2014 HONEY CROP

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Features . . . Bee Culture . . . The Rest

Happy Thanksgiving

The Russians In Medina

First let me tell you how I enjoy *Bee Culture*. I read every word and have learned to be a better beekeeper.

About the program "The Russians Are Coming" – I would like to be there but I can't.

I'd like to ask you to publish topics covered at the meeting. Maybe one topic a month. Hoping to hear more about the Russian bees.

Ray Cashion
Asheboro, NC

Editor's Note: *We'll see what we can do.*

Likes The Chickens

Just to say that I appreciate the hen articles in *Bee Culture* too! Some time ago you mentioned them in your editorial and at that time I had meant to write and congratulate you.

Thank you for another excellent edition.

Dr. Nicola Bradbear
Director, Bees for Development

Not Bad Beekeeping!

As a beekeeper I get just a little bit upset as I listen to all the pundits, researchers, chemical companies and politicians as they comment on the bee industry and the bee deaths particularly.

After reading and watching I would like to give the facts as I see them from a beekeeper's prospective. After over 50 years of experience and still working I have seen a lot of things change but never anything as devastating as the neonics. We are told it was a hard winter and it killed the bees. We have survived long spells of -30F and we would have less than 10% loss. Then came the neonics. We are told it is the mites.

We developed the tools to deal with the mites and our losses returned to the 10% range. We were given the neonics and our losses continue to climb to the 50% and higher range. We are told we are just bad beekeepers.

As I continue to read about the neonics, they are poisons that not only kill harmful insects but insects which are necessary in our food chain.

They are designed to interrupt the neurological function of all insects that come in contact with these neonic poisons. Both the targeted and not targeted are affected. This poison is designed to destroy the ability to communicate. This stops their ability to groom each other.

Beneficial insects as well as the ones that damage farmers' crops are being killed. We are having an over kill in the insect world with only 3% of them harmful why do we want to kill the other 97%? A large number of insects which prey on the destructive insects are killed too by the neonics. When the beneficial predator insects are killed there is no natural protection and more and more deadly chemicals have to be applied to kill the destructive insects. This upsets the balance of the whole ecosystem. The harmful insects are given great vast acreages of desirable food as soybeans, corn and many other crops that suits their particular needs to multiply and flourish year after year.

The neonics are designed to weaken the immune system. Now we beekeepers become the scapegoats for the problems with the bees. We are told we are not looking after our bees because they have become sick. Just like humans we can treat for the sickness but if we do not remove the cause we will continue to be sickly, less productive and die prematurely. Beekeepers know sick bees are not profitable.

Tests have shown that these chemicals from the neonic class are brought into the hives in pollen and contaminate the whole hive so it becomes sickly affecting all castes of the bee family. Not all the bees die but they do not produce honey and will not carry out pollination. And I sure like apple pie! Do you?

I understand the farmers need the best production possible. Rising land costs, rising input cost and rising various forms of direct or indirect taxing have pushed them to produce and produce beyond what

was expected in previous years. They are caught in the economic spiral too.

The only ones that we see as being the big beneficiaries of the system are the chemical companies and their sales outlets.

As an overall picture what is the loss of a few beekeepers in our society? I think of the quote by Martin Niemöller who opposed Hitler in the 1930s "*They came for the communist and I did nothing. They came for the Unionist and I did nothing. They came for the Jew and I did nothing. They came for me and there was no one!*"

So the question is posed what are the long term results of our continual destruction of the overall insect world. Who is going to be there for pollination and the pollinators? These chemicals are easily dissolved into the water and go into the lakes, streams and subterranean water systems. We are killing the invertebrates in the water because of this characteristic.

Invertebrates such as dragonfly larva and midges and mosquitoes feed fish and neonics destroy the natural food chain in which we are at the top. Our water system is becoming contaminated with the chemical and the effects on human health are just starting to come to our attention.

There is documented evidence of these issues. In a war the only ones that profit are the manufacturers of the war materials. In this case the foot soldiers are the beneficial insects and the agriculturalists themselves are the casualties.

Ferguson Apiaries
Hensal, Ontario

The Biggest & The Best

After reading Jim Tew's article – "Biggest Colonies, The Best Colonies," I had to reply.

Now I don't know what bees do at the equator or where there is basically one season – Summer. But I do know where I live in the Pacific NW queens don't lay eggs in the Winter. October is the cut off and February is the start up. So we have about five months without reproduction and in October she doesn't lay as many eggs as in the Summer. Same with February.

So to get a hive as big as a "pick-up truck" would be impossible with one queen. I use this formula – 6 x 7 x 2000 = 84,000. Say the queen lays 2000 eggs per day, and Summer bees live six weeks and seven days in a week – simple math.

Winter bees live longer or at least they used to live five to six months. So in February and March the bees born in October are dying off, and the queen isn't laying 2000 eggs a day in February. So I think 84,000 bees per colony is a reasonable figure.

But then again I don't know how big his pick-up is.

Jim Cowan
Aberdeen, WA

More About EpiPen

In September *Bee Culture* Phil Craft is exactly right in answering – no way – to a reader's question "what do you think of beekeepers having an EpiPen at their disposal to use on someone else if they have an anaphylactic reaction to a sting?" I would like to add a few more reasons to discourage this practice. In recent years a nearly fanatical fear of "allergic reactions" has gripped the public. However, based on my 25 years experience in Emergency Medicine, and 15 years as a beekeeper, I find life threatening allergic reactions to bee stings to be incredibly rare. I would liken keeping an epinephrine injector on hand in case someone has a serious reaction to a bee sting, to carrying a vial of cobra antiserum when hiking in Vermont. Everyone who is envenomated by a bee will experience some degree of allergic symptoms, but it's extremely rare for someone's life to be jeopardized by a bee sting. Here's another thing to consider – the list price for an EpiPen pack is $399, if you can find the generic it's a little less. Not only that but they expire and need to be replaced every few years. Are beekeepers expected to shell out several hundred bucks every few years for something almost never needed, and that any ambulance crew can supply in a few minutes if and when needed? But, you say, my doctor will prescribe it and my insurance prescription plan will pay for it. Well guess again, if you ask your insurance to pay for a medicine that's intended for someone else, that's considered insurance fraud, a felony. Especially when 400 bucks is involved. Not only that, your doctor will need to justify to your insurance plan why YOU need the EpiPen, also fraud. Please don't ask your doctor to commit fraud, it's very uncomfortable. Last, if as the questioner mentions, "Our club promotes beekeepers having one", this can eventually be seen as a requirement for beekeepers everywhere, and municipalities could require it. If, heaven forbid, litigation ever arose from a sting, the plaintiff's council could fault the beekeeper for not having an EpiPen.

Good job Phil on your reply.

Glenn Kotnik, M.D.
Zionsville, IN

Listen To Ross

Ross Conrad's overview of the underhanded strategies employed by the Big Three pesticide companies is excellent, but he forgot one important strategy: character assassination. As environmental activist and promoter of sustainable agriculture Vandana Shiva, PhD, knows first hand: "Character assassination has always been a tool used by those who cannot successfully defend their message." In other words, if you can't spin the message, then kill the messenger (or at least destroy his/her career).

Gail Damerow
TN

Bee Apocalypse Reality Check

I have been getting more and more vocal locally about the hijacking of the bee crisis by the environmentalists.

If you google "What's killing the bees" the majority of articles are about pesticides, GMO and Monsanto. With headlines like:

What's killing the honey bees? Mystery may be solved.

Pesticides appear to play a key role in killing off the honey bee population, according to a new study from Harvard University.

Scientists discover what's killing the bees and it's worse than you thought.

But in a first-of-its-kind study www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.

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pone.0070182#authcontrib published today in the journal PLOS ONE, scientists at the University of Maryland and the US Department of Agriculture have identified a witch's brew of pesticides and fungicides contaminating pollen that bees collect to feed their hives.

Scientists may have pinpointed what's killing the bees: Yep, it's the pesticides.

Looks Like the Leftist Fringe Was Right About What's Killing the Bees.

After years of wait-and-see news reports, things are getting cinematic: The evil chemical corporation might be the bee murderer after all, but if it is, it's not going down without a fight.

news.vice.com/article/monsanto-s-herbicide-might-be-killing-farmers Monsanto's herbicide might be killing farmers. Read more here.

The sheer volume of articles submitted by environmentalists and their supporters seem to overwhelm the information channel.

Locally, one of the famous "bees are dying" movies was held locally at the Carmel Indiana library by an environmentalist group. They advocated planting only native flowers (which is fine, particularly for native bees, but frankly, some of the best forage for honey bees is non-invasive plants from Europe, home of the honey bee). But then they went on and said, effectively, 'we must lobby the state legislature to fund light rail transit, to save the bees.'

[Incidentally, the cost of a $2 ticket – each and every ticket – was estimated to need about $18 of tax money to break even].

The cell phone non-study, the Einstein quote, and the study by Chensheng Lu, and the PBS "Silence of the Bees" with the totally dishonest segment on China pears and chicken feathers (there are countless examples) . . . all take on a life where debunking is ineffective. When confronted with the data debunking their point, they act like promoting a falsehood is acceptable if it helps the final goal.

Like everyone else, I'm cautious about pesticides. After all insecticides kill insects. But this hesitancy had, for a long time, made me too cautious to speak out for better balance.

Well, I'm speaking out now.

From a post on Bee-L

CORRECTION

On Page 90 of the September issue we gave credit to the wrong people for the bear damage photo. The photo was taken by Corky Luster of Ballard Bee Company in Seattle. Our apologies to Mr. Luster.

Perfect Bee Strain

I think I have developed the almost perfect bee strain! The queen is good for years. No need to replace her because she lives almost forever. She lays over a 1000 eggs a day. Lives on a minimum of food, is able to mate with any/all drones in the apiary! This queen carries enough sperm for 100,000,000 eggs. She is easy to spot because she is so large and not shy because she will come to the top of the center frame and wait to be found. Her progeny are great honey producers and she can live and work on the darkest frames.

The foragers are even better! They are impervious to mites and laugh off tracheal virus! They have a GPS built into them so do not need any dancing to know where the nectar is located. Mites die when trying to attach themselves to the forager bee. Insecticides mean nothing to them. Gentle beyond belief, allowing anyone to mow around the entrance and small hive beetles leave immediately for fear of being eaten! Wax moths are the same.

Now all I have to do is teach them to fly! LOL

Bill Tompkin

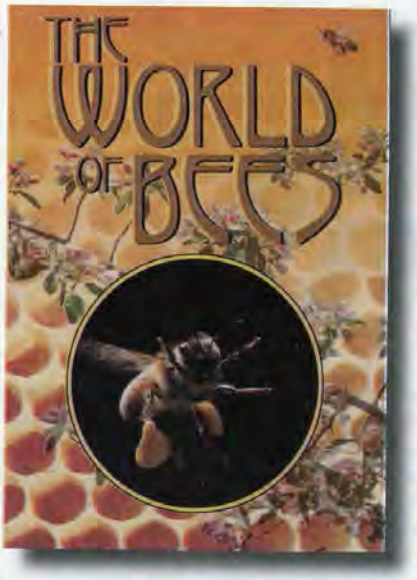
New For The Beekeeper –

Bee Time. Lessons From The Hive. By Mark L. Winston. Published by Harvard University Press (due October 2014). 5.5" x 8". 276 pgs. No photos. ISBN 978-0-674-36839-2. $24.95.

Mark Winston wrote a very popular column for this magazine for several years, but he retired from this monthly task about 10 years ago when he took a different position at his University, leaving his honey bee research work, which he had been doing for years, to others. What he had been writing wasn't a beekeeping column, and it wasn't a research column, but it was about bees, and bee research, and beekeepers and bee products...it was about the things in beekeeping that are too often missed because we are always so focused on the immediate that we miss the bigger picture. Mark sees bigger pictures, and the little things too, that most of us miss.

Well, that's what this book is. Kind of. But it is also a documentary, a recap of what's been going on in beekeeping over the past 10 years or so. Though not directly involved in day to day honey bee research, Dr. Winston has left no hive unturned in this work, documenting all the good, and the bad that has occurred during his absence. So, if you are new to this industry, new in the last 10 years, you would do well to see what you've missed, and why we are where we are. And what we have learned in a decade.

And you would do well to stop and smell the bees, as it were, to see what you haven't seen, and to hear what you haven't heard in a bee yard, or a bee meeting, or in time spent with other beekeepers. There are indeed lessons to learn from a bee hive. This work will share some of them with you. – *Kim Flottum*



The World Of Bees DVD or Blueray. Text, photographs and narration by Charles Hofmann. Produced by Larry Hofmann, Hofmann Studios. $22.95. **www.theworldofbees.com**.

This 52 minute DVD is an update and rework of the VHS released several years ago. Charles Hofmann was a commercial beekeeper in Minnesota in the 1950s for over 60 years, and became an excellent photographer. He had a deep understanding of how honey bees live, and a profound respect for the contributions they made to his life, and the lives of all of us. He explores these with the subjects he covers including honey bee biology, pollination, honey production, and foraging with a wealth of stunning photographs of bees inside and outside the hive. He captures the life of the hive using over 200 images, and, though still photos, are made to move and pause and move some more. A perfect show for schools, beginner's classes, and just to enjoy. – *Kim Flottum*

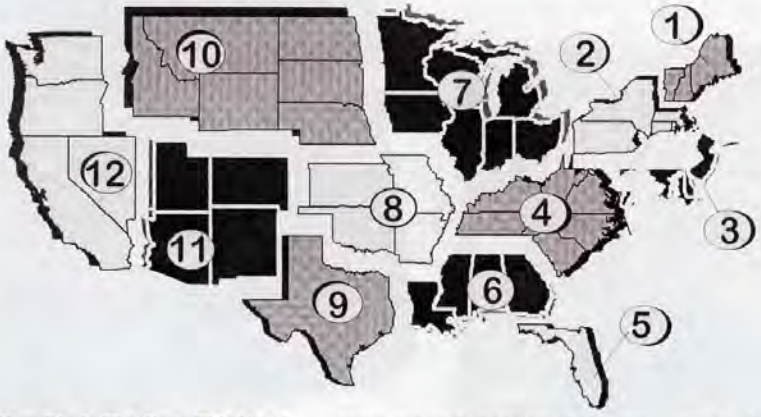
Cool Flowers. How to grow and enjoy long-blooming hardy annual flowers using cool weather techniques. By Lisa Mason Ziegler. Published by St. Lynn's Press, Pittsburg PA. ISBN 978-0-9892668-1-3. $17.95, available almost everywhere.

When we consider planting for bees, we almost never consider annuals. We want something permanent that will be here next year, and the year after, and get larger and bigger and better over time. Annuals don't fit that description, yet most home gardeners have mostly annuals, and they don't have a lot of information available.

The flowers is this book aren't all excellent bee plants, though all will assist pollinators of some kind. The value here is in the information on how to grow annuals. You'd think it was simple, but there's more than meets the eye when considering early, early spring and late, late fall and keeping blooms going until the bees are stuck inside for the winter. Think blooms before last frost and after first frost – your bees are still looking for food, and, with this, they'll find some. – *Kim Flottum*

Continued on Page 13

NOVEMBER – REGIONAL HONEY PRICE REPORT



How Big Is The Crop This Year?

Once a year we try to come up with a prediction of the U.S. honey crop, and this is the month we do it. We poll our honey reporters of course and that gives us a pretty good estimate of the real world of honey production. But we check out what others in the business are hearing too, and we look at the weather in the places that count, especially the top 10 producing states. For several years we've asked our reporters for two numbers – average colony production for just those colonies they harvested honey from, and then, average colony production for all of their colonies whether they produced honey or not. Over the years we have been consistently low in our predictions when compared to the USDA NASS numbers that come out each February (last year it was later than that) because they sometimes count the same colonies more than once. They are consistent in their technique, and we are with ours, so you can look at both and decide for yourself.

Last year we predicted total honey production in the U.S. would fall between 96 million pounds and 112 million pounds – those two figures we use, remember. Also, we have to estimate the number of colonies total to come up with that number – we don't have the USDA NASS count to use for the current year, so we look at last year's and figure an up or down number based on our research here. Last year we estimated 2.55 million colonies, and the final USDA NASS count was 2.54 million colonies, up from the previous year's 2.49 million. So, on both counts we were right on and we feel comfortable with both our technique and results. We predicted a terrible crop…and it was a terrible crop.

This year, we think it will be a little better. But only a little. And so does everybody we talk to. Everybody. The top 10 producing states are all below their running averages – and some way below, and they produce more than three quarters of the honey every year. When they suffer, honey suffers. And they suffered this year.

We'll know more in February when the other set of numbers come out, but this year the average production of all colonies that we counted came to 42.0 pounds per colony. If you work with only those colonies that produced honey, leaving the 0 producers out of the equation, the average moves up to 53.0 pounds per colony. Now – how many colonies? We're going to go out on a limb here because of what we've been hearing and our estimate is that when honey was harvested this year beekeepers had right about 2.65 million colonies. But everything we hear since then tells us that number is down to 2.40 million honey producing colonies, maybe less. It was a hard year on bees in lots of places, but not everywhere.

Given the counts we have then, the U.S. honey crop, according to *Bee Culture* magazine's sources, will fall between 111.3 and 140.5 million pounds.

Region #'s/Colony 2014 Average

Region	#'s/Colony
1	51
2	70
3	43
4	38
5	86
6	77
7	56
8	51
9	63
10	47
11	39
12	62

REPORTING REGIONS													SUMMARY			History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																	
55 Gal. Drum, Light	2.19	2.25	2.19	1.80	2.45	2.30	2.60	2.19	2.00	2.23	2.33	2.25	1.75-2.60	2.21	2.21	2.25	2.10
55 Gal. Drum, Ambr	2.14	2.00	2.14	1.76	2.20	2.08	2.55	2.14	1.90	2.14	2.19	2.25	1.70-2.60	2.12	2.12	2.14	2.02
60# Light (retail)	217.00	198.33	177.50	188.00	180.00	185.00	200.67	193.19	150.00	171.00	174.90	210.00	150.00-240.00	191.38	3.19	193.52	184.38
60# Amber (retail)	224.67	197.50	172.50	182.00	180.00	180.00	193.47	198.83	140.00	198.83	168.30	270.00	140.00-270.00	192.67	3.21	188.93	174.06
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																	
1/2# 24/case	90.69	69.34	68.00	69.27	78.42	78.42	50.30	78.42	78.42	91.20	78.42	114.00	45.60-114.00	77.04	6.42	76.87	68.89
1# 24/case	129.45	110.65	111.60	97.07	108.00	114.48	89.60	120.59	120.59	150.00	97.80	124.20	84.00-172.80	112.78	4.70	114.06	105.88
2# 12/case	115.88	94.28	104.07	85.25	99.00	94.86	88.60	105.82	100.00	136.80	105.82	107.00	76.80-144.00	101.25	4.22	101.59	98.51
12.oz. Plas. 24/cs	110.07	86.88	73.80	81.25	79.20	69.00	68.13	87.35	87.35	93.45	100.80	97.13	42.00-134.40	86.50	4.81	87.91	82.36
5# 6/case	147.46	104.52	103.50	99.67	126.00	123.29	98.60	123.29	123.29	143.40	123.29	125.00	84.00-174.00	117.58	3.92	116.48	108.06
Quarts 12/case	160.00	154.44	185.00	119.68	144.00	110.42	145.50	131.46	131.46	175.80	119.40	136.00	72.00-186.00	133.91	3.72	132.57	126.32
Pints 12/case	112.25	86.95	102.00	80.75	96.00	64.25	121.20	84.42	66.00	84.42	84.42	87.00	42.00-125.00	85.33	4.74	85.92	76.60
RETAIL SHELF PRICES																	
1/2#	4.45	4.60	3.65	4.14	4.18	4.00	3.11	4.18	4.18	3.80	3.50	6.00	2.75-6.00	3.99	7.98	4.11	3.84
12 oz. Plastic	6.56	5.16	5.21	4.75	5.00	4.33	4.16	5.37	5.37	4.23	5.95	6.40	3.00-8.25	5.11	6.39	5.07	4.66
1# Glass/Plastic	7.50	6.44	6.05	6.39	7.00	6.90	4.88	6.52	6.52	7.08	6.16	9.00	3.00-10.00	6.53	6.53	6.61	6.13
2# Glass/Plastic	13.69	10.30	10.22	9.84	12.00	9.66	8.94	11.35	9.00	9.70	9.76	16.00	6.00-18.00	10.69	5.35	10.91	10.20
Pint	11.50	9.95	10.50	8.50	7.50	7.09	14.25	9.71	6.00	9.67	8.00	10.20	6.00-14.50	9.17	6.11	9.25	8.13
Quart	16.50	15.10	15.75	14.62	15.00	11.99	14.57	14.95	14.95	16.41	11.67	17.60	8.80-22.00	14.50	4.83	15.69	13.44
5# Glass/Plastic	29.00	22.22	26.33	21.75	29.00	24.98	22.15	24.98	24.98	23.90	22.30	30.00	15.00-36.00	24.46	4.91	24.27	22.44
1# Cream	9.83	6.94	9.25	7.13	8.18	8.18	5.75	8.18	8.18	7.60	8.18	9.00	5.00-12.00	7.85	7.85	8.17	7.83
1# Cut Comb	9.83	7.50	10.55	8.00	11.02	6.50	7.74	11.02	11.02	10.00	11.02	17.00	5.25-20.00	9.42	9.42	9.70	8.71
Ross Round	10.00	5.00	10.09	6.10	8.27	8.27	9.00	8.27	8.27	8.27	8.27	8.27	5.00-12.00	8.04	10.05	8.97	8.49
Wholesale Wax (Lt)	7.67	7.50	6.17	4.56	3.40	3.40	6.25	6.14	6.14	6.00	3.50	4.63	3.00-10.00	5.78	-	5.82	5.10
Wholesale Wax (Dk)	6.88	6.43	6.17	4.23	3.20	2.88	7.50	5.53	5.53	5.53	2.43	4.10	2.00-10.00	5.06	-	4.98	4.62
Pollination Fee/Col.	94.40	72.50	97.50	60.60	70.00	55.00	58.33	94.95	94.95	80.00	94.95	131.50	35.00-185.00	79.91	-	80.83	72.11

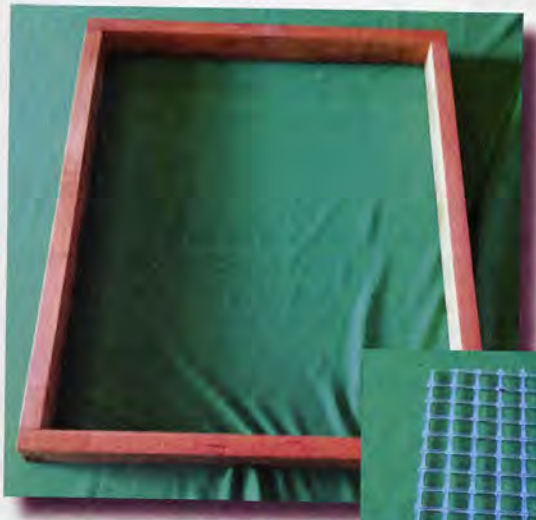
More New For The Beekeeper –

Every beekeeper will experience a broken rabbet. A standard rabbet is 3/8' across with a 5/8" drop to the frame rest and 3/8" making up the remaining thickness of a ¾" board.

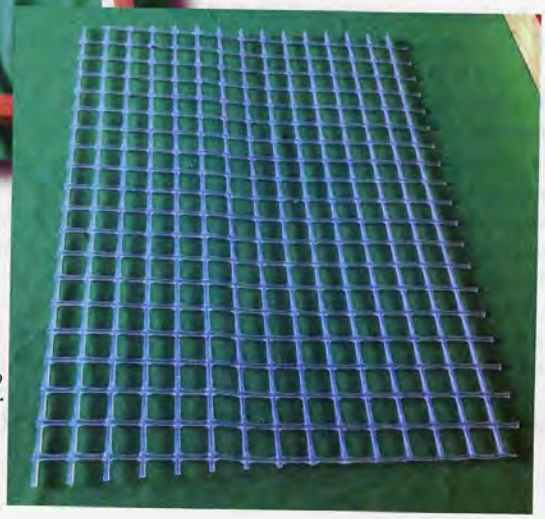
This thin 3/8" x 5/8" part of a hive is prone to breakage, primarily by mistakenly prying frames loose with it. Once this rabbet is broken, three options exist: 1) discard the box; 2) repair the rabbet; 3) do nothing and use it as you previously did. The first option is a sad waste. The second option currently needs repair annually. Last option causes further problems with pests, defense, and maintaining control of humidity and heat.

Eco Bee Box developed and has a patent pending on a very simple solution to a major weakness in wooden-ware. We now have a durable replaceable rabbet. These rabbets can be inserted on new or old equipment, and if further box breakdown occurs, can be removed and reused on the next box. Our current rabbet is made of extruded aluminum and can be fastened with nails (pneumatic or hammer) , screws, or silicone. Packages come with 10 pieces or 5 sets, all 16 ¼ long.

Purchases can be made by calling 801-654-9700 or at **www.eco-beebox.com**



One rim, or two make room for sugar.



Tray sits on top bars. Newspaper sits on top of tray.

Sugar Lumps and our new Feeding Trays and Weatherproofed Spacer Rims

Use our Feeding Trays for making Sugar Lumps, similar to making Candy Boards, but so much easier. Based on the Emergency Winter Rations and Moisture Control you simply put a sheet of newspaper on the plastic mesh tray that sits right on the top bars, wet with water and then start adding a 1½ cups of granulated sugar at a time, spraying each layer with water. This will cause the sugar to harden and will be available to your bees throughout the Winter if they run out of stores or can't reach them. Added bonus, these trays are easy to remove and replace keeping all the food neat and in place. You can check your hives or dust with powdered sugar and then replace if you feel they still need to be fed. Bees rarely use sugar water during cold weather, but they gobble these lumps down.

Use with our Weatherproofed 1-1/2" Spacer Rims, you can stack two together and has the winter progress and the bees eat the sugar lump down, you can remove one to lower their ceiling.

Our Feeding Trays are made out of food grade plastic and our Spacer Rims are Weatherproofed, like all of our woodenware, boiled in a solution of paraffin and tree rosin. This method drives out all the moisture so our products will not rot. They are ready to go right on the hive. NO PAINTING EVER.

More information on our website, **www.countryrubes.com** or call 530-913-2724. Our Feeding Trays are $5.00 each and the Spacer Rims are $6.00 sold separately or as a kit with a Feeding Tray and 1 Spacer Rim for $10.00 or a Feeding Tray and 2 Spacer Rims for $15.00. Postage not included in price.

INNER COVER

Jack Happ called recently but unless you've been reading this magazine for over 40 years that name probably doesn't ring a bell, so I'll fill you in on why a call from Jack is memorable.

In the early 1960s, Jack started working here as an Assistant Editor under then Editor M.J. Deyell, who was arguably the best beekeeper to ever fill the chair I sit in. When M.J. retired Jack took over and made several significant changes, building on many of the advances M.J. started. Jack came from Texas A&M I believe, with a degree in entomology, adding a level of experience not seen in an industry journal previously. His first major change was to bring in the readers much more than in the past, with emphasis on the Mailbox for opinions and information, rather than just questions on 'how-to' that got answered by staff or regular contributors. And he changed the size of the magazine, too, from the traditional 'Digest' size, to the size we still use today, if you have a paper copy. Jack oversaw a team of well-known industry writers while on duty here, including Glenn Gibson, Harry Rodenberg, John Ambrose, and P.F. Thurber, all who dealt with the practical side of beekeeping, but he worked with the science side too, even more than previous editors, including the early work of Dr. Roger Morse, from Cornell.

Jack hung around for about 10 years but then the entomology side of his brain kicked in and he went back to doing what he was trained to do – would you believe – being an exterminator. And he was good at it. Because of his work here he was especially good at educating people about killing honey bees, what swarms were for, and the dangers of pesticides everywhere. Especially since he was keeping bees all that time. He also became a county commissioner and saw what he thought was the less than pretty side of small town, local politics. But he stayed on there until his opponent was female and the politics got really ugly, and he cashed it in.

Today Jack is 92, and he still has bees. I'm impressed with that fact alone. But weight issues – the boxes, not his – have slowed him down and he has, as he pointed out, a devil of a time lifting those full boxes (switching to smaller, eight-frame equipment doesn't come easy to long-time traditional users I guess). As you might expect, that has slowed his ability to do good check-ups, and his bees have not thrived as a result.

Which is why he called. He was getting ready for winter, and he knew he had to take a look, and what he saw was something he hadn't seen before – not in all of his 92 years. He had frames of brood that were not sealed, and the brood was jet black. Not brown. Not gooey. Not sac brood. Just black. And there were no bees on those frames. Nobody checking them out, removing the dead bodies, nobody. And what really got his attention was that just a few frames away were frames of pearly white, healthy brood doing just fine with nurse bees tending them like you would expect.

Well, he wanted the county Inspector to take a look and needed his phone number. But we chatted for a bit, talked bees and beekeeping, what was once his and is now my magazine, the expansive newsstand exposure we have now, and the marvelous increase in interest everybody seems to have in bees, and the changes in the beekeeping industry, the old timers who aren't here anymore, and those that are, and why aren't bees as simple to care for as they used to be, 50 years ago. Or 75 years ago when he was just starting out.

It was, as they say, a moment. Not exciting or revolutionary, but memorable. Thanks for calling Jack.

So what's in store for beekeeping? One thing for sure – better data needs to be available to every beekeeper so they can make better management decisions.

Here are some of the things folks are already monitoring to get better data, and make better decisions – internal hive temperature, humidity, sound, hive weight for colonies or pallets, external temperature and humidity and rainfall, internal carbon dioxide levels, a count of bees leaving and returning, whole hive movement, brood population, RFID chips for a whole variety of measurements, LIDAR (like radar but using light waves instead of radio waves) for measuring where bees are, bar codes, IR cameras – so now, do you feel a bit behind the curve? You should. I do.

Holy satellite Batman, most of us are still in the Stoneage!

I was at the Western Apicultural Society Conference in September in Missoula, MT watching all sorts of beekeeping geeks (I'm told that's a sought-after description) do their thing with all manner of electronic gizmos and machines and scales and whatnot.

You're going to see more and more of this as the technology gets easier and cheaper and better. Good beekeepers are going to have hive tools, smokers and smart phones and remote monitoring devices on their hives, pallets, trucks, and warehouses. Good beekeepers are going to know what's going on in every beeyard before they send a crew out to check. Good beekeepers are going to know how much feed to bring to a yard and which colonies in that yard need feeding. Good beekeepers are going to know which colonies are ready to swarm, are queenless, are hungry, are in trouble, need supers, have been stolen (and where they are now), and more and more and more.

Good beekeepers are going to know before they put on a veil, light a smoker, pick up a hive tool, load the feed tank, get in the truck. Time, money and energy will be saved. Finally.

It's about time. The Future is here. Use it.

If you don't you'll be on the outside looking in, at the bottom looking up, and not doing as good a job as you could. Change is. Use it.

•

So – have you seen our web page recently? We've done a whole lot of changes lately. And, though it's still being born, there's a lot there that wasn't there before.

And it's still in the building stage. Jim Tew is putting together a Best Information page that will be THE place to go for good, safe and accurate information on what's on the web. You'll finally have a place on the web you can trust, that has sound advice, up-to-date information and will be something you can trust. Others will be joining the list of vetters, if you will (one of which is me) when we discover something new and want a second, or third opinion on is it good, safe, correct or rubbish. Keep your eye on that particular Pull Down at the top of the page.

Also on the top is our Industry Directory, listing the contacts for the major industry organizations, plus our FIND A BEEKEEPER link for most of the state and county associations in this country. If you look and yours isn't there, or we have dated data, please let us know so we can fix it – you are our link to correct information.

We are just getting started on downloading the historical information Jim Thompson has provided us. Besides the many articles of his we have published on everything from ancient honey bottles to hive carriers to this month's foundation equipment, Jim has managed to find every, or nearly every U.S. Patent for every, or nearly every piece of beekeeping equipment since the beginning of patents. It is the largest file I've ever encountered, and it's taking us a bit to get it organized. Some say we should have had this done before we opened shop, but the technology kept changing on how to do that, and then, the web page folks kept getting delayed because the rest of our company's web pages came first, so we waited – but now we're moving ahead.

Also on the top are the Beekeeping Science and Government contacts – check those out. All of these, with the exception of Jim's work, are from the page we had up. Of course there's the digital calendar we use, run by Malcolm Sanford. You got a meeting, send it along and we'll get it up for you.

Soon, maybe by now, we'll have our new digital edition sample up to view. We're trying to get this up by the December issue, but we'll see. All this all-new stuff gets all of us bogged down so we'll see how fast that goes. But trust me, it's worth waiting for. You won't believe the changes.

Further below, we still have our CATCH THE BUZZ archives and sign up . . . if you haven't already, sign up for this FREE service. If you haven't yet, take a look at what the BUZZ is, how often you'll get one and the subjects we cover when you click on the Archives button. You can use any of the information sent out in your newsletter, send to a friend, your congressman or on your web page. It's copyright FREE, and FREE to you. Join the nearly 8,000 readers who already know.

Below that is our Events page. We just finished our THE RUSSIANS ARE COMING event, and getting ready for the next one, so stay tuned to that section.

Below that is our Writer's section. Each of our regulars, except Connie right now, but she's coming soon, has a photo there. At the very bottom is a button that will take you to the page with their bios – as soon as they send them in – stay tuned for that. If you click on their photo you'll find a variety of things – some or our writers put out blogs, some have web pages, some have little or no web exposure. The blogs and web pages and Facebook and Twitter and Pinterest links for them will be there if they have them, but if not, you'll find past, but recent articles they put in our magazine. You can keep tabs on our writers and their activities on our web page. Sort of a facebook for *Bee Culture*. Sort of.

And of course at the bottom we have our shameless commerce division, where we sell our books, magazine subscriptions and DVDs. Don't miss any of that – there's some really good products there.

At any rate, our new page is still growing, adding more reliable infor-

Continued on Page 92

It's Summers Time –

I want to share just a bit more about our trip to Oregon in August. We drove down to Grant's Pass. This is the town Jessica lived in prior to Myrtle Creek. Grant's Pass is about 25,000 people and nestled in a beautiful valley with mountains completely surrounding it – a beautiful place. The first time we visited there was nine years ago for Jessica's wedding and my thought then was – I could probably live here. I still enjoy going there.

Grant's Pass has bears – right there in town – on almost every street corner – big bears. Let me clarify – these bears are made of fiberglass. These bears are beautifully painted in all different fashions. We found one sitting on a bench "dressed" in overalls and with a chicken in a cage beside him. So we couldn't resist taking a photo with him.

Many cities do this sort of thing. Cleveland has done it with guitars in honor of the Rock N Roll Hall of Fame. The Cleveland airport even has several of these large guitars wildly painted in amazing color schemes.

A couple of years ago Medina was raising money for some good cause here in town and did large fiberglass honey bees. I know you all remember that we are the home of the honey bee. Our school mascot is the honey bee. There was a contest and different groups all over town painted their bees to represent their business. We have one beautifully painted with flowers all over it, standing in our candle store here at the A.I. Root Company.

It was a dark day in the chicken coop today – no eggs – zero. The first time in over three years that we have had no eggs, - not even one. We had been getting at least one or two until today. Not sure exactly what is going on. We actually had to buy a dozen eggs when we went grocery shopping this week. But the girls still seem very happy and content – Kim not so much.

For the last few weeks we've had a nine-year-old boy and his mom living with us. It's been about 20 years since I've lived with nine-year-old boys. Not a lot has changed – they're still always starving at bedtime and still don't want to do their homework and don't like getting up in the morning for school. But he has brought a great bit of joy into our house. He makes me laugh and Kim makes him laugh everyday. Every night we get a good night hug and that makes everything else OK.

Last week Kim and I took a day off work to be outside and get in the bees. We will have eight colonies going into Winter. Right now they are in good shape. We kind of shuffled them around – took honey from some who had a lot and gave to others who needed it and actually managed to get one super of goldenrod for ourselves. The goldenrod was amazing. That's two years in a row. One of the eight is a top-bar hive and it's doing well right now. We had a nuc living right on our front porch – keeps solicitors away – that had grown to nine boxes tall. We rearranged that one into eight-frame equipment, so now it's five boxes tall. We fedeveryone protein. All that's left to do now is Winter wrap them in a couple of weeks and then hope and pray for the best.

September was a busy month for Kim and I. We got home on the 2nd, had to get the October issue done. Then it was off to the Mother Earth News Fair in PA for three days. Once again it was an amazing time. It rained one day, but the other two were great weather days and folks didn't seem to mind the rain, they came prepared. We found out while we were there that they are moving their WA State site to Albany OR for 2015 and they are adding a site in WI. So plan ahead for next year – NC in April, OR in June, WI in August, PA in September and KS in October. If one or more of these are at all close to you, you need to think about going. It is a great event.

Kim's talks on beekeeping filled up the tents, even on the day it was pouring rain. Shane Gebauer of Brushy Mountain gave two talks and folks are hungry to learn about beekeeping. We talked to hundreds of people over the three days and sold a bunch of books.

After Mother Earth we came home for a day and enjoyed Vaughn Bryant as our speaker for the Medina County Beekeepers Association. He was amazing. He knows more about pollen than most anyone in this country. He does some interesting work.

Then we left for the Western Apicultural Society Conference in Missoula MT. Once again we had more airport time than we had anticipated. We spent a lot longer in Denver than we wanted to because of yet again, a broken plane. But we met up with John Miller who was headed to the same meeting on the same plane. So visiting with John made the time go faster. Eventually we made it to Missoula.

It was very late and pitch dark outside when we got to our hotel room. Our room was on the first floor with a very small patio outside. Looking out into the night you could just make out the sparkle of water. When we looked out the next morning the river was about 50 yards from our door. It was gorgeous.

The meeting was held at the University of MT and it was within walking distance, a little longer walk than we're used to, but the weather was beautiful.

It was a good meeting. It was my first trip to MT and what a beautiful place – mountains everywhere – lots of wilderness. The University had a very nice campus, much more spread out than we are used to here in the Midwest.

I hope all of you have a wonderful Thanksgiving with family and friends. Wherever you are enjoy the Fall, Winter is headed our way.

Hoody Summers

Pollen For Lunch? Again?

Ian **Stell**

Figure 1. *Pollen particles seen with scanning electron microscopy. The outer layers are woody, but contain openings (pores) through which the contents can be digested.* (Image courtesy or Louisa Howard, Dartmouth College EM Facility)

Bees get their key nutrients from pollen. There is a lot of nourishment within these woody particles, but they are hard and spiky and their insides are difficult to get at (figure 1).

So the bees' digestive system has to be able handle this food source. This article looks at the anatomy of the organ where most of this digestion happens, the ventriculus.

Swallowed pollen grains pass along the oesophagus to enter the crop. From here they are gathered by the proventricular 'mouth' and passed into the ventriculus, through a sleeve, the cardiac (or stomodeal) valve (figure 2) which prevents regurgitation. Within the ventriculus the swallowed pollen is kept within membranes, the peritrophic membranes (figure 3). These thin membranes are secreted by the cells lining the ventriculus (epithelial cells). Nearly all insects have membranes like these, and a considerable amount of study has gone into establishing the role that they play in digestion. In the honey bee these membranes are produced by some of the epithelial cells and successive sheets of membrane peel away from the wall and coat each bolus of pollen as it arrives (figure 3). The pollen can move relatively quickly along the length of the ventriculus within the membrane, arriving at the end of the ventriculus within minutes. Here it is generally held for some hours before passing through to the next part of the digestive system which lies beyond the opening of the malphigian tubules, through the pyloric valve, the small intestine (figure 4). Once a layer of peritrophic membrane has peeled away, a further layer is formed, and several layers can be seen in some histological sections through the ventriculus. These peritrophic membranes move more slowly along the ventriculus and are also, ultimately, digested.

The membranes were previously thought to provide protection for the lining of the ventriculus from sharp points on the pollen. However, it is more likely that they are important in concentrating a range of digestive chemicals (enzymes) where they are most needed. These enzymes are produced by the epithelial cells themselves and they break down proteins, fats and carbohydrates. The production of enzymes varies along the ventriculus, a higher proportion are released towards the end of the ventriculus (figure 5), whereas in the first part of ventriculus many are bound to the surface of long, finger-like microvilli (figure 6).

The peritrophic membranes probably create compartments within the ventriculus (Moritz and Crailsheim) (figure 7). For example, there is evidence that the enzymes released towards the end of the ventriculus are washed back up the ventriculus in a stream of liquid between the outermost membrane and the ventricular wall. This stream of liquid is likely to come from the malphigian tubules as their flow onwards can be impeded by a ring of

Figure 2. *The first part of the ventriculus. The stomodael (or cardiac) valve (1) is a sleeve surrounding the opening bringing food from the crop through the proventriculus. It prevents regurgitation back into the crop.*

Figure 3. *Two peritrophic membranes (1) in the ventriculus. These contain pollen (2) at two different stages of digestion.*

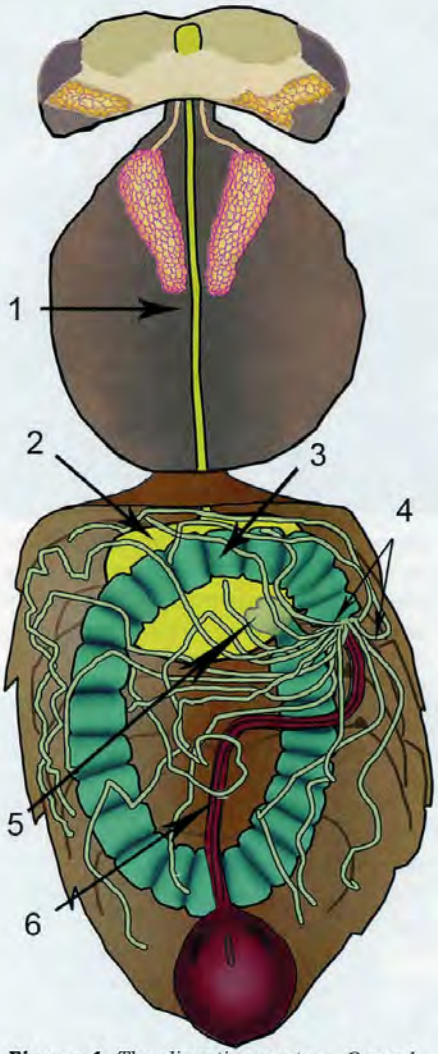


Figure 4. *The digestive system. Oesophagus (1), crop (yellow, 2), ventriculus (green, 3), malphigian tubules (4), proventriculus (5), small intestine (red, 6).*

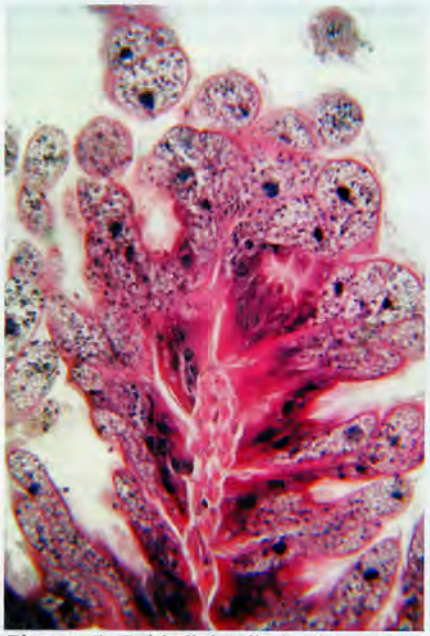


Figure 5. *Epithelial cells in the ventriculus laden with packages of digestive enzymes which are seen as small dark particles in the cells.*

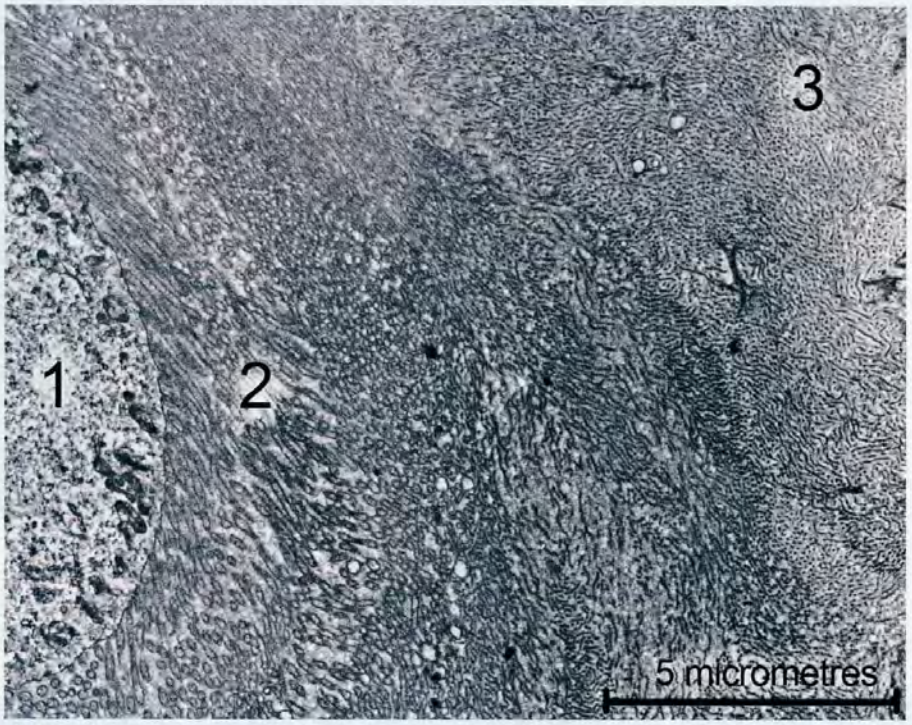


Figure 6. *Transmission electron microscopy (x5600) image of the surface of a ventricular cell (1). Numerous finger-like villi (2) carrying digestive enzymes extend into the liquid layer over the surface. Further from the surface the liquid is thick with digestive enzymes and particles, the glycocalyx.*

muscles at the beginning of the small intestine, the pyloric sphincter. This fluid flowing back up the ventriculus is probably largely absorbed by ventricular cells and returned to the haemolymph from where fluid is once more collected by the malphigian tubules. In this way fluid is recycled between the digestive and excretory systems. In addition a cycle of fluid moves within the ventriculus, forward within the membranes and backwards around the sides (Jimenez and Gilliam). This countercurrent flow system has been observed in other insects.

The enzymes brought back up the ventriculus pass through the membranes and mix with swallowed pollen. In this way enzymes are concentrated within membrane packages where they can be most effective in penetrating pollen and digesting out the contents (figure 8). Once the pollen is finally released from the end of the ventriculus it passes into the small intestine.

Polypeptides and other complex molecules released from within the pollen need to be broken down further. The molecules pass through pores in the peritrophic membranes

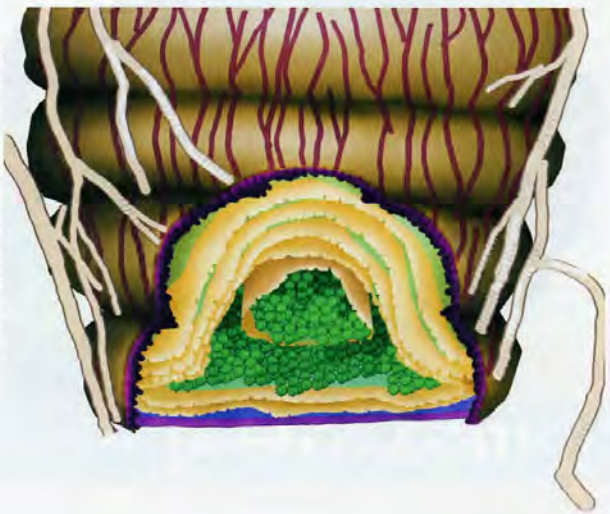


Figure 7. *Diagram of a section through the ventriculus. Pollen grains (colored green) are within compartments made by the various layers of peritrophic membrane (yellow). Fluid containing digestive enzymes flows around the peritrophic membranes back towards the beginning of the ventriculus.*

before being cleaved to simpler compounds by enzymes outside the peritrophic membranes and in a viscous layer, the glycocalyx, that coats the epithelial cells, as well as by enzymes bound on the surface of microvilli. Finally, simple compounds are absorbed through the ventricular epithelial cells and released into the haemolymph. BC

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Moritz B., Crailsheim K. *Physiology of protein digestion in the midgut of the honeybee* (Apis mellifera *L.*). Journal of Insect Physiology 1987 ***33*** 923–931

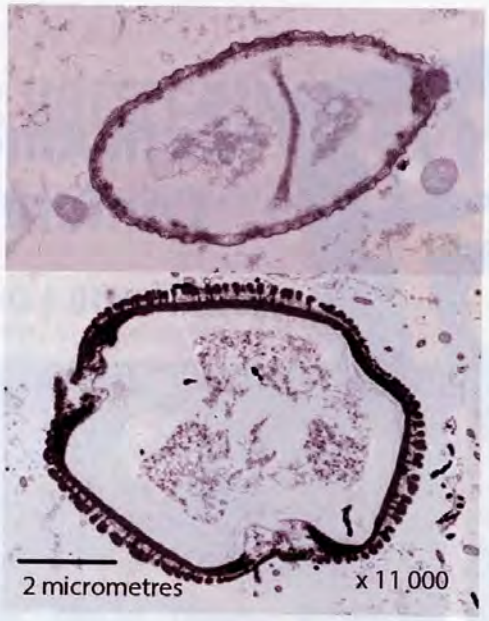

Figure 8. *Sections through pollen grains from within the small intestine, after their contents have been digested while passing through the ventriculus.*

The Pollinator Stewardship Council

PESTICIDES WINTERING IN YOUR HIVES

What pesticides are hibernating with your honey bees?

Michele **Colopy**

Now that it is November, honey bees across the U.S. have been moved to the south, the west, or "wrapped up and put to bed" for the Winter. Whether your honey bees were placed to pollinate crops, you moved your bees through a county or region to secure continuous nectar flows for a honey crop, or your bees sat in your backyard: they were all exposed to pesticides.

What pesticides are hibernating with your honey bees: lurking in the pollen, suspended in the honey, saturating the wax? No one is checking the pesticide residue load in the wax and honey prior to winterizing their hive. Many factors affect the lives of our honey bees, their survivability of Winter, including the sub-lethal or pre-lethal effects of pesticide residues that build up in their hives.

Studies have shown pesticides do not "stay put." The EPA acknowledges this:

"Pesticides can move from the sites where they are applied into the surrounding environment through a number of different ways, including drift and volatilization. Pesticide drift can occur when pesticides move off the application site in the air as particles or aerosols during application or when the pesticides move that are attached to dust. Volatilization occurs when pesticide surface residues change from a solid or liquid to a gas or vapor after an application of a pesticide has occurred. Once airborne, volatile pesticides can move long distances off site. Fumigant pesticides (used to treat soil before planting and to treat structures such as homes or storage bins) are especially volatile." [1]

The National Coalition on Drift Minimization defines drift as, *"The physical movement of pesticides through the air at the time of pesticide application, or soon thereafter from the target site to any non- or off- target site."* However, they continue to explain, *"Pesticide drift shall not include movement of pesticides to non- or off-target sites caused by erosion, migration, volatility or windblown soil particles that occurs after application, unless specifically addressed on the pesticide product label with respect to drift control requirements."* [2]

You can call it "drift" you cannot call it "drift," either way honey bees and native pollinators are exposed to pesticides. Sub-lethal or pre-lethal, pesticides have an impact upon your bees. A study of trapped pollen in seven countries and beebread from 12 European countries found 72 of 107 trapped pollen samples contained one of 53 different pesticides. Seventeen of the 25 samples of beebread contained one of seventeen different pesticides.[3]

The International Bee Research Association published a study analyzing the hives of "amateur beekeepers from five U.S. states." Besides finding chemicals normally used by beekeepers to protect against Varroa, the study found chemicals not used by beekeepers. Other "agricultural compounds were dimethoate, an organophosphate insecticide, a fungicide, and two herbicides."[4]

IBRA Science Director Norman Carreck says: "In general, the levels of residues found in honey from the brood combs in this study were significantly higher than in the honey supers. Even though the amounts of pesticide found were well below the LD50 levels known to directly kill bees, because the brood nest honey is fed to developing bee larvae, there is a concern that these sub lethal doses of pesticide may harm bees. This study's results support current concerns relating to the possible effects of sub-lethal doses of pesticides on bees and clearly demonstrates that further studies of this nature are needed".[4]

A study reviewing four common pesticides toxicity to honey bee larvae found:

"All pesticides at hive-residue levels triggered a significant increase in larval mortality compared to untreated larvae by over two fold, with a strong increase after three days of exposure. Among these four pesticides, honey bee larvae were most sensitive to chlorothalonil compared to adults . . . We also tested the common 'inert' ingredient N-methyl-2-pyrrolidone at seven concentrations, and documented its high toxicity to larval bees. We have shown that chronic dietary exposure to a fungicide, pesticide mixtures, and a formulation solvent have the potential to impact honey bee populations, and warrants further investigation. We suggest that pesticide mixtures in pollen be evaluated by adding their toxicities together, until complete data on interactions can be accumulated." [5]

"A broad survey of pesticide residues was conducted on samples from migratory and other beekeepers across 23 states, one Canadian province and several agricultural cropping systems" that found "121 different pesticides and metabolites within 887 wax, pollen, bee and associated hive samples."[6]

"Almost 60% of the 259 wax and 350 pollen samples contained at least one systemic pesticide, and over 47% had both in-hive acaricides fluvalinate and coumaphos, and chlorothalonil, a widely-used fungicide. In bee pollen were found chlorothalonil at levels up to 99 ppm and the insecticides aldicarb, carbaryl, chlorpyrifos and imidacloprid, fungicides boscalid, captan and myclobutanil, and herbicide pendimethalin at 1 ppm levels. Almost all comb and foundation wax samples (98%) were contaminated with up to 204 and 94 ppm, respectively, of fluvalinate and coumaphos, and lower amounts of amitraz degradates and chlorothalonil, with an average of six pesticide detections per sample and a high of 39." [6]

Even a USDA study in Gastonia analyzing the pesticide residues in beeswax exclaimed "it was surprising to find more pesticides than expected."[7] The beehives in the urban area of Gastonia were found to contain coumaphos, fluvalinate, thymol, and chlorothalonil (a fungicide).

A 2011 study by Wu, Anelli, and Sheppard studied

indirect and direct effects of pesticide exposure. They studied worker bees *"reared in brood comb containing high levels of known pesticide residues (treatment) or in relatively uncontaminated brood comb (control). Delayed development was observed in bees reared in treatment combs containing high levels of pesticides particularly in the early stages (day four and eight) of worker bee development. Adult longevity was reduced by four days in bees exposed to pesticide residues in contaminated brood comb during development. Pesticide residue migration from comb containing high pesticide residues caused contamination of control comb after multiple brood cycles and provided insight on how quickly residues move through wax. Higher brood mortality and delayed adult emergence occurred after multiple brood cycles in contaminated control combs. In contrast, survivability increased in bees reared in treatment comb after multiple brood cycles when pesticide residues had been reduced in treatment combs due to residue migration into uncontaminated control combs, supporting comb replacement efforts. Chemical analysis after the experiment confirmed the migration of pesticide residues from treatment combs into previously uncontaminated control comb."*[8]

The sub-lethal effects of pesticide residues in the hive delayed larval development, delayed adult emergence, and shortened the life-span of adult honey bees. "In addition, longer development time for bees may provide a reproductive advantage for parasitic *Varroa destructor* mites."[8]

The dose makes the poison: an immediate lethal dose, as well as the slow, long-term exposure to low doses of lethal toxins (or a cocktail of lethal toxins). The synergism with other pesticides, with pathogens, and pests impact the honey bee (and native pollinators) through direct contact with pesticides, low doses that build-up, residues that survive in the hive and in the food stores. In the end, dead is dead! Your bees may survive the Spring and Summer, only to die a slow death from toxic food, a toxic hive environment, and opportunistic pests and pathogens.

No matter your level of beekeeping, replacing combs, and decontaminating your hives annually may be the wave of the future. A researcher in Georgia annually scrapes the hive frames down to the foundation, removing the old wax filled with pesticide residues. For commercial beekeepers to manage such a feat they would have to have one set of colonies simply to create pesticide free comb that would be put into the comb of the migratory bees. When the migrant bees return, those frames would be scraped to the foundation, decontaminated and given to the bees that simply build comb. The remaining problem with that concept, is where can a beekeeper keep enough honey bees away from pesticide exposure and drift who will simply build pesticide residue free comb for the migrant bees? The *philosophical question* is why can't the honey bees keep the food they collect? After eons, why is the food bees have always collected now weakening their immune systems, impairing their ability to navigate, creating a toxic home environment, and killing them? BC

Footnotes and Research:

[1]Pesticide issues in the works: pesticide volatilization, from EPAs website **www.epa.gov/opp00001/about/intheworks/volatilization.htm**

[2]Power point presentation for Pesticide Drift From MSU Pesticide Education Program Michigan Groundwater Stewardship Program (MGSP) **www.google.com/l?sa=t&rct=j&q=&esrc=s&source=web&cd=10&ved=0CGwQFjAJ&url=http%3A%2F%2Fmacd.org%2F_literature_129929%2FPesticide_Drift_Management&ei=0M8NVMjaIajK8gHWioCwDw&usg=AFQjCNFLo8KBqeFZfdZMv5gPGTRY4mUQQw&sig2=y-0dy-eBBSKwU6B-8yjInQ&bvm=bv.74649129,d.b2U**

[3]The Bees Burden,Published April 2014 by Greenpeace Research Laboratories, School of Biosciences Innovation Centre Phase 2, Rennes Drive, University of Exeter, Exeter EX4 4RN, United Kingdom **sos-bees.org/wp-content/uploads/2014/04/469-The-Bees-Burden-LoRes_2.pdf**

[4]**Overwintered brood comb honey: colony exposure to pesticide residues**, Dr. Nancy Ostiguy and Dr. Brian Eitzer, Journal of Apicultural Research, vol. 53(3) pp. 413-421, July 4, 2014 **www.ibra.org.uk/articles/Pesticides-in-brood-comb-honey**

[5]**Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae ,** Wanyi Zhu mail, Daniel R. Schmehl, Christopher A. Mullin, James L. Frazier, Published: January 08, 2014, DOI: 10.1371/journal.pone.0077547 **www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0077547**

[6]**High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee Health,** Christopher A. Mullin, Maryann Frazier, James L. Frazier, Sara Ashcraft, Roger Simonds, Dennis vanEngelsdorp, Jeffery S. Pettis, Published: March 19, 2010, DOI: 10.1371/journal.pone.0009754 **www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0009754**

[7]**Pesticide Residue Detection in National Science Lab Beeswax,** Posted by Michael Sussman, Science and Technology Programs, on August 2, 2011 at 2:45 PM

- See more at: **http://blogs.usda.gov/2011/08/02/pesticide-residue-detection-in-nsl-apiary-beeswax/#sthash.AmgIyzEC.dpuf**

http://blogs.usda.gov/2011/08/02/pesticide-residue-detection-in-nsl-apiary-beeswax/

[8]**Sub-Lethal Effects of Pesticide Residues in Brood Comb on Worker Honey Bee (Apis mellifera) Development and Longevity,** Judy Y. Wu, Carol M. Anelli, Walter S. Sheppard, Published: February 23, 2011, DOI: 10.1371/journal.pone.0014720 **http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0014720**

A Closer Look

QUEEN MANDIBULAR PHEROMONE

Clarence **Collison**

Inhibits new queen production, prevents worker ovary development, influences comb bulding, affects juvenile hormone, swarm behavior and is a drone attractant.

Honey bee queens produce a sophisticated array of chemical signals (pheromones) that influence both the behavior and physiology of the worker population. Most striking are the effects of queen mandibular pheromone (QMP), a chemical blend that induces young workers to feed and groom the queen and primes bees to perform colony-related tasks (Beggs et al. 2007). Compounds in the mandibular gland secretion of the queen have been demonstrated to possess an incredible variety of functions, both as primer and releaser pheromones (Blum 1992). Releaser pheromones elicit rapid behavioral responses from recipient honey bees while primer pheromones affect the physiological state of the individual resulting in long-term changes in behavior.

The mandibular glands are a paired set of glands on either side of the queen's head. Each gland is connected to the mandible by a duct; a valve allows her to regulate the discharge of secretions (Winston and Slessor 1992). Five substances are secreted by the mandibular glands of the queen, a mixture of fatty acids and some aromatic compounds: (E)-9-keto-2-deconic acid (9-ODA), (R,E)-(-)- and (S,E)-(+)-9-hydroxy-2-decenoic acid (9-HDA), methyl p-hydroxybenzoate (HOB), and 4-hydroxy-3-methoxyphenylethanol (HVA) (Slessor et al. 1988). Although there is considerable variation in the quantities of these five chemical substances found in the glands of individual mature laying queens, the following secretion pattern has been observed: two- to threefold excess of 9-ODA to 9-HDA, with 1/10 as much HOB and 1/100 as much HVA (Slessor et al. 1990).

The retinue of workers that attend the queen facilitates the distribution of QMP throughout the colony, where it inhibits the rearing of new queens (Winston et al. 1990), helps prevent the development of worker ovaries (Hoover et al. 2003), influences comb-building activities (Ledoux et al. 2001) and affects the biosynthesis of juvenile hormone (Kaatz et al. 1992). Outside of the hive, QMP is involved in worker orientation during swarming and drone attraction during the queen's mating flight (Gary 1962).

The ontogeny (development) of the five queen mandibular gland semiochemicals that initiate and maintain the retinue behavior of worker honey bees was investigated by Slessor et al. (1990). No detectable pheromone is present at the time of eclosion (emergence from pupal case), but decenoic acid levels build up rapidly during the first week of the queen's life. The two aromatic components attain detectable levels later, with the more plentiful methyl p-hydroxybenzoate preceding the 4-hydroxy-3-methoxyphenylethanol. Pheromone levels are maximal in mature, mated laying queens. The ratio of (R,E)-(-)-9-hydroxy-2-decenoic acid to the (S,E)-(+) enantiomer increases with the age of the queen. Pheromone quantities in the queen's mandibular glands were unaffected by confinement, either in queen banks or mailing cages. All major body parts of typical queens, especially the head and legs, have sufficient mandibular exudates to be highly attractive to worker bees.

"Results indicate that queen mandibular pheromone inhibits the initiation of queen-rearing but not the maintenance of established cells."

The amounts of 9-ODA and 9-HDA produced by queens, and therefore the effects of the queen's secretions, depend on queen age, mating status, time of day and season (Winston 1987). Of 9-ODA, virgin queens less than two days old produce on average only 7 µg, whereas virgins five to 10 days old produce 108-133 µg, and mated laying queens less than 18 months old produce 100-200 µg. Thus, the secretion of 9-ODA is a function of queen age rather than a result of mating and/or egg laying. Older laying queens show reduced 9-ODA production, and this reduced output may be associated with queen supersedure by workers.

Virgin queens exhibit a 24 hour cycle in the production of 9-ODA, synthesizing most of this compound during the late morning and afternoon, the period during which nuptial flights occur (Pain and Roger 1978). Therefore, the

production of this pheromone is maximal during the period when the virgin female is utilizing it as a sex pheromone on mating flights.

The exact chemical blend produced by the queen differs between virgin and mated laying queens. Kocher et al. (2009) investigated the role of mating and reproductive state on queen pheromone production and worker responses. Virgin queens, naturally mated queens, and queens instrumentally inseminated with either semen or saline were collected two days after mating or insemination. Naturally mated queens had the most activated ovaries and the most distinct chemical profile in their mandibular glands. Instrumentally inseminated queens were intermediate between virgins and naturally mated queens for both ovary activation and chemical profiles. There were no significant differences between semen and saline-inseminated queens. Workers were preferentially attracted to the mandibular gland extracts from queens with significantly more activated ovaries. These studies suggest that the queen pheromone blend is modulated by the reproductive status of the queens, and workers can detect these subtle differences and are more responsive to queens with higher reproductive potential. Furthermore, it appears as if insemination substance does not strongly affect physiological characteristics of honey bee queens two days after insemination, suggesting that the insemination process or volume is responsible for stimulating these early postmating changes in honey bee queens.

The effects of various dosages of queen mandibular pheromone on the inhibition of queen rearing in queenless honey bee colonies was investigated (Winston et al. 1990). Dosages ranged from 10^{-3} to 10 queen equivalents (Qeq) per day; one Qeq was the amount of pheromone found in an average pair of queen mandibular glands. Both temporal and dose-dependent effects were found. The higher doses were effective at preventing queen rearing early in the experiment (days 0-6), but by day 10, when queen rearing was effectively completed, there were few effects at any dose. Approximately one Qeq/day was sufficient to suppress queen rearing for up to six days in colonies of 8,000-10,000 workers. Results indicate that the active components of queens' mandibular glands exhibit dose-dependent effects on queen rearing, but there are additional requirements necessary for the suppression of queen rearing for periods longer than six days. The amount of pheromone secreted by queens and distributed by workers may be considerably greater than previously considered.

Adding queen mandibular pheromone into honey bee colonies earlier than 24 hours after queen loss resulted in an inhibition of queen-rearing, but not when added after four days. The number of queen cells initiated in each treatment decreased with the addition of the pheromone, although there were no effects on the number of queen cells torn down following pheromone treatment. The effect of adding the pheromone to queenless colonies given

FtCls - fat cells; O - ocelli; MdGld - Mandibular gland. (from Snodgrass)

newly hatched female larvae under different regimens of queen cell provisioning and cell structure also was investigated. Only colonies in which larvae were presented in unmodified worker comb exhibited significantly lower rates of queen rearing. Results indicate that queen mandibular pheromone inhibits the initiation of queen-rearing but not the maintenance of established cells (Melathopoulos et al. 1996).

The effects of synthetic honey bee queen mandibular pheromone on colony foraging and brood rearing were investigated (Higo et al. 1992). Colonies newly established in the spring showed a significant, dose-dependent increase in the number of foragers gathering pollen, and individual pollen foragers returned to the nest with larger pollen loads. These two effects combined resulted

"Queenless honey bees can adopt a strategy of constructing drone-sized cells in order to increase reproductive fitness through male production following queen loss."

in a doubling of the amount of pollen brought into colonies by foraging bees. Brood rearing also increased, but not significantly. In contrast, large, established colonies showed no effects at their Summer population peak. They concluded that queen mandibular pheromone can significantly affect foraging, but its effects depend on colony conditions and environmental factors.

Synthetic QMP seems to calm colonies and reduce stinging, suggesting a role for QMP in managing colony defensive behavior (Gervan et al. 2008). Defensive responses of colonies that were queenright, queenless, or supplemented with two forms of synthetic QMP (liquid QMP on glass slides or Bee Boost® synthetic lures) were assessed by counting stings on a leather patch and the number of responder bees at colony entrances. Colonies with queens showed decreased defensive behavior when exposed to liquid QMP; colonies without queens and exposed to liquid QMP had no change in the number of stings but a decrease in the number of guard bees. Bee Boost had no effect on colony defensive behavior in colonies with or without queens. The ability to reduce defensive behavior with QMP could have positive implications for commercial beekeeping especially in context with Africanized bees, should an effective release device be developed.

The influence of the queen and her pheromonal signal on comb construction was examined. Ledoux et al. (2001) tested four treatments with newly hived packages of bees containing: 1) a mated queen, 2) a virgin queen, 3) no queen but with a dispenser containing synthetic queen mandibular pheromone (QMP), and 4) no queen and no pheromone. After 10 days, the comb produced by each colony was removed, comb measurements made, bees from the comb-building area collected, the size of the scales on the wax mirrors of the collected bees ranked on a scale of 0-4 and the queens removed and analyzed for QMP components. Queenless workers built substantially less comb and the comb they did build had significantly larger, drone-sized cells than for the other three treatments, indicating that both cell size and the quantity of comb built are mediated through the queen, particularly QMP. The observations of wax scale size suggested that QMP influenced comb building behavior rather than wax scale production. These results support the idea that queenless honey bees can adopt a strategy of constructing drone-sized cells in order to increase reproductive fitness through male production following queen loss.

Beggs et al. (2007) investigated how this pheromone works at the cellular level. They found that QMP has profound effects on dopamine pathways in the brain, pathways that play a central role in behavioral regulation and motor control. In young worker bees, dopamine levels, levels of dopamine receptor gene expression and cellular responses to this amine were all affected by QMP. They identified HVA (4-hydroxy-3-methoxyphenylethanol) as a key contributor to these effects which bears a striking structural resemblance to dopamine and provided evidence linking QMP induced changes in the brain to changes at a behavioral level.

Grozinger et al. (2003) investigated the effect of QMP on gene expression in the brain of the adult worker. Cage experiments revealed that QMP transiently regulated expression of several hundred genes and chronically regulated the expression of 19 genes. Several of these genes were also affected by QMP in experiments with colonies in the field, demonstrating robust gene regulation by this pheromone. They also focused on one function of QMP: delaying the transition from working in the hive (nursing) to foraging. A list of QMP regulated genes was compared with lists of genes differentially regulated in nurse and forager bees generated in a separate study. QMP consistently activated "nursing genes" and repressed "foraging genes," suggesting that QMP may delay behavioral maturation by regulating genes in the brain that produce these behavioral states.

The attraction of drones to queens for mating was initially demonstrated in response to mandibular gland extracts, and subsequently 9-ODA and to a lesser extent 9-HDA were found to be the active components (Gary 1962; Butler and Fairey 1964). Drones maybe attracted by queen pheromone at distances up to 60 meters (Winston 1987).

The queen's mandibular gland secretions also have three swarm-

associated functions outside of the hive: they attract workers to the cluster, stabilize the cluster and aid in swarm movement to a new nest site (Morse 1963; Simpson and Riedel 1963; Butler et al. 1964; Butler and Simpson 1967; Morse and Boch 1971; Avitabile et al. 1975; Winston et al. 1982). When workers issue from a nest in a swarm, they are attracted to the queen wherever she has alighted; 9-ODA appears to be more important for attracting flying workers, whereas 9-HDA seems to function more to stimulate alighting and clustering. Once the cluster has formed, both pheromones, but 9-HDA in particular prevent the workers from becoming restless and leaving the cluster prior to the swarm's movement to a new nest site. When the swarm lifts off to travel to the new nest, workers sense the presence of the queen through the 9-ODA odor, and the swarm moves as a group only if the queen is present. For both cluster formation and swarm movement, Nasonov pheromones act in concert with the queen-produced substances (Winston 1987). BC

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MOSES QUINBY

America's Father Of Practical Beekeeping

David **Edwards**

MOSES QUINBY

In 1853, Lorenzo Langstroth of Massachusetts and Moses Quinby of New York published their books on beekeeping – "*Langstroth on the Hive and the Honeybee--a Beekeeper's Manual*" and "*Mysteries of Bee Keeping Explained*", by Quinby, both books going through the printing press at the same time according to Mr. Quinby.

Moses Quinby (born April, 1810, Westchester County, New York), Rev. Lorenzo Langstroth (born December, 1810, Philadelphia)), and Rev. Dr. John Dzierzon (born January, 1811, Prussia) were by all accounts the premier beekeepers of their generation. Quinby, the *Father of Practical Beekeeping* and as we shall see, discoverer, inventor and author; Langstroth, the *Father of American Beekeeping*, credited with utilizing the concept of "bee space" in his innovative top opening movable frame hives; and Dzierzon, the *Father of Modern Apiculture*, who observed that "male bees have no father," the description of parthenogenisis or asexual reproduction and author of over 800 articles and 26 books on bees. They influenced each other, used each others observations to improve their own methods, occasionally cried plagiarism, and in the end raised the quality, efficiency and productivity of beekeeping around the world.

Quinby, an astute observer of bee activity, called himself a 'practical beekeeper' and utilized his observations to both develop methods of managing bees and design equipment. He managed large numbers of bee colonies, freely shared his concepts, supported beekeeping organizations, and later in life engaged in queen rearing. He is credited with inventing the smoker with bellows that we know today, building one of the very first centrifugal extractors, and recognizing and developing methods of treating foul brood disease. He was a frequent contributor to the bee keeping literature, sometimes having multiple articles and a Letter to the Editor in a single monthly journal. He appears to have been the first person to actually make a living keeping bees as an occupation.

Moses Quinby (some ancestors spelled it "Quimby," but ancestor William Quinby emigrated to America prior to 1664 from Quinberry, England with a patent for land in Westchester County, New York) was born into a Quaker family in variously Chappaqua, New Castle or North Castle, Westchester County, New York on April 15 (or July 16?), 1810. In 1791 New Castle was split off from North Castle. Chappaqua WAS in North Castle, but after the split it was in the adjacent New Castle. It is safe to say he was born in New Castle; probably Chappaqua; certainly not North Castle. His parents were William and Hannah Sands Quinby.

In 1820-1822 his family moved to Greene County, New York, and at age 18, in 1828 he took up beekeeping in addition to his 'day job' of running a lathe and other woodworking equipment at the Pazzi Lampman sawmill. Soon thereafter he drilled a hole in the top of one of his hives, determined to give his bees access to a separate box in which to store surplus honey. This was the early concept of what we now call 'supers,' and Quinby was on his way to becoming a reknown beekeeper.

In Coxsackie, Green County, Moses lived on "Honey Hill," overlooking the valley called "Honey Hollow." His woodworking abilities came in handy for making beekeeping equipment, and one of his early creations was a hive with glass sides and wooden shutters that allowed observation of the working bees. During the rest of his life he made not only beekeeping equipment but also "very good maple and cherry furniture."

When Moses was about 16 years old his family became involved in the Forestville Commonwealth, referred to in writings as a 'communist' (with a small "c", but certainly socialist) society similar to the Amana, Oneida, New Harmony and Zoar groups. Moses was personally too young at the time to join. His older brother was a prominent member, but their father was excluded because of reports of issues with 'demon rum.' This living experiment in Greene County was short lived, but later, at age 21, Moses did take an extended trip west, via the Mohawk Valley, to visit some of the similar communities. He took a riverboat up the Hudson River from Coxsackie to Albany, then by rail to Schenectady, by canal boat along the new Erie Canal to Buffalo, by lake boat along Lake Erie to Cleveland and then again by canal boat to

L.C. Root

Massilon, Ohio. Awaiting him there were his uncle and aunt, Harry C. and Tamar Quinby Fosdick, members of the Kendal community.

During his life he remained true to his Quaker upbringing and beliefs. He was part of the Temperance Movement, and was anti-slavery. However, he may not have been a pacifist since he reportedly had a uniform of a Captain of Militia, but there is no record of his service. He felt strongly that God had made all things possible and that he was obligated to share what God had allowed. He never patented any of his inventions so that they would be available to anyone. He did not even copyright his books or other writings (but shortly before his death his son-in-law, business partner and future editor of his book, Lyman C. Root did obtain a copyright --No. 13306, 1874 – for Quinby's book). Shortly after the death of Moses Quinby L.C. Root also patented certain features of the Quinby beehive.

Moses freely gave of his time and experience to others who wished to learn the art of beekeeping. Between February 1867 and April 1875 he had 26 articles published in the American Beekeeping Journal, and wrote extensively for the *American Agriculturist* and *Country Gentleman*. His ABJ articles included topics such as bee diseases, overwintering of bees, bees by mail, races of bees, raising, mating and selling queens, and various comb related comments. By far, his most through and frequent contributions dealt with foulbrood diseases.

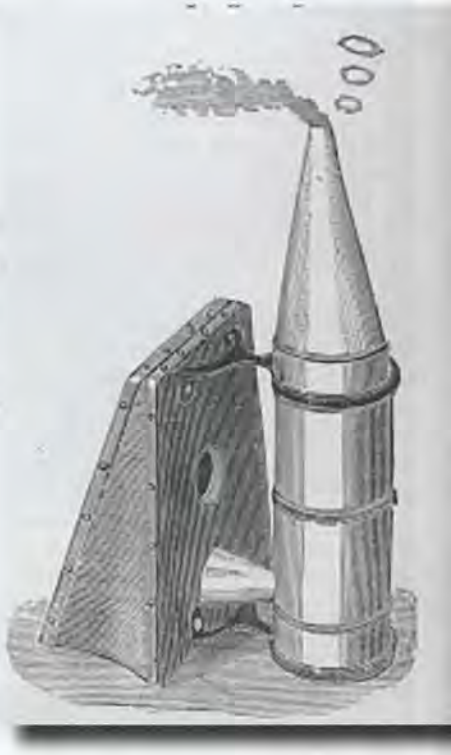
He hosted beekeepers from various parts of the country, demonstrating, explaining and answering questions. Local beekeepers sought him out for advice on a regular basis.

Moses began writing his book in 1851, and as noted above, he published the first edition of *"Mysteries of Bee-Keeping Explained, Being a Complete Analysis of the Whole Subject: Consisting of the Natural History of Bees, Directions for Obtaining the Greatest Amount of Pure Surplus Honey with the Least Possible Expense, Remedies for Losses Given, and the Science of "Luck" Fully Illustrated – the Result of More Than Twenty Years Experience in Extensive Apiaries* in 1853. It offered the results of 35 years of beekeeping experience, a comprehensive treatise on the subject. Later editions reported on methods of propagation of the Italian Bee. His book critiqued several types of hives (which he referred to as "patent hives") and explained why he used the type he did at that time. He met Langstroth shortly after their books were published, recognized the value of the Langstroth hive, and quickly modified his (which became known as the Langstroth-Quinby hive).

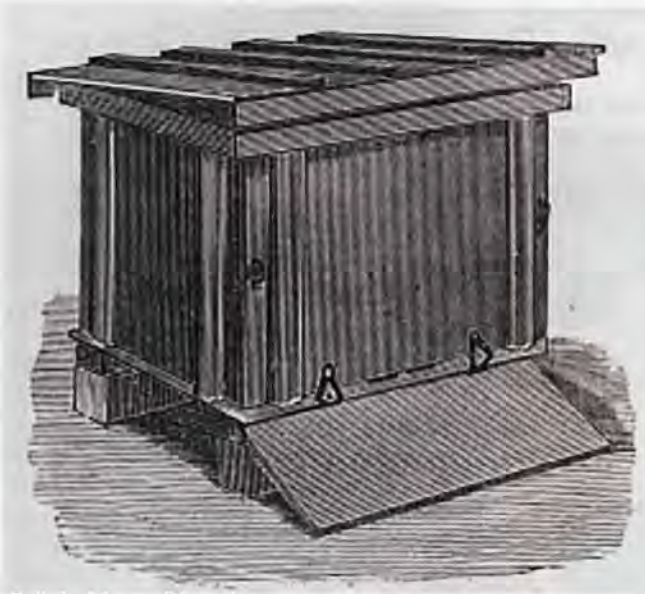
Moses Quinby was the grandson of Moses and the son of William and Hannah Sands Quinby. In Coxsackie, his family was close to the Norbury and Fosdick families, a friendship that played out later in Kendal/Massilon Ohio and St. Johnsville, New York. John Norbury married Mary Fosdick. They had at least two children, Elizabeth who married John Underhill and Martha Powell Norbury (b. December 18, 1813), who married Moses Quinby on September 8, 1832. Moses and Martha had two children, Rev. John William Quinby (b. October 4, 1833) and Elizabeth Hannah Quinby (or Hannah E., b. July 19, 1837.) John had no children. Elizabeth married Lyman C. Root and they had two daughters, Kathryn Hildreth Root and Dr. Stella Quinby Root, neither of whom married. The Moses Quinby line came to an end.

Moses's son Rev. John William Quinby was educated at the Fairfield Seminary, Herkimer County, New York, at the time one of the premier educational institutions in central New York, at Amherst College and at Harvard Divinity School, as well as a practical education during service in the Civil War. The Cooperstown Freeman's Journal reported on March 13, 1863, under "Promotions", that "1st Sergeant John W. Quimby to be 1st Lieutenant, Jan 3, 1863 to replace D. Hill, promoted." His first, last and only calling was as pastor of the Unitarian Church in Eastbridgewater, Massachusetts for thirty years. He died there, in retirement, in 1911 at age 78.

On February 28, 1869, Moses Quinby wrote to Lyman C. Root, a beekeeper in nearby Mohawk, Herkimer County, New York:



Quinby Smoker



Quinby Hive, with roof.

> "Men can be trained to manage this way much easier than the others, and when Montgomery County and Herkimer County is filled with apiaries three miles apart there is a little room outside yet for more. Now if I have reasoned correctly in this matter – and my 40 years experience ought to tell me what to expect – there is the fairest chance for a future with the least labor and capital of anything of which I can conceive."

This constituted an offer to Root to join Quinby as a 50/50 partner in the bee business, Quinby being well aware that Root is not currently in any permanent business and does not particularly like St. Johnsville.

Lyman C. Root and Elizabeth Hannah were married in St. Johnsville in 1869. Whether the marriage was a result of the business partnership or the partnership was developed in anticipation of the marriage is unknown. The granddaughters Stella and Kathryn were born in St. Johnsville, but in 1887 moved to Stamford, Connecticut as children when Lyman and family moved there to pursue dairy farming. Dr. Stella Root practiced general medicine, obstetrics and anesthesiology in Stamford for many years and Kathryn Root was for many years the Supervisor of Home Economics for the Stamford Public Schools.

Daughter/wife Elizabeth Hannah Root was an indispensable part of the beekeeping operation of both her father and husband. It was she who was responsible for most of the rewriting and editing of the books as well as doing almost all the illustrations, many from direct observation. Her skillful artwork was recognized internationally. She died in Stamford in 1896 at the age of 59.

Lyman C. Root (not to be confused with the beekeeping Roots of Ohio) was born in St. Lawrence County, New York in 1840, and was educated at the Fairfield Seminary in Herkimer County, New York and St. Lawrence University, Canton, St. Lawrence County, New York. He graduated from the Eastman Business School in 1865. He carried on his beekeeping activities first near Mohawk, Herkimer County, New York, and then also in conjunction with Moses Quinby in nearby St. Johnsville, Montgomery County, New York. He moved to Stamford, Connecticut in 1887 ostensibly to engage in dairy farming, but one must assume that he did not completely eliminate beekeeping from his life. Lyman died in Stamford in September, 1928.

When the Quinby's left Greene County he was the largest beekeeper in the area. He was fortunate to have a brother, David, a commission broker in New York City, as a safe outlet for his honey. However, due to a 'serious regression of the soil' (hard pan at the base of the plow) the bees lacked adequate vegetation. Central New York and the Mohawk River valley, at the time were lush with vegetation, wild and cultivated.

What brought Quinby to the Mohawk Valley was not just the vegetation that he had certainly noticed – there are some things that beekeepers seldom overlook when they travel – on his 1831 trip to Ohio, but the fact that he had relatives in the area. His wife's sister, Elizabeth Norbury, had married John Underhill, a Coxsackie tanner. In about 1850, John, Mary and their three sons purchased the Beekman Tannery in St. Johnsville. It was here that their son Thomas learned the tanning trade, learned to keep bees with his Uncle Moses who arrived in 1853, and eventually expanded the leather business into semi-finished boot uppers. Thomas' shipping knowledge and the proximity of the Erie Canal and local railroad allowed him to assist his Uncle in shipping honey to New York City.

At some point before or after the arrival of Moses Quinby in the area, John Underhill also became a beekeeper. According to a price list from the Moses Quinby enterprise in the late 1870's, "J. Underhill of St. Johnsville, from 15 colonies obtained six swarms, 1050 lbs. box honey and over 500 lbs. extracted honey – the last was from two hives, 225 lbs. box honey was from one hive."

While working with Uncle Moses from 1853 to 1859, Thomas Underhill invented a moveable honey frame (the Leaf or Underhill hive), went on the road to sell it, discovered in Williamsport, Pennsylvania an area ripe for a tanning and leather making business (probably because of the easy availability of tan bark from the extensive lumbering that was taking place in north central Pensylvannia, where Williamsport had become a "Boom Town" – log booms capturing felled trees floated down Pine Creek and the West Branch of Susquehanna River). In 1859 the family business moved to Williamsport, grew extensively, failed during Reconstruction, revived, and was sold in 1884. Underhill headed west, became a rancher just down the trail from the Teddy Roosevelt Ranch, and eventually became the first Railroad Commissioner of North Dakota. He returned to St. Johnsville in later life, and died there in 1928, age 93.

On arriving in St. Johnsville, Moses Quimby purchased eight acres from Christian Klock and established himself and his family. His new homesite, which had been the site of the historical Battle of Klock's Fields during the Revolutionary War, contained a large spring that served him and two other homeowners as well as two ponds that Quimby built. One of the ponds was a source of water power for Quimby's turning mill and one was a breeding pond for speckled trout. His house had "running water" year round via a system that ran

the spring water directly to the kitchen sink and thence to a specially constructed cabinet that functioned as a refrigerator or at least a 'cooler' for milk and perishables. He also planted an extensive orchard, a series of basswood trees (that were still standing in 1951) and terraced vineyards, laid out his apiary, and built a honey house. He appears to have purchased an additional seven acres from Abigail Smith for $1300 in 1855.

In 1862, Moses Quinby reduced the number of hives under his care, possibly due to the lack of help since many young me were off to fight in the Civil War, and the departure of his partner and nephew Thomas Underhill in 1859 to pursue his leather career in Williamsport, Pennsylvania. Instead of owning or co-owning up to 1200 colonies, he chose to concentrate on raising his strain of Italian bees, selling packages and Queens. Still, in 1865 he shipped 11 tons of honey to New York City.

Until 1859 the only honey bees in America were the "Dark Bees" or "Black Bees", *Apis mellifera mellifera* from Northern Europe. That year the Italian ("Golden Bee" or "Yellow Bee"), *Apis mellifera ligustica,* was introduced into the United States. Moses Quimby was one of the first beekeepers to raise that stock.

In 1868 he advertised to ship queens over short distances by mail. Such shipments did not become common however, since they were soon excluded from the mails by postal officials. By 1869 he was selling various bee supplies by mail, and the 1872-73 Boyd's Business Directory listed Quinby & Root, honey, as a business in St. Johnsville, New York.

During his beekeeping career Mr. Quinby devised many unique approaches with new, improved or modified equipment. He utilized several variations of the hive body, tweaked the movable frames design as well as how wax foundation could be utilized in the frame. He freely shared his methods, not considering patenting or copyrighting anything until late in his life.

He eventually settled on the "New Quinby Hive," held together at the corners with "Quinby Hive Clamps," and flat bottom foundation.

In 1873 he invented the Quinby Bellows Smoker, improved it in 1874 and offered it for sale. He had utilized comb foundation as early as 1846, but probably not as full sheets. He did improve the full sheet comb available by developing deep comb, but one of his few patented inventions was a distinct failure. After his death, announcement was made that he had applied for a patent on an artificial comb of full depth made of metal. Such combs would be virtually impervious to the destructive wax moth, but he apparently failed to consider the effects of temperature extremes on metal and the idea died a timely death. He is also credited with making the first honey extractor on the North American continent as well as the first practical knife for removing honey comb cappings.

He was involved in developing almost all the improved products of his time. He, along with others, came up with various modifications to the Langstroth hive; he made what was probably the first extractor in this country, based on de Hrusehka's invention in Vienna – it was later modified, improved and commercialized by A.I. Root in Ohio; he developed the smoker that was later improved and patented by Bingham in Michigan; his first uncapping knife underwent many improvements over the years; he undoubtedly had input into the development of the flat bottom foundation that Hetherington patented and Van Deusen produced; and he made improvements to Langstroth's Alexander style veil.

He originated the "driving" or "shake-off" method of treating foul brood, but it was McCarty who later got the credit; he developed one of the first if not the first pollen substitute – rye and buckwheat flour mixed with sawdust; and although he disagreed with Langstroth on the size of a beehive, he enthusiastically recommended and encouraged the use of Langstroth's concept of movable frames, and readily gave him credit for this development.

As early as 1835 Quinby recognized Foulbrood Disease, but not the fact that American and European forms of the disease existed. He commented on it extensively in the bee keeping literature. He fought a losing battle recommending a method of combating the disease that avoided destruction of both the colony and the equipment. By the early 1900s scientists had identified the long lived spores that are responsible for American Foulbrood, and the current recommendation remains death by fire and burial of the remains – bees, box and frame. Efforts to modify this process have not yet been officially accepted.

In 1859 Quinby's friend Langstroth had finally managed to import some of the new Italian bees, reported to be more gentle than the common German bees, they also were supposed to be more cold tolerant and more prolific. The increased availability of Italians may well have been another reason that Quinby switched to queen raising at the outset of the Civil War. Or, quite possibly, he found out that his friend Langstroth was selling Italian Queens at $20 each and realized what a lucrative source of income that could be.

The Constitution and By-Laws of the New York State Bee-Keepers' Association was adopted March 10, 1870 and leaves no doubt as to the genesis of the organization. Article 1 states clearly "This Association shall be known as the New York State Bee-Keepers' Association founded by Moses Quinby in 1868". By 1872 the organization was known as the Northeastern Bee-Keepers' Association, and Moses was still President and served in that office until his death in 1875. He died financially secure, having lived most of his 65 years supported by his bees.

But Moses Quinby was not "All bees, all the time". In addition to his woodworking and mechanical abilities he was a noted chess player, and played both the banjo and the flute.

After Quinby's very sudden death on May 27, 1875 (of "apoplexy of the heart") his son-in-law Lyman C. Root (married to Quinby's daughter Elizabeth Hannah in 1869), commercial bee keeper of Mohawk, Herkimer County, New York, took on the responsibility of revising and updating what became "*Quinby's New Bee-Keeping*", now containing 50 years experience and billed as "*A Complete Guide to Successful Bee-Culture*", by L.C. Root, practical apiarist. At some point after 1874 the original and then the revised books were copyrighted. Root continued to edit the book until 1915.

Moses Quinby and his wife Martha, who died in Stamford, Conecticut in 1901, are buried in Upper Village Cemetery, St Johnsville.

The revised edition of the Quinby book included an additional preface by L.C. Root as well as a memorial by

Captain J.E. Hetherington of Cherry Valley, New York, Quinby's most noteworthy protégé.

Moses Quinby left his mark on beekeeping. Nearly 140 years after his death we continue to utilize equipment, techniques and methods that he either developed or improved. His ideas have been handed down in writing and through his disciples and correspondents. He truly deserves the title *Father of Practical Beekeeping.* BC

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Preparing For A Beekeeping Course, Part III

The Bee Club Scenario

Larry **Connor**

Many local, regional and state beekeeping clubs offer courses in beekeeping. During the first two parts of this three-part series we focused on club development of a bee course. In this post CCD era of beekeeping many of these club meetings draw in huge numbers of participants, with reports of 500 to 1000 beekeepers being relatively common. Many clubs intentionally offer much smaller classes because they have found they can offer a meaningful course by limiting development. That number may be 30, 60 or 100 individuals and provides certain advantages and disadvantages.

Advantages of a limited enrollment class:

- Manageable numbers for facilities, snacks and parking
- Easier to recruit, register and teach a smaller number, using the experience of the prior years.
- It is possible to find a mentor for each student if the club is large enough
- Reduced financial risk if enrollment fails to fill, but economic stability if the course fills
- Encourages development of a group of local instructors.
- Presents a positive reputation and image for the club within the overall community.

Disadvantages of a limited enrollment class:

- Limited income (if the club uses the bee school as part of its financial base)
- People are forced to wait to participate and may loose interest in bees altogether
- Lack the financial ability, due to low student income, to bring in a quality speaker(s)
- May reflect a series of missed opportunities for growth and club recognition.
- Any sized class that is poorly instructed serves as a poor reflection on the club and its image within the community.

The Self-Sponsored, Self-Taught Class

Arranging, sponsoring, and instructing a course yourself can be pretty exciting, but also pretty scary. Some newer beekeepers with more experience in teaching and instruction than in beekeeping jump into the teaching game and put on some very successful courses, while others fail to teach essential ideas. These instructors are frequently 'one page ahead' of the class in terms of content, so they work hard and do a thorough job of reviewing the introductory aspects of bees and beekeeping and presenting new information.

Experienced individuals often present classes in beekeeping, presented as one evening, one day or multiple evening sessions in their local area. The advantage here is that, like local bees, experienced local instructors have the knowledge of colony growth conditions, bee flora flowering cycles, timing on making new colonies, supering, wintering, and many other localized aspects of beekeeping. I learned beekeeping this way, from local people, and from a single professor in a state college class (which we will cover). The potential disadvantage is that a few more experienced instructors may be stuck in a time warp, continuing to teach practices that others consider old fashion. I suspect that this is rarely a huge problem, but it can be discouraging to those who have progressive objectives. Most experienced instructors have a large and loyal following.

It takes a well developed business sense to organize your own class. I find that these courses are very rewarding, but it is exhausting to keep all the details in mind and not to miss a key detail. Keeping good records is an essential requirement. I use PayPal for class payments to ensure good payment history. These courses may be more expensive than other (club sponsored) classes unless you make your profit by selling bees and equipment.

As the organizer and instructor you will have the choice of course format, textbook, and will have the ability to change the class if the students do not quite fit your previous experience.

Certain students seem to make a point of being rather unforgiving. They want the coffee and tea water ready when you start, with a wide selection of packaging and sweeteners (be darn sure you have honey in three varieties!), to have good visual aids, to

have a detailed set of handouts and much more. They want short, direct answers to their questions, and often fail, or choose not to understand more complicated concepts. It may be frustrating to you as the instructor to have students who want simple answers and oversimplified cookbook solutions rather than informed discussions about the complexities of the bee hive.

Then you can have the well-read, serious student who is ready to engage in a complicated discussion on any topic. I love these students, but their constant questions and comments will often interfere with the flow of the entire class and cause other students to loose interest. Finding middle ground for all students is an ongoing challenge as a sole instructor. Meet with the exceptional students before or after class if necessary.

It is easy for me to call up or hide behind my so-called years of experience when I teach my classes, so my instruction tends to contain some stories of experiences and people I have encountered during my career. A few students react to this as shameless name dropping, but generally the majority of students appreciate the range of experiences one can present by telling stories based on personal experiences and from other beekeepers. I was taught by beekeeping storytellers, and some of it became part of my teaching DNA.

Perhaps one of my best self-taught classes was the one I offered several years ago at the family farm. We started the season in late winter with unassembled bee equipment that the class worked as a group to put together. We arranged to obtain five frame nucs from a local bee breeder and installed them, together. We did everything together. We worked the bees, as a group, so every student saw what each of their classmates' hives were doing. We experienced a wide range of results from these so-called sister hives and sister queens, so that the students were all exposed to a wide range of results. The negative side of this was that there were some students who had hives with poor luck: queen failures, heavy chalkbrood, and other problems. It was hard for these students to have the same positive response to the teaching experience as the group that had colonies that produced a deep super of honey in a week and later survived the first Winter without a problem.

Many of these students went on to great success with their bees, but a few lost interest for personal or beekeeping reasons and disposed of the colonies. A few were repeated no shows during sessions, and pulled the entire class down with their failure to participate, and the decision if the class should inspect their hives or not.

The challenge for me was that this class became a scheduling nightmare, took many more trips to the apiary than I ever expected, and worked out to a low return for my time teaching the class. On the positive side, I developed some solid friendships with some of the students, and learned a lot about beekeeping teaching techniques. It made me a strong advocate of collective teaching experiences in community apiaries. Several of the members of this class were responsible for helping start and sustaining the Kalamazoo Bee Club, so the synergism of the course was very effective.

Self sponsored but not self taught class

Many beekeepers are good at course development and management but self-identify as poor teachers. They are constantly in search of a qualified instructor for a one-day class, a multi-evening bee school, or something more complex. Potential speakers include well established master beekeepers and college and university instructors and professors. There is reluctance of the upper-level educators to accept such a teaching assignment unless they are compensated well, or acknowledged significantly by their home institution.

For the organizer, the challenges are many. First, you need to identify an instructor who will provide the range of instructional experience that a diverse class will respond to favorably. My initial job as a state extension specialist made me the go-to instructor for evening classes and weekend day courses. Even back in the early 1970s, travel funding was a significant issue for extension outreach, and the trend was to coordinate several groups together for bee schools and other training. It was then that I discovered the fact that beekeepers would not participate in zero or low cost programs at a reliable rate, forcing me to conclude that they figured if the course was free, it must not be worth anything. It is ironic, to me, that people will attend an $800 program for two or three days and think it was absolutely the best class ever, while the same content material could be offered for a few dollars at a community center with little, if any, loss in course content. Understanding key aspects of human psychology is important in setting up a course with a guest speaker on a specialized subject.

This leads me to the concept of compensating an instructor well for their efforts for any bee course, but certainly one offered privately. Most people will willingly pay for a key speaker on an important topic if they are properly educated and prepared in advance for this event. So start a year or 18 months before the class to build up interest and sell the program to potential enrollment.

Once you sponsor such a program, keep the momentum going. Do not drop back for fear that you cannot do it again, but offer a follow up program with the same speaker or a new program with a different speaker. Bee clubs do this all of the time, so why not you too?

College and University Courses

University apiculture and

apiology courses are often based on a traditional course offered by a noted professor or scientifically successfully visiting professors. Courses with these high standards are rare but have enjoyed a boost in student interest over the past decade. Some universities require that certain majors must take an apiculture lecture course – majors like horticulture, for example. But getting the bee course on the electives list at a major university will put students majoring in education, behavioral psychology, urban planning, environmental science and even engineering in the apiculture course. Following a 15-week semester of one or two lectures per week, the course can reveal considerable content and detail. Most of these programs are offered where there is a university appointment for a professor with duties in apiculture.

Beekeeping courses are often offered at universities, colleges and community colleges and are taught by adjunct instructors that are probably teaching local bee schools as well. Most are extension or continuing education programs, depending upon the academic institution. Most of these courses are offered where there is no existing research or teaching program for bees and beekeeping.

More and more bee clubs should encourage local institutions to have a beekeeping education program that fits into an existing program, or may be part of a sustainability education program. This may, in the future, lead to a more permanent faculty position with bee responsibilities, even in small colleges and universities that lack a tradition in agriculture—we have comb full circle as more and more programs focus on local food production regardless of the geography or distance to the closest ag college.

Specialty Classes

Special classes in queen rearing, mead making and hive products production and marketing are the most common specialty courses being offered by clubs and individuals with the knowledge to teach the material adequately. These are best taught by the doers in the respective fields, and are rarely academic but may be somewhat technical in scope. If there are thousands of people taking introductory beekeeping classes each year, there must only be dozens, by comparison, taking specialty courses. Queen rearing courses are growing in popularity due to the need for locally-produced queens. Mead making courses are following a trend toward local brewing and some state encouragement to enter into the alcohol sales arena for small producers. Hive products courses should appeal to a wide range of small scale beekeepers who are looking for ways to increase their sales of hive-based products while keeping costs at a minimum.

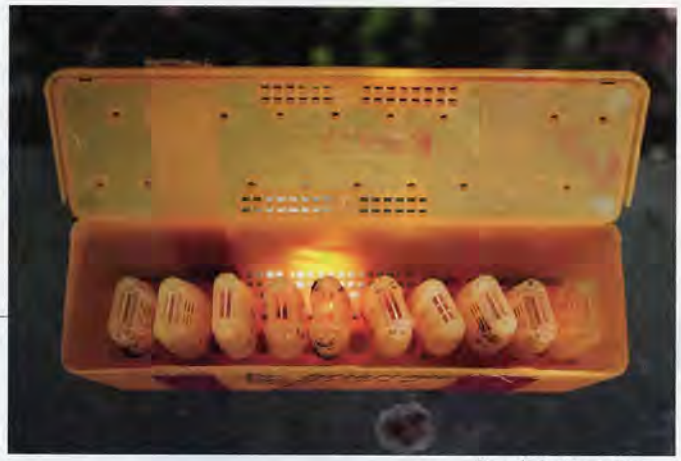
Each course of this sort takes a coordinated effort from the host or sponsoring group and the instructor. Promotion is a key challenge to such programs, as it is often a challenge to figure out where and how to promote special bee programs, especially outside the local and state bee club.

Teaching is a challenging opportunity to promote bees and beekeeping. Creating a course, or helping with the sponsorship of a class, will provide a rewarding opportunity to those who choose to become involved. It can also become a valuable revenue stream for the club or for yourself. I hope this series of three articles has been useful to you and I welcome your feedback. BC

November puts Dr. Connor at the Texas Beekeepers Association meeting and the Southern New England Beekeeper's Assembly in Groton, CT. For details, check the ***www.wicwas.com*** *website. By November the newest Wicwas title will be released. It is a photo summary of a lifetime of photography by beekeeper-photographer Peter Lindter of Delaware.* Garden Plants for Honey Bees *is a much needed addition to the literature about bees and flowers for beekeepers and the general pubic.*

The Problem With Queens

Jennifer **Berry**



Small battery box.

For the last several years we have had to purchase queens outside the state for our research projects, which have started so early in the Spring that our local queens are just not available. Unfortunately, the earliest we can graft here in the Piedmont region of Georgia is around March 15th. This means that we wouldn't have well-mated and matured (laying) queens until mid-to-late April, which was much too late for our recent research schedules.

Yet, I wish we could have raised our own queens because, in both years, the purchased, early-season queens were very disappointing. Honestly, they were horrible! The tragedy has not only been the material cost, but the set backs in our plans and expectations. This includes the time lost while introducing purchased queens into our research colonies and, then, dealing with all the failures that followed. It has been gut-wrenching. Over the last two years, we have had in excess of a 70% failed-acceptance rate, and, of the queens that were accepted, 20% were either superseded within the first month or so poorly mated (i.e., pitiful brood patterns, some even drone layers) that they were not worth keeping! What a mess!

Now, I have no intention of disclosing the two breeder operations who sold these queens to us; so, please don't even ask. But they know who they are! In any case, it is my intention to share our hard-earned experience, mention a few tips and tricks, and offer the names of a couple of good suppliers to hopefully assist you in the process of buying and installing queens when getting started, increasing your stock, or just requeening to improve certain traits in some or all of your existing colonies.

Like I said, we needed early queens. So, I reserved them in the previous year to ensure that our significant orders – over 300 queens each year – would arrive on time. Orders of this magnitude typically come in what's called "battery boxes," which can be a plastic shipping container, which holds up to 20 plastic queen cages, or a cardboard carton with screening on each side to allow ventilation, which come in different sizes and can hold hundreds of queens. Trays or compartments inside these boxes hold the cages in place so they don't get knocked about. Another advantage of these vessels is that you can ship them with an abundance of shared attendant bees and resources instead of the old practice (Benton cages) of having a few attendants in each individual queen cage.

Once the queen cages are set securely in the box, loose worker bees are shaken or brushed into the surrounding interior, along with a wet sponge and some queen candy (fondant), before it is sealed for shipping. The sponge provides moisture to the attendant bees for dissolving the candy to feed the queens as well as themselves. And, notwithstanding negligence or abuse (e.g., exposure to heat in parked trucks or black mailboxes in July, suffocation by blocked ventilation panels, or injury by throwing, kicking, squashing, etc.) by delivery carriers, they generally arrive alive.

Two years ago, our order for 300 queens was to be shipped out in early March. There were two separate arrivals (150 queens each) a week apart. Both batches arrived alive, and there were no apparent injuries to the containers, attendants, or, most importantly, the queens. Once in our hands, we jumped into action to introduce the queens to their new families. There are many different ways to introduce a queen, and I've probably done them all. But, when you have thousands of dollars invested, you want to take as many precautions as possible. For that matter, even if you have only one queen to introduce, you should take care. So, I will explain what we did this particular time and, then, explore some other techniques as well.

We needed 240 nucleus colonies. Instead of trying to make them all up as the queens arrived, we endeavored to have the nucs ready just beforehand. Since it was Spring, we split our stronger colonies by taking three frames of bees and brood, one frame honey, and one frame pollen to establish each nuc. We moved the nucs to different apiaries to discourage the bees from drifting back to their original colonies. Foragers from queenless hives tend to drift into queenright colonies despite the presence of brood. Though, open brood usually helps to stabilize a queenless colony for a short time.

Once the queens arrived, it was truly a race to insert them. Since I'm not a fan of banking queens for more than a few days, all the nucs were ready and standing by. But instead of just inserting the queen cages and walking away, we needed to be more strategic since the nucs were made up with milk brood almost a week in

advance. Because of that, what do you think that the bees had been doing? Yep, they had been making queen cells. When a colony with brood has unexpectedly found itself without a queen, the bees' primary goal becomes to rectify the situation as soon as possible. And, since it had been almost a week for some nucs, their cells were either capped or close to being capped. So, as we were inserting queen cages, we checked each and every frame and cut any queen cells found. This was very important! In my experience, I've had better luck with queens being accepted when there are no cells present. Disclaimer: Bees seem to change their collective mind on just about everything they do, how they do it, and when they do it. So, you may have had a different experience on a particular occasion. Heck, what can I say? It's a box full of women! Did I say that out loud?

When exploring for cells, it is best to use a quick, single shake over the hive box to knock most of the bees off the frame. Since there's no queen, you don't have to worry about losing or injuring her, and you will be amazed at how much better you can see the nooks and crannies in the comb where queen cells hide. The girls will tuck cells in the frame corners, as well as in gaps and other odd formations in the comb, where it's virtually impossible to see under one or more layers of bees. Be sure to check both sides of a frame before deeming it safe. Also, check all the frames (even honey and pollen) since you never know where you may find those cells. A mated queen is no match against a virgin - especially a virgin from the original colony.

Once the frames were void of queen cells, we would push the edge of the queen cage into the center comb of a brood frame with the screen side facing the area between the frames (not against the comb) so the bees could feed her and spread her pheromones (Figure 3). It's helpful to mark the top bar of the frame where the cage is located (with an arrow pointing at the cage) to save time later. I also like to put a dab of honey on the screen for the queen to eat. This also brings the bees to the queen immediately, and just seems to make their introduction a little bit nicer – like meeting someone new at a dinner party (Ok, I might be anthropomorphizing just a bit . . .). Avoid pressing cages into honey, which can drown the queen, and try to avoid brood and pollen. Note that small hive beetles LOVE to lay eggs underneath queen cages because the bees can't get to them. You will come back a few days later to release the queen and find a wiggling, boiling mess of beetle larvae behind (and, sometimes, even inside) the queen cage.

Another precaution is that I never like the bees to release the queen on their own. So, we always leave the plastic cap or cork in the end of the queen cage for at least a few days. For the California cages we add duct tape on the bottom of the tube just to make sure that the bees won't get through too early. I prefer to release the queen myself. It is just too unpredictable as to when she may get out when left to the bees. Different fondant amounts and concentrations, weather conditions and other factors can yield a premature release; then, boop, there goes $25 (or more!), dragged out and dropped off the edge of the bottom board along with the other pieces of debris. I want to make sure that she's given three to five days (depending on our research schedule and/or when I can get back to the hive) of undisturbed opportunity to be accepted by (chill out with) her new family. Also, when you manually release a queen, you can watch the reaction of the other bees when she crawls down between the frames; you may have an opportunity to rescue her (put her back in the cage for another day or two) if it seems like she's getting balled (attacked by the others).

After the allotted period of time has elapsed, it's time to release the queen. When opening the colony, use as little smoke as possible. I'd rather not disrupt the girls too much. It's bad enough to take off their roof, rearrange their furniture, and confuse them into thinking there's a "forest fire" since we are filling their hive with smoke. This can be a little disrupting, don't you agree?

Begin by removing an outer frame or frames in order to create an open slot (some space). Next slowly slide the two frames (with the cage between) apart before lifting out the marked frame with the cage embedded in it. If you don't create this space first and try to remove the frame with the cage, it will scrap and damage the wax comb and kill numerous bees and brood on its way up. Now observe the bees on the frame with the queen cage. How are they treating the queen? You want to see the bees walking calmly around the cage, feeding the queen, but not attacking, biting or trying to sting her through the screen. Also, while the hive is open, it may be a good time to sweep all the frames again for queen cells; you never know what those girls have been up to, and it's worth the extra few minutes.

Now, depending on time, we can either: [1] open the access to the candy (remove the cap, cork, and/or tape) and allow the bees to eat through to the queen, or [2] manually release her (pull the cork from the non-candy end, remove the screen, or open the plastic cage). I prefer to manually release because I like to see the queen walk out of the cage and onto the comb. A word of caution here: whether you're releasing her into the hive entrance, onto the top bars, or directly onto the comb, keep her covered with your other hand while she exits the cage because she may try to fly. If you are new to beekeeping or nervous about manually releasing, just open the candy end and let the bees do it. I confess, it's even happened to me several times. I opened the door and off she went . . . up, up, and away. There went my beautiful, my beautiful Queenie. I must have looked pretty silly to those bystanders across the road one particular day, as I went running around and around a field with my arms in the air, jumping up

Large battery box.

and down, and yelling "Here Queenie, Queenie, Queenie! Here Queenie, Queenie, Queenie!"

Male: "What the heck is that woman doing over there, Mildred?

Female: "I don't know Fred, from the looks of her, probably been in the sun too long. We better start locking the doors.'"

Remember, the queen has slimmed down a bit since she's not been laying eggs. It's similar to the queen's condition in springtime leading up to swarming. That helps her to be a good flyer. Actually, any queens that have been kept from laying (caged) for a few days begin to look small, skinny, and "virginesque." But once they start laying eggs again they will plump up to their normal "queenesque" size and shape.

There are other ways to introduce queens, like I mentioned, and I've tried most of them. When time is short, I will pinch the old queen and immediately introduce the new, caged queen. The cork or cap is left on to keep the candy covered. Then, in a few days, I will remove the cork/cap to expose the candy and let the bees release the queen. When introducing a new queen, I've heard that feeding the colony helps with her acceptance. But be very careful not to induce robbing. This will surely reduce her chances of being accepted if the house bees have to fight off unwanted robbers!

The three most popular queen cages.

Once the queen successfully integrates with the general population, I make a point of leaving her alone in the hive for several days before returning to look for eggs. Once it is established that she's laying, I won't check back again for several weeks. At that point, I'll want to see her brood pattern. If you don't see eggs after a week or so, the queen is probably a dud. You'll need to find her, if she is still there, and remove her. If you wait too long, the workers will resort to laying eggs themselves, which is not a good thing! My recommendations to folks in this situation are as follows:

1. If you can get another queen sooner than later, add a frame of milk brood (eggs, and young larvae) from another hive to keep the bees occupied in the mean time. The pheromones from young larvae help to suppress workers' propensity to start laying themselves (unfertilized eggs).
2. If you can't get another queen, depending on time of year you have a few options:
   a. In early Spring, give them a frame of milk brood and let them rear their own queen.
   b. In late Summer or early Fall, combine the queenless with queenright hive.

Once Fall starts rolling in, the drone population rolls out and diminishes. So, queens produced late in the year rarely have the appropriate number of drones to mate with, unless they've been "artificially" stimulated in the vicinity (drone comb added to hives).

Now back to our bad experience with queens. Once we realized the queens were no good, we called the producers to see if they would either send more queens or give us a refund. The first year producer did neither. He kept saying that we must have done something wrong because none of his other clients had had issues. Hmmmm??? My crew and I have only been doing this for . . . over 15 years! Yet, we did "something wrong" to three-quarters of the queens? This is very unlikely, my friends. And he stuck to that story even after I presented numerous other corroborating complaints about their queens that people I knew had shared with me.

My thoughts of what went wrong center on the idea that we were shipped inferior queens. Whether this happened due to poor grafting techniques (larvae were too old when transferred or not kept at temperature), insufficient mating (too few couplings due to not enough drones in the area or bad weather keeping the queens from flying enough), or poor quality mating (poor genetics in the local drone pool or low sperm loads), the sale of these queens could have been prevented if they're performance was properly validated before they were pulled from the mating nucs and shipped. In other words, it has become standard operating procedure for many, large queen producing operations to pull and ship queens simply by the calendar or when they first begin to lay eggs. They claim not to have the luxury of waiting several weeks to verify solid brood patterns due to the demand of the market. And I do understand, since they are shipping out thousands of queens each week, they don't have the equipment, manpower, and time to leave queens in their mating nucs for 21 to 28 days after they've started laying. But at the same time our research projects, the bees and we suffered the consequences.

Unfortunately, this year wasn't much better than the year before. Predictably, we spent time wrestling with the introductions of 300 queens. Then the time spent on checking them, requeening when most ended up failing again, and dealing with the unavoidable side-effects such as laying workers, which all contributed to a huge mess and blown project schedules. Regarding the material cost, it's not just the price of the queens that went down the drain. There is only so much brood available in our healthy hives to set up nucs. Then, if we have to re-supply brood to failing nucs during re-queening, it is very easy to over-tax our base of established hives. Their populations have been subsequently jolted by these interruptions in the brood cycles and many of our hives (as well as nucs) succumbed to the certain demise of small hive beetle and wax moth infestations. Hence, the accumulated

costs in dollars, lost time and bee/brood stock is easily underestimated.

Most of the queen producers that I've dealt with over the years have provided good to excellent queens, and, if not, they stood behind their products and rectified their gaffes. Sadly, there are a few bad apples out there who don't see it that way. They clearly put short-term profits above client satisfaction and long-term client retention.

This past month, we ordered queens from Michael Palmer from Vermont and John Jacobs at Old Sol Apiaries in Oregon. Out of the 116 queens ordered, all were accepted and have proven to be good layers. That's 100%, folks! I've used these fellows' queens before, but, understandably, they can't raise queens in Oregon and Vermont in late February to be ready to ship by mid-March. Although, when particular projects call for later season queens, these operations are certainly on our short list of quality suppliers. I just find it interesting, after conversations with each, to find out that both of these gentlemen leave their queens in their respective finisher colonies until they see the kind of brood patterns that they can be proud to sell. I think that this is a key ingredient to successful queen production.

If you plan to re-queen next year, increase your colonies, or you're just starting out, order your queens now. But be sure to read and ask around to improve your likelihood of ordering from reputable producers who not only produce an outstanding product but stand behind their queens. And don't complain about spending a bit more for that "bug". A well grafted, cared for, mated queen that's been laying eggs longer than a day is well worth the extra $10-20 dollars. Trust me, it could save you a lot of headaches, heartaches, money and TIME, something we all need a little more of.

As a precaution when purchasing queens ***ALWAYS*** ask the producer if they are participating in the BIP queen Testing Program run by David Tarpy.

See ya! BC

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

All photos taken by Ben Rouse.

Back To Basics: Foundation

Jim **Thompson**

Honey bees are amazing insects, but you already know that but I just wanted to reaffirm that information. The strongest geometric shape is the circle. It is the concept behind steel toed shoes which are made to protect a person's toes from heavy weights. A chicken's egg cannot be broken by a human when placed in the center of one's hand and that person tries to squeeze it. Of course there are a few stipulations; the egg must not be cracked prior to placement, no gouging of the egg with your finger nails, and no beating or pounding on the egg.

You can surround the most area with the least amount of edge material, if the area is in the shape of a circle. That is why many companies use tin cans to package their food. If we try to stack or package tin cans into a compact area we find that there is much less wasted space between the cans if they are staggered. However every row contains a half can at the end of each row and therefore the purpose of staggering the rows is defeated.

Wax dipping tank.

I am reminded of the story about a ship that sunk and when a case of cans was recovered, the pressure from the water had reshaped the cans into a hexagonal shape. Thus the hexagonal shape is close to the circle in strength but also has a small amount of wall material needed to enclose the area. The hexagon also shares common walls when stacked together, thus is very efficient in saving material.

I don't know how honey bees know how to make their cells hexagonal, but they do. In the wild, the honey bees will build their comb from branches or some other object that serves as a "roof", but in rare instances they can support their comb from the side or bottom.

In order for a bee to produce wax she usually hangs from a support. On the underside of her body the wax glands are exposed and wax flakes can be excreted. By using her free legs, she can scrape off the wax flakes and transport, shape, and attach the flakes to the area where beeswax is needed. Younger bees are generally better suited for this activity, but sometimes older bees that have gone through winter may be required to become wax producers.

Over the years, beekeepers have used different tactics when raising bees and have found that by providing a foundation for the bees, the production of honey and brood is increased. At one time beekeepers simply used frames that had a "V" foundation guide. Later when foundation was made, the beekeepers would cut the foundation into strips that would be put in frames to hang down about ⅜".

Starter Strips & Wax Tubes

To install a starter strip in a frame was a common practice of placing beeswax in a groove of the frame top bar and waxing it in or pressing the foundation into the top of a basswood section.

To wax the frame, it was turned upside down and a wax tube, (tool), was filled with hot wax and kept in the tube by placing a finger over the vent hole on the handle. You would then position the end of the wax tube between the starter strip or foundation and the top bar and release your finger from the vent hole. Wax would flow out and so you would move the tube along the frame and tilt the frame to help the wax flow.

Many times the wax would get cold and thus this process didn't work as well as it was intended. I found it better to modify an "old" serving spoon. You bend the end of the spoon so it has a smaller and sharper tip. You want to be able to pour wax off the end of the spoon in a small stream. After a little practice and experimentation you may decide to bend the handle of the spoon to be like a gravy ladle so you may dip into the hot wax reservoir and yet be able to pour the wax easily.

You position the foundation and frame as you would with the wax tube, but your activity is more of a pouring and tilting process. You pour a little wax in the junction of the wax and frame and tilt the frame so the wax runs down the desired junction.

Foundation mold with lid placed back halfway.

If you run out of wax, you move down the frame to that point, add wax and continue tilting the frame. When the wax comes close to the end bar, the tilt of the frame is reversed and the wax goes in the other direction. If the wax is too hot, it may take several cycles of tilting the frame for the wax to cool and solidify. You will be surprised how quickly this method of attaching the foundation goes once you get set up and determine how much wax is needed.

Make Your Own

There were two methods in making your own foundations. The leaf press was a large form or mold that had the hexagonal pattern and a corresponding heavy top. You would simply pour beeswax into the tray and lower the top and let the beeswax cool. If everything went well you could open the mold and peel out a sheet of foundation that would need to be cut to size. The problems that one would encounter with this method were to get the proper amount of beeswax in the mold, getting the beeswax to release from the mold and having the mold with the desired cell size.

Another method was to render about three gallons of beeswax and have it in a tall dipping tank. You would then dip a long, wide flat board in the tank until there was a build-up of about 1/8" of wax. After cooling slightly, you would scrape off the wax from each side of the board thus having two sheets of plain wax. You would then run the sheets of wax through a set of foundation rollers to get the desired thickness and design on the wax.

Again the common problem was being able to have foundation rolls that had the desired cell size. Efforts have been made to make the cell size the same as the bees normally make, but bee cell sizes change with the race of honey bees, life habits of the bee, time of year, and weather conditions. The early foundation mills were slightly off from the size that the Italian bees used. Then starts the discussion of what is the perfect cell size. Do you prefer a larger cell as it will allow you more honey per cell or do you choose a smaller cell to allow bees to develop faster? A larger cell may help in raising drones for queen rearing operations and could also be used in mite control by freezing or killing the drone larva, but there might be a reduction in brood and honey production due to the missing or damaged comb.

Old Mills

The foundation rolls pictured were made in the time period of 1886 and you will notice that this is the smaller 6" set. The common practice was to cut the foundation into strips or squares for comb honey production. The larger 10" rolls (not pictured) were used generally for sheet foundation for the deep frames and you could adjust the thickness of the foundation. An improvement in making the foundation was to have the sheets of wax come off three different mills and be joined together in one sheet. This was known as triple ply foundation and was a little stronger due to the plies and was a slightly thicker sheet.

The early foundation mills had cylinders that had holes at the center points of the cells. A hexagonal headed lead or soft metal "pin" with the three sided base pattern of a cell was inserted into the holes. Therefore one could repair the rolls by replacing the pins. However the cell size could not be changed.

The proper orientation of the cells was found to have the points of the cell vertical in the hive. It is interesting that if bees were living in a tree and if that tree is cut down or breaks causing the bees to have a change the cell orientation, that change takes place in a very short time. A similar situation happens when you are trying to have bees leave the comb by reversing the slope of the cell. If you don't remove the "old" comb soon enough, it will be reworked and the bees will continue to use it.

New Mills

The newer foundation rolls are meant to make foundation in continuous sheets, so there is a process to form beeswax in large rolls of wax that consist of flat wax that is wound around a spindle. As the wax passes through smooth rollers it is pressed into the correct thickness and cut to the proper the width of the sheet. Then the wax will pass through the embossing rollers which will determine the cell size. The foundation from these rolls would be cut to length.

The wired foundation is made from bigger foundation machines that produce the foundation coming out with the correct width. The vertical wires will join the foundation after the rolls, be embedded, and be cut and bent. Thus you can see that there could be several foundation machines running or several different set ups required to run the different sizes and thicknesses of foundation needed.

New foundation rolls are available and you may choose cell sizes or smooth rolls and whether the rolls are

Milling Machine that makes foundation rolls.

Small set of commercial foundation rolls for regular worker cell foundation.

Frame with Aluminum Foundation

hand operated or electrically driven. The newer foundation rolls are about 10½" in length but there are larger models.

The machine that makes the foundation rolls is a three headed milling machine and to those that are machinists it is a common machine. However you rarely see one as there aren't many applications where a three headed machine is needed. Thus you will see one that was pulled out of production and still has a foundation roll still in its vice.

When I was a county bee inspector, I came across a beekeeper that put regular door screen instead of foundation in his frames and his bees would build on it. It seemed to work.

During World War II there was a shortage of beeswax as one of the uses of wax was to lubricate gun barrels. So for a time foundation was made out of a thick aluminum foil. The bees did not like to use it but with some coaxing with sugar water, the bees would draw out nice looking comb. However it was found that in the northern states the cold of the Winter would transfer through the hive and raise havoc with the cluster.

Another form of the aluminum foundation was made in fully developed cells. A major drawback in this foundation was that cells could be damaged by rough handling or bumping the cells against other objects as well of the heat transfer problem.

After the war, beeswax became more plentiful and then there was confusion caused as to what thickness one should use. Do you use single ply, triple ply, thin surplus, or wired? The size that you use is determined by the type of frame top bars and bottom bars used and the planned use of the foundation.

One mistake made by many beekeepers is to use single ply or plain foundation for comb that will be used in chunk honey, cut comb honey, or sections. Yes it is heavier and provides a straighter comb but it also makes the end product chewy, due to the extra wax. The foundation that one should use in "eating" comb is either the thin surplus foundation or starter strips or squares. When you use starter strips, the bees will then make their own delicate foundation. A trick that I learned while I was an inspector was to horizontally wire the thin surplus frame. Then just before cutting out the comb, you cut the wires on the end of the frame and put an electrical short on each strand to heat up the wire and pull it out the end of the frame. A battery or a train transformer works well for the electrical current.

If you extract with foundation that is unsupported, thin, or very new, there is a good chance that you could have it blown out of the frame.

There's also a plastic sheet about the same thickness as the aluminum foil sheet. It was embossed with the hexagonal pattern and had communication holes in the lower corners of the sheet and a metal strip on both ends to keep it straight. It is coated with a generous amount of beeswax on both sides and the bees like to use it. However if the beeswax coating is removed down to the shiny plastic, the bees will have nothing to do with the foundation. So you are left with the decision of replacing the sheet or try to apply a thin coating of beeswax back onto the plastic.

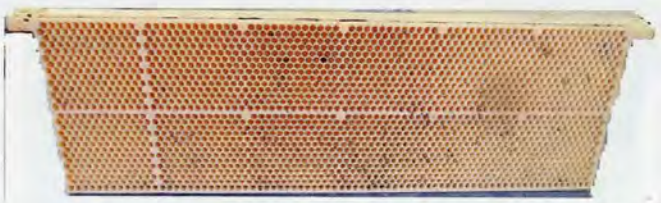
Adding Wax

If you decide to add beeswax on to the frame, there are still more considerations that you face. Do you spray on the coating of wax? Do you brush or pour on the coating of wax? Will you destroy the hexagonal pattern of the base plastic? Are you sure that the beeswax that you use is clean and free of diseases and insecticides? These are the same problems that the manufacturers of all the other plastic foundation face.

When you use beeswax foundation in a frame it is just a matter time until a mouse comes into the hive and chews a large hole in the foundation. Besides the nest, hair, and smell of the mouse, bees will stay away from that area. In the Spring when you find the damage, you will try to clean up the mess. If you put back the frame with a large hole in the hive the bees have a tendency to repair the hole with drone cells. Thus you have choices; cut and install a piece of foundation to fit the hole, replace all the foundation in that frame, or do nothing and raise drones. If you opt for the latter choice, I would recommend that the frame be placed near the inside wall of the hive to discourage the queen from laying eggs in the cells.

Plastic foundation is available in sheets to be inserted into frames or in complete frames. They are available in different cell sizes, plain plastic, coated with beeswax, and in a variety of depth of the cells. It is a real time saver in that you can open the box, put the frames in the hive and you are ready to put the super on the hive. You do not have to worry about wiring the frame or the foundation slipping. Wax moths and mice do not do as

Plastic Wax Coated Frame



Permacomb. One-piece plastic frame and drawn comb.

much damage to the plastic as they normally do to a wood and wax frame. So I can see that eventually we may be forced to use plastic equipment. However bees do not like plastic as well as they like the wood and wax and so you will have to learn how to make the bees accept it.

The early plastic foundation must have had an odor that either killed bees or caused the bees to avoid certain areas. When you looked at the brood pattern on these frames it look similar to the pattern of American Foulbrood. However after one season of use, the bees accepted the frames and you would notice a good brood pattern.

If you place plain beeswax foundation and undrawn plastic foundation in frames that are adjacent to each other, you will notice that the bees will work on the beeswax foundation to the extent that it will encroach upon the plastic frames.

If you use all undrawn plastic frames in a super, most bees will develop brace comb that will connect two frames together or will develop a new foundation that is a bee space away from the plastic. Shake the bees off those frames, cut out the unwanted beeswax, and spread out the honey and beeswax over the effected area. This procedure has the same effect as spraying the foundation with sugar water or coating the foundation with beeswax. It is recommended to spray sugar water on the plastic foundation when putting it into the hive to get the bees on the foundation.

Once frames have been drawn out, you can use them as dividers for frames that you are trying to be repaired. Also the drawn frames could be spaced further apart in the honey supers with less problems of brace comb or when you notice a "free" standing comb between the frame. BC

The Surprise And Frustration Of Late-Season Swarms

I didn't see that coming!

Powerful colonies produce big, nice swarms

Many times, I have said to audiences that late Winter management schemes combined with aggressive Spring management frequently results in some really nice swarms a few weeks later. It was an effort to be funny, and I certainly never expected my bees to be the swarmers – but even more I never dreamed of my bees being the ones to swarm in late August. Plus, they were not little piddling swarms but beautiful five-pounders that majestically soared through the air.

Some of the facts of this case

For the past few Spring seasons, I have been purchasing nucs from local beekeepers. There is more variation and confusion in nuc purchasing than in package bee purchases, but I get local bees and queens and enjoy the process. This past Spring, I bought four five-frame splits each with a new queen. When I got them, they looked good.

By seasonal design, the beekeeper who produces the nucs must use nearly all of the Spring season to build up the colonies strong enough to split. I got my divides late in the season after much of the flow was over. To make up the difference, I fed abundant amounts both sugar and pollen supplement. The nucs began to build up nicely.

Many years ago, I tinkered with the process of wintering nucs in Ohio. I tried both indoor and outdoor nuc-wintering projects. The best I ever did in either case was just a bit more than 50% survival. Much has changed over the years. High-density foam nucleus hive bodies are much more common now. Duplex wooden hives may offer more insulating effects to wintering splits. All those years ago, I simply made five-frame splits, fed them heavily, and wished them well. In general, they needed more – apparently a lot more. They did not survive very well.

Look for the dark spot in the very top of the tree.

Recent Winter-kill rates

In recent years, winterkill percentages have been high – very high. Queens are more available during late Summer and early Fall. My plan was to build up these four nucs to a strong single deep, split them into nuc equipment, possibly provide some Winter wrapping, and be prepared to feed during late Winter and early Spring. In theory, I would have doubled the number from four to eight. If all had gone well, I would have had replacement colonies for any of my colonies that might perish during the upcoming Winter. Well, the bees had other plans.

Ironically, I was at home

I was actually at home and outside on August 26, 2014, when I saw the clear signs of a swarm departing from one of the splits. I didn't believe it. No sensible colony would swarm so late in the season. Surely they would come back or possibly this was just some kind of massive play flight. I was really confident that the bees would resolve this situation.

As is so typical, there were bees everywhere – tens of thousands of bees randomly flying all about. They seemed particularly interested in the top of a 75-foot locust tree behind my shop. Then I saw the beginnings of a cluster 70 feet off the ground on the flimsiest of limbs, and the reality of the situation began to dawn on me. Not only were they going to swarm, but they were also going to pitch in a location that was inaccessible. That's exactly what they did. Just as high and impossible to reach as they could possibly put themselves.

I was sick and frustrated. I actually had trouble getting to sleep the first night. I put out bait hives. No doubt the bees found that amusing.

For those of you who have read previous articles . . .

During recent years, I have written numerous pieces about my bees and my neighbors. Due to my friendly neighbors, I have modified my philosophy about beehive size and colony population in relationship to my non-beekeeping neighbors. I have told other swarm stories about my departing swarms heading straight for my neighbor's property and my conversations with them.

This high swarm was just flaunting its inaccessibility. There was nothing I could do. No shooting the swarm down. No long, long poles to dislodge the cluster. No bucket attached to something with an alluring piece of brood comb inside. If I did successfully upset the swarm, I had to realize that there was good chance it would move to my neighbor's property. Then all this fiasco would involve innocent people, and I would be standing on their lawn looking up in the top of their tree. If there were any chance to get this swarm, it would take an industrial bucket truck to reach them. I didn't have one.

My entire family and most of neighbors watched the high swarm for nearly four days. Late morning during the fourth day, they were just gone. I didn't see them go. I didn't want to see them go. I was sick. I was forced to think of all the times I had told you that some swarms just escape. I told you it was natural biology and a powerful biology at that. I guess I never really thought that it would be my bees doing the impossible swarming and that I would essentially be lecturing to myself.

The day after the first swarm vanished, the second colony swarmed. I went ballistic.

By sheer coincidence . . .

By blind chance, I took a walk to check on my beehives. I had a notion that the autumnal drone massacre might have started. It had not, but there they were – another large swarm taking flight. I was all over this one. This is not going to happen again.

My neighbor mowing and me waiting. The swarm is high in the tree and not visible.

As the swarm moved, there was nothing I could do but keep a close watch. No water hose spray, no tanging metal – there is nothing you can do but hold your breath. Where are they going to land? This group of learning-challenged bees began to cluster in an evergreen about 35 feet up.

I immediately disregarded all I have ever told you about swarm safety. Don't use ladders. Don't use trucks. Don't get too high off the ground – all that went out the window. I quickly relocated my truck and positioned a five-foot ladder on the tailgate. I lashed two 14-foot paint roller aluminum handles together and duct-taped a five-gallon bucket to the end of the second roller handle. I measured the arc-fall that I would have to make to dump the swarm on the ground. I put the only equipment I had available at that end spot – a six-frame polystyrene nucleus hive. I was ready to do this. At that moment (seriously – at that very moment) my neighbor started his lawnmower.

The grass did not need mowing in the least, but it's what we do – we run our mowers. I could not start this bee-disruptive procedure with him and his machinery in the vicinity. In years past, I have had to ask him to stop his work and let me do mine with a swarm. I simply could not do that again. I would just have to wait until he finished. But not until he made a round by the scene and shut down his mowing machine and asked what was going on? You know the drill. *"Don't you ever get stung?" "I'm allergic!" "My grand dad had bees, but I never liked them."* I was incredibly antsy, but needed to appear rational and neighborly polite. I gutted it out. It seemed like he chatted for a couple of days. Finally he went back and finished his mowing.

Up the ladder I did go

Up the ladder I went, contraption in hand, positioned it, steadied myself, and gave a hard push. To my joyous surprise – it worked. About 20 feet above my head on the flimsiest of a handle, I had about three pounds of bees in a bucket. I immediately went into the arc fall and dumped the bees in front of the nucleus hive on the ground. Of course, confusion abounded, but many bees were curious about the box and stayed around. I performed the bucket procedure four times and each time I jumped down to search for the queen in all the chaos. If I could just find her, I could nail this down, but I never saw her. In remarkably short order, I had the second swarm down. It was a very sweet, sweet moment. The first swarm may have escaped, but I had this one.

It was a short moment. The nuc was choc-a-bloc full of bees and they were dancing all over the thick bee mat on the hive front. I knew there were not dancing for a food source. They were dancing for home sites and home was not the box they were in. These bees were going to go again.

How fast can you put hive equipment together?

I had all the equipment I needed, but it was not assembled. Good grief – it's early Autumn. Why would I have extra equipment sitting around? I

This was the best I could do in just a few minutes. The swarm is in the topmost tree shadow.

began hammering a deep together when the wife of another neighbor came over with a cucumber she wanted to swap for tomatoes. Take all you want. I didn't care. She began to talk about the late Spring and the slow garden year. I was wound as tight as a cheap watch but once again, I was neighborly. I explained all that was happening and showed her the box on the ground full of bees. I tried to look calm. I'm not sure it showed. As she casually left, I returned to my equipment assembly task as if my pants were on fire.

The box went together quickly – now the frames. It was back to the storage barn for frames and foundation inserts. Work fast – work fast. I came roaring out of the barn and nearly ran into my Amish roofer. He had stopped by to discuss my house roofing project that he would be starting later in the week. This was not a casual conversation; I had to take the time. Yes, I must say it again, for the third time; I attempted to look calm and normal. It took nearly 25 minutes to close the re-roof deal. Then he and his crew wanted to know all about the swarm. As our conversation waned, one of the men said (and I will never forget it.), *"What are those bees doing?"* As he pointed to box on the ground, you know what they were doing. They were already in the air. Maybe, maybe, maybe they will cluster again and cluster nearer the ground. Nope. They moved higher and higher in a spiraling, organized chaotic fashion. Of course, they went to my neighbor's yard. Did any of you think they would land in my yard again?

They were hovering around the tops of pines about 45 feet up. This was going to be bad . . . No, it was actually worse than I thought. They were not clustering. They were leaving. If it had not been my bees, it would have been magical. There were thousands and thousands of bees in the air. The buzz was obvious. In no more than 10 seconds, they were completely gone as if they had vaporized. There was not a single bee or a single buzz. The roofers wanted to know where I thought they went. I wanted to tell *them* where to go. I didn't, but I did feel more than terrible. I had that swarm on the ground. *I had them.* I even had a plan to put a large screen over them until I got the equipment built, but I simply could not survive the constant interruptions. That's part of urban beekeeping.

These two swarms are going to die

Unless beekeepers were called to retrieve these swarms, both are going to die and probably die before Thanksgiving. There is a minor fall flow in this area of Ohio, but nothing great. The Fall flow here is mostly just a strange smell. These two goof-ball swarms don't have a prayer.

Are these swarms stupid?

These two swarms are either instinctually stupid or extremely practical. The single deep on each split was filled with bees and brood and not much honey. Did these colonies have an instinctual sense that their resources would not support the large populations they had as they headed into Winter? Was the plan to reduce populations to something more compatible with the resources at hand? Were they responding to the late Spring we had in Ohio in 2014? Are these late swarms a result of super queens and abundant feeding? The two parent colonies that are just now getting new queens don't look all that great, but they do have smaller populations. Whatever the bee logic, this was clearly a radical procedure.

Remember that I said that I bought four splits. The other two are powerful units in single deeps. They have done nothing unusual. The same is true for my other established colonies. What's up with these two colonies? Anyone else have large, late season swarms? Anyone want to guess why these two colonies took such drastic, late season procedures? I have certainly learned something, but I'm still trying to determine what it was. All my other bees look great. I will focus on them. BC

I have posted a three-minute *Video Visit* that discusses a few other aspects of this discussion at:

Original URL - https://www.youtube.com/watch?v=DSMi5HbLIXM
Shortened URL - http://goo.gl/vxa6Xm

Dr. James E. Tew, State Specialist, Beekeeping, The AL Cooperative Extension System, Auburn Univ; ***tewbee2@gmail.com; http://www.onetew.com; http://www.facebook.com/tewbee2; twitter@onetewbee; http://www.youtube.com/***

Deeps, Mediums, Shallows, or? ... Decisions, Decisions, Decisions

All boxes are not created equal. Pick the one best for you.

Ross **Conrad**

In the old days choosing a home for your bees was relatively easy. Bees were kept in a portion of the original tree that the swarm had moved into (log gum), or other handy containers made of wood, mud or straw (skeps). Beekeepers being the way beekeepers are, started to experiment over time with various designs and styles in an effort to "make 'em better." Some developed frames (or top bars), designed to be placed inside the skep. Others developed additions that could be placed on top of the log gum, or under the skep in order to provide the colony with additional room for expansion when needed. One thing led to another, and today we have so many options and choices for bee hives that it can create a bewildering experience for the beginning beekeeper.

Now if you are just getting started and preparing to choose the style of hive your bees will call home, the easy thing to do is to just ask your mentor, the instructor of your beekeeping class, or your neighborhood beekeeper what hive is best. This approach will help you cut through all the options to the best choice for you and your area...or will it? The person you ask is likely to simply recommend what they use which is usually what they were taught to use by their mentor or teacher. Their decision may work well for them, but is it really the best choice for you? In order for you to make a more fully informed choice, here is a summary of the primary options currently available.

Double deeps, all mediums, a mix of deeps and shallows – the number of permutations available for today's beekeepers when it comes to choosing a hive can be overwhelming.

The Conventional Deep Langstroth Hive

The hive patented in 1852 by L. L. Langstroth that opens from the top and features movable frames has become the most commonly used style of hive in the world.

The deep Langstroth-style hive body that is 9-5/8 inches high, holds 10 frames and designed with bee space in mind has long been the standard brood box for managed colonies. While a single deep box is often sufficient for bees in Southern climes, in Northern regions, two deeps are usually utilized for the hive proper in order to provide additional room for brood rearing and food storage. The deep super can weigh upwards of 80 pounds when filled with honey, so having an additional empty deep box into which frames can be transferred during manipulations/inspections rather than moving the whole hive body at once, might just save your back. Of all the options, the deep Langstroth hive body tends to provide the greatest expanse of uninterrupted comb into which the queen can lay her eggs (something that queens seem to prefer). Nowadays however, the conventional Langstroth hive made up of deep brood boxes is starting to become not so common and conventional.

Mediums

With the advent of so many backyard beekeepers taking up the craft of apiculture during the past decade there is a growing trend in the use of medium sized boxes for hive bodies which, at 6-5/8 inches tall, only weigh about two-thirds as much as a comparable deep when full. This size box is often called a Western, or Illinois Super. The big advantage of using all medium boxes for both the hive body and the honey supers is that you only have to inventory a single frame size for all your equipment and never have to worry about the incompatibility of your frames of comb and boxes. When three medium boxes are used for the brood chamber it creates just about the same size hive cavity as two deep hive bodies. Beekeepers down south may use two medium supers in place of a single deep. The drawback to using all mediums is that you will need to use more pieces of equipment and will end up with significantly more frames to handle when conducting frame manipulations and inspections compared to deep brood boxes. Also due to their shorter height, more medium boxes will be required for honey storage than when deep supers are used. The additional frames will significantly increase the amount of work needed to extract honey during the harvest.

Shallows

At 5-11/16 inches high, the shallow box is the lightest option for regular use as a hive body or honey super. Shallow boxes can be used as hive bodies if need be, but they have the same drawbacks as the medium sized boxes only accentuated! As a result, shallows are most commonly used as honey supers. You may see boxes that are 4¾ inches deep being offered for sale by beekeeping supply companies. These are not extra short shallow supers, but specialty boxes made especially for comb honey production.

Eight-Frame Equipment

Another fairly recent development is the popularity of eight-frame Langstroth-style equipment. Available in either the deep or medium sizes, an eight-frame box is lighter by about 20 percent than its 10-frame counter part and being narrower, the center of gravity when grasped with both hands is closer to the body making it easier to lift. The downside is that an eight-frame hive will need to be taller than a comparable 10-frame hive due to the smaller cavity space created by the eight-frame box. This can provide an additional challenge in years when there is a strong honey flow and the supers are stacked up like a skyscraper requiring use of a ladder to reach the top. The narrow base can also make the eight-frame hive more likely to topple over in heavy winds, especially when top heavy during those good honey years. Since the majority of beekeepers still use 10-frame equipment, it may also be harder to resell used eight-frame equipment to another beekeeper should you ever decide to give up your beekeeping career.

Mixing It Up

Today the hive that is made up of a single sized box is relatively rare. Most hives utilize one size box for the hive body and a smaller box, either a medium or shallow for the honey supers above. Down South for example a medium is often placed above a single deep, while the double deep more common in Northern regions, is often topped with medium or shallow supers that are placed above for the collection of honey that is intended for harvest. Eight- and ten-frame equipment however, cannot be used on the same hive very effectively due to the varying widths. This lack of interchangeability suggests that one should get either eight-frame equipment, or 10-frame equipment and stick to that size throughout their beekeeping days. Otherwise the day will inevitably come when a ten-frame super is needed and all that is available are supers designed to hold eight frames, or vice-versa.

Top Bar Hives

Alternatives to the Langstroth hive have become popular. The most common alternative to the Langstroth hive is the Top Bar Hive (TBH). The Top Bar Hive comes in two styles, the Kenyan TBH that features sloping walls, and the Tanzanian TBH that has straight walls. Top bar hives typically consist of a single box, but since their use and production has not been standardized in the way that the Langstroth hive has, the TBH comes in a wide variety of sizes. Beekeepers who build or purchase top bar hives that feature a top bar that is the same size as the Langstroth top bar find that their compatibility with the Langstroth hive is very convenient when performing certain hive manipulations or if they decide to move their bees from one style of hive into the other. Top bar hive inspections can only be conducted one frame at a time. Unlike with Langstroth-style supers, there is no ability to move large numbers of frames quickly and honey production tends to be limited requiring a lot of additional labor. This is why it is unlikely that the majority of commercial beekeepers will ever switch over to top bar hives.

Warré Hives

The Warré hive offers another alternative to the Langstroth hive. Unlike the top bar hive however, the Warré has established interior dimensions that are standardized and the hive has the ability to be "supered" from the bottom as the colony expands. As with the TBH, combs are typically attached to a top bar and allowed to be built naturally without the aid of sheets of foundation. Warré hives tend to be better for honey production than TBH, though raising the entire hive in order to add a super to the bottom of the colony may be challenging.

Unique/Original Designs

In the continuing effort to improve upon bee hive design, some beekeepers will experiment with their own unique hive designs. Here again, designs that feature frames or top bars that are compatible with the standard Langstroth hive make life easier, especially when transferring bees, brood and comb into or out of a Langstroth hive. As long as the hive design incorporates the bee space and a removable frame into its design, it should not run afoul of the bees' preferences, or state laws that require a movable frame to enable inspections for diseases and pests.

So what type of hive is best for you? If lifting heavy objects is a concern the top bar hive, or a Langstroth hive – especially those made up of eight-frame medium boxes – may be the best options. Much also depends on your purpose for keeping bees. If honey production is important then a Langstroth or Warré hive is likely to be more satisfying. If you will be keeping bees such as Italians that tend to build up early in late winter/early spring, Langstroth and Warré hives rather than a TBH will allow for easier expansion of the honey storage area in order to help ensure enough room for the extra honey that the Italian bees will need to survive the winter without supplemental feeding. Just remember that if you experiment with more than one style of hive, try to ensure that the top bars from each hive are the same length so that combs may be moved from one hive to another to simplify any hive manipulations that you may want to make in an attempt to correct hive issues or relocate colonies.

Bees are incredibly resourceful and adaptable and are able to thrive in almost any type of cavity that we provide. From my point of view, it is not the box that you keep your bees in that is critical as far as the bees are concerned, but how you care for them that matters most. BC

Ross Conrad is author of Natural Beekeeping, revised and expanded 2nd edition. Join Ross and the Colorado Beekeeping Association in Broomfield, CO from 8:30-5:00 for an advanced beekeeping workshop on Saturday January 24, 2015. ***http://coloradobeekeepers.org/ross-conrad/***

Pumpkin Time

A Fall tradition not to be taken for granted

Dewey Caron

Son Mark with grandson, Torrin in pumpkin patch.

Fall is time to market pumpkins and honey. September is National Honey Month, October includes Halloween and November brings Thanksgiving. Without bees, as beekeepers but too few pumpkin-lovers know, there would not be pumpkins nor other traditional foods we give thanks for at Thanksgiving.

The good word is there are adequate pumpkins this year in contrast to last year when the news was not so good. Too much rain brought flooding which washed out pumpkin fields from the Mid-Atlantic to New England (especially New York and Vermont) and too much rain in the Carolinas resulted in a short crop with too few pumpkins to export pumpkins to areas with short supplies from states further south.

Pumpkins, like honey, are often a value-added market product of smaller family farms. *Edible Portland* Magazine (2013 Fall edition) had a nice article about brothers Dylan and Darren Wells and their "Autumn Harvest" market brand. They specialize in miniature pumpkins and gourds which Dylan, now 22, grows on a 200 acre farm. In the Fall, newspaper and magazine articles abound featuring local farms offering pumpkins for sale directly to the public through U-pick or farm stands. Some growers invite the public to "Come out to the farm" to select your own. Visiting a field full of pumpkins makes for an attractive afternoon family outing.

I enjoy taking the grandchildren to a local pumpkin farm in the Portland area. If you have never had the pleasure, I encourage you to go and enjoy a nice weekday or weekend afternoon at a pumpkin farm in your area. Look for websites or flyers that list local farms and what they sell. Many sell honey, sometimes the honey production of the beekeeper providing pollination service, along with the pumpkins and other typical farm produce. Don't pass up the fresh apple cider.

Pumpkin (called a fruit) is a native of the Americas. It is related to zucchini and spaghetti squash (squash are in contrast termed vegetables). Our standard Halloween jack-o-lanterns and edible pumpkin pie varieties have been shaped by humans for some 800 years. They vary widely in size from miniature to giants, over 1500 pounds, for special local fair competitions.

Most of the cucurbitaceae family (including pumpkin and squash) are tropical or subtropical but there are a few wild species in North America – most natives have high levels of cucurbitacins which give the skin and innards their bitter taste. They typically grow by vining as many home gardeners learn when one or two squash/pumpkin plants 'take over' the garden. In addition to pumpkin and squash, gourds, melons and cucumbers, watermelon, luffa (sponges) and chayote are other familiar cucurbits. Like our samples of local honey, taste and color vary extensively in pumpkins and squash.

The American natives, pumpkin and squash, rely on native squash bees (about three dozen indigenous species) for pollination. Squash bees (two different genera *Peponapis* and *Xenoglossa*) are very hairy and only slightly smaller than the honey bee. They are ground nesters. Populations vary wildly from one site and season to another. Females make a foot-long or deeper, pencil-thin tunnel in the soil with side partitions. Though male and females forage the flowers, only the females collect pollen which they mix with the nectar to form a food mass for their egg, deposited on the food. Male and females rarely visit other flowers, even relatives such as melon or cucumber.

Male squash bees spend the night in unopened flowers. Although they do not collect the pollen, they have been found to still be efficient pollinators since they become covered with the pollen grains overnight and then transport it to other flowers as they search for females in the morning.

Squash bees are the opposite of generalist honey bees – they are specialists. Jim Cane of the USDA Pollinating Insects Biology Management Lab in Logan Utah has been surveying abundance of the native squash bees and their pollination biology. Found throughout the U.S., squash bees are less common in the east and very uncommon in the Pacific Northwest. Bumble bees are also good pollinators of cucurbits.

Cucurbit flowers are only open in the morning hours so populations of pollinators need to be high to realize desired commercial crop yields. Squash and pumpkin flowers can be pollinated by larger-bodied bees but modern farming practices and fall marketing demands means pollinator availability may not meet the demand. So to insure adequate pumpkins, growers rent honey bee colonies as 'insurance' in case too few native bees are present to pollinate the flowers. Homeowners too sometimes find they can grow lots of vines but none or too few fruit – zucchini squash seems to be the exception.

Many pumpkin pollinators are smaller-scale

Squash bee.

beekeepers. Selling pumpkin pollination however is not straight-forward. The native pumpkin and squash are rather poorly pollinated by honey bees. In my survey of pollinators on both east and west coasts, the rental fee ranges from as low as $30 to over $75 per colony at a density of one colony for every two acres.

A study in New York looked at identifying landscape-level impacts on bee-mediated pollination services using pumpkin pollination as their study focus. An OSU (Ohio State) graduate student Jessica D. Petersen looked at landscape diversity by calculating percentage of semi-natural grassland in the landscape around pumpkin fields. She counted the number of bumble bee (*Bombus impatiens)* and honey bee visits. Both positively affected yield. The study concluded that pumpkins grown in areas of highly diverse cropland/forest sites or areas of high grassland landscapes benefit more from bumble bee visitation. Landscape diversity did not increase honey bee visitation to flowers.

Since bumble bees benefited from a diverse landscape and their visits to flowers positively impacted pumpkin production, the authors recommended conservation of a diverse landscape to support improved pumpkin production.

Other studies have demonstrated that increased pollinator diversity (competition from more than a single flower-visiting bee species) improves yield in other cucurbits (watermelon and cantaloupes), sunflowers and blueberries.

Growers can use this information to decide where to plant pumpkins to improve the potential for high yields and to identify scenarios where landscape diversity could be increased, plus better determine where supplementation with honey bee colonies might be needed.

All cucurbits require multiple flower visitation with pollen transferred to all parts of the large stigma to yield perfect, well ripened and properly shaped results with the characteristics highly important for marketability of these commodities. Supplemental rental of honey bee colonies as 'crop insurance' still is the best alternative. BC

BUILD A PORTABLE OBSERVATION HIVE

Ed **Simon**

To sell your honey at a farmers market or a flea market you need a gimic to get the people to stop and look. We found that once someone stops, looks and asks a question, we can sell something about 60% of the time. One of the better ways to get your potential customer's attention is with an observation hive. The following observation hive is as uncomplicated as I could make it and still have some flair. To keep the construction simple a feeding station was obmitted. This means that you will have to limit the time a set of bees remain in the hive.

Parts (Thickness x Width x Length) - two medium frames

1. ¾" x ??" x 19¼" – Top and bottom(2)
2. ¾" x ??" x 16" – Sides(2)
3. ¾" x ¾" x 1½" – Frame rests(4)
4. ¾" x 4½" x 23½" – Top cover(1)
5. ¾" x 5¼" x 26" – Base(1)
6. ¾" x ¾"x 8" – Stabilizing legs(2)
7. ¾" x 1¾" x 17⅜" – Door top and bottom(2)
8. ¾" x 1¾" x 16" – Door sides(2)
9. ¼" x ??" x ??" – Glass or clear plastic(2)
10. Silicone sealant(1)
11. Window screen or hardware cloth – Approx. 10 sq. inches
12. Handle(1)
13. Hinges(2)
14. Hasp(1 or 2) – with lock(s)

Construction

First we'll make the frame that has a fixed glass or plastic panel and then we'll add a top and base that adds stability to the unit. Finally we'll build the door that allows easy access to the bees. Please note that this observation hive has no allowance for feeding the bees. It is strictly for short term use.

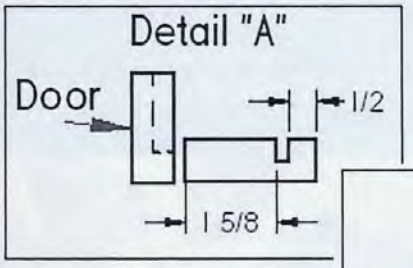
Step 1: The first cut that has to be made is the ⅜" deep groove ½" from the edge of an 8' board. This groove will eventually hold the fixed glass in place. Make this cut first while the selected board is still in one length. This ensures that the groove will match around the entire observation hive. The width of the groove is dependent on the thickness of the glass or plastic that you are using.

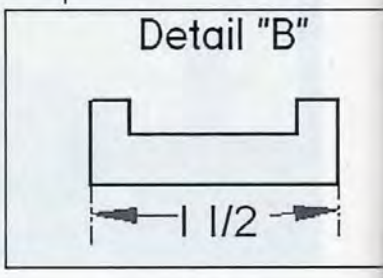
See the drawing Detail 'A" for and end view of the board.

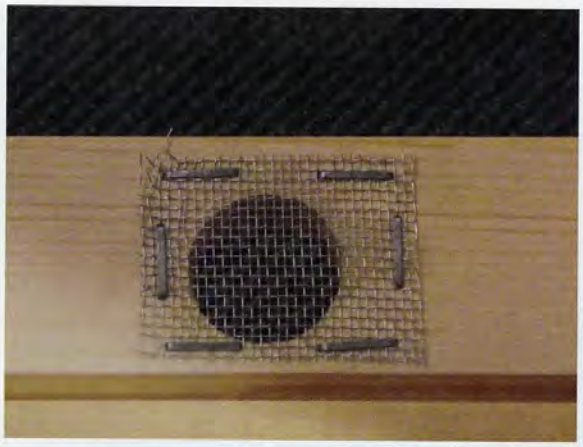
Hint: Slide your glass or plastic along the entire length of the groove before performing the next step. This is to make sure you will be able to install the glass once the box is complete.

Step 2: Rip cut the groove from the long board. This piece will be used to make the top, bottom and sides (parts 1 and parts 2). The width of this piece is dependent on the thickness of the glass or plastic you are using. Calculate the width of this piece by adding the ½" outside part of the groove plus the groove width plus 1⅝". Again see the drawing Detail "A".

Step 3: Cut the top cover (part 4) and base (part 5).
Hint: Now is the time to sand the pieces you have just cut. Once they are assembled, they are harder to sand.







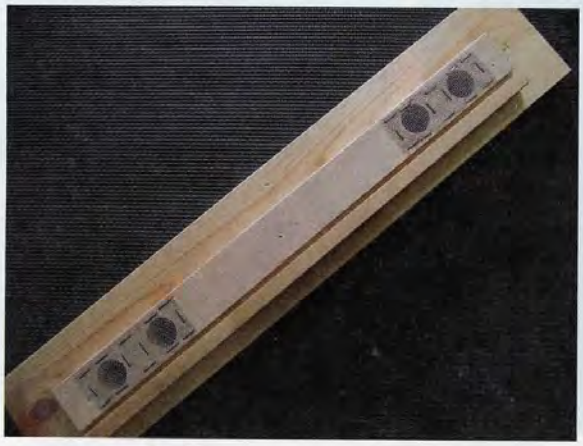
Step 4: Drill 1" vent holes in the sides (parts 2). After drilling the holes, staple window screen to the inside to prevent the bees from escaping.

Hint: To make a neat hole, drill from one side until the point of the drill emerges on the other side. Then turn the piece over and finish the hole from the other side.

Step 5: Cut the frame rests (parts 3) and then glue them to the sides. Be careful you don't cover the groove that the glass will slip into. See Detail "B" for an enlarged view of a frame rest.

Step 6: Glue and nail the base (part 5) and the bottom (part 1) together. It is a little tricky to get the bottom positioned on the base. Centering the bottom left and right is simply making sure the same amount of distance is on each side. The front to back positioning of the bottom needs to take into account the access door which will not be built until a later step. To accomplish this, temporally tack a ¾" piece or wood on to the non-grooved edge of the bottom and then use the new width to position the board. Remove the temporary piece of wood when you are finished.

Step 7: Repeat the same operation to assemble the top that you did for assembling the bottom (previous step).



Step 8: Drill the vent holes in the assembled top. Then use the window screen trick to keep the bees from causing a panic at the next farmers market.

Step 9: Use screws to assemble the top, bottom and sides into a square while test fitting the glass. Use screws so the unit can be taken apart later and the glass inserted.

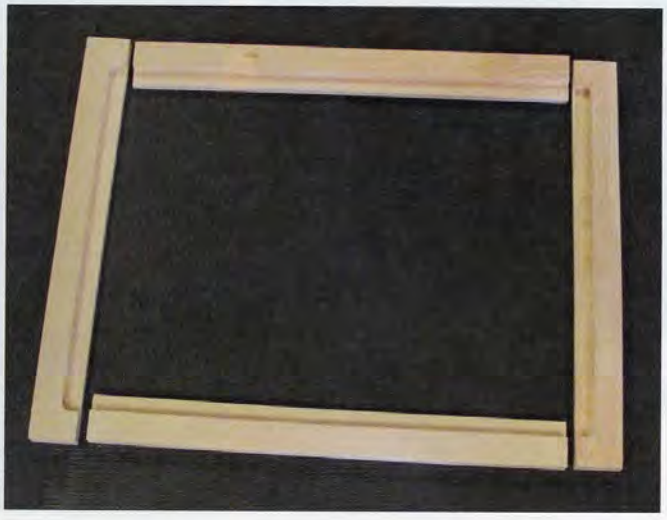
Note: The glass is not installed at this time so you can paint or varnish the observation hive without getting paint on it.

Step 10: Cut the stabilizing legs (parts 6) and attach them to the bottom of the unit. Do not cover any screws you have used so far. You may want to disassemble the unit in the future without removing the legs.

Step 11: Cut the door top, bottom and sides (parts7 and parts 8) from your lumber.

Step 12: Explanation: The glass is recessed on the inside of the door. This keeps the glass close to the frames of bees and reduces the amount of wax and propolis buildup on the glass.

Lay the door rim (parts 7 and 8) out on a flat surface with the good side facing down. Then center your door glass over the door rim and mark the edges of the glass. Use these markings to cut the recess into the door pieces.



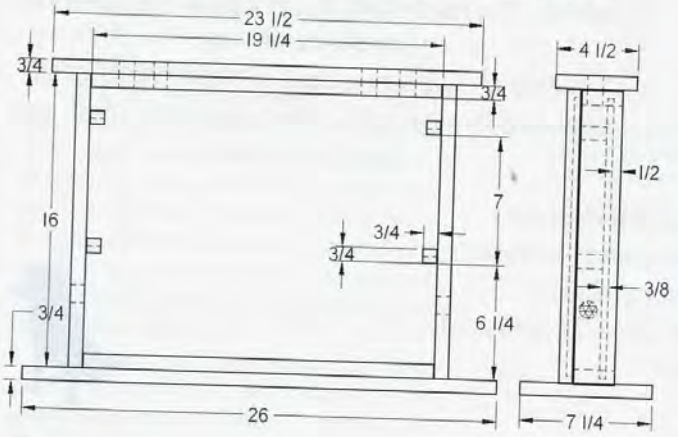
Step 13: Glue the door frame together. Make sure the joints are tight and the door is square.

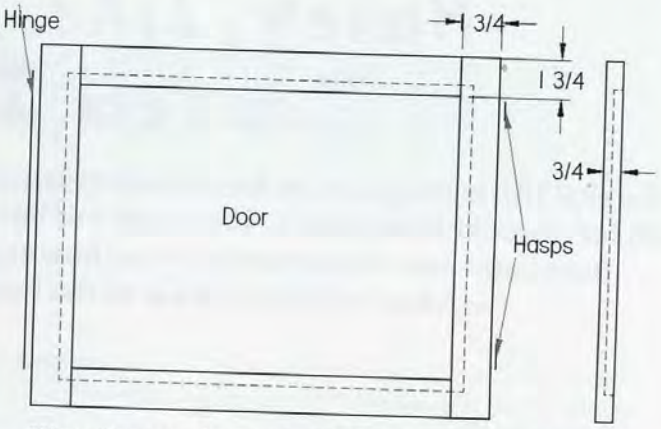
Hint: Use a framing helper to keep the door in alignment until the glue dries.

Step 14: Paint or varnish the unit at this time. A couple coats of polyurethane varnish will make the cleaning of the unit a lot easier.

Step 15: Mount the glass in the door using silicone seal and let it dry. The glass and silicone will hold the door frame rigid.

Hint: Use masking or painters tape to cover the wood before adding the silicone seal. Removal of the tape will clean the excess sealant off the door.





Hint: Be sure the inside of the glass is even with the inside of the door.

Step 16: Mount the door to the hive using the hinges and the hasps.

Step 17: Remove the top and add the handle (part 13). Then slide the glass into the slots on the side opposite the door and replace the top.

Step 18: For safety, add a Phillips head screw that goes through the top into the door frame. After you load the bees screw the top to the door. You never know what someone will try to do and 1000 bees loose at a flea market or demonstration will guarantee that you will never be invited back.

Congratulations! The observation hive is complete. Now all you have to do is fill it with your gentle bees.

Usage

Add a couple frames with bees and some capped brood and you have a fantastic conversation piece and a lead in to a lot of sales.

For transportation cover the observation hive with a dark cloth. Do not restrict the ventilation holes.

In an emergency honey and/or water can be added to the hive through the top ventilation holes.

Caution

Do not let the observation hive sit in the sun. The glass, bees and sun can be a deadly combination. You should also lock the hive door so it can't be opened when you take it to the market. With my luck I know some smart kid would open the door so he could pet the bees.

Thoughts

You can change the size of this observation hive to hold two deeps or one deep and one medium very easily by changing the length of the sides and repositioning the frame rests. If you use a deep or two you should also consider adding a couple more air vents. BC

BIGGER PICTURE

Jessica **Louque**

A Yellow Jacket Adventure

I've seen a lot of unfortunate misidentifications of bees lately. It could be because I work with honey bees on a daily basis, so I am always on the lookout for bees, or maybe it's because bees are so popular right now. Either way, I can't tell you the times there was a picture of a "bee" and it was a hover fly or a leafcutter bee or a wasp. Even at my own state beekeeper meeting had a syrphid (hover fly) picture greeting all those checking in to the meeting! The bee exhibit at the zoo is also depressing. The place that is supposed to teach the public about bees has approximately half their display photos incorrect – how embarrassing! Does anyone fact check anymore?

Speaking of embarrassing, we had an incident where our youngest kid didn't know the difference between a honey bee and a yellow jacket, although it was stressful circumstances. We went hiking for the weekend, and decided to take an advanced trail (gluttons for punishment at this point, camping with four kids) and ended up stomping through a yellow jacket nest. Poor George had them stuck in his clothes and chasing him, and was screaming at the meanie bees. I later explained to him that yellow jackets were not bees, but they were wasps and meanies who eat bee babies. When we came home from the trip, we fire bombed a nest in our backyard as retribution.

Since we needed a family education on different types of bees and wasps and flies, and we currently have a family vendetta against yellow jackets, we've been doing a little research on wasps and bees. Hopefully everyone has learned something about them besides how much the stings hurt!

Yellow jackets have several names, and a lot of them can be used for totally different insects. The actual yellow jackets (here at least) are the *Vespula squamosa* species, which are the Southern Yellow Jacket. Sometimes they are called ground hornets since they can nest underground. Another common name for them is meat bees. I particularly enjoy this one. It is one of the biggest differences between bees and wasps. Bees are not carnivorous, and get their protein exclusively from pollen sources. Wasps and yellow jackets both feed their babies meat.

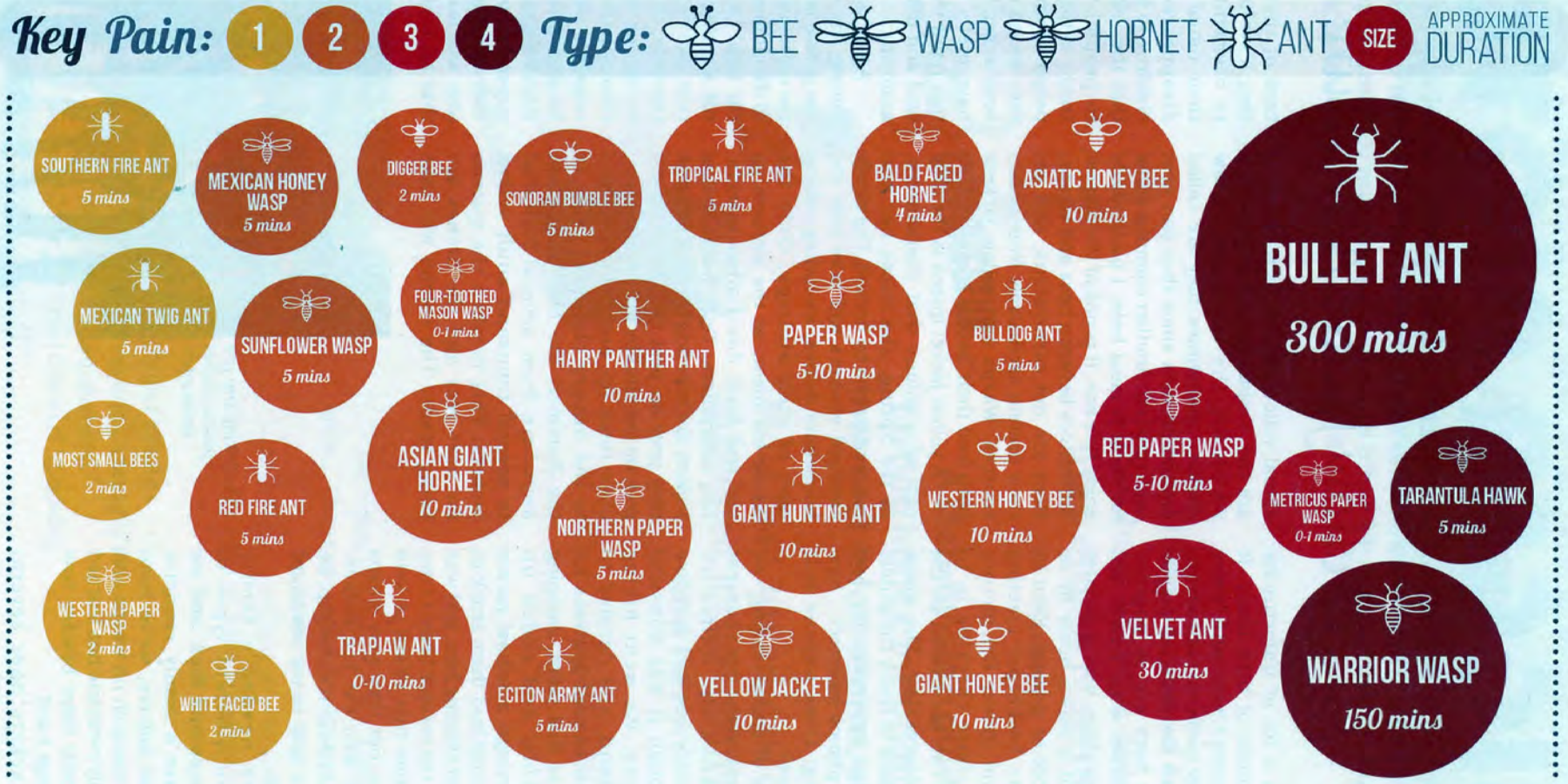
A yellow jacket queen is the only part of a colony that overwinters. In the Spring, she raises her first batch of babies by herself. The newly emerged workers will take over the household duties, including taking care of their siblings. Only the larvae eat meat, so the workers go out and hunt down other insects, like caterpillars. Technically, yellow jackets are beneficial insects because they prey on pest insects. They will pick up the chubby little caterpillars, chew them up, and then feed them to the hungry children. Later in the Summer, the hive builds up, anywhere from several hundred to several thousand adult yellow jackets. This is when the queens for next year and the drones are being made. The colony will take care of them until Autumn when they leave to mate and find a place to overwinter. In the meantime, their usual food, caterpillers, has disappeared, and they still have children to feed. It's during this time that they really become a nuisance to people. They start foraging in trash, eating from tables, following people around – come to think of it, they sound a lot like dogs. I've never been stung by my dog, but she does have pretty vicious farts. I guess at this point they're both desperate for food and don't realize they are being annoying.

Aggression is a common trait among the wasp families, although the yellow jacket is considered one of the most aggressive. This is likely due to the underground nesting habits of the local populations. If a nest is in the air, there's a lot less of a chance that you're going to disturb them. However, if you're walking around, or in our case, hiking (stomping) through the woods like a pack of ungainly elephants, you're going to be getting some incredibly unhappy visitors quickly. Yellow jackets are super awesome because not only can they sting multiple times, but they also will mark you with a scent so that all their friends know to hunt

The hiking trip pre yellow jacket encounter.

THE SCHMIDT INSECT STING PAIN INDEX

The Schmidt Pain Index was developed by Dr. Justin Schmidt, an entomologist, as a method for comparing the pain of various different insect stings he experienced during his work. The scale runs from 1 to 4, with four being the most painful. Pain can be subjective, varying from person to person, and this scale is therefore not absolute.



Note: circles sizes relate to duration, but are for purposes of comparison only, and are not to scale. All durations are an average, and as with pain, are subject to variation.

you down. It's really sweet of them, like giving you a present that had a lot of thought behind it. I have a friend who did some grad school work with yellow jackets and he informed me that if he was ever marked, he had to wash his clothes several times to remove the odor. It smells a little similar to the angry honey bee smell, which to me is like an artificial banana smell – not an actual banana smell, but if you rolled yourself in banana runts candy. Of course, if you can smell the marking, it's probably time to run away (if you're not already).

One of the more important (for me) aspects of life with yellow jackets is: how do I get rid of them? I am not normally an "ew kill it!" type of gal, but in the case of yellow jackets I feel that it's more of a preventative measure, or a revenge prequel, to kill a nest. These rank up in the line of hate with mosquitoes, ticks, and roaches. They're not cute, cuddly-ish (like a baby bee that just emerged from it's cap and looks like a teddy bear – awww), or remotely friendly. As I said earlier, we had an unwelcome residency in our backyard, which we literally stumbled over earlier in the Summer. It mostly became overlooked for the year until the hiking incident, when it became the focus of the revenge plot. We've had a rough time with yellow jackets at the house because of the honey bees. It seems like having hives of bees around is like a McDonald's to the local predatory insect population. We have hordes of robber flies, wheel bugs, spiders, and of course, yellow jackets. They all pick off bees or larvae like it's a drive-thru window. Populations build up fast for all these predators, who also have plenty of non-bee food sources as well. I like to watch most of these, but the yellow jackets are always concerning. Last year, I had to kill a nest at my neighbor's house to keep them from coming here (the yellow jackets, not the neighbors) and also to keep the neighbor from getting attacked while he was doing some yard work.

At our house, we like to do ordinary tasks with pizazz. We thought about lighting fireworks on top of the hive, but we figured we'd just blow through a window in the house and catch the roof on fire. We also don't really use any pesticides here unless it's a biopesticide (something like Bt), so we were trying not to spray Hot Shot or Raid or a comparable bug killer. We compromised the fireworks display with gasoline and fire. I was not amused with pouring gasoline in the ground, but we tried a little bit of lighter fluid the night before and burned it for a good 10 minutes. The next day, we went to check on the hole, and about six inches over, they had razed an area of grass and dug an even larger hole. At this point, I think we (Bobby) might have poured in a cup or so of gasoline and lit it on fire like a torch from the hole with a paper towel. It worked really well like a candlewick or an oil lamp. There were a few stragglers the next day, but it didn't appear that there was a new hole anywhere. Thus, we declared success over our enemies.

The burned yellow jacket nest.

Fortunately for everyone, yellow jacket stings are not going to kill you or anything like that, unless you are one of the very few people who are allergic to venom in a way that stops your breathing (as opposed to what everyone else considers "allergic" where it hurts a lot and it swells and some people get all whiney). On the Schmidt Insect Sting Pain Index, honey bees and yellow jackets score the same Level 2 on a scale of 0-4, with 0 being the stinger doesn't break the skin, and 4 being a bullet ant. If you were wondering, bullet ants are so aptly named because it feels like being shot. Now, in my personal opinion, bee stings hurt a lot, yes, but a yellow jacket is a much more burning, intense pain that stings for days. I don't show any signs of being stung at all after about 10 minutes, but if something touches me in the general vicinity of a sting, I get all crabby (Bobby is the same way, including the crabby). The kids get these big blotchy red patches that swell up and last for a week or two. I guess the venom from thousands of honey bee stings works a little bit on yellow jackets. Too bad it doesn't reduce the amount of pain too!

I hope everybody has picked up a few interesting things about yellow jackets. I know in our family, George in particular, has taken a keen interest on his newly forged arch-nemesis rivalry. Maybe one day we can all coexist in peace and harmony – but until then, keep the gasoline and the blow torch handy! BC

This graphic used with permission from Compound Interest, an absolutely fascinating web page designed and managed by Andy Brunning, a chemistry teacher living in London. It has hundreds of graphics like this, all explaining in entertaining detail the chemistry of life...from why tomatoes are red to all about the periodic table. Check it out at www.Compoundchem.com. Thanks Andy.

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

Sumacs As Bee Plants

Connie **Krochmal**

Hardy, Rugged And Easy To Grow In Difficult Sites

The showy sumacs with their colorful fruits and flamboyant foliage put on quite a show as Fall approaches. Found throughout the country, these hardy, rugged, easy to grow natives are great for difficult sites in the bee garden. They grow along roadsides, in open areas, hedgerows, and wherever woodlands occur.

Of the 120 species worldwide, around 15 are native to the U.S. Fast growing with an irregular growth habit, these plants often sucker and form thickets. Related to cashew and poison ivy, sumacs are important bee plants in the Northeast, North Central, Plains, and the Southeast.

General Description

The large, alternate, compound, feathery leaves can be toothed or hairy. A few species are evergreen.

With five petals and five sepals, the small blossoms are typically greenish-yellow or white. These open on large, conspicuous, terminal or axillary panicles, reaching about a foot in length. Male and female blossoms emerge on separate clusters or separate plants. Although most begin blooming in mid-Summer, there are exceptions. Sumacs bear large clusters of showy, berry-like, hard, stony, egg-shaped or rounded fruits with those from some species being used for drinks and dyes.

Growing Conditions and Care

Sumacs adapt to a range of poor soils, including sandy ones. Most prefer an acid to neutral pH. Although these tolerate some shade, full sun is best for the bee garden.

The weak wooded, short lived plants are prone to damage from wind, ice, and heavy snow. Generally low-maintenance, sumacs benefit from an occasional pruning to remove dead and damaged stems and to rejuvenate the plants.

Sumacs can be grown from seeds, which need a moist, cold treatment in order to germinate. Some species can be divided. Named cultivars are grown from cuttings. Generally, sumacs experience few insect and disease problems.

Bee Value of Sumacs

During favorable weather, these superior bee plants can yield considerable nectar and pollen. Bees collect the pollen in early morning and the nectar later in the day. Rain can affect the nectar flow, which lasts about three weeks. Sometimes, the honey can result in a strong aroma around the hives.

Typically, the high quality, mild tasting honey is golden amber. When fresh, this sometimes has a bitter or unpleasant taste. However, it mellows with time.

In many cases, sumacs result in a small surplus of perhaps 25 pounds or so. However, they can bring 100 pounds per colony, depending on the location and the plant species. Of the many sumacs, those known to be outstanding bee plants include the following.

Fragrant Sumac (*Rhus aromatica*)

Suited to zones three through nine, this very variable species is typically a dense, rounded shrub. Tolerant of salt spray, it is native from Vermont southward to Florida and Louisiana westward to Minnesota. Fragrant sumac inhabits open woods, banks, rocky areas, sandy soils, and barrens.

Reaching three to ten feet in height, this species is named for the attractive, glossy, three-lobed leaves that release a pleasing fragrance when crushed.

Fragrant sumac blooms earlier than most sumacs—from late February through May in the South. Small yellow blossoms form tight, terminal clusters.

Various cultivars are available. Wilts and rust can occur. Adapted to most soils – including wet and dry ones, this species prefers an acid pH. Fragrant sumac transplants easily.

Shining Sumac (*Rhus copallina*)

Named for the shiny, attractive foliage, this does best in zones four through ten. Withstanding salt spray, it is native from Maine to Florida westward to Minnesota, Wisconsin, Oklahoma, Kansas, and Texas. Shining sumac grows in dry woods, openings, woodland prairies, rocky hillsides, forest edges, right of ways, abandoned fields, and along roadsides.

Usually a small, shrubby, irregularly shaped tree with open, crooked branches, shining sumac is generally six to 12 feet or less in height and about half as wide. However, it can be taller. With over 20 leaflets, the winged leaves are toothed. This is grown for the attractive, glossy, deep green foliage.

The greenish-white blooms create eight-inch-long, branched, pyramidal panicles, mostly in early Summer. Males and females are on separate plants. The hairy fruits form drooping bunches.

While it prefers a dry, sandy, acid soil, this adapts to loam. Shining sumac tolerates a range of moisture levels.

This species is a particularly good honey plant, averaging from 25 to 100 pounds per colony provided no rain occurs during the blooming period. The good quality, amber colored honey is heavy bodied.

Smooth sumac (*Rhus glabra*)

Also known as scarlet sumac and red sumac, this is suited to zones three through nine. It is native from the

Northeast to Florida, Mississippi, and Alabama westward to the Midwest and Texas. It grows on glacial morraines, waste places, hillside pastures, abandoned farmland, meadows, thickets, woodland borders, sunny open sites, river and stream banks, burned areas, moist rich lowlands, and along railroad tracks.

Smooth sumac is similar to staghorn sumac except for the deeper red fruits and smooth stems. This tree or shrub is generally seven to 15 feet in height with a rounded, open irregular crown, and an irregular branching pattern. Covered with a waxy bloom, the stems are three-sided.

The toothed, deep green leaves contain up to 31 leaflets. Flowering is mainly from June through August. Male and female blooms emerge on separate plants in erect clusters.

Laciniata is a widely grown cultivar with finely cut foliage similar to that of Dissecta staghorn sumac. Sometimes, these doubly pinnate leaflets are more prone to mildew than those of Dissecta.

Smooth sumac is an excellent source of nectar and pollen, particularly in New England and Texas. Best on hot, clear days, the nectar flow decreases with cool, foggy, or cloudy weather. A good honey crop of 45 to 100 pounds per colony is possible.

With little aroma, the very heavy bodied honey is profound amber to golden. Slow to granulate, it becomes waxy. Initially bitter tasting, the honey later develops a mellow, rich flavor.

Staghorn sumac (*Rhus typhina)*

Easy to transplant, this widely grown species is easily recognized by the dense, velvety hairs covering the young branches. The asymmetrical plants do well in zones three through eight. Staghorn sumac occurs in the East southward to Georgia westward to Illinois, Iowa, Missouri, and Minnesota. This grows in pastures, meadows, burned or abandoned areas, swamps, and along roadsides, woodland borders, railroad tracks, and streams.

Typically a 10 to 25 foot tall tree, this features a flat crown with numerous, crooked, leaning trunks. If necessary, staghorn sumac can be pruned to control its height. With up to 31 leaflets, the sharply toothed compound leaves are almost two feet long. Grown from root cuttings, Dissecta is a cultivar with fern-like, finely slashed leaflets.

Sumac seed pods, when ripe, make excellent smoker fuel, and some beekeepers claim the smoke causes Varroa *to fall off adult bees.*

The yellow-green male and female blooms emerge on separate plants on foot-long, cone-shaped clusters from June through July. The red, hairy berries are used for smokers.

Staghorn sumac adapts to various soil types, including poor, dry, rich, and rocky ones, provided they're well drained. Tolerant of salt spray, staghorn sumac is prone to branch dieback and stem canker.

Much loved by bees, staghorn sumac flowers provide a very heavy nectar flow during rain-free periods with 22 mg of nectar per flower daily. This can bring 40 to 100 pounds of honey per colony. Initially bitter, the flavor improves with age. Profound amber to golden, this very heavy bodied honey becomes waxy instead of crystallizing.

Other Sumacs

Various other sumacs are known to be good bee plants. These include some natives with limited distributions and several introduced ones.

Chinese sumac (*Rhus potaninii),* also called Chinese varnish tree, is hardy to zone seven. This deciduous plant reaches 40 feet in height with a 25 foot spread. The winged leaves are sometimes toothed. The white blossoms appear on hairy panicles mostly during very early Summer. Male and female blossoms emerge on separate clusters.

Favored by bees, this adaptable species is unfazed by heat, humidity, wind, pollution, drought, deer, rabbits, or exposed sites. It is suitable for sandy, clay, and poor soils.

Chinese gall (*Rhus chinensis),* also known as Chinese sumac, is considered one of the most beautiful sumacs when in full bloom. This Japanese and Chinese native is suitable for zones six through nine. It becomes a spreading, loose, suckering shrub or a flat-topped tree, 15 to 24 feet in height and equally wide.

The plant features winged leaf stems, bright green foliage, and creamy white or whitish-yellow blossoms in Summer on large, broad, pyramidal, foot-long panicles.

Coral sumac (*Rhus metopium)* or mountain manchineel occurs in southern Florida and the Keys. The acid sap can cause severe burns. Reaching 20 to 30 feet tall, this attractive tree is an excellent honey plant. The greenish-yellow flowers form axillary, drooping panicles. Coral sumac can yield a huge crop of good quality, pleasant tasting, thick bodied honey.

Various other sumacs occur in the Southwest or California. **Green sumac** (*Rhus virens)* typically grows

near other sumacs, and sometimes hybridizes with them. This species inhabits woodlands and stony, hilly areas, usually from 2000 to 5000 feet elevation in Arizona, New Mexico, and Texas. The sparsely branched tree or dense, rounded shrub is eight to 12 feet in height and about two-thirds as wide. With thick, waxy foliage, it blooms from Spring to Fall. Bees love the flowers.

A variety of green sumac known as **Mearn's sumac** (*Rhus virens var. chiriophylla)* is slightly taller, perhaps 16 feet. It blooms from July through August.

Kearny's sumac (*Rhus kearneyi)* grows in sheltered locations in Arizona. This endangered, evergreen shrub can be 16 feet tall. The leaf edges can curl under slightly. The white blossoms open in March.

Hardy to zone nine, **laurel sumac** (*Rhus laurina)* is found in California in the foothills, coastal scrub, and shrubby woodlands. It adapts to various soil types. With a spreading, rounded crown, this tree or tree-like shrub is six to 15 feet tall and wide. The shiny, evergreen, lance-like foliage is aromatic.

Loved by bees, laurel sumac blossoms generally yield good crops of excellent flavored, amber colored honey. This can sometimes have a slightly unpleasant odor.

Lemonade berry (*Rhus integrifolia)* occurs in California along beaches, bluffs, ravines, and canyons below 3000 feet elevation. Tolerant of salt spray, the species is prone to verticillium wilt. This scented evergreen shrub or small tree typically grows in sand. Generally three to ten feet in height, it is occasionally 30 feet tall.

The very small rose, pink, or white flowers open on large, branched clusters. Although flowering usually occurs from February to March, lemonade berry can bloom as late as July. Considered a good bee plant, this species provides a moderate honey surplus.

Prairie or lance-leaf sumac (*Rhus lanceolata)* is found in Arizona, New Mexico, Texas, and Arizona. This prefers dry or limestone soils, particularly neutral ones. The small, upright, branched tree or shrub with a rounded crown can reach 30 feet in height. It pretty much resembles shining sumac except for the larger fruit clusters and narrow leaflets. Prairie sumac blooms from June to August with the male and female blossoms on separate plants.

Squawbush sumac (*Rhus trilobata)* or skunkbush is noted for the ill smelling leaves. Hardy to zone three, this is mainly found in Illinois and parts of the West, including Washington, California, Utah, and Texas. Usually three to four feet tall and wide, this deciduous shrub is very drought tolerant, and adapts to alkaline soils.

Bearing smaller blooms and fruits than fragrant sumac, this upright species begins bearing small greenish blossoms in March. Squawbush sumac flowers are a favorite of bees. This can provide a good honey crop.

Sugar bush (*Rhus ovata)* thrives in poor, dry, and rocky soils on ridges, dry slopes, and hillsides in California and Arizona. It is intolerant of salt spray.

This spreading, upright, small evergreen shrub or tree with an irregular, rounded crown is hardy to zone nine. It can be 10 to 25 feet tall. Sugar bush bears shiny, evergreen, leathery foliage and pink, greenish-yellow, or white blossoms, which open from March to May on long, dense, terminal clusters. This species can provide a huge crop of honey, especially in California. BC

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

DOWNTOWN

Dealing With The Changing Temperament Of Our Bees

As this beekeeping season comes to a close around here, one recurring theme among our newbees and mentees has been unwelcome changes in hive temperament. Not far behind has been deciding when a hive is too hot for either the beek or the neighbors – then figuring out what to do about it. One of the great lessons of 2014 is really a very old lesson: if you don't know that you have a gentle, local queen, swap her out for one with an established pedigree. I might go so far as to say that urban beeks might want to pay just about as much attention to this lesson as our colleagues in Africanized Honey Bee zones.

So, who likes temperamental bees, anyway, and why is this a particularly urban topic? The usual worries apply: legalized beekeeping might take a hit from a stinging incident, our apiaries are surrounded by a lot more people who could get stung, and it's harder to take proper care of cranky bees. But survey after survey also indicates that city beekeepers tend to be newer to the craft, more likely to be self-educated, and less likely to be the sole user of the areas where their apiaries are located (meaning we use areas in community gardens, school and church grounds, parks, and so on).

When "urban savvy" is not so smart

Why do "newer" and "self-educated" matter? We all know that so many of our decisions about our bees depend on a solid gut sense of what is going on, what is healthy, and what is normal for the place where we are standing. In the case of a hot hive, a new beekeeper could legitimately believe that the problem was in how they might be fumbling with tools, smoker, and woodenware, and blame themselves. Most urban beekeepers also join up with the idea that they are participating in "saving the honey bee," not squashing ornery queens. They often will not go there on their own. My mentees ask me for permission: a lot.

If your average beekeeper has two years or less under her or his belt, the gut located there still has a lot to learn. And we clever urbanites like our books, webinars, and online videos because they are easy to fit around busy crowded lives: not like a class that takes up tired hours after work, or to which you have to sacrifice a chunk of several weekends. But it's easy to miss key topics when writing your own syllabus, and many urbanites have simply never had any experience with practical agri- or apiculture.

Wouldn't it help to know what to expect of bee behavior and temperament based on the seasons at your latitude? But it's also hard to find an experienced mentor, especially in these super-growth years of interest.

Nowadays, city beekeepers that have been around awhile are often already fielding questions from a half dozen newbees. Rather than wait around for someone to be available to visit your apiary, for a class seat to be offered, or for the weather to allow a group meet up, its faster and easier for a city newcomer to Google "beekeeping in a nutshell" and believe the first source that seems to make sense. It is not great preparation for the unexpected, which biology and the bees are never short on delivering.

Hot Hives In The City

Beggars can't be choosers

Another unforeseen effect of the recent growth of urban beekeeping, the relative inexperience of practitioners, and the price of space around here is that we have relatively few nuc and queen producers dedicated specifically to our city club. All around here, in suburbs and more rural areas, good hearted and smart beekeeping communities have been working hard to make up overwintered nucs and local queens for their students, and they sell the extras to us when they can. But we are not yet in a place to supply the 40 or 50 new beekeepers that graduate with every short course with known local stock. So we get bees where we can: usually packages, usually from hundreds of miles South, and we count ourselves lucky that we have the option. In the absence of nucs, many of us make as many splits as we can in the Spring for our mentees, but a lot of these queens are free mated. Catch-22.

Shared spaces and getting serious about genes

This is not a public confession that I make lightly: about once a year, I help destroy a hive: usually a great, big, healthy one. The common factor every year: bees in small and shared spaces where non-beekeepers are getting hurt. This year it was in a place frequented every day by small children and every evening by passing foot commuters. My group got involved after the police did. I picked up between 100 and 200 stings putting out that fire. It made me think.

There is no villain in this story (or, frankly, any of the others: careless people don't call for help). In most of the recent cases, the queen in question came from a package that

was lovingly cared for, except for the requeening-with-someone-local part. The beekeeper that ended up in trouble found the package queen to be productive, gentle and easy to work in 2013, so why change? But she found herself with a fire breather after the 2014 nectar flow. What happened? Well, no one told her a few things.

Here in DC, our packages mostly come from the South, from areas bordered by zones known to harbor Africanized bees. Most package queens come from mating programs complete with drone flooding (or so the assurances go), but in the best of such efforts, who knows which drone found which queen along the way? And bees don't have to be AHB to be jerks, anyway.

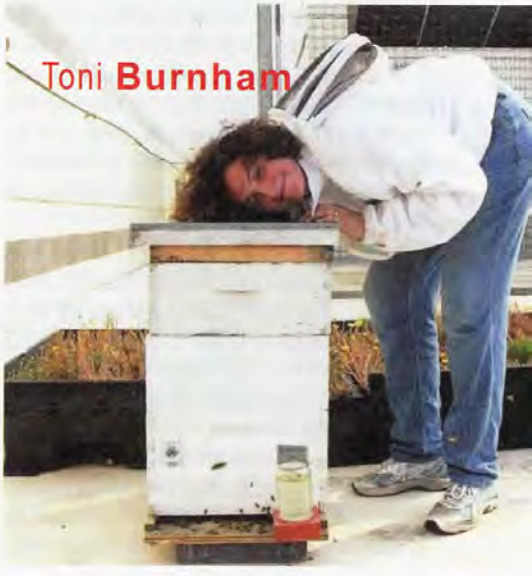
What we think happened is an efficient supercedure that resulted in a hot second cross. There was no obvious drop in hive strength or brood rearing to signal queen loss, but after the honey was stored away, the fireworks started.

What do I mean by a second cross? In Mendelian genetics, you can have a parent who breeds true to a desirable characteristic mate with another sporting a not-so-nice quality. The first generation of offspring can still turn out to be just peachy. But if you let *that* generation free mate–no one that I know of is drone flooding downtown–a significant percentage of their young can revert to hell-on-wings. The second cross is, in fact, *cross*. And the package bee producer has no way to tell me whether it will happen, or how often, or which queen.

Our new policy for recommending bees in community gardens, parks, school yards, and anywhere the public can pass within 20 feet of a hive entrance is really knowing the pedigree of the bee lines placed there. We love swarms, we depend on packages, but we want to know everyone's grandma before we put them on public space. And if we don't know at first, we want to know by the time the season is over. By any means necessary.

Some basics of thinking about bee temperament

There are some pretty standard management techniques, seasonal changes, and genetic train wrecks that I consider when figuring whether a hive, or really its mama, is too hot for downtown. I consider these the three tent poles of deciding whether



the local royalty has to go. But there is truly one variable you don't need an expert mentor to decide for yourself: is working your bees painful for you? Don't put up with it.

There's a lot of stuff out there right now about working without protective gear, and without smoke. Hey, it's any adult's choice, but I get stung a lot more that way. And the bees are more riled when that happens, what with all the alarm pheromone around the place. If you are in the city, getting stung, and generally getting the girls worked up, please consider trying a veil and a smoker. The next person passing by did not volunteer for the privilege, and the bees will be testy after you leave. But this alone does not mean that they are hot.

And some bees are hotter at some times than others, so you can work with that, within reason. The bees of early Spring around here are a marvel of peace and contentment, right through our nectar flow of April-May-June. After that, you have a full sized colony of underemployed bees, and they are less pleasant company. All this means is that you work them less, and with more awareness of the state of affairs.

I would not recommend requeening every hive that reacted more defensively after a flow, especially when the queen is already from known stock. If putting the empty supers on after harvest is a threat to life and limb, however, I would consider it.

And I would consider it strongly. If you do not know the queen's background, and you do have access to a known quantity, this is your last chance to requeen before colony populations get north of 40 or 50K.

We have a predictable annual dearth in late Summer, when we try to mostly leave colonies that are in good shape alone, if only to prevent robbing. Even I put on the gloves in late Summer around here.

If they continue to get hotter as they grow into our dearth season, and that hive is in a public place, we face the thrilling prospect of attempting to dissect a vigorous volcano of a hive in the middle of all humanity. My so-wise mentor once told me that finding the queen in a normal August hive around here was not about skill, but luck. Luck is not good enough in a major American population center.

Fall requeening is what's generally recommended around here (though there are energetic philosophical wars around the subject), and if I did not remove an unknown queen before now, this is when to go for it. Try to get a friend or four to help: once while making splits, Jennifer Berry showed us how to have multiple beekeepers simultaneously each grab and inspect a single box for the queen before the latter got a chance to run. In late Summer, I also use a hive drape to minimize the number of bees in the air. This is a tremendous way to cut down on time required and pheromone released, while maximizing your chances of success. (If I have described this poorly, it's my fault, not Jennifer's, and you probably should be reading *her* article anyway.)

We can *manage the heat*

Like you read earlier, there is nothing particularly urban about having a hot, unmanageable hive, but we face elevated risk of getting our approach and our genes wrong, and harming other people when we do. So we need to be thinking about whom we have inside those boxes, what we know about her, and how we are going to manage her succession plan. This reminds me a lot of the kind of awareness that is common practice in AHB areas, and we could consider taking a page or two from their published recommended practices.

But my main (and somewhat unhappy) advice is to be ready to let go, even of a high-producing, well-behaving queen if you don't know what you have and don't know what you will do if the situation goes bad. The worst case does not happen that often, but it really sucks to kill 50,000 bees (and the stings are no fun, either). The best case is that you are building up the healthy temperament and genetics of your entire urban area each time you introduce known, high quality stock into such a concentrated space. Over time, we will produce more of our own, but until then, we have to be suspicious and a little bit mean ourselves.

One way to deal with a large, hot colony in a very great hurry is to use a very large black plastic garbage bag. Remove the telescoping cover but leave on the inner cover, with the bag at the ready. Slip the bag all the way over and down to and cover the entrance. Tip the colony on its side and put another bag from the bottom up. The heat from the sun and no moving air will suffocate the bees in a matter of minutes, with no free flying bees to be a danger. BC

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

Let's Make A Gift Basket

Ann **Harman**

Gift baskets – are they a container for everything honey bee including the proverbial kitchen sink – or do they serve a defined purpose? A successful gift basket has a theme designed for the recipient. Yes, it does show off your, or your beekeeper friend's, talents but it really has to be useful to the recipient. Let's take at look at various ways gift baskets can be useful, informative, and attractive.

Gift baskets can be given for an occasion – for example a birthday, new baby, anniversary, to say 'thank you,' and for a wedding. Gift baskets can be for a holiday – Christmas, Easter, Valentine's Day. Gift baskets can be made for organizations and businesses to give to their clients. Perhaps a beekeeper can supply honey or other bee-related items for their gift basket. A gift basket, with a theme, can be a very useful gift for someone 'who has everything.'

Gift baskets are sometimes a class in a honey show. If no theme is given for the year you can be assured that the baskets will be enormous with impossibly large bows holding too much colorful wrapping together. Look at all the overwhelming contents probably including items that would never be used. Look closely and you just might see the kitchen sink. If the show organizers give a theme, changed every year, the gift basket could actually serve a purpose. Honey show baskets with a theme are much easier to judge fairly.

Before you begin preparations for making a gift basket you may wish to visit a craft store. In addition to standard decorative items, you will find seasonal ones displayed well in advance of a holiday. Here you can find appropriate ribbons and clear wrapping materials, ways to keep the contents from tumbling about and even a selection of baskets or other containers.

We need to take a look at containers. No, they do not have to be a basket. However we will continue to use that word. How about Santa's sleigh as the container for Christmas? Do you, or a friend, make handcrafted baskets out of local materials such as vines? Depending on the recipient a handmade wooden or pottery bowl may be more appreciated than an actual basket. Consider other items such as a cutting board, a nice baking pan for someone who likes to bake, and a useful carryall for a baby shower. A picnic basket with unbreakable plates, wine glasses and eating utensils would make a perfect gift basket. For people who take short day-hikes – and if you know what they prefer – a simple backpack could be used.

For someone just starting out in a first apartment think about a skillet or a nice cooking pot. For an Easter present for a child consider a nice toy rabbit holding a basket (just the other way around from a basket with a toy rabbit). Think outside the 'basket!' Keep your eyes open and wander through various kinds of shops. A small overnight suitcase, an attractive wastebasket (it's not a real basket). A large bird feeder. A container that can be recycled. An attractive flowerpot. Think about the recipient's age, hobbies, occupation, beekeeping interests – or not a beekeeper. You want the recipient to appreciate and be able to use the entire gift.

Now you have the 'basket.' It's really a container. At the craft shop you could find the usual Easter basket stuffing material – the fake grass. However since this gift basket is custom designed for the recipient the 'stuffing' can be useful. For the person who loves to cook, the stuffing is very easy – potholders or oven mitts, kitchen towels, an apron, a set of napkins. Those would also be appropriate for the person in their first apartment. So would a set of bath towels. For the small child who will receive the toy rabbit, an appropriate t-shirt would be nice. For the picnic basket some stuffing could be a packet of attractive cloth or paper napkins. A pair of gardening gloves in the flowerpot would be useful. You will find endless stuffing items for the baby shower in the infant's section of any large store.

Take a walk through a hardware store, a grocery store, an auto parts store, a sports store, and other specialty shops. If you run out of ideas, take some colored paper or wrapping paper appropriate for the occasion, crumple it up and use that. At least it can be recycled. Making the stuffing useful does not have to cost very much unless you want it to be an important part of the gift basket.

Let's consider that important part of the gift basket. The honey bee part. Honey, just plain honey, comes to mind first. However, be certain that the recipient does like honey and you know they appreciate it and use it. Yes, I have encountered a few – a very, very few – who have said they do not care for honey. (They probably did not know what many things they could do with it.)

Honey – should it be liquid or creamed or in the comb? Although some recipients may love comb honey, others have no idea what to do with it. Some are not familiar with creamed honey. Here is an opportunity to introduce someone to it. Put a container of liquid honey in the basket and a small container of creamed honey with a hangtag describing what it is and what to do with it. That information may initiate sales of your creamed honey.

You need to think about a suitable honey container type and size. Just look in the equipment supplier catalogs. The assortment of honey containers is really enormous, especially when considering the sizes available. Many adults love the squeeze bear. Well, it is cute and actually very convenient so it is not only for children. The 'upside down' container makes life with honey non-sticky (look for 'inverted' honey container in the equipment suppliers catalogs). That container is certainly the most practical. However a glass jar may be the most elegant. You can use the classic, the hex and the

Muth jar that all come in different sizes. Even the tiny two-ounce bear could be used. If you have or can obtain honey from many different floral sources that have different colors and flavors, fill a number of two-ounce bears, label floral sources, and consider it a sampler of honey.

You can put your usual honey label on the container of honey. However if the basket is used as a gift, not being sold, you could create a personalized label. 'My bees visited two million blossoms to make this jar of honey especially for you.' You can think of other messages.

Candles come to mind as a desirable hive product. Consider the recipient and the theme of the gift basket. Weddings, anniversaries and birthdays would be suitable for candles. If you have molds with themes – Halloween, Christmas, Easter – they could be used at the appropriate time of year. Even children would like such a candle. However if it is a Bon Voyage gift basket or one for a student leaving for college, candles might not be really useful. Beeswax ornaments are attractive and useful additions, especially at holidays. They can be left plain beeswax or decorated with suitable paint.

Think about what else beekeepers make with beeswax. Lip balm and hand creams are always appreciated. Soaps and scrubs made with hive products make nice additions to some gift baskets. If you do not make such items yourself, partner with another beekeeper who does. However if you were entering a honey show, the show rules would indicate if all the basket's contents have to be made by the entrant.

Other products, such as mead or beer made with honey are also appropriate for a gift basket. You might wish to include a simple corkscrew or an opener if the beer has a crimped cap. The addition of a wine glass or a decorative beer mug can accompany the mead or beer.

Other bee-related items will have to fit the theme or the recipient of the gift basket. A honey cookbook would be a good addition to the basket for someone who loves to cook. Not as many cookbooks are available today as were many years ago. Sometimes state or local associations have compiled honey cookbooks. Several pollinator fund-raising organizations have packets of seeds for bee plants. The gardener who is receiving the flowerpot 'basket' would appreciate that addition.

These items filled a huge gift basket that Kim received when he spoke in Idaho this past Summer. Honey, soap, mugs, wine, potatoes, jam, hats, pancake mix, candy and more, all with an Idaho theme.

If you are presenting the gift basket to someone then include a card. Some beekeepers make cards with photos of flowers and bees. One of these cards would certainly be appropriate. However a commercial card for the occasion – birthday, Christmas, etc. – is appropriate also. You can use the card for a message to the recipient. For a beekeeper you could add a gift certificate for some bee equipment or a queen.

In general, corporations and businesses have someone who assembles their gift baskets to be given to clients and personnel. If you can find that person you may be able to sell them honey, candles or other bee products for those baskets. The corporation baskets may have a theme such as products of the state. Your honey and beeswax items certainly fit that theme. Perhaps the baskets are only used at Christmas time. Beeswax ornaments, painted or plain, would be a good addition.

In some cases you may be asked not to put your label on a container of honey because the company wishes to use their labels with their company name. Perhaps you can put a very small label on the back of the container – honey produced by . . . your name and contact information. The person assembling the gift baskets will guide you.

Gift baskets are fun to create! Use your imagination to make each one a special gift with appropriate items that will be used and appreciated. Please do not include the kitchen sink. BC

Ann Harman puts together gifts baskets, keeps her bees and does it all from her home in Flint Hill, Virginia.

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

(Note to *Bee Culture* readers: An answer in my September column elicited such decided responses, both pro and con, that I felt some additional comment was required. A beekeeper in New York was concerned because a doctor there was providing bee club members with prescriptions for EpiPens – without any exam – to be used in case someone were to have an anaphylactic reaction to a bee sting. The club encourages this practice. My response, in brief, was that EpiPens should be prescribed after a medical exam and used on the patient for whom it was prescribed or, alternatively, should be administered by emergency medical personnel. An endorsement of my response by an Indiana doctor and beekeeper appears as a letter to the editor in this issue. An email (edited for length) denouncing my view appears below with my answer.)

A beekeeper in Michigan writes:

. . . I have always read Ask Phil and valued your opinion . . . All my trust for your advice ended when I read your response in the Sept. issue to a reader who was uncomfortable with giving epi to someone having an anaphylactic reaction.

I am a retired R.N. With nearly 50 years of experience in ICU, CCU and Emergency departments. As staff, then supervisor and mentor to new nurses. I have also been very active in layperson training of basic and advanced first aid, including CPR, Automatic defibrillator and the EPI PEN!!! Through the years, the medical profession has realized that the key for survival of catastrophic events such as cardiac arrest and anaphylaxis was proper initial treatment IN A VERY TIMELY MANNER. Results of survival rates very much prove that.

You sir, using your "expert" status, have given some VERY dubious advice. There is a vast difference between a perscribed [sic]med which is tailored to an individual healthcare status and an emergency med which is used for specific medical conditions to stabilize a very dangerous event.

. . . Do you realize the school and child placement institutions in Michigan are REQUIRED to have epi pens and provide training twice a year on their use.

Do you realize that the reader, as untrained as you, will probably, based on your flawed "knowledge" not seek training to get the knowledge that answers his concerns in a correct manner.

. . . Wouldn't it have been much better to suggest to him that you are in no way qualified to advise him on this matter and it would be much better for him to voice his concerns to his family health provider or to seek out training through the agencies which have excellent programs to teach and inform.

. . . [I am] very disappointed in you.

Phil replies:

I often edit letters and emails sent to me when they appear in my column, either for length or to leave out details which would tend to identify the writer without his or her permission. I'm sorry if my omissions in this case caused you to misunderstand the writer's question. She - herself an RN with decades of emergency room experience and married to a retired emergency room physician - is not "*uncomfortable with giving epi to someone having an anaphylactic reaction.*" She is uncomfortable with a doctor's writing prescriptions for club members, without examining or even meeting them, for use by a third party, also not a patient, who might possibly experience anaphylaxis while visiting a beeyard. She made this explicit in her letter, and I hoped that it was clear in the edited version which appeared in the magazine.

You mention that you have been active in layperson training in the use of EpiPens and that school systems in Michigan are required to have them on hand and to provide training in their use twice a year. I think the essence of my correspondent's concern, and mine, is that prescriptions are being provided to her club members, not only without examination, but also without training of any kind. As you know, allergic reactions to insect stings are common, but truly severe ones are rare. Certain common medical conditions and medications can make the administration of EpiPens dangerous and contra indicated in any but life threatening situations. Also, it is my understanding that dosages of epinephrine are adjusted by body weight – impossible when the prescribing physician doesn't know to whom the Epi will be administered. To expect a lay person, without any training, to correctly diagnose a case of anaphalaxis and to properly administer an injection without necessarily knowing anything about the victim's medical history or condition is reckless to the point of malpractice – especially when the chance of a reaction so severe that it can't wait for an emergency medical response is extremely remote.

In part of the original letter which I omitted, the New York nurse/beekeeper says: " *I have seen many, many, mild and moderate reactions from a variety of causes which warranted treatment. In some cases because of medical co-morbidities we just gave the diphenhydramine* [Benadryl] *because the risk of giving epinephrine was too great. In all*

Washboarding bees. (photo by Mary Parnell Carny)

Bad equipment – extra extrance.

those years, I have seen only a few, truly severe reactions. I think that having some diphenhydramine on hand and calling 911 for further treatment is the reasonable course of action. In very rural settings where EMS is not readily available, I suppose that might be another matter. I worry that giving someone epinephrine in an uncontrolled setting can put the person at risk especially if the first injection could have waited until they were at least evaluated by EMS."

Dr. Kotnik, the ER doctor whose letter to the editor appears in this issue, concurs about the rarity of severe reactions, likening keeping an EpiPen on hand just in case to "*carrying a vial of cobra antiserum when hiking in Vermont.*" He goes on to discuss additional arguments, both legal and financial, against the casual, indescriminate prescription of injectable epinephrine.

It was never my intention to suggest that there is no appropriate use for EpiPens. Anyone who had ever had a severe, or even a moderate reaction, to an insect sting would be well advised to consult his or her physician. A prescribed dose from a doctor familiar with the patient's medical condition, accompanied by training in the pen's proper use (including instruction for the patient's family or close associates) is a reasonable and prudent precaution. Even when a person's medical condition makes the administration of epinephrine risky, a severe enough reaction could preclude any other option. But do you really want an untrained, and perhaps panicky, bystander making that call instead of an EMT or doctor?

I hope this explanation has restored your confidence in me. My advice was based on research and consultation with experts, and clearly there are medical professionals who agree me. At any rate, I stand by it.

A beekeeper in New York writes:

I have a question about upper entrances for the bees. Is it good to give them an upper entrance, or does it do more harm than good?

I gave my strongest hive an upper entrance by putting small spacers between the second brood box, and the bottom super. They crowd around the entrance, but do not pile up on each other, and seem to lick the wood of the boxes, while moving from front to back. There are no foragers flying in or out. What is going on?

Phil replies:

As to the value of upper entrances - lots of beekeepers provide them and consider them beneficial for several reasons. The most common is that an upper entrance, under or between supers, facilitates honey production by providing foragers with direct access to the boxes where nectar is stored. Even a hard working bee will take advantage of a short cut when it's offered. Another advantage is that an extra entrance promotes ventilation by allowing air flow between upper and lower. Beekeepers from northern parts of the country say that an upper entrance can provide ventilation even in winter when the lower one is covered by snow or ice.

There are a number of ways to create an upper entrance, including drilling holes in honey supers or using spacers such as you describe. I've even seen more elaborate constructions, with wood strips inside to prevent the bees from building burr comb in the spacer. The way some of my hives acquire extra entrances might best be described as the laissez faire method, due to some of my woodenware's not being in the best of shape. The first areas to deteriorate in hive bodies are the corners of the boxes where they are repeatedly pried apart. As a result, many of mine have gaps between the upper hive bodies and elsewhere. The accompanying photo is of a hive that made me seven supers of honey this year. It might not win a most beautiful contest but, throughout the honey flow, foraging bees laden with nectar were lined up at every gap and hole. Who knows, maybe the extra entrances helped to make it such a good producer.

You asked about the possibility of an upper entrance's doing more harm than good. The only risk would be to a very weak hive in which multiple entry points would make it more vulnerable to being robbed. In such a hive, I would recommend sealing any extra entrances (whether planned, or incidental like mine.) Duct tape works quite well.

The second part of your question is more interesting, but not so readily answered. First of all, I think the reason you aren't seeing foragers flying in and out of the upper entrance is simply that you are in a dearth period. (This question was sent to me on the 31st of July.) In the absence of a nectar flow, the bees have no need to make frequent trips to and from the honey supers. That they are using the upper entrance, however, is evident from the way they crowd around it. You ask what is going on when they seem

to lick the wood while moving front to back. What you have provided is an excellent description of a behavior called washboarding which some hives exhibit during the hot part of the summer – usually during a dearth.

Washboarding manifests as a rhythmic movement, in which bees on the front of the hives seem to step forward and backward, swinging their front legs in what looks like a sweeping movement. In another era, when I was a child, my mother still sometimes made use of a washboard to do small batches of laundry by hand. (Her main laundry chores were done in an old fashion ringer washing machine.) This movement of the bees does remind me of the up and down motion she used on the washboard. However, I think it looks even more like a dance. Since the phrase "honey bee dance" was already taken to describe the way forager bees communicate the location of nectar sources by dancing inside the hive on the face of the comb, I guess a new term was needed for this behavior. I find it interesting that only certain hives take part. Last summer, out of the 20 full, two story hives in my apiary, only two were exhibiting this behavior. Most of my hives were strong - full of bees - and almost all of them had bearding on the hive entrances, but only two acted this way. Why only these two hives were washboarding, I do not know. One is shown in the photo. Though the picture can't convey movement, the way the bees are aligned may give some sense of the choreographic aspect of their display. As you say, they don't just pile on each other as in clustering or bearding.

That is **what** is going on in your strongest hive; the question I can't answer is **why**. While many beekeepers believe that the bees are cleaning the surface of the hive near the entrance, I am not convinced. I do not know of any scientific research or evidence which supports that theory. Readers, if you are aware of any, please let me know. I did find one interesting article, co-authored by Dr. Jeff Pettis – former head of the USDA Bee Research Lab in Beltsville, Maryland, discussing some of the scant research which has been done on washboarding, but the authors conclude that the reason for it is still unexplained. You can view this short paper at: **http://iussi.confex.com/iussi/2006/techprogram/P2650.HTM**. If you have internet access, you may try the link below of a little video I filmed of some of my girls doing their "washboard dance" – and turn up the sound. http://philcrafthivecraft.com/wp-content/uploads/2012/08/Washboard-for-website.mpg

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mation and churning ahead. Welcome to our Brave New World.

•

You know you're a walking bill board, don't you? Just going to the grocery store exposes you to a crowd of folks you don't normally see... strangers in the isle, exchanging glances. Traveling anywhere puts you front and center with people you'll never see again. So I try and use these opportunities to show off... to make sure people who don't know me, know I keep bees. It's amazing how many doors that opens. Let me back up. I used to be a bit more self-conscious (really!). Keeping my bee stuff for bee meetings. But then it dawned on me – Duh! – at the meeting everybody is a bee dude, and everybody knows it. In the grocery store, at the airport, in a restaurant nobody does. So now I'm that bill board. When I put on a shirt or hat emblazoned with our Medina Beekeepers logo, or any of the many shirts or hats I have with bee dude logos I am never, ever alone, never bored, and I've made a whole lot of friends. Every time!

Here's the latest. I'm in the security line at Cleveland airport. I have a Preflight Security clearing so am walking to the scanner and the lady who asks about pocket stuff before she lets me go through stops me. She saw my Medina logo shirt.

"Do you know about bees?" she asks.

"Yup, sure do", says this confident bee dude.

"My husband wants to learn. We have fruit trees, but no fruit, a no-veggie garden. He says we need bees. I don't know anything at all about bees. Can you help?"

Meanwhile, a dozen folks are lined up behind me, getting a little anxious. But two, then four come close because they heard the question and want to know too.

"Where can I learn?" she asks. And two more crowd in and so do two TSA guys.

So I says "WWW.MedinaBeekeepers.com. Write it down, memorize it. Come to our meetings. Join the group. Take the course. Drink the Kool-Aid!" And seven of the nine people got out something to write on.

All because I had that shirt on. The lesson was simple. The result amazing. All you have to do is point the way.

•

Right about now a lot of people reading this magazine are considering expanding their operations for next season. After a few years in the business or hobby (probably more in the hobby size than already a business size), they can see how there could be enough financial security in this to put something in the bank every year – and get even bigger over a few years.

If this is you, here are some considerations to ponder as you are counting your silver coins. Ask yourself these questions, and have answers, and when you're done you'll have a better idea if being in bees is a good idea for you, or staying just the right size you are now is a better idea.

For starters, there shouldn't be a biology question anybody in the business could ask that you don't know the answer to. If you aren't sure, you aren't ready. You have to know the basics, and advanced basics, and already be enrolled in another advanced course to move on. Once a master beekeeper means that once you were a master beekeeper if you aren't getting ready for another class.

And there should be no doubt that you won't lose bees to pests. If you do, you've done something wrong or not done something else. It's that simple. *Varroa* loads at 1% or less. Nosema at less than a quarter million. And nothing else to give you problems.

You absolutely must have a business plan. There's three for starters. If you can't handle these it's not time yet. be patient. But....

When your hobby turns into a part time job, and the 'parts' keep getting bigger you need to decide... this, or what my life was before this. So, where are you now? What do you have? Bee stuff, sure, lots of it. Count it. But you have other stuff. A garage. Credit cards. Church obligations. A family. The regular stuff to do...fix the gutters, mow the lawn, shovel the snow, a day job, kids, pets, animals. And time...how much time do you have? Really. This is tough, and you have to be brutally honest with yourself. Your friends will believe anything you say. Your family some of what you say. Your banker...well, he'll have the last say.

OK, you know what you have and it seems reasonable to you, your family, your banker and a few close friends that moving along is a good idea. So where do you want to be? And by when? You want more bees? You want more income? You want to sell more stuff? You want to raise queens, make more honey, sell nucs, move to Idaho and spread out, quit your day job, get rich, get richer? Nobody but you can fill in those blanks. Again, be honest, brutally honest. Only you know your limitations – smart enough, strong enough, good enough, clever enough – are you all of those? You need to be.

Ok, what can you do? Can you raise queens? Make nucs, make honey where you are, make bees, open a store, make wax stuff, make equipment, do three or four of these, or all of some of these, or some of all of these? And even if you CAN do some of these, do you want to do some of these, or all of these? Is raising queens the beginning and end of getting bigger? It could be, but if you dilute it with making nucs, or trying to make equipment, or keeping fussy beekeepers happy in a store is also on the list, will you do a good job raising queens? I think I already know the answer to that. Do you?

There's lots more in this decision making process. Lots, and you already know a lot of it. Stay tuned for more – and get answers to the questions here before next month.

November. There's a Holiday this month. Gather the family, enjoy the time.

November Cover: *This photo of a honey bee on a New England Aster was submitted by Bill Mondjack, a frequent contributor to these pages.*

GLEANINGS

NOVEMBER 2014 • ALL THE NEWS THAT FITS

President Obama Honors Nation's Top Scientists and Innovators

President Obama today announced a new class of recipients of the National Medal of Science and National Medal of Technology and Innovation – our Nation's highest honors for achievement and leadership in advancing the fields of science and technology. The new awardees will receive their medals at a White House ceremony later this year.

"These scholars and innovators have expanded our understanding of the world, made invaluable contributions to their fields, and helped improve countless lives," President Obama said. "Our nation has been enriched by their achievements, and by all the scientists and technologists across America dedicated to discovery, inquiry, and invention."

The National Medal of Science was created by statute in 1959 and is administered for the White House by the National Science Foundation. Awarded annually, the Medal recognizes individuals who have made outstanding contributions to science and engineering. The President receives nominations from a committee of Presidential appointees based on their extraordinary knowledge in and contributions to chemistry, engineering, computing, mathematics, and the biological, behavioral/social, and physical sciences.

The National Medal of Technology and Innovation was created by statute in 1980 and is administered for the White House by the U.S. Department of Commerce's Patent and Trademark Office. The award recognizes those who have made lasting contributions to America's competitiveness and quality of life and helped strengthen the Nation's technological workforce. A distinguished independent committee representing the private and public sectors submits recommendations to the President.

The new recipients are listed below.

National Medal of Science

- Bruce Alberts, University of California, San Francisco, CA
- Robert Axelrod, University of Michigan, MI
- May Berenbaum, University of Illinois at Urbana-Champaign, IL
- Alexandre J. Chorin, University of California, Berkeley, CA
- Thomas Kailath, Stanford University, CA
- Judith P. Klinman, University of California, Berkeley, CA
- Jerrold Meinwald, Cornell University, NY
- Burton Richter, SLAC National Accelerator Laboratory and Stanford University, CA
- Sean C. Solomon, Columbia University, NY

And a posthumous Medal to:

- David Blackwell, University of California, Berkeley, CA

National Medal of Technology and Innovation

- Charles W. Bachman, MA
- Edith M. Flanigen, UOP, LLC., a Honeywell Company, NY
- Eli Harari, SanDisk Corporation, CA
- Thomas Fogarty, Fogarty Institute for Innovation, CA
- Arthur D. Levinson, Calico, CA
- Cherry A. Murray, Harvard University School of Engineering and Applied Sciences, MA
- Mary Shaw, Carnegie Mellon University, PA
- Douglas Lowy and John Schiller, National Cancer Institute, National Institutes of Health, MD

These Trees Are The Bees' Knees

Trees that produces 40 different types of stone fruit are being sold in the U.S. to raise money for the creation of a national heirloom fruit orchard.

The trees created by Sam Van Aken with Syracuse University's College of Visual and Performing Arts, begin singularly with one identity and are developed through a process of budding and grafting to accept, nurture and produce branches yielding different fruit.

Van Aken, learned in 2008 that an orchard at the NY State Ag Experiment Station was about to be shut down due to a lack of funding. The orchard grew a great number of heirloom, antique, and native varieties of stone fruit, some 150 to 200 years old.

He knew that to lose this orchard would render many of these rare varieties extinct and rather than let this happen, he bought the orchard.

Working with more than 250 varieties of stone fruit, Van Aken developed a timeline of when each of them blossom in relationship to each other and started grafting a few onto a working tree's root structure.

Once the working tree is about two years old, Van Aken uses a technique called chip grafting to add more varieties on as separate branches. This involves taking a sliver off a fruit tree that includes the bud, and inserting this into an incision in the working tree. It's then taped into place, and left to sit and heal over Winter. If all goes well, the branch is pruned back to encourage it to grow as a normal branch on the working tree. Each branch feeds from the same source.

It took about five years for Van Aken to complete the first Tree of 40 Fruit. He now has 16 of the trees and they have been planted in museums, community centres, and private art collections around the U.S.

As the tree matures, it will produce more than 40 different types of fruit, including peach, plum, apricot, nectarine and cherry.

"Working with art historian/critic/entrepreneur and real estate developer Chris Thompson and his partner Jed Troubh, we will be planting the first grove of Tree of 40 Fruit this Fall at Thompson Point in Portland, ME," he tells *Bee Culture*.

"Through this smart growth project, as buildings are added to the site, another Tree of 40 Fruit is added, eventually creating an orchard of trees integrated into the site."

Van Aken says sale of the trees will help support the creation of an heirloom fruit orchard that would serve as an archive of these native and antique stone fruit varieties.

"This orchard would be much like the original orchard at the New York Agricultural Experiment Station that was torn out and where I collected many of the varieties I use to create the trees," he says.

"Through the orchard, which would be open to growers, nurseries, and the general public and the field guide, I hope to reintroduce many of these forgotten varieties."

A Tree of 40 Fruit was selected as a symbol of the university's remembrance of the victims of Sept. 11, 2001, terrorist attack on the U.S.

"I've been told by people that have a tree that it provides the perfect amount and variety of fruit," he says. "So rather than having one variety that produces more than you know what to do with, it provides good amounts of each of the 40 varieties. Since all of these fruit ripen at different times, from July through October, you also aren't inundated."

Display Advertisers

The lion lay down with the lambs, but she murdered them first. Three of our five little darlings got disemboweled. The other two simply lay stone dead in the orchard, neck-bitten. A few minutes after I discovered the crime, the Internet installer arrived. He runs a few thousand sheep in his spare time. "Mountain lion," he said, with a measure of disgust. "They'll be back for those other two."

When I remarked on the seemingly senseless killing of the intact lambs, he speculated. "Maybe it was a kitten-training exercise." Maybe. Gentle reader, remember: these are cats. When I called the local wildlife officer, he said, "I haven't heard from you in awhile. You must have a bear."

"Much more interesting," I said.

Those black-faced Suffolk lambs kicked up their heels when my gal Marilyn took them their grain the night before. She walked back to the house alone in the dark.

The wildlife officer came for a look. "Mountain lion," he confirmed. "They go for the heart and lungs and liver. We'll write you a check." The Colorado Division of Parks and Wildlife reimburses farmers for game damage. Bear and lion are game. But not coyotes. If it's coyotes, you're on your own. "How about the two that didn't get torn up?" I asked. "Should I butcher 'em?"

He arched a brow. "Why not?" he said.

Later, we learned that the neighbor's chickens disappeared the night before. We – both our neighbor, and Marilyn and I – are responsible for protecting our animals from predators. Two years ago a bear killed one of our sheep. In these parts, you need a guard dog, or an attack-proof shelter. You can't just hope for the best. We keep learning the hard way.

Take care of your animals – this includes honey bees – or pests and predators will do the job for you.

There are two kinds of beekeepers – those who've suffered losses from *Varroa* mites, and those who will. You think mites are someone else's problem? You poor innocent! When it's October and your hives are riddled, when you see curly wing virus in your hives, go ahead and pull your head out of the sand. It's far too late. There, there. It's OK. Start with new bees in the Spring, and you'll be so much wiser.

Do you remove from the hive drone comb that mites love to breed in? Great! Do you have mite-resistant bee stock – Russian bees, or VSH-trait bees, or hygienic little darlings? I commend you. "Mite resistant" bees sometimes successfully resist *Varroa* infestation. I've had hives that I've not had to treat for several years running. I knew by testing them that it was safe to let them go untreated. These hives are the exception, not the rule.

Last Spring I made sure my mite numbers were low. Hives that tested more than one mite per 300-bee sample got Apiguard (thymol) or Mite-Away-Quick-Strip (formic acid) treatments. Then half of my colonies got hauled to very isolated apiaries in the Colorado high country. Feral bees don't overwinter up here. The rest of my bees stayed at lower elevations, where they had plenty of competition from feral and domesticated neighbor bees. By August, the contrast in mite loads was dramatic. The high country bees had generally low mite counts, as in one or two or three, occasionally more, mites per 300-bee sample, while the valley bees had some big numbers. Twenty-nine mites in August is a big number. Somebody wasn't paying attention!

This doesn't prove anything, and we're not comparing apples to apples here. The high country and the low country yards have different weather. But maybe the problem is not so much a small number of mites multiplying inside one hive over the course of a Summer, as it is bees picking up mites from other bees. How are you going to stop that?

One of those alpine yards is on Aspen Mountain at 9,000 feet. I work on the mountain, but I live an hour and a half away. I generally take the bus to work and check on the little darlings when I drive the truck to the top of the mountain in the morning. I keep spare honey supers right in the yard. This arrangement works fine, as long as I'm just collecting pollen and supering.

This Summer when an Aspen colony went queenless it got a little complicated. I wanted to re-queen with a nuc, but this meant I'd have to drive, rather than take the bus. Wait a minute! Maybe I could take a nuc on the bus. I work weekends when there's hardly anyone on the bus. The nuc could sit on the seat next to me. I'd strap the lid down tight. Who would know?

I did skin and dress those two throat-bitten but otherwise intact lambs. Marilyn encouraged me, because she thinks we should live off the land. They'd been dead less than 12 hours. They ought to be fine.

That's what I thought until I took my first bite. I like lamb, but this reeked. You live, and you learn. The only one who's going to eat this is Marilyn's blue heeler dog Pepper. He's OK with it. He thinks he's in Heaven.

Ed **Colby**

Midnight Snack