MAY 2010

Bee Culture

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CATCH THE BUZZ

INSIDE . . .

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When swarms first leave a colony, they most always fly only a short distance...20 – 50 yards isn't uncommon – and gather together in a location to make sure the queen is present and safe, and to wait for the scouts to finish their campaigning for the newest nest location. Again, most always, this decision is made within a short time – an hour to a day isn't uncommon – and off they go. When they are in the holding mode is when beekeepers are most commonly summoned to save the day and remove the swarm, because once they leave this location they are – mostly always – lost for good. Sometimes, however, the decision of which new nest location is best isn't made...or can't be made. As a result, the bees don't leave the first location for a new location and stay put. What you see here is the result. In the tropics these bees will probably survive, but as you move further away from the tropics, the probability of them surviving overwinter decreases. What you see is the result of analysis paralysis... Photo by Gary Shilling.

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MAY 2010 VOLUME 138 NUMBER 5

FEATURES

DEPARTMENTS & COLUMNS

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Swarm Advice

I've made my living from bees from over 30 years with about 500 colonies, primarily for honey production. I raise my own queens and produce nucs to sell.

Success in beekeeping demands timely attention, preparation for what can be expected, and anticipation of the unexpected. Weather is the biggest wildcard in beekeeping.

When pollen comes into the hive in early Spring it triggers the colony to reproduce in earnest. Brood rearing in a colony is enhanced by availability of feed – nectar and pollen – natural or beekeeper applied. As a colony grows in numbers and overall size, less confinement is needed to conserve heat and more room is required to accommodate expansion. The more sealed brood there is the more heat it generates and retains with less need for adult bees to cluster for warmth. Longer days mean more foraging, which means more brood rearing. Colonies grow exponentially, soon reaching the point when reproduction switches from an emphasis of more individuals to more colonies – thus SWARMING.

The solution for swarming (in western NY)? May and June-inspection intervals should not exceed seven days. Don't let foul weather deter inspections. Remember foul weather accelerates swarming tendencies. Keep one box ahead of colony growth (Put excluders in the closet). When inspecting colonies, tip up the second brood box and look for active queen cells in any stage on the bottom bars. If active cells are found make a split or they will swarm. Once they have indicated an inclination to swarm most other attempts are futile. A split can be as simple as moving the top brood chamber to a new stand and adding an empty box, with frames and foundation to each resulting hive.

Bee diligent. Bee vigilant. Bee Thankful. Bee Content.

Harry Whitehead
Farmersville Station, NY

Flowers & Lawns

Thank you Dr. Tew for you *Lawn* article. Since I'm in soggy Oregon I can't help on wild flowers to cover in the un-mowed area. But I located people who do. Please try Wildseed Farms, Inc., P.O. Box 3000, Fredricksburg, TX 78625, 800.848.0078. They have a fantastic catalog and pictures and testimonials.

Michael Page
Coquille, OR

National Honey Bee Day

August 21, 2010 has been designated as National Honey Bee Day. We are asking for state and county bee associations to participate, promote, and take advantage of this special occasion. The national honey bee day allows individual bee groups to benefit from a national approach by making our voices heard by the combined efforts of all participating.

National honey bee day 2009, consisted of 42 programs, across 16 states, all focused on educating the public and expanding the beekeeping industry. Some of the programs last year consisted of open houses at beeyards, educational programs at environmental centers, booths at county and state fairs, association membership drives, and honey tasting events.

This past year beekeepers all across the country voted through the national honey bee day website for a national theme. The selected theme for 2010 is "Local Honey - Good for Bees, You, and the Environment!" This year we have a goal to double the number of groups participating. Please consider contacting your local association if they are not participating in this worthwhile program.

National Honey Bee Day is administered through "Pennsylvania Apiculture, Inc." a non-profit 501 (c) filed with the state of Pennsylvania.

For additional information please visit the website **www.national-honeybeeday.org**

Mike Thomas
Lewisberry, PA

Calendar Winner

I just got my January copy of Bee Culture and was extremely surprised and pleased that you chose one of my photo's for the Calendar. Thank you.

I did want to let you know the history behind the photos I sent you.

The picture you published was taken by my son Kyle (14 years old) and it was during our first annual honey extraction using our Church youth group. I guess one of the reasons I wanted to write this was to set the record straight. The picture I sent in and was published as the October calendar photo has *my* name on it but in reality it was taken by my son ***Kyle***, who of course reminds me (rightfully so) often that I stole his thunder. I also wanted to make sure our youth group at First Baptist Church in Elizabeth City, NC are recognized as fantastic promoters of beekeeping in our community.

David Lacasse
Elizabeth City, NC

Teaching Teachers

Thanks so much for a great magazine. I look forward to the calendar every year. I have it at my work and my clients always ask about my bees. I try to educate them as much as possible.

I had a group of teachers come to my house to show them all I could on my bees. I had a table set up with all of my *Bee Culture* magazines on it. The teachers were able to take so much information back to their students. In doing this I am hoping to get the younger generation interested enough to start their own beehive. I am planning on another group coming to the house again this year.

I have only been keeping bees for five years and I know I have so much more to learn. Your magazine sure has helped me along the way. I must say the kids' page was a great addition to the magazine.

Keep up the good work.

Candy L. Boise
Norwich, NY

Boy Scouts & Bees

Dear Friends of the Honey Bee,

My name is Christopher Stowell. I am 13 years old. I am a boy scout in Troop 250. I am also a Beekeeper in Skiatook, OK. I am a member of both the North East Oklahoma Bee keepers Association (NEOBA) located in Tulsa, OK and The Oklahoma State Beekeepers Association.

I have recently learned that the Boy Scouts of America discontinued the Beekeeping merit badge in 1995. I have contacted the National council to ask why they discontinued the merit badge. They explained that there were not enough beekeepers in America who were able to teach scouts beekeeping. They also informed me that the reinstatement of the merit badge had been brought up several times since to no avail.

It seems to me that it would only make sense to encourage beekeeping if there are not enough beekeepers in our country. I believe that now more than ever before the survival of the honey bee is important to all. If other boys are not encouraged to learn how to become beekeepers, then there will be even fewer beekeepers in the future. The reinstatement of the merit badge will lend validity to the art of beekeeping.

I have started a campaign to get Boy Scouts of America to reinstated the Beekeeping Merit Badge. I have a goal set to send in my proposal to the council by July 15, 2010. At that time, I would like your endorsement of my proposal as well as your help in getting as many beekeepers and people who believe in the importance of youth learning how to keep bees as possible involved in this effort.

This is what I need from you:

1. Please go to the Häagen Dazs web site and sign the petition and write a few words to Boy Scout Council telling them why YOU believe that teaching the youth about honey bees is important. Click on THE BUZZ and you will find a picture of me there. Häagen Daz has offered to help by making an on line petition so everyone can help. Here are the site links for the Haagen Daz Petition:

http://www.helpthehoneybees. com/#buzzlove and

http://www.experien ceproject. com/beepetition

2. If you are a beekeeper, please go to **www.beesourse.com** and look under "Resources." There will be a link to resources for the Beekeeping Merit Badge Project. One of the documents listed there is a form resolution that your local beekeeping club or association could pass in support of this effort. Also, there are form letters and sample petitions that you could sign or take to your friends who keeps bees. If you have a beekeeping club, you could pass out copies of those documents to the members. Boy Scouts of America is concerned that there are not enough beekeepers to support the merit badge. We need to prove that there are plenty of beekeepers who would help.

3. Please tell all the other beekeepers or other persons you know about this project and my requests for help. For example, you could copy this letter and send it to your friends and to other beekeepers, gardeners, or business members in your community. If you have friends who you send emails to, please send all of your friends and email asking them to go to the Häagen Daz website and sign my Petition.

This is not a boy scout project. I am doing this on my own. All expense is paid for by my parents. So please help get the word out.

If you have any other ideas on how you could help please feel free to contact me. I would appreciate any thing you can do to help. I look forward to hearing from you. There is also a forum devoted to this project on Beesource.com, which you can look at by going to **Beesource.com** forums. Thank you.

Christopher Stowell
Skiatook, OK

INNER COVER

I get to hang around quite a few commercial beekeepers. I listen to them compare notes, swap lies, complain about the newest rules and regulations, trade formulas on food supplements and pest control concoctions and once in awhile lapse into Spanish when talking about the folks who make their organizations work as well as they do. Mostly they're way over my head when it comes to the financial part of their business. The really good guys understand a spread sheet up, down and sideways, and they know who has what in bulk to buy from cheap. But all of them tend to be a bit shy when real numbers get asked . . . commercial beekeeping can be a very good way to earn a living, or an easy way to go broke it seems. It all depends . . .

But pretty much all of them agree on a simple axiom of the craft: Don't waste time on the Dinks. (My definition of a Dink is a colony that isn't thriving for reasons unknown, and has not reached that critical mass a colony needs to have enough bees to take care of a growing population and lots of extras to take advantage of the honey flow going on; or in the Fall, not enough bees to keep themselves warm, especially as Winter winds down and bees begin to die of even natural causes).

Mostly, don't bother with Dinks . . . set them aside and let them die. Don't put two or three of them together or you'll just have one big Dink. Don't requeen a Dink because there's not enough bees to handle a productive new queen so you just waste that queen, and don't take their brood and give it to another colony because you don't really know why it's a Dink and it may be something you don't want to share, and don't waste money on food or medication on a Dink. Shake them out and use the equipment to make money, instead of costing you money.

The biology and the business side of this decision are pretty straight forward. The economics of spending more than about five minutes on a colony are pretty simple when looking at the cost of labor, medication, space, checking, checking again, checking again, food, food, more food . . . Usually, when playing the odds, a Dink never becomes a buster. Mostly it's a money pit. They don't make honey or measure up for a pollination contract and they don't overwinter next year . . . Dinks are almost always a waste of time, money, space and equipment. That's what the commercial guys tell me. Keeping bees profitably, whether you have five or five thousand means working the bell curve of performance, and getting rid of the left third of the curve . . . the under achievers, the losers, the Dinks. And they're right . . . but you know . . .

We made a late Summer split last year to get a small colony going for an observation hive this Spring. Three frames of honey, brood and bees, but a new, survivor queen. Fed like mad, but there wasn't any Fall flow, it got cold and rainy, and they just never took off . . . struggled all Fall into Winter . . . a Dink, for sure. Well, I thought, let's see what happens. I left it on the front porch, but I kept feeding and checking and feeding.

We had another small split across the way we'd made in the Spring, moved from the home yard then forgot about so it only got fed once before it was on its own, but it survived, barely. But by September it was still on only three frames, no brood, hardly any bees . . . but another survivor queen from a friend. Moved it back home and put it on the porch with the other one. Another Dink for sure. But as long as I was feeding one, why not feed two, and feed some more. And let's see what happens.

Plus, we have an observation hive on the porch all Summer. One made by our resident craftsman Peter Seiling. It's the one he made that stays outside but has one glass side that butts up to a window so you can see what's going on, without having a hive inside. It's pretty cool. We started it last year and it did OK, but it stayed smallish . . . not too bad really . . . by Fall it was four deep frames of bees and brood and food, but still, it wasn't a buster . . . so we put it in a five frame box to Winter it over, but it was almost a Dink.

So, three Dinks on the porch all Winter. Every commercial guy you know would say don't waste your time. Well, I can be stubborn. I kept feeding them fondant all Fall. I wrapped them up so they stayed warm. I watched and hovered and babied and tweaked all Winter long, every time I could get in to see how they were . . . and they kept eating, and eating. The smallest had every bee in the box hanging on that clump of fondant I think. But it was a long, cold Winter, and I couldn't get in as often as I'd like, and I was gone during some of the worst times. So some of the bees starved. The mass of bees in a Dink is just too small to stay in touch with what food there was, though some of their sisters were close enough and lived.

By mid-April it was good enough to open them up . . . Geeze, lots of bees on the bottom. But not all of them. Some made it. One of the survivor queens didn't, so I combined the two smallest Dinks . . . another wrong move by most counts . . . and ended up with a-still-too-small Dink. But that queen was laying, and bees were flying and they were eating like

Continued on Page 69

Dinks.
Poisons.

New For You —

Why Do Bees Buzz? Fascinating Answers to Questions about Bees. Published by Rutgers University Press. Elizabeth Capaldi and Carol A. Butler. 248 pages. Soft cover. Color and Black and white. 5½" x 8½". ISBN 978-0-8135-4721-3. $21.95.

This work is a volume in the Rutgers Press Q&A series. For this book, Capaldi is the honey bee expert, and, it seems Butler brings her experience in writing other books in this series, most notably on butterflies. The two work well together.

There are 127 questions in the 10 chapters, each covering one aspect of honey bees. The questions are intelligent, if sometimes basic (do bees have bones?), but for the general audience this book is intended for, perfect. Beekeepers will enjoy having this book, if for no other reason than as an additional source of information for all those questions we get at the fair every year.

There are a few minor errors...500,000 beekeepers in the U.S., producing 150 million pounds of honey...a 24 frame radial extractor labeled as a 4 frame extractor...but these are few and far between. Basically, the text is strong on biology, anatomy and behavior, not so much on basic beekeeping. But that's OK. We already know basic beekeeping.

Appendices include Further Reading, and the references used to answer many, but not all, of the questions.

BEE. By Rose-Lynn Fisher. Published by Princeton Architectural Press. 7-3/4" x 9-1/4", 60 black and white illustrations. Hard cover. ISBN 978-1-56898-944-0. 128 pages. $29.95.

Beekeeping For All. Simple and Productive Beekeeping. Northern Bee Books. Abbe Warre. Soft cover. 154 pages, black & white. 6½" x 9½". ISBN 978-1-904846-52-9. $19 + postage to the U.S.

Our ambitious friends at Northern Bee Books have released the first English translation of this book, originally published in French. This is from the 1948 French edition, but there were a total of 12 editions. It is produced in 'publish on demand' style, so a few of the black and white drawings appear just a tiny bit fuzzy. This does not detract from the book however. If this style of beekeeping is something you are interested in – that is, straight sided top bar beekeeping then this is the book you have been looking for.

When this book was written, beekeeping in France was declining at a rapid rate. To turn this around the author felt a better hive was needed . . . better than the skeps some were using, and less expensive than the modern Langstroth-style hives that were only just available. Eventually he devised his new People's Hive. But this came to be only after the author experimented with over 350 different styles of hives available at the time.

We published an article about this style of hive a couple of years ago. It is called the people's hive because it is inexpensive to make, and relatively easy to manage. Management is explained, as is much of basic beekeeping. Honey harvests are not the same as with frames, and there are other differences, to be sure. But the hives are easy to make and seem relatively easy to work.

There is a strong contingent of beekeepers using this hive, both in the U.S. and other countries so there is a lot of support and information available. These are all listed in the appendix of the book. Available at **www.GroovyCart.co.uk/beebooks** for $19 postpaid to the U.S.

BEE ...

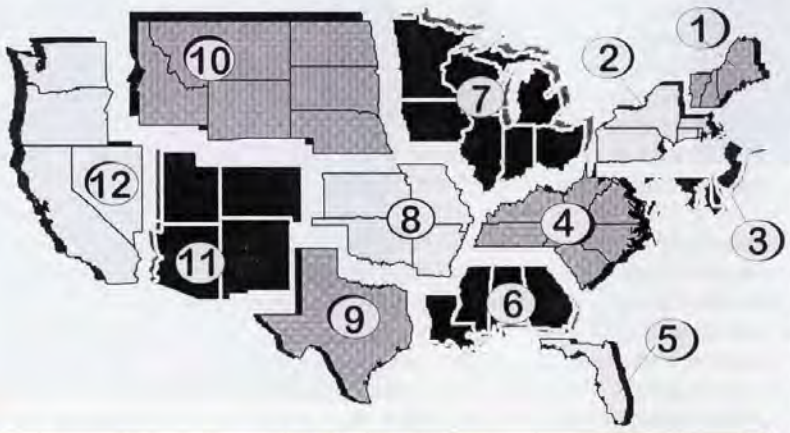
The author of this book is not a biologist, but rather an artist, working in photography and mixed-media. This gives a somewhat different slant to what we see in her photos. It becomes a matter of form and function...after all, this is from a publisher of architecture books, not anatomy books. I found this to be a fresh approach...certainly something different in a sea of books about honey bees.

If you have a bent for scanning electron microscope photos, which these are, then this book, when coupled with the SEM book by Erickson and Garmet about 30 years ago (Iowa Press, but now out of print), and the Form & Function book by Goodman (published by IBRA) about five years ago make a great trio. This newest edition complements the other two in that it is less scientific, though it is accurate, and more visual and pleasing, while the others are hard core science. It makes a nice balance. And this is a great book.

See Page 74 for more new products!

The Ultra-breeze, ventilated beesuit jacket is available from Honey Moon Apiaries. Made of three layers of mesh cloth – top is a layer of netting, between is a spacer mesh and the inside is another layer of netting - with mesh size and thickness such that you can still see though the three layers, this well ventilated suit is ideal for those hot, hot Summer days when you need good protection from ill mannered bees. Even the pockets are made of ventilated mesh for a cool, cool suit. Sleeves are a combination of elastic and Velcro closing to fit every wrist. All material, closures and brass zippers are made in the U.S., and the roomy sizes...small, medium, large, extra large, 2x, 3x, and 4x will make for a good fit for any body. Jacket prices range from $120 for small, to $140 for 4x. The hood is included and is made of the same three layers of material. For more photos, information and ordering, see the web page at http://www.honeymoonapiaries.com/suit/suit.htm, or call 918.720.7908 (don't leave a message, call back) or email at infohma@honeymonnapiaries.com.

MAY – REGIONAL HONEY PRICE REPORT



Colony Losses Winter/Spring 2009/10

We surveyed our reporters this month about winter losses now that most everybody has had a chance to take a look. The answers generated the tables below, and we included the answers to the same questions from last year for comparison. Interestingly, when looking at how all our reporters measured their losses, 31% felt they were low, 40% moderate and 29% high. Not quite and even split, but nearly so. Our commercial reporters' numbers are sobering . . . every one lost 500 or more colonies this year and of those, 60% reported that the bees simply disappeared. We don't have a representative sampling of commercial operations in our survey, so this doesn't reflect what the country as a whole is seeing, but it sure is a tough year for some. Starvation seems to be the most prevalent problem this year, except among the commercial sized operations. Last season wasn't a good one, and it shows.

Colony Losses

Size of Operation	% Reporters		# Colonies Lost: >10		10-100		100-500		500+	
	09	10	09	10	09	10	09	10	09	10
Commercial	9%	3%	–	–	–	–	66%	–	35%	100%
Sideline	36%	33%	21%	–	63%	80%	16%	15%	–	–
Backyard	55%	64%	75%	55%	25%	29%	–	–	–	–

% Of Colonies Lost Due To

	Pesticides		Nosema		Disappeared		Starved		*Varroa*		Disease		Pests		Don't Know		Queens	
	09	10	09	10	09	10	09	10	09	10	09	10	09	10	09	10	09	10
Commercial	–	–	67	–	33	60	100	45	67	50	–	–	–	–	67	–	–	–
Sideline	–	–	26	25	43	26	73	79	39	33	4	22	17	2	26	26	9	4
Backyard	9	8	11	14	26	45	74	75	29	44	6	18	–	3	20	21	11	9

REPORTING REGIONS

	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	SUMMARY Avg.	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.58	1.65	1.58	1.50	1.55	1.65	1.49	1.60	1.58	1.60	1.44	1.56	1.44-1.65	1.56	1.61	1.53
55 Gal. Drum, Ambr	1.51	1.55	1.51	1.50	1.45	1.45	1.55	1.50	1.40	1.51	1.34	1.55	1.34-1.55	1.48	1.47	1.38
60# Light (retail)	130.00	124.50	130.00	130.83	120.00	140.00	123.50	136.67	130.14	135.00	136.67	150.00	120.00-150.00	132.28	134.89	125.70
60# Amber (retail)	130.00	115.00	130.00	127.00	120.00	117.60	117.00	140.00	100.00	118.75	137.00	153.15	100.00-153.15	125.46	127.77	119.78
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	55.20	73.98	55.60	53.00	75.14	87.25	55.59	75.14	45.36	51.27	81.52		45.36-87.25	65.35	57.18	58.17
1# 24/case	77.56	72.37	72.00	70.70	97.00	75.26	75.47	80.80	93.10	97.00	81.36	102.20	70.70-102.20	82.90	77.80	75.32
2# 12/case	73.80	64.08	66.60	63.33	94.50	73.68	66.14	78.00	62.00	75.00	63.10	81.00	62.00-94.50	71.77	68.71	67.23
12.oz. Plas. 24/cs	68.16	80.98	60.40	62.04	60.00	67.00	58.01	68.40	77.79	56.40	66.03	71.05	56.40-80.98	66.35	63.69	60.65
5# 6/case	87.81	75.98	78.00	70.63	65.08	78.00	76.23	80.40	65.08	70.20	65.60	89.67	65.08-89.67	75.22	79.53	76.72
Quarts 12/case	122.30	139.00	122.30	92.92	96.00	89.02	95.14	96.00	120.00	107.94	94.23	117.00	89.02-139.00	106.82	95.73	95.22
Pints 12/case	65.19	76.48	65.19	59.60	58.00	50.33	57.40	61.40	84.00	59.20	55.00	67.50	50.33-84.00	63.27	67.87	56.63
RETAIL SHELF PRICES																
1/2#	3.00	3.31	2.63	3.16	3.97	3.16	2.99	1.79	2.97	2.49	2.82	4.01	1.79-4.01	3.03	2.98	3.25
12 oz. Plastic	3.50	4.26	3.23	3.68	4.00	4.08	3.48	3.79	3.79	3.27	3.53	4.38	3.23-4.38	3.75	3.63	3.73
1# Glass/Plastic	4.25	4.89	4.47	4.42	5.43	4.63	4.42	4.89	3.39	4.58	4.93	6.07	3.39-6.07	4.70	4.70	4.63
2# Glass/Plastic	8.75	7.50	8.61	7.44	10.75	7.89	7.24	8.65	6.15	7.95	8.18	9.41	6.15-10.75	8.21	7.94	7.63
Pint	8.69	8.25	8.69	6.17	6.00	6.00	6.89	6.81	9.25	7.14	6.30	9.75	6.00-9.25	7.49	6.70	7.01
Quart	14.69	11.48	14.69	10.56	12.00	10.09	10.77	11.58	18.00	13.55	10.21	15.55	10.09-18.00	12.76	11.25	11.39
5# Glass/Plastic	17.00	12.74	20.95	14.10	18.66	14.07	14.40	19.50	18.66	15.29	16.82	23.00	12.74-23.00	17.10	17.76	16.44
1# Cream	5.71	6.11	5.50	5.74	5.71	5.25	5.61	6.19	5.71	5.85	5.54	6.25	5.25-6.25	5.76	5.77	5.45
1# Cut Comb	6.50	5.46	6.50	5.34	6.72	5.70	6.84	6.00	6.72	8.00	7.08	8.50	5.34-8.50	6.61	6.21	6.85
Ross Round	6.97	4.65	6.50	5.00	6.97	6.50	6.64	6.50	6.97	6.97	6.56	6.62	4.65-6.97	6.41	6.37	6.88
Wholesale Wax (Lt)	2.25	3.67	2.50	2.38	2.15	4.06	3.60	3.67	2.00	4.18	3.54	4.67	2.00-4.67	3.22	3.24	3.65
Wholesale Wax (Dk)	2.25	2.98	2.50	2.26	2.00	3.77	3.41	4.00	1.72	3.95	2.86	4.50	1.72-4.50	3.02	3.63	3.00
Pollination Fee/Col.	90.00	93.33	58.25	45.60	150.00	69.67	52.14	60.00	84.76	84.76	67.50	96.25	45.60-150.00	80.30	80.46	77.00

a closer look

PROPOLIS

Clarence Collison
Audrey Sheridan

Propolis is composed of three main ingredients: plant resin, bee salivary enzymes and beeswax; it may or may not also contain pollen.

Of all the hive products that have been shown to have health benefits for human consumers (beeswax, pollen, royal jelly, etc.), propolis is perhaps the most versatile in terms of human medicinal uses. The sticky, resinous substance that absolutely will *not* wash out of clothing is, in fact, a major contributor to colony hygiene. Its antimicrobial properties have long been known, and propolis has been used since ancient times to treat a laundry list of human diseases. In addition to its antibacterial properties, propolis extracts (in ethanol) have demonstrated antifungal, antiviral, anti-inflammatory, antioxidant, immunostimulating, anesthetic and cytostatic (prevents cell growth, esp. cancer) activities in laboratory assays (Marcucci 1995, Silici and Kutluca 2005).

The word 'propolis' is derived from the Greek 'pro' (for 'in front of' or 'at the entrance to') and 'polis' ('community' or 'city') and describes a substance used in defense of the hive (Castaldo and Capasso 2002). Propolis is composed of three main ingredients: plant resin, bee salivary enzymes and beeswax; it may or may not also contain pollen. A more detailed breakdown of the constituents gives us approximately 55% balsams and resins, 30% waxes, 10% etheric oils and 5% pollen (Lotfy 2006). Propolis also contains minerals such as magnesium, calcium, iodine, potassium, sodium, copper, zinc, manganese and iron, as well as vitamins B1, B2, B6, C and E (Lotfy 2006). Foraging bees collect the plant resins from plant buds and cracks in the bark of trees and work it thoroughly with their mandibles while mixing in salivary enzymes. The masticated and chemically altered resin is then further amended with varying amounts of beeswax and pollen, according to the purpose intended for it. The primary floral sources of propolis in North America are exudates from the buds of *Populus* spp. (poplar trees); in tropical regions, where poplars do not grow, the floral sources are much more diverse (Bankova et al. 2000).

The majority of compounds isolated from propolis are flavonoid pigments, which are photosynthesizing cells ubiquitous in the plant kingdom (Burdock 1998, Grange and Davey 1990), aromatic acids, and the esters of these acids (Bankova et al. 2000). Flavonoids are well known for their antibacterial, antifungal and antiviral action, and it is these compounds which are thought to be responsible for the biological activity of propolis (Kujumgiev et al. 1999). Grange and Davey (1990) performed a series of investigations of the inhibitory activity of propolis on several different types of pathogenic bacteria. Propolis extracts were made in 70% ethanol and mixed into agar (growth medium). Of the 10 bacterial species assayed, the preparation of propolis inhibited growth of *Staphylococcus aureus*, *S. epidermidis*, *Enterococcus* spp., *Corenybacterium* spp., *Branhamella catarrhalis* and *Bacillus cereus*. It also partially inhibited growth of *Pseudomonas aeruginosa* and *Escherichia*

"The majority of compounds isolated from propolis are flavonoid pigments, which are photosynthesizing cells ubiquitous in the plant kingdom, aromatic acids, and the esters of these acids."

coli, but had no effect on *Klebsiella pneumoniae*. Other similar studies have reported comparable results with the conclusion that propolis has limited activity against Gram-negative cocci, but a wide range of Gram-negative rods are susceptible.

Propolis composition varies between geographical regions, and consequently the biological activities also differ to some extent. Popova et al. (2004) found a statistically significant correlation between samples of propolis from three geographic regions: Europe, Brazil and Central America. Samples from Europe and Brazil had similar antibacterial activity, despite their differences in chemical composition; both had significantly higher antibacterial activity than the samples from Central America. Brazilian propolis has received a lot of attention from the scientific community because of the wealth of novel bioactive compounds extracted from the "bee glue" collected from this region. Some of these compounds have biomedical potential: moronic acid showed significant anti-HIV activity and artepillin C inhibited the growth of malignant tumor cells. Brazilian propolis treatments given to mice challenged with *Paracoccidioides brasiliensis* (a dangerous and endemic fungal pathogen of humans in Latin America) showed an increase in macrophage activity against the pathogen (Lotfy 2006).

Propolis collecting also varies between races of honey bees. Silici and Kutluca (2005) compared the propolis collection behavior of *Apis mellifera carnica, Apis mellifera caucasica,* and *Apis mellifera anatolica*, all of which have distinctive predilections and uses for propolis. The most important characteristic of the Carniolan bee is the minimum use of propolis, while the Caucasian goes to extremes in building brace-comb and in the use of propolis. To the beekeeper, the frugal habits of the Carniolan make it more attractive than the propolis-hoarding Caucasian race from a management perspective. The Anatolian bee also builds brace-comb and uses an inordinate amount of propolis, but is very productive under migratory beekeeping conditions (Yeninar et al. 2009). Propolis was collected from each race of bees using a plastic propolis trap, then desiccated and extracted in 70% ethanol. All three races of bees shared several compounds in their propolis samples, and all bees gathered resins from *Populus* and *Salix* (willow) trees; none of the races used a single source of propolis. Samples were screened for differences in bactericidal and fungicidal properties on three bacteria and one yeast species. Results showed the propolis activity to be: *A. mellifera caucasia* > *A. mellifera anatolica* > *A. mellifera carnica*.

"It is difficult to predict any adverse effects of using propolis treatments topically or orally on humans, since the composition of propolis varies greatly from region to region."

In terms of human medicine, propolis appears to have bioactivity against several different causative agents of human disease. Ethanol and dimethyl-sulphoxide extracts of propolis were active against *Trypanosoma cruzi* (Chagas' disease) and lethal to *Trichomonas vaginalis* (Trichomoniasis). The bacterium responsible for chronic gastritis, *Helicobacter pylori*, was greatly inhibited by extracts of Bulgarian propolis (Lotfy 2006). It has been claimed that various propolis fractions affect the replication of viruses such as vaccinia virus and the virus responsible for Newcastle disease (Viuda-Martos et al. 2008). Isopentyl ferulate isolated from propolis has also been shown to inhibit the infectious activity of Hong Kong virus A. Two of the flavonoids present in propolis – chrysin and campherol – have been shown to be very active in the inhibition of replications of several herpes viruses, adenovirus and rotavirus. The flavonoids quercitin and rutin, found in both honey and propolis, show antiviral activity against HSV, syncytial virus, poliovirus and Sindbis virus. Some scientists have even suspected a synergism between phenolic compounds in honey and flavonoids in propolis, which explains why honey and propolis together have greater antiviral activity than either individual component (Viuda-Martos et al. 2008).

The anti-oxidative properties found with propolis makes it a promising candidate for use as a prophylactic drug. The propolis constituent, caffeic acid phenethyl ester (CAPE), has demonstrated potential as a scavenger of free radicals, as well as an anti-inflammatory in both chronic and acute models of mammalian inflammatory diseases (Castaldo and Capasso 2002). A study investigating the immunostimulating activity of propolis on humans

used oral preparations of propolis as a prophylactic treatment. The subjects ingested propolis for 13 days, and were tested for changes in cytokine levels, which reflect an immune response. The prophylactic application of propolis led to a time-dependent enhanced immune reactivity without undesired side effects (Bräter et al. 1999).

It is difficult to predict any adverse effects of using propolis treatments topically or orally on humans, since the composition of propolis varies greatly from region to region.

For the most part, propolis is considered safe in low doses: however, adverse effects are common at doses over 15g/day. The adverse effects most commonly experienced are allergic reactions, as well as skin or mucous membrane irritations (Castaldo and Capasso 2002). The benefits of using propolis seem to outweigh the risks, as it is widely sold as homeopathic or "natural" medicine. Aqueous solutions (0.5-1%) have been administered to humans in aerosol form to successfully treat acute and chronic respiratory disease, and as eye drops. A 10% solution of propolis in alcohol has been used as a substitute for disinfectant in dental surgical practice (Grange and Davey 1990). Europeans tend to use propolis-containing products more than Americans, but propolis is available in American health food stores in capsule form (as a dietary supplement, usually 15 mg per capsule), and is mass-marketed in toothpaste and dental floss (Burdock 1998). One of the biggest obstacles to marketing propolis for human medical use is the inconsistency in the bioactive constituents of generic propolis. The standardization of propolis into geographic "types" would help eliminate some of this inconsistency and provide a way to chemically classify propolis by the function of its most prevalent active ingredient (Bankova 2005). BC

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RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

"The fungus isolates originating from Varroa mites in brood cells may be well-adapted to the hive environment and . . . have good potential for Varroa control."

One of the lessons that history holds for the beekeeping community is that chemical pesticides used to control *Varroa* mites have a limited lifespan. Over and over again and in a succession of countries this persistent mite has developed resistance to mite control pesticides. The resistance can reach the point where previously effective pesticides no longer protect colonies against mites. As a result, many beekeepers and researchers consider that the answer to *Varroa*, in a sustainable beekeeping industry, will not come from reliance on continued development of new synthetic miticides to place inside beehives. While the set of answers that will eventually allow our bees to coexist with *Varroa* may not be readily apparent, candidates include breeding for improved mite resistance in bees, adapting cultural methods of mite control into beekeeping management, designing traps or other disruptive mechanisms to limit mite population growth, developing improved "soft" chemicals for mite control and implementing biological control. Recently, a group of Danish scientists reported on their discovery that a fungal pathogen of *Varroa* mites occurred in the worker brood cells of honey bees. (Steenberg et al, 2010)

The fungus, *Beauveria bassiana*, belongs to a group of fungi that are entomopathogenic (harmful to insects). This particular species had been reported previously to be capable of infecting *Varroa* mites and also had been reported to occur on mites inside beehives. However, based on previous research, it was unclear whether the fungus could or did exist within honey bee brood cells. In the study by Steenberg's group, the researchers collected mites from honey bee brood cells in 46 different hives located in 24 apiaries across Denmark. The number of mites from each colony ranged from one to 183. Each of the collected mites were "surface-sterilized" by placing them in a dilute bleach solution for two minutes followed by two rinses in sterile water. The mites were then placed on moist filter paper in Petri dishes and allowed to incubate for 10 days. During this time, any mite cadavers that showed the presence of *B. bassiana* were further sampled and the fungus isolate from the cadaver was grown on agar plates for cultivation.

The researchers found a total of 16 infected mites in their combined set of samples for a *B. bassiana* incidence of 0.9%. Overall, the prevalence of all detected fungal types ranged from 4.4% to 33% in the mites sampled. Although mite samples were collected from the apiaries from June through November, fungus was detected only in the mites collected in Autumn. The authors also investigated the incidence of *B. bassiana* infection in mites that fell through a screened bottom board in four different hives. In this case, the "prevalence" of *B. bassiana* increased from the 0.9% found in brood mites, up to 41% in mites collected under the screen in one of the four hives. The other three hives had *B. bassiana* in levels ranging from 10% to 17%. The authors noted that the fact that they found the fungal pathogen in brood cells from all four colonies indicated that the pathogen may be spread by bee drift and "therefore might become common on a local scale." Unknown aspects of the biology of the pathogen remain, including whether it can overwinter in beehives. The authors noted that the warm temperature of the brood nest was apparently not detrimental to the pathogen. Steenberg et al. concluded that the fungus isolates they propagated from mites collected from honey bee brood cells "may be well-adapted to the hive environment and may have good potential for Varroa control." The commercial application of *Beauveria* to control *Varroa* mites is not a very likely scenario in the near term. However, in this paper, Steenberg and colleagues make a significant contribution to the body of work on *Varroa* biology and potential biological control.

Honey bee foragers as biocontrol agents

One of the hallmarks of improved understanding of biological diversity and agricultural systems is that certain aspects of natural systems can be employed to good advantage to reduce pest populations and increase yields. Thus, a number of invasive weed species in the western U.S. have become increasingly "under control" through the establishment or enhancement of populations of the insect species that consume them. This approach is known as biological control (biocontrol) and (in the example above) led to a significant reduction in the amount of chemi-

cal herbicides that are now used for some weed species. Recently, Finnish scientists reported the successful use of honey bees as biocontrol agents to control a problem fungus known as "grey mold" (*Botrytis*) on raspberries and strawberries (Hokkanen and Menzler-Hokkanen, 2010).

The researchers conducted their experiments on three organic and seven conventional farms in Finland. The researchers placed two colonies at each of the berry fields with special inoculum dispensers. The inoculum was a commercial formulation of another fungus (*Gliocladium*) that inhibits the growth of the undesirable grey mold fungus. The principal involved was that the foraging bees would pick up the inoculum during their exit from the hives and then transfer it to the flowers during pollination. The dispensers were used during the three weeks of the pollinating season, with inoculum dispenser refilled daily. The experimental design included untreated controls, chemical treatment (fungicide), bee-vectored biocontrol, and fungicide + bee-vectored biocontrol together. The researchers reported that all methods of treatment were successful compared to the untreated control. Bee-vectored biocontrol reduced disease incidence by 50%, chemical control alone reduced the disease incidence by 65% and bee-vectored biocontrol + chemical control reduced the disease incidence by 80%. Despite the differences in disease incidence, the authors noted that marketable yield was equivalent for all of the treatment methods. Further, bee-vectored biocontrol increased the storage "durability" of the berries compared to chemical control. Finally, and quite importantly, the authors reported that bee-vectored biocontrol provided savings to the farmers in time, equipment, labor, environmental impacts and money, with the biocontrol costing from 1/3 to 1/2 the cost of chemical control.

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Managed Pollinator CAP
Coordinated Agricultural Project

Nosema ceranae

Tom Webster

Quite a bit has been written on *Nosema ceranae* in recent years. This pathogen was discovered in European-stock honey bees only a few years ago. Now we know it to be a worldwide disease. Much of our understanding of *N. ceranae* is based on a century of research on a related disease, *Nosema apis*. *N. apis* is the "nosema disease" discussed in many honey bee books. It often weakened colonies without killing them. But this newly discovered *N. ceranae* is more serious, and the biology is different in significant ways. Collectively, they are called "Nosema" in this article.

This article will cover some of the fundamental issues and focus on what I feel are the most important findings. We can organize our understanding and long range plans into the areas of biology, diagnosis and control. Biology comes first, because it is essential to good diagnosis and effective control. Careful diagnosis is essential to beekeeping, and a little tricky because the symptoms of Nosema can be ambiguous. Treatments beyond fumagillin, sold by the trade name Fumagilin, have been hard to come by. This microbe is well protected either by the spore wall, or by the honey bee tissue it invades.

Biology

Much of our understanding of both Nosema species is illuminated by a vast amount of work on the larger group called the Microsporidia. This is a group of parasitic fungi, and it includes over 200 different species of Nosema. These pathogens have much in common, and some even infect humans. Later this year, Dr. Lee Solter will contribute an article describing the big picture of these pathogens and their hosts, and how they inform us of honey bee pathology.

Like other Microsporidia, the Nosema organism exists as a spore form and a vegetative form. The spore is a single cell with a tough coat around it. Like spores of American foulbrood or chalkbrood, it can survive for years on beekeeping equipment. We must direct our control efforts at both forms. But the strategy for spore destruction is very different from the efforts to kill the vegetative form. An infected bee usually has both spores and vegetative forms.

The infection begins when a bee, usually a worker, consumes spores. This can happen when a house-cleaning bee removes feces from comb, and ingests some spores from the feces. The spores then travel through the esophagus, the crop, and then into the midgut. The midgut is where the bee produces enzymes to digest pollen and honey, and absorbs the nutrients in those foods. Some sort of stimulus then causes the spores to germinate. This means the spores each shoot out a very long, thin tube called the polar filament. See Figure 1. This filament is so long and moves so quickly, that it often reaches one of the cells that line the inside of the bee's midgut.

After the filament penetrates the bee's midgut cell, the remaining contents of the spore migrate through the filament. This is the infective machinery of the Nosema organism, the "sporoplasm." When the sporoplasm enters the bee's cell, trouble begins. The Nosema hijacks the bee's cell processes, and begins to grow and multiply. This is the vegetative form of the disease. Soon the bee's cell is entirely dominated by the developing Nosema, and new spores form. Some spores invade adjacent bee midgut cells. Others are shed when the midgut cell breaks open. These new spores may germinate in the midgut and infect more cells. Or they may pass on to the rectum of the bee, and come out in feces.

Several new twists on the story have come to light with recent research. *N. ceranae* DNA has been found in the hypopharyngeal glands of infected worker bees, and in stored pollen in infected hives. The hypopharyngeal glands secrete much of the food for bee larvae and the queen. Perhaps this is another mode of disease transmission.

Diagnosis

It is quite common for beekeepers to treat their bees for Nosema without knowing whether they have the disease. This can be an unnecessary expense, and possibly harmful to the bees. However, diagnosis is not always easy. The following are methods for diagnosis, each with its advantages and problems.

Spotting on the front of the hive. Bees with problems in their digestive system will often defecate on the front of the hive, as they exit and crawl up from the entrance. See Figure 2. This "spotting" can be caused by Nosema infection, and apparently by other disorders. So this symptom suggests Nosema but is not a sure indicator of disease. On occasion I have collected this fecal material from the front of a hive and found no spores when I examined it by microscope.

The "field test." One popular test is to pull the midgut from a bee and examine it for discoloration. Often, a healthy midgut will appear ➢

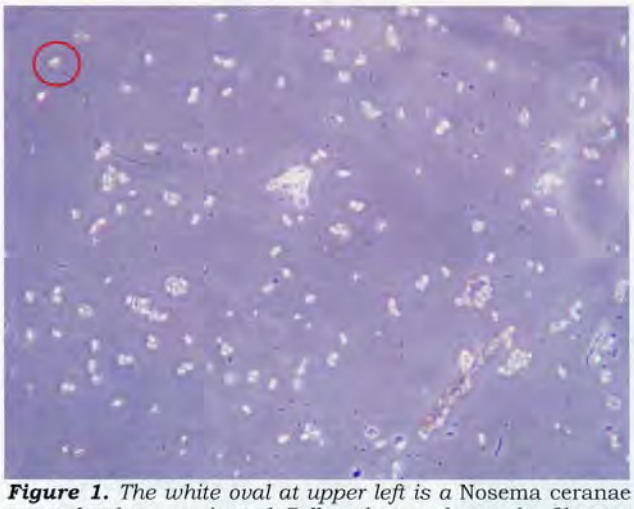

Figure 1. *The white oval at upper left is a* Nosema ceranae *spore that has germinated. Follow the very long polar filament down to the lower right. It was too long to catch in one photo.*

Figure 2. *A hive with fecal "spotting" above the entrance suggests Nosema, either* N. apis *or* N. ceranae.

reddish brown, while a bee with Nosema will have a white or cream-colored midgut that is swollen. A beekeeper can examine a bee in the field, by pulling the gut out with tweezers (Figure 3). A magnifying glass is helpful.

But this field test is also unreliable. See the midguts in Figure 4. The midguts numbered one to 10 were taken from healthy bees I collected at the hive entrance on a nice day. Those numbered 11 – 20 were heavily infected, after consuming spores in laboratory cages. The two sets of midguts look about the same. So appearance cannot be a good indicator. I suspect that a white or creamy, smooth midgut can be caused by other microbes, perhaps as secondary infections that may or may not occur with Nosema. Also, pollen in the midgut adds to the color and varies widely according to the floral source of the pollen.

Examination of gut contents with a microscope. For a rapid and accurate diagnosis, a good microscope is the tool of choice. A sample is prepared by squashing the guts of bees in water, and placing a drop of the liquid onto a microscope slide. A magnification of 400 power is best. The spores are seen as ovals, about three microns by five microns. *N. apis* spores tend to look like "racetrack" ovals : flat on the sides and round at the ends. *N. ceranae* spores are more almond shaped, and slightly smaller. However, there is wide variance in shape among the spores, so we cannot rely entirely on what we see. Spore shape suggests the species of Nosema, but is not conclusive evidence. The vegetative form of the disease is there too, but difficult to see with a standard microscope.

A hemacytometer is a special type of microscope slide that allows one to count the number of spores in a small volume of water, and estimate the total number of spores per bee. A heavily infested bee may have over 20 million spores of either type of Nosema.

The antibody test. This test was described by Dr. Kate Aronstein in the January 2010 issue of this journal. It has very important promise because it will be rapid, simple, and will not require the expense of a microscope.

Genetic methods. Tests for DNA specific to a species of Nosema is the gold standard. A lab method called polymerase chain reaction allows the identification of minute amounts of DNA from either *N. apis* or *N. ceranae.* However, this test is laborious and requires expensive equipment and considerable expertise.

Other possibilities. I have seen

Figure 3. *The field test is an examination of a bee gut pulled from a bee. The midgut is just out of each bee, and the rectum is farthest to the left. Note that the midgut of the upper bee is slightly lighter in color. The crop, or honey stomach, and esophagus are inside of the bees.*

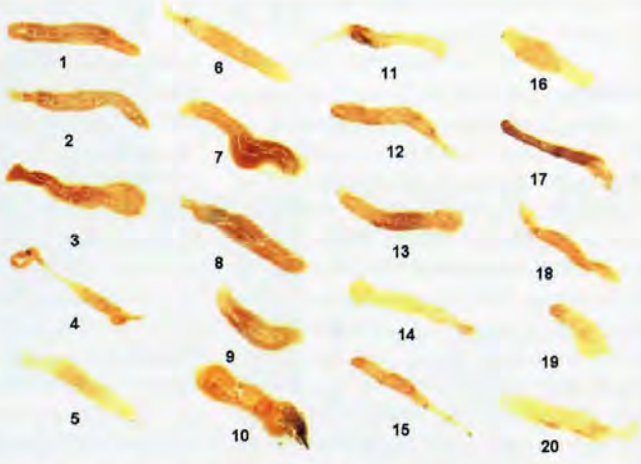

Figure 4. *Does the field test always work? Ten of these 20 midguts are heavily infected with Nosema, and 10 are from healthy bees. See the text for an explanation.*

extensive fecal debris on the inside of a *N. ceranae*-infected hive. Feces were on the top bars and underside of the inner cover. My observations were in July, when the bees could fly nearly every day. This hive appeared healthy in other ways. This raises the possibility that spore transmission via fecal debris can happen in good weather, not just when the bees are confined indoors during a long Winter.

Controlling Nosema disease
Control of vegetative forms inside the bees.

Fumagillin. This chemical has been used for many years to control Nosema in honey bees and related pathogens in other animals and in humans. It is often still effective against both *Nosema apis* and *Nosema ceranae*. However, we must consider alternatives. We cannot rely on a single type of treatment. Experienced beekeepers have seen the development of *Varroa* mites highly resistant to chemical controls and American foulbrood bacteria resistant to antibiotics. The same problem will certainly arise with extensive use of fumagillin.

Fumagillin is produced naturally by another type of fungus called Aspergillus. Like many microbes, Aspergillus has developed its own arsenal of chemicals that help it survive.

Fumagillin treatment is prepared in sugar syrup, and fed to bees. Inside the midgut, it penetrates Nosema-infected cells. There it interferes with the Nosema genetic machinery, or with certain proteins. It does not affect the spores. After fumagillin treatment, the midgut will still contain viable spores unless the infection is in its earliest stage, before spores have formed.

Beekeepers should be aware that Nosema spores will persist inside the bees long after the fumagillin treatment. Even if all of the vegetative forms are killed by fumagillin, spores will persist, possibly for weeks. Some beekeepers who collected bees from their hives a day or two after treatment have been alarmed to see that the spore counts did not go down. From this, they incorrectly assumed that the treatments were ineffective. Beekeepers should wait for at least several weeks after the bees consume the fumagillin before sampling again for Nosema.

Figure 5. *The spores that glow red under UV light are not viable. The spore membranes have been ruptured by a sterilizing agent, and a red fluorescent stain has penetrated these spores.*

Beekeepers should also be aware that fumagillin will degrade quickly in light, especially sunlight. It should not be fed to bees in clear, glass jars that are exposed to sunlight. Also, it is heat sensitive. Fumagillin should be added to syrup after it has cooled.

Many other products have activity against the vegetative form of Nosema. Unfortunately, most are either less effective than fumagillin or more expensive. The difficulty is that a product must enter the honey bee midgut cells to kill the Nosema. And it must not seriously affect the very sophisticated and complex honey bee colony behavior and physiology.

However, I am somewhat optimistic that effective and relatively inexpensive treatments will be discovered. We can consider that plants and animals have been battling fungal diseases long before our bees had this problem, so they have had time to develop their own natural defenses. One such product is now under study here at KSU.

Control of spores outside of the bees, by comb and equipment decontamination.

Now that *N. ceranae* is known to be widespread in the U.S. and other countries, many beekeepers must consider methods for decontamination of equipment. If a colony dies or is weakened by the disease, we must assume that much of it is contaminated with spores. Healthy bees on this equipment will quickly consume spores by their comb-cleaning behavior, causing the disease cycle to resume. Destruction of the equipment would be effective, but expensive.

Several agents do kill spores. One is ultraviolet (UV) light. In Figure 5 we see spores killed by UV light. The killed spores are bright red with a fluorescent stain, which enters spores with damaged membranes.

Years ago, in a more civilized time, people dried their laundry outdoors on something called a clothes line. This often sterilized the clothing as it dried, because sunlight is a potent source of UV light. UV light kills Nosema spores quite effectively and it leaves no chemical residue. The main problem is that beekeeping equipment must be manipulated quite a bit to allow light, from the sun or a UV lamp, to get exposure into all the cells and wooden parts. This may be an option for some small scale beekeepers.

A variety of liquids, including dilute bleach and alcohols, also kill spores. However, these methods also require considerable equipment manipulation. The equipment must be dried and free of fumes before it could be used by the bees. BC

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CANADIAN BEE RESEARCH

Tom O'Brien

The busy Dr. Ernesto Guzman, DVM, UNAM (Mexico), MSc, PhD, California (Davis) was found in his tidy office at the University of Guelph, Guelph, Ontario, Canada. Dr. Guzman had just completed a lecture to over 150 students of Introductory Beekeeping. His easy to understand dialog and mellow voice makes him an interviewers delight.

"Apiculture is popular with students in various streams and disciplines at the Guelph University," he said.

"Some have relatives who keep bees and find the subject interesting, if not fascinating ... the University of Guelph is unique in having all these many full time students studying Apiculture."

He has worked at several institutions including Purdue University. He studied for and received an MSc and PhD from the University of California (Davis) after graduating from UNAM Mexico with a DVM (Doctor of Veterinary Medicine) degree. His many Apiculture research projects have been funded by numerous agencies in Canada, Mexico, and the United States and along the way has received several honors and awards. He is presently researching honey bee breeding, genetics and behavior, and honey bee pathology at the University of Guelph.

Asked about artificial insemination in bees, Dr. Guzman said, "AI is not popular with beekeepers because it is very difficult to accomplish and frozen sperm is not available. The queen bee will run out of viable sperm sooner than naturally mated queens using the AI techniques." He added, "Suzanne Cobey of the U of California, (Davis), is one of the best in the business as she was the developer of the New World Carniolan Bee using the AI process."

At the moment he is engaged in an organic treatment of *Varroa* mites. "It is a two pronged study using organic compounds in a biocontrol method."

More than 20 compounds were tested. Thymol was selected for further study to discover its toxicity to mites and whether it is harmless to bees. Thymol in dust form was mixed with confectionary sugar and placed above the brood chambers. Ninety-five percent of all *Varroa* mites were killed and the numbers of bees were not significantly reduced. Such was studied at U of Guelph in 2007, 2008, and 2009 as well as Alberta in 2009.

He leaned forward with a small ripple of enthusiasm in his voice. "I feel very excited," he said, "and at the same time very cautious ... because it is being proven that organic compounds are varying in efficacy from season to season, beeyard to beeyard and year to year... much depends on climate, colony strength, method of application, and strain of bees."

After catching his breath, he added, "We need to repeat the work for at least another year to feel confident that the results are continuous over time and that we can recommend Thymol formulations that we are developing."

He was asked if there was anything new about Nosema research that may have piqued his interest. Without hesitation, he answered. "We are developing new lab techniques to identify and quantify Nosema infections caused by *Nosema apis* and *Nosema ceranae* ... these two are fungi that reproduce in the mid guts of bees, thrive, and thereby shorten the life span of bees making them unproductive. It is very difficult to identify the exact species of *N apis* from *N ceranae* under a microscope in a laboratory ... each fungus spore needs a specific remedy ... we must learn more about *N ceranae* ... much is already known about *N apis*." Dr. Guzman said that Fumagalline works well against *N apis* but more research is needed to find out if it successful in the fight against *N ceranae*.

As for the present Nosema study, he said, "We are studying the hygienic behavior of bees, especially the mode of inheritance of hygienic behavior ... and we found that this behavior is mainly expressed through maternal inheritance ... queens raised from a hygienic colony would produce hygienic workers that are more hygienic relative to those in other colonies."

Dr Guzman produced an article published November 4, 2009 in the Journal of Heredity from which the following is taken:

Maternal Effects on the Hygienic Behavior of Russian X Ontario Hybrid Honey bees

Only a few studies have been conducted on the genetic basis of hygienic behavior of honey bees and it is well known that such behavior is influenced by the genes carried by the bees. It was established previously that resistance to American Foulbrood was and is due to a bees genetics.

With that in mind, Dr. Ernesto

Dr. Ernesto Guzman

Dr. Medhat Nasr

Guzman and Peter Unger researched Hygienic Behavior in Russian and Ontario bees with subsequent hybrids. They used the laboratories and hives at the University of Guelph, Guelph Ontario.

Strains and hybrids of Russian and Ontario honey bees were evaluated for hygienic behavior at both colony and individual levels. It is a well known fact that Russian honey bees are a very hygienic race of bees that score exceptionally high on the ability to detect and remove diseased larvae from brood cells.

The objectives of the exercise were to determine the phenotypic and genotypic variability and to study the inheritance of this behavior.

At the colony level, Russian bees uncapped and removed significantly more freeze-killed brood than Ontario bees. (Such is not surprising as breeders of Russian bees have often observed this same phenomena.) The next step for Dr. Guzman and his colleague Peter Unger, was to study the hygienic effect in the reciprocal crosses involving selected Russian queens that scored highest and the Ontario queens that were lowest. Bees from the hybrid colonies as well as those from the parentals were tagged and introduced into observation hives, where hygienic behavior was directly observed on a piece of frozen brood comb.

Russian and hybrid bees of Russian mother had the highest percentages of workers uncapping cells and removing diseased brood. At the same time it was observed that Ontario bees and their daughters had the lowest scores. Amongst the four hybrids, those with Russian blood had high scores while once again those with Ontario blood had the lowest.

The results* demonstrate that hygienic behavior is a trait passed on to worker bees mainly from the maternal parent.

The use of hard chemicals for the control of *Varroa destructor* have been used successfully. However, there has been a steep cost. They leave residues in the honey and wax which many believe have lead to worse results. Some believe that the residues have left the bees with a depleted ability to defend themselves against other ills (an immune deficiency).

Dr. Guzman and Paul Kelly from Guelph University and Berna Emsen, of Ataturk University in Turkey researched the use of Thymol and Oxalic Acid, alone and in tandem, in the fight against *Varroa*. (Thymol may leave residues in honey but they are not considered harmful.)

Thymol and Oxalic Acid were each used alone, and together, and delivered to the hives in three different methods: 1) In dust mixed with confectionary sugar, 2) dissolved in sugar syrup and trickled into the hives, and 3) diluted in 96% ethanol and impregnated in vermiculate blocks. Treatments were applied between September 19 and October 13, 2005.

Simply stated, the results using the Thymol dust and Thymol vermiculite were superior to that of Oxalic Acid dust and Oxalic Acid vermiculite. The Thymol with Oxalic Acid in dust form scored well along with the same two in vermiculite.

RESEARCH FUNDING AT THE UNIVERSITY OF GUELPH

From the Media Information Center it was learned the University of Guelph receives 142 million dollars annually for all of its research projects. (The equivalent of U.S. $135,000,000.) The sources are various corporations and individuals, as well as Government Agencies such as The Canada Council, The Canada Foundation for Innovation, The Agricultural Adaptation Council, and The Natural Sciences and Engineering Research Council. The Ontario Beekeepers Association have helped fund Apiculture Research Projects.

CANADIAN APICULTURE RESEARCH OUTSIDE OF ONTARIO ALBERTA APICULTURE RESEARCH

The Alberta Beekeepers recently honored Dr. Medhat Nasr for his Apiculture Research achievements using Oxalic acid, Formic acid, and Thymol products as alternative treatments for *Varroa* mites.

Dr Nasr, who previously worked at the University of Guelph in Ontario, has worked hard to insure the sustainability of the Alberta Beekeeping Industry. Setbacks have not deterred him from gaining necessary funding for Apiculture projects and programs.

He has been Alberta Provincial Apiarist since 2002 and transformed the office from a regulatory agency into one that includes research and extension. He has long been a champion of making sure Alberta Beekeepers have access to effective miticides and has done extensive testing on Apivar and Checkmite in regards the efficacy of each under Alberta climatic conditions.

Dr. Nasr is well known for his educating and informing Alberta Beekeepers about different systems of beekeeping and management practices. His February Pest Management Workshops include prominent scientists. He produces an annual "Beeginners" Beekeeping course that concentrates on management techniques akin to Alberta conditions.

Dr. Nasr's work has resulted in international acclaim. He has headed a research project with Alberta Food Safety Division that studied antibiotic residues in Alberta honey to make sure there is no misuse of treatments. It is believed that the resulting consumer confidence has lead to an increase of exported honey to the U.S., Japan, and European countries.

Dr. Nasr serves as a chair of the bee imports committee with the Canadian Association of Professional Apiculturists and is a liaison with the Canadian Food Inspection Agency.

He serves as a member of the Honey Bee Health committee - Canadian Honey Council and as a director for Canada with Apiary Inspectors of America, a regulatory and enforce-

*Three Methods of Application ... Thymol and Oxalic Acid ... *Varroa* destructor ... Northern Climate: Collaborators; Berna Emsen, Ataturk University, Turkey: Ernesto Guzman, and Paul G. Kelly of the University of Guelph, Canada. **from an article in American Bee Journal, (Apicultural Research section in that journal.)

ment group in the U.S. He also works closely with other apiculture research institutes, commercial and hobby beekeepers in Canada and the U.S.

The Alberta beekeeping industry is crucial to Alberta's $350 million Canola and Forage industries. In addition, the direct farm cash receipts from Apiculture (honey, beeswax, pollen and pollination rental fees) are valued at about $50 million per year. Alberta keeps 250,000 bee colonies that account for 40 per cent of the nation's bee colonies.

CANADIAN BEE RESEARCH FUND PROJECTS

The Canadian Bee Research Fund announces three projects funded for the current year.

2009 Dr. Steve Pernal, Adony Melathopoulos, Dr. Jeff Pettis, T. Thompson;

Integrated Management of Nosema & Detection of Antibiotic Residues $6,957

2009 Albert J. Robertson, John Gruszka, Tim Wendell, John Pederson; The Saskatraz Project: Selection of Productive Honey Bee Genotypes with Tolerance to *Varroa* and Tracheal Mites and Development of Molecular Markers - $5,143

2009 Dr. Rob Currie; Cultural and chemical treatments to synergize honey bee resistance mechanisms against the parasitic mite, *Varroa destructor*, and the diseases it vectors- $6,000.

The following are some of the projects previously funded.

2008 Dr. Rob Currie, University of Manitoba, $3,000 "Cultural and chemical treatments to synergize honey bee resistance mechanisms against the parasitic mite, *Varroa destructor*, and the diseases it vectors."

2008 Dr. Steve Pernal, Agriculture Agri-Food Canada, $8,000 "Integrated Management of Nosema & Detection of Antibiotic Residues"

2008 Albert J Robertson, Saskatchewan Beekeepers Association, $3,000 "Mite Tolerance in Selected Honeybee Lines and Attempted Correlation of Tolerance or Sensitivity with DNA and Viral Markers associated with CCD"

2008 Dr. Leonard Foster, CHIBI, University British Columbia, $3,000 "Apis mellifera Proteomics of Innate Resistance (APIS)"

2008 Dr. Karen Burgher-MacLellan, AAFC Kentville, $3,000 "The use of real time PCR to identify the microsporidian Nosema spp. and other pathogens in honey bee (Apis mellifera) colonies in Nova Scotia." BC

Tom O'Brien is a beekeeper, freelance writer and retired high school Science teacher who lives on a farm near Mattawa, Ontario. He can be contacted at ***tmobrien1@sympatico.ca***.

THE BUZZ IN IRAQ

Samuel Soza

A class that teaches local Iraqis how to raise and care for honey bees graduated its first students in Husaniyah, Iraq, March 1, 2010.

Members of the U.S. State Department's Karbala Provincial Reconstruction Team and Soldiers with 2nd Platoon, Company D, 2nd Battalion, 69th Armor Regiment, attended the beekeeping course graduation.

"Our [Karbala PRT] mission is to assist the Iraqis with capacity building," said Sgt. Fatimah Muhammad, from Chicago, Ill., the 308th Civil Affairs Bn. rule-of-law noncommissioned officer in charge.

Part of that mission includes teaching women job skills that will help them participate in society and be economically independent, she said. Muhammad is embedded with the Karbala PRT as the women's initiatives coordinator.

The graduating class had 20 students, and around 80 percent of them were widows, said Muhammad.

The class taught practical skills, so the women could harvest honey, as well as theories about bees and beekeeping.

The goal was to teach skills that would benefit more than the class members alone, Muhammad said.

"It's a skill set they can teach others," she said, "They can take it to their communities and empower other women and help them earn an income off of it."

There are plans to extend the course to three other areas in the Karbala Province and enlarge the classes to 20 or 30 people.

At the graduation, the women were given a certificate of completion, five hives with bees, and equipment to harvest the honey, such as protective veils and gloves.

"It's a low-cost program that will be appreciated," said John Kincannon, of Chaska, MN, the Karbala PRT team leader.

Muhammad also addressed the graduates and asked them how the class went and what other classes they would like to see conducted.

They suggested poultry farming and sewing.

The course was taught at the Agricultural Extension, a local branch of the local Agricultural Community College.

Karbala, one of the nine provinces making up United States Division – South, is not the first to look to beekeeping as a way to help the people help themselves.

"The beekeeping project has a larger history that has been going on in USD-S for a while," said Kincannon.

Success with similar projects in Basra Province led to the efforts in Karbala, said Kincannon.

"Iraq had a strong honey industry and they're trying to rebuild it," said Muhammad.

Part of the follow-up for the graduates will be getting the honey sold locally and in the neighboring Babil Province, which has a higher demand for honey and even houses a honey factory.

The Karbala Beekeeping Association and the Agricultural Extension were important partners in creating the class and in teaching the skills, said Muhammad.

"They are the subject matter experts," she said.

The PRT also procured financial support through the use of Quick Release Funds by submitting a proposal that explained the capacity-building potential of the program.

Beekeeping is just one of several projects that the Karbala PRT and the college are involved in together.

Another project is focused on creating an agriculture lab that will be used to help with the problem of soil salinity, a dilemma for the region that dates back to the time of Hammurabi, said Kincannon.

One solution being looked at is Bermuda grass, a native plant of the province, which naturally removes salt and can be used as animal feed.

A similar project makes use of mobile test kits that will allow farmers to plant crops in various soils by assessing the soil composition.

One of the major issues the agricultural labs will be able to address is the lack of an independent way to know the protein content of animal feed, said Kincannon.

Farmers pay for feed based on its protein content, which should be around 20 to 25 percent. However, without a reliable way to determine the true content, farmers are often swindled into buying nine to 13 percent at the same price, he said.

Tackling the many issues facing the local agricultural industry requires projects that address the concerns of people from each cross-section of the Iraqi agricultural community, as well as building relationships with those people, said Kincannon.

"The beekeeping project was a good opportunity for the U.S. forces to reach out to women who have had little or no contact with Americans," he said.

Muhammad also felt it was important to target specific groups within the community.

"Women are a large part of society," said Muhammad, "I love working with the different women's organizations to see [women] empowered." BC

*For queries, contact the U.S. Division – South Public Affairs at **USDS_PAO@iraq.centcom.mil**; by phone at (Iraqna) 0790-194-2865 or 770-263-9379. For more USDS news, visit our website: **www.dangerforward.us**.*

two tools

Larry Connor

2009 Beekeeping students at the Farm set up two colonies and two nuclei hives. This increases the chance of more colonies available in the early spring when the season really gets started.

Two Valuable Tools Or Possible Problem Areas For Beekeepers.

When my schedule and access cooperate, I am on the Internet several times a day. The landline is quiet nowadays since I rarely use the local phone and the only calls I get anymore on that line are from politicos and wrong numbers. To keep the Email from piling up I like to check email messages several times a day. The key emails are answered, the fluffy stuff deleted, the Re: Re: Re: forwards are never opened and the SPAM is scanned for something it would not pass on to me. It is rare when a message does not make it into the box, and when it fails, it usually has nothing in subject field. As a result I probably miss one or two very important emails a week. I am not happy about that, but I am not Mr. Gore and do not know how to fix this problem. Certainly when I send someone an email and I do not get a reply, I simply resend with a note asking "Did you get this?" Quite often they have not.

No longer do I receive emails or summaries from Internet chat lines, Bee-L and others because of two reasons. First, there are some wrong things promoted on the Internet. Second, some of the writers sure do not like being challenged that they may not be right.

Queen cell produced by the grafting (transferal) method. Pushed into the side of the brood, it will allow the virgin queen to emerge and reestablish the colony.

Don't Trust the Internet!

After a few months of beekeeper meetings this year and after dealing with four or five thousand beekeepers at those meetings, I observed that many conversations lead to verification of something they saw on the Internet. As a person who writes for the Journals the beekeeper wrongly assumes I know all about the subject they have seen. I should have kept a list this past winter of some of the things people have read on the Internet. It scares me when otherwise intelligent acting people buy into some of the claims made online. They do NO apparent fact checking (until they ask me, and I often know nothing about the subject at hand), and they are very trusting of what they read on a blog or Facebook or other social network.

It is clear to me that some folks do not want to get facts, but instead seek support for their opinions and beliefs. There is a lot of Internet information on the effects of small cell size in controlling *Varroa* mites. The belief system states that smaller cell size creates smaller bees with fewer mites. The science shows, under the parameters of the testing procedure, that there is no reduction in mite numbers when bees are produced in smaller cell sized. So the reader needs to ask a few questions: Did the research work with the same bee population as the folks on line (European vs. African is one example)? Did the folks with the belief system run any scientific tests (hard data vs. experience).

One could accurately argue that I am a scientist, I write for the trade publications, and I write and sell books, and therefore I have a strong opinion on the role of science in beekeeping. But I also attempt to have a solid base within the Art and Craft of beekeeping too. With the books I write I attempt to get others to read the manuscript before I send it to the printer. I want a range of readers, scientists and non-scientists; small scale to large scale beekeepers, chemical users and non-chemical users, etc.

The reality is that I use the Internet all the time for

March (2010) nucleus colony at the Farm in Galesburg shows several frames of bees and partial brood. Frames of honey are added to a second box to insure survival into mid Spring.

my own fact checking, for further information on subjects I do not know, and for other uses. The difference is that I attempt to sort out the opinions (and rants) from the facts. I read many entries in Google and other search engines on a certain subject and often find research on the topic to review and digest. I am a fan of the new Extension website eXtension.org[1] compiled by Michael Wilson at the University of Tennessee. As an old Extension guy myself (Ohio State Extension Entomologist, 1972-1976), it is my opinion that this is one very excellent use of the shrinking resources at State Universities with a huge tradition of Extension Education and Outreach.

Set Up and Keep Nuclei All Year

This Spring I am asking my new beekeeping students to set up and manage a four or five frame nucleus hive as part of their first year training. This may seem to be an advanced beekeeping technique to some readers, but the more I have worked with the new generation of newbee beekeepers, they both want and need this experience the first season of keeping bees. My big fear is that beekeepers will set up a nucleus hive and NOT have success with them because they expect the bees to make a queen and rapidly produce a booming increase colony. Let's check the math on this. Here is a chart showing the time from nucleus setup to the appearance of the first eggs and the first emerging worker brood. The chart shows the pros and cons of using nuclei in ANY operation, small scale or large scale.

No queen is introduced. Bees are forced to produce a queen from the larvae given on brood frames. The table nicely shows the differences in time for various methods of getting a queen into a colony. It shows the slowest method, that of letting the bees raise their own queen from larvae provided on the brood frames. In this method beekeepers take brood frames covered with bees from a strong colony and do not move or add a queen, thus forcing the bees to make a queen from the proper aged eggs on the comb. These eggs are often zero to 36 hrs post hatching. In this system, the time from set up of the colony to the emergence of the first daughter worker bees produced by this queen is at 37 to 42 days (six weeks). That means that if a colony was set up without cells on June 1st, it would be July 11-14th before the first brood would emerge! True, this may be acceptable for beekeepers wanting to make up Summer increase to overwinter, but the risks are huge. There are many things that can go wrong with a colony in 51 days, from starvation to small hive beetles. Also, the bees must produce a queen from the larvae given to them and produce her under the conditions of the colony. If there are no young larvae they may produce a queen from an older individual at her limits for queen production, and then not have adequate bee numbers for quality queen production.

Combine Nucleus with a Laying Queen to a Colony Needing a Queen

The opposite extreme of letting a colony raise its own queen is to add an established laying queen from a nucleus, or combine the two or three center frames of the nucleus, the frames holding the queen and her brood, with the colony. Some layer newspaper between the frames, while others smoke and syrup the colony so the bees are busy taking up syrup when the frames are combined. The outside frames of the colony receiving the nucleus are removed (or any undrawn or empty frames). Whatever was wrong with the queen in the colony, it is highly likely the new queen will fix the situation. Of course, if the old queen is still alive it is absolutely essential that she be removed to prevent any biological confusion and bee losses.

As the table suggests, the advantage with this system is to provide an immediate replacement queen for a colony that suddenly looses its queen or it needs to be replaced. Queen losses inside strong colonies are common in the late Spring and Summer months, and indeed are undoubtedly part of the natural cycle of the hive, where the old queen produces daughters and one of them takes over the hive. Other reasons for a beekeeper to replace or restore a queen include:

In May 2009, this nucleus colony was ready to replace a queen that failed during the season. This colony was then overwintered.

[1]http://www.extension.org/pages/Bee_Health_Update_2.2_February_March_2010 In this issue: 32 new pages to Bee Health at eXtension.org! *New Content Category: Basic Beekeeping Techniques *Bee Anatomy Illustrations from Snodgrass and Nelson *CAP updates *Multi-State Research Updates *Examining colonies for Nosema *Native Bee Profiles *New FAQ's *Review Process

Stage of queen introduced to the Nucleus	Days as larva	Days as pupa	Days as a Young Queen Up To Mating	Days To Start Laying Eggs	Days For Worker Bees To Emerge	Total Days To New Brood
No queen is introduced. Bees are forced to produce a queen from the larvae given on brood frames	1-3	5	7-10	3	21	37-42
48-Hour Old Queen Cell	1	5	7-10	3	21	37-40
Newly sealed swarm cell			9-10	3	21	33-34
Ripe Queen Cell (one day to emergence)			8-11	3	21	32-35
Virgin Queen			2-7[2]	3	21	26-31
Mated Queen Introduced in Push-In Type Cage				3	21	24
Combine Nucleus with a Laying Queen to a Colony Needing a Queen						0

Presence of chalkbrood, sacbrood and European foulbrood
Accidental injury of the queen (dented abdomen or thorax)
Accidental death of the queen
Increasing defensive behavior – stinging, helmet hitting, etc.
Queen is not up to the standards of the other colonies in the apiary.

Bottom line, instead of waiting several days or weeks for a queen to arrive and be installed into the colony, a laying queen in a nucleus is one of the fastest and safest methods I know that will continue the productivity of the hive. Old school beekeeping teachers recommended that every beekeeper have one nucleus for every 10 hives, but I strongly encourage all beekeepers maintain one nucleus for every hive up to five, and then two or three for every five to 10 hives beyond that.

Natural Timing for Nucleus Set-up

Many colonies, even new packages and installed nuclei, instinctively produce queen cells during the late Spring season. Timing of nucleus building to coincide with the swarming season ideally uses abundant brood, young nurse bees, stored food frames, and naturally produced queen cells as the basic components of Increase Nuclei. Failure to remove queen cells often leads to a 50-60% reduction in the population of worker bees when the swarm leaves the colony. Using the queen cells in the colony is moderately controversial since it is possible to select for the swarming tendency over a number of generations of doing this. But most beekeepers know it is better to use a well-produced, large and vigorous queen at the peak of the season rather than any other queen. Ultimately the beekeeper has the option of replacing the queen with another bloodline. If the Nuclei Increase colonies are made up in late May, they can be requeened a month or more later after the queen has mated and has reestablished the brood nest.

Remove two to five frames of sealed and emerging worker brood from each colony – the number of frames of brood will determine the strength of the colony in less than a month. Brood frames can be combined from different colonies to make them stronger. The nurse bees on the frames should not be removed, but moved with the frames of brood. To reduce the swarming instinct, make sure the frames you remove have the swarm cells on them. Do not move the old queen. If necessary return to the parent and increase colonies to check for the old queen. The colony with new eggs five days later holds the old queen!

Nuclei hives may be kept in four or five frame boxes. Additional nucleus boxes and frames may be added as the colony grows. These may be split and brood removed from as the Summer progresses. As queens are needed from the nucleus restore the missing frames with at least some brood and add a queen, virgin queen, queen cell or a 48-hr cell. If you are not producing queens yourself, you can dequeen a top quality colony and let them raise queen cells, and remove frames to restore the nuclei. The old queen can then be re-introduced into the original colony.

Nuclei are wintered in most of North America as Increase colonies. Increase Essentials covers this topic in detail. BC

Interested in Queen Rearing? Check ***www.wicwas.com*** *for classes this summer offered by Dr. Connor. And pick up a copy of* Queen Rearing Essentials *from that website or your very most favorite bookseller.*

[2]If a virgin queen is newly emerged, expect a delay of 7 to 12 days prior to mating. For a queen one week old, expect only 2-4 days if the weather cooperates.

Swarming – Control & Management

James E. Tew

It's no longer just about a lost honey crop.

The swarm call

Only a beekeeper can understand the sense of urgency that arises when the phone call comes giving information about a "big swarm" hanging low to the ground. In a real way, it's similar to the feeling that we have when someone shouts, *"fire!"* We must move and we must move – NOW. Who knows how long the swarm will stay where it presently is? Many of us – I am definitely included – have arrived at the swarm scene only to find that the *"swarm just left a few minutes ago."* The disappointment is palpable. During swarm season, which is late April – early June where I am, I keep a couple of boxes in my truck and at my home – all at the ready awaiting the call. Looking a bit like a fire engine leaving the station, I have hastily driven away with back truck doors open and equipment slipping and sliding across the back of the truck. All that mattered was speed. I WANT THAT SWARM. This is the feeling that beekeepers of years past felt and it's the same feeling that beekeepers feel today. What has changed now is that I now want the swarm for different reasons.

Lose a swarm – lose your honey crop

As recently as 30 years ago, a bee swarm was essentially free bees. During many seasons, I retrieved so many swarms that I wanted no more. I either gave them to another beekeeper or simply allowed them to find their own home. Books and experts admonished beekeepers not to allow swarms to issue. A lost swarm represented a lost honey crop for that season. *(This was not really true, but it was close to the truth.)* Hiving a swarm in my beeyard was exciting, but nothing like the excitement of hiving a swarm of bees that was not from one of my colonies. They were free bees and they were free bees with a profound work ethic[1]. When I realized that I had lost a swarm, I felt badly. I had lost both bees and honey. True, I had given a valuable pollinator to my local environment but 30 years ago, my local environment seemed to have plenty of honey bees. It felt like a waste.

Now, lose a swarm – lose your bees

As are many of you, I am struggling to keep colonies alive and as healthy as possible. I wish I could say that this is an easy process. It's not. Bluntly, most of my colonies that survived the Winter are not record setters. They are weakish, slightly below average when compared to colonies of years past. They built up, but not fast. Swarming is not really a problem – but wait.

If I assume that all my colonies are below par and that swarming will not be a problem, rest assured that a few will take off. Years ago, I would have only been annoyed. Today, I want those bees – all of those bees. I do not want to lose a single swarm. Not because I care about honey (though I do). Not because I am trying to keep queens from colonies that over-wintered well (though I do). Not because I am trying to make colony increase (though I am). I want all my bees (swarms) because bees are hard to get and are increasingly expensive. If past trends hold, I must expect to lose more bees next Winter than I care to admit. I need more bees, more swarms, and more colonies just to stay at the hive numbers I presently have. Today, a lost swarm is more of a loss than a lost swarm of 30 years ago. Now, I only want to get swarms; never to lose one.

The Swarming impulse

Beekeepers love nice, straight combs. Bees don't. Beekeepers put multiple hives in straight lines and paint them the same color. Bees randomly scatter their colonies across their ecosystem and don't paint anything. Beekeepers encourage their colonies to produce entirely too much honey. Bees want to produce enough honey to pass the winter and to swarm several times per year. Beekeepers hate swarming and do what they can to prevent it. Without a strong swarming potential, feral bee populations will decline even more than they already have. To survive as an independent species, bees need to swarm. I have written previous articles for *Bee Culture* that cover swarming behavior and biology more thoroughly.[2,3] My intent in this piece is to go a bit beyond simple swarming to the next level – dealing with colonies during and just after the swarming event.

The primary swarm initiators – crowding and old queens

Crowded colonies

Don't let colonies become crowded. I suspect for some of you, by the time you read this, it is already too late. Even so, put extra equipment on the bees. In many instances, other factors that govern swarming have not kicked in and the extra space will still be welcomed. How

[1]During a productive season, bees from a healthy swarm are prodigious workers that will build comb and store honey at a startling rate. A lack of brood probably allows for resources to be directed to comb construction and honey hoarding rather than being used to meet brood-food needs.

[2] Tew, James E. 2006. *A Few (More) Comments On Honey Bee Swarm Biology* **http://www.beeculture.com/storycms/index.cfm?cat=Story&recordID=482**

[3] Tew, James E. 2001. *Swarming.* **http://www.beeculture.com/storycms/index.cfm?cat=Story&recordID=109**

can one tell if a colony is becoming too congested? Knowing the season and observing how many empty frames the colony presently has are deciding factors. If you take a look at a colony and only two frames on either side of the cluster don't have bees – and if the primary nectar flow has not started, this colony needs more space. A good colony can fill those four empty frames in just a bit more than a day. If you allow the top super to become jam-packed, due to crowding, your bees miss part of the nectar flow. Ideally, the top super should never be completely full.

Reversing Brood Chambers

Wintering colonies move upward in the hive during the winter. By spring, the queen, cluster, and brood nest, are near the top of the hive. Though plenty of space is now below the cluster, many times, the colony will consider itself crowded and begin to make swarm preparations. In early Spring, reversing brood chambers will help limit swarming. Basically, you are putting the brood chamber back on the bottom board and providing expansion space above the brood chamber.

Requeening (Every Two Years at least)

To prevent swarming, people like me have told people like you to requeen every other year for as long as I can remember. Now, queens are expensive and often hard to get. Personally, I always mean to requeen but I frequently don't. I know I should. In fact, with all the changes ongoing in hive management now, I would not hesitate to recommend requeening every year. Requeening is a form of hive surgery. Know what you are doing before you start the process. Requeening can be done anytime during warm months. In fact, it may be more difficult to get queens in the early Spring. Everyone wants them then.

Destroying Queen Cells

Destroying queen cells as a swarm prevention procedure is in the same category as Winter-feeding. It reads well, but it doesn't work well. It's a desperation measure. For those of you who haven't tried it, essentially, swarm cells are systematically destroyed as a way to prevent swarming. Problems? Skip just one cell and the colony will still swarm. Even so, some colonies will swarm with no swarm cells in the colony. Finally, it's a lot of work opening and closing hives every few days. I'm betting you're going to tire of doing it and then your colony will swarm – guaranteed.

Queen genetics

Selecting queens for hygienic characteristics and for low swarming propensity is big bee business. For many of us – maybe even most of us – genetically-hopped-up queens are overrated. Our industry has been seriously selecting queen stock for what – 50 years – and where are we? We are still complaining about poor queen stock performance, mysterious die-offs, and excessive Winter kills. I don't want queen breeders to ever stop trying to produce great queens, but as an average beekeeper with an average lifestyle and with average amounts of time to commit to my beekeeping, I generally only need an average queen.

Modern beekeepers are frequently stuck with a conundrum – what to do with the queen in a swarm you have just hived? The swarm queen headed a colony that developed strong enough to swarm, but generally beekeepers don't want swarming stock. If I requeen the swarm colony with a new, young queen, I have no way of knowing if that queen will lead to a productive colony. But I am fairly sure of this – swarm queens are quickly superseded. More than likely, when exposed to this situation, I allow the queen to establish a brood nest and then requeen with a new queen a few weeks later. I will most likely lose some of the characteristics that allowed the colony to prosper, but if I allow the colony to naturally replace its queen, much of the Spring/Summer season will be lost.

Burr comb in a crowded colony.

I found queen cells. Now what?

It happens. No matter how much you read, if you keep bees – sooner or later – you will be faced with a swarm issue. It's not like it's the end of the bee world. Cutting down queen cells probably won't help. If you are finding queen cells, first of all, accept the reality that there is a good chance that this colony is going to swarm – no matter what you do. But try you must.

Make a split (or splits)

The most direct way to stop a queen-celled colony from swarming is to split the colony. You don't even have to find the queen, but just be sure that all splits have queen cells. Making more splits (three to four) is more likely to stop the swarm than simply halving the colony. Do you have that much equipment? Large splits are still likely to swarm so you will have two swarms (one headed by a virgin queen) rather than one. Be sure that the splits have abundant room.

Remove the queen to a smaller split and destroy existing queen cells

I don't care for this, but it can work. Find the queen (good luck) in the crowded, swarmy colony and confine her somewhere else. Maybe a small split. Maybe store her in an observation hive that you set up. Then destroy all the queen cells you can find. More than likely there is little young brood, but even so, check for cells again in a day or so. Don't wait any longer. If you missed a single cell, the colony can swarm without the reigning queen. Add some empty space. Essentially, you have removed the queen, you have removed queen potential, and you have provided space. This will all have been quite a chore.

Though I have tried some dramatic things such as turning colonies upside down to upset swarming, there

Two capped swarm cells.

is not much else you can do. Once a colony has cells, there is a good chance it is going to leave.

The swarm left, but I caught it. Now what?

Most of the time, after hiving the swarm, do nothing. Leave it alone. The colony will prosper and build up and you have a new swarm story. But too often, and very frustrating, the colony will swarm again, leaving your hive digs and moving on to other pastures.

Always take some kind of queen cage with you to the swarm site. In desperation, I have used a match box. I once improvised a cage from folded paper, but it is much easier just a have several queen cages as part of the swarm equipment paraphernalia. In a perfect world, you see the queen and are able to catch her. At the chaotic swarm site, the world is rarely perfect. There is no easy way to practice finding and caging the swarm queen. Good luck is really handy to have.

Now there is a second conundrum at this point. If I have hived a swarm and immediately harass it – trying to find the queen as she runs about – I risk forcing the swarm back into the air. This is a risk even if I wait for a few hours for the swarm to settle. I would recommend: (1) quickly searching for the queen as the swarm hangs on the limb, (2) quickly searching for the queen as the swarm is hived, (3) quickly searching for the queen an hour or so later, and (4) search one last time the next day. At some point, I must just give up. It's not worth keeping the hive open for hours, with bees in the air, just to find the queen. *(I wonder if I could search for the queen at night. I have hived swarms at night, but I have never searched the swarm cluster for a queen at night? Anyone tried that?)* A few times (maybe three), I have had a swarm leave a caged queen. This is rare. I suppose those bees don't read the same bee books I read.

Final thoughts

Don't let the colony become crowded. Try to keep good, young queens heading your colonies. Replace swarm queens as soon as possible. Finally, expect to lose the occasional swarm. It's okay. BC

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Hive Considerations

Eric Schmiedlin

There's more to being a beekeeper than a box full of bees!

The area where I grew up, here in northeast Ohio, was pretty much rural at the time. The local park system held various craft type classes during the Summer to help keep us youngsters on the straight and narrow. One such class my sisters and I took was butterfly collecting. We learned how to catch and kill insects and then stick pins in them to display their beautiful colors. I recall when a childhood friend was aghast when I stepped on a bee which was working some clover where we were playing baseball. I had not paid much attention to the fact his dad had several hives – a mutual feeling, as the bees paid no attention to me.

I guess I have evolved some, because now I let most insects live, and even provide several high-rise apartments for them, in exchange for some golden rent. Regularly, but on a surprise basis, I hold fire drills, but I can't say that the bugs come out double file and wait patiently for the all clear.

Needless to say, there are several varieties of insects that I feel should be wiped off the face of the earth. – such as the stinging, robbing yellow jackets, and naturally, the small hive beetle, just to name two.

Like many new beekeepers, when we got our first hive, my wife Sharyn and I would sit in our white, plastic, lawn chairs with our morning coffee (mine with honey, thank you) and observe the comings and goings of the little darlings. That first year, with all new equipment and a package of Russians from Georgia through a local distributor, we got 75 pounds of rent, which was pretty satisfying.

One of the factors that prompted the plunge into the insect land-lording business was the fact that there was what seemed to be a large hive of bees in a wall of an empty building located on our property. We took beginners classes at two area clubs to learn as much as possible. At the annual Tri-County meeting in Wooster, Ohio, we attended a workshop on the removal of bees from building walls. We learned of bee vacuums and liability insurance, and possible money to be made by cutting through various building materials.

Although packages were not yet frightfully expensive, a hive from a building wall would certainly be a feather in my hat. I discussed the situation with several club-mates, gleaning bits of information and various ideas. One fellow warned, "No way! You have no idea what pests or diseases the feral bees may have. I would exterminate them!" My feeling was that if the walled bees had been surviving for several years without treatments of any sort, they might be a hardier strain.

By the third Spring I thought I had enough knowledge and also enough courage to proceed. Unfortunately, Mother Nature and Old Man Winter had other ideas. The furniture was there, and there was plenty of food in the cupboards – but the bees had relocated. I did remove honey (very dark for this area) and six buckets of wax from the wall. In fact, the honey won a second place ribbon in one of the amber classes at a local county fair. The following year, a new hive moved into a different section of the same wall – which, by the way, is a north wall.

The next year I captured my first swarm, which came from that wall. The building is near the road, and I happened to drive by as the departing group was leaving their old home en masse. The swarm settled into a nearby tree. As quickly as I could, I chose a deep with drawn comb topped with two empty boxes, providing enough room to easily accept the branch with the swarm. After several attempts at choosing the right ladder, and after some preliminary pruning, so I wouldn't poke my eye out, the branch was cut and carefully lowered into the waiting boxes. That night I returned to the scene, and found for the most part, everyone had gone inside. A thorough job of sealing and tying together preceded a short drive to my nearby beeyard.

I felt confident the girls would move down to the box with the drawn frames, but again Mother Nature and her female assistants had a different view. The swarm quickly built comb attached to the inner cover and going well down into the middle box. And their commune was founded; they had no intention of paying gold to a greedy landlord.

A few years back, I discovered a bee tree on our property with the entrance just a foot off the ground. It doesn't seem to be a large cavity, and at the end of each Summer it has been boiling over with bees, and the end of last season, there was still a strong colony in that north wall. At this time, I see no reason to move either hive into my "buildings." I feel it is worth while to observe what is happening in the natural state and also to allow the genetic diversity to continue in the area. BC

For The Love Of Honey

Jennifer Berry

Savannah Bee Company

Remember the first time you were about to explore the interior of a beehive? The range of feelings coming at you all at once: excitement, fear, joy, anxiety, curiosity, nervousness, delight, and terror. Putting a veil on for the very first time. Wondering if you got all the strings tied right, or what about this gap between your neck and the netting or was your collar high enough in the back or was that hole in your jeans going to be a beacon for these flying creatures with sharp stinging instruments?

Walking out to the apiary with this metal tool in your hand, not having a clue what to do with the darn thing. Watching as the beekeeper lights the smoker and fills the air with smoke, creating this mystical, foggy environment. Moving ever so slowly towards the hive and hearing a faint buzzing sound as you cautiously come in for a closer look. Then a bee buzzes by your head and begins this kamikaze attack mode in your face. You panic, blood pressure rises, sweat beads up on your forehead, images of killer bees covering your body (much like they did in that movie you saw back in the 70s). You start to run but just then the beekeeper touches your arm and in a very calm voice says, "Would you like to see the queen?"

After several hours and numerous colonies the beekeeper is exhausted from all my questions and really wants to go home. But I keep pressing him for more information. I don't want to leave, not yet. Wait, let's open just one more hive, and can you explain again that round dance thing they do or watch bees emerging. And how many drones does the queen mate with? Can we see her again? How long does she live? Just one more hive, please!

A few months ago at the Georgia Beekeepers Association Spring meeting, I had the opportunity to sit down and talk with Ted Dennard, owner of Savannah Bee Company. We started off the conversation talking about how he became a beekeeper. As he paused to think for a second, he smiled and then started telling me about his first experience in a beehive, the excitement and horror he experienced at the same time.

Ted was 13, living in Brunswick, Georgia, when a friend of the family, Roy Hightower, "Old Roy" as he lovingly expressed, asked if he could put bees on their property. When the bees arrived Ted was immediately interested but also terrified. Hesitant about going into a colony, he put on several layers of clothes to cover every inch of his body. He was not going to get stung. He explained, "When Old Roy first opened the hive, it was almost like watching a scary movie. You want to cover your eyes and look away but you just can't because you don't want to miss a thing." Well, he kept looking. He said as he stood there he was drawn in, totally fascinated by what he was seeing, hearing, and smelling. His fear quickly melted away and fascination took over. Then what he remembers most from that first voyage into a bee's world was the honey frames. He explained as a frame was pulled out of the super, it

Beeyard at Savannah Bee Companies new warehouse.

Savannah Bee Companies trade mark.

was backlit by the sun. The image was breathtakingly beautiful. He was overwhelmed by the colors of the honey shinning through. Then he began to notice the various hues, some amber, some golden, some red. The assortment of different honeys glowing in that beeyard that day opened a door, which would eventually carve a path to the conception of the Savannah Bee Company.

Well Ted's beeyard days didn't end there. His interest continued. Several years after his introduction to bees, Mr. Hightower passed away, leaving the bees for Ted to manage. He was still a novice but did the best he could to keep the bees alive. But then it was time for college and off he went to study Theology at the University of the South in Sewanee, Tennessee. Back home Ted's father tried to take charge of the bees, but a nasty allergic reaction pulled him out of the beeyard, forever. Then mites arrived and the bees perished, but not Ted's fascination.

While in college Ted rented a log cabin from a retired minister/beekeeper, Archie Stapleton, who became Ted's teacher and mentor. "He was extremely smart and knew all the really cool facts about bees. He was also this happy, jolly sort of fellow who loved making wine". Years later when Archie died an incredible story followed. Archie passed while reading a book in his favorite chair. EMS arrived and as they were loading his body into the ambulance, bees filled the entire truck. The EMS workers had to quickly evacuate and wait for the bees to leave. People who witnessed this event were truly amazed at what they saw; the bees just wanted to say goodbye.

After college, Ted volunteered for the Peace Corps and was assigned to work with beekeepers in Jamaica for two years. He worked primarily in the field addressing issues and helping where he could. While there, the Jamaican beekeepers formed an association, which attracted over 130 beekeepers, and Ted worked with them all. Being in Jamaica was glorious but while there he had an epiphany. Years ago "Old Roy" introduced him to the glorious world of the honey bee and now here he was, working in Jamaica, helping beekeepers. The ripple effect made him pause. He realized then it's the small acts that make a difference, one by one that have an impact.

After his return to the states he moved to Flagstaff and Durango. For five years Ted ran a wilderness business called Onshore & Offshore Adventures. It was an awesome concept. He would take school age kids backpacking for a week, exposing them to the wilds of the earth. Next they would stay a week on a Hopi or Navajo reservation giving them a real, cultural experience. Then to end the adventure, they would spend one week on a river trip.

Recently Savannah Bee Co. took home the grand prize for products entered at the 2010 Flavor of Georgia Food Product Contest.

It was a grand time, but Ted was anxious for something more in his life. So he traveled to Asia for six months exploring ideas for his future. He loved the multi-cultural, diverse nature of Asia and knew he needed to live somewhere that offered this type of environment. When he arrived back into the U.S. he landed in Savannah. It didn't take him long to realize that Savannah was going to be his home. He quickly started back to beekeeping with five hives. It was a dream of his to turn beekeeping into a full time career but he hesitated. Beekeeping was a hobby that he loved and was extremely passionate about; he didn't want to spoil it. He understood that too often this is the case when you're trying to make a buck. Your passion runs dry with the day-to-day pressures of running a business. It can become more about the profit and less about the product. And making a profit sometimes requires cutting corners.

But he loved producing honey and his few hives were doing such a great job of it. He and his roommate decided to buy an extractor and sell the surplus to surrounding stores. "Bee Buster Honey" was sold in squat, little jars

Ted inspecting tupelo honey.

Ted explaining the honey process to the crew of Food Network.

with hand painted logos. But it wasn't paying the bills (yet) so Ted worked numerous full time jobs. He was teaching an experiential youth program for the Savannah Board of Education until they lost funding. Next he taught environmental science classes to 1st and 2cd graders.

But he loved producing honey and slowly but steadily his honey began to sell. Stores started asking for more and then other stores became interested and started asking. The line kept growing. However, for the business to expand, this meant more equipment, more bees, and more time in order to meet demand, so off to the bank Ted traveled. His initial business loan was $13,000. This enabled him to buy 50 hives, a truck and a trailer. The following year he made his first crop of tupelo, and gallberry honey; the Savannah Bee Company was born. As more stores kept asking for more honey, the business moved from the kitchen, to the garage to an 800 square foot space at the Oatland Island Wildlife Preserve. Yet, he still had to work numerous other jobs to pay off the note from the bank. He resurfaced bathtubs, flipped houses, removed bees, was a Mr. Fix-It man, and beekeeper.

It was a crazy time and the requests for his product kept growing. Swankier stores started calling and demand was rapidly growing, but his "time" was the limiting factor. So he decided to take the plunge in December of 2001 and make the Savannah Bee Company his one and only job. Just three years after he bought his first round of production hives, Ted walked down the road called "Dream Job Lane". Ok, that was corny.

He headed west for a short course in business, mortgaged the house and decided to give the Savannah Bee Company everything he had for 12 months. In 2002 Ted started displaying at gift shows. In 2003 Williams-Sonoma approached him and asked for his product. Shortly later Dean & DeLuca, Nieman-Marcus, and Bloomingdale's followed. He moved into a warehouse and in four short years outgrew it, so had to buy an even bigger warehouse. Demand continued to outpace supply and by 2004 he started packing honey because he just couldn't do all the honey production and extraction himself.

In 2007 the Savannah Bee Company was honored with the Georgia Small Business of the Year Award given by the U.S. Small Business Administration. This year they won the grand prize at the Flavor of Georgia Food Product Contest. And the accolades keep mounting.

Having that charitable soul of his, the Savannah Bee Company has partnered with the Heifer International, "helping people to help themselves." They're selling Honduran honey which is part of the Heifer Beekeeping projects. It is labeled "Peace Honey" and $3 from each bottle sold is donated to Heifer.

In nine years, after risking everything, Ted has cre-

One of many production lines at the Savannah Bee Co.

Ted's honey filling operation.

While in the peace corp Ted worked with 100's of beekeepers in Jamaica.

ated a multi million-dollar company. If you haven't seen the products Savannah Bee Co. offers, check them out and you will understand why the company has become so successful. Ted's marketing savvy took honey to a different dimension. He removed honey from the pick-up truck tailgate, and placed it into the halls of culinary sophistication. For decades honey has languished in quart jars on the shelves of roadside stands and farmer's markets. Savannah Bee Co. discarded that image and raised honey into the ranks of that of a fine wine or cheese. From the logo to the elegance of the French style wine bottle, the presentation of Savannah Bee Company's honey sets it apart from the rest.

But is it the only reason this company is flourishing? Partly, but more importantly, Ted loves what he does. His passion for bees and their products, his hunger to learn more, to do better, to give back, and to create something new, all play into his success. And maybe a tad bit of luck: being at the right place at the right time? But remember, it takes a lot of sweat equity to get to that right place at the right time.

And too, he keeps looking.

See Ya! BC

Jennifer Berry is the Research Coordinator at the University of GA Bee Lab. Contact her at ***Jennifer@BeeCulture.com****.*

BEE BOX FURNITURE

Cheaper than regular shelving, and better looking, these boxes solve lots of storage and stacking problems.

John Phipps

When I was at grammar school nearly half a century ago, my place of escape was always to the woodwork room where the smell of sawdust mingled with the smell from the double-boiler glue pot which was always simmering away on a gas ring. It was good to be able to use the best selection of hand tools to complete woodworking projects – and in those days we were not allowed to use screws, nor nails, for all items had to be made with the most appropriate joints. I remember that my exam piece was a secret dovetail joint for the corner of a drawer and the compulsory technical drawing we had to do was an isometric projection of an open set of stepladders. Obviously, the headmaster didn't understand how much skill was needed for both of those exercises, for he said to me that as an academic pupil (studying divinity, history and New Testament Greek) I should 'leave it to the other boys to get their hands dirty.'

Well, I am glad I ignored his advice, for over the years my practical skills have been of great benefit to me, allowing me to restore two properties, design and make animal houses whether they were for rabbits, poultry, pigs or goats when I taught agriculture and horticulture, and of course, being able to make a whole range of hives and associated beekeeping equipment.

I'll be honest, I am not a skilled craftsman now, for I tend to cut corners wherever possible and I tend to lose

Unfinished unit for media players etc. Two boxes placed vertically, the middle one horizontally, with a wooden plank used for the top.

Large cupboard, the weight supported by the floor, but fastened to the wall at the top with right angled brackets. The inside of the cupboard has been finished and the doors are made of tongued and grooved wood.

Unfinished, open storage for a variety of things. To the right the Langstroth box was cut in half to give shallower shelves.

interest at the final finishing stage where an extra bit of planing or sanding might have ended in a better job being done. And, of course, with such a plethora of cheap powered tools available, my use of hand tools has long since been suspended.

When we moved to Greece a decade ago, we had a stone house built. We took a lot of our old cottage-type furniture with us for in the Mani, the wild southern part of the middle finger of the Peloponnese, there was no antique furniture which we would be able to buy. The reason is quite simple; in this part of Greece until the beginning of the last century, the Maniates had little in the way of furniture, a cupboard was a recess in the wall, a wardrobe some nails in the wall or on the back of a door, and a bed just a thin rolled-up matress. The houses were too crowded with people anyway, so space was limited indoors.

Foolishly, we allowed our builder whilst we were away, to fix in kitchen units and cupboards and extra wardrobes. Unfortunately, he had them made in the most dreadful quality MDF which looked both hideous and out of character with the rest of the house and furniture. So, at my wife's instigation we threw the MDF out and looked for a better solution to our storage problems.

I should have thought of the answer myself, but shopping one day in our nearest town, Kalamata, we came across a health food shop selling a huge variety of goods and all the storage space was made up of bee hive boxes on their sides. Instantly, my wife turned to me and said there lay the answer to our storage problems.

The Langstroth box is a perfect and adaptable unit which would allow me to make many items of furniture:

- it was cheap - just eight euros (then) for each empty box
- it was made of real wood
- it was solidly constructed with lock joints
- it could be used on its side either way up
- each unit could support a good load
- to make a piece of furniture all that was essential was the fastening together of several units
- the furniture could be improved by fastening strips of wood where two boxes met
- it could be finished with wax polish, varnish or paint

In order to make an item the boxes were fastened together (ensuring that the rebated part of the box was always to the rear), one at a time, firstly with glue from a heated glue gun. This quickly held the boxes in place whilst screws were fixed through two box sides, driving the screws to just below the surface of the wood so the screwheads could be hidden from sight with some wood filler. Once the boxes were all in place the insides were smoothed with sandpaper and the exterior surfaces by using a belt sander. Caution is important here: the sander must be used from the edges inwards and follow the grain of the wood.

If the sander is allowed to run over the edge where the lock joints are, a lot of splintering will result.

Using a circular saw, long flat strips of wood can then be cut to frame the item and to cover over where the boxes meet. Additionally, if required, these strips could have a slight chamfer on their outward edges to reduce their sharpness.

If doors are required I usually join pieces of tongued

The simplest of units. Four boxes joined together to make a simple book case. The depth and height of the boxes allows even the largest books to be stored away.

Large storage unit made for a friend.

and grooved wood together (with the tongue and groove cut off the outer pieces) using traditional Z-type bracing, and then fix the doors to the carcase with T - hinges.

We normally use linseed oil to protect the wood and to bring out its color. Between coats a rub down with methylated spirits and steel wool is recommended or when the units need a good clean.

Any of the items made can be fixed to walls with angle brackets, though for larger items like big cupboards, it is best if the floor bears their main weight with just a couple of brackets holding them firmly to the wall.

Once I had finished making various pieces of furniture, I found that their price was roughly half of what I would have to pay for a similar item made of MDF.

The only problem I have found with my Langstroth furniture is that people ask me to make similar things for their own homes, and, whilst I have done so for a couple of people, I still have enough to do finishing pieces already in use but not completed!

Whilst I have used new boxes for all my construction work, with effort and paint old boxes could be used for a variety of projects, especially for use in garages, workshops and utility rooms. There must be lots of cheap second hand boxes lying around apiaries in the U.S. – grab some and see what you can make. I wonder what Lorenzo Langstroth would think about this use of bee-boxes in this his bicentenary year. BC

John Phipps is the editor of Beekeeper's Quarterly, *lives in southern Greece, and is a sideline beekeeper and pretty good woodworker.*

Small kitchen cupboard – finished with strips of wood to hide the gaps where the boxes meet.

Jim Agsten

Queenless or Queenright?

It has happened to me. A mid to late Spring hive inspection shows a decent number of bees, some capped brood. But, wait a minute! I can't find any eggs or open brood anywhere! Oh no, queenless! Panic strikes! Gotta get a queen quick! The Spring flow is on! I call every queen producer I can find. "Sorry, we are sold out"; or if you find one, its not be available until next week or shipping it quick costs more than the queen and no, it's not insured. Let's step back a minute and take a measured look at our "queenless" hive and see what we can see. It just might save you some money.

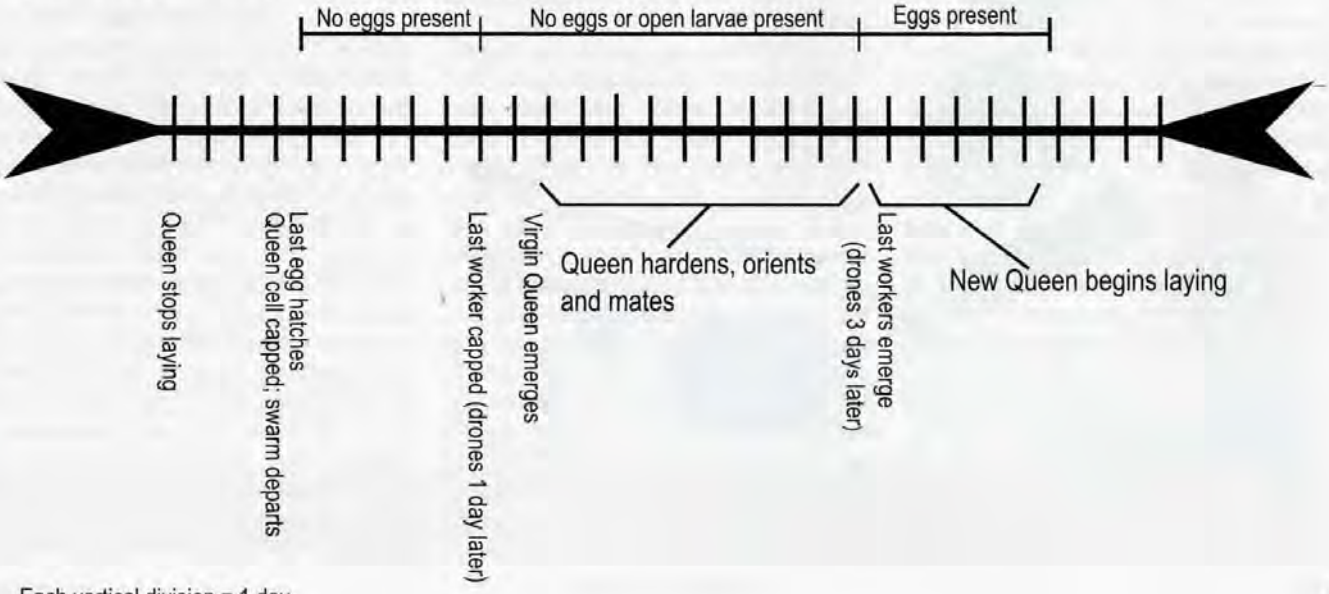
We already know what we think we see when there is no sign of eggs, no young larvae, possibly some capped worker and drone brood. But what does this really mean? Does it mean the hive is queenless? Not necessarily, and more often than not, no. The bees have been rearing and replacing queens far longer than we have and in general, they do a pretty good job. Analyzing this situation takes you back to bee school and the basic foundations of bee culture. Eggs are laid. Three and half days later, they hatch. The young larvae develop as open brood for approximately six more days until capped, a bit more for drones. From what we have observed: no eggs, no open brood, we can only assume that we have not had a laying queen for at least nine or 10 days.

Now let's review the actions of the queen bee after her emergence from the queen cell. She spends three or four days running about the combs as a virgin while she finishes developing or "hardening off", then another three to seven days for orientation and mating flights. Finally, about 10 – 14 days after her emergence, she is mated and begins to lay. Now let's look at the numbers and the conditions that might bring about this "queenless" situation.

I think this happens most often after a swarm. Of course no hive in its right mind would swarm without first informing the beekeeper! In a swarm situation there are many queen cells produced and most of what I have gleaned from texts indicate swarms generally issue when at least some of the replacement queen cells are capped. Prior to the swarm, the bees have been chasing the queen to trim her down to flying weight. In other words, she is prevented from laying for a period of time.

So let's create a hypothetical situation and see what goes on, and when. In this example, we will say the original queen stopped laying

The sequence of an eggless/open broodless period following a swarm. In this example, the queen ceases laying 3 days prior to the swarm leaving at the capping of a queen cell. The extent of the break in the brood cycle while the queen is replaced will vary with the timing of the events (when a queen stops laying and when a new queen emerges) and whether it's a swarm, supercedure, or emergency queen replacement. "Smooth" supercedures may result in NO eggless period as a new queen begins to lay and her mother heads to the retirement home (hopefully)! What is important to see is the general sequence of events and why an eggless and open broodless condition does not necessarily equate to a queenless condition.



Arrow indicates bullet-shaped capping of drone reared in worker cell. Most of the other cells are drones in worker cells (uncapped) although some viable workers are still there. The sign of a nearly spent queen.

three days before the issuance of the swarm and the swarm leaves "on schedule" with the capping of a queen cell. Queen cells are capped approximately 8½ days after egg lay and continue to develop another seven to eight days before the virgin queen emerges. That gives us 10 or 11 days with no new eggs laid (three before the queen cell was capped, plus seven to eight days queen cell development). Any eggs laid by the departing queen have hatched and are now capped or about to be. Referring back to the queen development after emergence adds 10 - 14 days until the new queen is mated and beginning to lay. So, when we finally have eggs again, most of the brood of the departing queen have emerged or are close to emergence. This leaves us a window of seven to 14 days, in this particular situation, where there are no eggs or open brood, but the hive is not queenless.

This window will vary with the weather, larval development times, mating success and at what stage of development the queen cells are at when the old queen stops laying or leaves. Even if the queen were to lay up until the day a swarm left, and a replacement queen emerged the same day, there would still be a four to seven day period where there may be no eggs present (although there will be some open brood).

Attempting to introduce a queen during this time is akin to murder, not to mention a waste of the money spent on the queen and shipping. Similar situations arise in supercedures or emergency queen replacements and the eggless period also varies with the factors mentioned above. As a side note, this break in the brood cycle also interrupts *Varroa* mite reproduction, a good thing!

Of course, there are situations where you really are queenless. Okay! Thanks a lot! Now what do I do? How can I tell the difference? Am I queenless or not? Of course I had to bring up an exception to the situation (If I didn't, the bees would!). My observations indicate to me that if the hive has a queen, although not yet laying, the bees will tend to leave a brood area open with freshly cleaned and polished cells. It may be a small area just on one or two frames, or it can be larger, depending on the colony. This is usually in the center of a hive body. I feel these cells are prepared "in waiting" with the knowledge that a queen is present and are made ready for her when she does initiate laying. By contrast, in queenless situations, I see much more filling of the brood nest area with nectar and pollen and much less regard to maintaining open cells.

Other queen problems might involve drone laying queens or laying workers, which have their own indicators. Both drone layers and laying workers will lay unfertilized eggs yielding only drones. The eggs will be laid in both worker cells and drone cells. Drone larvae reared in worker cells will be capped with a bullet shaped cap to accommodate the larger drone larva. In distinguishing between a drone laying queen and a laying worker, I find the pattern of laying workers to be far more irregular and scattered than a drone-laying queen. In one instance, a drone laying queen placed a very nice, solid pattern of drone cells right in the center of a frame! Possibly a spent (out of sperm) or damaged queen laying only unfertilized eggs may not know it herself and continues on as if all is well. Failing queens may lay a few viable workers amidst many drones as they "fade."

Laying workers in control, will tend to lay multiple eggs per cell and may have eggs on the sides of cells rather than the bottom center. The shorter abdomen of the worker bee playing queen cannot always reach the bottom. It is important to note, colonies with laying workers consider themselves queenright and will rarely accept an introduced queen. I have not had any success myself with shaking the colony behind the hive and requeening to rid the hive of laying workers. I have however, been quite successful forming a two or three frame nuc with a new queen and placing this on top of the laying worker colony with paper between, then joining them in a few days.

Other indicators may only be noticed by you and your relationship and history with your bees. Does the hive seem different now than at the last inspection? (you take notes, right?). Are there any remnants or evidence left of queen cells from a swarm or supercedure? Was anything done recently that may have created the situation? Sometimes when making splits or pulling frames of brood, the queen is missed (removed to the split) and creates a replacement situation in the donor hive. Take note of the "tone" of the hive at each inspection. Queen right, healthy hives seem to have a more energetic thrum whereas a queenless hive tends to have a lower pitched, melancholy tone, lacking

vigor. Look at all the indicators and if there is some doubt, wait and recheck the hive after a few days or discuss the situation with another beekeeper or mentor.

If you decide your hive is queenless, and you receive a new queen, consider the different methods of queen introduction. I prefer making small nucs and requeening with the nuc atop the queenless hive, paper between. If no additional brood is available, introduce the queen slowly, either in the shipping cage or using a queen introduction cage. Introduction cages allow the queen and her attendants' access to a small area of comb and can get the queen laying before "joining" the rest of the hive. Observe the bees as you place the cage in the hive. Are the bees aggressive towards her? Better wait and check again for another queen or try adding a feeder with 1:1 syrup. After a few hours feeding, the bees may be more receptive to the new queen. Keeping the feed on during the new queen introduction can help make the requeening successful.

Whether you have one hive or 50, develop a system of record keeping that works for you. Keeping good notes on hive inspections goes a long way when you have resort to "detective work" and solving (or at least hypothesizing) what may have happened in your hive.

Take a digital camera with you to your beeyard(s). Pictures are good records if you are not sure what you are seeing and you can show them to a mentor later on. Most digital cameras also have an audio recording feature so you can record a description along with the picture or just make a voice recording of your observations. Take note of anything unusual, especially if it does not make sense at the time. The bees may explain it to you in later inspections!

Have your queens marked or mark them yourself (carefully!). It will help you know if your original queen has been superceded or replaced. If you just bought her and she was superceded quickly, let your queen supplier know. Always remember, in determining the status of your queen, to exercise patience, and take into consideration what you see in your hive and what it means before deciding to call for a replacement queen. Many times at a follow-up inspection, you will find eggs and a beautiful queen, laying well, not to mention a few more dollars in your pocket! BC

Colony Collapse Disorder (CCD) Is Alive And Well

Jerry Bromenshenk

Despite published rumors of its demise, this winter CCD again decimated colonies in California and other states. I saw collapsing colonies in Florida after the American Beekeeping Federation meetings. When I got back to Montana, we had reports of bee problems from several states, along with stories of major collapses in California. I called the Editor here and found that we were both getting similar reports, so, to find out more, *Bee Culture* sponsored a trip to California to see what was going on in the almond orchards.

What I found was a situation that mirrored that of 2007. Bee losses were widespread. The affected colonies displayed the signs of CCD, with sudden colony collapses, resulting in empty hives or hives with a queen and a fistful of young bees. Some beekeepers lost 80-90% of their bees; many more lost 50-60%, with the mildest cases reporting 30-40% of colonies showing signs of failing to thrive and dwindling.

I inspected and sampled bee colonies from Modesto down to Bakersfield, and saw the same scenario everywhere. Although impossible to quantify, CCD bee losses seemed to be on par or maybe even worse than in 2007. Both intra-state and inter-state migratory beekeeping operations were impacted, as well as stationary beekeepers. Size of beekeeping operation did not appear to be a factor; nor were all beekeepers affected. I saw some exceptionally strong colonies, but in general, strong colonies were only found in operations that did not report CCD.

One 20,000 colony outfit from North Dakota had good looking bees from western North Dakota, but 50% or higher losses of bees from eastern ND, and about 30% losses in Idaho. In addition, additional colonies came out of the wintering shed in Idaho with few or no bees. Twenty thousand colonies dropped to less than 10,000 before almonds, and the beekeeper was scrambling to find sufficient numbers of bees to meet his pollination contracts.

Some of the affected beekeepers had problems with *Varroa* mites, *Nosema ceranae*, or both. Others maintained very tight management, with meticulous treatment records, and supplemental feeding in the Fall with pollen supplements. Obviously, these beekeepers spent the time and money to control bee pests, yet still sustained CCD damage.

Overall, many of the affected colonies had displayed a lack of colony growth and less than expected honey crops the Summer before. Most of the sudden collapses appeared to have started as early as mid-December, with the worst losses having been sustained by the time I arrived in California in early February. By mid-month, growers who had not contracted bees, thinking that they were going to get bees at bargain basement prices, were frantically calling beekeepers, offering as much as $150 per colony for any beehive with any bees.

All in all, I was able to sample more than 30 beekeeping operations. The CA Almond Board stepped up to the plate and authorized emergency funding to pay for pathogen analysis, which we intend to subcontract to the U.S. Army Edgewood Chemical and Biological Center. The Cramer laboratory in Bozeman did a quick survey for *Nosema apis* and *Nosema ceranae*, using microscopy and PCR methods. Preliminary results indicate the *Nosema ceranae* continues to be a wide-spread organism infecting honey bees in both "strong" and "collapsing" colonies, but its relation to CCD and this current collapse remains unclear but is under intense research.

We suspect that CCD is caused by the interaction of two pathogens. The data set from the sampled beekeeping operations should help us to prove or disprove that hypothesis. Many of the beekeepers that we talked to are now noticing signs that point to a contagious disease. However, there are always alternative hypotheses, and the new and most prevalent one this year is that CCD is associated with cranberries. That might be a factor in the collapse of bees from Washington and Oregon, but it's difficult to argue for bees from North Dakota, Idaho, Texas, and Nebraska. What is clear is that published reports that CCD is on the wane, or that the millions of dollars invested in specific research projects have reduced the incidence of bee loss were premature. BC

CCD caused empty pallets from a single operation in California this year.

Talkin' Tupelo

Long before Peter Fonda came onto the scene in the movie "Ulee's Gold," the little town of "Wewa," has had a long, rich history of tupelo beekeeping families dedicated to the production of this highly prized honey.

Hazel Freeman

The road sign announced my arrival into "Honeyville", better known as Wewahitchka (American Indian for "Place of much water"). This charming rural Florida town is famous for producing Tupelo honey. Only a few places on earth can produce this rare, mono-floral honey and this region of the Florida panhandle is one of the best.

The area's abundance of "old Florida charm," natural beauty, and friendliness is reason enough to remain in the panhandle and avoid the crowds further south. For those interested in beekeeping and honey production, it's highly regarded, for as local beekeepers will proudly tell you, a place where some of the finest honey in the world is produced.

Long before Peter Fonda came onto the scene in the movie "Ulee's Gold," the little town of "Wewa," has had a long, rich history of tupelo beekeeping families dedicated to the production of this highly prized honey. Located in Gulf County, about 30 miles east of Panama City, Wewa is a part of the Apalachicola River basin in the North West portion of the panhandle.

The white tupelo tree, Nyssa Ogeche, thrives not only along the Apalachicola River but also the Chipola, Ochlocknee, and Choctahatchee. Similar to Cypress in its desire to have its feet wet, the tupelo flourishes along the many swampy backwaters, bayous, creeks, and rivers that make up this unique area of Florida. The major tupelo belt in the panhandle stretches for some 75 miles and is 20 miles wide.

Well before other beekeepers were using migratory practices, early Florida beekeepers chased the different nectar flows and moved their colonies, often by boat, wherever they could find food for their bees. Prior to the 1920s, tupelo was considered no different than any other honey. All honey was blended together. By 1940, tupelo honey was being recognized for its greenish gold color, rich, distinctive flavor, and its resistance to granulation if pure enough, but also for the effort required by beekeepers to harvest it.

By the mid-1960s, the Florida Department of Agriculture had put into place a method of pollen analysis used to determine the percentage of tupelo in a honey sample. With its unique cylinder shaped pollen, tupelo could be identified from other nectar source pollens. For dedicated tupelo beekeepers who painstakingly strive to extract the purest tupelo honey, this analysis gave them a way to prove their tupelo was some of the most pure available, and therefore justify charging more for it. This

Gulf County, Florida, Extension promotes their honey as "The Best Honey In The World."

Tupelo beekeeper Don Smiley extracts tupelo in his honey house.

The Tupelo Honey Festival takes place under the huge, moss-draped oak trees in Lake Alice Park, in Wewahitchka, Florida.

Cases of Smiley Apiaries tupelo honey is ready to be sold at the Honey Festival.

highly prized honey has helped put the little town of Wewahitchka on the map.

Different parts of the country have their own challenges when it comes to maintaining healthy bee colonies. Weather can easily make or break a good honey crop. Few places is this more apparent than during the short tupelo season which may last only a few days. Having experienced their worst Winter in 25 years, Florida beekeepers are suffering heavy colony losses. Add to their weather worries: infestations of mites, small hive beetles, increased development, mosquito spraying, and the damning of the all important rivers, and it seems tupelo beekeepers have their share of problems with which to deal.

Problems are put aside, though, when you visit Lake Alice Park, in Wewa on the third Saturday of May, where you'll be immersed in all things tupelo. The town celebrates their sweet liquid gold with the annual Tupelo Honey Festival. It was here where I strolled about under the old moss-draped giant oak trees on a muggy May Saturday. Mixing it up with the locals, I sampled tupelo honey lemonade and visited each honey vendor for a taste of what they consider, "the best honey in the world".

Ben and Glynnis Lanier

Names such as Lanier, Rish, and Smiley, are synonymous with tupelo honey in Wewa. The Lanier family celebrates 112 years of harvesting tupelo in 2010. Heading up the third generation are Ben and Glynnis Lanier. Ben's grandfather, L. L. Lanier, Sr. started the business in 1898 with a $500.00 loan from one of the area's wealthier farmers. Five hundred dollars back then was a lot of money. I'm sure he would be proud to know his legacy lives on.

I watch as Glynnis Lanier offers up samples and sells bottle after bottle of the Lanier family honey. "As long as my husband has a job, I'm buying tupelo honey," one customer announces. Glynnis shares with me some of the family history and her love of cooking with tupelo, "I love it in my coffee," she says. She promises to share with me a recipe for some of the best oatmeal raisin cookies around.

For those familiar with the movie "Ulee's Gold," the Lanier's beeyards were those used in the filming of the movie. Ben also acted as Peter Fonda's tutor in the art of handling bees for his role. Ulee's Gold introduced the world to tupelo honey. With the increased popularity of natural foods, locally produced healthful products, and cooking with fresh, unadulterated ingredients, the demand for quality tupelo honey continues to grow. "We can sell every drop of tupelo we bottle," says Glynnis.

Although the Laniers predict this to be a good tupelo year for the trees, "the swamps have been full of water all Winter and Spring, which is good for the tupelo." they expect honey production to be down. Averaging around one thousand hives, colony losses from an exceptionally cold Winter, *Varroa* mites, and hive beetles have taken a serious toll on their hive numbers and strength. "We've been affected by mites like we've never seen before," laments Glynnis.

"If you don't have a mite problem, the hive beetle usually isn't a problem, but when hives are weakened by the mites, the beetles move in and overwhelm the hive," she adds. Tupelo beekeepers are finding the authorized treatments are not as affective as they once were and the mites are devastating the colonies. As for CCD the Laniers believe the accumulation of pesticides has something to do with it. "We have not been affected, but we keep our bees on our own land, and never utilize them for pollination services or locate them near agriculture."

Jim and Kathryn Rish

"This is the best honey on the planet," Jim Rish sings out as people stroll by his honey table under the big oak trees. Rish doles out dollops of his pale, greenish-gold tupelo to willing tasters. "This will put the pep in your step," he chimes in, as the tasters become buyers. Money and honey exchange hands, and Rish reaches from a stack of cases to restock the honey bears, and bottles just purchased.

Rish, a fourth generation tupelo beekeeper, has been involved in the family honey business since he was six years old. "My great-grandfather started the tupelo business in 1885." Rish says his great-grandfather's original honey house, now over a hundred years old, is preserved at the Panhandle Pioneer Settlement, a living history museum in Blountstown, Florida. Rish's son, Nathan, and wife, Crystal, are learning the business and plan to carry on the family's tupelo tradition.

Until recent years, Rish and his dad, who passed away in 2005, man-

Smiley's beekeeping operation was chronicled in the 2005 book, "Robbing The Bees . . . A biography of Honey - The Sweet Liquid Gold That Seduced The World," by Holley Bishop.

Fourth generation tupelo beekeeper Jim Rish sells his honey at the Tupelo Honey Festival.

aged about 500 colonies of bees. The last few years the South African hive beetle and the *Varroa* mites have taken a serious toll on Rish's numbers. For *Varroa* mites he has found some success with Apiguard, and the use of screen bottom boards in Spring and Summer. "I've accepted the fact that every year it's almost like starting over," he says of trying to rebuild colony numbers.

For hive beetles, he uses organic beetle traps. He's been known to use smoke on each frame of a hive to drive thousands of beetles out, where they drop into a pan of cooking oil. "It's slow and it's laborious but it takes out thousands of beetles," he says. "If you don't keep on top of them they'll put you out of business."

As for CCD, Rish says he's been lucky and hasn't experienced the problem yet, but adds, "I never put my bees where they spray pesticides on crops. To protect them from mosquito spraying, I keep them at least 100 feet away from the road with a row of trees between them and the road". He believes pesticides have to be contributing to CCD. "For the hive to leave the brood, they have to make a decision collectively. Something in that hive had to make them want to leave," says Rish.

Rish is one of the few beekeepers who still moves some of his hives by boat to tupelo locations. Placing hives up on platforms in flood prone areas, beekeepers must constantly be aware of the threat of flooding in their beeyards. He has had run-ins with bears and eastern diamond back rattlesnakes, and admits, "Nowadays you really have to want to be a beekeeper. It's hard work but it's rewarding".

Don and Paula Smiley

Don Smiley wasn't born into the bee business. He came by his interest in beekeeping later in life. He worked at other jobs before getting into bees. In the late 1980s his fascination with bees got the best of him. After talking bees with a friend who kept them, he finally decided to give it a try. "I started with eight hives and I just fell in love with them. I kind of became obsessed with them. For years I'd dream about bees," he laughs, shaking his head as though that seems kind of silly now.

Smiley's hobby beekeeping soon grew into a full-time business and he's been at it for over 20 years now. "It seems like it gets harder every year. Maybe that's because I'm getting older." He's grown his business into becoming one of the biggest producers of high quality tupelo in the area and ships his honey around the world. "Tupelo is what keeps us all in business," he says, "If not for the tupelo, we wouldn't be able to make a living at it." Tupelo producers can get three times the price that regular wildflower or mixed honey brings.

Smiley's beekeeping operation was chronicled in the 2005 book, "*Robbing The Bees . . . A biography of Honey – The Sweet Liquid Gold That Seduced The World,*" by Holley Bishop. Bishop follows Smiley through a typical year of beekeeping in his quest for the "tupelo". "That's when I really started selling honey," Smiley says of his notoriety following the release of Bishop's book. The past of couple years have been good tupelo years, with Smiley averaging around a hundred, 55 gallon drums each of the last two years.

Though 2008 and 2009 were some of the best tupelo years he's had since he began beekeeping, Smiley is not optimistic about this year. "I've probably lost in excess of three hundred hives this Spring," he says. With a combination of cold, wet weather, and the *Varroa* mites, Smiley says he'll spend this year just trying to build up his colony numbers in hopes next year will be better. "If we don't get something else in our arsenal to battle mites we're going to be in trouble."

Smiley's advice for new beekeepers: "Read, read, read . . . listen to other beekeepers, and find an experienced beekeeper that will work with you to help you learn. We need more beekeepers," he adds.

Tupelo beekeepers agree the challenges of keeping bees and producing honey seem to grow more difficult with each year. They find solace in knowing that they are not alone. Many fellow beekeepers are also experiencing many of the same trials and tribulations. Their hope is that the recent renewed interest in the importance of bees brings about more positive changes for the future and future beekeepers. BC

Let's Vent

Even Summer bees need good ventilation – upper entrances and screened bottom boards go a long way in reducing this manageable stress in a colony.

Joe Traynor

I started in almond pollination in the 1960s when California almond acreage stood at 100,000 and bee-rental prices were $3/colony. California beekeepers, almost exclusively Central Valley beekeepers, provided all the required bee colonies. As almond acreage ratcheted up to 250,000 acres in the 1970s, higher pollination fees (around $10/colony) attracted a few beekeepers from Oregon and Washington and one or two from Montana and the Dakotas. This was the first opportunity I had to look at out-of-state beehives and I wondered what those little holes in the upper hive body were for, as I had never seen them before. My curiosity overcame my fear of exposing my ignorance and when I asked a Dakota beekeeper "why the holes?" I was patiently told they were there to provide an upper entrance in case of snow but more importantly to provide ventilation. The snow explanation made sense but I had trouble with "ventilation" until it was explained that bees needed to rid their hives of excess moisture. If I had read (or retained) the information in the beekeeper bible *The Hive and The Honey Bee*, I would have known this since John Ambrose explained it in the 1992 edition, pp 645, 646 (and it was likely covered in the 1975 and 1963 editions which I can't locate):

Boxes with upper entrances and "weathered" joints provide good ventilation all Summer, and all Winter long.

> *"Bees seem to have little trouble with cold temperatures, but cold temperatures in combination with moisture or high humidity, do present a problem. Therefore it is to the beekeeper's advantage to provide adequate ventilation in the hive to reduce moisture buildup. This is particularly true in the winter when the bees cannot break their cluster to dry out the hive interior by fanning their wings . . .*
>
> *A strong colony that stays dry will be able to survive cold weather conditions and the beekeeper's main concern is keeping the bees dry, not warm . . . ventilation flow can be augmented if the beekeeper maintains an auger hole in one of the upper hive bodies. This hole can be anywhere from ¾ of an inch to an inch in diameter and it should be on the front of the hive."*

Thinking back, I wondered why Central Valley beekeepers didn't make ventilation holes since their hives Winter in cold, foggy weather. I have since concluded that such holes were (and in some cases *are*) not necessary because colonies in our Central Valley shrink down to four frames or less in the Winter unless significant supplemental feeding is done (few CV beekeepers provided supplemental feed in the 1960s). A two-story colony holding only four frames of bees should have ample ventilation, even when beekeepers provide entrance reducers for cold protection. Today, some CV beekeepers with strong colonies (via supplemental feeding) refuse to apply entrance reducers because they feel they will impair ventilation. CV beekeepers with populous Winter colonies should probably implement some form of ventilation for their hives if they continue to Winter hives in the Central Valley. Some large southern California beekeepers that bring their bees to CV almonds in January (they must start early in order to get the last of their bees in before bloom) are concerned about ventilation for the two to three week period in the cold-foggy valley before almond bloom commences.

One thing that impressed me with Dakota bees in the '70s, was their tremendous populations when they brought them to California in November – two boxes crammed full of bees and even after a 10% drop in popu-

lation during the winter, still 12+ frames for almond pollination – this was well before tracheal and *Varroa* mites entered the picture.

Populous hives generate considerable heat with consequent water condensation. You may have experienced the same phenomenon when you hop in your car on a cold day after a workout at the gym – your body heat causes the windows to fog up a bit. Pile four of your workout buddies into the same car and you're talking major window-fogging. A populous bee hive will produce far more moisture during cold weather than a weak colony.

The importance of ventilation was brought home to me this past Winter when a Colorado beekeeper who had always provided excellent almond bees suffered significant dwindling and nosema problems this past December-January. He had replaced many of his old, tattered, leaky supers with brand-new air-tight boxes. Great-looking equipment, not-so-great-looking bees. Fortunately, he wasn't able to re-do his whole outfit and his cruddy-looking hives were fine. This beekeeper spent thousands of dollars on pollen patties and when he found mold and fungus growing on the patties in the air-tight boxes, he threw the patties away because he thought the foreign molds and fungi could be exuding toxins.

With beekeepers now attempting to provide hives with high bee populations for almond growers, the need for adequate hive ventilation becomes more important than ever. This is especially true in this era of CCD, believed to be caused by a virus or other pathogen, with nosema implicated in the malady. Just as the H1N1 flu virus is spread more rapidly when humans are confined in a small space (airplane, classroom) nasty bee bugs can spread rapidly when high populations of bees are confined for prolonged periods in boxes lacking adequate ventilation.

There has been a discussion for years among out-of-state beekeepers that winter their hives in California as to whether it is better to Winter bees in the valley floor, where fog can confine the bees or in the foothill area to the east that is out of the fog belt. Those favoring the valley floor feel that the fog keeps the bees from making fruitless foraging flights that result in rapid aging of the bees. Those favoring the foothills feel that damp, foggy weather is detrimental to bees. All agree that best place to Winter bees in California is in fog-free areas that have ample flower sources. These areas are on the coast or in Southern California but are very limited.

The spike in CCD instances this past Winter could well be due to a combination of cold weather, populous colonies going into Winter and poorly ventilated hives. The prolonged cold spells that hit the southern states this past Winter were well covered on TV and also documented in the March issue of the American Bee Journal (p.237). These cold spells affected colonies in the major bee states, Texas and Florida. If these colonies had the bug, or bugs, that cause CCD during the Summer-Fall months, populations of this bug (or bugs) could have exploded during December-January confinement in cold weather, especially in hives that lacked adequate ventilation.

The moral: if you Winter bees in areas that are susceptible to prolonged cold snaps – even a once-in-20-year cold spell – and your equipment is "tight", you would be wise to implement a slogan recently used in another context: *Drill baby, drill.* BC

Joe Traynor is a pollination broker in Bakersfield, California, and a frequent contributor to these pages.

MEMPHIS ZOO'S BEES

Gail Karr

The Memphis Zoo encompasses 70 acres in the heart of Memphis, Tennessee. The annual attendance averages around 900,000 visitors. In Memphis, we strive to connect people with wildlife, and in our new, highly interactive exhibit "Birds & Bees," we've done just that.

This exhibit has previously been a spider house and butterfly exhibit. In 2009, our staff decided to convert the spider exhibit into a bee exhibit which connects to an outdoor aviary for budgies (small parakeet type birds). The response has been overwhelmingly positive.

I have been a beekeeper in the Memphis Area Beekeeper Club for 10 years. We have discussed numerous times putting a honey bee exhibit at the Memphis Zoo's "Once Upon A Farm" exhibit; however, it never seemed to happen.

I was thrilled when the department approached me about doing an interactive Birds & Bees exhibit. It would contain an educational bee exhibit that would be connected to a budgie aviary.

The bee exhibit contains a historical display of beekeeping equipment, graphic panels that explain bee swarms, pollination of our food and interesting facts about bees.

The crown jewel of the Bee House is the observation hive. I had looked at many observation hives to try and build one that was both functional and visitor-friendly. We had a carpenter build a twelve-frame observation hive made of safety glass. There was a safety glass tunnel to the outside.

This hive has a crowd watching it regularly. We have Zoo members who return weekly to see the progression of the hive. The queen is marked and is regularly seen laying eggs on the frames.

In addition to the observation hive, the two traditional hives on the backyard of the exhibit have been doing well. Needless to say, I have employees fighting to get honey. I am hoping to do a drawing for the jars of honey and donate Zoo honey to silent auctions.

Our focus is educating the public about the recent decline in honey bee populations. We used colorful wall graphics to compliment the exhibit. There is a display of a beekeeper and the historical tools used in beekeeping. Walter T. Kelley Company supplied the display with many artifacts for the display on loan.

The biggest challenge of the exhibit was getting the bees inside the observation hive. We started a traditional hive at another location, letting it get established. We moved the bees into the hive in May. This was quite the ordeal. There were bees everywhere – not all went into the hive.

Once the hive settled down into their new home, I knew this was going to be a worthwhile exhibit. There is always so much to see in the hive. The honey produced is the most beautiful I have seen.

Beekeepers work the beehives during public hours. The bees also make guest appearances on television with a one-frame observation hive to promote the exhibit.

The Memphis Zoo is hoping that while promoting conservation of natural species, we can also encourage visitors to keep bees in their own backyard. BC

Be A Mentor

More and more of us realize that we need to make an investment in those who are interested in becoming beekeepers.

Fred Hembree

A young aspiring beekeeper recently asked, "How do you find a mentor?" And then he added, "All the beekeepers I know seem to be too busy and say they don't have time to mentor someone." This is a good question, but the comment that came along with it concerns me. Those who love the craft should be willing to make an investment in the future of beekeeping.

It is my hope that this young beekeeper will find a mentor and that more and more of us will be willing to "take on" someone who wants to learn about how to keep bees. A mentor is often considered to be someone who is more experienced and who has specific skills to pass on to others who are less proficient at a particular skill or task. Over the years, many people have benefited from having a mentor to help them advance in their particular endeavors.

A mentor can help new beekeepers avoid mistakes, save time and learn more.

How to find a mentor? Local beekeeping associations can be a great place to begin your search for a mentor. In our association, the question often asked is, "How many of you here tonight could use someone to help you with your beekeeping questions?" Almost every time the question is asked one or two hands go up. Then the next question is, "Where do you live?" Once that question is answered another question is asked, "Who in our association lives near this person and would be willing to help?" I have been pleased that every time that series of questions and answers has been put before the group, someone responds, offering to help.

If there is not a local beekeeping association in your area, check with your county agricultural extension agent. He or she may be able to put you in touch with other beekeepers willing to be of help. Don't give up in your quest to find a mentor. They are out there!

More and more of us realize that we need to make an investment in those who are interested in becoming beekeepers as well as with those who are new initiates to beekeeping. We do this in order to assure that there are others coming along for us to pass the beekeeping mantle to, if you will. Lets face it; we aren't getting any younger! In fact, I am in my 50s and several of my beekeeping friends are considerably older than I am. That said, a good number of us do all we can to help younger hopefuls who want to become beekeepers. It is in so doing that we plant seeds for the future of beekeeping!

I am currently enrolled in the Young Harris College and University of Georgia Master Beekeeper program. They have a wonderful "Beekeeping Institute" that meets each May in the north Georgia mountains, at Young Harris College (**www.ent.uga.edu/bees/young-harris.html**). One component of the Master Beekeeper program is that participants are required to complete a number of "public service credits." These credits are awarded for things such as giving a public demonstration on a beekeeping topic at a fair, festival or similar public event. Credits are also given for presenting a bee-related lecture or workshop to a non-beekeeping group, or for assisting members of youth organizations with project work. In addition, credits are given for mentoring a new beekeeper through at least one complete season. While this is not a complete list of items eligible for public service credits, it gives you the general idea that participants in the Master Beekeeper program are taught the importance of being mentors who reach out to help others in beekeeping and to encourage others to get involved.

Think for a few moments of those who have helped you become the beekeeper you are today. My earliest memories take me back to childhood when I watched my grandfather work bees in hives and old "log gums." As I got a bit older, he allowed me to help him work the bees. He was my first mentor and he taught me so much. Granddad passed away a number of years ago, but his positive influence on my life remains intact. I often feel as if he somehow is looking over my shoulder when I pull

out a frame for inspection from one of my hives.

Then there was a neighbor who loved to produce comb honey. He took me to his mother's home where he had an apiary. Surprisingly, his mother lived in the city in an older established neighborhood. High thick shrubs surrounded his mother's backyard where he had his apiary and all the yards nearby were literally covered with white dutch clover that the bees enthusiastically worked. He showed me how he managed his bee yard for comb honey and gave me a sample of the sweet honeycomb that he had harvested just the day before. Delicious and instructive all at the same time!

I think of Keith Elrod, the president of our county beekeeping association who has been more than happy to discuss bee related issues as they have developed in my apiary. He has been a tremendous help as someone with which to discuss ideas and options in dealing with situations in the bee yard. Not long ago, Keith invited everyone in our beekeeping association to come to his home apiary and go through his hives. As we did, he took time to show the newly initiated all the things they should look for while doing a hive inspection. In fact, he does this on an annual basis. Way to go Keith!

I think of people like Bob Cole and Ann Harman who have often provided a book table at beekeeping events I have attended. I usually purchase a book or two from them. However, I am of the opinion that the books are not the most valuable things they have to offer. They are the real jewels! Both of these outstanding individuals are highly respected Master Beekeepers and I have found them to be more than willing to share from their vast repertoire of experiences. More than that, they are encouragers who do all they can to help those less experienced grow into more proficient beekeepers. How do you put a value on that?

There are several tests that are required for those moving through the various phases of the Master Beekeeper program at Young Harris. Sensing my pre-test jitters this year, Bob Cole smiled and gave me a reassuring look and said, "Don't worry about the test. I know you are going to do just fine." Hearing those words of encouragement from someone as highly respected as him meant so much to me. Perhaps Bob is a bit prophetic or perhaps he has just been around long enough to know from our conversations that I was prepared and ready to take the test. I don't know for sure, but I can say with confidence that all of these beekeeping mentors and acquaintances have proved to be more valuable than I could have ever imagined.

Mentoring has been a tradition in beekeeping passed down from generation to generation.

Many of you have given of yourselves generously to mentoring others in beekeeping over the years. Thank you! Your efforts have made a difference in the lives of many. Mentoring has been a tradition in beekeeping passed down from generation to generation. In that regard, all of us are challenged to step up to the task of mentoring! Being a mentor does not necessarily require lots of time and energy, but rather it requires a desire to impart to others some of the knowledge and skills we have learned over the years. What often goes unsaid by those who serve as mentors is that we understand the debt we owe to those who instructed and encouraged us in the past. In that regard, many of us feel a sense of obligation to pass along the knowledge and skills we have learned.

It has been my observation that you never know just how important even the smallest amount of assistance means to someone who is struggling to become a beekeeper or to become a better one! So please consider giving a little of your time in helping others. Being a mentor gives us the opportunity to give back or to return some favors, if you will, that were extended to us by those who served as our mentors along the way.

Lastly, one of the greatest joys of being a mentor is the opportunity it provides us to make new friends! The relationships established are often cherished for many years. This is my hope for you as you make an investment in the future of beekeeping by being a mentor. I wish you the best! BC

G.I. BEES

Ross Conrad

The largest source of funding for apiary research comes from the Pentagon and the U.S. military.

Honey bees have been used in military campaigns for thousands of years. In her book *The World History of Beekeeping and Honey Hunting*, Eva Crane describes the release of bees into mines, tunnels, and other enclosed areas that were occupied or used by enemy forces as among the earliest reports of bees used in warfare. During the middle ages (500-1500 AD) it became common to drop, throw, or project hives of bees upon the enemy, typically over fortified walls. The association between an angry swarm of bees and incoming projectiles established during this time led to the intertwining of English language etymology: *bombard* with the bee's entomology: *bombus* (the name given to the bee genus that includes the bumble bee in the family Apidae).

After about 1850, the use of trip wires, or other means of disturbing strategically placed hives at the appropriate time came into use during wartime. Such tactics are said to have been used in the American Civil War, World War I, and during the U.S. war in Vietnam. Honey bee products have also long played a role in warfare from encouraging invading armies to consume toxic honey in 399 BC, to the use of beeswax as a lubricant in the manufacture of shells and munitions during WWII.

In the 21st century the use of honey bees in warfare is forging a new course. Our modern day warfare is based upon intelligence. As a result, much of the focus of the "war on terror" is not aimed primarily at what the enemy is doing but at what the enemy is intending. As a result, rather than simply being used as a weapon of war today's "six legged soldiers" are being applied to intelligence gathering in ways that extend our human senses. The largest source of funding for apiary research today comes not from the U.S. Department of Agriculture, but from the Pentagon and the U.S. military as part of an effort to remake entomology in an age of empire.

Anthropologist and geographer Jake Kosek, who serves as an Assistant Professor at the University of California, Berkeley, has examined this new role for the bee in the military and much of what follows here is based on his work. His exploration is part of a project that is examining the broader relationship between humans and honey bees and the role this is playing in the current CCD crisis. This boundary between human and non-human, or human and animal exists at the crux of the "war on terror" according to Kosek.

It has been noted that in order to understand crimes and atrocities that are committed against human beings by other people during wartime, one must investigate carefully the manipulation of power and information that allows a certain segment of the human population to be so completely deprived of their rights and prerogatives that no act committed against them appears as a crime. It is acknowledged that dehumanizing language and discourse that occurs within society helps turn others into "animals" who become less than human in the eyes of the populace and thus deserving of acts of aggression.

Similarly, in many societies, the general acceptance of the idea that animals are not very intelligent and beneath us that makes it acceptable for us to draft them into service during times of war. For a number of years now bees have been used to sample the environment in order to detect trace elements in the air, water, and within plants as they go about their foraging activities. Such sampling techniques are used by intelligence agencies in dozens of countries not only to detect land mines, but everything from plastic explosives, tritium used in nuclear weapons development, and chemical weapons deployment and development. Much of this work has been developed by the military science think tank DARPA (Defense Advanced Research Projects Agency).

Bees are easier to train than other animals like dogs and are more effective at detecting odors than wasps. By simply feeding the bees sugar syrup spiked with a small amount of the material you want them to seek out, the bees, through this Pavlovian training technique, associate the smell of a specific material with a food source and will naturally congregate in areas where the material occurs. Bees also can cover a lot more area faster than dogs can, and don't accidentally set off buried land mines. A new group, the Los Alamos Stealthy Insect Sensory Project Team has developed honey bee training and tracking techniques to the point that they boast that all they need to do is get specially trained hives within two miles of their target in order to be effective.

Military researchers and planners are finding that there are a number of limiting factors in their efforts to enlist the honey bee in military missions. They have discovered what all beekeepers learn, that bees have a mind of their own. As a result, bees are often delinquent in carrying out their mission and are just as likely to visit a blossoming fruit tree as a land mine, or chemical weapons facility. Additionally, bees don't fly at night or when temperatures drop too low. These restrictions have

led to the development of a trace element sampling device that relies on individual bees rather than entire hives.

Bees that have been trained to extend their proboscis whenever they detect an environmental chemical cue are inserted into a Styrofoam "cell" that hold them in place. The cell is then placed within a unit that is carried into the target area and the bee is monitored to see if it instinctively extends its proboscis in reaction to the presence of the trace element on which it has been trained.

As long as it is periodically fed, the bee will live for about two weeks within this man-made cell. Once it dies the bee is simply replaced with a new bee, much like a printer's ink cartridge is replaced once it is out of ink.

Such instrumentalization of the honey bee is being taken even further by a DARPA funded program called the Hybrid Insect Micro-Electro-Mechanical Systems (HI-MEMS) project. The aim of this project is to develop tightly coupled insect/machine interfaces by placing bio-electro-mechanical systems inside insects such as the honey bee early in their development stage. When inserted early enough, such as during the rapidly growing larval phase, the insect is able to heal itself and incorporate the technology directly into its body as an adult. Such an interface allows military personnel to control behaviors in motion and trajectories using remote GPS, optical or sonic signals, among others.

Jake Kosek also reports that the honey bee genome mapping project has spurred military efforts to genetically engineer the honey bee. These efforts are designed to try and make the bee more sensitive to odor thus enhancing the bees' detection abilities through the transgenic process, and with the synthesis of additional new traits, would better design the bee for tasks like the detection and monitoring of weapons development. All these efforts Kosek argues are making the line between the human and the honey bee more porous as we bend the behavior of the bee into service, not as a weapon, but as a source of technologies of intelligence. This is creating new militarized relationships between humans and honey bees. As the bee's senses are utilized for human intelligence, the nature of the bee is being affected and remade. The honey bee's genetics, physiology, and biology are being transformed by military interests and desires. As Kosek points out, the bee is in a sense becoming more human, and humans are coming to know the world in part, through the militarization of the bee.

Bees are easier to train than other animals like dogs and are more effective at detecting odors than wasps.

One example of this can be seen in a new battlefield strategy being developed to try to deal with today's wars that tend to be without definable territories and have no front lines that in previous times, would help to define the war effort. In an attempt to redesign modern battlefield techniques the Pentagon has turned to the form and metaphor of the swarm to combat the unpredictability and de-centered approaches to battlefield tactics that define modern warfare. In the publication, *Swarming and the Future of Conflict* published by the Rand Corporation, the case is made that swarming needs to replace air-land battle doctrine as a conceptual framework of military strategy. Air-land battle doctrine emphasizes close coordination between land and air forces acting in an aggressive maneuvering manner, such as when air forces attack the front lines of the enemy. Swarming on the other hand, relies on the operations of decentralized forces in a manner that values mobility, unit autonomy, and continuous synchronized real-time communications. Swarming is about opportunism and contingency rather than centralized planning in decision making. Such strategies entail the systematic pulsing of force or fire by dispersed units in both close-in and stand-off positions, in order to strike the adversary from all directions simultaneously. This does not necessitate surrounding the enemy, though at times it might, but rather focuses on individual units striking at will without command directives and in constant assessment, and reassessment of on the ground conditions.

Interest and research into swarming tactics were adopted in 2003-2004 by the Joint Concept Development and Experimentation Directorate, which is the joint forces command focused on research and planning made up of Army, Navy, Air Force and Marine personnel, and known as J9. As a result, the swarming concept has become a central strategy and planning element that is expected to be finished being developed and integrated into the U.S. armed forces by 2012.

The adoption of swarming tactics by the military will require structural changes. Such an organizational redesign would likely involve the creation of platoon-like pods joined in company-like clusters that would keep, but retool the most basic military unit structures. This is similar to the corporate redesign principle of flattening, which often eliminates or redesigns layers of middle management. This approach has been successful in business affairs and some believe that it may prove equally useful in the military arena.

For example, one study that has potential military value looked at how insects such as the bee, deposit chemical pheromones to coordinate foraging and other activities. Through a series of computer simulation-based experiments, the U.S. Department of Defense found that algorithms based on pheromones obtained impressive results in commanding a swarm of unmanned aerial vehicles that were attacking mobile targets.

Such strategies developed by private think-tanks and military intelligence are explicit in their use of animals and insects such as the honey bee. As such, nature in general, and the honey bee specifically, is no longer seen as a threat but has become a new model for efficient and effective warfare.

The relationship between humans and animals is an important one. Over the past two hundred years, humans have reshaped the honey bee to accommodate the requirements of modern industrial agriculture. Now we are reforming the bee for military advantage. Yet the importance and sacredness of our relationship to nature and animals is commonly recognized. It is the reason many parents provide pets for their children, so that the child will learn how to care for, and relate to animals in a positive way.

During this time of crisis between the honey bee and mankind, would it be wise to place more care in the making and reforming of our relationship to the bee? What is the legacy we are creating by genetically engineering bees for work as technological instruments of espionage, and for humans acting as the architects of military strategy for the U.S. empire? Under what conditions and to what means are some humans acknowledged to have the right of ethical treatment and due process, while others are subject to torture and become as killable as animals? Such questions and critical thinking about our relationships to animals, to each other, and the larger natural history of warfare are largely missing from the media and today's political discourse. In the beekeeping world, as Jake Kosek points out, an exploration of the relationship between humans and bees allow us to get to the heart of the CCD issue. BC

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How Does Your Garden Grow?

Gardening is a healthy activity, and your bees will thank you.

Ann Harman

Gardening is a combination or some hard work, some creativity, and lots of pleasure. If you have never gardened, start small and simple. Then in subsequent years you can decide whether to just have a few bee-friendly plants or expand into a world of flowers for bees. If you love your beekeeping you will soon find that watching the visiting bees has increased not only your pleasure at seeing them work but also your knowledge of the bee's life. If you have been an enthusiastic gardener for years perhaps this year is the time to increase your assortment of bee-friendly plants.

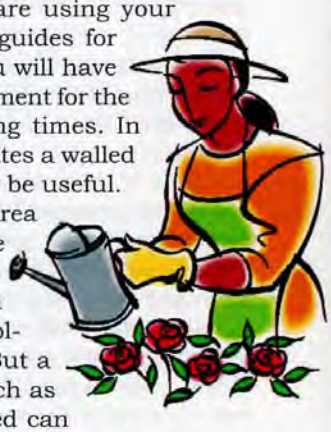
By the way, make sure you have plenty of batteries for your camera. Photographing bees on flowers is great fun. Besides, those photos can be useful. If you are giving a presentation on bees, on bee plants, or related topics those photos can be an important part of your talk. Photos are also used in the beekeeping journals and in various newsletters for associations. Perhaps those seeing the enthusiastic bees will inspire others to plant more bee-friendly flower gardens.

Lights, statues, various decorations, even garden gnomes can take their place in your garden. Paths between beds can be as fancy or plain as you wish. You can create your own stepping-stones of concrete by purchasing molds or making your own mold. Of course you will want a birdbath. Your bees will probably use it also as a place to collect water. I don't think the birds will mind. Pools and fountains are popular garden features. All these items create visual interest and make your garden unique.

A deck makes a very useful garden area even if you have a larger garden. But for those with limited space a deck can provide you with quite a selection of fruits, vegetables and flowers. The catalogs are showing a huge assortment of containers. Flower boxes that fit over or hang from deck railings come in multiple sizes. Huge pots are plastic for ease in moving. Pots on wheels allow you to rearrange your deck for giving a party. The hanging tomato bags are increasing in popularity. Everyone enjoys a home-grown tomato but do watch out for birds that may enjoy them, too. How about a container-grown blueberry bush? Nurseries are realizing that urban dwellers wish to grow berries and vegetables just as much as those in suburbia or rural areas with tracts of land for big gardens. So container-compatible plants are being developed. Although strawberry jars, in all sizes, have been around for many years you can put some plants in a flower box along with your bee-friendly flowers. The alpine strawberries make excellent flowerbox plants.

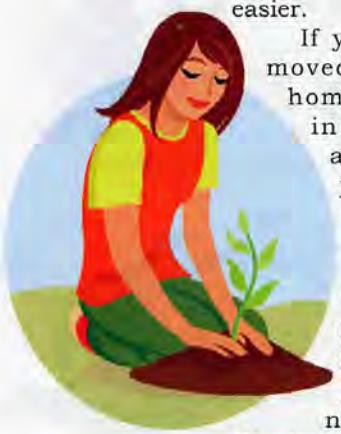
The wall of the house can have a trellis, or several, for vines. For flowers,. yes, but a trellis can support a cucumber vine or pole beans. Bees will appreciate both. The selection of trellises is enormous. You can have flat ones or three-dimensional ones. An arbor is like having two trellises. If the vines cover the top of an arbor you now have a cool spot to sit. If you don't like the trellises and arbors offered in various catalogs or at your local garden supplier, you can easily make your own to fit a particular space.

I promised you gardening with walls. These will extend your creativity with gardens. Walled gardens have existed for centuries. Brick or stone walls really create an interesting microclimate. They warm during the day and release their stored heat after the sun sets. Therefore, vegetables that grow within a walled garden can be planted and harvested sooner than those in the open. And the growing season is extended into Autumn when nights get chilly and frosty. Walls of wood also act the same way but not to the extent as brick or stone. If you are using your bee plants as guides for beekeeping you will have to make adjustment for the earlier flowering times. In some hot climates a walled garden will not be useful. The enclosed area will simply be too hot for successful growth for even heat-tolerant plants. But a single wall, such as a house or shed can be used.



A walled garden, no matter how small, makes fruit trees available. The technique for growing them is called espaliering. Woody vines and flowering shrubs are also espaliered. This technique is quite successful for vines with vigorous growth that are unsuitable for smaller areas. If you are planning to espalier a fruit tree I suggest looking through gardening books and paying a visit to the Internet. An amazing amount of information is available. You do need to search for dwarf and semi-dwarf fruit trees but these are abundant. You will find a number of shapes for training your espaliered tree. These shapes make interesting patterns against a wall. An accompanying technique is

to plant a tree to be espaliered in a large container. Since the roots are crowded growth is slowed. Management of the espaliered plant becomes easier.



If you have just moved into a new home, especially in a suburban area, to begin your gardening it may be wise to investigate your soil. You may not be aware of the history of the ground you are now living on. Was it pasture, cropland, spread with sludge, forest cleared for development? It may be possible to discover what had been done in the past. But even with that knowledge it would be wise to obtain a soil analysis especially in the area you plan to put your garden. Contact your local Cooperative Extension Service agent or Department of Agriculture to find out the details of having your soil analyzed. It can be very disappointing to see some plants that don't seem to thrive. Plants have nutritional requirements just like you and your bees.

Soil in new housing developments is frequently compacted by heavy equipment used in construction. Sometimes the soil is removed from one area and put in another. If homes are built with basements, where did that excavation dirt go? When covered over by sod you may see no trace of what was done. Compacted soil may have serious drainage problems. Sometimes it may take several years to rebuild good growing soil. But it is worth the effort. In the meantime you can plant some not-fussy annuals. In a larger area buckwheat is often planted. The blossoms are much appreciated by the bees. Then the plants are tilled into the ground for soil improvement.

Rocks. Some soils seem to grow rocks. The early settlers knew what to do. They just collected the rocks and built stone walls. You can use your rocks for building rock gardens and even low walls around beds. Use your imagination and artistic sense to make an interesting sculpture.

You will read about mulches. And you will find some of the information very confusing. Mulches actually serve several purposes. Weed control is just one. Winter protection is another. So is soil temperature. It is interesting to note that tomato plants really like red plastic mulch better than black. But be cautious in hot climates with plastic sheeting as it can raise soil temperature too high for the plants.

Speaking of weeds. A weed is actually a plant growing in the wrong place. But honey bees really love some plants that regularly appear on weed lists. Dandelion is a good example. Bees love dandelion nectar and pollen and find it a useful spring plant. Well, if you want a few dandelions in your bee-friendly garden, why not! Non-beekeeping visitors may be horrified. Don't let that bother you. Just smile and say the dandelions belong to the bees.

You may discover various critters that you never realized love gardens. The type of animal depends on where you live. In many area of the U.S. deer are a big problem, especially in suburbia where they are thriving on gardens and orchards. If you have visiting deer go ahead and try the various repellents, fences and planting undesirable (to the deer) flowers and vegetables. And then there are rabbits, chipmunks, birds, groundhogs, turtles, and even the neighborhood cats. Those are small, but bears do love berries. You will soon discover which invaders give you trouble and what are the best solutions.

Plants do get diseases. Various viruses, bacteria and fungi can invade some of your plants. Resistance to some of these diseases has been bred into some plants. However instead of reaching for an array of chemical cures, learn what you can do to prevent the problems occurring. If prevention means not growing a particular plant, then don't grow it. Our bees are subjected to many undesirable substances. There is no need to add more.

We can indeed help our flowers and vegetables to be productive in spite of the above threats of critters and diseases. But there is one thing we do not have control over. Call it weather or Mother Nature. You can be certain that at some time you will have untimely frosts, too much rain, drought, tornadoes and hurricanes. Just remember, as with bees and beekeeping, next year will be better.

Rooftops are becoming gardens now. However, before you embark on that project just make certain your roof and its supports are suitable. Gardens on top of tall buildings may be subject to wind damage so plan on low-growing plants or putting up suitable barriers to break the force of high winds.

Be sure to leave space for that particular flower that you love so much but is not at all native or bee-, butterfly- or hummingbird-friendly. It's a me-friendly plant so go ahead and plant it. Your garden, large or small, is for the enjoyment of all.

Gardening is a healthy pursuit. I recently read an article about all the heath benefits of gardening. Imagine this: if you spend 45 minutes gardening it equals 30 minutes of aerobics. Now, at the end of the aerobics what do you have to show for all that effort? At the end of your gardening time you could have a basket of tomatoes or a photo of a bee on your favorite flower. Some other health benefits mentioned were: Environmental Health – air pollution reduction; Financial Health – growing vegetables; Psychological Health – relieving stress; Physical Health – lowering blood pressure and receiving vitamin D. So I say Get Healthy! Be a Gardener! BC

Ann Harman enjoys her garden and her bees at her home in Flint Hill, Virginia.

INNER ... Cont. From Page 10

mad and bringing in pollen and, well, doing their bee things just fine. I figure I spent several hours and I don't know how much money on those three colonies all Winter . . . to end up with two Dinks that may, or may not amount to much this Summer. But they made it. We got 'em through one long, tough Winter.

You can tell me how they manage that, how they vibrate and quiver and move to stay warm. But they're just bugs in a box, and during the Winter a Dink is on the edge all the time. Always just about dead, always just about out of food. Always just hanging on. Dinks might not amount to much financially, and they might never take off, but I'm in complete awe of a handful of bugs that manage to keep their buzz going when thousands of others give up the ghost. They may be Dinks, but they're our Dinks, and we're proud of them. And I'm going to keep 'em going as long as I can . . . just wait and see how well they do.

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Have you seen the article everyone is talking about . . . the one that lists the hundreds of pesticides found in beehives? You can read the whole thing at **http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0009754**. It's 18 pages long including the references. There are lots of stories in this sad tale. Some are written boldly in the article, some are hidden between the lines. Some still remain to be told.

The boldest are the lists . . . pages long . . . of chemicals found in the wax, the pollen, and the bees. These toxic chemicals are now part and parcel of the lives of our bees. And, of course, all the rest of the creatures that dare to live in the real world.

Here's the bottom line, that I'll put first . . . The researchers found 121 different pesticides and metabolites comprising 5519 total residues within 887 wax, pollen, bee and associated hive samples (with an average of 6.2 detections per sample), from 23 states and one Canadian province. Those associated hive samples included corn syrup, pollen substitute, royal jelly, honey and floral nectars.

Beeswax, certainly, is a problem. Years ago scientists at the USDA Bee Lab in Madison, Wisconsin took a look at commercially available beeswax foundation to see what was there. This was before the days of mites and miticides and the only poisons in a honey bee's life were farmer applied. And there were lots of poisons to be found, even back then. Dr. Erickson, the Lab's Leader used the analogy that the beeswax in a colony was like a sponge, with water dripping on it. The poisons brought back to the hive were soaked up in that wax until the wax couldn't hold any more, and then they dripped back out . . . lipophilic is the term that means 'soaks up pesticides like a sponge'. He advocated routine comb replacement back then . . . that's where I got it, too.

In this newest paper even more chemicals were found in foundation wax – 27 they say. Two, by far the most, were beekeeper applied miticides. But twenty five . . . 25 – other chemicals that don't belong in a honey bee's life were there too. That's 25 toxins in your colony before you ever start, before you put that frame in a colony. They're already there before a baby bee takes it's first breath. 25. That's an easy number to remember.

Once foundation becomes comb, bees bring back still more of those chemicals that don't belong in a beehive . . . and beekeepers add some too. They found 87 different chemicals that had soaked into the beeswax samples they took. Not all from one hive, no, that would be unthinkable. But when they looked at all of the 259 comb samples they took and added up all the chemicals they found in those samples . . . 87 was the magic number.

Here's the kicker. Our two most-used miticides? Both were found in 98.1% of the samples. No escaping this. stuff, is there. And, there's no escaping it for years because the half life of these chemicals in beeswax is five years. The tests they ran can detect one part per billion of these chemicals. One part per billion. The sample with the highest dose of fluvalinate had 204,000 parts per billion . . . the lowest two parts per billion – the average amount found, over all of the 254 samples with fluvalinate present was 7,473.8 parts per billion. That seems like a lot, but remember, it's parts per billion . . . so keep that in mind.

There's more to this tale. They took samples of pollen stored in these same hives. This is the staff of life for honey bees . . . the protein power bars that get the kids up and running. The building blocks of worker jelly, royal jelly, drone jelly . . . if you are what you eat, then our bees are pollen powered. So our bees are feeding our bees more of the same chemicals found in the wax. Ninety eight chemicals were found in these pollen samples. Not all 98 in every sample, certainly. That would be unthinkable. Personally, I'd put anything more than, say , 10% to be a serious problem . . . that is, any chemical found in more than 10% of the pollen samples is available in amounts great enough to look at again. So, greater than that, why, it's only 18 chemicals that look to be significant. For the wax samples, only 22 chemicals were found in 10% or more of the samples. Again, these are parts per billion . . . Billion.

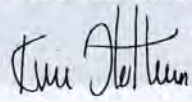
Other tales remain to be told, I'm told. Honey isn't in here, but they were looking at brood boxes, not honey supers. And royal jelly samples were taken, but not reported in this paper. I need to find out why for those yet.

It's quite obvious that our bees live in a dangerous world. They may have some natural powers of detoxification for these chemicals, but the constant assault of lethal and sublethal chemical weapons both at home and while in the world can't have a positive outcome, if for no other reason than this: You and I live in the same world our bees do. And we, too, are daily bathed in this toxic shower. Our bees are not doing well.

So how do you feel today?

It's May, and the news isn't as good as we'd like, but at least now we've looked the tiger in the eye. And we can fight back. We can move bees away from trouble, and we can work with the beekeepers on the Honey Bee Advisory Board who are trying to get this fixed (want to help the HBAB? Call me). Listen to what they have to say and help them when you can by reporting problems and donating some money. They haven't given up. We can't afford to.

And remember . . . keep your smoker lit, your hive tool sharp and your veil tight . . . it's full speed ahead.



The Long Blooming Bee Garden

It is possible to provide bees with nectar and pollen for at least three seasons of the year.

Connie Krochmal

Pink Hyacinths and Lambs Ears.

With careful planning, it is possible to provide bees with nectar and pollen plants for at least three seasons of the year. The following plants are highly recommended for the long blooming bee garden.

Hardy Bulbs

Hardy bulbs are very reliable sources of nectar and pollen. You can have Spring bulbs in bloom over a five month period.

Here in western North Carolina crocuses can begin flowering in early February. Great for naturalizing, these bulbs provide nectar and high quality pollen. When enough plants are available the blossoms can yield a small crop of honey.

Other suitable bulbs for bees include grape hyacinths, hyacinths, glory of the snow, snowdrops, and anemones. With the flowering onions, you can extend the blooming season into June.

With the exception of the anemones, most hardy bulbs need full sun. A well drained soil is best. Choose bulbs with single type blossoms as the doubles aren't suitable for bees.

Mahonia (*Mahonia spp.*)

Among the long blooming shrubs that provide nectar and pollen are the hollies and the boxwoods as well as the mahonias and Oregon grape holly.

While several mahonias are hardy to zone five, most are suited to warm climates – zone seven or so. These plants typically reach about three to six feet in height.

Members of the barberry family, there are at least seven species in cultivation. Improved cultivars are also available.

The thick, leathery, evergreen foliage of the mahonias resembles that of hollies. This is alternate and compound with up to nine leaflets. Some species have spines along the margins. During the Winter, the leaves often turn greenish-purple. One specie, the Oregon grape holly (*Mahonia aquifolium*), is named for the attractive grape-like fruits. These ripen to blue, and have a whitish bloom.

*Windflower (*Anemone blanda*).*

The mahonias have bright yellow, sweetly scented blooms. With six petals and nine sepals, they open in large clusters.

Despite our frequent snow storms here in western North Carolina, the reliable leatherleaf mahonia (*Mahonia bealei*) continues to bloom sporadically throughout the late Winter into the Spring months. To protect the flowers from snow and ice, I plant them under the eaves or other sheltered spot. It is hardy to zone six.

The mahonias are adapted to most soils provided it is well drained. Partial shade is best as the foliage of some species can experience Winter burn in full sun. Generally these plants have few problems. They will need pruning occasionally.

The mahonias can provide a high yield of light amber honey as well as pollen.

Viburnums (*Viburnum spp.*)

Along with the spring flowering cherries, plums and crab apples, include several of the viburnums. Some of these reliable, vigorous plants are native. About 35 species are in cultivation. The height can vary greatly with some reaching 25 feet in height. However, very dwarf ones are also available.

These woody plants include small trees as well as shrubs. They typically bloom from April through late June, depending on the species. There is a viburnum for every type of situation and climate with some being hardy to zone three.

Viburnums have opposite leaves that can be deciduous, evergreen, or semi-evergreen. They bear large, rounded or flat clusters of small

white blossoms. Some flower clusters resemble snowballs or hydrangeas. The small, tubular blooms have five petals. Often, they're fragrant.

The blooming time can vary slightly. While most are Spring flowering, some species, such as Laurestinus viburnum (*Viburnum tinus*) can begin blooming during January and February in the South. Chinese snowball (*Viburnum macrocephalum*) can produce blossoms during the Fall in the South.

These plants have very showy fruits, which ripen in the Fall. The color can vary widely, depending on the species.

Requiring little attention, the viburnums are easy to grow. They prefer a reasonably rich, well drained garden soil with an acidic to almost neutral pH. While most viburnums prefer full sun, several species are adapted to shade.

Assuming enough viburnum blossoms are available, these can yield a surplus of light colored honey. They also provide pollen.

Evodia (*Evodia spp.*)

While the majority of bee trees tend to bloom during the Spring there are a number of Summer flowering species. The evodia is perhaps the best known. This tree is a member of the rue family.

Korean evodia (*Evodia daniellii*) is the most popular of this group. Somewhat shorter than the other species, it is an excellent choice for the bee garden. While this might ultimately reach 50 feet in height under good growing conditions, it is usually only 30 feet or so with a matching spread.

The stems are often angled. The deep green, opposite, compound leaves are smooth and shiny. Up to five inches in length, these taper to a point. Providing no Fall color, they drop after a killing frost. This tree has light gray, smooth bark. The red to pink fruits split to reveal the blackberries.

Beekeepers favor the tree because it is covered with tiny white blooms for three weeks or more during the late Summer. Providing nectar and pollen, this is a favorite among bees. These blossoms appear in large, clusters.

This is a relatively short-lived tree. Hardy to zone five, Korean evodia is weak wooded. The limbs tend to break during Winter storms and heavy winds. Easy to grow, it is a carefree tree that requires little attention once it is established. This exhibits few if any disease or insect problems. Preferring a moist, rich, well drained soil, it needs full sun. An acidic to neutral pH is ideal. The young plants have a fast growth rate.

USDA Hardiness Zones

Zone		From	To
0	a	< -53.9°C (-65°F)	
	b	-51.1°C (-60°F)	-53.9°C (-65°F)
1	a	-48.3°C (-55°F)	-51.1°C (-60°F)
	b	-45.6°C (-50°F)	-48.3°C (-55°F)
2	a	-42.8°C (-45°F)	-45.6°C (-50°F)
	b	-40°C (-40°F)	-42.8°C (-45°F)
3	a	-37.2°C (-35°F)	-40°C (-40°F)
	b	-34.4°C (-30°F)	-37.2°C (-35°F)
4	a	-31.7°C (-25°F)	-34.4°C (-30°F)
	b	-28.9°C (-20°F)	-31.7°C (-25°F)
5	a	-26.1°C (-15°F)	-28.9°C (-20°F)
	b	-23.3°C (-10°F)	-26.1°C (-15°F)
6	a	-20.6°C (-5°F)	-23.3°C (-10°F)
	b	-17.8°C (0°F)	-20.6°C (-5°F)
7	a	-15°C (5°F)	-17.8°C (0°F)
	b	-12.2°C (10°F)	-15°C (5°F)
8	a	-9.4°C (15°F)	-12.2°C (10°F)
	b	-6.7°C (20°F)	-9.4°C (15°F)
9	a	-3.9°C (25°F)	-6.7°C (20°F)
	b	-1.1°C (30°F)	-3.9°C (25°F)
10	a	-1.1°C (30°F)	+1.7°C (35°F)
	b	+1.7°C (35°F)	+4.4°C (40°F)
11	a	+4.4°C (40°F)	+7.2°C (45°F)
	b	+7.2°C (45°F)	+10°C (50°F)
12	a	+10°C (50°F)	+12.8°C (55°F)
	b	> +12.8°C (55°F)	

St. John's wort (*Hypericum spp.*)

The St. John's worts have earned a place in the bee garden. This group includes both perennials and shrubs. These can provide flowers for over two months during the Summer. Several are grown as ground covers. These plants have showy bark.

In some climates, the shrubby forms are evergreen to semi-evergreen. The opposite leaves reach five inches in length. This can provide Fall color along with attractive, ornamental fruits.

Some species have stems with four angles. These tend to sucker and spread, forming large colonies.

St. John's wort is best known for the distinctive, fluffy flowers that can be three inches across. Appearing in clusters, they have five, rounded, golden or yellow petals. The blooms are packed with stamens containing lots of pollen, which is eagerly collected by bees. Depending on the species, these bloom from June through September.

Shrubby St. John's wort (*Hypericum prolificum*) is among the hardiest. Hardy to zone four, this deciduous shrub is native to the East. It can reach four feet in height with a matching spread. This adapts to a range of growing conditions. Suited to partial shade and full sun, shrubby St. John's wort prefers an acidic to nearly neutral pH.

Some of the St. John's worts are hardy to zone three or so. There are both introduced and native species in cultivation. Easy to grow, most are adapted to full sun. However, certain species will tolerate some shade.

For the most part, these plants require little routine care. Some St. John's worts can benefit from an annual pruning to keep them looking tidy, especially if the stems suffer dieback during bad winters.

Long Blooming Herbaceous Plants

A number of herbaceous plants are valuable choices for the long blooming bee garden. Borage (*Borago officinalis*), an annual herb, easily self sows. It pretty much blooms from early summer until frost. If the seeds are started early indoors, they can begin blooming even earlier. A carefree plant, it requires almost no attention.

Borage plants are very hairy. A favorite among bees, the small nodding blooms are pink with blue. The

Vivid But Calming Blue (Anemone coronaria).

flowers provide a moderate yield of excellent tasting honey. This can vary in color from whitish to very dark. Borage also brings pollen as well.

There are a number of excellent, long flowering perennials for the bee garden. Two of the best known are the lavenders (*Lavandula spp.*) and anise-hyssop (*Agastache spp*).

In addition, the various bugloss species are long blooming plants. Depending on the species, the bugloss can be annuals, perennials, biennials, or even shrubs. There are 40 species worldwide with many being native to Europe. Most are slightly less hardy than the common vipers bugloss.

The common vipers bugloss (*Echium vulgare*) generally behaves as a biennial, flowering the second year. Hardy to zone three, it is the most commonly cultivated species of bugloss. Originally native to Eurasia, it has naturalized in some areas of the East. This is also called blueweed and blue thistle.

Reaching 2½ feet in height, vipers bugloss provides lots of nectar and pollen from early Summer until frost. My plants always seem to look rather untidy. So you may want to place this coarse looking species in a less visible spot in the bee garden.

This species is covered with coarse, bristly hairs, which can be irritating. For that reason I wear long sleeves when working around the plants. The simple, oblong, alternate leaves can reach six inches in length. Lacking stalks, the foliage forms basal rosettes and also appears on the stem.

A very floriferous species, vipers bugloss has flower spikes all up and down the stem. The showy, bell-like or funnel shaped blossoms are pink when they first unfurl. Over time they turn blue.

Other species of bugloss can have flowers in a range of colors, including violet, red, white, and yellow.

All of the bugloss needs a sunny, well drained spot. These are adapted to dry soils. Avoid fertilizing too much as this can reduce flowering. They're easy to grow from seeds.

The bugloss can yield a surplus of honey when enough plants are available. With a good body, this tends to granulate rather rapidly. The delicate tasting honey is white to light amber. The plants also yield a lot of pollen.

Summersweet (*Clethra spp.*)

These shrubs are also called sweet pepperbush and clethra. They bloom from mid-Summer into September. Various species are in cultivation, including both native and introduced ones. They're generally deciduous though at least one tender species is evergreen. These have alternate, toothed leaves, which are up to four inches long.

The common names refer to the very sweetly fragrant blooms. While the flowers are generally white, they can be pinkish to red in some varieties. The small blossoms are less than one-half inch wide, and appear on new wood. They open in nodding clusters, around eight inches long.

Though most species are shrubs, there is one small tree among the group. Height ranges from nine feet or so up to 30 feet.

Japanese clethra (*Clethra barbinervis)* is one of the taller ones, reaching 15 feet or so. Common clethra is native to the East, mainly in the Southeast, and is hardy to zone six.

Cinnamon clethra (*Clethra acuminata)* is a native species. This is also hardy to zone six. It reaches ten feet in height. Found in the Southeast, it is named for the attractive bark.

Summersweet (*Clethra alnifolia*) is the most commonly grown one of the group. Several cultivars are available. This is also known as white alder and pepperbush. It can reach nine feet tall and almost as wide. The stems are erect. Its leaves can provide yellow or gold Fall color. Native to the eastern U.S., it is hardy to zone four. This species prefers partial shade with a somewhat acidic pH between 3.5 and six. It will tolerate wet soils, and does well in coastal areas.

Requiring a moist soil, most other species are adapted to full sun and shade. Some of them tend to sucker and spread to form colonies. While these are generally trouble-free plants, spider mites can attack during very dry weather.

In the areas of the country where the various species are commonly found, these yield an excellent, premium quality honey with a pleasing flavor. Rarely granulating, this is heavy bodied and light in color. It can be combined with honey from other sources. Under good conditions, these plants can yield over 300 pounds per colony. BC

Connie Krochmal is an award winning garden writer and a beekeeper in Black Mountain, South Carolina.

St. John's Wort (Hypericum calycinum)

GLEANINGS

MAY, 2010 • ALL THE NEWS THAT FITS

QUESTIONABLE INDIAN HONEY

The European Union is threatening to ban Indian honey from next month after testing found the presence of antibiotics and heavy metal residues in the honey.

The EU is the second largest destination for Indian honey exports after the United States.

Indian officials say the EU move comes after an increase in the number of samples that failed quality tests.

They tell the Indian newspaper Business Line the EU now wants to ban honey imports from India instead of blacklisting a few who export contaminated honey.

Canada has already rejected some Indian honey consignments alleging adulteration with cane sugar, an official says.

"Some exporters are importing adulterated Chinese honey and re-exporting illegally to markets such as the EU and Canada," they say. "This is giving a bad name to all."

The Commerce Ministry is holding urgent talks with honey producers and the Export Inspection Council (EIC).

India would soon seek more time from EU to explain the situation, the newspaper says.

"It is becoming a political issue," an Indian official. "We are hopeful about resolving this," an official says. "Our fisheries exports faced a similar problem in the EU, but we resolved it."

The newspaper says some producers use antibiotics to prevent bacterial diseases and honey from such bee colonies may have these residues.

There is also ignorance about EU's strict food safety standards and the EIC regularly sends data to the EU on tests of honey samples meant for export.

"We think bee keepers don't maintain quality," S.K. Babu, managing director of Eco-green Unit, a community based organization, tells the newspaper. "Some exporters mix raw sugar to make honey sweeter which makes it impure."

India's honey exports totaled US$32.39 million in 2008-09 with a quarter of this in sales to the EU.

Alan Harman

CITY BEES IN CALGARY

A sold-out course in Calgary, Alberta, on urban beekeeping apiaries is evidence of a real buzz around beekeeping, the organizer says.

Eliese Watson, who runs ABC: Apiaries and Bees for Communities, says the seminar at the Calgary Zoo attracted a full-capacity 125 registrants, with many more turned away.

"I think people really do like the productivity of their gardens and are getting back into the soil – and also the hobby aspect of it," Watson tells the Canadian Broadcasting Corp. "I think a lot of people are interested in learning new skills, getting their hands dirty."

Watson, who plans to expand her course into a full curriculum specifically designed for urban beekeeping, says novices need to learn how to care for bees properly.

She was recently awarded a C$5,000 grant from The Co-operators, the largest Canadian-owned, multi-product insurer, for her program to encourage urban beekeeping.

ABC – Apiaries and Bees for Communities was launched in February. It aims to bring small scale controlled apiaries to community and residential gardens. Through education and forums, members of the community will learn how to support ecological biodiversity and sustainability through the development of urban beekeeping.

Watson says the grant means she can set long-term goals toward educational programming. Forums, guest speakers, unique classes and programming will keep Calgary's beekeepers and their neighbors up to date on new ideas and trends in apiculture.

"Urban beekeeping is a good fit with the development of and the angle that the city of Calgary is moving –which is a more sustainable future," Watson says.

"Beekeeping and urban food production is about building community," she says. "If we lose our pollinators we will live in a lifeless city."

Alan Harman

BREAKTHROUGH IN FIGHT AGAINST VARROA FOR EUROPEAN BEEKEEPERS, AND SOON IN THE U.S.

BASF and NOD Apiary Products have announced a partnership to bring to European beekeepers a new product that controls *Varroa destructor*. BASF and NOD are investing in "Mite Away™ Quick Strips" (MAQS), which target *Varroa* mites while they feed on developing baby bees. The backbone of this easy-to-use strip is a film made of BASF's biodegradable plastic Ecoflex®, which is filled with the miticide formic acid in a saccharide (plant sugar) formulation. The strip's secret: Designed to penetrate the brood cap, it stops the mite where it reproduces.

"Through our work with scientists, farmers and beekeepers in the Bee Biodiversity Network in France, we have gained a broad understanding of the factors impacting bee health," says Sandrine Leblond, France-based BASF bee expert. The Network has delivered practical, tested solutions to improve bee nutrition, but to date there is no easy way to control the Varroa mite. Bringing MAQS to the market will help fill this gap, supporting beekeepers and BASF's farmer customers. The strip can be applied right through the season and beekeepers also enjoy the benefit of a single application product with a short treatment period (7 days versus 42). In product trials in the US, Canada and France, MAQS have controlled up to 97 percent of *Varroa* mites.

David VanderDussen, CEO of NOD Apiary Products said, "I am excited about this relationship and I am very pleased with BASF's great support. While our companies are very different in terms of size and focus, we share common values and are both passionate about the importance of biodiversity and the protection of the honeybee."

The strips are already on the market in Canada and the U.S., since authorities in Hawaii requested and received a "Special Local Needs" registration to ensure that beekeepers obtain access to the solution as quickly as possible. BASF and NOD plan to work with registrations authorities in Europe to make MAQS available to the European beekeeping community within two years.

According to the terms of the agreement, BASF will provide substantial support to facilitate a global product launch, including on-going technical and regulatory assistance over a five year period. Both companies currently co-own the patent, with BASF committed to providing support for product registration and distribution within the EU.

For further information: BASF, **barbara.aguiar@basf.com** or NOD Apiary Products, David VanderDussen, **details@miteaway.com**.

NATURE'S KICK CORPORATION ANNOUNCES RELEASE OF SIX MOUTH PUCKERING NEW FLAVORS

Nature's Kick has just added six sour flavors to the Original Honeystix line. Customers wanted the taste of a flavorful sour Honeystix and Nature's Kick responded. It is proud to introduce the following new sour flavors: Sour Pucker Grape, Sour Green Apple, Sour Pink Grapefruit, Sour Lemon Drop, Sour Wild Cherry, and Sour Blue Raspberry. Glenn Peters, inventor of the Honeystix and President of Nature's Kick said he was happy to broaden his line and "now there is a flavor for everyone."

Nature's Kick is Home of the Original Honeystix. It offers 37 distinct Honeystix flavors to wholesalers and distributors. Nature's Kick website is **www.originalhoneystix.com.**

BRITISH BEEKEEPERS, RESEARCHERS SPLIT ON FUND

The British Beekeepers' Association has quit the management board set up to run the government's Healthy Bees strategy, aimed at reversing the serious decline in honeybees in Britain, in a dispute with government officials over spending.

London's Telegraph newspaper reports the association, the country's largest beekeeping body, believes money put aside for the £2.8-million ($4.47-million) government initiative to protect the health of honeybees is being misspent.

The 16,000-member association says the money allocated by the government to the Healthy Bees project is being wasted on unnecessary surveys and accuses civil servants behind the scheme of ignoring the views of beekeepers.

New association president Martin Smith tells the newspaper money is being wasted.

"We agree with the aims, but there is no point participating when they are just telling us what they are going to do and not listening to what we have to say," he says. "Money is being wasted. It is not doing harm but it is not doing the good it could do."

The association sees money being wasted in spending £1.7 million ($2.71-million) of the Healthy Bees budget on a stock-take of the nation's apiaries and £13,000 ($20,777) on a separate survey of beekeepers.

A Department of Environment Food and Rural Affairs (DEFRA) spokesman says the department is disappointed the association has quit the board.

"The rest of the program board, including the Bee Farmers' Association, Welsh Beekeepers' Association and National Farmers' Union, will carry on with the work in the interests of amateur and commercial beekeepers and we hope that the association will rejoin later," the spokesman says.

The 10-year Healthy Bees was announced by the DEFRA and the Welsh government aims to sustain honeybee populations by supporting beekeepers to ensure effective biosecurity measures are adopted to minimize risk from pests and disease."

The government wants to make contact with perhaps as many as 20,000 amateur beekeepers to stress the importance of informing the National Bee Unit f any health problems among their bees, and to encourage them to register on a beekeepers database.

Ironically, among the plan's objectives is the following:

"To get everyone to work together on bee health." – *Alan Harman*

Mother Honey Bee's Song

My grubby dears,
My larval darlings,
My little snuggly
Soon-to-bees,

In these cubbyholes
You're growing,
While outside
The apple trees
Are unfolding
All their blossoms...
Every farmer
Knows it's true

That the dream
Of Red Delicious
Rests entirely
On you.

by Beverly McLoughland

GOT POLLEN? KOPPERT BIOLOGICAL WANTS IT!

Commercial bumblebee keeping originated in Europe and made its way to North America in the early 1990s. Koppert Biological Systems, Inc. established its production facility in south eastern Michigan in 1994 and is now the largest commercial producer of bumblebees in North America.

The bumblebees produced by Koppert play a critical role in greenhouse pollination and are widely used as the primary pollinator for hydroponic tomatoes. Due to the year round demand for commercial pollination in the greenhouse industry it is necessary to produce the bees in an enclosed facility and to have them ready for shipment every day of the year.

During the production process fresh pollen is king to bumblebee queens. Bumblebee brood does not develop well on pollen substitutes, freeze dried or irradiated pollen. Since the bees are unable forage for themselves Koppert regularly supplies them with necessary provisions for good hive development. This means that Koppert provides pollen and nectar to each individual hive. In fact, Koppert provides the bees with thousands of pounds of fresh frozen high quality pollen each year, all of which was collected by their honey bee cousins!

As the pollination business keeps growing Koppert's pollen consumption increases exponentially as well. Due to the boost in pollen usage Koppert needs reliable pollen suppliers more than ever. Koppert is actively seeking beekeepers who would like to increase their hive revenue through pollen collection. In an effort to establish lasting and reliable relationships with beekeepers Koppert is able to offer competitive payments and can provide technical assistance if necessary. With the rapidly expanding pollination market Koppert hopes to maintain the same high quality hive with the help of the honeybee keeping community.

For more information call 800.928.8827 or **hburroughs@Koppertonline.com.**

VARROA THE KILLER IN 85% OF ONTARIO BEE DEATHS

Varroa mites are the main culprit behind the die-offs of honey bee colonies in Ontario, Canada, over the past three years.

University of Guelph biologist Ernesto Guzman says in a study published in the journal Apidologie the parasitic mites were responsible for more than 85% of honey bee colony mortality in Ontario.

The next most important killers were too-sparse beehive populations in Fall and insufficient food reserves for Winter.

About one-third of Ontario's colonies died in the Winter of 2006-07 and another one-third died in 2007-08 – about three times the expected Winter loss in average years. Some beekeepers in parts of the province lost all of their hives.

Guzman says his study offers solutions for beekeepers and crop growers, many reliant on honey bees for honey production and for pollination of many other food crops.

He studied 408 commercial colonies in six southern Ontario counties, including Wellington, Middlesex and Norfolk. In Fall 2007, Spring 2008 and early Summer 2008, he counted bees in colonies and weighed colonies to gauge food reserves. He also tested bees for *Varroa* mites, tracheal mites and the Nosema fungus.

Besides *Varroa* mite infestation, weak populations and low food reserves in the Fall can cause colony mortality, says Guzman.

"We're pretty sure we've solved a great deal of the mystery," he says.

Based on his study, Guzman recommends beekeepers strictly follow a mite treatment regimen, feed enough sugar syrup and avoid splitting colonies too late in the season.

Ontario Beekeepers' Association president Tim Greer says the Guelph study will help the province's 2,200 beekeepers improve their management practices. He says the industry still needs reliable treatments for *Varroa* mites.

"We've identified the problem, now it's coming up with treatment," he says.

Greer says experts are concerned about effects of systemic pesticides on bees in other parts of the world, although those products appear not to be a major problem in Ontario.

Guzman is studying genetic techniques to learn more about honey bee infections and to help breeders develop better bees. – *Alan Harman*

NEW BEE BIOLOGY

Fast Sight – Bees see the world almost five times faster than humans, researchers at the University of London have found.

This gives them the fastest color vision of all animals, allowing them to easily navigate shady bushes to find food, researchers Peter Skorupski and Lars Chittka report in the Journal of Neuroscience.

The ability to see at high speed is common in fast-flying insects; allowing them to escape predators and catch their mates mid-air. However, until now it wasn't known whether the bees' full color vision was able to keep up with their high speed flight. This research sheds new light on the matter; suggesting that although slower, it is also about twice as fast as human vision.

"We can't easily follow a fast flying insect by eye, but they can follow each other, thanks to their very fast vision," says Skorupski of Mary's Research Centre for Psychology in the university's School of Biological and Chemical Sciences.

"How fast you can see depends on how quickly the light-detecting cells in your eye can capture snapshots of the world and send them to you brain. Most flying insects can see much quicker than humans, for example so they can avoid getting swatted."

Bumblebees use their advanced color vision in many ways, Skorupski says.

"Bees were the first animals that scientists proved to have color vision, and they have since been shown to put it to good use; navigating dappled light and shady areas, recognizing shapes like their hive entrance, and particularly for finding nectar-bearing colored flowers," he says.

The experiments show the bees burn more energy to see in color than they would to see in monochrome, raising questions about how they make the most of it.

"Bees' energy can't be used frivolously, as they need so much of it just to stay alive," Skorupski says. "It seems they only see colors at half the speed they see white light, which give them enough detail to find their favorite flowers and navigate back home."

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Heater Bees – Job training in the beehive involves temperature controls, a German researcher discovers.

Prof. Jürgen Tautz, head of the bee group at Würzburg University, in Germany, says a special group of bees control the temperature inside their hives to determine which job their young will perform in the colony when mature.

They number from a handful to many hundreds depending on the outside temperature and size of the hive.

The heater bees exercise the muscles normally used to drive their wings to increase the temperature of their bodies up to 44°C – nearly 10° hotter than a normal bee, which requires a body temperature of around 35°C to be able to fly.

"They decouple their wings so the muscles run at full power without moving the wings and this allows them to raise their body temperature extremely high," Tautz says.

They then enter empty cells within the brood nest, transmitting heat to the surrounding cells where the bee pupae are developing. One heater bee can transmit heat to 70 pupae around them or it can remain alongside an individual cell to adjust the temperature of a single cell.

Tautz made the finding using thermal imaging cameras after a total of 59 different behavioral tasks and the positions of 1,590 labeled workers and the respective queens on the combs were recorded twice daily for 20 days.

"The results show that brood rearing temperature affects the general in-hive behavioral pattern of workers," he says. "So besides the genetic basis, also environmental conditions have consequences on the behavioral profile of adult honeybees,"

The Germans say the heater bees change the temperature of each developing pupae by around a degree and this small change determines what work is ahead for each honey bee.

The bees destined to leave the nest to gather nectar and pollen are kept at 35°C. Those kept at 34°C never leave the nest and their duties include feeding the larvae and cleaning the hive.

Tautz tells reporters this allows the heater bees to ensure there are always enough bees filling each role within a colony.

"There are guard bees, nest building bees, brood caretaking bees, queen caretaking bees and forager bees," he says. "By carefully regulating the temperature of each pupae, they change the way it develops and the likelihood of the role it will fulfill when it emerges as an adult.

Tautz says the research shows the empty cells, previously seen as undesirable in a hive, are essential to ensuring the health of a bee colony.

"Now we know these empty cells are important, bee keepers can try to avoid selecting for queens that don't leave these cells empty," he says. "It can help to ensure colonies can regulate their temperature properly and have the right mix of individuals."

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Mean Males – Seminal fluid from one male can damage the sperm of other males in bee species where females mate with several males, according to international research carried out at the University of Western Australia (UWA).

UWA researcher Boris Baer and colleagues at the University of Copenhagen studied the seminal fluid of two species of bees – the multiple-mating honeybee and the single-mating bumble bee – and three species of Panamanian leaf-cutting ants, of which two are multiple-mating.

Baer says the research results, published in Science magazine, are the first evidence that it is seminal fluid – rather than sperm – that may harm other males' sperm in the female, until a substance in the female acts to prevent further destruction.

Baer is the coordinator of the Collaborative Initiative for Bee Research, which aims to intensify basic scientific research into honeybee reproduction, immunity and ecology alongside with partners from the Australian bee industry.

The ultimate goal is to better understand honeybees to avoid future dramatic losses of Australian honeybees as occurring elsewhere.

Baer says while the quality of human sperm continuously decreases in western societies, selection has maintained very high sperm viability in social insect males because the sperm is used for fertilization long after the males' death, which occurs during or shortly after mating.

"These social insects are amazingly efficient at keeping sperm alive," Baer says.

The researchers found that only the seminal fluid of the multiple-mating species appears to have the capacity to damage the sperm of competitors.

In the single-mating bumblebees, the male inserts a 'plug' into the female once she is mated which seems to prevent her re-mating, so ejaculates from different males never get into contact with each other and have not evolved a system of sperm warfare.

"The queens of ants and bees mate only during a brief period early in their lives, as young virgins, and store the sperm of their mates for the rest of their long lives in a single specialized organ, the spermatheca," Baer says.

"In some species such as leaf cutting ants, queens can initially store close to half a billion sperm and use them during several decades to sire a hundred million offspring."

Baer says the current working models of the group can be illustrated by the 1872 painting by Jean-Léon Gérôme called Pollice Verso (Thumbs Down) depicting a triumphant gladiator standing over the bodies of his enemies as wealthy women in the audience, who have given the losers the thumbs down, congratulate the victor.

"By analogy, the arena is the females' sexual tract, the gladiators are the ejaculates and the women have the power," he says. "Our findings now provide first empirical support for this idea, and our work at The University of Western Australia has started to identify those components within seminal fluid that are responsible for the effects as published in Science," he says.

Alan Harman

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Most residents of our rural community either know or know of Bob. No one knows how he makes a living, but he volunteers at the local fire department. That fact motivates me to clean my chimneys and replace the smoke detector batteries. According to my daughter, who works at the library, Bob loiters for hours near the front desk, talking incessantly and making the Librarian nervous.

I met Bob recently when he and his teenage daughter came to the door to buy a jar of honey. Bob is an encyclopedia of upstate New York folklore, especially on the subject of rattlesnakes. Beeyards attract mice and mice attract snakes. If you work in tall grass on south facing, rocky slopes (perfect apiary sites) in rattlesnake country, this information could save your life – or not. Bob started talking as he stepped over the threshold.

"Fella over to the Burns farm got stung twice by a bee." he said. "I went over with the fire department. Couldn't find no pulse. They revived him three times, but he died anyways."

"That wasn't a honey bee," I countered, a little defensively. "They only sting once."

"No it weren't," he corrected himself. "It was one of them mud bees or yellow jackets. Funny thing; I get stung by any bee and I'm dead in five minutes. That's what I use this honey for – my bee sting allergy." He held up the jar he'd just purchased. "But a rattlesnake bite, that don't bother me none. You know that parking area, on the expressway down near Painted Post?"

"The one with no restrooms?"

"Yeah, that's the one. I was taking a leak behind a tree and I seen a rattlesnake. I just reached down, grabbed him by the neck, and held him up over my head. He was so long; his tail was still on the ground. He got me on my hand. See?" He showed me two red dots on the back of his wrist. "There was a cop parked there. I called over to him, said, 'Hey, you want lunch?' He come over, said, 'where'd you get that?' 'There he was,' I says. 'I just reached out and grabbed him.' He couldn't believe his eyes! The cop brought over a gunny sack and I dropped him in. They took it down to Cameron and took a picture of it for the paper. I didn't let'em put me in the picture. Didn't need the game warden to see me near that snake. He already don't like me. Another fella down to Cameron stopped to change a tire. Snake tried to bite him. He killed it and put it in the back of his truck. They caught him; wanted to give him seven years in jail. I can put a snake to sleep. You just squeeze their windpipe, but not too hard. You want a little air to go through or they'll die."

"That's, um, a good thing to know, I guess," I interjected while Bob was taking a breath. "Where'd you learn this stuff?"

"I grew up on a Indian reservation and learned how to catch rattlesnakes. You just reach down and kind of roll your arm away as you grab him by the neck, like this . . ." Bob demonstrated the smooth twist and grab movement. I remembered the pin point scars on his wrist.

"I learned how to eat'em, too. If that cop wasn't standing there, I'd a pulled out my pocket knife. Oh you got to try rattlesnake! If you cook it with lemon juice, it'll taste like fish. If you cook it in batter it will taste like chicken. I eat'em whenever I can. The kids won't touch it." He nodded toward his daughter, looking sullenly out the window. She rolled her eyes.

"I don't think I'd want to butcher a rattlesnake," I said. "I'd like to see one though."

"When you're looking for rattlesnakes, go out between 11 and two o'clock. That's when they're sunning themselves. Wear a Miracle Ear, if you have one. You can really hear the rattle from a long ways away. If one's rattling from that far away (he pointed about 10 feet), you take one step toward him and wham! He'll strike at you. A rattlesnake can jump half his length and he knows how far he can jump."

"So far we don't have rattlesnakes here. We're in a cold pocket," I said. "But with all this global warming, I imagine they'll be moving in soon."

Bob agreed. "If you have rattlesnakes around, get yourself some black plastic pipe, cut it to about five feet long, heat it up and bend it. Lay pieces of it around the place. Rattlesnakes will think it's a black snake and keep away. Black snakes kill rattlers. They can get bit seven times by a rattlesnake and live."

After Bob left, I got to thinking about snakes and bee yards. I checked with the local wildlife biologist. He told me that rattlers don't consume bees. As pit vipers, they can only detect warm blooded animals, such as mice. In that sense rattlers are beneficial to beekeepers, if they don't accidentally kill you. Rattlesnakes spend their life within a two mile radius of their Winter den. Randomly relocating them out of their territory may kill them.

In this area, many apiaries are in prime rattlesnake habitat. A local state bee inspector told me that he frequently sees non-venomous snakes around beeyards and several times found them curled up in the tops of dead outs between the inner and outer covers. A snake has to be small to squeeze up through the frames and as far as he knew, they were harmless. At least none ever rattled at him.

My recommendation: if you work in rattlesnake habitat, just in case the black plastic pipe doesn't deter them, keep the yard mowed, make yourself a pair of cowhide hip waders, and most important, wear a Miracle Ear.

Peter Sieling

Rattlesnake Bites

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