in place.

I had just finished photographing these bad beehives when the owner and beekeeper came lumbering down the hill with his smoker in hand. He had stuffed his overweight frame into a dirty, white bee suit. On his approach he yelled, "Great day for nectar!" When he reached me, he placed his smoker on the ground and sank to one knee. As he drew a match to light the can, he said, though out of breath and puffing, "Yah. I have a problem with the bees in the last hive. It might be queenless."

We pulled the hive apart and examined the brood chambers to confirm that the hive had indeed swarmed.

"Oh, well," he said, as we finished replacing the cracked and pealing cover, "that's enough for today. Let's go have a beer."

The good, dedicated beekeeper maintains a neat, clean and secure apiary.

8 Shall we talk about the person who wants (to save the bees perhaps) to *own* a beehive or two? I made the casual inquiry, "how are your bees?" to the new member of our beekeepers club. "Oh,

they're fine," he said in a slow, deliberate way. "I watch them on Sunday afternoons, while I cool off with a cold beer under my shade tree." He smiled a big toothy grin. I asked about the size of the brood in his hive. "Okay, I guess. Don't know, really. I haven't looked," he replied casually. When was the last time you opened your hive, I inquired with some curiosity. "Last year, I think. There're pretty good at taking care of their selves. I like them bees. Not much work to 'em." He went on about how interesting and relaxing it is to watch the bees flying in and out of the hive with big packs of pollen and such . . .

Later that day, I installed a swarm trap in a tree across the road from the owner's backyard and a fine, 'free-range' beehive.

Swarms are awe inspiring, intriguing and enticing. They garner much media attention when in populated areas and often get people quite excited. To a beekeeper they see something else. Although exciting, it is the excitement of the hunt. To a beekeeper a swarm represents new blood, a rich resource, money in the bank – free bees.

However, catching swarms is not always a simple or easy matter. One day in August I returned home from the Saturday Farm Market to discover a newly emerged swarm high up (40 feet) in a large spruce tree. I thought of it as a routine recovery. So, I gathered an empty deep super with frames, a set of heavy hand loppers, and a tall aluminium extension ladder. Although it was a very hot day, I wore a full bee suit with gloves for the capture.

With the ladder in place and secure, I climbed it to the very top. This is where it began to get tricky. The swarm (a very large and heavy one) hung about two feet *above* my head. Undaunted, I reached up with the loppers and hooked the two inch thick branch. Then, trying to squeeze the handles together with one hand and my inner elbow I reached precariously out with my other hand to 'catch' the severed branch and the swarm.

As I cut halfway through the branch the weight of the great swarm caused it to break and hinge downwards quickly enough for the swarm to hit me in the face. The bees exploded into flight and proceeded to sting me numerous times.

I retreated quickly down the ladder, and abandoned the swarm capture. Most of these bees resettled later in the afternoon, and by the next day the swarm had flown off to some new nest site beyond my survey.

I applied balm to my stings and scratches, and contemplated the fiasco that had just occurred. To make the experience more humbling and regrettable was the video shot and recorded by my neighbour, who I had invited over for a 'lesson in beekeeping.'

Of course, how else would we learn that swarms must be captured in a safe and controlled manner? To do otherwise is to court disaster of some kind or another.

All these stories are true. I have either experienced them myself (with chagrin) or witnessed them. With the exception of the author, all names have been withheld.

It takes time to become proficient, knowledgeable and skilled at beekeeping. Along the way one is bound to make mistakes and learn from them. This is not bad beekeeping – unless you repeat these mistakes often enough to cause you or your bees serious problems. BC

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Kentucky writes:

I make use of a feeding station for my bees. It is over 1000 feet from my bee yard. (This distance keeps robbing from starting.) The syrup feeders are mason jars with feeder lids (you can buy these.) They are sitting on my homemade feeders (white). I took a 2x6 and sawed groves in it so the syrup would not puddle, it keeps the bees dryer. In the plastic tubs I placed some dry pollen. They were much more interested in the pollen than the syrup. If you have a feeding station there are a few things you have to keep in mind.

1. It attracts other insects.
2. The temps must be over 55°.
3. You must pick up the food before the temps drop at or below 50. Bees don't fly under 45°.
4. I put the feeder out every morning, and remove it in the evening. This assures the bees fly back to their hive in the evening.
5. YOU MUST HAVE IT AT LEAST 1000 FEET OR A LARGE STRUCTURE BETWEEN THE STATION AND THE HIVES. ROBBING IS AN UGLY THING. THEY KILL AND STEAL.

Those are some of my thoughts on open feeding. I would appreciate yours.

Phil replies:

I'm glad of an opportunity to talk about open feeding. In beginning beekeeping classes, it is typically either not mentioned or strongly discouraged, with little discussion about the method. That is primarily because of the risk of its leading to robbing when improperly done. Robbing occurs when bees from one hive enter another, usually weaker, hive to uncap and remove stored honey. That leads to fighting between the robbers and the bees defending the assaulted hive, and ends in the death of bees and the depletion of the already weaker colony. As you say, "Robbing is an ugly thing." Weak hives, newly established ones, and captured swarms, all of which may lack sufficient bees to repel the invaders, are the most vulnerable, however even strong hives can be at risk.

Why should open feeding set off robbing? It is the nature of honey bees to continuously collect and store food, even when the colony already has an ample amount for its needs. We are the beneficiaries of their overproduction, which is why human beings have been keeping hives, in one form or another, for thousands of years. But the instinct to accumulate food stores persists even during periods when there is little or no nectar available to collect. In Kentucky, as in many parts of the country, the threat of robbing is greatest during the annual mid-Summer dearth, in other unusually dry periods, and in early Spring, prior to the onset of widespread blooming. When nectar is scarce, other food sources become more attractive. It turns out that the dance language, by which honey bees communicate with their nest mates, is good at conveying both the direction and distance of remote food resources, but is not as specific within a radius of less than 50 yards. Open feeding near hives causes returning foragers to spread the terpsichorean equivalent of the message, "Lots of food, just outside!" The result is thousands of honey bees frantically searching the immediate area for the scent of food, and possibly finding it in a neighboring hive. That is why your precaution of the 1,000 foot buffer and the presence of an obstacle between hives and feeding station is so important, and should be, I agree, sufficient to prevent robbing.

When steps such as the ones you suggest are taken to prevent robbing, there is no overriding reason for beekeepers not to practice open feeding. The most compelling reason to do so is to save the time and labor of opening hives in order to place and refill other types of

Photo by Mary K. Parnell

feeders. The more hives, the greater the savings, which is why open feeding is typically practiced by large scale beekeepers. While some may make use of feeding stations with jar feeders like yours, most simply use five gallon buckets or barrels. Placing straw or styrofoam peanuts in the container, or almost any material which floats, will reduce the chance of bees' drowning in the syrup. In early spring, many beekeepers like to stimulate feed, or offer small amounts of thin sugar syrup (equal amounts of sugar to water, or thinner), often punctuated by several days between feedings, to trick the bees into early brood production by simulating an early nectar flow. Some prefer to feed in the open to make the simulation more exact.

There are a few drawbacks to open feeding, unrelated to robbing, which have to do with its inefficiency. The colonies which reap the greatest benefit from open feeders are the strongest – those with the most numerous foragers to gather the syrup. Yet those are the very hives which are least likely to need feeding, whereas weaker colonies, with greater need but fewer foragers, benefit the least. One reason for feeding in the first place is to make syrup available where it is easy to get at, requiring a minimal investment of energy from the hive being fed. Proper open feeding, with the feeder set up at least 500 yards from the apiary to minimize robbing, mitigates this advantage. Another consideration is that the beekeeper is feeding not only her own hives, but also anything within flying distance of the feeder. This may include bees from another apiary, feral colonies in the area, or, as you pointed out, other insects. I was at a beekeeping meeting once where the president of the group was discussing his open feeding in the spring. One of the other beekeepers, who noted that he had hives a few hundred yards away from the feeding station, stood up and thanked the association president for taking care of his bees as well.

Though there is nothing wrong with open feeding if carefully done, and it is practical labor saving method for large scale beekeepers, I would not recommend it for beginners. Recognizing the onset of robbing may be more difficult for them, and since they will have only a few hives at most, the labor savings is negligible. In general, my advice is to feed over the brood boxes using commercially available or homemade top feeders. Top feeders greatly reduce the chance of bees from other colonies being attracted to the syrup, since they sit away from the entrance and force potential robbers to go through the brood nest to reach the syrup. Quart jars, similar to yours, make good homemade feeders. I use a nail to punch small holes in the lids and place the jars upside down over the inner cover. Small sticks under the lid allow bees access to the holes, and one empty brood box or two empty honey supers, set on the inner cover and topped with the outer cover, complete the set up. For new beekeepers, with only a hive or two, entrance feeders also work well, as long as theirs are the only hives in the neighborhood. In an apiary with existing hives, entrance feeders are vulnerable to robbing, since the robber bees need only slip inside the entrance to gain access to the feeders. However, springtime robbing should not be a problem for beginners (whether they use top or entrance feeders) because the season for installation of package bees and new nucs typically coincides with the spring nectar flow when the danger of robbing is reduced.

Open feeding is an example, like so many others in beekeeping, of a practice that is neither right or wrong, but a matter of personal choice. The key is to learn as much as you can about the options, try different methods, then decide what works for you.

A beekeeper in West Virgnia writes:

This is my fifth year beekeeping and my first attempt at creating my own nucs. One is from swarm cells and one is from a friend's swarm that had an extra queen. So far both are growing.

My first question refers to "shaking in some extra nurse bees" when creating the nuc. When I try that, the result is a huge cloud of bees, few of which end up in the box. Help?

Also, if the nuc has food frames, is it necessary to feed?

Phil replies:

Congratulations on your first nucs. It's standard procedure to shake in extra bees, and I'm not sure why your shaking produced such a cloud. It's possible that you are holding the frames too high above the nuc, or not shaking hard enough. What works best for me is to give the donor frame a sudden, firm jerk just an inch or so above the nuc. You might describe it as a snap. This motion should make most of the bees fall onto the frames of the new nuc. The older ones, that have already begun foraging duties, will fly away to collect nectar or pollen and then instinctively return to their original hive. Most of the younger bees should stay put.

I'm sure you know that when making up a nuc, it's best to select frames containing mostly capped brood, and the same is true when choosing a frame from which to shake additional bees. A high percentage of the workers on frames of brood, capped or uncapped, will be young bees, which is what you want. The young ones are often referred to as nurse bees because one of their tasks is caring for larvae. Not only will you need nurse bees in your nuc, but they will also be less likely than older bees to desert it, since they have not yet begun making flights outside the hive. An additional advantage of young bees is that they have most of their lifespan remaining. A nuc needs to increase its population quickly, and having more of the original colony members live longer is beneficial. A foraging bee is at least halfway through its 42 day lifespan. The frames and bees you move to the nuc do not even have to be from the same hive. We can mix and match, so to speak. However, when choosing your frames, make sure that you know where the queen is in the donor hive. You do not want to shake her into your new nuc. If you did,

Photo by Mary K. Parnell

there might be a low percentage chance that she would make it back to her own hive, but I would not count on it.

Though a frame of un-capped brood is also likely to have a very high percentage of young bees on it, I would not shake such a frame in the manner I described. Young larvae are extremely delicate, and prone to damage if shaken, so choose a frame of mostly capped brood. When making up nucs, I prefer frames of capped brood for another reason as well. Larvae require less care from nurse bees to complete their development, as compared to pupae. Larvae still need to be fed, and wax cappings must be produced to seal their cells. Pupae only need to be kept warm until they are ready to emerge. This frees up more workers to *draw out wax on any undrawn frames you may add to the nuc, and to care for the larvae from newly laid eggs. In addition, capped brood emerges sooner, quickly providing the nuc with worker bees and making cells available for the nuc's queen to lay in, beginning the cycle of another generation of bees.*

As to the second part of your question, when making a nuc we should include enough honey on the frames to tide the new colony over until they are in a position to bring in additional food stores on their own. This is all the more important if, as discussed above, it consists almost exclusively of young bees that have not begun foraging. My own nuc recipe consists of: one frame containing mostly honey (which could be capped or uncapped), and ideally some pollen; two frames of capped brood, preferably also containing some food stores; and two frames containing new foundation or good quality drawn comb, unless I need some space for a queen cage or frame feeder, though when I feed I normally do it over the top of the nuc with a quart jar feeder inside an additional nuc box.

The primary reason for including stored honey when making up a new nuc is not to supply the developing colony with food to sustain it, but to provide it with an emergency reserve in the event that its forager population cannot collect enough nectar and pollen. Stored food is, in effect, a rainy day fund, not a checking account for the everyday necessities of rearing new brood and providing fuel for bees making wax. So the answer to your question about feeding is: it depends. You would not need to feed **if** *there is a nectar flow on, and* **if** the new colony has enough foragers to collect sufficient food.

Of course, what I have described above is my approach to nuc making, and not everyone goes about it the same way. Whereas I keep my nucs in the apiary where I assemble them, some beekeepers immediately move theirs to a distant site. Moving them can change the make-up of the nuc and affect the need for additional feeding due to the way foraging bees navigate. On their earliest flights, honey bees orient to their colony's location by imprinting upon landmarks in its vicinity. If we move a hive, from a few feet to a several hundred yards, the bees do not go to the new location after foraging, but return to the original one, even when there is no longer a hive there. (I discussed this behavior in more detail in an earlier column.) By leaving my nucs in the same general location from whence the bees in the nuc originated, I am virtually guaranteeing that all the older, forager bees will return to their original hives, leaving my nucs full of young, unfledged bees. I personally prefer this for the reasons I have already discussed, and because I like to keep my veteran foragers busy making honey for me in my stronger hives. I don't look for a honey crop from nucs; I just want them to survive and build up in their first year.

Some beekeepers prefer to make up nucs which include older bees. The way to accomplish this is to shake as many bees as possible into the nuc, seal it immediately, and move it to a new site at least a mile away – preferably two. When the nuc is unsealed, foragers exiting the hive will not recognize their surroundings, and will re-orient to the new location which becomes home to them from then on. The advantage of nucs created in this way is that, from the outset, they have a field force to supply food for the colony, while mine have to wait for pupae to mature and emerge to become nurse bees so that the nurse bees can graduate to foraging. For this reason, nucs at remote locations may be less dependent on supplemental feeding – and a good thing too, because it may not be as convenient to check on and feed them as with nucs in your home apiary.

You say that both of your nucs are growing, so supplemental feeding may not be necessary as long as you continue to monitor the hives closely. However, they will develop more quickly if you feed them for a while. I would further suggest that you begin feeding again after you move them into full size boxes, especially if you fill up the box with frames of new foundation, rather than drawn comb. My own practice is to feed a rehoused nuc until it draws out the first full sized brood box, then leave them on their own to draw out the second, as long as a nectar flow is in progress. However, the hive may develop more quickly, if feeding continues longer. As long as you have a nectar flow and a number of foraging bees, the rest is management choices without clear right and wrong answers.

I bet you thought you asked two simple questions. BC

Nest Habitats

Larry **Connor**

Long, long ago – the Skep.

The western honey bee uses a variety of cavities for it's home. The bees have general requirements only, and are quite flexible about where they nest. They want a dry chamber of a suitable volume, where there is good ventilation and a small entrance to protection from predators. Both honey and bee brood are sought as foods for a wide variety of wild animals and birds, so the social bee has evolved to use cavities in trees and rock outcroppings some distance off the ground. Depending on the area where the bees are living, the habitat determined the most popular nesting site. In desert areas, rock outcroppings are very popular places for bees, especially if they are difficult for predators to reach from the ground. Where trees are able to grow in both tropical and temperate locations, the preferred nesting site is in a hollow living tree. Bees are less likely to live in dead trees than living trees, suggesting the moisture in the living tree is beneficial to the colony or that living trees last longer than dead trees and are a better choice for a nest. Bees use resin from nearby flower buds to line their nests, the nearly magical propolis that creates a moisture and pathogen barrier between tree and the growing nest of bees.

The interaction of honey bees and humans has provided an increased number of structures for honey bees to occupy. A hut or cabin seems to offer a great place for bees to set up housekeeping, especially if it provides protection from predation. Wall partitions, floor joists and roof timber provide scout bees the right space for swarms to occupy. Cavities like baskets, carrying devices and agricultural voids are popular homes. Nowadays bees will occupy most any dry cavity that offers the proper volume of space, is dry, and has an opening with a southern or eastern orientation. Empty cavities, from unused grills, large bird houses, mail boxes, and even water meter containers attract bees. There are differences in the habitat of different races of honey bees. For example, the African bee will use a smaller nest cavity than European bees.

Top-Bar Hive.

Habitats by Humans for Bees

The transition of honey bees to cavities made by humans apparently occurred between five and ten thousand years ago. Various designs were used based on materials found within the existing community, including hollowed-out wood, woven baskets and clay cylinders and more.

Hollowed-out trees (gums) – In areas where trees were found and humans had the skill to cut down large trees, the keeping of hollowed-out trees, sometimes called gums in the United States because of the use of the gum tree (several species are called gum trees, including tupelo) became common. The initial step was to mark a tree in the forest with cuts in the tree to claim ownership. The bee nests were opened to remove honey but not destroyed, so the bees would continue to maintain a nest in its location. This lead to the felling of the tree and cutting it in such a way that the trunk could be set up in a primitive apiary – a few of these apiaries still exist as examples of early beekeeping methods. Some times boxes were placed on top of the cut gum hives to allow the bees to expand into and allow the harvest to honey or to make up a new hive. In other situations, the bees were allowed to expand into woven baskets, serving as a precursor of the modern honey super. This honey and wax could be crushed and allowed to drain into containers. Hollow wooden logs were also used horizontally, and even stacked like cordwood to provide for many bees in one location. Or the logs were hung from trees to keep them away from predatory mammals and birds.

Clay pots and cylinders – Where trees were less abundant or absent, humans created clay pots and cylinders to keep colonies of bees for harvest. The cylinder system, still in use in northern Africa, allowed

the beekeeper to remove a clay or wooden disk at the end of the cylinder and take out honey without destroying the bees inside the hive. Swarms were captured and put in front of hollow cylinders, allowing the beekeeper to collect a large number of colonies stacked up like cord wood. Trees were also used horizontally much the same way as clay cylinders.

Woven baskets (skeps) – Woven containers, shaped into baskets or large tubs, were used to house bees by many European cultures. Skeps were the dominant domicile for honey bees in European Middle Ages, and recesses in walls and the sides of buildings, called boles, are well documented in England. Skep beekeeping was a successful way of capturing swarms and keeping bees to produce honey and wax for the household, with the benefit of mead from the water used to was the wax. In North America the skep was used until about 1800. Their use faded in popularity because of the abundance of timber allowed beekeepers to either keep bees in gums or to build special boxes for the bees. The precursor of a honey super was a small basket called an eke placed on top of the skep.

Modern Wooden Hives – In 1852, Massachusetts clergyman L. L. Langstroth developed a beehive that combined his discovery of the bee space with a movable frame, top-loading hive which proved to be a giant step forward in the evolution of modern beekeeping. The ability to move frames in a hive, and to do it from the top of the colony, allowed for further development of methods to make increase nuclei hives, allow the development of comb foundation and the honey extractor that utilized centrifugal force and bottling the final liquid honey product. The Langstroth hive eliminated the need to crush the comb to harvest the honey. Drawn combs could be reused from season to season and became valuable reusable resources rather than being destroyed with every harvest.

The **Langstroth hive** changed beekeeping and is the most commonly used hive design in the world. There are different variations in different countries, and even in North America there are several depth and dimension options that fill the bee supply catalogues. European beekeepers have even more variation in the Langstroth template.

During the first part of the Twentieth century French pastor Emile Warré experimented with different hive designs. His goal was to develop a simple hive design that was easy on the bees. Its key feature is a top insulation system and the practice of under-supering the boxes as they are added to the hive. This allowed the bees to build comb down from a series of bars at the top of the box, much like they would in a bee tree. In the Langstroth system, new boxes of frames and foundation are placed above the existing box. As additional room is added to the hive, the bees would continue to build downward.

The hive works in cold climates and is suitable for those who are able to make their own equipment, thus saving over the cost of purchase of the more complicated Langstroth hive. It could easily be constructed from the scrap lumber found at a construction site or from a house undergoing remodeling. Several manufacturers offer the hives but at a price that does not save that much money. The hive is functional for someone who wants a temperate-region top bar hive but does not find the Kenyan top bar hive to be suitable for reasons we will explain below. The hive is called **the Warré Hive or the People's hive**. A Warré hive, with natural, unsupported combs are not acceptable in many areas, and are not suitable for commercial beekeeping. It would be hard to sell increase colonies unless you had a following of like-minded beekeepers. Yet the establishment of such hives with top bar hives makes them minimally acceptable to meet disease regulations in the United States. A simple box with top bar frames is certainly a simple way to keep bees.

The Omlet Hive – from the U.K.

I had just started working at The Ohio State University when I traveled to a meeting in Prague, where I saw images of a new hive for use in Kenya called the **Kenyan top-bar hive (KTBH**). Drs. Maurice Smith and Gorden Townsend were researchers from the University of Guelph in Ontario. They had funding from the Canadian International Development Agency to develop a hive for use in Africa. They were developing a colony that would hang under trees or from poles to keep it out of reach of wild and domestic animals. There were only top bars on the hive, and sloping sides to the boxes. By using a side angle of about 30 degrees, the bees were less likely to attach the comb to the sides of the hive. Smith and

Langstroth – the standard.

Warré

Photo courtesy of Bee Thinking ***matt@beethinking.com***.

Townsend were incorporating ideas from the hanging log hive with various top-bar colonies that they had seen.

Before the Kenyan hive other attempts had been made, and an ancient basket hive with top bars is known to exist in 1539 in Greece. Since the KTBH, other top bar hives have been developed, but all trace back to the Kenyan model. One modern African version has square sides that house Langstroth frames, making the frames interchangeable. The top bars measure the width of a comb plus a bee space, between one and one-quarter to one and three-eighth inches in width. This keeps the bees from building more than one comb on a top bar. A central strip of wax, foundation starter strip or a narrow piece of wood is used as the base of the comb. In the United States KTBH's are usually mounted on a set of legs to provide working height and stability.

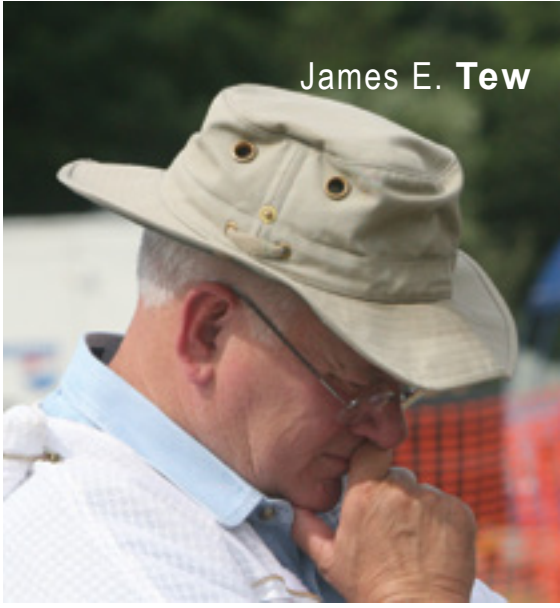
Top bar hives were immediately popular worldwide because of their simple design and less expensive construction. They are being constructed from recycled shipping containers, packing boxes and even old dresser drawers. There does not appear to be standardization among manufacturers and promoters of the hive. Bees are forced to move laterally rather than vertically, and the standard design has relatively poor ventilation. The long colonies can be divided into smaller units by the addition of a follower board the shape of the box. Frames may be a bit more awkward to manipulate and young comb will break if moved the wrong way. Honey must be harvested by a crushing-settling method that reduces the efficiency of extraction by centrifugal force; the honey is best harvested as cut comb honey.

Where Winter is mild beekeepers will experience good results with the KTBH. Tests in Canada showed that the bees have difficulty moving laterally rather than their preferred vertical Winter movement. Combined with poor ventilation survival has not been at acceptable levels for most beekeepers. I see this hive being used in northern areas where beekeepers kill the bees in the late Summer or Fall and harvest all the honey in the hive. Finally, the size and shape of the hive chance the dynamics of moving the hive for pollination and migratory purposes. I do not know of any BTBH's that are being moved to California for almond pollination.

My recommendation is that all North American beekeepers be initially trained to manage Langstroth hives. This provides a successful hive that is commonly available and widely accepted. If a person is interested in expanding into either the Warré or Top-bar hive, they will have the experience of working with the Langstroth hive to appreciate the hive design's strengths and weaknesses. As we see more an more plastic hives being introduced, we are likely to see the development of many hive designs that have novel features. My experience with plastic hives and plastic frames has been positive, and while I have friends who do not like them at all, I find the plastic equipment easy to use and observe that the bees build well with them, Winter successfully and are a fine alternative to wood hives. Some are quite expensive to purchase, which discourages their more widespread use. BC

Temporarily Relocating Beehives

Rarely a quick and easy beekeeping process for the small time beekeeper



Moving beehives – always eventful

I don't know what it is about beehives. Even if you have only one, sooner or later it will probably need to be moved. No brag intended here, but I have spent a lot of time, in total darkness the early hours, moving bee colonies. It's interesting that when things go well, few memories are formed – but when things go wrong – the event becomes impossible to forget. At this moment memories flash through the thumbnail viewer of my mind – rain, missed turns along the road, bearding bees on the front of hot colonies, bottom boards dropping off, lost hive tools, locked field gates, dysfunctional flashlights and dysfunctional smokers.

Years ago, I wrote several descriptive *Bee Culture* pieces with titles like *Moving Bees and Other Frightening Stories* in which I relived several harrowing beehive moving experiences. I don't want to do that here, but I would like to describe my present situation.

As you are painfully aware, I have written time and time again about my interaction with my neighbors. They continue to be good neighbors and tolerate both my bees and me without serious complaint, but I still want to do my own part to be a good neighbor to them.

What modern-day beekeeper does not know that a high fence is the premier structure for barricading apiaries from neighbors? So I have decided to fence my home apiary for general appearance and to reduce the visual effects of me working my bees. Here's the rub. I can't have fence installers putting up a fence with my bees flying everywhere. My hives must be temporarily relocated. Yes, it's true. I must move my beehives until the fence is in place.

Just now, the ground is soggy, soggy wet. The hives are heavy and I am increasingly an older man. This move could be a problem, so, I'm off to a good start. I will do this task alone and, as usual, photo the various events and report – good or bad – on the fence caper that I am only just beginning. What follows are questions and issues that must be addressed to successfully get this moving task completed.

Variables of all hive moves

The following variables affect potential hive moves. Each variable should be dealt with appropriately.

Hive Move Variables

1. Distance of the move
2. Weather (or time of the year)
3. Hive population (or colony weight)
4. The old yard's location (loading difficulty)
5. The new yard's location (unloading difficulty)
6. Beekeeper friend availability

Long trip vs. a short trip

I am only planning to move my eight colonies about 15 miles away to a friend's farm. That short distance should help make things a bit easier. Obviously, long moves are more challenging than a local one. Local moves seem more conducive to sloppiness. You don't have to pack the colonies as tightly. You don't have to tightly close the entrance or provide a top screen for ventilation. You can do a better job of choosing your weather *("It's raining tonight so I will do it tomorrow night.")* or you can more readily justify other risks *(My trailer tires are worn, but they should make the short trip okay.")*

But having said that, if you want the short trip to go as easily as possible, load the bees as though you were moving them 500 miles. It's more work and easier said than done, but it will really help things go smoothly.

An experienced friend as a helper

Increasingly, an experienced friend who will help you move colonies is more difficult to find than Jumbo-depth frames. Some of us have them while some don't. You should know that, at times, you might become the friend of another beekeeper with a moving problem. Then it will be payback time. Through the years, I have gone through two brothers (I have no sisters or I would have surely have asked them, too.), cousins, parents, uncles, distant relatives and casual friends. I must provide protective gear and duck tape them into oblivion to get them ready. I am

Hive equipment that is securely secreened on top and bottom.

pretty much at the point now where, if I decide that I need help, I must use money to find someone (anyone) to help with a hive move. Make no mistake – moving established hives is hard work. Looks like I will be doing this alone.

Forget it. I'll just do it myself

That decision is made a lot. Sometimes you just can't find another to give you a hand. Ironically, the basics of hive moving are pretty much the same whether or not you have some to help. Never leave home without a mobile phone. A GPS device is helpful, too. What an unbelievable luxury this technology is compared to hive moves thirty years ago.

Hive carriers

I know that I said that I will primarily be discussing a single-person hive move, but two-person hive carriers still need to be mentioned. Such carriers, in someway, clasp the hive handhold and temporarily provide handles for moving the colony. Such carriers are lightweight, reasonably inexpensive and available from most bee supply companies – but they require two people to make the move happen.

Your hive equipment

Ideally, your equipment should be in sound shape – no holes, no rotted corners, no broken bottom boards and good, solid tops. For dependable moves, colonies should be screened – entrance *and* top – especially for strong colonies. Chilling a hive is rarely the problem – but the potential for overheating is a real danger.

Using either straps, staples or wooden battens, the colony should be secured as a unit. For the small-time keeper, ratchet straps are the primary tools for securing hive parts. Hive staples are still used but not nearly as much as they were several decades ago. Do not depend on propolis holding the hive together *(Unless you want to acquire your own Moving Hives story.)* Generally, the hive should be top-screened with eight-mesh hardware cloth and aluminum window screening across the lower entrance. The top screen is held in place with long screws. The entrance device is also held in place with screws. Catalogs offer other entrance-closing devices that are commercially manufactured.

Aluminum window screening has been traditionally used to close the entrance. Cut a piece about 4" wide and about 2" longer than the entrance. One end of the cut piece is folded at a point where it exactly fits in the entrance lengthwise. Then, the end-folded piece is lightly folded down the longitudinal center and pushed into the entrance. Normally the "spring" of the lightly folded screen is enough to hold it in place. If you have doubts about it staying in place, staple it a few times. Fiberglass screening is more readily available and possibly cheaper, but it will not stay in place on the entrance unless securely stapled along the front of the hive.

The two most common devices used to prepare a hive for a short move are probably ratchet straps and window screening. For a longer move, a top screen should be added to the mix. Commercial beekeepers use plastic nets to cover the entire load when moving hives long distances. Such netting is expensive and is beyond the economic reach of many smaller beekeepers. For the most part, commercial beekeepers and beekeepers moving only a few colonies, do not secure colonies in the same manner.

A simple beekeeper-built upper screen. (D. Wilson photo)

Picking up the hives

I have harped and harped about the fact that our beehive design is not perfect. My opinion of the primary imperfection is that two people are required to lift the two-story colony. That imperfection comes into play at this point. Without a doubt, the most strenuous aspects of colony moves are getting the hives onto and off of the truck (or trailer or out of the car).

Unless you are exceptionally strong, don't attempt to lift the hive manually. In years past, I have used a low trailer and a ramp. I hand-trucked the hives up the ramp onto the low trailer. In even more years past, I had a bumper mounted lifting crane attached to my truck. Yet another truck had a hydraulic tailgate. These devices really made my bee life easier, but they were expensive and sometimes cumbersome.

I can't be more blunt – getting the hives on and off the truck is work. A combination of hand trucks and ramps will probably meet most hive move needs. Now, having said that, a hand truck – loaded with a heavy hive – can be remarkably unstable when used on soft ground. The wheels are too close together, but if I conceptualized a hand truck with a wider wheelbase, hence more stable, it would be difficult to maneuver it in the confines of the truck (or trailer).

One way or another, the hives are on the truck

The frequent tendency is to get the hives on and truck and take off – *It's only a short drive*. Squelch that tendency. The most unexpected things can go wrong. One dark night, a State Highway Patrol officer who was unaware that I had open, un-restrained hives on board pulled me over for being on the short side of a yellow traffic signal. When the load of bees was found, I was promptly sent on my way with a quick admonishment.

More often, the problem arises when the path to the new location is rough, requiring bouncing and banging the hives in the process. A bottom board only must slip a small amount to allow frustrated bees to escape. (There goes the loss of another friend.) So, again, I strongly recommend that you secure the hives, with braces or straps, within the truck (or trailer). Getting the hives onto the truck is only half the process.

Must hives be moved at night?

Hives can be moved during the day. Naturally, some part of the field force will be lost, at no small cost to the

hives. But moving hives during daylight hours is easier in some aspects. Many times, a beekeeper will leave a hive or two to pick up the field force of returning bees. Later, the remaining hive or two are moved – all much easier than having larger numbers of hives at night.

The downside of daylight moves

Obviously, you will need to make two trips if you leave catch-colonies at the old location. A second trip may or may not be practical. Secondly, during daylight hours, you will have a lot more of society with which to deal. Traffic lights, school buses, and congested traffic can make you more apprehensive. Under the cover of night, you can hide more of what you are doing – so you are exposed to fewer people, but you work in the dark.

Not as bad as it sounds

Moving hives is not as bad as I have made it sound, but the uneventful beehive move is rarely discussed – only those moves that blow up get coverage. Be prepared and be confident.

Some suggestions for making the hive move go easier

1. Have a good, big flashlight (and a spare)
2. Always, always lay your hive tool and your smoker on something other than the ground.
3. Have a roll of duct tape nearby.
4. For longer moves, take a water hose sprayer to wet down hives should they begin to overheat.
5. Have basic tools for repairing or repositioning hive closing devices and hive components.
6. Have multiple packs of matches and readily available smoker fuel.
7. Know where you are going. Landmarks look different in the dark.
8. Do not depend only on propolis to hold a colony together during a move.
9. Only use protective gear that is in perfect shape.
10. Take some water to drink. That always helps.

A hand truck is vital for the one-person hive move event.

I will let you know

No doubt, I will let you know how this turns out in next month's article. I hope it is a boring report. BC

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Medi

Who Meditates?

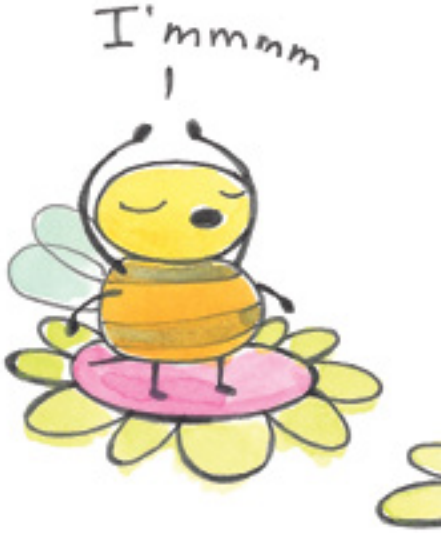
Meditation is a simple practice of quiet mindfulness and reflection that can produce calmness and relaxation. Everyone meditates, whether they know it or not. For example, a fisherman holding a rod visualizes fish checking out the bait, and day dreams while waiting for fish to strike; a farmer taking a Sunday stroll through orchard or field, finds peace and quiet and visualizes a successful crop; when preparing a cup of coffee or tea, one often drifts off in thought while waiting for the kettle to boil.

Why Meditate?

We all care about nature and biodiversity. Hov
modern lifestyles may not allow us to connect w
often. Close observation of nature, but especial
honey bees, can bring greater appreciation of the b
of these fascinating insects, and also bring us c
Close observation through meditation can also h
clear our minds, and instill a "peaceful, easy feeling
following describes a practice for meditating on ho
safe, and will help achieve maximum benefit for t
whether you are a beekeeper or not. As well, the pr
be adapted for meditating on other insects or in r

How to finish the session

- Slowly and gently remove the bee suit, fold it and return the suit to storage.
- Cover your eyes with the palms of your hands and pause briefly to have a moment of silence as you return to normal breathing and awareness. You are now no longer a bee.
- As you return to normal activities, note how you feel compared to when you started the practice.
- With continued practice and experience, you will feel a sense of connection with the bees, and a feeling of oneness, wholeness, and balance.



Moving away from the hive

- When you are finished at the hive, move slowly and calmly away from the hive; continue focused breathing and mentally reciting "i'M" on in-breath, and "a'bEE" on out-breath.
- Return to where you began.

At the hive

- Kneel, or sit on the ground, or sit on a stool close to th
with your eyes reasonably level with the entrance if p
to three feet above the ground works well); sit comfort
on knees, be relaxed and remain still; continue focuse
mentally reciting "i'M" on in-breath, and "a'bEE" on o
- Observe bee behavior at the entrance; focus on in
interactions with other bees. What are they doing? Are
(e.g. returning from foraging, guarding hive, exchang
is the focus of an individual bee?
- Continue focused observation and visualize being one
change bees every few minutes to experience the
behaviors; continue for 5-15 minutes. HERE IS THE BI
will not be thinking of stressors at work, you will becor

Acknowledgements

Thanks to my wife, Nancy, for tolerating my intrigue with honey bees for so many decades. Also, for forgiving me when my work with honey bees resulted in her getting stung, and for critiquing and editing this article. Thank you to Kim Huntzinger, Jim Dempster, and Veldon Sorensen for reviewing and offering perspective on the final draft.

Dick **Rogers**

tation

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with nature very
ly highly social
behavior and life
loser to nature.
help us refocus,
" to our day. The
oney bees that is
the practitioner,
actice can easily
natural settings.

Inspiration

"Meditation brings wisdom; lack of meditation leaves ignorance. Know well what leads you forward and what holds you back, and choose the path that leads to wisdom." - Buddha

"Reading makes a full man, meditation a profound man, discourse a clear man." - Benjamin Franklin

Considerations for meditating on bees

- Most species of bees can sting so they deserve respect and care when observing them. However, many are not aggressive and if they can sting, it is not very painful. Honey bees on the other hand, have a very capable barbed stinger for injecting very painful venom. Also, they are very well suited to defending their nest if they feel threatened. Some honey bee colonies are genetically predisposed to be more defensive than others. Environmental and colony conditions, or recent threats to the colony, may also influence this defensiveness. ONLY meditate with less aggressive colonies, ALWAYS wear protective gear, and DO NOT take risks or be lackadaisical.
- Always assess honey bee colony defensiveness as you approach a hive. Do not become complacent or over-confident about this step. Make assessing aggressiveness top priority each time you begin your routine for meditating with bees.
- Move slowly, approach the hive from side or back, stay out of the flight path, stay low and do not loom over hive for this practice, do not wave or swat at bees, and adjust distance from side of entrance as necessary so honey bees do not perceive you as a threat. Don't cast a shadow on the front door.

Preparation before approaching hive and appropriate layering of apparel

- No scents policy (no strong body odor, perfumes, scented deodorants or hair sprays, and sunscreens or insect repellents).
- Base layer clothing: long pants, long sleeved shirt, and socks.
- Outer clothes: high top boots (to protect feet and ankles), full bee suit and hood with veil, and gauntlet gloves.
- Assemble the outerwear, and carefully put on over your base layer; check all zippers and fastenings to ensure proper closure; start focused breathing reciting "i'M" on in-breath, and "a'bEE" on out-breath (I'm a bee).

Moving to the hive

- Move slowly to the beehive; continue focused breathing and mentally reciting "i'M" on in-breath, and "a'bEE" on out-breath.
- Approach the hive from the side or back; as you get closer, lower yourself to level of hive entrance; observe bee behavior as you approach and visualize yourself as a bee coming home; be aware of flight activity and coming and going at entrance. Is flight directed or erratic?

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ut-breath
dividual bees and their
they intent on something
ing food, fanning)? What

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multitude of tasks and
G BENEFIT TO YOU: you
me relaxed and refreshed.

Artwork © David Walker

The Voice Of The South

Neonicotinoids

The use of a class of systemic insecticides called neonicotinoids remains a highly controversial issue for the general public, beekeepers and government regulators. Some people, including beekeepers, suggest that use of these insecticides have mediated large die offs of honey bee colonies during the last decade or so. However, there remains no unequivocal evidence linking episodes of high honey bee mortality (termed Colony Collapse Disorder) to neonicotinoids or any other insecticides. It is a 'no brainer' to say that insecticides have a great potential for harming bees – insecticides kill insects, and honey bees are insects. However, a much higher standard of proof must be met before assigning blame for CCD to any single factor or class of insecticide.

The debate over the use of neonicotinoids swirls. Science-based answers need to guide governance of these chemicals, and unsubstantiated and often emotional claims do not foster a rational and fair approach to deciding the future use of these insecticides. The mammalian acute toxicity of the neonicotinoids is relatively low as compared to many other insecticides that have had extensive use in agriculture, which means that the risks to humans are greatly reduced. The neonicotinoids are relatively more acutely toxic to honey bees than some insecticides of recent popular use in agriculture; however, the class tends to be middle of the pack and generally less acutely toxic than organophosphates or pyrethroids. Acute toxicity does not tell the whole story. The potential harm to honey bees must also include some measure of exposure to bees in order to assign the relative risk.

The use of neonicotinoids as seed treatments has been thought to offer little risk of direct exposure to honey bees (except at the time of planting, see below). The chemicals are under ground with the planted seed, and of course, honey bees forage above ground. Neonicotinoid seed treatments may also reduce risk of insecticide exposure to honey bees because applications of pre- and post-planting insecticides (applied as foliar insecticides to seedlings or within the seed furrows at planting) are no longer needed to control insects that attack young seedlings of cotton, soybeans and corn. One consequence has also been a general reduction in total amount of active ingredient (insecticides) applied per acre as compared to the use of other classes of insecticides. Banning neonicotinoids in seed treatments may significantly and adversely change methods of food production and may actually increase harm to honey bees and other pollinators if there is a return to more foliar applications of older insecticides to control pests affecting the young plants.

What is so special about this class of insecticides that evokes so much concern? The primary reason is the way these insecticides work as systemic chemicals absorbed into plants. Here's how they work: Seeds of cotton, soybean or corn are coated with a material that forms a crust around the seed, and this material is laced with a known level of a neonicotinoid insecticide. The three most commonly used neonicotinoids in the South are imidacloprid, thiamethoxam and clothianidin. These insecticides leach into the living plant tissue as the seedling grows, and the concentrations in the plant tissue are high enough to kill insects that begin to feed upon the plants. Thus, the plants are protected by the systemic poison adsorbed into their tissues. Obviously, there is some potential for these materials to persist in plant tissues, and there has been much concern about the neonicotinoids remaining in either nectar or pollen when the treated plants begin to flower.

A second major concern is the discovery that residues of some neonicotinoids remain in the environment (e.g. in soil) for more than a year after being applied as seed treatments. The consequences of this persistence are largely unknown. For example, are these chemicals sequestered away in the soil, or are they freely moving about the environment into water and or secondary off-target plants like

Bees on tassels.

wildflowers? There are many more questions than answers, but many laboratories are investigating various aspects of these chemicals as they relate to bee health.

In 2012 a group of university researchers from Arkansas, Mississippi and Tennessee collaborated and began investigating various aspects of the relationship between neonicotinoid seed treatments and honey bee health (Stewart *et al.* 2014). The research team includes entomologists specializing in pest management of row crops, toxicologists and apiculturists. The first series of experiments sought to determine how seed treatments in cotton, corn and soybean relate to subsequent residues of these chemicals and their metabolites in various matrices in agricultural environments that included soil, flowers, nectar and pollen in plants, and honey bee foragers and their pollen loads. The research is pertinent because all of the cotton and corn and 70% of the soybean seed planted in our area are treated with neonicotinoids.

The work in our area was stimulated by reports from the Midwest of neonicotinoid seed treatments potentially affecting honey bees through several routes of exposure. Krupke *et al.* (2012) showed that exhausts from corn planters created dusts that carried neonicotinoids away from corn fields during planting. They also reported on the persistence of neonicotinoids in the soil long after planting. The dusts drifted onto wild flowers (e.g. dandelions) along field margins, but re-uptake of neonicotinoids from soil may also play a role in high levels of the chemicals in wild flowers.

Neonicotinoids were also found in dead bees from colonies kept near fields at the time of planting. Additionally, the group showed expression of neonicotinoids in corn pollen during anthesis (tasseling), and the chemicals were also found in corn pollen stored by the bees.

Thus, the main possible routes of seed treatment chemicals moving to a bee hive include (1) drift of neonicotinoids onto off-target wild flowers in planter exhausts, (2) re-uptake of neonicotinoids from soil into flowering plants, and (3) retention of neonicotinoids in either pollen or nectar (or both) of seed

Bee samples.

treated plants. Various researchers (including our Southern group) have replicated the results of Krupke *et al.* (2012) in which planter dusts carry neonicotinoids to off target wild flowers.

Fortunately, drift may be the easiest problem to rectify. Mechanical modifications of planter exhaust systems and changes in lubricants that are used in seed planters can greatly reduce the expulsion of neonicotinoid dust clouds. Education about the dangers of planter dusts can help mitigate procedures that might inadvertently expose bees to the dusts. For example, farmers can be instructed to load planters or to clean planters far away from apiaries or wild flowers to minimize the chance of drift of chemicals either onto bees or their food sources.

The Southern research group examined neonicotinoid levels in soil, flowers, and forager bees and their pollen loads from numerous fields of corn, cotton and soybean throughout Arkansas, Mississippi and Tennessee (Stewart *et al.* 2014). Over 80% of soil samples taken before planting showed detectable (≥ 1 ng per g) levels of neonicotinoids. The average level for all samples (n=112 samples from 28 fields) was 10 ng per g (or parts per billion = ppb). As with the Krupke et al. (2012), these finding suggest that neonicotinoids persisted from the previous growing season. However, it is not clear in all cases if the insecticides came from seed treatments or foliar applications of neonicotinoids, which are a common form of control for certain pest insects.

The team also examined about 78 samples of wild flowers that were collected from field margins within 0-3 days of planting. Almost one quarter of these samples showed detectable levels of neonicotinoids, and the average concentration was 10 ppb. However, two samples accounted for more than half of the total insecticide levels that were detected in all flowers. One flower sample came from ground immediately adjacent to where a corn planter had been loaded prior to planting. The flower sample had 257 ppb of neonicotinoid. The second highest came from a flower collected within two hours of planting, and it registered 115 ppb. The results suggest that the exposure of bees to neonicotinoids from wild flowers in recently planted fields is patchy or mosaic, and at least in this study, 70% of the wild flowers had no detectable levels of neonicotinoids. Reduced exhaust dusts and better safety precautions with planters should reduce the risk of exposure to neonicotinoids from wild flowers on field margins.

The researchers also collected bee samples from colonies of bees during two periods of the growing season. The first was at the time of planting (April-May), and the second was the flowering periods (June – September). Colonies were located at an average of 180 meters of field margins. Returning foragers and their pollen loads were monitored from 60 hives kept in 15 apiaries. A total of 74 bee samples were collected, and only two exceeded the detection limit (1 ppb). One of these samples had 48 ppb of neonicotinoid, and the bees in the sample associated with a foliar application of imidacloprid. Another bee sample from a different field was found with 10 ppb of clothianidin. Only one of 24 samples of pollen loads removed from foragers had a

Planter dust.

trace neonicotinoid level, which is just below the detection limit (1 ppb).

The research team also examined flowers from soybeans, corn and cotton from fields that were planted with varying rates of active ingredients (neonicotinoids) applied to seed coats (Stewart *et al.* 2014). In four trials with soybeans, no soybean flowers were found with detectable levels of neonicotinoids. Whole flowers were used in the samples, so there was no separation of nectar and pollen here. The researchers also found no detections of neonicotinoids in cotton nectar. The mean neonicotinoid levels in composited samples (n=15) of cotton pollen was under the detection limit; however, one sample cotton had two neonicotinoids detected at a total concentration 4 ppb. Corn pollen varied in concentration of neonicotinoids with the amount of chemical used in the seed treatment. Thiamethoxam averaged less than the detection limit. Clothianidin was detected at 3 and 6 ppb for the two highest seed coat treatment rates. These results for corn are similar to those of Krupke *at al.* (2012). Soil from two thirds of the soybean and corn fields and 100% of the cotton fields in this study had levels of neonicotinoid > 1 ppb at the time of flowering. The highest level recorded was 18 ppb. Thus, these chemicals persisted in the soil into the flowering periods. Much higher average levels were found in soil of cotton fields (*e.g.* 129 ppb).

What does it all mean? Neonicotinoids used in seed treatments for crops grown in the southern U.S. were found in the soil in a majority of fields, in wild flowers immediately after planting, and in the pollen of corn and cotton from at least a few samples in this study. Neonicotinoids were not found in either the nectar of cotton or in whole soybean flowers. One question the researchers tried to answer was whether the average levels of neonicotinoids found in various samples reflected a high risk of acute oral toxicity to honey bees (Stewart *et al.* 2014). They used a previously reported $LD50_{oral}$ = 0.004 µg per bee, which is the dose for oral intake at which 50% of the tested worker bees died after acute ingestion of any of the three commonly used neonicotinoids (imidacloprid, clothianidin or thiamethoxam).

The U.S. Environmental Protection Agency suggests a conservative approach to deciding acute toxicities for honey bees, and they recommend that real exposures should not exceed 40% of the acute $LD50_{oral}$. Thus, a conservative value of 0.0016 µg per bee was used to estimate the "levels of concern" for ingested pollen or nectar. For example, a previous study found that the maximum amount of pollen ingested by an adult worker bee per day was about 9.5 mg. If a worker honey bee received 0.0016 µg neonicotinoid after eating 9.5 mg pollen, then the level of concern for acute toxicity from pollen would be (0.0016 µg neonicotinoid ÷ 9.5 mg pollen), which is equivalent to (1.6 ng neonicotinoid ÷ 0.0095 g pollen) and equal to 168 ng per g (ppb). For nectar, the maximal amount of nectar eaten per day by a worker bee is about 292 mg. If the worker received 0.0016 µg neonicotinoid in 292 mg nectar, then the level of concern for nectar would be (1.6 ng neonicotinoid ÷ 0.292 g nectar), which is equal to 5.5 ppb. Clearly, in terms of acute oral toxicity, nectar has a much lower critical threshold than pollen.

The researchers concluded that the use of seed treatments in corn, soybean and cotton do provide a potential risk of exposure to neonicotinoids through multiple routes of entry. However, the levels detected in flowers, pollen and nectar suggest that there is no serious health risk to honey bees – at least in terms of acute oral toxicity. The group concedes that more work is needed to get a fuller picture of the potential health concerns for honey bees. For example, they are currently measuring the rates of degradation of neonicotinoids in the tissues of the plants and in the soil. They are also testing whether residues in soil can enter plants through the root system and pose a threat by sequestration into pollen and nectar. They also admit that the current study cannot answer questions about chronic exposure of bee colonies to sub-lethal doses of neonicotinoids through time. Additionally, future experiments need to include measurement of colony health to provide a better assessment of risk. Clearly, more work is needed to assess the total risk profiles for honey bees from neonicotinoids in seed treated plants.

You might wonder, "How come it takes so long to do these studies?" One factor is cost: consider that 560 samples were analyzed in this study at a cost of $200 per sample to give a total cost of $112,000 just to pay for the chemical analyses. This does not count the labor of researchers and their graduate students. Research requires extensive time and money. The good thing is that at the moment there are many research groups trying to better describe the relative risks of exposure to various insecticides for honey bees. BC

Sources Consulted

Krupke, C.H.; Hunt, G.J.; Eitzer, B.D.; Andino, G.; Given, K. (2012) Multiple routes of pesticide exposure for honey bees living near agricultural fields. *PLoS One* 2012, 7(1), e29268 DOI: 10.1371/journal.pone.0029268.

Stewart, S.D.; Lorenz, G.M.; Catchot, A.L.; Gore, J.; Cook, D.; Skinner, J.; Mueller, T.C.; Johnson, D. R.; Zawislak, J.; Barber, J. (2014) Potential exposure of pollinators to neonicotinoid insecticides from the use of insecticide seed treatments in the Mid-Southern United States. *Environmental Science & Technology* 48: 9762-9769, dx.doi.org/10.1021/es501657w|Environ. Sci. Technol. 2014, 48, 9762-9769.

BIGGER PICTURE

Jessica **Louque**

Package Installations

The whole group.

Last year, we installed 200 packages at work. Bobby and I had just switched to a new-to-us company, and we were scrambling to get everything ready. If you read my rant last year on the bee company that cancelled our order and sent our check back just days before our packages arrived, you may remember some of the stress we encountered. We had just cleared five acres of land in a square-ish plot, and only had one side of that ready to use. All of our installation help were new people, which was around 12 helpers, but only two of them had ever even seen the inside of a hive before. We had people setting up hives when we drove in with the packages that Saturday because a thunderstorm rolled in on Friday afternoon and was so bad that nobody could go in the field. We had a few people who had also never used ratchet straps. It was a little bit horrendous. In the end, it worked out okay, but we vowed that this year would not happen that way again.

The first thing we did was plant our field in what was supposed to be bee plants mixed with Winter wheat to give some erosion control over the cold months. In retrospect, we should have planted a clover/vetch mix a little thicker, because now the wheat is starting to shade out our newly-emerging buckwheat that reseeded itself from last year. It definitely looks better and mud is not running everywhere, but there's room for improvement.

We also wanted to do a little more work in the field to give more space for the bees. Putting all the hives on one side of the field grouped them a little closer together than I would have liked (and probably closer than they would have liked too). We had a grader come in and make us a nice driveway around the outskirts of the field, and set up our hives on three sides. Last year, we had four hives to a pallet and I didn't really like having them that close to the ground either, or that close to each other. We put up 67 eight-foot long stands this year that had three hives on each stand. It raised up the hives a little more, which helps our backs and makes it a little easier to feed them, but it also makes a nice pathway where you are always behind the bees and never in a flight path. We use a truck with a 330-gallon elliptical tank on the back to feed, and last year you were always in the way of at least one or two hives every time you stopped to feed. It's really much better.

As I mentioned earlier, we had a serious problem with our equipment. We came in late to the bee season and had to scrounge and beg and call in favors to pull off the season. That was one more level of insanity that we were hoping to avoid, which I would say was fairly successful this year. With bee work in California, the Dakotas, and several other places, we are working with a total of around 650 colonies. We've had our techs working on equipment for a good couple months.

Dadant really saved us last year with the equipment, so we wanted to give them all our business this year as well. Mark worked with us to make sure we had all of our equipment and would even drive it down to us so we didn't have to pick it up. I think I picked out 14 different paint colors this year and had the techs go at it. We still use the Mann Lake feeders, but this year we remembered that the sides of the wire is not secured. Last year, we had two techs sitting in the grass for hours with Disney princess and purple leopard print Duck Tape to hold down one side of the feeder (the side we weren't using to feed) so the bees didn't come out and get stuck in the feeder and die. We went through almost 50 bottles of silicone this year sealing up those edges, and it looks a lot nicer.

Hives ready for packages.

Package moving.

We also have to do a lot of digital photography with our bees, and every frame has to have a label on it so we know which frame it is from which hive in what study. We attach labels with metal tags, and let me tell you, bees do not like if you attach them while the frames are occupied. We were able to get all of our hives and frames labeled before the package installation, and that is no small feat.

There was also a nice surprise that we were getting some serious help in California. Our bees out there are from Olivarez Honey Bees, and Ray agreed to babysit our bees for us. All we had to do was ship him equipment that we wanted to use, and he would have his group install, feed, and monitor the hives until we needed them for the studies, at which point he would also drive them down for us. The techs had to get together 200 hives worth of equipment, get it on pallets, and get it loaded on a truck for delivery to Ray all with about 10 days' notice, plus finishing up 230 hives for our first installation day here, and getting started on our 190 package installation that will happen in another two weeks.

Another issue we had was the lack of experience from our techs. This year, we have offered positions to 26 graduates (or students) for the Summer field season onward. We interviewed almost 70 people to pick the people we thought could deal with the stress level that comes with the bee work. We had one tech that stayed from last year, and four techs that have been on board for a couple months. Almost everyone else (except one from Ireland and one from Canada) won't graduate until May so they couldn't work full time until then. We offered this group the chance to come out for package installation to get the bee experience as well as be gophers for us. If they seemed to pick up the installation process well, then they could do some too. We ended up with a total of our original 6 (our Irish tech came in this week) plus 13 that were counting this as their first official day of work. Our currently employed techs sat out all the stands and hives previously, but every frame still had to be sprayed with sugar water. We use plastic frames for various reasons, but the bees take to them a lot better with that sugar spray. When we were ready to install, every hive was open, with frames sprayed, feeder to the side, and ratchet ready.

For the package installation itself, Bobby and I were not exactly wanting to replicate last year when we ended up doing the majority of the installations by ourselves. We worked out a deal with Tim Dover, one of the owners of The Carolina Honey Bee Company to not only deliver our bees, but to also help us do the installation and bring some help with him. I also called Jack Tapp to see if he could come help, and he brought his youngest son with him. We received moral support from Don Hopkins, mostly because we scared Tim into thinking he was going to get lost and he arrived a full three hours before we thought he'd be there and Don couldn't come until around the original time. Honestly it's worth having Don around just for his advice and bee knowledge. With this team on board, we had a pretty smooth time, with a few bumps, because it's never perfect!

We had everyone arrive by 9:00 a.m., and we finished the actual installations right at 1:00 p.m. We stopped for lunch, and then went back up for some pictures. We did have about three swarms that had to be evaluated, but only having three swarm problems from over 200 packages isn't so bad.

One was particularly a problem though because it was about five hives' worth of bees. Bobby and I decided to tackle the beast head on, as it was hanging out of a tree maybe 15 feet in the air. I would say we enjoyed putting on a show for the techs, but we would have done the same thing if we were there by ourselves because either we really like challenges or we are insane (maybe both).

If you can estimate the size of our truck, the swarm was about six or eight feet above the cab. It seemed to us at the time that the best way to catch this swarm was

Bobby's jump.

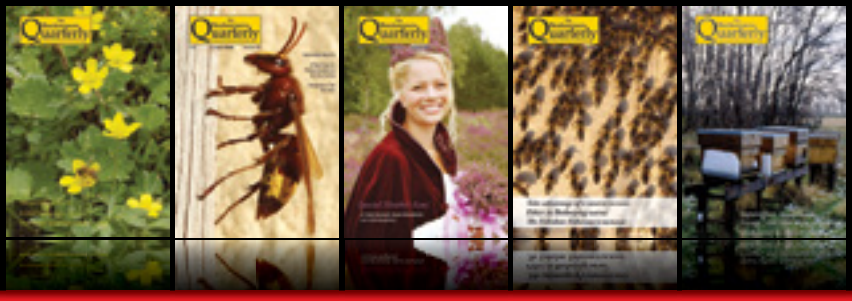
to put a box on the cab of the truck while standing on the toolbox and have Bobby kamikaze jump at the tree to shake the bees out (yes, there is a video floating around. It was an impressive jump). Unfortunately, the trajectory slightly changed, and although we did catch the queen in the box on the first shake, we lost about 80,000 (or more) bees down the side of our truck and onto the ground. They made a nice little trail and started pouring themselves into the box until they couldn't fit anymore. A lot of them also resettled into the tree.

Bobby ripped his hands open on the tree during his jump, so the next few rounds he went baseball style on the tree to knock them out. We ended up with five completely full boxes of bees for that swarm. It's going to be nice splitting those back out later.

Overall, I think our planning went a lot better for this year. There're a few things I'd like to change for next year, like better forage in the field and maybe even a little more spacing around the hives, but it seems like a successful year so far. Blue is the color of the year for the marked queens, and I guess it's fitting that our queens are marked Duke blue. Obviously NCSU couldn't win because it wasn't a red year for the queens. Yeah, I'll stick with that. BC

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

This is the dawning of the age of asparagus!



Overcoming Barriers II

How To Continue Doing What You Love

Morris **Ostrofsky**

Reconsidering your beekeeping goals is another way to continue keeping bees. Why not keep bees for the sheer enjoyment of keeping them? What better way to start the day than to sit in front of the hive with a cup of coffee/tea and just watch. Ask yourself, "Do I really need a dozen hives?", "Do I really need to make more honey than my family consumes?", "What else can I do with the wax?" Your answers to these questions can lead to less strenuous but equally satisfying beekeeping.

One way to keep your hand in beekeeping is to focus on raising nucs. Typically five-frame nuc boxes weigh very little. They are easy on your back, you can still enjoy keeping bees, and there is always a market for them. Another option is to simply harvest enough honey comb for your own family's consumption. You do not have to extract and can leave most of the honey for the bees. This means no heavy lifting, no extracting and no marketing. An added bonus is little or no late winter feeding. Bill Greenrose, the New England beekeeper, has recently started to make lip balm and body creams. "From the standpoint of being a slowly aging beekeeper, I think these 'other' products are a nice alternative to the heavy lifting that goes with both pollination and honey production."

Beeswax has lots of potential to keep you in bees.

Raising queens is another consideration. It is a challenging activity that requires knowledge of bee biology, weather conditions, plant phenology and general beekeeping skills. Again no heavy lifting is involved not to mention the queens are locally adapted. You can use the queens or sell them as there always seems to be a market for them.

At times something beyond aging changes our daily lives and therefore our ability to keep bees. Beekeepers are nothing less than creative and when faced with a disability find ways to adapt to the change in order to continue beekeeping.

I met Naomi Price at a laboratory workshop at a conference. She came rolling in on her own and was confidently ready to learn. This is consistent with Naomi's approach to beekeeping. She wants the freedom to tend her bees without assistance from others. "Accessibility is all about attitude," she says. After a couple years of working with the Langstroth hive, Naomi found she needed a different hive configuration. Living with paraplegia and restricted to lifting less than five pounds per arm, she wanted a hive that she could work independently without taking away from what the bees need.

Naomi's background includes doing ADA accessibility work with county and city governments. Her quest for a more user friendly hive involved studying foraging, brood rearing, communication, food storage, ventilation, Winter clustering, pests, and even the local weather. She compared the histories of hive designs, read research papers, and factored in her own beekeeping experience. To all that, she added the requirements she needed for successful beekeeping.

The Valhalla hive is the result of Naomi's research and consultation with The Hive Man, Richard Nichols. Naomi has used her Valhalla hive for two seasons. She says, "I still monitor and question every aspect of the Valhalla and probably will for several years to come."

The Valhalla hive is based on the Tanzania design with modifications.

1) The hive can be set at any height.

2) The outer metal cover on the hive is attached to the body with hinges and is designed to require only five to eight pounds of force to open it.

3) The hive cover, that provides a barrier to the sun and wind, will not close unexpectedly due to a clever latch system.

4) There are 24 deep foundationless Langstroth frames in the hive.

5) One frame can temporarily rest against the inside surface of the cover

6) Duck cloth is placed over the frames to protect them from the elements and robbing bees.

According to Naomi, "My five colonies are showing consistent approval for this hive design through all weather conditions, predators, robber attempts, while filling frames with brood, bee bread or honey."

Raising a few nucs to sell or use.

Why not try raising a few queens?

There is no need to lift boxes to do inspections or to store empty boxes during the Winter. The hive cover does not need to be removed for inspections because it is hinged on the front side. The side latch holds it open when working the hive.

Richard and Naomi continue to improve the Valhalla hive design. Richard sells the complete hive and hive plans. See references for contact information for Richard and the fabricator and supplier of the arm latch and metal cover.

Another example of adapting to changing circumstances is Krista Conner of Seattle. She has over eight years of beekeeping experience, is a certified Journeyman beekeeper in Washington State and is the most recent past President of Puget Sound Beekeepers Association. Krista says, "I hope this story ends up inspiring others to not let things stand in their way." She became a beekeeper despite a major health issue; in this case cancer. "I used beekeeping as a topic to distract myself thru my surgery and treatments over the course of a year and set a goal for myself to start beekeeping at the end of it all as a reward."

In 2011 cancer "reared its ugly head "again. Krista became physically disabled and unable to manage hives at all. "I reached out to my beekeeper friends at PSBA to help me finish out the year. (I've learned beekeepers are great in this regard – pitching in help)." During the Winter Krista focused on her health and looked toward the 2012 Spring beekeeping season as the light at the end of the tunnel. She says, "Again, this kinda crazy hobby became a welcome respite for me – something to focus upon besides the trials and tribulations of dealing with a major health crisis."

Krista focused on what she did have and what she wanted to accomplish which was to continue beekeeping and gain strength and mobility. "This felt like the proverbial lemons to lemonade saying." Her self-inventory revealed she had a decent level of knowledge of hive management, a strong skill set of project management and a willingness to share her knowledge.

Since 2012 Krista has run an apprentice program offering new beekeepers the chance to manage her 20+ hives while she tutors them along the way. "Overall I have found excitement and meaning in finding ways to help my apprentices learn how to keep bees." Krista concludes, "So, there you have it, the highlights of how I've overcome some barriers to beekeeping and even how beekeeping has helped me overcome barriers in my life."

To continue keeping bees we need to adapt to the changes that come with age or disability. There are many ways this can be accomplished if beekeepers keep one principle in mind. Charles Darwin sums it up the best when he said, "It's not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

Krista Conner

Naomi Price and her Vahalla hive.

Bush Farms	**http://www.bushfarms.com/beeslazy.htm**
Randy Oliver	**www.scientificbeekeeping.com**
Magnifiers	**http://www.magnifier.com/headband_magnifier.htm**
Beekeeping supplies	**http://www.mannlakeltd.com/beekeeping-supplies**
Beekeeping supplies	**http://www.dadant.com/catalog/index.php?cPath=88unassembled 8 frame**
Journals	**http://www.cafepress.com/+beekeepers+journals**
Hive Tracks (electronic version)	**http://hivetracks.com**
Safe lifting	**http://physicaltherapy.about.com/od/ergonomics/qt/SafeLifting.htm**
Back strengthening exercises	**http://www.realsimple.com/health/fitness-exercise/workouts/4-back-strengthening-exercises/side-plank**
Osteoarthritis	**http://www.mayoclinic.org/diseases-conditions/osteoarthritis/basics/treatment/con-20014749**
Leg strengthening exercises	**http://healthyliving.azcentral.com/home-leg-strengthening-exercises-6286.html**
Extra long hive tool	**http://www.kelleybees.com/Shop/12/Smokers-Tools/Tools/4636/Extra-Long-Hive-Tool**
Instructions to cut down10 to 8 frame western	**http://www.bushfarms.com/beeseightframemedium.htm**
For plans or already constructed Valhalla hive (no delivery)	The Hive Man Richard Nichols 541-447-7907 **richardtarsia@gmail.com**
Fabricator and supplier of Valhalla hive arm latch and metal for outer cover	McAlister Industries Tim McAlister 541-610-5554 **mcalister@cbbmail.com**

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

IN RE	)	Hon. Joan B. Gottschall
	)	
HONEY TRANSHIPPING LITIGATION	)	Case No. 13-CV-02905

SUMMARY NOTICE OF CLASS ACTION SETTLEMENT AGREEMENT

Ernest L. Groeb, Troy L. Groeb, Robert Feerick, Marquette Capital Partners, Thomas Jenkins, Horizon Ltd., Horizon Capital Partners III, and the General Unsecured Claims Litigation Trust for Debtor Groeb Farms, Inc. (collectively, "Settling Defendants") have agreed to a Class Action Settlement resolving allegations against them regarding the unlawful importation of Chinese honey (the "Settlement"). **YOU MAY BE ENTITLED TO RECEIVE A SETTLEMENT PAYMENT IF YOU ARE A MEMBER OF THE SETTLEMENT CLASS:**

All individuals and entities with commercial beekeeping operations (300 or more hives) and packers of honey that produced and/or sold honey in the United States during the period from 2001 to the present.

Excluded from the class are alleged co-conspirators of the Released Parties and the following individuals and entities who have prospectively opted-out of the Class: Chris Moore d/b/a Moore's Honey Farm, Cox Honey of Utah, LLC, Brett Adee d/b/a Adee Honey Farms, Kelvin Adee d/b/a Adee Honey Farms, Daniel C. Whitney d/b/a Davis Honey Company, Bauer Honey, Inc., Bee Natural Honey, LLC, Bernard Casavan d/b/a Casavan Apiaries, Blake Shook d/b/a Desert Creek Honey, Ruby's Apiaries, Inc., Kallas Honey Farm, Inc., Wind River Honey Company, Heaven's Honey, Inc. d/b/a Chip's Bees and Bennett's Honey Farm, Brad Stromme d/b/a Stromme Honey, Dan's Honey Co., William H. Perry d/b/a Perry Apiaries, McCoy's Sunny South Apiaries, Inc., Willow Bee, LLC, GloryBee Natural Sweeteners, Inc. and Orange Apiary, Inc.

Description of the Settlement

The Settlement is intended to resolve all damage claims brought against Settling Defendants for claims arising from or related to Defendants' alleged importation, packing, and sale of unlawfully transshipped Chinese-origin honey. Plaintiffs have sued the Settling Defendants and others (the "Non-Settling Defendants") to recover damages. Settling Defendants deny any wrongdoing whatsoever.

The Court has conditionally certified the Class for settlement purposes only. The Court has not determined the merits of any claims or defenses of the parties. The Settlement will become effective only upon final approval by the Court.

If approved, Settling Defendants, through a D&O insurance policy[1] will pay a sum of $3,000,000.00 to the Settlement Fund.

Counsel for the Class are seeking, in the aggregate, attorneys' fees of no more than 33% of the Settlement Fund. The fees and costs incurred in the administration of the Settlement Funds (including the cost of Notice) are to be paid out of the Settlement Fund.

The Court shall consider Counsel for the Class' application for attorneys' fees, reimbursement of expenses, and payment of incentive awards to named plaintiffs, and award only those fees, expenses, and incentive awards that the Court finds to be reasonable. Class Counsel's motion for attorneys' fees and expenses, together with all supporting documentation, shall be filed with the Court by August 2, 2015 and shall be posted on the Settlement Website at the time filed for review by all interested Class Members.

The remainder of the Settlement Fund after deductions for Court-approved fees, expenses, administration costs, and incentive awards (the "Net Settlement Fund") shall be distributed amongst eligible Class Members who have submitted valid claims forms, as reviewed and approved by a Settlement Administrator, on a pro rata basis proportional to the mass of honey produced or packed (whichever is greater, mass produced and mass packed shall not be added together) validly claimed on the claim form of each eligible Settlement Class Members that submits a valid claim form by the deadline.

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Joint Fairness Hearing

A Joint Fairness Hearing will be held on October 2, 2015 before the Honorable Judge Joan B. Gottschall in Courtroom 2325 of the United States District Court for the Northern District of Illinois, Eastern Division, 219 South Dearborn, Chicago, Illinois, 60604 at 9:30a.m. Central time, to determine: whether the requirements for certification of the Settlement Class have been met; whether the proposed settlement should be finally approved as fair, reasonable, adequate, and in the best interests of the Settlement Class Members; whether the award of fees and litigation expense reimbursement to Class Counsel should be approved; whether incentive awards should be paid to the Class Representatives; and whether a final judgment should be entered dismissing the Complaint against the Settling Defendants (except Horizon Partners, Ltd.) on the merits and with prejudice. The place and time of the Joint Fairness Hearing may be changed by the Court without further notice.

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Any Class Member who does not timely object to the Settlements shall be deemed to have waived all objections to each of the Settlement Agreements.

Effect of Final Court Approval

If the Settlement is approved, the Litigation will be dismissed with prejudice as to all Settling Defendants except Horizon Ltd. and Horizon Capital Partners III, as set forth fully at paragraph 76 of the Settlement Agreement. Litigation will continue against the other Non-Settling Defendants. Unless you opt out from the Settlement, upon Court approval, you will be bound by the Settlement, including the judgment of dismissal.

Date: April 9, 2015

Honey Transshipping Settlement Administrator, PO Box 43355, Providence, RI 02940-9554
888-706-3404
www.HoneyTransshippingLitigation.com

1 "D&O Policy" means Forefront Portfolio Policy No. 8208-1192 issued by Federal Insurance Company to Groeb Farms Inc. for the May 1, 2011 to May 1, 2012 policy period.

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

IN RE	)	Hon. Joan B. Gottschall
	)	
HONEY TRANSHIPPING LITIGATION	)	Case No. 13-CV-02905
	)	

SUMMARY NOTICE OF CLASS ACTION SETTLEMENT AGREEMENT

Ernest L. Groeb, Troy L. Groeb, Robert Feerick, Marquette Capital Partners, Thomas Jenkins, Horizon Ltd., Horizon Capital Partners III, and the General Unsecured Claims Litigation Trust for Debtor Groeb Farms, Inc. (collectively, "Settling Defendants") have agreed to a Class Action Settlement resolving allegations against them regarding the unlawful importation of Chinese honey (the "Settlement").

YOU MAY BE ENTITLED TO RECEIVE A SETTLEMENT PAYMENT IF YOU ARE A MEMBER OF THE SETTLEMENT CLASS:

All individuals and entities with commercial beekeeping operations (300 or more hives) and packers of honey that produced and/or sold honey in the United States during the period from 2001 to the present.

Excluded from the class are alleged co-conspirators of the Released Parties and the following individuals and entities who have prospectively opted-out of the Class: Chris Moore d/b/a Moore's Honey Farm, Cox Honey of Utah, LLC, Brett Adee d/b/a Adee Honey Farms, Kelvin Adee d/b/a Adee Honey Farms, Daniel C. Whitney d/b/a Davis Honey Company, Bauer Honey, Inc., Bee Natural Honey, LLC, Bernard Casavan d/b/a Casavan Apiaries, Blake Shook d/b/a Desert Creek Honey, Ruby's Apiaries, Inc., Kallas Honey Farm, Inc., Wind River Honey Company, Heaven's Honey, Inc. d/b/a Chip's Bees and Bennett's Honey Farm, Brad Stromme d/b/a Stromme Honey, Dan's Honey Co., William H. Perry d/b/a Perry Apiaries, McCoy's Sunny South Apiaries, Inc., Willow Bee, LLC, GloryBee Natural Sweeteners, Inc. and Orange Apiary, Inc.

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All The Buzzz in...

Hello Friends,

Have fun this summer planting bee friendly plants, observing nature and cooking with honey.

Bee B. Queen

Bee B. Queen Challenge

What is your favorite book about bees?

Maggie Thomas, 8, PA

John Lehman, 4, OH

Raymond Willis, 6, IL

Do Be a Do Bee

It's summertime. Looking for something to do? Here are some crafts, books, recipes and activities to help fill your days with honey bee fun.

Garden Bees

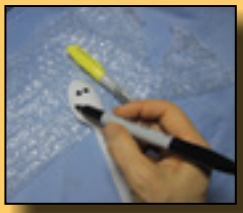
Every garden needs honey bees. Brighten up your garden or yard with these fun-to-make honey bees.

You will need:

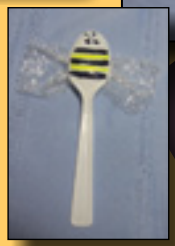
- plastic spoons
- permanent markers
- bubble wrap
- scissors
- tape

Directions:

1. Draw a bee on the back of a plastic spoon.



2. Cut a rectangle piece of bubble wrap, bunch it up in the center, and tape on the front part of the spoon.



3. Place in the ground, on cupcakes, or in a flower bouquet to brighten up someone's day.

Read About Bees

Bee (Bouncing Bugs)
David Hawcock (Author), Lee Montgomery (Illustrator)

Discover busy bees building a honeycomb for their eggs, gathering pollen, and doing their mysterious circle dance to show the location of food.
Age Range: 3 and up

The Honeybee Man
by Lela Nargi and Kyrsten Brooker

This award winning book offers an inside look at the life of an endearing beekeeper in Brooklyn, New York and the honey-making process.
Age Range: 4 - 8 years

Flight of the Honey Bee (Read and Wonder)
by Raymond Huber (Author), Brian Lovelock (Illustrator)

Follow the flight of a honey bee as she searches for nectar to sustain her hive and, along the way, pollinates flowers to produce seeds and fruits.
Age Range: 3 - 7 years

... Bee kid's corner

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

It was not long ago. I was about eight and at a gas station. Bees were on the trash can. I got to pet them. It was fun!

Hunter Hemmis, 9, PA

What's the Honey, Honey?

Different flowers make different nectar which makes different kinds of honey with different colors and flavors. Can you unscramble these plants that make distinctive varieties of honey? Take the letters that appear in the boxes and unscramble them for the final message.

LEPTUO ☐☐☐☐☐☐ (6 4)

VROLCE ☐☐☐☐☐☐ (2)

TEBKWUAHC ☐☐☐☐☐☐☐☐☐ (1 3 5)

Bee B. Queen says... ☐☐ ☐☐☐☐☐ (1 2 / S 3 4 5 6)

Going Bananas for Bees

Make this fun snack for your friends. You can even make this banana bee on top of ice cream. Yum! Yum!

You will need:

- a banana
- 2 pretzels
- 2 stick pretzels
- raisins or nuts for eyes
- chocolate sauce for stripes

1. Cut a paper plate in a flower shape.
2. Slice a banana in half lengthwise. Lay on a plate rounded side up.

3. Place two pretzels for wings. Use pretzels sticks for antennas and raisins or nuts for the compound eyes.

4. Drizzle chocolate sauce on top for stripes.

What's the Buzz

One person is chosen to be the honey bee. All the other kids leave the space. The honey bee hides a paper flower then calls the other kids to come back and try to find the flower. The honey bee "flies" around telling the players how close they are by making a buzzing sound around the person closest to the flower. Buzz louder as they get closer to the spot.

Pick the Pollinator

The Public Broadcasting System has an online pollinator game. Search for "pollinator game" on their website at www.pbs.org.

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Answers: Tupelo, Clover, Buckwheat, Bee Happy

Ross **Conrad**

Bermuda

Bees or Bust

One of the benefits of having written a book on beekeeping is I occasionally get invited as a presenter to speak to groups of beekeepers. Now normally I avoid flying due to concerns about the environmental impacts of air travel, and the violation of my constitutional rights by prodding, prying and groping TSA agents, however, it was in late March 2015 at the tail end of one of the coldest snow-covered Winters the northeast U.S. has experienced in many years, that I found myself boarding a flight destined for the island of Bermuda.

With a landmass of 21 square miles (54 Sq. km), Bermuda hosts a population of 65,000 people. Temperatures are fairly constant year around rarely ever dropping below 45□F (7.2□C) or rising above 95□F (35□C). Tropical plants grow in abundance all over the island and a yearly honey harvest of 125 pounds of honey is not uncommon.

Bermuda appears to be a beekeeper's paradise and, in some ways it was before the *Varroa* mite was first discovered on the island in 2009. No one knows for sure how the mite made it to the island located 650 miles off the North Carolina coast. The only bees that had been imported onto the island in recent memory were queens from Hawaii. These queen shipments were promptly discontinued however, once *Varroa* was found in Hawaii in 2007. Since then no bee importations have been allowed. This has created a challenge for the island's beekeepers since the only way they can increase their hive numbers is to either make splits or nucleus colonies and let the bees raise their own queens, or capture swarms.

Government of Bermuda statistics indicate that while the average value of the island's honey crop was over $170,000 between the years 2000 and 2009, that figure had dropped to just $50,000 by 2010. The number of managed hives on the island has also dropped from a high of around 350 to somewhere in the range of 60-70 and the number of beekeepers has dropped from about two dozen to approximately 14 today. All these declines are primarily due to the mites. This has created a situation where the typically strong demand for local honey on the island has increased something fierce.

Having learned from the experience of other countries, Bermuda's beekeepers want to avoid the synthetic pesticide chemicals that have led to resistant mites and contaminated combs and many initially turned to the Mite Away Quick Strip (MAQS) formic acid treatment. The application of the treatment unfortunately occurred during a time of high temperatures and humidity which caused many of the bees to abandon their combs and beard up on the outside of some of the hives (see photo). This treatment just happened to coincide with the arrival of a hurricane, and the accompanying rains that saturated the ground caused the Argentine ants to come up out of their underground nests. Since the strong winds of the hurricane had stripped much of the island's vegetation bare of fruits, flowers, and leaves, there was little food available for the ants so they ended up moving into the hives that the bees had been forced out of. This caused the bees to abandon their hives altogether, absconding and increasing beekeeper's losses even more. As a result, many of the beekeepers on the island have understandably become apprehensive about the use of mite treatments and prefer not to treat their bees with anything to control *Varroa*.

This was the situation when a group of concerned Bermudans came together in August 2013 and formed The Buzz, under the auspices of the Bermuda Environmental Sustainability Task Force (BEST). This small group's first event, in an effort to help address the threat to bees in Bermuda was a "Keep Bermuda Buzzing" bee fair that was held in April 2014 to educate the public about the importance of bees and the skills required to keep and promote their propagation. Kim Smith of BEST invited me to visit the island and share the experiences of beekeepers throughout the United States that are managing to keep the majority of their bees alive year after year without treatments despite the presence of *Varroa*.

I found the beekeepers and people of Bermuda to be wonderfully friendly and full of a warm hospitality

*Many bees are being forced out of the hive by a formic acid mite treatment allowing ants to move into the hive resulting in the colony absconding. (*Tommy Sinclair photo)

Giant toads like this one can eat a lot of bees so hives in Bermuda tend to be kept on stands 16 or more inches off the ground in order to prevent the toad from having easy access to the colonies.

Randolph Furbert (on right) is one of Bermuda's best known beekeepers and runs one of the island's largest operations, Chartwell Apiaries. Mr. Furbert is pictured here in an office in the back of his honey house with the President of the Bermuda Beekeeper's Association, Tommy Sinclair and a beautiful observation hive."

that rivals their sub-tropical climate. My primary guide while touring Bermuda and visiting the island nation's beekeepers was Tommy Sinclair, Agriculture Officer with Bermuda's Department of Conservation Services, President of the Bermuda Beekeeper's Association, and the island's unofficial bee inspector. Although historically Bermuda was an agrarian society with about 3,000 acres of cultivated land in the late 1800's and early 1900's, today there is less than 400 acres of land in agricultural production. Thus, most honey bee forage comes from backyard gardens and wild plants. According to Tommy, Bermuda's beekeepers often enjoy two honey harvests a year. The first nectar flows coming out of winter begin around the end of March and finish with the first harvest at the end of July. The Fiddlewood tree, Bermuda palmetto, and some Brazilian Pepper (aka Mexican Pepper to the locals) are the main nectar sources along with minor contributions from Bottlebrush and Pigeon berry. These plants produce a "summer honey" that tends to be fairly light in color.

The months of July and August are too hot and humid for many of the island's plants to produce much in the way of nectar. However, a strong late nectar flow from the Brazilian pepper and a second Fiddlewood bloom in some years, between mid-October and the end of November produces a darker honey that is the main harvest on the island. While things are still green and some plants are blooming between November and the end of March, the nectar that dribbles in here and there is not enough to sustain hives over the winter so a medium super full of honey is typically left on hives to prevent starvation.

Along with *Varroa*, Bermuda's beekeepers have to deal with many of the other pests and diseases that the beekeepers in other parts of the world regularly contend with. These include American foulbrood, European foul brood, Chalkbrood, Nosema, Deformed wing virus, Black Queen Cell Virus and wax moths. In addition Bermuda's bees have to deal with Giant toads and a lizard called the Jamaican Anole, both non-native pests.

As mentioned above, ants can be a big problem so some beekeepers will set the feet of their hive stands in moats of water or oil to try to keep the ants at bay. Unfortunately, if the moats are too small, the ants simply keep attempting to cross it eventually filling up the moat with enough dead ant carcasses that the rest of the ants are able to walk across the bodies of all the dead ants and reach the hive. Thus, more and more beekeepers rely on grease to keep the ants at bay, though in some instances grease designed for high temperature applications needs to be used to keep it from melting in the heat of Summer.

For smoker fuel many of the island's beekeepers do what beekeepers in other countries do, they use whatever is lying around and will burn well. In this case banana leaves, palm thatch, cedar wood and/or bark from the endemic Bermuda cedar are all items that can be typically found in or near a beeyard and used to produce an abundance of smoke for working bees.

I had the opportunity to speak with the islands entomologist, Claire Jessey, who also acts as the government's plant protection officer and as such is involved with approving pesticides for use in Bermuda. Due to the mounting evidence of the harmful impacts to bees from the neonicotinoid family of pesticides, all new applications for neonics have been restricted there with only previously approved products allowed on the island. The government is now considering the idea of revoking the use of these pesticides for homeowner use as well.

So given the fact that the beekeepers in Bermuda do not want to use toxic synthetic chemicals to control varroa mites, most of the beekeepers are ambivalent about using softer chemical controls such as organic acids or essential oils, and doing nothing is pretty much a sure road to the elimination of beekeeping there, what's a island nation to do?

One idea being considered according to Claire Jessey, is to allow the importation of queens that have a scientifically proven level of mite tolerance such as *Varroa* Sensitive Hygiene (VSH) bees. While this would greatly increase the limited genetic diversity of the remaining bees on the island and introduce genetic traits that are proven to help, experience elsewhere indicates that it is unlikely to solve the mite problem on its own. This path

also harbors the risk of introducing new pathogens or pests to the island however, and will have to be carried out very carefully if followed.

The only other viable option is to do what many beekeepers all over the world have started to do to keep their bees alive in the face of *Varroa* mites without placing any foreign substances in the hive for mite control. That is to resort to a combination of cultural management techniques, each of which in the long run is ineffective on its own, but when combined can suppress the impact of the mites enough to keep colonies alive year after year. These techniques, which are spelled out in the book *Natural Beekeeping,* are:

- Using screened bottom boards so that mites that lose their footing and fall to the bottom of the hive are removed from the hive.
- Making regular splits, or nucleus colonies in order to break up the breeding cycle of the mites and slow down their population growth during the year.
- Regularly rotating out old combs in order to keep the comb in the hive relatively free of disease organisms and toxic pesticide contamination.
- Regularly trapping and removing mites, or culling capped drone brood from the hive in order to also remove *Varroa* that are in the act of reproducing.

As mentioned above, none of these cultural management measures are typically enough on their own to keep a colony alive year after year without mite treatments of any kind, but when combined, especially with bees that have some level of tolerant genetics these management treatments are proving themselves to be a viable alternative to having to place foreign substances in hives in order to deal with mites.

At minimum, at least three of these measures must be used for reasonable results most of the time. Combining four of these management treatments provides better and more consistent results, while using all five measures (including tolerant genetics), will consistently offer the best chances for survival.

One other possible option, other than doing nothing, is to gamble on the fact that it is likely that the remaining bees in Bermuda are colonies that have at this point been naturally selected to exhibit some level of mite tolerance since the most vulnerable colonies will have theoretically been killed off. Aggressive splitting and breeding from these remaining hives has the potential to lead to an isolated strain of mite resistant bees on the island, while the act of making nucleus colonies and spits will help interrupt the brood cycle of the mites and slow down *Varroa's* population growth at the same time. BC

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

TANGING WORKS WELL

Okay, fine, call me nutbag-crazy. But I'm here to tell you that tanging does, indeed work. It's not just for breakfast (or laughing at) any more.

My apiary was devastated last year, by "operator error" and just plain bad luck. The cold and wet weather set off a small hive beetle explosion in my back yard apiary here in Charlotte, NC. I went from 8 queen-right colonies and 5 starts down to 1.

On an autumn Sunday watching football and enjoying an all-day pajama day where my one big effort would be spent making a cozy fire in the fireplace, our dog Honey whined to be let outside. I opened the front door. A little girl was crying across the street, having just fallen off her bike (she was fine, and was being attended to by a gaggle of friends). I decided to skip that scene. After all I wanted to get in and out before the team timeout was over and the Denver Broncos got back to beating the snuff out of Washington.

I took our dogs quickly to the back yard and let them out. Just two steps out into the yard, I heard the unmistakable sound of a swarm. I looked up and saw the telltale circular flying pattern. The entire back yard was filled with honey bees, their wings humming in unison with a purpose. Where are they trying to land? They didn't seem to have a spot picked out as far as I could tell, though some were starting to investigate a nearby bush.

I called the dogs in, who ran quickly through the cloud of bees that stretched from ground level to about 25 feet in the air. We all scurried inside. I threw on my white shirt and jeans, told Yvonne I was going to try to convince my bees to stay (or at least watch the last of my hives leave just like all the others), and said a prayer.

I believe that the legendary use of tanging, which is to make a loud clanging or ringing noise (done in the olden times with a pot or pan) works. Now, I've been called crazy before and have no problem with that. I also believe in UFO's, Bigfoot and ghosts. I think there are things seen just as well as unseen. And, I'd read just the other day about having faith the size of a mustard seed in Luke.

I ran into our yoga room and grabbed my wife Yvonne's Tibetan singing bowl, a small hand-hammered bronze bowl that "sings" with the slightest circular motions on the rim with a small wooden mallet. I just knew tanging would work. I could feel it. Regardless I was going to tang those bees. It was the only thing I could do at that point, other than stare in awe.

I've seen a video of someone using a hive tool on the metal portion of a telescoping top. They rapped repeatedly and loudly, and the swarm landed just a few feet from where the person was standing. I'd researched the myth, and discovered some who say it only works while a swarm is active and hasn't settled. Others say it was originally a way settlers could claim a swarm was theirs, running across neighbors' property lines and had no actual influence on the behavior of the bees. But, maybe, just maybe, both were true. For whatever reason, I'd been called by circumstance, or Providence, to my back yard in the middle of a swarm. I was happy to experience it, sad to see my last bees leaving.

As soon as I stepped into the back yard, the sound was even louder than before and the yard was filled with a cloud of bees flying in a great big circle. As it turns out the swarm wasn't that large, but in the middle of 'em it it sure seemed big to this third-year beekeeper. I believed that I could tang them into a desirable place and told myself, "I know this will work." I commenced tanging the small metal broze bowl with the wooden mallet. "Tang, tang, tang, tang," our backyard sounded like an old-fashioned fire alarm going off.

I held the bowl up high and tanged even louder. I started going near the bush, and then realized, "Heck, I'm tanging them to the hive stand instead of this bush. Why not?!" Were these my bees? Most likely. But then again swarms are often attracted to bee yards. The hive boxes were 50 feet away.

Holding the bowl as high as I could, I took slow steps toward the hives and methodically struck the bowl each second with the wooden mallet. The sound of the bees got louder and louder. About 7 feet in, I realized the swarm was circling around me. It was working! I smiled and reveled in the moment. The view underneath the swarm, a small circular cloud of bees above, was beautiful.

I continued my slow pace, tanging the bowl and approaching the hive. I knelt close to the hive entrance,

L, WITH A LITTLE SEED

and kept on. This time I changed where I was striking the bowl and successfully got a smoother, slightly lower and softer tone than before. I don't know if that made a difference but I sure felt like the Pied Piper. The bees quickly covered the Boardman feeder and hive entrance. I was amazed at how fast it happened. I let the bowl stop on its own and just took it all in.

With a quick, excited phone call to my friend and our club president George, I told him the news. "Tanging works!" Bees were indeed going into the hive, one by one, as a few bees were Nasinov fanning at the entrance. A few foragers with a tiny amount of pollen landed and looked utterly confused. Before I realized it, about halftime plus the 3rd quarter of the Denver-Washington game, it was all over (just as fast as those poor Redskins were).

When do I inspect the bees? George encouraged me to waste no time. "What damage would you do?" If they were my bees and were convinced to swarm regardless of this false start there wouldn't be any harm in inspecting. If it was a different swarm of bees that just got settled in, a quick inspection wouldn't convince them to leave, either.

I lit my smoker, just in case it was needed (it wasn't). I opened the top nuc box with 5 frames of food stores and a few bees, and placed it to the side. No queen cells were present in the brood chamber. Tight brood pattern, nice food stores, single eggs present, no foul odors, and no small hive beetles seen. Time now to inspect the top box.

I removed a frame that I thought my baggie feeder had dripped syrup onto. Then I realized I was looking at small hive beetle larvae, tiny ones, feasting on this food frame. They had slimed just one side. Another frame with only a piece of comb had been slimed also. The other frames were untouched. Only 2 small hive beetles were found, and I dealt them swift justice. The remaining three honey frames were untouched. I took this box and frames off the hive. To be safe, on the slimed frame I performed the rope test with a nearby twig to check for American Foulbrood. A little bit of capped brood was on this otherwise food frame, which was odd. The cells caps weren't sunken, but still I wanted to be sure. Each time I stirred up the larva with the twig it came out clean, white and not at all "ropey." I let out a sigh of relief.

I went inside with my head hung low, humbled with the knowledge that so very little damage was required to make my bees abscond. "If only, if only … ," I mentally began to beat myself up. "What's that sour look on your face for?" Yvonne asked. "Well, my last bit of bees almost left, because yet again I'd made the same stupid mistake I've been making all year long with these beetles." Then I realized her question was right on time. It was a different time, a time for thanks and optimism. I had faith that tanging would work, and it did! It was possible to use sound vibrations to direct a swarm.

Some may call it a coincidence and that's fine. Me? I call it a mustard seed. "… If you had faith as big as a mustard seed, you could say to this mulberry tree, 'Pull yourself up by the roots and plant yourself in the sea!' and it would obey you." *(Luke 17:6)*.

The legendary practice of tanging swarms, something reserved for by and large as a crazy legend that does nothing more than making you look like a fool, fits neatly in with all my other "crazy" ideas and beliefs. But I tell you, it's not so crazy. Science will teach you there are always exceptions to every rule. And sacred texts will tell you there's more to life than things you can put your finger on. "For we fix our attention, not on things that are seen, but on things that are unseen." *(2 Corinthians 4:18)*

Did I get rid of that sour look on my face and start smiling? You bet, because I realize that tanging, and maybe other crazy ideas will work, as long as you give that mustard seed of faith some fertile ground to grow in. I'll be keeping that Tibetan singing bowl in my truck, now, with the rest of my swarm equipment, a happy reminder of those mysterious things like faith that ring true.

Bee good. BC

Tom Davidson is a third-year beekeeper in Charlotte, NC, where he served as club v.p. for the Mecklenburg County Beekeepers Association. You can reach Tom by email, ***tom@tsbeeshoney.com****.*

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Field Exam

Planning Ahead For A Field Exam

Ann **Harman**

Beekeeping clubs, small and large, will be giving their Master Beekeeper exams during the next few months. Scheduling and giving the written parts pose few problems. However a Field Exam does need to be a part of all levels of Master Beekeeper exams, from the lowest level to the topmost one. Planning and giving this part does have a few problems.

Composing the Field Exam is a bit difficult; being the examiner and grading the exam is difficult also. Those giving the written parts have something on paper, written by the candidate and is easier to grade – a set number of points, the answer is really wrong, really right, or partially. Something similar can be done with the Field Exam but it will be the examiner asking the questions, possibly recording the answers and assigning points. Also colonies can present difficulties that are not the candidate's fault.

What is this frame telling you?

Two local associations, the East Cupcake Beekeepers Association and the West Gumshoe one have combined their tests and their testers. These associations found combining made it much easier to obtain enough proficient beekeepers to develop and administer the tests. You and one other have volunteered to set up and give the Field Exams.

It will take some time to plan the exams. Some associations have three levels of proficiency, others have four. How many will be taking the Field Exams at each level? When is an appropriate month? Whose hives are going to be used? So many questions! Where to start planning?

Coordination with the exam organizers is essential. The Field examiners need to know how many will be taking the Field Exam and on what level. These numbers help in deciding where the exam will be given and also for scheduling days and times. If too many have signed up for the lowest level of the exams another one or two examiners could be recruited. However all examiners must be asking the same questions and grading the answers in the same way. Before giving any results to the candidates and passing on results to the organizer have a conference to resolve any problems or questions.

Today consideration must be given to hives other than Langstroth. The top bar hive is now being used by both beginning beekeepers and those more advanced. However, someone wishing to have high honey production will be using Langstroth hives. The Warré hive is used by some, but not in such large numbers as top bar hives. Examiners not familiar with top bar or other styles may wish to find some volunteers to give those exams, Perhaps a beekeeper who has passed two levels of the exams could be recruited.

Let's start with when to give a Field Exam. This is the time to review your bee season, longer in the south, such as Alabama, but shorter in the north, such as Wisconsin. When is your main nectar flow? It's not fun taking off four heavy honey supers to get down to the brood boxes. Do you have a dearth month when bees are hostile and robbing could be a problem with an open hive? You can find a suitable time but let the candidate know if a rainy day will require rescheduling. You will need to consider a weekend day for candidates, and perhaps yourself, who work during the week.

Where will the Field Exams be given? A few local associations have a beeyard. If so, then these hives could be used. The examiners could volunteer some of their hives for exams. But where are these – miles away from anyone? In a very urban place where opening hives must take the neighbors into consideration? Perhaps some beekeepers of the clubs will volunteer their apiary. However the examiners should do a pre-exam visit to be familiar with the hives and the bees. Another solution could be the best, one that is used in the UK – the candidates' own hives. The only problem with examiner going to candidate's apiary would be distance of driving. The questions the examiner will be asking do not necessarily depend on special colonies, ones crafted for special situations or certain questions.

Those examiners who are creating the Field Exam can do a trial exam using each other as examiner and candidate. Such a trial can be useful in determining

the length of time the Field Exam would take. Since the hives used for exams belong to beekeepers, whether the examiners', candidate's or a club member's hives, stress on the colonies needs to be kept minimal. Make certain a replacement queen is available in case a queen is killed during the exam. Keep club members happy when they offer their hives for Field Exams.

Unfortunately in some areas of the U.S. the small hive beetle thrives on examination of a hive. The propolis prisons are broken and shb population increases. Therefore, some (even including the examiner) may be reluctant to offer hives for exams. The Field examiners need to discuss shb problems with those giving the other exams. Beekeepers living in and keeping bees in Africanized bee areas also need consideration. These bees are very unpredictable in their behavior – quiet one minute and mobbing anyone nearby the next minute or even absconding when disturbed. These two topics, shb and AHB, can generate exam questions.

Give each candidate a short list of what to bring to the exam. A veil is essential even if the candidate never wears one at home. It is certainly permitted to wear a jacket or coveralls. Gloves are a problem. Some wear them to keep fingers from getting sticky with honey and propolis. Perhaps it would be wise to ask the candidate to use a new pair of household gloves instead of gummed-up leather ones. Hive tools come in various styles and lengths. Yes, candidates can use their own favorite one but it must be brought completely clean, no gummy wax or propolis. The candidates will be happier with their own smoker but ask then to clean the back board of the bellows. Candidates can certainly bring their own smoker fuel and lighter. You want the candidate to be comfortable. Except for the first level exam, lighting a smoker does not need to be one of the questions.

What sorts of colonies are needed for Field Exams? Ordinary colonies will definitely work. Many good questions can be made with ordinary colonies. However, a disease such as American foulbrood is probably best done with a sterilized frame in the Lab Exam. A disease, such as European foulbrood or chalkbrood generally appears briefly in spring and disappears. Pests such as *Varroa* and small hive beetle are so common that they could be on the Field Exam. Some frames, such as one with too many drone cells could be saved from year to year. Such a frame can be slipped into a hive a few weeks or so before exam time and pulled later to be stored for next year's exam.

The First Level exam should cover packing and lighting a smoker, smoking a hive, opening, doing a simple exam of the colony and frames, and closing and putting out smoker. Your question could be – before any actions including lighting smoker – does this colony have a queen and how will we know? The examiner could be asking questions while the candidate is doing the work or the candidate could be asked to explain each step.

You now have a number of items to grade: putting enough fuel in smoker to last longer than two minutes, amount of smoke puffed into hive at first and during inspection, quietness and ease of removing and replacing tops, selection and removal of frames, how to tell if queenright, replacing frames, tops back on, and finally putting smoker out. You can certainly add questions to this level. One could be to explain the choice of placement of hive (exposure, ease of work, winter protection).

Don't be afraid of turning a problem into a question. For example, a hive is opened and the usually calm, nice colony is having a very 'bad day' and boils out with stinging on its mind. At the first level of the exam it might be best to step in and close up the hive. At one of the higher levels of the exam ask the candidate what should be done – and then do it. There is always another hive to use for other questions. Of course you will have to explain to the other field examiners what happened and discuss any grading or perhaps extra credit allowances.

Each level of the Master Beekeeper exam will require more questions, more detail, and a longer time than the next lower level. However, examiners should set themselves a time limit for the selected exam hive to be open. Sitting open with frames being waved around is stress on a colony. If several candidates have signed up for one of the upper levels it might be best to have selected more than one hive to be opened.

In order to save time for the upper level Field Exams, the smoker could already be lit and ready to use. At the upper levels the emphasis should be on the colony within the hive. Of course if an upper level candidate overly smokes the colony, does strange things with frames, upsets the colony with rough handling then points could be subtracted.

At all levels of the exam points should be assigned for overall assessment of colony handling. Are the candidates able to keep control of the colony, exhibit calm but efficient removal and replacement of frames, and keeping track of the orientation of frames that were removed and set aside? Other items, not exactly questions, could be graded. What is the condition of the hives? Rotten places, holes and other damage, condition of beeyard – overgrown with grass and weeds or full of broken equipment – could be part of a Field Exam. If a hive has ancient comb, damaged comb or wild comb make these problems and their solutions a part of Field Exams.

Questions for the upper levels do not necessarily have to be a series of yes/no types but rather a project type of question. For example a question could be asked of the candidate before even opening the hive – you hope to split this colony to increase the number of colonies you have. Please determine, at this time of year, whether this colony is a good choice and why you chose to split or not to split. Describe how you would make the split. In order to determine a grade for such a question the examiner would have made a set of possible answers and points to be awarded. The candidate would have to open the hive, pull out frames, evaluate the population and the queen's brood pattern and also fit the answer to the time of year.

When all the exams (Written, Lab, Field) are over for the season have a meeting of all those involved with the exams. What went well? What didn't? Were the questions appropriate for the level? How about the candidates – did they seem comfortable with the way the exams were prepared, given and scored? Immediately after exam time is the best time to plan for next year's exams. Be certain to thank all those who volunteered their hives for the Field Exams. You will need their help next year. BC

Ann Harman has been teaching beekeepers and giving field exams for many years. She keeps her bees, cats, dogs and horses in Flint Hill, Virginia.

GLEANINGS

JUNE 2015 • ALL THE NEWS THAT FITS

NEONIC USE UP

The use of neonicotinoids increased dramatically in the mid-2000s and was driven almost entirely by the use of corn and soybean seeds treated with the pesticides, Pennsylvania State University researchers report.

Previous studies suggested the percentage of corn acres treated with insecticides decreased during the 2000s.

But graduate student in entomology Margaret Douglas says once seed treatments were taken into account the researchers found the opposite pattern.

"Our results show that application of neonicotinoids to seed of corn and soybeans has driven a major surge in the U.S. cropland treated with insecticides since the mid-2000s," she says.

Douglas says research suggests neonicotinoids may harm pollinators. The European Union suspended neonicotioid use on bee-attractive crops and the U.S. Environmental Protection Agency is expediting its review.

After discovering that neonicotinoid seed treatments were not explicitly documented in U.S. government pesticide surveys, the Penn State researchers synthesized available information to characterize the widespread use of these insecticides.

They compiled pesticide data from two public sources – the U.S. Geological Survey and the U.S. Department of Agriculture – that both reported aspects of neonicotinoid use, but did not estimate seed treatment use specifically.

Using this, together with information from insecticide product labels, the team estimated the percentage of land planted in corn and soybeans in which neonicotinoid-treated seeds have been used since these products were introduced in the mid-2000s.

They corroborated their results with information from the U.S. Environmental Protection Agency and DuPont Pioneer, a major seed supplier.

The team found that in 2000, less than 5% of soybean acres and less than 30% of corn acres were treated with an insecticide, but by 2011, at least a third of all soybean acres and at least 79% of all corn acres were

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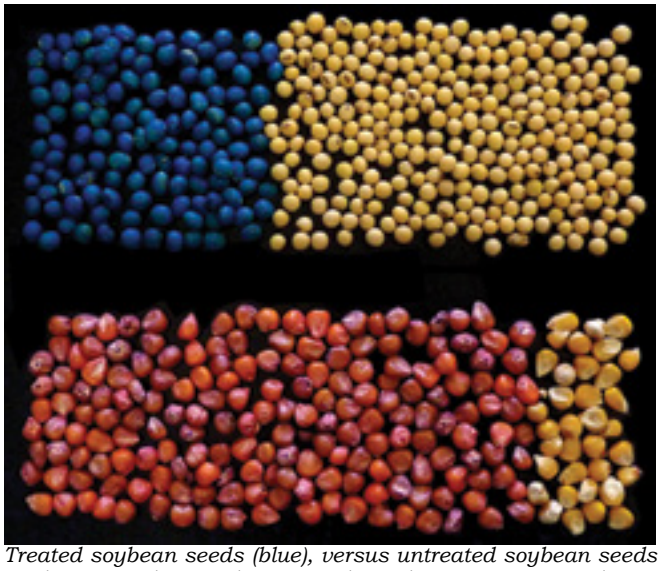

Treated soybean seeds (blue), versus untreated soybean seeds at the top and treated corn seeds (red) versus untreated corn seeds at the bottom. (Penn State photo by Ian Grettenberger, Penn State)

POLLEN AND CLOUDS: DID APRIL FLOWERS BRING MAY SHOWERS?

The main job of pollen is to help seed the next generation of trees and plants, but a new study from the University of Michigan and Texas A&M shows that the grains might also seed clouds.

The unexpected findings demonstrate that these wind-carried capsules of genetic material might have an effect on the planet's climate. And they highlight a new link between plants and the atmosphere.

Pollen has been largely ignored by atmospheric scientists who study aerosols–particles suspended in the air that scatter light and heat and play a role in cloud formation.

"The grains were thought to be too large to be important in the climate system, too large to form clouds or interact with the sun's radiation," said Allison Steiner, U-M associate professor of atmospheric, oceanic and space sciences. "And also the large particles don't last in the atmosphere. They tend to settle out relatively quickly."

But Steiner and her colleagues weren't sure that was the whole story. Sweeping a dusting off her porch one spring morning, she wondered what happens to the grains in the air. Steiner turned to the medical community. Pollen causes seasonal allergies, which affect between 10 and 20 percent of U.S. residents.

"When we were looking in the allergy literature we discovered that it's pretty well known that pollen can break up into these tiny pieces and trigger an allergic response," Steiner said.

Smaller grains could have big implications. The research team set out to see if moisture could cause the pieces to break down.

"What we found is when pollen gets wet, it can rupture very easily in seconds or minutes and make lots of smaller particles that can act as cloud condensation nuclei, or collectors for water," Steiner said.

In the lab-based experiment at Texas A&M, the researchers tested pollen from oak, pecan, birch, cedar and pine trees, as well as ragweed. These are the most common sources of wind-driven pollen in the U.S. They soaked two grams from each source in pure water for an hour.

They used an atomizer to make a spray of the moist pollen fragments and sent the spray into a cloud-making chamber in the laboratory of in Sarah Brooks, a professor of atmospheric science at Texas A&M. The team found that three different sizes–50, 100 and 200 nanometers–of

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planted with neonicotinoid-coated seed.

It was also found that the vast majority of neonicotinoids are used on crops, rather than in other arenas such as people's homes or gardens, or in turf grass and ornamental settings.

The research results appear today in the journal Environmental Science & Technology.

John Tooker, associate professor of entomology, says adoption of neonicotinoid insecticides by seed companies and farmers has been very rapid and does not appear to relate well to a corresponding risk from insect pests.

"This pattern suggests that neonicotinoids are often being used as an 'insurance policy' against uncertain insect attack, rather than in response to a documented pest threat," Tooker says.

Douglas says the Pen State results will contribute to the ongoing debate on neonicotinoids in the environment and their possible negative effects on non-target animals, including wild and managed pollinators.

"Regulators, seed companies, farmers and the public are weighing the costs and benefits of neonicotinoid use," she says. "This debate has been happening in a void of basic information about when, where and how neonicotinoids are used. Our work is holding up a mirror so that this conversation can be informed by basic facts about neonicotinoid use."

In the future, the researchers plan to better document the prevalence of secondary insect pests targeted by seed treatments. They also will explore the unintended effects of neonicotinoid seed treatments on predatory insects that help to suppress insect pests.

They are also studying alternative management practices for early-season insect pests, for instance, using cover crops to reduce pest pressure and foster predatory insects.

Alan Harman

GOOD BACTERIA

A bacterium has been found that appears to give honey bee larvae a better chance of surviving to become pupae.

U.S. Department of Agriculture molecular biologist Vanessa Corby-Harris and microbial ecologist Kirk Anderson of the Carl Hayden Bee Research Center in Tucson, Arizona, have named the new species Parasaccharibacter apium.

This is the first bacteria found to offer a benefit to bee larvae. In laboratory experiments, bee larvae fed P. apium had about an average of 30% better survival compared to those fed a sterile control.

Corby-Harris says it is not yet known how P. apium confers this survival advantage to the larvae.

The researchers this far have found P. apium only in honey bees and their hives. While P. apium found in honey bee hives is a distinct and new species from any previously identified, it has very close, naturally occurring relatives found in the nectar of many flowers, including cactus flowers, daisies, thistles and apple blossoms.

The genome of P. apium has been sequenced and the researchers are beginning to dissect the functional properties that distinguish flower-living Acetobacteraceae from those that have co-evolved with the honey bee hive. Pinpointing these ecological differences will be key to understanding the function of P. apium in honey bee hives, Anderson says.

With minimal sampling effort, P. apium was found in nearly every one of the healthy managed bee colonies examined by the researchers. A future study will explore the abundance of P. apium in weak or struggling managed bee colonies.

While the mechanism by which the bacteria benefit the larvae remains to be studied, the importance is clear enough that Corby-Harris and Anderson are already field testing its use along with a number of other bacteria that may benefit the pollination and honey-production industry as potential management tools.

Alan Harman

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all six types began to pull in moisture and form clouds.

"Samples entering the cloud chamber are exposed to moist conditions representative of the relative humidity found in the atmosphere," Brooks said. "If a sample is an effective cloud activator, droplets will rapidly grow on the sample fragments, forming large cloud droplets."

Cloud droplets are 10 times larger than the pollen fragments, and the researchers used an optical particle counter to count them as they exited the cloud chamber.

For confirmation, they looked at the samples under a scanning electron microscope. They saw that grains that had begun as around 20-50 micrometers in size had been reduced to the nanometer size range– well within the size that can lead to cloud formation.

The findings inform climate science and public health.

"What happens in clouds is one of the big uncertainties in climate models right now," Steiner said. "One of the things we're trying to understand is how do natural aerosols influence cloud cover and precipitation under present day and future climate."

And the allergy community might be interested in knowing what the particles are made of. When they ruptured, the researchers determined that they're mostly carbohydrates and proteins.

As next steps, they plan to conduct similar studies in the field and, through computer simulations, model the potential feedback between the plant life and the atmosphere.

"It's possible," Steiner said, "that when trees emit pollen, that makes clouds, which in turn makes rain and that feeds back into the trees and can influence the whole growth cycle of the plant."

MORE ON NEONICS

New research in the U.K. finds neonicotinoid pesticides wreak havoc on the bee populations, killing bees' brain cells, rendering them unable to learn, gather food and reproduce.

The report, published by the Federation of American Societies for Experimental Biology in The FASEB Journal, suggests the effects of these pesticides on bee colonies may be reversible by decreasing or eliminating the use of these pesticides on plants pollinated by bees and increasing the availability of "bee-friendly" plants available to the insects.

"Our study shows that the neonicotinoid pesticides are a risk to our bees and we should stop using them on plants bees visit," says Christopher Connolly, a researcher involved in the work from the Medical Research Institute at the Ninewells Medical School at the Univ of Dundee in Dundee, UK.

"Neonicotinoids are just a few examples of hundreds of pesticides we use on our crops and in our gardens. Stop using all pesticides in your garden and see insect damage as a success. You are providing for your native wildlife. Nasty caterpillars grow into beautiful butterflies."

Connolly and colleagues fed bees a sugar solution with very low neonicotinoid pesticide levels typically found in flowers – 2.5 parts per billion – and tracked the toxins to the bee brain.

They found that pesticide levels in the bees' brains were sufficient to cause the learning cells to run out of energy. Additionally, the brain cells were even vulnerable to this effect at just one tenth of the level present.

When the ability of the bee's brain to learn is limited, the bee is unable to master key skills such as recognizing the presence of nectar and pollen from the smell emitted from flowers.

In addition, scientists fed bumblebee colonies this same very low level of pesticide in a remote site in the Scottish Highlands where they were unlikely to be exposed to any other pesticides.

They found that just a few of the exposed colonies performed well, colonies were smaller, and nests were in poor condition with fungus taking over. This further suggests that bumblebees exposed to this type of pesticide become poor learners, become unable to properly gather food, and become unable to properly nurture the next generation of bees.

"It is ironic that neonicotinoids, pesticides developed to preserve the health of plants, ultimately inflict tremendous damage on plant life," says Gerald Weissmann, editor-in-chief of The FASEB Journal.

"These chemicals destroy the insect communities required by plants for their own reproduction."

The federation is made up of 27 societies with more than 120,000 members, making it the largest coalition of biomedical research associations in the U.S.

Alan Harman

A FLOWER THAT CHANGES COLOR

Flowers that change color throughout the day are growing in CO and their developers are looking to spread them worldwide.

Fort Collins-based Revolution Bioengineering used synthetic biology to engineer petunias to change color from red in the morning to blue over the course of the day, with various purple hues in-between.

They're calling their plant "petunia circadian" because its pigment molecules are expressed based on the plant's circadian rhythm.

While genetically engineered plants are usually associated with agriculture, company co-founders Keira Havens and Nikolai Braun have taken the technology and developed it for consumers.

Havens says the two partners wanted to use synthetic biology to create something beautiful.

"Right now synthetic biology is something technical and distant for the public, but a color-changing flower is something that people can personally interact with," she says.

"This flower is purely aesthetic – it is not for human consumption, it does not contain pesticides, it does not contain herbicides."

Petunia Circadia is being developed using synthetic biology, an emerging scientific discipline that applies engineering principles to biological systems to develop new biological functions.

Havens says the flowers are engineered to go from one color to another – red to blue and back again.

(There's) no chemicals, no complicated care, just sunlight, soil and a flower that changes color," she says.

Braun says scientists fix a broken pathway to make the flowers change color.

"The white flowers are missing an enzyme they need to produce color," Braun says.

"We use a biological switching mechanism to turn on that enzyme, allowing the flower to bloom in full color. It's completely user-driven – you can decide when you want the color switch to happen."

"Plants have circadian rhythms: cyclical expression of genes throughout the day," Braun says. "This allows them to start photosynthesis when the sun comes up or release fragrance in the evening when their pollinators are active. Petunia Circadia harnesses this internal clock to regulate flower color, resulting in a flower that changes color over approximately 12 hours."

Havens says it is a gentle transition from one color to another, not a flashing strobe light.

"When you leave for work, your garden might be pink, and by the time you get home, it would be purple or blue," she says.

Irish-based SynBio AXLR84, a business accelerator programme focused on developing companies that use synthetic biology to engineer new biological functions in organisms, has invested US460,000 in Revolution Bioengineering, calling the product cool and fresh.

SynBio AXLR8R business partner Bill Liao says the company has the potential to be a massive global success.

"What they are doing in creating something beautiful is actually a foundation stone for a much wider mission to solve big problems with tiny engineering," he says. "They have stepped out of their comfort zone in the scientific establishment to be pioneers in the biotech world and we are proud to have them as part of our inaugural programme."

University College Cork partnered with SynBio AXLR8R to provide a state-of-the-art molecular biology lab and access to university facilities for three months.

The company has begun an Indiegogo crowdfunding campaign to develop the flowers.

Project backers can own a color-changing petunia of their own for US$42 or three for US$99

Those in search of a one-of-a-kind flower can contribute US$350,000 and the company will develop to order a unique, personalised petunia.

If it reaches its US$75,000 funding goal, the company has plans to expand the color-changing varieties available.

One idea is for a flower that changes color continuously throughout the day. The company also wants to develop single plants that produce many different coloured flowers, as well as plants that produce flowers with new patterns such as polka dots.

At last report, the company had raised a little more than US$16,000.

See the video at **https://vimeo.com/108904322**

Alan Harman

RNAi TO CONTROL VIRUSES

Honey bees use different sets of genes, regulated by two distinct mechanisms, to fight off viruses, bacteria and gut parasites.

Researchers at Penn State and the Georgia Institute of Technology says their findings may help scientists develop honey bee treatments that are tailored to specific types of infections.

"Our results indicate that different sets of genes are used in immune responses to viruses versus other pathogens, and these anti-viral genes are regulated by two very distinct processes – expression and DNA methylation," says David Galbraith, graduate student in entomology at Penn State.

Christina Grozinger, director of the Penn State Center for Pollinator Research, says honey bees have more than 20 types of viruses, and several of them have been linked to losses of honey bee colonies.

"Yet, beekeepers currently do not have any commercially available methods to reduce viral infections," she says.

With a goal of uncovering which genes increase or decrease their activity in response to the presence of viruses, the researchers measured expression levels of all genes in the honey bee genome in both infected and uninfected bees. They found that the RNAi pathway had increased activity and, therefore, is likely an important anti-viral immune pathway in bees.

"Previous studies suggested the RNAi pathway was involved in anti-viral immune responses in bees, but we showed that expression levels of many genes in this pathway are significantly higher in virus-infected bees," Grozinger says.

"The RNAi pathway helps to cut up and destroy viral RNA so it is not infectious."

She says scientists and beekeepers are increasingly interested in using RNAi approaches to control viruses and parasites in agricultural crops and in honey bee colonies.

"We will need to make sure that any artificial RNAi approaches do not interfere with the natural anti-viral RNAi mechanisms in honey bees," Grozinger says.

In addition to examining gene expression in virus-infected versus uninfected honey bees, the researchers scanned the honey bee DNA for extra methylation marks that may have been added or removed from genes in virus-infected bees.

They found viral infections do change the pattern of DNA methylation in honey bees, and in a completely different set of genes from the ones in the RNAi pathway.

Many of these differentially methylated genes are also involved in anti-viral responses in mammals, but they have not previously been linked to anti-viral responses in insects.

"We found that there was very little overlap between differentially expressed and differentially methylated genes, suggesting dual genomic response pathways to viral infection," Galbraith says.

"For the first time, we characterized both the global gene expression and DNA methylation patterns associated with acute viral infection in honey bees. We confirmed that the RNAi pathway, which has been seen in other insects, is also an antiviral defense mechanism in honey bees.

"And, for the first time, we observed alterations in DNA methylation patterns in response to viral infection in honey bees," Galbraith says.

Alan Harman

CALENDAR

♦INTERNATIONAL♦

The 62nd Annual Beaverlodge Beekeepers' Field Day will be June 19 at the Agriculture & Agri-Food Canada Research Farm in Beaverlodge, Alberta.

The speaker is Michelle Flenniken, MT State Univ. The program begins at 10:00 a.m. BBQ lunch will be served.

Contact Steve Pernal, **Steve.Pernal@agr.gc.ca**.

♦COLORADO♦

The CO State Beekeepers Association will be June 13 in Rifle/Silt. The featured speaker is Maryann Frazier.

Visit **www.coloradobeekeepers.org/summermeeting2015/**.

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

For details visit **www.ucanr.edu/sites/was2**.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2015 Speaker Schedule – September 29, Sam Comfort; October 27, Juliana Rangel Posada on the Reproductive Biology of Honey Bees; November 17, Michael Fairbrother of Moon Light Meadery on Mead.

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

♦GEORIGA♦

A Honey Of A Queen Rearing Class with Jennifer Berry, June 19-20 at her farm in Comer, GA.

The course includes inside lab lectures and grafting sessions along with outdoor field studies. Catered lunch each day and a wine and cheese social Friday evening. The cost is $300/person.

For information on lodging, travel, registration and more visit **www.Honeypondfarm.com**.

♦ILLINOIS♦

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

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

♦INDIANA♦

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

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

To register contact Debbie Sieb, dlseib@yahoo.com, 317.432.4952 or visit **hoosierbuzz.com**.

♦IOWA♦

IA Honey Producers Association Field Day will be held July 11 at Lynnville. Linville bank and Phil Ebert's residence weather permitting.

Leo Sharashkin from Missouri will be the speaker.

Visit **www.abuzzaboutbees.com** or contact Roy Kraft, 515.293.2458, **Kroyster.rk@gmail.com**.

♦KANSAS♦

Northeast KS Beekeepers Funday – June 6 at Douglas County Fairground, Lawrence. Marla Spivak, Marion Ellis and Chip Taylor will be the guest speakers.

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

♦MONTANA♦

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

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

♦NEW YORK♦

The Long Island Beekeepers Club will host Diana Cox-Foster, June 28 at the Frank Brush Barn, 211 E. Main Street, Smithtown from 2-4p.m.

Visit **www.longislandbeekeepers.org** or 631.265.8249.

♦OHIO♦

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

June - Field Day; September - Phil Craft; October - Dave Duncan and Ellen Harnish

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

The OH State University Bee Lab Webinar will hold Joe Raczkowski, June 17 - Social Insects; Reed Johnson, July 15 - Effect of Tank-mix Pesticide Combinations on Bees.

Contact Denise Ellsworth, **ellsworth.2@osu.edu**.

♦OREGON♦

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

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

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

♦PENNSYLVANIA♦

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

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

For information visit **delval.edu/non-credit**.

♦SOUTH CAROLINA♦

SC Beekeepers Association will hold their Summer Conference July 23-25 at Clemson Univeristy at Hendrix Hall.

Speakers include Phil Craft and Dwight Wells.

For information visit **www.scstatebeekeepers.org**.

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

Don't believe a word I write. I keep learning, and yesterday's gospel morphs into today's heresy. Before I first sent bees to the California almonds two years ago, I assumed they'd come back thick with mites. I was wrong. In 2014 they came back looking pretty good. But bees will fool you. This spring's 32 returnees are a mixed bag. Only one colony sugar-shake tested zero mites. Half had five or more. A couple had more than 40, which is way too many. I tested all of them.

I recently wrote that bees that Winter here in Colorado get mites, too, as if there were no mite downside to sending bees to the almonds. That's a little misleading. In February, I tested four hives in one stay-at-home yard, and they all had mites, so I treated the whole yard with Api-Var, a time release application of Amitraz. But later in February I couldn't find a mite in my other, untreated, winter apiary. Location apparently matters. It's really nice to have clean bees in the spring, and opt not to treat, or fret about what damage your treatment might do to the bees.

The California bees came back at the end of March full of not only mites, but honey and brood. These are hives that I can split right now, in mid-April. And the home bees? I can pull a nuc out of the strongest. Dandelions bloom as I speak, the weather's hot, but three-frame hives that overwintered here are barely pooping along. So there are no right or wrong answers, just different scenarios, none of them perfect.

I just picked up the last of my bees that pollinate the fruit orchards outside of Grand Junction. The final load came from a little sweet cherry orchard on Orchard Mesa. When he lost his crop to a killer frost, the owner acted like this was my fault. First he complained that I dropped off fewer hives than I did last year, while charging the same. I explained that I try to bring extras, to cover hive failure. How many depends on how much room I have in the truck.

Then he told me that my colonies were weak. Look, these were the strongest of my hives that overwintered in Colorado. They had six or eight or 10 frames of bees when I set them down in his orchard in mid-March. You put hives of this strength in a blooming fruit orchard, throw in some warm weather, and they'll explode. But a hard freeze not only kills the cash crop – it can throw a rapidly expanding honey bee colony into reverse.

So with his cherry crop 95 percent dead, why this gentleman obsessed about my honey bees escapes me. Looking for someone to blame, I guess.

His problem is that his orchard lies naked under cruel Colorado night skies. Cool nights and hot days make delectable fruit, but this comes with a downside, a shadowy guy called Jack Frost. Successful growers here all employ weather modification techniques to protect their fruit.

Another pollination client, a retired science schoolteacher, uses three main techniques. First, giant oscillating propellers, or wind machines, above the orchard, mix warmer upper air with colder air on the orchard floor. Second line of defense: oil-fired heaters on the ground, blasting heat upwards into the trees. Third, relatively inexpensive pumps manufactured in Uruguay that suck cold air off the orchard floor and shoot it 300 feet into the air.

He told me about a grower who sprays water not on the blossoms like they sometimes do for citrus, but on the ground under the trees, because as water freezes, it gives off heat. I was incredulous. "Are you sure?" I queried. He sounded confident. And he's a science teacher.

When I asked my unhappy orchardist why he didn't get a wind machine, he said, "Because a used one is $19,000." When I told this story to the science teacher, he shook his head. "When I bought mine, it paid for itself the first year." You can get rich quick with cherries, if you get any. The number that gets tossed around is $10,000 an acre.

So one of these guys is destined to go out of business, while the other prospers. And one will have consistently strong honey bee colonies pollinating his orchard, while the other wonders why Ed brought bad bees.

I do business on a handshake. Always have. But when the sullen grower didn't pay his pollination bill when my other growers did, while simultaneously complaining about my bees and insisting they stay way past full bloom, just in case any blossoms survived, I got a little concerned. The little darlings had done what they could. The bloom was over. Neighboring peach orchard blossoms lay spent on the ground. My bees needed to escape the coming onslaught of post-blossom pesticide applications. Plus new queens were due to arrive UPS any day. I wanted the little darlings home, not 70 miles away.

But first I needed the grower's consent. I felt like I was being held hostage. Remember, he owed me money. When I called him two days ago, I told him I wanted to pick up my bees that evening. He did some more complaining but finally relented. Finally I said, "It doesn't sound like you like my bees. Are you planning on paying me?"

"Oh, sure," he said. "I was going to mail you a check today. Do you want me to put it on top of one of your hives?"

"That works," I said. God bless him. He was true to his word, and his check hasn't come back yet.

Ed **Colby**

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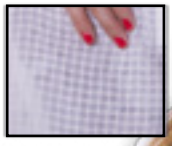

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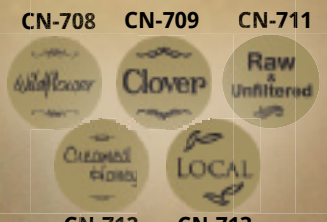

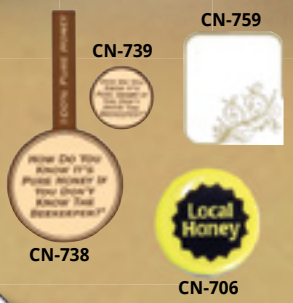

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