TRUTH IN HONEY LABELING

ROOT PUBLICATIONS

Aug 2014

Catch The Buzz™

Bee Culture®

The Magazine Of American Beekeeping

www.BeeCulture.com

Queen Quality –
Just Like It Used To Be

Hive Tool Care

Overwintering Nucs

Build A Top-Bar

ROOT PUBLICATIONS $4.99

08

7 35048 28163 9

Features . . . Bee Culture . . . The Rest

Buying A Deep Instead

Buy a deep not a package or nuc if you can.

Over the past three years I have sold between 20-30 deeps each year for people to get started in beekeeping. Once the hives come out of apple orchards they are strong. A great way for beginners to get started is to begin with lots of bees on drawn frames. I tell them to locate the hive properly the night they pick up the bees and add a deep on top. They leave with a deep, nine frames, a migratory cover, and a bottom board. They'll get honey the first year unlike with nucs and packages that must first build up. I check days before to insure there is a good brood pattern. It costs more of course but the people that start with a strong deep will likely have success in their critical first year of beekeeping.

Rick Green
Ballston Lake, NY

Honey Ideas

I saw a past copy of your magazine at a used bookstore in Dallas, Texas.

Very Interesting. Do some beekeepers make "blended" honey – from different flowers and areas?

You should feature "flavored" honey recipes.

I buy honey in the small bear-shaped plastic squeeze bottles from the store, and add various flavorings that really enhance the taste to a whole new dimension – for example, powdered spice-herb blends (cinnamon, clove, thyme, sage, ginger, powdered onion, powdered bourbon, orange peel). A few drops of vanilla or orange extract works well.

A real treat is to add one or two spoonfuls of Angostura Bitters to the honey and stir well.

Glen Spielbauer
Dallas, TX

Response From BIP

We (the Bee Informed Partnership) would like to post a short reply to Mr. Tom Theobald's letter in the most recent issue of *Bee Culture*.

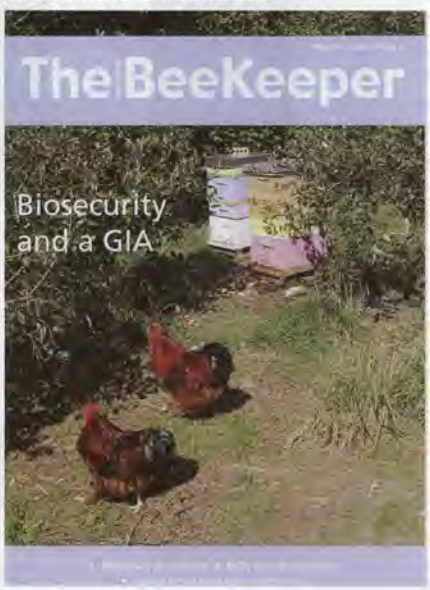
Dear Tom

We refer to your letter titled "BIP survey" in which you imply the numbers were low because we do not consider splits and other increases that may die throughout the season. This is untrue. We have always taken into account splits and increases with regard to losses in our surveys. You can find the nitty gritty details on how we calculate this at any of the previous published articles on the losses at our website: **beeinformed.org/results-categories/winter-loss/**

Karen Rennich
Bee Informed Partnership
Project Manager
College Park, MD

Chickens On The Cover

The cover of the May issue of *The New Zealand Beekeeper*, the official journal of the New Zealand Beekeeper's Association, talks about chickens and bees. The photographer, Marina Steinke, remarks, "chooks don't seem to eat bees – unlike guinea fowl, who love them." *Bee Culture* will probably never get chickens on the cover, but we know that lots of beekeepers don't mind them at all.



Blue & Purple Honey

Last Summer there was an article in *Bee Culture* about blue honey. They seemed to be unable to find its source. The following might help.

A few years ago I was helping a beginner beekeeper. We were short two deep frames for the brood box but had some shallow frames with drawn comb. I explained that we could use them until they got some deeps or else they may even leave them permanently. The bees would build comb on the bottoms to match the deeps. They could cut off the comb on the bottom if they wanted to use them elsewhere.

Later when I came by to help (I believe it was in August), we checked things out. When I lifted up one of the shallow frames I saw comb on the bottom as expected. What I didn't expect was the purple honey in the comb when held up to the light. The other shallow was the same. I'd had bees since 1958 and I had never before seen purple honey. I couldn't think of anything blooming at the time that could explain it. In the days following I searched for the source of the purple honey. Few things were blooming at the time. Kudzu was one of the few and there were large patches (acres) within flying range of the bees. Some were within 100 feet. I noticed that some bees were going in under the thick growth of leaves. The heavy leaf cover hides most of the flowers, but there were flowers underneath.

Kudzu has good smelling flowers similar to Wisteria but not as showy because they are mostly hidden by the leaves.

Years earlier a couple of beekeepers in the same area had asked me what the bees made blue honey from. I couldn't think of anything at the time. I never had bees in that area.

It looks like Kudzu is a likely source for blue or purple honey.

Those who wrote the article about blue honey may be able to confirm or rule out whether Kudzu is the source if they will do some observing and testing when Kudzu is in bloom.

We cut the honey off the bottom of the frames and put them back in the brood box. It was thick and had a good flavor.

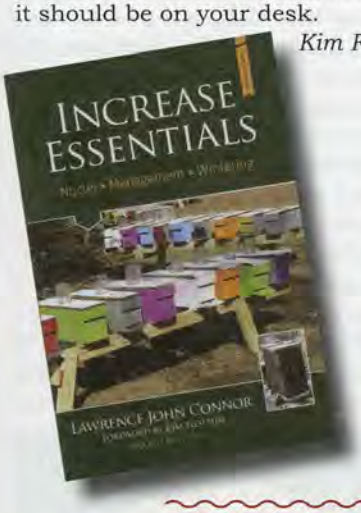
Rufus Payne
Appalachia, VA

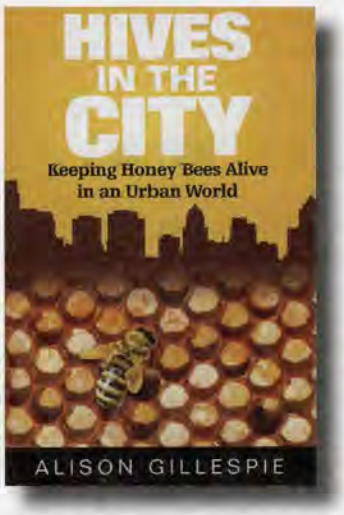
Lots That Is New For You –

Increase Essentials, by Lawrence John Connor. Second Edition. ISBN 9781878075352. Published by WicWas Press, LLC, Kalamazoo, MI. www.wicwas.com. 176 pages, 6" x 9", color throughout. $25.

This second edition has introduced many new aspects of managing your bees using nuclei colonies, which has come to be a sure way to deal with replacing colonies, expanding your operation and staying in business. Dr. Connor combines information from the first edition with new science and input from experienced beekeepers, himself included, and other recent developments, adding more methods, new techniques and safe and sane methods of sustaining bees. It has come to be that the beekeeping industry has made a wide-spread shift to increase nuc production as a means of producing new colonies in the face of ongoing losses from not enough good food, the onslaught of pesticides, and the *Varroa*-virus plague. This one shouldn't be on your shelf, it should be on your desk.

Kim Flottum





Hives In The City, by Alison Gillespie. Published by Croydon Hill. ISBN 9780996025904. 317 pages, 5.5" x 8.5", no photos. $14.00 on Amazon.

This is not about keeping bees in the city. It is about the people who keep bees in the city, and why they do it. It is a light, almost whimsical story, looking at the craft in DC, New York, Philly, Baltimore, a chat with Jeff Pettis, the MD State Fair and watching a bee removal. This is a book a beekeeper should give to someone who wants, or better, needs to know about keeping bees in a city. I'm thinking your local government folks who make the rules, or a good neighbor that you want to stay on the good side of. It's an easy read and a good gift. *Kim Flottum*

The Bee-Kind Garden: Apian wisdom for your garden, by David Squire. Published by Green Books. ISBN 9780857840240. 5" x 8", 95 pgs. Black and white line art throughout. $15.95

I've found that anytime an author or publisher uses the word Apian in the title of a book, the book isn't about keeping bees, but rather about beekeeping. There is a distinction, that being the first provides information on keeping bees – management, technique, equipment, timing, and the rest. But those books about beekeeping share information on bees and beekeepers. Handy little factoids are what you get that are fun to know if you don't keep bees but are interested in the art and science of the craft. Such is the nature of this book, much like the Hives In The City book reviewed here. This book has lots of that kind of information, but focuses more on the plants bees like that one can grow in the garden. Early chapters are Getting to know bees, Attracting bees, Where do bees live and Equipment. Then there's the too-often quoted myths on tanging, honey moons, telling the bees and the rest, information on making mead, and the proverbs and limericks that abound. This is a good gift book for someone interested in bees, but not for a beekeeper.

Kim Flottum

Old Manhattan Has Some Farms, by Susan Lendroth. Published by Charlesbridge Publishing. ISBN 9781580895729, $16.95. 32 pages, hard cover, all color.

A clever new spin on "Old MacDonald," this book explores the popular trend of urban farming. From rooftop farms and gardens on Manhattan high rises to neighborhood gardens in empty lots in Atlanta to hydroponic gardens in Seattle, growing food locally has become an important part of city-dwelling life.

Set to the popular children's tune, this book is filled with absolutely beautiful illustrations. The vibrant colors and simple verse make it an easy, enjoyable book for you and your children to read together. It has gardens, it has worms, rooftops, herbs, beehives and even a picture of a chicken.

You can also download a free recording of the song created by popular children's performer Caspar Babypants. *Kathy Summers*

Honey and Pollination Expense and Revenue Spreadsheet South Carolina Certified Beekeeper and Side-Liner

Dave MacFawn's Business Plan Spreadsheet for a Bee business is excellent for helping decide where a business currently is and most importantly where the business can go. Real property, equipment owned, number of hives operating are included. The spreadsheet calculates a profit/loss statement for the owner to review and is useful for hobby, sideline or commercial operators. Pollination activities can also be reviewed. For the sideliner trying to decide if buying an expensive extractor is worth the cost incurred the spreadsheet can calculate a breakeven point to aid in seeing the cost benefit of the purchase. The spreadsheet has a similar breakeven feature to help the commercial to backyard beekeeper determine the most cost effective way to manage all aspects of 1 – thousands of hives. The key value of this spreadsheet program is seeing the cost benefits of future actions under consideration before making costly investments.

Some experience in reading spreadsheets helps, but Mr. MacFawn provides excellent customer service. The program comes with comprehensive written instructions.

The Beekeeper's Business Plan Spreadsheet program can be purchased directly from Mr. MacFawn by contacting him at dmacfawn@aol.com.

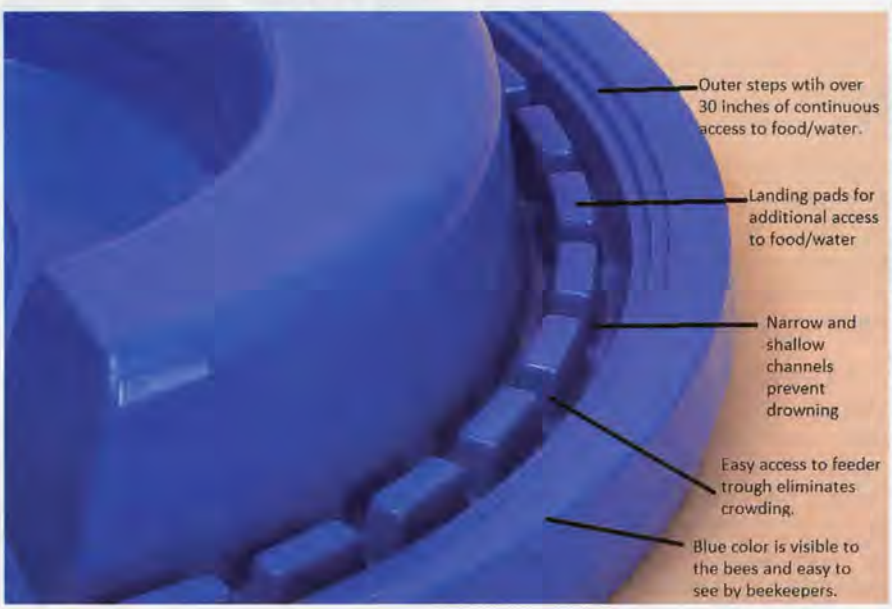
Patrick O'Connor

Sample columns for calculating honey sales profits

cost/jar QT	total Qt jars $ all sold as qts	# 1lb jars used based on product mix	total # 1-lb jars quantity if all honey sold as 1-lb	cost/jar 1-lb Queenline glass	total 1-lb jars $ all sold as 1-lb	# pails used based on product mix	total # pails quantity if all sold as 60#

Bee Smart Ultimate Hive Feeder

This is one smart bit of work. you can see all the advantages already. Easy to use, easy to fill, easy on the bees, three of them fit in a five-gallon pail. They fit in a deep or medium, eight-frame or 10-frame and they bounce when you drop one. Say goodbye to those mason jars and broken glass. The base, which is separate from the tank can stay right in the hive, right on top of the inner cover as long as you are feeding. The base has guards so bees can't get to the spring loaded valve. Get yours at your local bee supply dealer, or most major supply dealers.



Beautiful Beehives

When Nansy Mathews was traveling in Europe she visited the Luxembourg Gardens Bee School in Paris. Back home, she saw her hives with new eyes - compared to the aesthetically pleasing hexagonal copper hive covers she had seen in France, her traditional utilitarian hive covers seemed drab and unappealing.

After searching the market and finding nothing suitable, she turned to her old friend Bart. Retired from a career as metals conservator for the National Park Service, he now restores WWII-era airplanes in his WV shop. Bart, also a beekeeper, was enthusiastic, and crafted a hive cover that is esthetically pleasing, enriching its setting.

Nansy realized that other urban and suburban beekeepers might also desire beautiful beehives and she has partnered with Bart to make these hand-made covers available.

Beautiful Beehive covers are handmade to order. Our hexagonal copper covers are made of roofing-weight copper and have brass finials. They fit over standard eight-frame and 10-frame telescoping hive covers. Our covers are light - weighing less than a super of honey - yet they are sufficiently heavy to withstand being blown off by all but the strongest winds.

Beekeepers who own our covers have found that they help keep the hive cool and dry.

$650. Shipping and handling extra. Find out more at **www.beautifulbeehive.com**.

If you live within a morning's drive from Martinsburg, WV, and you order more than one cover, we will deliver them to you.

The Myths of Safe Pesticides. By Andre Leu. Published by Acres USA. ISBN 978-1-60173-084-8. 168 pgs. 6" x 9". B&W photos and line art. Due out September 2014.

The author has street, or maybe I should say field cred for sure. He's the President of IFOAM, the International Federation of Organic Agricultural Movements. He lives in Australia, and became interested in this project when his government declared that all agricultural products had to be dipped in a pesticide to stop the spread of a new pest. Of course this is not in the best interests of an organic farmer, and Mr. Leu began looking at what's what in the current pesticide world. What he found will not be pleasant reading.

Basically the book looks at the myths of safe pesticides – such as: Rigorously Tested, Very small amounts, breakdown products, reliable regulatory authority and pesticides are essential to farming. He cites study after study showing that many of the claims made about these compounds are either not supported by good research, or have no research at all to back them up. That is the premise of this book...a fundamental lack of good research exists, yet these compounds are used every day.

There are two aspects of this book that are even more noteworthy than the rest. The first is that, as

we have lately found a serious problem for bees, there is essentially no sound research at all when it comes to tank mixes. None. Zero. Zip. Yet the very few studies that have been done have shown that these mixes are often extremely more toxic than any of the individual compounds alone. Our almond orchard experiment this spring supports that in spades.

The second point is that when followed carefully, organic production methods equal, and often exceed those of comparable conventional ag practices. He produces some interesting information, and his arguments are sound. You read this book, you're going to quit eating anything you don't grow yourself.

The Hive Side Picture Guide is designed to assist new beekeepers with hive inspections. Carefully selected, high-resolution images help beekeepers identify what they are observing in their apiaries. This field guide measures 3.3 inches by 2.1 inches and contains 14 pages addressing basic honey bee biology and diseases.

The Hive Side Guide is meant to be highly portable to assist both new beekeepers, and educators during hive inspections. This guidebook is a beautifully prepared photographic introduction to the world inside the hive. Perfect for experienced beekeepers sharing information during classroom presentations and for new beekeepers during self-guided hive inspections.

The retail price is $6.99, with wholesale pricing $5.00 each, minimum order 20.

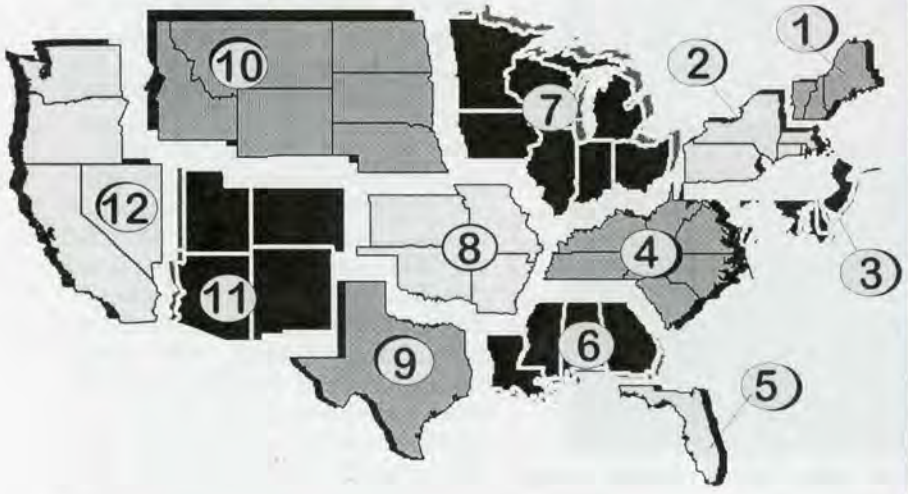
For more information about ordering contact Joe Zgurzynski, 412.225.0930 or **Joe@countryBarnFarm.com**. Or visit **www.TheHiveside.com**.

Kencove Farm Fence Supplies, a leading manufacturer and distributor of agricultural fencing supplies, announces that it has acquired Forester Industries, LLC.

Forester Industries, LLC is the exclusive manufacturer of PasturePro® fence products. Using a patented process, Forester Industries creates lighter, stronger wood-plastic composite posts for electric fence systems. Manufactured in Nevada, Mo., PasturePro® posts contain no fiberglass or PVC and are approved for use in Certified Organic food production and handling. Since 2005, the PasturePro® post has been selected by industry professionals as a permanent fence post solution over metal t-posts and fiberglass rods.

Kencove Farm Fence Supplies is a nationwide distributor of high-tensile, electric, woven wire, and horse fence systems, along with rotational grazing supplies and hydraulic post drivers. Since 1980, the company has committed itself to serving farmers and fence builders with fast, friendly service and expert advice. Kencove operates from its headquarters in Blairsville, Pa. and warehouses in Earl Park, In., Peculiar, Mo., and Nevada, Mo. Please visit **www.kencove.com** or call 1-800-KENCOVE.

AUGUST – REGIONAL HONEY PRICE REPORT



	% Important			% Less Important		
	2012	2013	2014	2012	2013	2014
Price	80	59	53	20	41	47
Label Design	64	46	49	36	54	51
Name on Label	71	67	64	29	33	36
Local Honey	96	61	77	4	39	23
Variety of Honey/label	27	32	19	62	78	81
Second Label	17	5	8	83	95	92
Location I sell	61	57	58	39	43	42
Time of Year	36	17	28	64	83	72
Glass Container	52	35	31	48	65	69
Plastic Container	25	19	17	75	81	83
12 oz. size	55	32	35	45	68	65
1 lb. size	74	56	60	26	44	40
2 lb. size	65	35	55	35	65	45
5 lb. size	43	38	42	57	62	58
Quart jar	57	46	45	43	54	55
Pint Jar	52	42	40	48	58	60
Specialty Jar	30	10	13	70	90	87

What's important?

We asked our reporters again this Summer what's important when it comes to selling honey. We tried to cover all the bases from when, where, how, how much, and more. See the topics, and then, see what they think is important, and what isn't. What's most important? Again this year, having LOCAL HONEY on the label is tops, by a pretty big margin. Close behind in value is having your name on the label – so folks know it's local, and so they can find you again. It's hard to beat repeat business because you don't have to convince them your honey is the best they can find.

Interestingly, price continues its decline in its importance as a selling tool. With prices climbing as rapidly as they have been over the past year, it's hard to comparison shop. Mostly, for consumers, if they can find it, and they want it, the price isn't a factor.

The one pound jar continues to dominate sales, but the other sizes are becoming increasingly more popular, with the exception of quarts and pints, whose popularity is slowly eroding.

And second labels still aren't on most folks' list of being important. And this still continues to surprise me. Variety, season harvested, raw, a second local label – all tell more about what's inside. And a label on top should be required when selling on a table. But it's not.

Plastic or glass? Neither, it seems is critical anymore. It used to be glass was king, and plastic a cheap second cousin. Now, it's the market – heavy or light, expensive or less expensive. Easy to use, or a pain in the jar.

We have three years of good data now – note the trends, the changes, and the things that haven't changed. That will tell you what's important, and what's not.

	REPORTING REGIONS												SUMMARY			History	
	1	2	3	4	5	6	7	8	9	10	11	12				Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS													Range	Avg.	$/lb		
55 Gal. Drum, Light	2.05	2.45	2.05	2.00	2.35	2.60	2.55	1.20	1.80	2.25	2.29	2.35	1.20-2.60	2.21	2.21	2.21	2.11
55 Gal. Drum, Ambr	1.98	2.25	1.98	1.99	2.20	2.20	2.44	1.20	1.60	1.98	2.14	2.25	1.20-2.50	2.11	2.11	2.05	1.91
60# Light (retail)	217.00	195.00	188.00	188.00	180.00	181.67	190.00	180.00	160.00	171.00	179.60	235.00	136.00-285.00	191.61	3.19	192.11	169.73
60# Amber (retail)	224.67	195.00	188.00	184.00	180.00	195.00	184.67	170.00	150.00	199.40	171.20	235.00	130.00-285.00	191.31	3.18	182.50	173.84
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																	
1/2# 24/case	90.69	76.19	74.40	71.35	75.10	60.00	61.10	75.10	75.10	51.84	85.20	100.00	45.60-104.40	75.21	6.27	77.62	70.48
1# 24/case	127.02	110.16	123.60	96.30	108.00	117.33	96.00	104.00	118.86	106.32	112.50	123.00	79.20-172.80	111.72	4.66	111.87	104.29
2# 12/case	116.06	98.75	115.20	87.67	99.00	93.00	85.98	108.00	103.06	97.44	102.00	98.00	70.00-144.00	99.13	4.13	99.64	91.29
12.oz. Plas. 24/cs	118.65	96.04	76.80	79.87	79.20	79.20	73.68	91.60	92.41	74.40	105.00	93.00	48.00-144.00	88.83	4.89	86.82	80.83
5# 6/case	146.00	100.84	108.00	94.68	126.00	120.00	100.00	111.00	120.63	102.30	115.20	120.00	83.10-175.00	112.20	3.94	115.79	104.68
Quarts 12/case	160.00	203.22	185.00	119.83	147.78	106.80	137.28	122.00	147.78	125.64	133.80	149.00	68.00-252.00	135.57	7.53	133.58	121.52
Pints 12/case	88.30	106.48	102.00	81.60	81.84	64.20	90.43	64.80	66.00	81.84	87.40	94.00	36.00-126.00	82.69	8.16	83.85	78.26
RETAIL SHELF PRICES																	
1/2#	5.15	4.75	3.92	4.07	4.39	3.33	3.44	2.19	4.39	2.96	4.48	6.00	2.12-7.25	4.09	8.18	4.06	3.87
12 oz. Plastic	5.83	5.63	4.00	4.56	5.00	4.58	4.24	5.08	5.53	4.44	5.46	7.33	3.00-8.99	5.07	6.75	4.88	4.75
1# Glass/Plastic	7.54	6.90	6.94	6.18	7.00	6.25	5.19	6.13	6.48	6.70	5.75	7.87	3.00-10.00	6.47	6.47	6.25	6.16
2# Glass/Plastic	13.55	10.79	13.38	10.32	13.00	9.60	9.39	10.45	11.37	9.08	8.49	15.00	5.90-18.00	10.80	5.40	10.74	10.35
Pint	12.25	11.98	11.00	8.51	9.31	7.24	10.42	7.05	6.50	9.00	8.50	11.80	4.50-14.50	9.12	6.08	8.57	7.97
Quart	16.50	18.82	17.00	14.81	17.11	12.58	14.63	15.41	17.11	16.13	16.23	17.55	7.50-30.00	15.47	5.16	14.76	13.28
5# Glass/Plastic	28.40	21.13	28.75	22.50	24.67	33.00	22.52	25.25	24.67	23.89	20.03	25.00	15.00-36.00	23.83	4.77	23.31	22.31
1# Cream	9.38	7.58	11.00	7.06	8.24	8.00	7.01	5.99	8.24	7.52	8.49	10.00	4.90-12.00	8.03	8.03	7.90	7.54
1# Cut Comb	9.83	10.00	11.00	8.58	9.45	7.67	9.13	8.00	9.45	10.00	10.50	12.00	5.00-14.00	9.41	9.41	8.90	8.44
Ross Round	8.25	6.98	7.83	6.50	7.83	7.00	8.97	9.00	7.83	7.83	8.50	7.83	3.50-12.00	7.91	10.54	8.64	8.49
Wholesale Wax (Lt)	7.50	7.50	7.00	4.44	3.20	8.00	5.40	5.67	6.12	6.00	3.99	5.08	3.00-10.00	5.73	-	5.45	5.37
Wholesale Wax (Dk)	6.25	5.47	7.00	4.24	3.25	6.00	4.76	5.75	4.95	4.95	2.80	4.00	2.00-8.00	4.90	-	4.60	4.93
Pollination Fee/Col.	99.25	73.00	115.00	66.80	70.00	96.00	67.00	90.00	118.25	80.00	83.00	165.00	35.00-260.00	89.00	-	82.73	80.46

INNER COVER

Here's a saying I made up. Take care of the bees that take care of the bees that go into Winter. That means, to me anyway, early August is the time to take care of those bees. I use the analogy that if your grandparents are sick or damaged, they won't be able to take care of your parents, who in turn will be damaged or poorly cared for so they won't be able to take care of you. And it's you who has to last all the way until March. Damaged grandparents, damaged parents and then damaged you. What happens is the *Varroa*/virus complex that challenges immune systems, opening up the opportunity for viral damage, Nosema or pesticide or nutrition issues, and bees simply live shorter and shorter lives. You run out by March.

But to see why, let's do the math. For the grandparents generation an egg laid on August 10 is an egg for three days, larva for six, pupa for 12 and is a nurse bee for about five days after that. 26 days total. If she takes care of the same larvae cohort for all five days of her nursing career, she'll get on average five of the six larval days to help out the next generation, that would be the parents. Your parents then would have the same overlap, and the total time from grandparent's egg to you as an adult is 56 or so days – essentially October 5. You can play with the numbers if you want, but the time span is from now to early October. If your mite load hasn't been addressed (presuming it was at a treatable level way back in July), the bees alive in early October will most likely be dead before New Year's Day.

So really, you need to do your *Varroa* control *BEFORE* your grandparents are even eggs. So taking care of them, at least for some of us, begins way back in July. To take care of the bees that take care of the bees that go into Winter – July, last month – is when to start. It's late July right now. Get crackin', your life depends on it.

•

Of course mites aren't the only Winter preparation you need to be doing now.

But it's August! It's hot! I've got to extract! School starts next week! I can't start now there's a flow on and I want the honey! I can't start now there's a flow on and the bees need the honey! Do you know how much that stuff costs?

If you have been around even a few years in this business you'll recall Dr. Hachiro Shimanuki, the now retired USDA Honey Bee Research Leader at Beltsville. (He is, by the way, enjoying his retirement in Florida now way too much I think). He has a saying – I don't know if he made it up or not, but it's pretty good. If you produce the right number of bees that are of the right age and in the right condition, and are in the right place at the right time, you will be successful. This is Shim's Rule Of Rights.

This Grandparents thing is exactly what he was talking about – especially that part about the right condition – healthy, unchallenged by Nosema, mites, virus, disease and with enough good food stored in the right place in the hive for the next several months. It's a simple concept. Really. It's not so simple to make happen, especially if you have more than a backyard full of bees. But like your pets, your livestock, you family – you have a duty to care for these animals responsibly.

So. The right number of bees. How many bees is enough bees to go into Winter? I suppose you can do a count, but here's what I shoot for and because I use all mediums in eight frame boxes, and I overwinter in four boxes, you'll have to convert to whatever size you want. In early October I want all honey in the top box. All frames, all honey. I want bees and brood in the middle three frames in the next down box, with honey on the sides. There has to be enough bees on those frames to reach over the top, and around the sides of all eight frames. They have to be able to reach all the honey in that third box without breaking into smaller bunches and moving the cluster.

In the next box down I want maybe two frames of honey on either edge and the rest mostly brood and covered in bees. Enough bees to go top to bottom and edge to edge of the whole box. In the bottom there will be some brood, and some bees, about like the third box up. For me, that's enough bees. To get there, I have to start measuring in August. I have to make sure the mites are down, that the other pests are under control, and that there is enough room to make all this happen – not too much honey so there's no room for brood, and not too much brood so there's no room for honey. The right amount of bees.

•

I'm sure you've heard about the 80,000 or more colonies that were damaged and killed in the almond orchards this year right at the end of bloom. The weapons used were tank mixes of fungicides and insect growth regulators applied during bloom during the day when bees were actively foraging. The chemicals, when used by themselves, have a history of causing little damage, but even that was being questioned. However, current labels said it was OK to spray when bees were visiting the blossoms. What the label didn't discuss however, in fact

What's Right What's Not.

what they made no mention of at all, is what happens when these individual chemicals were mixed in a tank with an additional adjuvant added to enhance the effectiveness of the chemicals applied. Since it's not on the label saying Don't, applicators Can. And did. And 80,000+ colonies collapsed. 80,000+. I don't know how many beekeepers went down with those bees but you don't lose thousands of colonies in your operation, and some did, and not be both financially and emotionally affected.

It did get the attention of the EPA, the folks responsible for what is, and isn't on a pesticide label however. They came to California and listened to the beekeepers that were part of this. And they said, essentially, wow, that's a real shame, and we need to get those labels up to speed, and it isn't going to happen anytime soon because we need good data to make those changes.

I can understand the caution. I can't comprehend the loss. But what can you do? In the days afterwards, when the carnage was still being measured as beekeepers got back home, lots of people were wondering the same. What can we do? Some ask...can we put it in our contract, can we say NO SPRAY, LEGAL OR NOT! But if it's legal, they can. Unless. Yes, there's an unless . . .

Here's what one cautious beekeeper has in his contract. And it works. At least it works for him. After all, a contract is a contract, right? Here's what he says:

My pollination contract says "The grower is responsible for the safety and security of the hives from time of hive placement until hive removal. This includes but is not limited to theft, vandalism and pesticide spray damage. "

Notice the contract does not say "when applied according to label directions" or any such thing...

I like the way he put it...both safety and security. Essentially, you want my bees, you take care of my bees, and we'll both be OK. So far, it's been working for him. A contract is a contract. He didn't get sprayed this Spring. You might want to add this to your pollination contract, no matter the crop your bees are in.

•

Speaking of labels, how's that definition of honey coming along? We still need one because you can't say what something isn't until you can say what it is. But so far as I know we still don't have one. FDA came up with a hardly-at-all revised suggestion a bit ago, that didn't change much of anything. The points they made are listed here:

1. What is honey?

Reference materials in the public domain define honey as "a thick, sweet, syrupy substance that bees make as food from the nectar of flowers and store in honeycombs." 2,3 FDA has concluded that this definition accurately reflects the common usage of the term "honey."

2. How shall I name my honey or honey product?

If a food contains only honey, the food must be named "honey," which is its common or usual name. The common or usual name may also include the source of the honey, such as "Clover Honey," on the label. (See Q&A 3 below.) Because honey is a single ingredient food, you do not need to include an ingredient statement on the label. However, you must include all other mandatory information (e.g., net weight).

3. Do I have to declare the floral source of honey?

No. You do not have to declare the floral source of honey on the label. However, you may label the honey with the name of the plant or blossom, if:

a. The particular plant or blossom is the chief floral source of the honey, such as "Orange Blossom Honey" or "Clover Honey" and

b. You, or the honey producer, can show that the plant or blossom designated on the label is the chief floral source of the honey. (See FDA Compliance Policy Guide, section 515.300. That Compliance Policy Guide was written in 1980, 34 years ago).

•

So my question, actually I have lots of questions, starting with how much is CHIEF, anyway? More than half? If there are five different floral sources for the honey in that bottle, the CHIEF source could be as little as 21%, right? And if you harvest only once a year, the CHIEF source could be as little as 5 – 10%, right? But The National Honey Board has a definition that basically says more than half, which is a good measure to use. But when you have 49% bottom-of-the-tank wildflower and 51% orange blossom, can you tell it's orange? Neither can I. Meanwhile, the international CODEX group says the PREDOMINANT floral source, the one with the greatest percent, which supports that 21% figure. So who's right? I dunno...

And then there's the "is honey, honey, if it doesn't have pollen in it"? The FDA doesn't say anything about pollen. So maybe they mean honey shouldn't have pollen? They call it a single ingredient food after all. They did say it's made from the nectar of flowers, and pollen sure as heck isn't nectar, is it? That question seems obvious to me but apparently not to a lot of folks that feel different and are willing to go to court to defend the position that honey isn't honey if it doesn't have pollen. It can't be both ways, I think.

This all came about when that guy in Washington found out that Chinese packers were ultrafiltering their product to remove not only some medicinal contaminants, but also all the pollen so when people like Vaughn Bryant looked at it there wasn't any pollen to identify. No pollen, no identity. Then that writer started looking at grocery store honey and found out that commercial packers actually filtered pollen out of honey, too. This got his shorts in a knot then and he figured all filtered honey must be illegal, and by implication adulterated with who knows what, was probably Chinese in origin and guilty of avoiding the tarriff the Dept. Of Commerce had on Chinese honey. That some of his accusations were right and some wrong really confused the issue, but in the end it came to be that honey wasn't honey if it didn't have pollen in it. You still see headlines shouting the same thing.

That that definition hasn't held up in court several times seems to make no difference to people. Go fig-

2015 CALENDAR CONTEST. BEES AND WATER. DON'T FORGET. GET YOUR CELLPHONE, YOUR CAMERA AND GET THOSE BEES AND WATER PHOTOS HERE BY OCTOBER 1, 2014

Continued on Page 92

It's Summers Time –

So how's your Summer going? Our's is going pretty well so far. We're enjoying the heat and the sun.

This year I stepped away from a couple of big responsibilities that normally take up a big chunk of July and August. That has given me more time to do more around the yard. I've been working hard, but still can't seem to keep up. But our "garden in pots" is doing very well – even the corn on the deck is doing well. My 92-year old neighbor who grows acres of vegetables every year even seemed impressed with it.

We now have a broody chicken. The bossy Rhode Island Red that I told you about last month, has become broody. So maybe the bossiness was a prelude to the broodiness.

When I discovered this I got out the book. I had read all of this before, but I think things don't really sink in until it actually happens. If I'm understanding it correctly she has the desire to hatch some eggs – there aren't any eggs to hatch because we don't have a rooster. That fact does not lessen her desire. From what I've been reading this can be as dramatic as her starving to death if just left alone.

An easy technique to try, which is the one I'm going for, is to keep removing her from the box and chasing her out of the coop. So any time I'm in there and see her in the box, I shove her out the door. When she gets out into the yard she is eating and drinking so hopefully we'll break the cycle eventually and she'll be OK.

Have you ever heard a chicken growl? She has never pecked me when I reach in to get the eggs she's sitting on, or when I'm gently removing her from the nesting box – but she does make this very distinct growling noise.

Kim and I were checking hives a couple of weeks ago and came across a frame full on both sides of drone brood. Not sure what was going on, the hive is healthy, the queen is laying, but a frame full of drones. So, naturally we took it for the chickens. This is as much fun to watch as it is for the chickens to eat. They just go crazy.

We started a small water garden this week. When we first got the chicks we bought this very large Rubbermaid tub to put them in and it worked really well. Well for two and a half years now it's been sitting empty, with this thought floating around in my head of making it into a small water garden. We have several friends that have really nice, somewhat complicated water gardens and I knew we didn't have the resources or time right now to do something like that. So the thought just kept floating around in the back of my head. Well at our last beekeepers' meeting a friend brought in some water lettuce and water hyacinth (I think I've got that right). So there were the plants – free plants – I had no more excuses. So we took them home and got them in the water. We bought a few more from the garden center and it's doing very well. So thank you, Mike for giving me that little nudge. This weekend we bought 10 gold fish and put them in there. We'll see what happens.

One of the things that has been going on this Summer here at *Bee Culture* is the development of our brand new website. We've been working with some wonderful people that are designing and creating our new page. We are now in the training phase. They are teaching us how to manage and maintain and update the website all by ourselves.

Change is hard and this has been a challenge for all of us, but I think we're starting to get a handle on things.

We're hoping for a launch date of around August 1. I think you'll really like our new page. We'll keep you posted on our progress.

Don't forget about our 2015 *Bee Culture* Calendar contest. The them this year is 'Bees and Water'. If one of your photos is chosen you get a free one-year subscription to *Bee Culture*. We've gotten a bunch already, but you still have some time and Summer is the right time to get photos of bees and water. The deadline is October 1. Send your photos via email to **kim@beeculture.com** or send us a CD. Please make sure however you send them that we have your complete mailing address, or your photos will be disqualified.

Another event that is happening at *Bee Culture* takes place in October. The "Russians" are coming to Medina, Ohio. *Bee Culture* is holding a two day seminar with Russian Bee Breeders from all over. Take a look at page 24 to see the list of speakers. We don't have the exact schedule mapped out yet, but as soon as we do we'll get that published.

October is a great time to visit Ohio, so maybe take a couple of extra days and enjoy the sites. We have great Fall foliage in October. We have the Rock N Roll Hall of Fame and the Football Hall of Fame close by, both less than an hour from Medina. Hope to see you there!

Don't forget to check out **www.BeeCulture.com** right around August 1 for our brand new website.

Kathy Summers

A Closer Look

QUEEN QUALITY

Clarence **Collison**

A beekeeper is unable to determine the quality of the queen by just looking at her.

In recent years there has been a lot of concern in regards to the quality of queens available to beekeepers. High early supersedure rates are the main problem associated with these problem queens. A queen's quality is not only a function of her own reproductive potential but also how well she is mated. Numerous factors can affect queen quality: genotype, nutrition, rearing methods, rearing season, age of larvae at grafting time and the number of larvae grafted per cell builder colony.

A beekeeper is unable to determine the quality of the queen by just looking at her. Since a queen cannot be judged by her appearance, she has to be evaluated on the basis of colony characteristics and her brood pattern. Queens normally begin laying near the center of the comb and works her way outward in elliptical patterns. Good queens lay a solid brood pattern. Poorer queens scatter their brood.

There are many measures that can serve as indicators for queen reproductive "quality." The most intuitive perhaps are standard morphological measures of adult queens, such as wet or dry weight, thorax width, head width and wing lengths (Weaver 1957; Fischer and Maul 1991; Dedej et al. 1998; Hatch et al. 1999; Gilley et al. 2003; Dodologlu et al. 2004; Kahya et al. 2008), several of which are significantly correlated with queen reproductive success or fecundity (Eckert 1934; Avetisyan 1961; Woyke 1971; Nelson and Gary 1983). The important glycolipoprotein vitellogenin is also a potential indicator of fecundity since it is the yolk precursor associated with egg production (Engels 1974; Tanaka and Hartfelder 2004).

Nelson and Gary (1983) found a direct relationship between the weight of queens and honey production. In addition to heading colonies that produced more honey, it was found that heavier queens also produced more brood. Queen attractiveness to workers was also measured but there was no correlation between attractiveness and honey production. They concluded that the most practical method of selecting queens to head colonies for honey production would be to weigh them at a fixed time and to discard the lightest ones. It was suggested that discarding as many as 15 to 20% of the lightest queens would be appropriate. They concluded that the best time would be when the queens were about 12 days old and still in their mating nucs.

The reproductive potential of a queen is inversely proportional to the age at which she is initially reared (Tarpy et al. 2000). Woyke (1971) raised queens from eggs and from larvae one, two, three, and four days old. They were then mated either naturally or instrumentally with 1 to 2 x 8 mm^3 of semen. Each increase of one day in the age of brood grafted decreased not only the body weight, the size of the spermatheca and the number of ovarioles of the virgin queens, but also the number of spermatozoa in spermathecae of naturally and instrumentally mated queens. A given amount of semen injected into the oviducts resulted in different numbers but similar concentrations of spermatozoa in spermathecae of different sizes. A smaller number of spermatozoa entered the smaller spermathecae, despite a surplus of semen in the oviducts and plenty of space in the spermathecae. Tarpy et al. (2011) also found that low-quality queens are indeed produced from older worker larvae, as measured morphometrically (e.g. body size) and by stored sperm counts. They also showed that low-quality queens mate with significantly fewer drones, which significantly influences the resultant intracolony genetic diversity of the worker force of their future colonies.

"There's a direct relationship between the weight of queens and honey production."

Another measure of a queen's quality is the degree to which she is parasitized. The more notable parasites of queens are tracheal mites *Acarapis woodi* (Burgett and Kitprasert 1992; Camazine et al. 1998; Villa and Danka 2005), the gut microsporidia *Nosema apis* (Webster et al. 2004, 2008) and *N. ceranae* (Higes et al. 2006, 2008). Queens may also be infected with numerous viruses (Chen et al. 2005; Yang and Cox-Foster 2005), including acute bee paralysis virus (ABPV), chronic bee paralysis virus (CBPV), black queen cell virus (BQCV), deformed wing virus (DWV), Kashmir bee virus (KBV), sacbrood virus (SBV) and Israeli acute paralysis virus (IAPV). While several studies have measured

"A queen's quality is not only a function of her own reproductive potential but also how well she is mated."

these parasites in queen bees, none has fully investigated how they may impact a queen's reproductive quality (Delaney et al. 2011).

A queen's quality is not only a function of her own reproductive potential but also how well she is mated. This measure is often gauged by assessing the number of stored sperm in a queen's spermatheca (Mackensen 1964; Lodesani et al. 2004; Al-Lawati et al. 2009). A fully mated queen typically stores approximately 5-7 million sperm (Woyke 1962) that she uses to fertilize eggs over her lifetime. Camazine et al. (1998) estimated the number of sperm in the spermathecae of 325 queens from 13 different commercial queen breeders. They found that 19% of the queens were "poorly mated" (i.e., they carried fewer than three million sperm), as defined by Woyke (1962), a level which they compare to earlier reports of 29% by Furgala (1962) and 11% by Jay and Dixon (1984). The number of stored sperm, however, is not the only measure of a queen's mating success. Queens are highly polyandrous, mating with an average of 12 drones on their mating flight(s) early in life.

Delaney et al. (2011) assayed queens from various commercial sources for various measures of potential queen quality, including their physical characters (such as their degree of parasitism), insemination number (stored sperm counts), and effective paternity frequency (number of drone fathers among their offspring). They found significant variation in the physical, insemination and mating quality of commercially produced queens, and detected significant correlations within and among these various measures. Overall, the queens were sufficiently inseminated (3.99 ± 1.5 million sperm) and mated with an appropriate number of drones (effective paternity frequency; 16.0 ± 9.5). Importantly, very few of the queens were parasitized by tracheal mites and none were found with either *Nosema* species.

Honey bee queens mate with multiple males which increases the total genetic diversity within colonies and has been shown to confer numerous benefits for colony health and productivity. Tarpy et al. (2012) investigated the reproductive quality and mating success of commercially produced honey bee queens. Eighty commercially produced queens from large queen breeders in California were evaluated. They were measured for their physical size (fresh weight and thorax width), insemination success (stored sperm counts and sperm viability), and number of drones she mated with (determined by patriline genotyping of worker offspring). Queens had an average of 4.37 ± 1.446 million stored sperm in their spermathecae with an average viability of 83.7 ± 13.33%. The tested queens also had mated with a high number of drones (average effective paternity frequency: 17.0 ± 8.98). Queen quality significantly varied among commercial sources for physical characters but not for mating characters. These findings suggest that it may be more effective to improve overall queen reproductive potential by culling lower-quality queens rather than systematically altering current queen production practices.

Honey bee queens are reported to have between 100-180 ovarioles/ovary. Do queens with more ovarioles lay more eggs than queens with fewer ovarioles? Jackson et al. (2011) conducted a large scale study designed to assay the overall quality of 75 queens obtained from various commercial sources. Even though all 10 commercial sources provided queens with ovariole numbers within the expected range, ovariole number was found to vary significantly across sources. Overall, and within most of the individual samples, there was no correlation of ovariole number with other morphological attributes such as thoracic width, wing length, or wet weight. Queens from two of the sources, however, displayed a significant negative relationship between wet weight and ovariole number.

Akyol et al. (2008) determined the effects of queen body weight at emergence on the mating ratio, acceptance of the mated queens by the queenless colonies, onset of oviposition, diameter of spermathecae and the egg-laying rate of the queens. The queens were categorized in three groups; Heavy (207.63 ± 0.95

mg), Medium (193.47± 0.96 mg) and Light (175.00 ± 0.62 mg) according to weight at the emergence. Acceptance rates in heavy, medium and light queen groups were 93.33%, 86.66 % and 66.66%; average mating ratios were 93.3%, 90.0% and 83.3%; and the onset of oviposition was 8.5, 8.8 and 9.8 days after emergence, respectively. The diameters of spermathecae and the numbers of spermatozoa in the spermathecae were 1.25, 1.06, 0.86 mm; and 5.2, 4.8 and 4.2 million, respectively. The amounts of brood area, 30 days after the onset of oviposition were 6605.2 ± 63.6, 5571.3 ± 90.3 and 4520.2 ± 58.3 cm^2 in the colonies headed by heavy, medium and light queens. Statistically important correlations were found between queen weight and the diameter of the spermatheca (r = 0.98), the number of spermatozoa in the spermatheca (r = 0.97) and egg-laying rate of the queens (r = 0.90).

These studies have shown that queen reproductive capacity and mating success are highly variable because these characteristics are impacted by numerous factors that affect queen development and mating behavior. Select large queens that have been reared when colony nutritional conditions are excellent and mated when large drone populations are present. Solid brood patterns, temperament, colony characteristics and productivity are characteristics that should be used to judge your queens. Remember, you cannot accurately judge the quality of a queen without a large population of bees so the queen is able to develop to her full potential. **BC**

References

Akyol, E., H. Yeninar and O. Kaftanoglu 2008. *Live weight of queen honey bees (*Apis mellifera *L.) predicts reproductive characteristics.* J. Kansas Entomol. Soc. 81: 92-100.

Al-Lawati, H., G. Kamp and K. Bienefeld 2009. *Characteristics of the spermathecal contents of old and young honeybee queens.* J. Insect Physiol. 55: 116-121.

Avetisyan, G.A. 1961. *The relation between interior and exterior characteristics of the queen and fertility and productivity of the bee colony.* XVIII International Beekeeping Congress. pp. 44-53.

Burgett, M. and C. Kitprasert 1992. *Tracheal mite infestation of queen honey-bees.* J. Apic. Res. 31: 110-111.

Camazine, S., I. Cakmak, K. Cramp, J. Finley, J. Fisher, M. Frazier and A. Rozo 1998. *How healthy are commercially-produced U.S. honey bee queens?* Am. Bee J. 138: 677-680.

Chen, Y.P., J.S. Pettis and M.F. Feldlaufer 2005. *Detection of multiple viruses in queens of the honey bee* Apis mellifera L. J. Invertebr. Pathol. 90: 118-121.

Dedej, S., K. Hartfelder, P. Aumeier, P. Rosenkranz and W. Engels 1998. *Caste determination is a sequential process: effect of larval age at grafting on ovariole number, hind leg size and cephalic volatiles in the honey bee* (Apis mellifera carnica). J. Apic. Res. 37: 183-190.

Delaney, D.A., J.J. Keller, J.R. Caren and D.R. Tarpy 2011. *The physical, insemination, and reproductive quality of honey bee queens* (Apis mellifera *L.*). Apidologie 42: 1-13.

Dodologlu, A., B. Emsen and F. Gene 2004. *Comparison of some characteristics of queen honey bees* (Apis mellifera *L.) reared by using Doolittle method and natural queen cells.* J. Appl. Anim. Res. 26: 113-115.

Eckert, J.E. 1934. *Studies in the number of ovarioles in queen honeybees in relation to body size.* J. Econ. Entomol. 27: 629-635.

Engels, W. 1974. *Occurrence and significance of vitellogenins in female castes of social hymenoptera.* Am. Zool. 14: 1229-1237.

Fischer, F. and V. Maul 1991. *An inquiry into the characteristics of queens depending on queen rearing.* Apidologie 22: 444-446.

Furgala, B. 1962. *Effect of intensity of nosema inoculum on queen supersedure in honey bee,* Apis mellifera *Linnaeus.* J. Insect Pathol. 4: 429.

Gilley, D.C., D.R. Tarpy and B.B. Land 2003. *The effect of queen quality on the interactions of workers and dueling queen honey bees (Apis mellifera* L.). Behav. Ecol. Sociobiol. 55: 190-196.

Hatch, S., D.R. Tarpy and D.J.C. Fletcher 1999. *Worker regulation of emergency queen rearing in honey bee colonies and the resultant variation in queen quality.* Insectes Soc. 46: 372-377.

Higes, M., R. Martin and A. Meana 2006. Nosema ceranae, *a new microsporidian parasite in honeybees in Europe.* J. Invertebr. Pathol. 92: 93-95.

Higes, M., R. Martin-Hernandez, C. Botias, E.G. Bailon, A.V. Gonzalez-Porto, L. Barrios, M.J. del Nozal, J.L. Bernal, J.J. Jimenez, P.G. Palencia and A. Meana 2008. *How natural infection by* Nosema ceranae *causes honeybee colony collapse.* Environ. Microbiol. 10: 2659-2669.

Jackson, J.T., D.R. Tarpy and S.E. Fahrbach 2011. *Histological estimates of ovariole number in honey bee queens,* Apis mellifera, *reveal lack of correlation with other queen quality measures.* J. Insect Sci. 11: 82.

Jay, S.C. and D. Dixon 1984. *Infertile and nosema infected honeybees shipped to western Canada.* J. Apic. Res. 23: 40-44.

Kahya, Y., H.V. Gencer and J. Woyke 2008. *Weight at emergence of honey bee* (Apis mellifera caucasica) *queens and its effect on live weights at the pre and post mating periods.* J. Apic. Res. 47: 118-125.

Lodesani, M., D. Balduzzi and A. Galli 2004. *A study on spermatozoa viability over time in honeybee* (Apis mellifera ligustica) *queen spermathecae.* J. Apic. Res. 43: 27-28.

Mackensen, O. 1964. *Relation of semen volume to success in artificial insemination of queen honey bees.* J. Econ. Entomol. 57: 581-583.

Nelson, D.L. and N.E. Gary 1983. *Honey productivity of honey bee* Apis mellifera *colonies in relation to body weight, attractiveness and fecundity of the queen.* J. Apic. Res. 22: 209-213.

Tanaka, E.D. and K. Hartfelder 2004. *The initial stages of oogenesis and their relation to differential fertility in the honey bee* (Apis mellifera) *castes.* Arth. Struct. Dev. 33: 431-442.

Tarpy, D.R., S. Hatch and D.J.C. Fletcher 2000. *The influence of queen age and quality during queen replacement in honeybee colonies.* Anim. Behav. 59: 97-101.

Tarpy, D.R., J.J. Keller, J.R. Caren and D.A. Delaney 2011. *Experimentally induced variation in the physical reproductive potential and mating success in honey bee queens.* Insect. Soc. 58: 569-574.

Tarpy, D.R., J.J. Keller, J.R. Caren, and D.A. Delaney 2012. *Assessing the mating 'health' of commercial honey bee queens.* J. Econ. Entomol. 105: 20-25.

Villa, J.D. and R.G. Danka 2005. *Caste, sex and strain of honey bees* (Apis mellifera) *affect infestation with tracheal mites* (Acarapis woodi). Exp. Appl. Acarol. 37: 157-164.

Weaver, N. 1957. *Effects of larval age on dimorphic differentiation of the female honey bee.* Ann. Entomol. Soc. Am. 50: 283-294.

Webster, T.C., K.W. Pomper, G. Hunt, E.M. Thacker and S.C. Jones 2004. Nosema apis *infection in worker and queen* Apis mellifera. Apidologie 35: 49-54.

Webster, T.C., E.M. Thacker, K. Pomper, J. Lowe and G. Hunt 2008. Nosema apis *infection in honey bee* (Apis mellifera) *queens.* J. Apic. Res. 47: 53-57.

Woyke, J. 1962. *Natural and artificial insemination of queen honeybees.* Bee World 43: 21-25.

Woyke, J. 1971. *Correlations between the age at which honeybee brood was grafted, characteristics of the resultant queens, and results of insemination.* J. Apic. Res. 10: 45-55.

Yang, X.L. and D.L. Cox-Foster 2005. Impact of an ectoparasite on the immunity and pathology of an invertebrate: evidence for host immunosuppression and viral amplification. Proc. Natl. Acad. Sci. USA 102: 7470-7475.

Clarence Collison is an Emeritus Professor of Entomology and Department Head Emeritus of Entomology and Plant Pathology at MS State Univ., Mississippi State, MS.

The Pollinator Stewardship Council

FEDERAL AGENCIES COULD HELP ENSURE POLLINATOR HEALTH

Educational Materials, Best Practices And IPM

Michele **Colopy**

The bee industry, American Honey Producers Association, American Beekeeping Federation, National Honey Bee Advisory Board, and the Pollinator Stewardship Council, are working to protect pollinators and ensure their health for a sustainable and affordable food supply. Board members of the Pollinator Stewardship Council actively participate on the EPA's Pesticide Program Dialogue Committee, and sub-committees of pollinator protection, pesticide labelling, and pesticide enforcement. We are active in a myriad of pollinator coalitions and initiatives at the State and Federal levels to protect managed and native pollinators. During meetings with Federal agencies and legislators the bee industry has presented its concerns and solutions for pollinator health. This summary focuses on pollinators and pesticides.

The bee industry encourages federal agencies, United States Department of Agriculture (USDA) and Environmental Protection Agency (EPA) to work together to develop a best practices program complete with educational materials designed to reinforce the use of Integrated Pest Management techniques, and reduce the amount of harmful pesticides used. Such a program should educate agricultural pesticide applicators on following labels and the implications of failing to do so, particularly when crops are in bloom and pollinators are present. The program should also include a public education component on the value of pollinators to agriculture and the environment, as well as measures required to promote and protect those pollinators, including decreasing the use of pesticides and proper application when using them.

Ongoing pollinator research at USDA should focus on: more sustainable technologies for crop protection; more effective treatments for honey bee pests and pathogens; geographic diversification of Agricultural Research Service (ARS) laboratory locations; and more field studies of managed pollinators throughout the year.

USDA, through its ARS labs, should conduct research aimed at providing more sustainable technologies for crop protection, ensuring a safe and reliable food source with less dependence on the prophylactic application of systemic pesticides. ARS labs should focus their research on pests and pathogens which remain major threats to honey bee health, and cost the industry millions of dollars each year. It is critical that new miticides, or else completely new strategies for mite control be developed. In addition to *Varroa* mite control, research should focus on the viruses that can be vectored by *Varroa* mites. Methods should be developed to counter the viruses, so we can improve the ability of our honey bees to manage this serious stressor. The bee industry strongly encourages more field studies that track managed honey bee populations throughout the year, as the bees are exposed to natural and other stressors. ARS should diversify its geographical presence by establishing a stronger presence in areas such as the Dakotas and California where managed honey bees are most active during the honey production and pollination seasons. While field studies are important, it is vital ARS re-evaluate the importance of the Baton Rouge honey bee lab for purposes of advancing it to the top of the agency's capital investment priority plans. That lab is where genome research is likely to find the longest term solution to ensuring a sufficient pollinator population in the United States.

Better guidance on stewardship of conservation land, uniform national policies on the use of public lands, and a collaborative effort by private sector land owners could result in substantially better forage opportunities for pollinators as more land is put into agricultural use.

Ethanol production has driven a rapid expansion of corn planting throughout much of the upper Midwest, which is a warm season home to a majority of the commercial honey bees and where most of the nation's honey crop is produced. USDA should work to provide new set aside acreage strategically planned for pollinators, by providing appropriate incentives to off-set the economic effects of inflated commodity crop values due to renewable fuel standards (RFS) and subsidized Federal Crop Insurance. This land set aside for pollinators must provide safe places with reliable nectar that is not contaminated to provide the necessary carbohydrates and proteins for bees to thrive.

As honey bees are a unique species with specific nutritional requirements, USDA should consult directly with the national beekeeper organizations and honey bee nutritional experts at USDA, in addition to consulting organizations representing a wider range of native invertebrates, whenever the Department

seeks to improve pollinator habitat through programs, guidance or otherwise. USDA should continue to work with beekeeping organizations in selecting and producing appropriate, cost-effective seed mixes that can provide nutritious and abundant, season-long nectar sources to sustain honey bees. The bee industry is encouraged by the seed mix list being developed as part of the Natural Resources Conservation Service (NRCS) technical and financial assistance program to help improve the health of bees. However, more work can be done, including adding sweet clover to the seed mixes. We also recommend federal agencies consult with "Pheasants Forever" on their recent efforts to maintain pollinator friendly habitat, and their success in leveraging private dollars contributed for the cause.

Public lands offer a unique opportunity to expand pollinator habitat, and offset growing agricultural acreage. By coordinating across at least USDA, the Department of Interior, and the Department of Transportation, as well as with stakeholders with reach to state and local public land owner and manager counterparts, we could significantly increase forage opportunities for both managed and native pollinators. Education on preserving sufficient types of forage could have the dual benefit of improving pollinator habitat, while saving money for local and state governments engaged in "weed" control activities. Finally, privately held land or land with private rights of way that are currently not placed into agricultural or other productive use may prove good locations for honey bee and native pollinator forage. One model for consideration would be to include honey bee forage as part of Integrated Vegetation Management (IVM) practices to reduce the need for herbicides, promote healthy ecosystems, and provide measurable results, such as greater natural species diversity along rights-of-way. Edison Electric Institute and the EPA have signed an MOU along these lines, but more needs to be done to specifically acknowledge honey bees.

The Environmental Protection Agency (EPA) should better protect honey bees and all pollinator species by taking actions to minimize exposure to pesticides while ensuring sufficient crop protection. EPA should adopt the "tiered testing protocols" for assessment of risk when new pesticides are being considered for registration. Pesticides should not be fast tracked for release through the "conditional registration" process, as were the entire family of Neonicotinoid formulations. The bee industry remains concerned that the process for registration leaves users and stakeholders with insufficient information about potential and real harm they may cause to non-target species such as honey bees. One particular concern with Neonicotinoids is "dusting" that occurs when treated seeds are planted. The "dust" is not utilized by the target plant, but is lost to the wind and may be absorbed by other non-target species in the process. While work is ongoing to address this, more can be done. Further, some have suggested that such seed treatments are building up in soils due to their slow degradation and further that very low levels of exposure can cause increased mortality in all stages of bee development when combined with honey bee pathogens. Other suggestions are that these compounds can increase pathogen levels in honey bee colonies and affect the immune response of bees.[1] Whether these conclusions are accurate or not, many questions continue to be raised about industry studies that have shown no harm to honey bees.[2] In particular, questions have been raised about testing protocols utilized in such studies that are insufficient to accurately assess risk in regard to these compounds. To avoid a bias in testing protocols and the data produced, more federal research should be conducted prior to and after registration and less reliance should be placed upon industry research. In the case of pollinators, EPA should now provide guidance or protocols for properly assessing *long term* effects of pesticides, particularly Neonicotinoids.

In addition to reviewing registration processes and testing protocols, EPA should review existing pesticide labels to ensure they are adequately protecting pollinators. Pesticide labels are currently inadequate in providing protection for honey bees and often completely disregard the safety of native pollinators. Labels should provide specific warnings against application of pesticides known to be toxic to honey bees and beneficial insects during periods of bloom when it is likely that pollinators will be present. Of particular importance is to consider warnings about the impact on pollinators of increasing concentrations or applying the labeled pesticide in combination with other formulations. Many bee kills across the country have been a result of labels failing to warn of toxicity to honey bees in this way. Further, inert ingredients in pesticides have not been rigorously tested for their safety in conjunction with the labeled pesticide, and all risk assessment should be based on final formulations. Increasingly, as research continues, "inert" ingredients are suspected as being part of the honey bee health problem. In fact, some advisors to the industry have suggested that inert ingredients not included on labels may be as harmful to honey bees as the labeled compound. Combined with adjuvants, which work to increase pesticide efficacy, these products are additional stressors for pollinators.[3] EPA should make inert ingredient lists available to researchers to ensure that the science being produced is accurate.

EPA should also examine synergistic effects between pesticides that are used in combination and may together increase the toxicity of the mixed formulation to pollinators when compared with any of them when

[1]Bees Under stress: sublethal doses of a neonicotinoid pesticide and pathogens interact to elevate honey bee mortality across the life cycle: Vincent Doublet, Maureen Labarussias, Joachim R. de Miranda, Robin F. A. Moritz, and Robert J. Paxton; Institut für Biologie, Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany; Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden; German Center for Integrative Biodiversity Research (iDiv), Halle-Jena-Leipzig, Leipzig, Germany; School of Biological Sciences, Queen's University Belfast, Belfast, UK.

[2]Neonicotinoids, bee disorders and the sustainability of pollinator services: Jeroen P van der Sluijs, Noa Simon-Delso1, Dave Goulson, Laura Maxim, Jean-Marc Bonmatin and Luc P Belzunces.

[3]Learning Impairment in Honey Bees Caused by Agricultural Spray Adjuvants: Timothy J, Ciarlo, Chrisopher A. Mullin, James L. Frazier, Daniel R. Schmehl, Dept. of Entomology, Penn State University – July 2012.

used alone.[4] The recent poisoning of more than 80,000 honey bee colonies while pollinating in the almond crops was linked to a tank mix of fungicides and insect growth regulators, when combined, are far more toxic than either compound is when applied individually. Colonies that did survive had brood that was so severely damaged they will need an entire season to recover, and are no longer useful for pollination services or honey production. The EPA should develop risk management strategies for reducing the exposure of pollinators to harmful synergistic effects of multiple compound formulations. We also recommend that EPA require studies from manufacturers on the role of metabolites of compounds that are approved for use. For example, metabolites of Imidicloprid, such as olefin and 5-hydroxyimidacloprid, have been shown to have toxic effects on honey bees comparable to those of the parent compound.[5] These metabolites are of particular concern, because of the long term persistent exposure they cause for honey bees.

Finally, the EPA should consider working with the chemical industry on alternative technologies to GMO Crops, which while allowing for multiple treatments of herbicides, eliminate many of the native plant species that would otherwise grow in row crops and along the edges of fields. The result has been an environment that is less diverse for foraging honey bees. This new form of agriculture has greatly expanded the use of herbicides, and along with the additional products used to enhance efficacy, are leading to additional routes of toxin exposure in the environment. Resistant species are already requiring additional herbicides that are resulting in even further harm. This is not a sustainable practice.

The decline of honey bee health is a complex challenge. The current losses and economic consequences are weighing on the shoulders of beekeepers and specialty crop growers – in most cases small family owned businesses. As more and more beekeepers quit the trade, and populations of pollinators decline, we are dangerously close to risking the security of our nation's food supply.

And as the honey bee is an indicator species, its plight should be of serious concern to all who may quite literally be observing the "canary in the coal mine." BC

[4]Pesticide Residues and Bees – A Risk Assessment: Francisco Sanchez-Bayo, Koichi Goka Faculty of Agriculture and Environment, The University of Sydney, Eveleigh, New South Wales, Australia, National Institute for Environmental Sciences, Tsukuba, Ibaraki, Japan.

[5]Lethal and Sublethal effects of Imidiacloprid and Amitraz on Apis mellifera, Linnaeus (Hymenoptera: Apidae) Larvae and Pupae – Patricial Toth, University of Florida, 2009

Truth In Labeling

Testing Honey

Vaughn **Bryant**

How much would you be willing to pay for premium honey? Once purchased can you be certain it matches the information on the label? Unfortunately, in most places there is no guarantee because most of us have no way to verify the origin or type of honey we purchase.

The most expensive honey in the world is Mad Honey, which comes from the Kars-Trabzon region of the Black Sea and sells for $166/lb. The hills of that region are filled with blooming *Rhododendron ponticum* & *R. luteum*, both of which are native to Eastern Turkey and both of which produce high levels of a toxic alkaloid called *Grayanotoxin*. The high price of the honey results from its scarcity and a high demand because of its purported ability to stimulate sexual arousal, cure arteriosclerosis, reduce cancer, increase good memory, prevent hair loss, reverse barrenness in women, and solve a long list of other problems. In small amounts Mad Honey can also cause a feeling of euphoria, but if too much is consumed it can result in excessive bradycardia (<50 low pulse rate), hypotension (<77/46 – low blood pressure), dizziness, vomiting, and disorientation. Death from Mad Honey is rare, but temporary hospitalization is often needed.

The second most expensive honey is Sidr honey, produced in Yemen from the flowers of *Ziziphus spina-christi*, known as the Jujube bush. That honey sells for about $100/lb. and is a favorite of those seeking its reported killing action on bacteria, which is claimed to be far superior to anti-microbial agents currently used in medicine. It is also reported that when pure Sidr honey is mixed with a combination of nuts, ginseng and herbs it works better than Viagra and leaves no side effects.

The third most expensive honey is Manuka honey, made from the nectar of tea tree flowers (*Leptospermum scoparium* and *L. polygalifolium*), which grow throughout New Zealand. Manuka honey currently sells for about $40/lb. and is sought after by those wanting to enjoy the reported healthful benefits from *Methylglyoxal*; one of the antibacterial agents in the honey. Application of Manuka honey on superficial burns is also reported to reduce infection and speed recovery.

Many other types of honey command premium prices and are popular with different groups of consumers willing to pay high prices for those products. A few of the premium types include: Lehua, Kiawe, and Christmas Berry honey from Hawaii; heather and ling honey from the United Kingdom; fireweed honey from Western Canada and Alaska; gallberry, citrus, and tupelo honey from Florida; sourwood honey from Appalachia; thyme honey from Greece; and buckwheat honey from Eastern Europe, China, New York, and Canada.

The biggest problem with all of these premium honey types is that in most countries the consumer is required to "believe" what is written on the label. Many nations, including the United States and Canada, do not have strict requirements for truthful labeling of honey products. This means that consumers rarely get what is written on the label. I know this because each year I am asked to test hundreds of honey samples sent to me mostly by beekeepers wanting to be accurate about the types of honey they sell and by importers wanting to confirm the types of honey they are purchasing. A few honey exporters also need to have their honey certified as to the floral contents and place of origin in order to export it to some countries with strict requirements.

What I have been finding in my studies of honey samples from all over the world has been reported in many different media sources and those reports highlight the importance of testing honey. Without those tests many importers would have paid high prices for expensive, premium honey types when in truth the product was very ordinary and inexpensive honey. Some people who purchased exotic types of honey, and sent me a small sample, are often shocked to discover they purchased a blend of inexpensive honey rather than the exotic type mentioned on the label. Beekeepers and honey producers selling their products to commercial stores or at roadside stands are frequently amazed to discover they have been selling types of honey that are completely different from what labels they were putting on their jars.

POLLEN

If this is true, then which testing methods are the least expensive and the fastest way to confirm what nectar sources are included and where the honey originated? Most authorities will say that pollen testing, called melissopalynology, is the quickest and least inexpensive method when considered against all of the other testing alternatives. Nevertheless, pollen testing is not an exacting method because the technique is fraught with problems that can sometimes cause misinterpretations. I have discussed some of these aspects in the past, but they may need repeating. Essentially, the problems in melissopalynology focus on a number of variables that both beekeepers and the pollen analysts may not always anticipate, or recognize, when examining a honey sample. First, we know that not all honey bees are created equal. In any hive a portion of the workers will be very efficient at nectar collecting and very efficient at removing pollen from collected nectar sources while returning to the hive. Other workers are very inefficient and do not remove any of the pollen from the nectar they collect. That variable translates into some workers returning to the hive with nectar that is full of pollen while other bees will return from the same flowers with the same amount of nectar, but most or all of the pollen will have been filtered out during the return flight. This variation translates into high or low amounts of pollen present in the final honey product. Therefore, the pollen spectrum of a resulting honey may depend on what percentage of worker bees were efficient vs. those that were inefficient.

Second, depending on the temperature, available moisture, and sunlight, the same plants may produce more or less flowers from one year to the next and each flower might contain more or less pollen and nectar

depending on those same climatic variables. Those conditions translate into heavy or light utilization of those floral sources by the bees in a hive, which then results in a heavier or lighter emphasis on that type of nectar in the produced honey.

Third, some plants produce flowers containing nectar with tens of thousands of pollen grains, such as the nectar from sweet clover, forget-me-nots, rapeseed, and blueweed. Other flowers, such as fireweed, sourwood, thyme, alfalfa, croton, evening primrose, and cotton produce nectar containing very few pollen grains. This difference is then translated into honey containing very few pollen grains from some nectar sources or thousands of pollen grains from other nectar sources. Those differences mean that some unifloral honey should contain thousands of pollen grains from their primary nectar source while other unifloral honey samples might contain only minor traces of pollen from their dominant nectar sources. Finally, experiments have shown that plants that produce large pollen grains, those over 50 micrometers (1,000 micrometers = 1 millimeter) in diameter, such as magnolia, hibiscus, tulip poplar, and onionweed, are generally highly underrepresented in honey samples even when those flowers provide the primary nectar source for the honey. These many variables make the accurate identification of primary nectar sources in any honey sample a major challenge. Those analysts who examine honey, but fail to recognize the many potential problems caused by these variables can create mistakes in their identification of both the primary nectar sources and mistakes about the potential geographical origin of the honey.

ISOTOPES

If pollen studies of honey have so many problems, then why not use a different type of testing method, such as isotopes? For years we have known that various types of honey adulteration can be detected using carbon stable isotopic ratio analysis (SIRA). For example, we know that the ^{13}C content of the carbon used by different plants will vary depending on the photosynthetic pathway the plant uses. Most fruits and many flowers use what is known as the less efficient C3 photosynthetic pathway that produces sugar with a ^{13}C value near -25°/$_{oo}$. However, sugar cane and maize use the more efficient C4 pathway that yields a $\delta^{13}C$ sugar value near -10°/$_{oo}$. Because honey is produced from the nectar of C3 plants, normal honey should yield an isotopic signature, called $\delta^{13}C$, of about -23.2 to -24.6°/$_{oo}$. Variations from those levels often suggest some degree of adulteration created by the addition of high fructose corn syrup or the addition of cane syrup. Nevertheless, using the $\delta^{13}C$ isotopic signature of honey does not ensure it has not been adulterated. Sugar beet and rice syrup, which are produced by C3 plants, could be added to honey and not be detected using only stable isotope testing.

The isotopes of $\delta^{13}C$, $\delta^{2}H$, $\delta^{15}N$, and $\delta^{34}S$ in the honey proteins can be used to reveal the climate and environment where a honey sample is produced, and those data can then identify the geographical region where the honey originated. Although the amount of protein in honey is minimal, it comes mostly from the plant sources with small amounts introduced into the honey by the bees. The carbon and hydrogen isotopic ratios in honey

Canola pollen.

proteins are based on the water and carbon dioxide levels utilized by the plants that produce the nectar sources collected by bees. The $\delta^{13}C$ values in honey protein will increase slightly in hives located in areas of increasing amounts of sunshine, higher temperatures, and reduced humidity. The hydrogen or $\delta^{2}H$ value in honey protein will decrease in areas of reducing humidity, increasing elevation, and decreasing temperatures. The nitrogen isotopic composition of honey proteins comes from the plant's nectar, which is a reflection of the plant's ability to absorb nitrogen from the topsoil or fix nitrogen from the air. Therefore, slight differences in the $\delta^{15}N$ levels in honey proteins will reflect the nitrogen levels in the region where honey was produced. Finally, the sulfur isotopes found in plant nectar reflect the soil chemistry of the region. Clay soils tend to retain higher levels of sulfur than sandy soils. That results in different amounts of sulfur isotopes in a plant's nectar. When those nectar sources become part of a honey sample, the $\delta^{34}S$ ratios become a signature for the soils of a region.

None of the individual isotope values found in honey proteins is usually unique enough to identify a specific geographical region. However, when all of the isotope values in honey proteins are calculated it presents a multi-element evaluation often resulting in a precise geographical origin. Thus, the use of multivariate statistical analysis is essential to discriminate between different potential geographical locations.

George Brining's labels.

DNA

Some readers might ask why the analysis of the deoxyribonucleic acid (DNA) properties of honey has not been attempted. Recently, there has been progress in this area with the development of pyrosequencing and the use of barcoding strands of DNA. For plants, the ideal is to barcode selective DNA strands that have one or a few standard loci that can be sequenced easily and reliably in large sample sets. Comparisons of those sequenced data against available plant DNA databases will enable specific plant taxa to be distinguished from one another. The remaining problem, however, is that currently the DNA analysis can only provide ubiquity; in other words, it can identify the plant sources in a honey but it does not provide quantitative information on "how much" each nectar source contributed to the honey sample. Therefore, these types of DNA studies are useful for identifying blends of honey and they can help determine the possible origin of a honey sample. However, the drawbacks of DNA analyses are that they require a good plant DNA database for comparisons, the use of special DNA sequencing equipment, knowledgeable technicians, and at present the procedure remains a fairly expensive way to identify honey samples.

OTHER WAYS TO IDENTIFY HONEY

Liquid and gas chromatography have been used to identify the amino acids in honey. Patterns of the different amino acids present in the protein fraction of honey have been used statistically to show different patterns exist in different types of honey. Applying discriminant analysis to those data have shown that with a good database for comparisons, certain groups of honey samples can be distinguished from one another on the basis of free amino acids.

Volatiles contribute significantly to the flavor of honey and variations result from different floral origins and methods of handling the honey. The isolation and analysis of the volatile components in honey is difficult, but possible. Previous attempts confirm that a careful analysis of the volatiles in honey could become a useful tool for determining nectar sources, but note that such analyses should always be accompanied by pollen studies to confirm the results.

High performance liquid chromatography has been successfully used to characterize the flavonoid patterns in specific types of honey, such as citrus, sunflower, lavender, rosemary, and heather. Some believe that flavonoid patterns could become a useful tool for determining floral contents and geographical origins, provided the data were analyzed using multivariate statistics.

The mineral and trace elements in honey samples have been used to indicate types of environmental pollution that pinpoint certain geographical locations as being the origin of honey samples. Some analyses and experiments focusing on the composition of organic acids in honey have shown that those might also prove useful in providing additional ways to identify specific types of unifloral honey.

These are only some of the many ways that have been used to identify honey. There are numerous other ways, which have been used, or have been attempted in the pursuit of identifying the floral and/or geographical origin of honey.

All of the many identification methods mentioned thus far suffer from some type of problem. For some of the problems focus on the need for special and expensive laboratory equipment. Others are time-consuming and require developing an extensive database before the results can be determined. Some methods are costly to perform; others require skilled technicians or analysts with extensive training. In summary, there is no inexpensive, foolproof, or simple way to verify the floral and/or geographical origin of a honey sample. Many of the methods can provide generalized results and some of them can offer fairly reliable estimates, but much depends on the skills and experience of the people performing those tests.

ADDITIONAL PROBLEMS WITH HONEY IDENTIFICATION

In the United States and Canada we have inadequate laws needed to address the problem of proper identification of honey. Pollen studies of honey, as mentioned earlier, can correctly, or incorrectly, identify the probable floral and geographical origin of a honey sample depending on whether or not the pollen analyst understands the many potential problems that can affect a sample. Skilled pollen analysts normally understand these potential problems and consider them when writing the final report. A bigger problem, however, is that much of the honey sold in North

America no longer comes from only a single source, most are now blends. Many honey samples sold in stores or even at roadside stands are mixtures of different types of honey yet many carry the label of "Clover Honey." When I asked some beekeepers and honey producers why "all" of their honey was called clover, they replied, "because that is what customers want to buy!" In other words, for that group, it makes no difference what the actual floral sources might be. What mattered to them is putting something on the label that convinces customers to purchase it.

Another problem, which I have addressed before, is that the vast majority of honey sold in commercial food stores has no pollen because it was removed by filtering. Not only does that mask the true floral and geographical origin of honey, but it can also be used to hide transshipped and illegal honey. When I asked some honey producers why they removed the pollen, they replied "to prevent crystallization." They said that most customers avoid any honey that shows signs of crystallization. It is true that removing the pollen may slow the process of crystallization, but in reality the pollen content is one of the very minor causes of crystallization. As many of you know, the rate of crystallization in honey is most affected by the ratio of laevulose to dextrose (fructose to glucose). Honey containing higher percentages of dextrose will crystallize quickly while honey containing less than 30% dextrose rarely ever crystalizes. High dextrin contents will also delay crystallization, while storing honey at certain temperatures and stirring honey will often speed the rate of crystallization.

We have a significant problem in North America, which consumers are beginning to realize. The intentional or accidental mislabeling of premium grades of honey is cheating the customer and creating a climate of suspicion about the purchase of expensive grades of honey.

We have no federal laws requiring truth in labeling for honey products and attempts by some states to require honey labeling standards are not enforceable because state laws are trumped by federal laws that do not require truthful labels for honey. A few beekeepers, such as George Brining of Gold Standard Honey, are now putting the pollen contents of their honey on their labels to assure customers of the origin and floral sources. Other have stressed the need to establish some type of recognized testing system, run by beekeepers in the U.S. and Canada that could certify honey, especially the premium and expensive types. One example of how this might work is seen in New Zealand's efforts to protect the sale and distribution and their true Manuka Honey. Honey exporters and beekeepers in New Zealand have formed the *Unique Manuka Factor Honey Association* (UMF). The UMF strictly regulates and tests New Zealand manuka honey to ensure accuracy in labeling. Only honey that has been tested and certified as true manuka honey is permitted to use the UMF label. Because of the strict testing, the openness of their research efforts, and the association's published policies, consumers worldwide are willing to pay premium prices knowing that the UMF label on manuka honey ensures that the contents are 100% accurate. Perhaps this is the type of system that might work in the United States and Canada. Such a system could win back those honey customers who realize that any jar of honey carrying a label claiming it is a premium type, could easily be nothing more than a blend of inexpensive honey from some unknown region. BC

Most authorities will say that pollen testing, called melissopalynology, is the quickest and least inexpensive method when considered against all of the other testing alternatives.

Vaughn M. Bryant, PhD, Professor and Director, Palynology Laboratory, Department of Anthropology, Texas A&M University (TAMU 4352), College Station, TX 77843-4352. He will be speaking at the Medina County Ohio Beekeepers meeting on September 15. See www.medinabeekeepers.com for information.

Queen Quality, Just Like It Used To Be

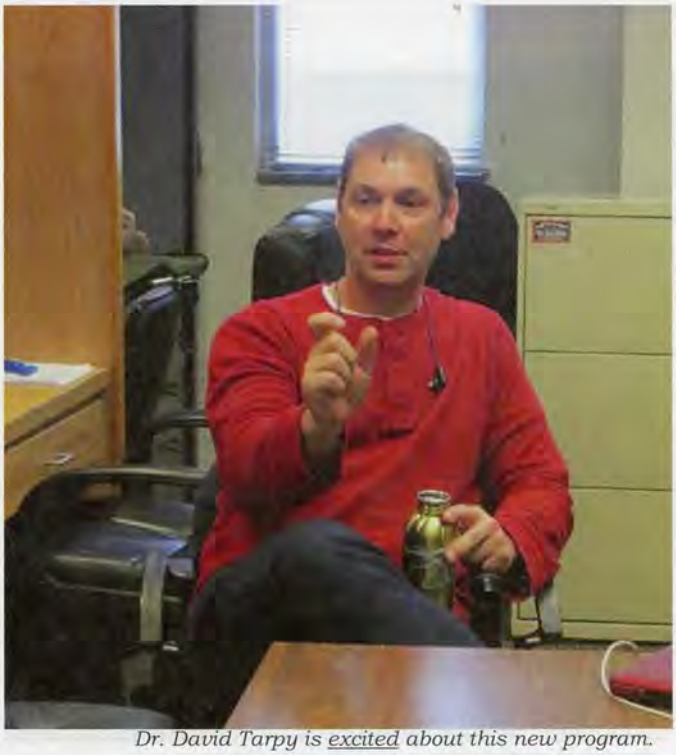
Kim **Flottum**, with Kathy Summers & Peggy Garnes

So, how's those new queens you got this year doing so far? Same 'ole, same 'ole? Get them in May, gone by July? Or were they good this year? You know – get 'em in in May and they're still at peak production today, kicking out brood by the square mile? Just like it used to be . . .

Well, no matter how they turned out this time, the next time you buy queens how'd you like to get a feel for how they'll turn out – BEFORE you buy them? Or better, how'd you like to know how good the queens are that YOU are raising, especially if you sell a few every year? And *especially* if you sell a ***LOT*** of queens every year? Wouldn't you like to be able to say, I raise A+ Queens, and I've got the data, gathered by unbiased University experts and tested in University labs in North Carolina to prove it. Wouldn't you?

Don't think it can be done? Well Blinky, have I got a deal for you!

You already know about BIP – the Bee Informed Partnership group that takes surveys trying to find out how beekeepers cope, or don't cope with the problems and management techniques they have, and put it all together to find out what works, and what happens when it does, and when it doesn't, (a Dennis vanEnglesdorp project, along with Marla Spivak, the USDA and NIFA support and a whole lot of other experts and staff). And you know about the teams that go around working with commercial beekeepers, taking samples and measuring all the things that can be measured, reporting back to the beekeeper the results so the beekeeper can make fact based management decisions using practices that have been working, and changing those that don't. These are the teams set up by Marla Spivak from Minnesota. You already know all about that, right? Of course those changes will be mitigated by cost – is changing worth the cost?



Dr. David Tarpy is excited about this new program.

Well all this got my attention, and back in April we took a trip to the North Carolina State University Apiculture Lab, and had a long talk with David Tarpy about all this. Here's what we found.

These programs got their start with a five year grant from the Feds. It supports the people who put together the surveys, analyze the data, write the reports, put up the web page, write the blogs, take the metrics in the field, spend all-nighters in motel rooms looking through a microscope to get real-time answers, and answer the phone. There's a bunch of them out there now doing that commercial beekeeper thing . . . in California, the Pacific Northwest, the Midwest, and in the Southeast. They pretty much have the commercial part of beekeeping covered.

But there are some things that they can't do in the field that they wanted to do. And one of those things was to work with queens. They wanted to be able to test the quality of the queens queen producers were producing so they could keep on doing the good things, and quit doing those things that weren't working.

A portion of the report that you would receive when your queens are tested.

Morphological measures

A	Weight (mg)	Thorax width (mm)	Head width (mm)
Average	195.1	4.7	3.7
Maximum	243.3	5.09	3.91
Minimum	162.3	4.31	3.39
% GLOBAL	48.1%	86.8%	76.9%

Pathogens and diseases

C	Nosema apis	Nosema ceranea	Viruses						
			ABPV	BQCV	CBPV	DWV	IAPV	KBV	SBV
% Positive (+)	Not measured	Not measured	29.2%	87.5%	8.3%	95.8%	20.8%	4.2%	16.7%
% Negative (-)	Not measured	Not measured	70.8%	12.5%	91.7%	4.2%	79.2%	95.8%	83.3%
% Low	NA	NA	12.5%	87.5%	8.3%	41.7%	20.8%	4.2%	16.7%
% Medium	NA	NA	12.5%	0.0%	0.0%	33.3%	0.0%	0.0%	0.0%
% High	NA	NA	4.2%	0.0%	0.0%	20.8%	0.0%	0.0%	0.0%

Insemination success and mating number

D	% Viability	Sperm count ($x10^6$)	% filled
Average	93.3%	2.16	21.9%
Maximum	98.7%	7.43	76.3%
Minimum	64.9%	0.41	4.7%
% GLOBAL	72.5%	31.9%	34.0%

Margie loading samples into the deep freeze.

So they took some of the grant money they had and went looking for some matching funds to get this up and running. They needed a place to do all this work, the machinery to do it, and the expert people to make it happen. And here's what they found.

It started with David Tarpy at the North Carolina State University. He's the diversity and molecular guy, and Margie Gurganus in his lab who's the molecular analyzer. That covers a lot. But queen quality has a lot more facets than that. They wanted size, weight, Nosema counts, what kind of viruses the queens had and how much, and they wanted to know sperm counts and viability in the queens they were testing.

These things cost money. So they went to Project Apis m. And Project Apis m bought them a machine that does all the sperm counting measures very quickly and accurately. Dave already had most of the other equipment, so when put together he had both the lab and the talent the BIP people were looking, and willing to pay for, for that first year.

Now, they need queens.

Before I go on, go to their web page and take a look at what they can do and the kind of report you can get when they test some of your queens. That will show you what you need to know. **http://entomology.ces.ncsu.edu/apiculture/queen-disease-clinic/**

How they came up with the grading system was pretty clever. They looked at boatloads of queens to get the range of measurements needed for each of the categories they measure – insemination quality, Nosema(s) levels, the presence/absence of seven viruses and the level of infestation, weight, the width of the head and thorax, Africanization, the genetic diversity (how many drones did the queen mate with), and sperm viability and amount. When you look at the web page you will get the idea. So they have a data base of measures, and when compared to the standards, they are able to 'grade' the quality of the queen based on a standard measuring stick.

Now, a couple of things. This program's first year was fronted by the BIP grant and another from the CA State Beekeepers. To continue into 2015 and beyond, it has to be sustainable based on the sample processing charges. Just like the work of the BIP teams taking samples from the commercial beekeepers in the various parts of the country. That program seems to be heading in the right direction as demand and success increases at every location. That program charges for its services, of course. But the beekeepers who are taking advantage of it are making better management and business decisions. Everything I've heard is that they are getting more than their money's worth. That's the rule, not the exception. And that's smart beekeeping.

So now there's a way to find out what went wrong with those queens you bought this Spring that went belly up after only a few weeks. In fact, if you bought a bunch from a single supplier, why not have a very small sample tested to see what you might be able to expect? If you find out they were poorly mated due to, maybe a week of rain at the wrong time, or he's running sterile drones because of mite treatments. Yes, it costs. But what is the cost of losing queen after queen after queen during the Summer? Knowing early can save you a bunch. And, if you have some good data, you can go back to the queen producer with the information and make some suggestions. That accomplishes several things. It supports the program certainly, but it helps you do a better job managing your bees, and, and – it helps the queen producer do a better job of producing better queens.

But wait. Wouldn't it be even better if the queen

producers got ahead of the curve and started doing this testing themselves, as a routine matter just like feeding or other regular management activities? If every batch of queens to come out of a mating yard at the same time had a few tested for at least some of the qualities the lab does, they'd be able to not only make better decisions about raising queens, but they'd know that this whole batch is crap because it rained for a week and nobody was able to mate. Would it be better to scratch a batch than to sell junk? Yes, it would. Wouldn't you feel better if a queen producer called or emailed and said that the queens you ordered weren't any good and another will be along in – whatever. You need a queen, yes, but are you willing to take a risk, again?

In the 30+ years I've been working with bees, and especially beekeepers, I haven't heard of a better deal. Everybody wins. If you raise your own, are you doing it right? If you buy from somebody else, how good are they? If you are selling queens, you can say they are THIS good and know that your queens will do well.

Ahhh – there's a problem you should be able to see already, right? What if the queen is a dud, but it's the beekeeper's fault? A queen producer does a good job and sends queens out, but within a short time the beekeeper comes back with a complaint.

That's the stickiest part of this, said Dave Tarpy, because the testing is destructive. The information they provide applies to groups of queens and assumes that a representative sample of tested queens are like the remainder. But there are times when newly mated queens are just fine, but they can go downhill fast once they're placed into a colony. So they are very clear that they are providing information for just the queens they analyze. The producer, or the beekeeper, can make management changes based on that information. They can implement a change in their operation – adding drone colony yards for instance, or becoming more aggressive with mite control – and then measure how successful those changes are. Does diversity improve? Do virus levels go down?

This won't be used to point at either a queen producer or a beekeeper. Rather, says Dave Tarpy, they are hoping that the queen producing industry gets proactive with this and measures, measures, measures. There's a cost, sure, but spread out over thousands of queens the individual queen cost will be very manageable, and I don't know a beekeeper alive who doesn't want the best queen he or she can get – or raise for that matter.

Margie Gurganus.

And If I was a queen buyer (wait, I am a queen buyer!), my first question will always be – do you subscribe to the BIP Queen program? When the answer is no, you can bet I'm going to be looking for another queen producer.

And can't you just wait for the day when you see the ad in this magazine by that new queen production company that says "We only sell B+ or better Queens. Anything less just isn't worth your time." Just like it used to be. BC

The Bee's Second Mouth

Ian **Stell**

An Efficient, But Complicated Bit of Work

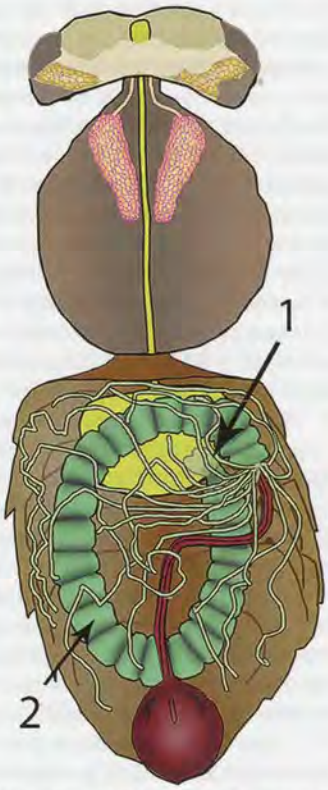


Figure 1. *The digestive system of a worker honey bee. The crop is shown in yellow, with the proventriculus arrowed (1). The ventriculus, the main digestive organ, is shown in green (2).*

The crop (or honey stomach) is used by the bee to carry nectar to the hive, but is also the gateway to the bee's own digestive system (*figures 1 and 2*). Enough food needs to pass on to be digested for the bee's needs, while keeping back the nectar to be returned to the hive. Control over what the bee keeps and what can be returned is exercised by the proventriculus. The proventriculus is effectively a second mouth which opens and closes within the crop and controls the passage of food through to the ventriculus where most digestion takes place.

Before describing the proventriculus in more detail let us review the nutrition of the bee. All the bee's needs can be met from nectar and pollen. Nectar is almost entirely sugars (carbohydrate) and water, while pollen provides a wide range of nutrients including protein (typically 20%) fats, starch, minerals and vitamins. The bee needs to

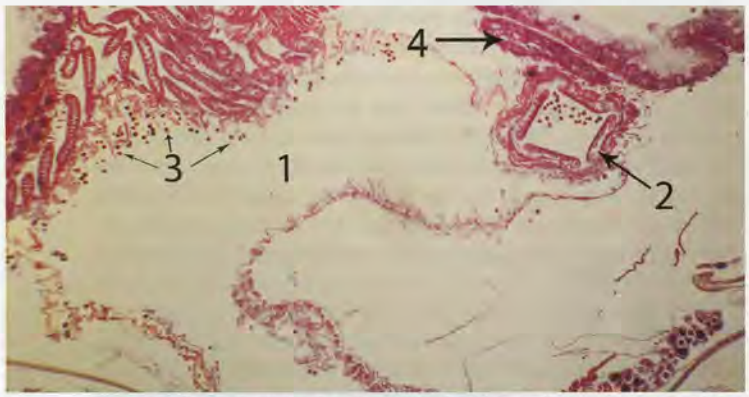


Figure 2. *Digestive structures in the front of the abdomen. The crop (1) is nearly empty and its wall is thrown into many folds. The proventriculus, (2) seen in cross-section, contains some pollen grains, as does the crop (3). The pollen will pass through to the ventriculus (4) for digestion.*

maintain a steady concentration of glucose in its blood (haemolymph) to maintain normal physical activity. As its bodily carbohydrate stores (of glycogen) are limited, this glucose is largely derived from the digestion of nectar or honey. So the proventriculus needs to pass on a steady supply of these carbohydrate solutions for digestion. The other nutrients required vary at different stages in a bee's life, for example large quantities of protein are required by nurse bees for the production of brood food, and substantial quantities are also needed for storage as Winter approaches. These nutrients are extracted from pollen which first needs to be removed from suspension in liquid in the crop.

The proventriculus protrudes into the crop (*figure 3*). It is an almost round structure 0.7mm in diameter, connected by a neck through the wall of the crop to the ventriculus (*figure 4*). Its conical top surface has a cross-shaped opening between four lips.

The function of the proventriculus has been studied in anaesthetised bees. The lips have been observed to open and close trapping pollen from the nectar which is in turn kept stirred by writhing muscular movements of the crop wall. Detailed video recordings of the action of the proventriculus were first described by Peng and Marston in 1986[1].

Figure 3. *This diagram shows the underside of the worker bee's abdomen and crop opened to show the proventriculus with its distinctive four lips and cross shaped opening.*

Figure 4. *The crop (1) and ventricu lus (3) of a queen bee. The proventri ulus (2) is just visible within the cro Numerous silvery tracheae surroun these structures.*

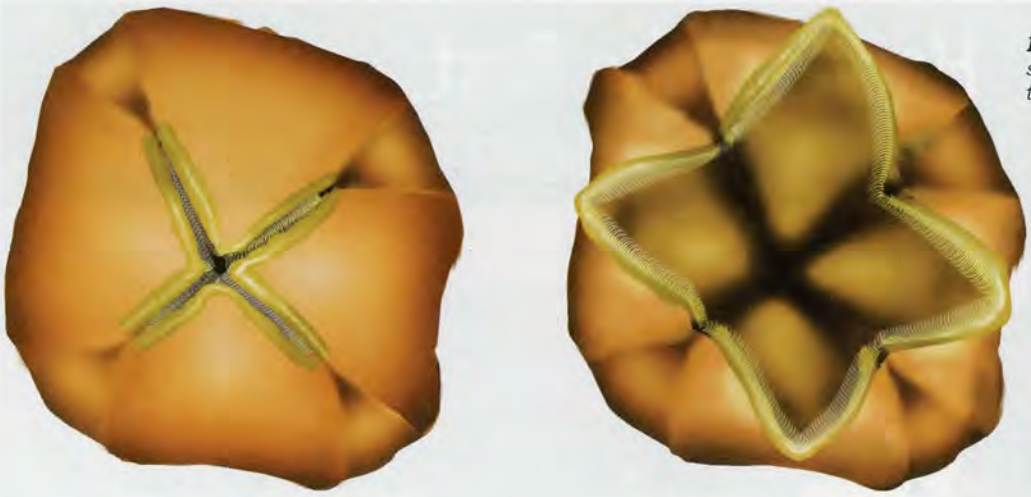


Figure 5. *The proventriculus seen from within the crop with the lips closed and open.*

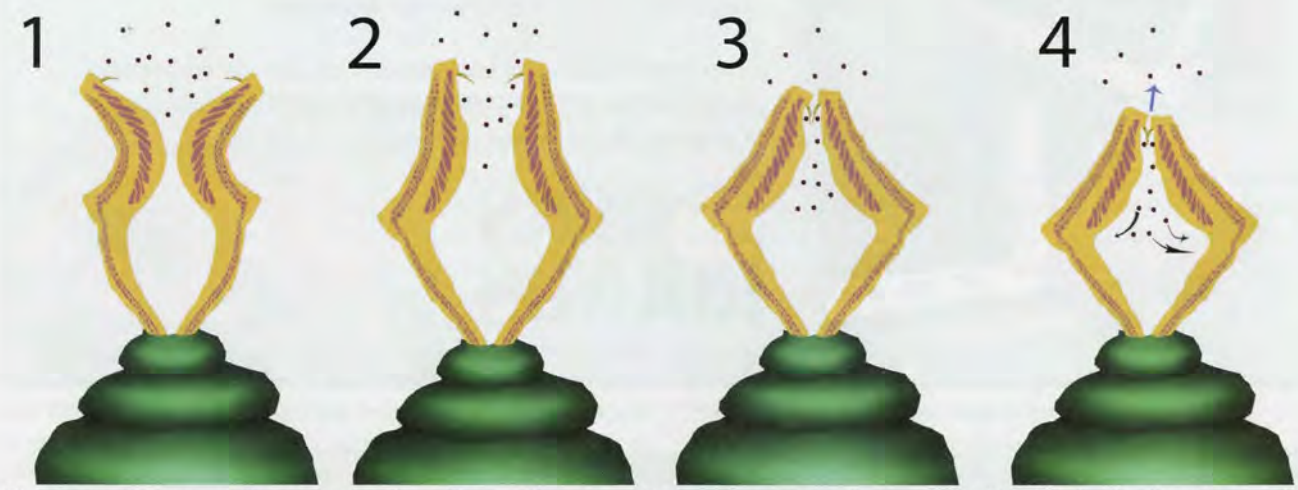


Figure 6. *Opening of the proventriculus allows pollen containing nectar to move between the lips (1). As the lips close pollen is caught behind fringes of hairs along the lip margin (2&3). Contraction of the circular muscle raises pressure within the proventriculus squeezing nectar back into the crop through the hairs. Trapped pollen moves towards the distensible pouches in the corners.*

Let us look at the function of the proventriculus in more detail. The proventriculus has four lips. Where each pair of lips meet in the angles of the proventriculus there is a flexible pouch. The proventriculus narrows towards the neck before passing through the wall of the crop and meeting the ventriculus.

The outermost layer of the proventriculus consists of a thick circular muscle. In the neck region contraction of this muscle prevents flow from the proventriculus into the ventriculus. In cross-section each lip can be seen to have an inner longitudinal muscle in addition to the outer circular muscle. Contraction of the inner longitudinal muscle opens the lips (figure 4). This is explained by the greatest shortening being experienced by the longest part of this muscle which is the part in the centre attached to the tip of the lip. As a result, when the muscle contracts the tip is pulled outwards. The lips are fringed by hairs whose length (70 µM) is about two or three times the diameter of typical pollen grains (30 µM). When the lips are pulled open tension on the edge of the lip causes the fringe of hairs to protrude away from the face of the lips. Later in the cycle, when the longitudinal muscle relaxes again, the lips close together trapping a quantity of nectar within the cavity of the proventriculus.

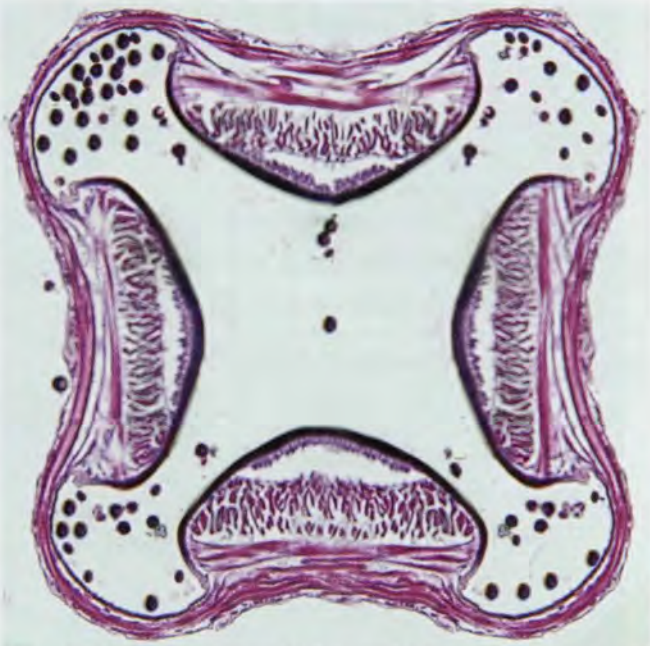


Figure 7. *Section across the proventriculus. This section is through the level of the pouches. With successive waves of opening and closing pollen is compacted into the four distensible corner pouches.*

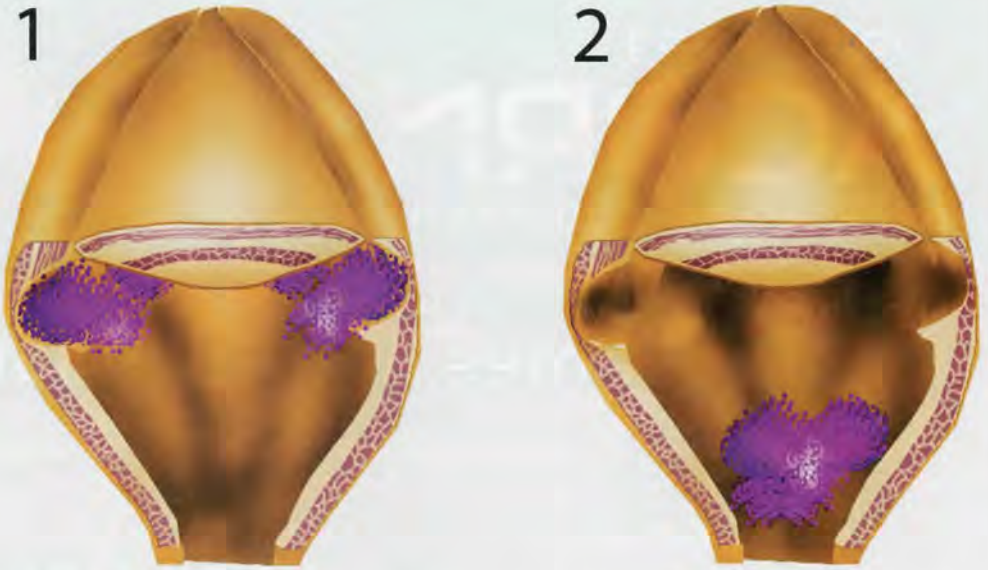


Figure 8. *In this diagram part of the proventriculus has been cut open to show the pouches. Once the four corner pouches are full (1) the neck of the proventriculus relaxes allowing the clumps of pollen to pass down to the ventriculus.*

The outer circular muscle then contracts, and the internal pressure rises. As the circular muscle contraction in the neck region prevents flow into the ventriculus, the liquid nectar is forced back into the crop between the fringing hairs. Any trapped pollen is then caught by the hairs. In the final stage of contraction as the four lips press closer together this pollen is pushed outwards towards the four pouches (*figure 6 and 7*).

With repeated opening and closing of the lips more and more pollen is packed into the pouches until they are filled to capacity. At this point a different process of muscular activity in the outer circular muscle takes place, the pouches are emptied into the center of the proventriculus, the muscle in the neck region relaxes, and the combined clump of pollen passes on into the ventriculus (*figure 8*).

The proventriculus is very efficient. The lips open and close rapidly, and the crop can be cleared of small amounts of pollen within a few minutes. With large quantities (a 25% suspension of pollen in syrup) the crop is still emptied in little over an hour[2]. BC

References

1. *Filtering mechanism of the honey bee proventriculus. Peng and Marston. Physiological Entomology. 1986; 11, 433-9*
2. *The action of the proventriculus of the worker honeybee, Apis mellifera L. Bailey L. Journal of Experimental Biology. 1952. 29, 310-27.*

Overwintering Nuclei Colonies

Larry **Connor**

Some northern beekeepers have success overwintering nuclei-sized colonies. This may be based on a particular stock or genetic trait, and should be tested carefully. More beekeepers are able to overwinter a single, deep hive body by packing the hive out with honey or sugar syrup in the Fall. In addition to food reserves, make sure such colonies are protected from the harsh winds of Winter.

Late Summer and Fall nectar flows. In many northern locations, there are important nectar flows that will make the Summer increase colonies strong in stores and perhaps produce a surplus, depending upon how you have made them up. Look for flows from purple loosestrife (*Lythrum salicaria*), sweet pepper bush (*Clethra*), Japanese bamboo (*Polygonum*), goldenrod (*Solidago*) and asters. Failing that, a good feeding program is essential.

Evaluating colonies. When you evaluate new queens established in increase colonies, there are several characteristics to consider:

Brood pattern – Look for a compact brood pattern with few missed cells.

Hygienic behavior – Test for hygienic behavior using the frozen brood or liquid nitrogen method for definite results. Lacking that, look for rapid cell cleaning if infected with chalkbrood.

Comb building/propolis – Excessive brace and burr comb, as well as excessive use of propolis, are no excuse to send a queen packing.

Temper – How defensive are these bees? Are you getting too many stings? Remove 'hot' colonies from your apiary and requeen.

Temperament – Are the bees quiet on the comb or running away as you work the hive. Quieter bees are easier to work and their queen is easier to find.

Food gathering – Are the bees adding to the stored food in the hive? If one group of colonies needs feeding while another is producing honey, that should tell you what to do.

Pollen storage – A band of pollen between the brood and the honey on a brood frame tells you a great deal about the pollen foraging of a colony. You want colonies with good pollen foraging behavior and reserves.

The queen is the wrong color for your tastes. Having said that, I try to ignore queen color, knowing some beekeepers want darker bees because they believe they are more *Varroa*-tolerant and work better at low temperatures and low light conditions. Other beekeepers want only bright yellow queens because they are easier to spot on the comb.

Incorporating key concepts from Brother Adam and G.M. Doolittle, beekeepers can successfully overwinter nuclei colonies. They mate and evaluate queens in Summer nuclei and overwinter the best for Spring increase or replacement hives. Two commercial beekeepers from Vermont, Kirk Webster and Mike Palmer, have developed similar and successful programs, both of which influence many beekeepers throughout the continent.

Webster and Palmer use double nucleus hives, an adaptation of the four-way nucleus used by Brother Adam. The colony uses a solid half-inch bottom board and a three-eighths inch rim. The bottom board is divided by a shim or divider down the middle to keep the two colonies separate when a special feeder is put in place. A deep hive body is fastened with a double division board feeder that sits on the center rim and divides the hive to create two separate nuclei. The feeder allows the worker bees to enter from one side only. The double nucleus provides room for four standard deep Langstroth frames for each nuclei. The feeder may be moved to be used as an eight-frame nucleus. Five-frame nuclei are possible when a Masonite™ or thin plywood divider is used.

Kirk Webster

Using double nuclei, Kirk Webster (Middlebury, VT) has successfully incorporated a high level of *Varroa*-mite tolerant survivor stock in his own operation. The spread of *Varroa destructor* in North America prompted him to obtain long-term survivor stock from the USDA bee-breeding program using daughters of Russian queens from Russia's Pacific coast, an area called the Primorsky Territory where *Apis mellifera* and *Apis cerana* are both exposed to *Varroa destructor*.

The Brood Factory Apiary wrapped for Winter. (photo by Mike Palmer)

There, surviving *A. mellifera* colonies gradually developed adaptations helping them to the tolerate the mites and increase honey bee survival.

The Russian bees differ from most stocks found in North America which are largely Italian in origin. The pressure of the *Varroa* mite population favored Russian bees that maintain a very small brood nest until the primary spring flow begins (May in Vermont) at which point the colony populations explode. Russian bees produce queen cells throughout the season and have an increased likelihood to swarm. After introducing these genes, Webster's bees are gentle and require minimal stored food for Winter survival.

Webster sets up his colonies as mating nuclei and produces the first queen cells in late May. As the season progresses, he runs five or more cycles of queens through the mating nuclei to meet queen orders and his own needs. At the end of the season he establishes queens that overwinter in the nuclei. His bee-breeding program incorporates 15 different genetic families so he must produce queens from each of the 15 families as well as any new genetic stock he is trying.

Queens are open mated in a semi-remote valley, an area where mating nuclei are somewhat isolated from other colonies and target drones are provided for saturation and mating, thus maintaining a larger percentage of the Russian characteristics.

Webster Winters colonies in four packs of eight nuclei. The colonies are positioned so four double nucleus colonies are shoved together. Empty grain feed bags are used as inner covers to wick out moisture and two-inch insulation is used as a top. No upper entrance is provided. These colonies are then wrapped with roofing paper and the entire arrangement is tied down with cord. Using this combination of genetic control and management manipulation, Webster has been able to run his operation miticide free since 2002.

Mike Palmer

Less focused on developing a mite-tolerant northern stock than Webster, Mike Palmer (St. Albans, VT) seeks to develop a stock that is productive in Vermont. He treats colonies for mites as necessary and makes up and overwinters double nuclei as a means of keeping his operation filled with productive honey-making colonies. He makes up nuclei during the Summer, at least ten weeks before the end of the main brood rearing cycle in northern Vermont. As they enter Winter, he provides young, newly mated queens with three and a half frames of honey in the lower chamber and four frames of honey in a second box.

Palmer identifies the least productive colonies in his operation and eliminates them to create nuclei. None of the original colony remains. From the middle divider, each colony gets an empty frame, a frame filled with brood, a partial frame with brood, and a frame of honey. They are given a queen cell the following day.

Overly strong nucleus colonies are cut in strength by removing a frame of brood. In September, both sides of the double nuclei are fed sugar syrup so three and a half frames are filled with honey or syrup, leaving half a frame for late brood to emerge and provide a cluster space for the bees. A second box of honey is added as an additional, divided box. The Winter cluster is very small and is given just 20-25 pounds of stored food. Most of the consumption of Winter reserves does not take place until April.

The double nucleus may be wintered by itself on an empty hive body as shown in the photos or on the inner cover of a strong production hive. On top of the double nucleus, Palmer adds a two-inch piece of insulation under the telescoping cover. The lower hive is wrapped with roofing paper, and the double nuc is given its own Winter wrap. BC

From the newly revised Increase Essentials, *Second Edition. Published Wicwas Press May 2014. Available from your favorite bee supply dealer or* ***www.wicwas.com.***

Read more about Mike Palmer's techniques next month.

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Kentucky writes:

I just did my normal lunch walk around my hives and noticed some signs of skunk near one hive. The hive reducer I had in place was pulled off and the grass was matted down. It's a weak hive I've been working on, thus the hive reducer. Last year I had a skunk issue and resolved it with live traps, but that was a stinky mess. What do others in our area use to deter skunks? I've read about chicken wire in front of the hive and using carpet tack strips on the hive entrances. I'm considering raising my hives off the ground more also.

Phil replies:

I've always been amazed that I haven't (so far) had skunk problems. There are plenty of skunks around our home where my apiary is, and my old dog had several *close encounters of the third kind* with them! She was sprayed each time, which made her canis non grata around the house. However, I admit that, since they have never bothered my hives, I do not have personal experience in dealing with skunks. I do have a long history of listening to beekeepers talk about the varmints, the trouble they can cause, and how to deter them.

A skunk's strategy is to scratch at a hive's entrance. When bees come out to investigate or drive off the intruder, the skunk chows down on them. Its thick fur gives it a measure of protection from stings. These predations are nocturnal, since skunks are not active during the day when bees are flying. Scratches on the hive's entrance, and bare earth, or even holes in front of the hive (caused by the skunk's digging while eating captured bees), are both evidence that one has been preying on your hive. You may also see skunk feces, containing the exoskeletons of bees, around the apiary. If skunks are in your area, even if they are not molesting your bees, you might see holes, a couple of inches in diameter and 3-4" deep, which they make in your lawn while digging for insects or earthworms. And, of course, you'll probably smell them.

Hive entrance enclosed by hardware cloth. (photo by Rob Snyder)

It sounds as though you have correctly diagnosed a skunk problem, and you're right in trying to deal with it as promptly as possible. Skunks, like bears, will return night after night once they begin preying on honey bees. They can seriously reduce the number of bees in a colony. Also, skunk activity results in extremely defensive bees. If the bees in one hive become too defensive, the skunk just moves to another. One of the first questions I ask beekeepers who call me complaining of mean bees is whether they have had a recent skunk problem.

As an alternative to eliminating the skunks, which is final but, as you've discovered, easier said than done, beekeepers use various deterrents. Most of them involve using screen, hardware cloth, or chicken wire, as you mentioned. Some beekeepers simply stretch a piece of hardware cloth or wire in front of the hive. It can also be attached to the hive's entrance and extended a foot or two along the ground. The purpose is to interfere with the skunks' walking and digging in front of the hive. The other tactic you refer to, of attaching a carpet tack strip on the bottom of the entrance, is also commonly recommended. The idea is that the skunks reach up, encounter the tacks and go away. Even just elevating the entrance at least 15" or 18" above the ground, may be of help. It forces skunks to reach higher, exposing their undersides to the bees and making them more susceptible to stings. All of these strategies make attacking the hive more difficult or painful for the skunks. Whether or not they're successful will depend on how determined the animals are and on the availability of more easily accessible food sources nearby.

Another method, which I've only seen in use a few times, is designed, not just to deter the skunks, but to prevent them from getting access to the entrance. It's a little more work for the beekeeper, so you might want to try some of the standard deterrents first. It involves enclosing the entrance with hardware cloth, tacked or stapled to the hive as seen in the photo. I would suggest

a fairly large opening size, so as not to impede the bees' movement. Openings of ¼" or ½" should work, as would chicken wire. Just make sure the hardware cloth or wire is taut enough that the skunks cannot push on the screen and move it into contact with the entrance.

Whichever method you try, let me know how it goes.

A beekeeper in Kentucky writes (Note to Bee Culture *readers: this question was emailed to me in early June.):*

Last Saturday, our hive appeared to be swarming. I was working in my garden and started hearing louder and louder buzzing then saw a very large amount of bees outside of my hive. When I went over to look, they were pouring out of the hive in large numbers. I, along with my two daughters, also found that we were getting hit with yellow matter on our heads and arms. Within about 10-15 minutes, they went back into the hive, without clustering on a tree. I felt that this was a prelude to a swarm, so the next day, we opened the hive and removed the numerous queen cells that we found. We did not go all the way down to the bottom box though, we were nervous about what we were doing so we didn't want to overdo and be sorry. I just want advice on what we need to do from here. If the hive is overcrowded, I know we should probably add a box - but wasn't sure if it is a good thing to have three brood boxes.

We have a honey super that is almost full, and had just added a new box on top. This was added before the pre-swarm (if that's what you call it).

I wanted to split the hive, but had a terrible fear that we'd hurt the queen or not put enough of what we needed to in the new box, since we are so inexperienced.

What is the best thing to do? If we removed the queen cells that we found, how do we know what the reason for them having them were in the first place? I would like to correct that problem ASAP.

Also, what was that yellow matter? Could it have come from fighting queens?

Phil replies:

First, I do not think that this behavior was related to swarming, though it's easy to see how it could give that impression. I have seen the same thing more than once when I was out working in my apiary: the sudden exodus of a great number of bees from a hive, usually in the late afternoon, lasting about 10 to 15 minutes, then ending suddenly. But instead of the cloud of bees' moving away from the hive or clustering in a tree as a swarm does, it reenters the original hive. I'm certain that what you saw was young honey bees making their first orientation flights. These flights last a very short time and are typically made on sunny afternoons. One difference between my experiences and yours is that I have never been hit by "the yellow matter" you described while I was watching an orientation flight. I have, however, on numerous occasions, been pelted by bee feces – because that's what the yellow stuff was. Perhaps, when I have seen orientation flights in progress, I have not been as curious as you and your daughters, and have not gotten as close to the hive entrance.

Though the activity you saw was not evidence of swarming, the presence of numerous queen cells, combined with a strong colony (I assume this based on its having filled a honey super this early in the season), is an indication that it is preparing to swarm, or has already done so. Before departing with the old queen, bees make numerous queen cells, referred to as swarm cells, to produce a queen for the continuation of the existing colony. My first advice is not to destroy any more of these cells. Colonies swarm as soon as the queen cells are capped, so it is possible that the old queen is already gone and that the queen cells contain the colony's future. Many beekeepers have destroyed queen cells in hives they thought were about to swarm, only to end up with queen-less hives. Since you did not destroy any cells in the bottom brood box, let's hope that some are still left there. You might even have a few in the upper box. They are easy to miss - another reason that removing queen cells is not an efficient swarm prevention technique.

In addition to swarm cells, queen cells can also be classified as supercedure and emergency cells. The purpose of these is to replace a failing queen or a lost queen respectively. Regardless of the bees' reason for making a new queen, you want this process to proceed. I suggest allowing Mother Nature to follow her own

course. New beekeepers are often overly concerned about swarming. Though it can weaken hives temporarily, they usually rebound quickly. I regularly have hives swarm, (sometimes without my being aware of it at the time), and still make a good honey crop from them. Swarming is part of the natural reproductive process of a colony, and there is no reproductive advantage in a strong hive's swarming and leaving behind a greatly weakened colony. Part of the activity of a colony about to swarm is directed towards ensuring that the old colony produces a healthy, new queen and lots of brood. That way both old and new colonies have a chance to build their populations and thrive.

If the hive has not swarmed yet, it is really too late to stop it. Once a colony progresses to the point of making swarm cells, it is well on the path to swarming. Adding a third brood box will not prevent it. They would likely fill the box as much with nectar as with brood, and for nectar, you have correctly added another honey super.

One action I do urge you to take, if you know or suspect that the hive has swarmed, is to check it in two to three weeks in order to confirm the presence of a replacement queen. It can take that long for the new queen to emerge from a capped queen cell, mate, and start laying eggs. The eggs themselves, along with young brood, are proof that she is there and laying, even if you do not actually see her. It's important to check, because queenless hives can result from swarming if the new queen dies or fails to mate successfully. Under those circumstances, I suggest re-queening the hive. A hive that fails to produce a mated, laying queen after swarming, is not in position to make additional queens, due to the absence of eggs and young larvae.

Orientation flights.

I hope this makes you sleep a little better. Beekeeping - helping our bees be more successful - is never simple, but sometimes the best course is to let them follow their instincts. Understanding why they do what they do is more difficult. BC

All The Buzzz in...

Bee B. Queen Challenge

Make up a new recipe using honey.

Hello Friends,
September is National Honey Month. Celebrate by thanking the honey bees for all their hard work.

Bee B.Queen

The Story of Honey

told by Benita the Bee and Her Bee Buddies

"OK Girls. We are the oldest bees in the hive. It's time to go out and bring back the groceries. What do we need to get? "

"We need pollen for our babies to eat. Protein!"

"We need nectar to make honey

"We need propolis to seal our hive. Can anyone guess the fourth thing we need?

"Water!"

"Yes!"

Kently Christensen, 6, UT

"I think on this trip, I'm going to bring back nectar. We need to make honey to store over the winter."

"Me too!"

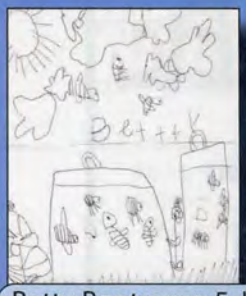
"Me too!"

"We can fly about 3 miles in any direction."

"Me too!"

Buzzzzzzzzzzzzzzzzzzzzzzzz

Buzzzzzzzzzzzzzzzzz



Betty Bontrager, 5, IN

"I see some clover flowers. Now I'll just stick my long tongue into the flower and slurp up some nectar. I only go to the same kind of flower on each trip. Yum! Off to another clover flower, and another and another and another. Over 100 flowers and my honey tank is full of nectar. Time to go home."

Home again. "Hey Bee Buddy. Help me with this nectar. I can pass the nectar to you using my tongue. Here you go."

"I will add an enzyme to the nectar and put the nectar into a cell. "

Sam Yoder, 11, OH

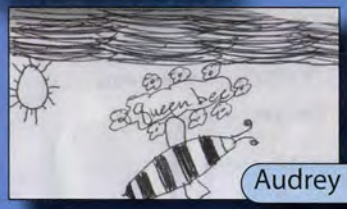
"All right girls. We need to evaporate the water. We don't have fans to move the air but we do have wings. Let's get to work. Flap those wings!"

"Keep going until we have about 17 % water."

"Now we have delicious, sweet honey!"

"Seal it up with wax."

"Yum, yum, yum!"



Audrey Broderson, WA

"Nectar from different flowers will make honey that looks and tastes different."

1A, 2I, 3G, 4E, 5H, 6C, 7B, 8F, 9D

... Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
August 2014

Fruity Frozen Yogurt Pops

Ingredients

- 1 cup - fresh, nectarines, pineapple, or strawberries
- 1-1/2 cups - plain yogurt
- 1/3 cup - honey
- 1 teaspoon - vanilla
- 8 - paper cups (3 oz.) and popsicle sticks or plastic spoons

Directions
In a blender, combine all ingredients; mix well. Pour into eight (3 oz.) paper cups; insert popsicle sticks or plastic spoon in center of each. Freeze 4 hours or until solidly frozen.

Thank you to the National Honey Board for this recipe. For more recipes go to www.honey.com.

The Honey Making Song

Tune: "If You're Happy and You Know It"
Words: Kim Lehman

If you want to make some honey fly around.
If you want to make some honey fly around.
If you want to make some honey,
If you want to make some honey,
If you want to make some honey, fly around.

Verses
Sip some nectar from a flower slurpity slurp...
Add some enzymes to the nectar gurgley goo...
Put the nectar inside the cells blah, blah, blah...
Evaporate all the water flap your wings...
Now we have some honey yum, yum, yum...

The Queen Bee Song

Tune: "Farmer in the Dell"
Words: Audrey Broderson

The queen bee lays the eggs,
She lays them all the time,
What if I were her,
I'd lay eggs all the time.

Honey Around the World

Honey in other languages is still sweet. Can you guess the language of each of these words for honey?

1. Spanish	A. miel
2. Swahili	B. דְבַש
3. Ukranian	C. mel
4. German	D. mât ong
5. Arabic	E. honig
6. Latin	F. 蜜
7. Hebrew	G. квітковий сік
8. Mandarin	H. وة حلا
9. Vietnamese	I. asali

Bee Buddy

My name is Samuel Kassel. I am 100% a beekeeper. I've been a beekeeper since I was 4 years old and I am 7 now. We have 4 beehives. My favorite things about beekeeping are looking into the hives to see what the bees are doing, and tasting honey. When I'm not beekeeping I like to ride my bike and skateboard. Last year I helped my dad make a top bar hive. Right after this picture was taken, one of our hives swarmed!

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

MOVE 'EM OUT

Jim **Thompson**

Hive & Super Moving Devices

Every so often a beekeeper is faced with a situation where a hive or many hives must be moved.

Hives are usually moved in the early morning before the bees have started to fly or in the evening after the bees have returned to the hive. However some hives must be moved during daylight hours. A hive that creates a hazard to people should be moved as soon as possible. The beekeeper must make a decision based upon the number of the bees that are within the hive. The hive is sealed up with ventilation and moved. If everything goes well during a day time move a few hundred bees, about the size of a person's fist, may gather for a few hours and then disappear. I have heard of placing a rope in the front entrance of a hive. The rope restricts the bees within the hive and the flying field bees are able to return when the rope is lifted. After several cycles of lifting the rope the majority of bees may be within the hive and the hive could be moved with minimal bee loss.

I have moved open hives that contained bees and closed hives. I like moving the closed hives best as it gives me some assurance that I won't be stung. Invariably there will be some holes that were overlooked and not covered by duct tape, bees hanging under the bottom board, and field bees that come in after the hive has been closed, or bees that escape when the supers shift during transit.

Many years ago the practice of securing a hive consisted of using staples, wood strips, rope, and window screen. You used hive staples to keep the bottom board to the first super or one super tight against another, it required three staples per joint. One staple is used on one side of the hive placed 90° to the joint. Two staples are used on the other side, placed at opposite angles to each other across the joint. This arrangement prevented the shifting of the hive pieces. After the move the beekeeper may have wanted to separate the hive and found that many of the staples broke. Thus there were protruding jagged metal points and holes in the hive parts where the staples came out.

One could use vertical strips of wood and small nails to keep the hive together. If the strips were left on the hives for an extended period of time, the nails could rust and the wood could disintegrate to make a mess for the beekeeper. Using rope to keep the hives together worked for some beekeepers but this practice was abandoned because different types of rope would stretch and allow the hive parts to shift and many beekeepers could not tie knots that keep objects tight. Window screen was cut or torn in strips four to five inches wide and about 18 inches long. The screen was then doubled back on the ends, so the remaining piece was the length of the entrance. Then the screen was bent in half lengthwise and opened up to form a "V". This piece could be pressed into the entrance with a hive tool, and the bees were sealed in for the move. The screen could be removed after the move with a quick yank. Some beekeepers like to use green grass to plug the entrance.

Later methods of sealing the hive up for moving include using a banding machine or ratchet straps. Before you tighten the straps make sure that the parts are aligned so there are minimal cracks. Duct tape can be used over the large cracks and adheres better if the surface is dry. If you use ratchet straps remember that when the mechanisms are left exposed to the weather, rust occurs and sometimes the webbing degrades or stretches.

If you move bees in hot weather be sure to allow plenty of air to move through the hive. A top screen normally has a border, but one could simply remove the top and staple window screen to the top of the super. I witnessed an event where three double story hives were put into a van and transported 30 miles. When the hives were unloaded, the bees had overheated and were dead.

In cooler weather you can move a hive without a top screen as long as there is plenty of room within the hive. It is helpful to have a screened front entrance. A front entrance screen has a framework that covers the entrance and is four to five inches tall. It can be mounted by hooks, screws, Velcro, or duck tape. The large front surface is covered with window screen or 1/8 inch hardware cloth.

For those that move many hives there are motor driven lifts. There are walk behind machines, lift arms mounted on trucks, hoists contained within bumpers, mounted lift gates, forklift type machines like the Swinger, DR power wagons, and tractors with a scoop or lift. You need to be moving large quantities of hives or make several moves to justify these machines.

A hoist that is mounted within a bumper gives the owner the maximum bed space but constant exposure to the weather can cause the winch to malfunction. The hoist can perform many functions from loading objects, pulling

fence posts, and getting the truck out of stuck spots. A built in outrigger is lowered if extremely heavy loads are expected. The maximum weight of the one pictured is rated at 1000 pounds. To load hives, the patented hive lifter (4,722,106) is used with the bumper hoist.

Most of the following devices are one person operational, however an assistant is helpful. I remember trying to get my wife to help me move bees and all the concessions that I had to make. "Yes, all the bees are in the hive. No, you will not be stung. Just dress up in that bee suit and forget that it's 90° out there." It is very difficult to get good cheap bee help.

In an earlier article I mentioned the green monster which was an invention that consisted of bicycle tires and a cage that surrounded the hive. (patent 2,108,480) You could wheel it up to the hive, winch it into the air and try to move the hive. The ground clearance was very low, the tipping or control handles were too short, the hive could bang against the cage, the wheels would sink into the ground and you could ruin your shins bumping into the cage. It was an unacceptable device. A similar type of red mover is featured that improves the ground clearance, steering and shin issue.

The wheelbarrow perhaps is the first type of device that people think of to move a hive. You must look at the different types of wheel barrows that are available. If all of the moving that you do is to transfer nucs, then one of the very light weight models may be the answer. If you plan to move a full sized hive in the small wheelbarrow, figure that the metal handles and the pan will bend. The commercial sized wheelbarrow may be your answer in hauling the larger loads. You can carry six or seven full depth supers in a standard wheelbarrow but they must be staggered. Because the standard commercial wheel barrow has a single front wheel, you may have trouble lifting and balancing a full sized hive. Once the load is in the wheel barrow you must worry about its stability and how you are going to unload it.

Another type of commercial wheelbarrow is the two wheeled variety. It has about the same capacity as the one wheeled variety however it does not tip as easily. It doesn't turn as sharp corners but you still have the lifting problem of getting a hive into and out of the wheel barrow.

I purchased a homemade hive moving wheelbarrow. It has a very large front wheel, TI45/80D16, so the handles are higher and the bed closer to being level. A warning on the tire mentions that it is for temporary use and to keep the speed below 50 miles per hour. It has a 24" x 34" deck so you may place two hives or equipment on it. I know that it is old as one of the front vertical boards is 14 ¾" wide. It handles well due to the wide 5-3/4" tire and the deck design allows hives to be easy to load. However one must pick up the hive from the ground and therefore it is better suited to moving small hives or nucs. If a person is creative, a platform could be made over the wheel that protrudes slightly over the bed of a truck. Once the wheelbarrow is against the truck, the hive could be raised to the platform and slid into the truck. The overhang of the platform hive would help steady the wheelbarrow when it was against the truck.

A collapsible wheelbarrow solved the lifting of a hive from the ground. It was commercially made and sold by a bee supply company. You would place the wheelbarrow around the hive and tip the hive onto bottom supports and clamp the sides of the wheelbarrow together with straps. You could pick up the hive and wheel it off to the new location. The downside of this part of the trip was due to the weight of the hive, the condition of the ground, and the thin front wheel. Sometimes the wheel would

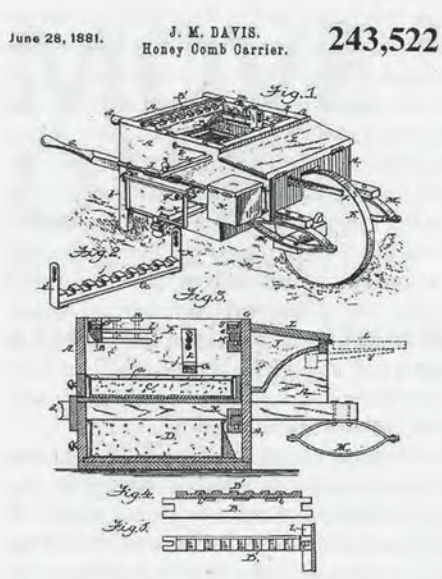

June 28, 1881. J. M. DAVIS. Honey Comb Carrier. 243,522

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

sink into the ground. The real problem began when you tried to wheel the empty contraption back to the truck. You suddenly realized that the two side pieces of the wheelbarrow would go in opposite directions. There needed to be detachable rods that held the wheelbarrow together when it was empty.

A four wheeled cart has been thought of as a conveyance device. There are several types that come to mind. The first has a large platform and a handle that can be removed. Most of the time these carts are used to carry office supplies, but in the field the wheels don't work properly. A regular wagon can be used to haul beehives. These wagons are available in different sizes and have a variety of wheel sizes. The landscape wagon is even better as the sides fold or can be removed revealing a flat deck for hauling. When the cart is wheeled on to a ramp, two people are usually required. A variation of this cart is a two-wheeled hand truck with additional wheels on the handle. Part of the handle unclips and is fastened into a 90° position. The result is a four wheeled cart but the small wheels are only acceptable on smooth hard surfaces.

I have seen carts made out of rotary lawn mower bases. For short moves on level ground they would work

well. However when ramps are involved you may have problems due to the ground clearance. If the hive is very heavy, you could bend the wheel mounting brackets or the mower deck. You may be forced to pull the mower deck because of the way the handle is anchored. However lifting of the hive onto the cart is kept to a minimum.

The two wheeled lift truck solves lifting a hive from the ground. The inexpensive lift trucks are unsatisfactory as the wheels are usually small, the nose or platform is short, and the handles are light duty. Several commercially made lift trucks are available but most have problems. The ideal lift truck should have large wheels, large nose, sturdy uprights, a looped handle, be light weight, have the ability to lift the platform, and be narrow enough to fit through regular doors. Thus the ideal two wheeled cart doesn't exist, but one that is satisfactory would have to be constructed and would probably have many of the mentioned features.

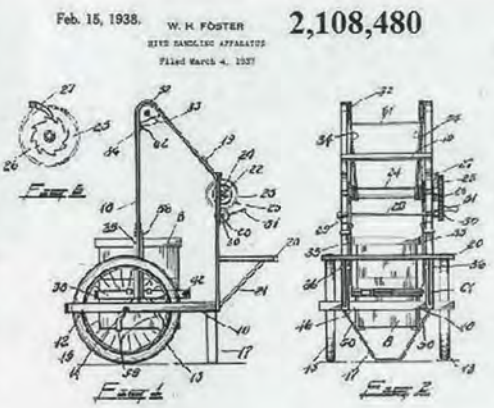
The tires on some lift trucks are doubled so there are four tires on the shaft. This gives you more surface area against the ground and the cart won't sink into the ground as easily. For wheeling a hive over uneven ground a larger diameter tire works best. The platform must be

capable of supporting an area of 22 inches by 16¼ inches. Some trucks have a tubular hinged platform that swings down for large loads. Other lift trucks have a solid ¼" steel plate for the nose. The solid plate makes the lift truck very heavy. The platform needs its strength near the base of the vertical members yet it is nice to have the depth to control and slide the hive. The vertical members need to be strong enough to be able to tip and control a 500 lb weight. The cart should be tall enough to enable moving a hive that has two deep supers and three Illinois depth supers which is about 40" tall. The grips made of rubber or plastic handle behind the staff tend to pull off at inopportune times. Therefore a loop type handle is recommended. The loop handle is also handy when you need additional help in pulling the cart up a ramp. A vertical lift of the platform might be nice if you wanted to wheel the cart near a truck and don't have a ramp. Another use for the raised platform is serve as a work table in loading frames into an uncapper or extractor.

In 1964 *Bee Culture* featured a different kind of two wheeled cart that would move loads that weigh less than the beekeeper, the handles are pushed down to wheel the hive low to the ground. It was invented by Arthur Brown from Port Huron, Michigan.

ARTHUR BROWN
Port Huron, Mich.

A different type of super moving device is the two pole pivot device. (Patent 5,735,728) The beekeeper has two adjustable poles and a clamp that will hook onto either a small hive or a single super. By tipping the bipod, the load will swing to the new position. It gets very confusing if you are planning to load a large load into a truck from the ground. Sometimes the pivoting could cause a negative mechanical advantage due to the placement of the poles and you may be required to lift the entire weight.



Moving a hive in the Winter time when snow is on the ground could be done by using a sled. A tough material such as some plastics, a tarp, sheet metal, or plywood could be fitted with a tow rope and used to pull a hive around. Care must be used to not jar to hive to make the bees to break their cluster. If the cluster is broken, the bees could freeze if they don't get back together.

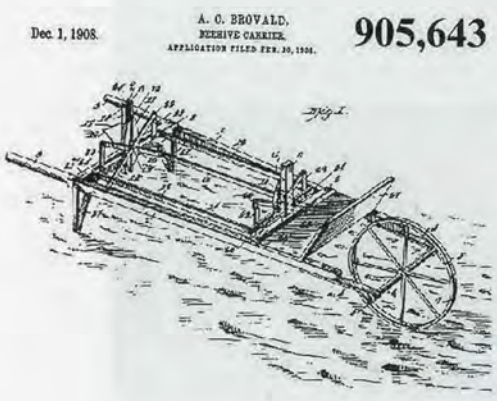
The two person approach in moving hives consists of the manual lift, pole and strap, scissor type lifts, and clamp type movers,

The manual lift is actually easier than it initially sounds. A hive is packaged as a moving unit and then tipped to an angle of 45° or more. The tilting can be either side ways or backwards. One person will pick up the hive by the back side of the lid and the other person will pick up the hive by the front, by clasping the bottom board that is off the ground. The hive may be carried in this position or it can be tilted and carried in a nearly horizontal position. Once it gets close to the bed of the truck or trailer, the lowest point of the hive is set down. The hive is then hoisted into the vertical position. The hive is then positioned in the truck for the trip and anchored so it doesn't tip or fall. The conventional direction of a hive

in transit is to have the frames parallel to the longitude of the vehicle. This prevents frames from rocking when the brakes are applied, killing bees.

The pole and strap method requires a long sturdy pole which will rest on the shoulders of two beekeepers. (Patent 4,392,679) A hive is hooked to the middle of the pole. If one person is stronger than the other the hive could be placed nearer the stronger person. It may be a bit scary because you are placing all of your confidence in the pole and the straps, and the other lifter.

The scissor type hive lifters are available in many styles. The current ones are made of metal tubing and are large enough that they will fit over the top cover. There is an intermediate bar that will pinch against the hive when the handles are lifted. Two models contain a rubber center for gripping. I have found that the round rubber center slips and allows the hive to be dropped. The other rubber center is flattened so it grips satisfactory. Some lifters have a metal tab that fits into the cut hand hold to maintain a solid grip. Care must be used when positioning this carrier as there is a definite top side. A smaller light weight metal scissor lifter is available for carrying supers. This lifter just barely fits over a super and is spring loaded. An advantage of this type of carrier is that it provides a positive and safe handhold. An older style of the scissor lifter is made of wood, works in the same way using friction. The parts that pinch the hive are mortised into the handles at an angle. These boards would be vertical when a hive is lifted. However it was made with such tolerances that you must remove the telescoping cover to put the carrier on the hive.

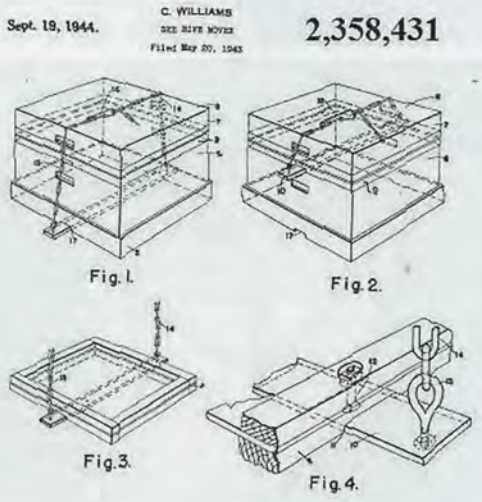


A variation of the scissor lifter is the clamp type that has an end board that will pinch against the end of the hive. The clamp end is spring loaded so the load is locked in while the hive is being carried. The disadvantage of this carrier is that it weights as much as a small hive.

Another two person carrier consists of two short handles that look like the"D" type shovel handles and have a hook on the bottom. Each handle is placed on opposite sides of the hive and hook is under the bottom board. The handles are placed in the middle of the hive for balance and are tied together with a strap. The hive may be picked up by the handles and moved. However the hive cannot be large because of the length of the handles.

My preferences in hive moving devices or techniques are to use a specially made two wheeled cart with the large nose plate or to hand carry the hives with a fellow beekeeper.

Once the hive or hives are loaded onto the truck or trailer, they should be anchored. Unstrapped hives have been known to tip out of their vehicles. It is not fun to pick up hive pieces with angry bees. BC



Jim Thompson is a beekeeping historian and collector. See his patent files and other articles on Bee Culture's *new web page, under Thompson's Files.*

The Care & Maintenance Of Your Most Useful Tool

Peter **Sieling**

When was the last time you sharpened your hive tool? Have you ever sharpened it? Some beekeepers prefer using a dull hive tool because it is safer. If you only use a hive tool for prying bee boxes apart and loosening and lifting frames, then a dull tool is safer. If you spend a lot of time scraping propolis and wax off frames and cleaning frame rest rabbets, you should at least try a sharp tool.

In Cub Scouts, we learned that a sharp blade, used properly, is safer than a dull blade. After 50 years, I still believe that. A sharp hive tool cuts through wax and propolis in light and easy strokes. A dull tool requires brute force. It may skip out of the cut and unexpectedly skid over the surface. A dull tool will cut into flesh as easily as a sharp tool when it slips.

With practice, sharpening a hive tool takes five minutes or less. You can restore the dull edge in seconds with a rock.

Hive Tool Styles

One of my beekeeping supply catalogs shows eight different hive tools with a wide price range, but they mostly fall into two categories – flat and L-shaped. They all have "nail puller" holes – almost worthless for pulling nails but good for hanging on the wall. The flat style tools have a chisel end for prying apart hive boxes and a lever end for lifting frames straight out of the box. I prefer flat tools for removing frames, but if you drop one between the frames, it will fall all the way to the bottom board. The L-shaped tools work best for scraping off burr comb from top and bottom bars and cleaning the frame rest rabbets. Buy one of each. They aren't expensive. Better yet, buy two or three. Hive tools are frequently misplaced or lost and a screw driver is a poor substitute.

Grinding the primary bevel.

Honing the edge with an oilstone.

Creating the hook with the shank of a drill bit.

A sharp hive tool will make long thing wood shavings.

Sharpening

A new hive tool has been dipped in paint. If it hasn't, paint it with a bright color to make it easier to find when you drop it in the weeds. If the paint covers the tool blade edge, scrape or wire brush it off the tips.

I keep both ends sharp on my L-shaped hive tool and use it mostly for cleaning and scraping. I use a dull flat hive tool for prying and frame lifting. If you have one hive tool, you may prefer to leave the prying blade dull.

There are two steps to sharpening any blade. First, shape the primary bevel, either with a bench grinder, a file, or progressively finer grades of sandpaper (starting with 100 grit and working up to 325 grit). The flat, prying end is shaped like a chisel with an angle similar to plane irons or knife blades: 25° to 30°. The angle isn't as important as it is for a hand plane. You can do it by eye. The L-shaped or scraping blade angle can be less acute: 30° to 45° or even more. Hive tools come with the primary angle already ground, so unless yours is very dull or nicked, you can skip the first step.

The second step is honing a secondary bevel, also called a microbevel, approximately 3° to 5° less acute than the primary bevel. Use a sharpening stone, or finer grades of sandpaper (400 to 600 grit).

The prying blade is ground and honed on both sides. The scraper blade is ground and honed on one side. But the quality of the edge is only as good as the back side of the

Additional Comments

Safety

A sharp hive tool cuts cleanly with less effort and is easier to control than a dull tool. When pulling a hive tool towards yourself, use two hands on the hive tool and anchor the hive in place by pushing against it with your body. When scraping one handed, never place your free hand in the trajectory of the tool. Reach across the hive with the free hand and pull the hive tool away from your free hand.

Sharpening Systems

Manmade abrasives are harder, sharper, and more uniform than any naturally occurring products. They are also expensive. You can buy water stones, ceramic stones, or diamond stones in multiple grits that can range from 220 for rough honing to 2000 or even 4000 for polishing (the higher the number, the finer the polish). If you are a serious hand tool woodworker, the expensive sharpening stones are great and save time, but, at the other extreme, I can hone a razor sharp edge with a carefully chosen stone from my driveway. That's sharp enough for a hive tool.

Sterilizing Hive Tools

Some beekeepers sterilize their hive tool by placing the ends in the smoker or playing a propane torch along the ends. That's good for hygiene but bad for the tool. The hive tool's cutting edge is very thin. When placed in direct flame, it will heat up long before the rest of the tool, annealing the edge. Fortunately there is a large temperature difference between killing spores and removing temper. With a propane torch, run the flame from the center of the handle out toward but not including the ends – the steel conducts the heat out to the ends. You are aiming for a temperature between 250 and 300 degrees Fahrenheit, hot enough to barely sizzle when dipped in water.

When you dip your hive tool in a smoker, you'll lose the temper on the edge, but unless you pump the bellows like a forge, the next time you grind an edge will most likely remove the annealed edge.

Better yet, scrub the tool in a bleach solution. The bleach will kill everything except foulbrood spores – those will wash off in the scrubbing. Don't forget that sterilizing your hive tool is worthless if you don't wash everything else that comes in contact with the next hive – your hands, gloves, bee brush, etc.

blade. Hone the back surface of the blade as smooth as possible. If the blade is nicked or pitted, hone a microbevel to the back side.

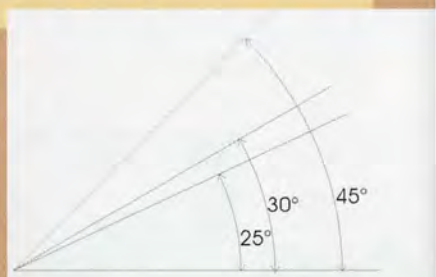
You can hone the blade several times before the primary bevel needs to be reground. It's time to regrind the primary bevel when it takes longer to hone a fresh edge than to grind and hone an edge together. If you have to hone for four or five minutes, go back to the grindstone.

Once the scraper blade is sharp, you can form a microscopic hook on the blade's edge, turning the hive tool into a cabinet scraper. To draw out the hook you will need a piece of steel that is harder than the hive tool. You can buy a burnisher from woodworking suppliers, but the shaft of a drill bit or a screwdriver shank will work almost as well. Put a drop of oil on the edge. Hold the burnisher perpendicular to the sharpened edge and draw it back and forth using moderate pressure at an angle that will bend a microscopic burr over the edge (see diagram). Five to ten strokes from one end to the other are adequate. You can feel the hook by drawing your finger perpendicularly across the blade edge.

A scraper with a hook works well for bare wood and brittle wax and propolis, but in warm weather it might clog. Remove the hook by stroking the back side of the edge with the shank of a drill bit.

Don't throw it in the tool box to rattle around with metal objects. Treat a sharp hive tool as you would treat a knife. BC

Peter Sieling writes, keeps bees, and sharpens hive tools at his shop in Bath, NY. His books are available at www.makingbeehives.com.



Bevel Angles for grinding hive tool blade

Honing a microbevel

Draw out the hook

Yes, It's True. I'm An *Intermittent* Beekeeper

And I have a lot of start/stop beekeeping company

During Winter, I make plans for the next Summer

During the long cold Winter months, when there is little to do but worry about the bees, I make plans for the upcoming warm months. In my mind, I dream of what a glorious season the next year will bring. Not at all like the last season when I got off schedule and missed a swarm, did not requeen the way I had intended, and the nectar flow was not an impressive one. No, none of this will happen next season. I'm making plans for a great year.

Then when Summer gets here, I make excuses

Well, here it is. Summer is well underway and as usual, I'm lagging – but not as much as last year. *(In my defense, I did have a major shoulder re-build that really held me back last season.)* I did get a mite control program underway, and I supered in plenty of time. However, I did not requeen as I had planned, but by not requeening I still have a chunk of funds that I would otherwise have used to buy queen bee bugs. So, in the expenses column, am I ahead or behind?

There's more to beekeeping than keeping bees

I have written about this phenomenon in past articles. Beekeepers live for bees, but actually very little passionate time is spent inside a bee colony. This is where some aspects of intermittent beekeeping begin to show. At the moment, there are plenty of things I could/should be doing in my bees, but nope – I'm off to a bee meeting where I will gather information on how to improve my beekeeping skills even more. Odd isn't it? If I just stayed home, I could have performed many of the tasks that I learn about at meetings. So, here it is – for most of us, beekeeping is more than just keeping bees.

Slapdash beekeeping on the fly

One of my overwintered colonies built up to become an unreasonably powerful colony. It had an obvious brood nest in five deep brood bodies and was a pleasure to watch at work, but not for long. The bees tended to be "stingy" and would motivate any unprotected person (or dog) who did not have good reason for being near the colony. Maybe that is one reason that the colony built up to such a large population.

For several days, rain confined these bees to the hive. Some of the bees were forced to cluster on the hive front. This was clearly a swarming situation, and there was not much that I could do. The first day the rain stopped, I opened this powerful hive.

I suspected that it would be chockablock filled with swarm cells. It was. I had no time to get queens to make splits, and the colony was clearly going to swarm – while I was away at an upcoming meeting in Colorado. This colony was not going to wait.

In numerous previous articles, I have written about my longsuffering near neighbors and their forced tolerance of my bees and me. This was going to be a huge swarm and was certainly going to pitch in one of my neighbor's yards. While I was away, this honey bee biological wonder was going to make a neighborhood scene. That seemed to be irresponsible.

Being the intermittent beekeeper that I am, I made a management decision that would fly in the face of many competent beekeepers. I decided that I would rather have the bees than the honey crop this colony might make in a few weeks. Additionally, I did not want to be a neighborhood pest with these animals. I included another deep in the mix and divided this colony into three separate hives each having abundant brood, food, and space in two deep brood bodies. Each split colony also had some maturing swarm cells. I had no idea where the queen was. No worries. I really did not have to know where she was.

I left the splits to themselves for about five days before having a look. Interestingly, the weakest of the three splits luckily got the original queen. Though I didn't see the virgin queens, the other two had swarm cells that had emerged and all the uncapped brood was now capped. So far, so good.

Some of the swarm cells in the big colony. By using the swarm cells to make divides, I am probably selecting for the swarming tendency.

Then came the required dark period

There were virgin queens in two of the splits, and I had to tell myself, as I have told so many others, to leave them alone. This is a disruptive time for the colony. The unmated queen is jumpy and evasive. Should she be damaged by an examination, the colony would be fatally affected. Outwardly, the two colonies looked perfectly normal. Pollen was being brought in and guards were on duty. This is the dark period when the queen is not readily apparent.

After about 10 days, I could not stand it. True, I was rushing the examination, but there was a chance that the new queens would be on the job. The first split I opened was a dream-come-true. Though I did not take time to look for the new queen, she was on the job and had already developed a nicely formed brood pattern.

The second queenless split, which ironically was the original colony that I divided, showed no signs of anything relating to a queen – *but it was oddly calm and quiet.* It was not making the typical buzzy noises of a queenless stressed colony. Had she just not mated? Had she mated, but not yet developed? After all, I was a few days early for my inspection. To see what the bees would do, I added a frame of uncapped brood. If they started more queen cells, this would indicate that it was still queenless. I had a look three days later, and there were two poorly formed and modestly fed new queen cells. Well, this seemed like a half-hearted effort by the colony, and all this poor reproductive performance was coming from what was presently a remarkably powerful, broodless colony.

My clock was running

Within a couple of days, I was going to be away for nearly two weeks. Two of the three splits looked good, and the swarm urge seemed to have subsided in this three-way divided colony. But every time I examined the one remaining queenless colony, *it was oddly calm and quiet.* If it were direly queenless, this colony should have been more upset.

In this *make-it-up-as-you-go-along* management style, for the third time, I put in a frame of uncapped brood from a nearby colony. About 16 days had passed, and the original colony still (apparently) had no queen. It got all the field force and was the largest split and, yes, it most likely would have laying workers by the time I returned from my trip.

Abruptly, I decided to recombine the mystery colony back with the split that had the original queen. My bees are valuable to me and just to let a colony move into the laying worker category was a waste of bees that I could not allow.

I planned to use the simple newspaper method for combining the colonies. Everything was at the ready. Smoker lit. Newspaper available. I had the mystery colony open and prepped for the combine, *but the colony seemed so normal.* It just did not strike me as a queenless colony. Abruptly I decided ***not*** to combine the colony.

I justified where I was with this difficult colony – I had stopped the swarm from issuing so my neighbors were unaffected. I had two productive colonies that were on the upswing. If this third unit did not make it, I would just recombine it with one of the successful splits. The main thing I would have lost was some of the honey crop, but getting no crop at all is not uncommon in Northeast Ohio so I had not banked that money. Even so, I anguished because the management procedure was unsophisticated – even messy. The next morning, I left for the long trip.

The colony on the left is the troublesome colony. The far right two colonies were the successful colonies. the brood donor colony is second from the left. I know, the grass needs mowing, but I will get to that later.

At the meeting

Thank you to the Colorado State Beekeepers Association for hosting me at your June 2014 Summer meeting in Silt, Colorado. I had a great time. Many times before, I have traveled in Western states where the topography and climate is inconceivably different. This time was no different. In remote areas, frequently hot and dry, there would be the occasional honey bee forging on some little desert blossom. At that moment, I would wonder what had happened in that third split back in Ohio. Nothing could be done. That colony was on its own, but I still wondered how it ended. For sure, one way or the other, by now it had ended.

Finally, the end

After meeting many new beekeepers and visiting some national parks and forests, I returned to Ohio and my bees. Should I unload the car or go straight to the mystery hive?

As I opened the colony, I immediately found abundant eggs and brood. *I thought so! I thought so!* I don't know why it took so long or if the colony had to perform a *"do-over,"* but the bees finally got a queen out of the deal. My risk-taking and patience paid off. Even so, this was a bumpy procedure taken by a beekeeper who could not be present to actually keep his bees. As an intermittent beekeeper, I must leave my bees to themselves more than I want.

Loose Ends

Some lost crop

I now have three, good colonies where earlier, I had a single huge colony. Providing a purchased queen would have moved bee things more quickly but would have been costly. I contend that sometimes it is okay to use the bee's natural method of queen replacement.

Frustration for both new and experienced beekeepers

What this colony put me through is an issue for new beekeepers who are unsure how to proceed during this period and do not have open brood to

continually add to the troublesome colony. I have described, time and again, the quiet dark phase that a colony enters as the virgin queen begins the mating process. There are no eggs, no brood, and no queen cells. How long to wait before making changes is a constant consideration. There is no easy answer. Managing a colony during the queen transition is an anxious time for all beekeepers.

Urban beekeeping

Discussions of bees in the populated environment are common. However, recommendations for managing bees in the city environment are now only evolving. Is the suburban beekeeper's typical goal to have the largest colony possible and produce the largest honey crop possible on the smallest city lot? I don't think so. In essence, during this saga, I manipulated my bees to attempt to control their effects on surrounding neighbors. I made these decisions at the cost of a reduced honey crop, redirected energies, and smaller colonies.

Smaller colonies in general

Huge colonies are generally managed by beekeepers with small numbers of colonies. Commercial beekeepers keep colonies small or they extract multiple times – which also keeps the colonies small. As I age, smaller colonies are much more appealing. I am in the enviable group that keeps bees for the enjoyment of it and not necessarily for profit (something that is not lost on my wife).

The start/stop process of intermittent beekeeping

At the Colorado meeting, I was relieved to hear John H., a longtime established beekeeper, say that the nectar flow was starting as he was leaving for the meeting so he, *"slapped on some supers"* and took off – classic intermittent beekeeping. I suspect that many of us practice this form of stop/start beekeeping.

Beekeeping is a major component of our lives, but for all but a few of us, it is not our only life. The bee management system of this type of intermittent beekeeping is a series of accomplishments and a longer list of promises. There is never a day in my life that I do not devote some part of my energy to beekeeping needs. This does not mean that I am in the colonies every day. Bees need time to be bees, and occasionally I need time to be something other than a beekeeper. BC

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

Thoughts On Packaging Honey

Ross **Conrad**

There are a thousand things to put honey in. Here are some of them.

These days our packaging options are many – which is the best for you and your customers?

As Summer draws to a close and the season's blossoms begin to fade, a beekeeper's thoughts naturally turn to harvesting and bottling the year's honey crop.

Every beekeeper who harvests honey will have to decide what type of container they will use to package their honey. This decision will be based largely upon the intended market for the honey, however other considerations such as the type of honey to be bottled, container cost, and shipping weight are also important. While honey tins were often used in the old days, metal containers can corrode and are seldom used today with the exception of 55-gallon drums used by large-scale operations. Todays metal drums are coated on the inside with a food-grade coating to prevent the metal from reacting with the honey.

Liquid Honey

Honey that is extracted from the comb is known as liquid honey, and is the most versatile form of honey. Most retail honey sold in the United States today is in liquid form, although this is not the case in most other countries. The most common package for liquid honey is a plastic container. Whether it is a bottle, jar, or bear, plastic packaging has many benefits. It tends to be less expensive than glass, plastic does not shatter like glass when dropped or banged around, and it weighs a lot less than glass. The latter two benefits are extremely important to beekeepers that ship honey to customers around the country or overseas. The drawbacks to plastic are that it does not suggest high quality, and due to its propensity to resist degrading, disposal can be an issue especially in areas that do not have recycling programs. Plastic also contains phthalates, plasticizers that may leach into the honey once it is bottled.

Glass containers tend to be used by those who wish to avoid plastic or desire to market honey to a more upscale consumer, or both. Reusable glass jars, or specially designed jars and bottles with unique shapes are often used to encourage customers to save and reuse the container once the honey has been consumed.

Crystallized or Set Honey

Honey that is allowed to crystallize naturally is called crystallized or set honey. This honey is not typically heated or filtered as is the process for producing liquid honey. Honey that is marketed as crystallized or cremed honey is best sold in wide-mouth jars or plastic tubs so that consumers don't have to heat up the container and liquefy the honey in order to use a knife or spoon to remove the last of the honey in the container. Wide-mouth containers are available in both plastic and glass options. Flavored honeys are almost always sold in wide-mouth jars as they are usually crystallized so the flavoring will stay suspended in the honey and will not float to the top of the jar as it does in liquid honey.

Creamed, Whipped, Churned, or Spun Honey

Creamed honey is similar to crystalized honey, except that the crystallization process is more controlled. A small amount of crystalized honey is mixed into liquid honey in order to seed the crystallization process. The size of the crystals used to seed the honey determines that size of the crystals in the finished product. Packaging requirements for creamed honey are the same as for crystalized honey.

Comb Honey

Honey in the comb is as natural as it gets, given that the comb is the bee's packaging system. Traditionally, comb honey was produced in wooden frames made of basswood. Today, most comb honey is produced in Ross Rounds, Bee-O-Pac, or the Hogg Half-Comb Cassettes, all of which have their plastic packaging built into the foundation frame. Some comb honey producers prefer the simpler method of simply cutting the comb out of the frame to produce what is known as cut comb. Producers of cut comb have two primary packaging options: clear plastic or aluminum foil trays that come with a clear plastic lid. Some beekeepers will use a plastic

What size, shape, color, and material is the best packaging for your honey?

clam-shell container, but I find that the square hard-plastic styrene boxes are much more attractive than the aluminum containers or any of the other plastic container options.

Chunk Honey

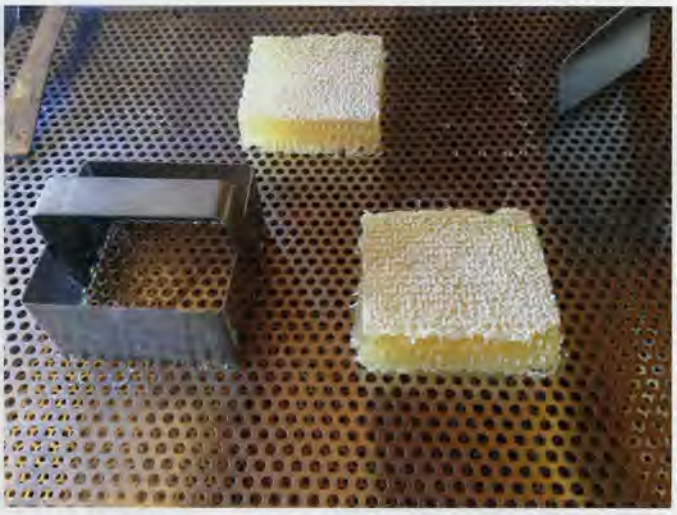
Chunk honey consists of one or more chunks of honey comb in a jar surrounded with liquid honey. Ideally, a honey that does not crystalize naturally such as tupelo or sourwood is used to fill out the remaining space in a chunk honey jar in order to best show off the comb it contains. Many comb honey producers will produce chunk honey as a way to make use of the left over pieces of comb honey that are not suitable to be packaged and sold individually. Due to the size of the comb pieces, jars or bottles used for chunk honey need to have a fairly wide mouth.

Types of Containers

Many backyard beekeepers will simply clean and reuse old containers and jars such as canning jars laying around the house to package their honey. However, when the honey is to be sold to other people, new containers are called for. The most popular plastic honey container seems to be the honey bear, although these days some companies are offering glass honey bears. Another popular jar is the classic queen-line jar. The queen line jar has an oval body and the narrow shape of this container makes it easy to show off the beautiful color of the honey when the jar is illuminated from the rear. This is especially useful when more than one variety of honey is being offered, as the differences in color help to highlight the different types of honey.

Today, replicas of old-fashioned honey jars are increasingly popular. One replica glass container that is commonly available is the old-fashioned Muth jar. Usually available in 8 ounce or 1 pound sizes, the Muth jar is a narrow-throated jar that is sealed with a cork. The replica Muth jar even features a skep on its side just like in days gone by.

One final type of packaging that deserves mention is the honey stick. This straw-like package is small, light-weight and inexpensive making it ideal for hikers, campers, or travelers that want to ensure the availability of honey for their coffee or tea. Kids of all ages enjoy them as a special treat.



Can we really improve upon honey in the comb . . . packaged by the bees themselves?

Container Sizes

Honey jars and bottles, be they plastic or glass, can be found in almost any size from one ounce -to-five pounds, and in tubs and pails from about two pounds to 55 pounds. The size of your honey containers will depend on who your customers are. Small jars are preferred by travelers such as tourists (the Transportation Security Administration (TSA) will not allow jars containing more than three ounces of honey on a plane). Fair goers who don't want to carry around a heavy jar of honey all day, and gift buyers looking for stocking stuffers also find small jars of honey attractive. There is also a considerable business to be made in providing small jars of local honey to couples about to be married for use as wedding favors. Larger jars are preferred by folks looking for table honey for everyday use, and the largest sizes are for the folks who make honey a part of their daily diet and are looking for the best bargains. Generally speaking, the more size options you offer your customers the more likely they will find the size that is right for them, and the higher your sales will be.

Lids

Lids for glass and plastic honey containers usually come in either metal or plastic. Unfortunately, the plastic used to make lids is much more brittle than the plastic used for bottles and the lids will crack fairly easily if the bottle is dropped on its lid or something strikes the lid hard. Metal lids may become dented when struck, but they will seldom crack. Metal lids also tend to cost more than plastic lids, however metal suggests higher quality and are therefore mostly used with glass containers and the upscale market. Plastic lids tend to be threaded, though some may have a flip top lid attached. Metal lids can be threaded or feature a lug cap. I find that threaded lids are less likely to leak than the lug caps. Either way, be sure your lids are on tight from the very beginning if you want to avoid a sticky mess. When filling a jar or bottle it is important not to leave drips of honey on the threads as they may not only leak down the side of the container over time, but the sticky honey can make the lid difficult to remove later on.

Most plastic lids are white, though black or yellow is also available in some styles. Metal lids come in numerous colors but are most often available in silver, white, or black. The decision as to which color lid to use often depends on the colors used on the label.

Some plastic lids come with a styrofoam inner-lining that will stick to the rim of the jar once the container is bottled up and acts as a tamper-proof seal. Metal lids usually have a plastic lining around the outside of the rim area that seals the container once capped and helps to prevent leakage. For folks who use metal lids and wish to include a tamper-proof seal, a plastic shrink-wrap seal tends to be the best bet. BC

Ross Conrad is the author of the revised and expanded second edition of Natural Beekeeping.

BIGGER PICTURE

Jessica **Louque**

The Masked Bandit

This year we have expanded our garden to approximately a quarter acre overall. The first row of blackberries went in with six varieties to try out and see what does the best. Two horseshoes circle around the blackberries and are 4' wide with a small walking space between. The back fence has an 8x60 foot swath tilled up for corn, okra, peppers, and flowers, and also hilled spots have popped up everywhere for the cucurbits. It's been a lot of work, and a lot of fingers crossed for good germination and good weather. Unfortunately, more work is coming this way.

It all started when we heard a squawking noise one night. We sleep with the windows open so we can keep an "ear" on the chickens. Bobby ran out, but it was too late. Somehow, Scissors (the one with the scissor-beak) in the chicken tractor had been killed. The door was shut and she was in the coop, but something appeared to have reached in and pulled her out and tried to drag her underneath the bottom of the fence. We're still not sure how it happened, but we know it was a raccoon. A week later, we heard it again and ran out, only to find that Dom, our Dominique rooster, had attacked the perpetrator while it was trying to steal another chicken. Scrappy sat underneath him, apparently not in too bad of shape. Come to find out, she had no meat left on her breastbone and her crop was on the outside now (not a pretty sight). When she drank water, it came out the front of her neck. We tried to heal her up because she still seemed perky, but it was a failed attempt. Now, none of the "outside" chickens will sleep in the chicken tractor and we have to round them up each night and put them back in with the coop door shut tight. Keep in mind, that last year was the "Great Chicken Massacre of 2013" from the raccoons and murderous opossums that obliterated our entire pen because they found a hole in the hawk net.

The last year I grew corn, it was really nice and green and planted in an area full of compost and it took lots of work to create little raised sections for each plant to thrive. It wasn't special corn, just some Silver Queen, but it was the first time I had grown it in a large area. It was almost ready to harvest and the raccoons destroyed it in one night.

This year, our Glass Gem corn is being grown in the backyard inside the fence, along with our Maricopa and Honey bi-color. Two large sections of our horseshoes are corn, which were not in the fence. Most of our free time (by "our" I mean Bobby) is spent in the evenings digging a trench and burying posts to build a fence in the front field. The bottom three feet are hardware cloth, and two wires run above it. These are in the works to be electrified to the point of blasting a raccoon 10 feet away in a pile of fried critter (stay tuned for the payback stories); however, the crossbow also works quite well. The wall of shame turned into the tree of shame after the neighbors complained about the lack of visual appeal, but the tree was where the chickens could have a view of their tormentors. Their teeth also make nice vengeance earrings.

As I seem to have developed an abject hatred of these little masked bandits of terror and destruction, I thought it would be a good idea to learn a little more about the object of my crossbow. Since they also have a bad rap of being honey bee pests, I figured everyone could stand to learn a little more about their future enemy (if it's not already, it will be).

Raccoons have the scientific name of *Procyon lotor*, which means "pre-dog washer" but not in a "it washes the early dog" type of scenario, if you happen to read it wrong. Back in the day, raccoons were thought to be some kind of dog or cousin to the canine family, but it turns out they're actually a little closer to bears. Their names in nearly every language have something to do with their habits of washing food or the dog-like appearance. It turns out that they normally only wash their food if it's given to them in captivity. In this case, I don't blame them because people are gross sometimes and don't wash their hands so I wouldn't eat unwashed food either. It's also thought that they do this because they have super sensitive little hand-paws that soften in water so they have more tactile ability.

So some people try to get rid of

They only appear to be cute while they dig through your trash.

Bobby putting Dom up for the night.

raccoons by trapping and releasing them somewhere "far away" like 10 miles or so. As sweet as that sounds, raccoons normally have a territory of around five - 20 square miles, so you're likely just dropping them back off at their doorstep. Although there can be somewhere between 15-50 raccoons per square mile, they are only semi-social, where males will form a little posse during the mating season to fend off opposing males, and sometimes females will hang out with their babies together like a little play date. The mom raccoons will hide when they're raising their brood (called kits, like a puzzle set) because most males don't take kindly to the babies and will kill them. The kits will live with their mom for about a year, and some might stay with her over the winter if it's particularly cold. Usually the females will choose to den somewhere near their mother, but the males will roam up to 20 miles away, probably so they're not inbreeding.

Public restrooms range from "I probably didn't contract anything" to "I don't have to go that bad – really" in my scale of grossness. For raccoons, they have a shared toilet space called raccoon latrines where they all meet up to socialize, sleep, play around, and find out what's going on with everyone. They use their waste as identification for each individual and use it like a calling card for that annoying salesman that came to the door again.

A raccoon mounted to the wall of shame.

I've heard and read that raccoons prefer insects and mollusks or fish rather than birds, but will often steal chickens because they are easy prey in the night. Our chickens are two steps from dead when they sleep because they are absolutely worthless after sundown. You could probably eat them while they roost and they wouldn't move (with the exception of Dom, the hero rooster). Raccoons also like to eat pollen, and will pull it out of pollen traps, and they also like to eat bee larvae. Normally they won't rip open a hive, but if they ever find stored frames or previously used equipment they will destroy it. I think they are looking for wax moth caterpillars, or they just like the smell of beeswax (I mean really, who wouldn't?).

They will also sometimes remove a hive cover that isn't propolized down from just being inspected and doesn't have a brick on it. You'll find the cover off and one, maybe two frames missing, but lying on the ground maybe 20 yards away.

I'm also not a fan of rabies or any other of the awesome diseases carried by raccoons. Distemper is a pretty gross virus, but I didn't realize raccoons carry that too. People can't catch it, but it's still nasty for any of your other farm-type animals/pets. Distemper is supposedly the main killer of North American raccoons. If you have pets that might end up outdoors, you always have to keep up with their rabies shots. Something I have learned in my research is that oftentimes, that day-walking raccoon is a mother raccoon nursing her kits and trying to find food in daylight so that a nighttime predator doesn't eat her children. I always thought they were rabid if they were out in the daytime, no exceptions. That doesn't particularly make a difference to me, as seeing my mutilated chickens has removed any shred of sympathy for this species. They also have a propensity to carry roundworms in their intestines, which people can catch. Roundworms can hang out in the raccoon latrines, and if you eat raccoons you need to make sure they are properly cleaned and cooked or you'll be internalizing their health problems.

For those of you so inclined, I thought you might like a raccoon recipe. I pulled this from the 1966 Women's Day Encyclopedia, as I do not have my own recipe. I did tweak it a bit, because somehow the original raisins in the recipe were the offensive part to my tastes.

Roasted Raccoon with Sweet Potato Stuffing

1 dressed raccoon, 4 to 5 pounds
4 teaspoons salt
3 cups sweet potatoes, mashed
¾ cup seedless raisins (or pomegranate seeds – with the juice bits still attached)
2 ½ cups soft breadcrumbs
1 ¾ cups apples, peeled & diced
¼ cup honey (substituted for corn syrup)
¼ cup melted butter
¼ teaspoon pepper

Remove the raccoon's waxy nodules, (commonly referred to as "kernels") from under each front leg and on either side of the spine in the small of the back (FYI, opossum also has the same kernels). Wash meat thoroughly and dry. Remove part of the fat, leaving just enough to cover the carcass with a thin layer of fat. Sprinkle one teaspoon salt inside body. Fill with mixture of two teaspoons salt and remaining ingredients except pepper. Skewer the vent by inserting several toothpicks through the skin from side to side. Lace with string, tying the ends securely. Fasten both the forelegs and the hind legs with toothpicks and string. If there are any lean parts on the outside of the body, fasten a small piece of the surplus fat to this part with a toothpick. Sprinkle with remaining salt and the pepper. Put on side on greased rack in shallow baking pan and roast in preheated slow oven (325 degrees F.) for 45 minutes per pound. Turn when half done. Makes six to eight servings. BC

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

BUILDING A TOP BAR HIVE

Ed **Simon**

The Top Bar Hive (TBH) has become an easy and relatively cheap way for a gardener who wants bees to maintain a hive to get into beekeeping. It has many advantages as well as disadvantages. These have been widely discussed and written about in all the magazines during the past few years. We'll build a TBH with an optional viewing window that will allow you to observe the activity within the hive.

Long Term Requirements

There is no standard for a TBH. Consequently interchangeability is a hit and miss proposition. If you are assessing the use of TBHs for more than a single hive then you should keep the measurements consistent. The most critical is the length of the top bar itself. The second most important is the angles used. If these are consistent then you can swap comb between hives. You may have to use a knife to trim the comb, but that is minor problem compared to not having any drawn comb at all.

The TBH consists of three components: the main body, the top bars and the telescoping top. Each section will be described independently.

Section #1 – Main Body

Construction

The angles needed for the TBH require a little different construction technique. First we'll cut the separators which we'll then use for the jig to keep the sides and ends in alignment. We'll next cut the sides. The ends will be cut next; and to finish the hive body, the bottom will be cut. Its cut last since its width depends on the accuracy of the previous cuts and it can be easily changed.

Parts (Thickness x Width x Length)

1. ¾" x 13" x 11 ¼" – Separators (2)
2. ¾" x 11 ¼" x 36" – Sides (2)
3. ¾" x 11 ¼" x 15" – Ends (2)
4. ¾" x 7" x 36" – Bottom (1)
5. ⅛" x 7" x 30" – Glass or plastic viewing window (1) (Optional)
6. ⅜" x 7 ½" x 32" – Viewing window cover (1) (Optional)
7. Hinges (2) (Optional)

A separator is used to restrict the bees to a certain section of the hive. Usually the section the bees start out in is small. Then as the bees become more numerous the separator is moved and additional top bar are added. It can also be used to split a hive if there is more than one set of entrances to the hive.

Step #1: Cut the separators.

By cutting the separators first you can ensure a snug fit when the hive is assembled. You may still have to trim the separators, but they will be close to fitting correctly.

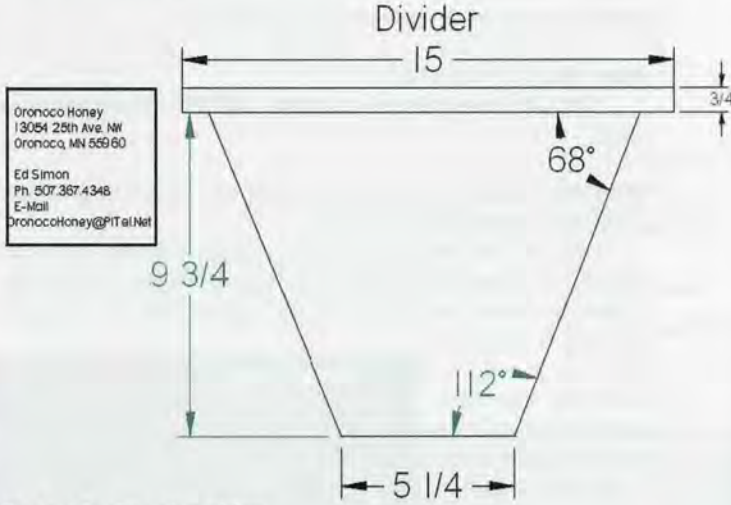
Note: Do not cut off the bottom of the separator. Because of the angles being cut and the possible difference in length made by a slight angle change, the height may vary. The bottom of the separator will be cut to the correct height after the hive has been assembled.

Note: The measurements defined are for a 22 degree angle. This is only a recommendation. You may find that a different angle will work better for you. Regardless, the assembly instructions are the same.

Use the following diagram to lay out a 1" x 12".

You will now be able to use these separators to hold the sides in position while you assemble the sides and ends.

Hint: For future consistency, create a third separator to use as a pattern for future TBHs.



Step #2: Cut the sides

Rip the top and the bottom of the sides to a 22 degree bevel. This will allow the top and bottom of the sides to match the bottom of the TBH and the top bars to lay flat on the sides.

Step #3: Add a viewing port. (Optional)

The addition of a viewing window is optional. It provides a way to inspect the hive without removing the top bars. It's great to look inside the hive without suiting up. Remember, you cannot just remove the telescoping top and look down at the bees and comb on a TBH.

Hint: If you are using plastic window, do not remove the protective covering of the plastic until you install the window and paint the hive.

1) Cut a piece of plastic or glass for the window
2) Layout glass on the **inside** of one of the sides – a minimum of two inches from the top so the telescoping top will not conflict with its use.
3) Mark the edges of the window with a pencil
4) Draw a second set of lines ½" inside the previously marked lines. The ½" lip is used to hold the window.
5) Cut on the inside lines with a circular and/or a saber saw.
6) Using a router, cut the ½" lip of the opening to the depth of the plastic or glass. Add a little to the depth for the caulking that will hold the window in place.
7) Test fit window and make adjustments as necessary.
8) Sand the edges of the opening. Do not install the window at this time.

Step #4: Add entrance holes.

If you are going to use side entrances then drill the holes now. They can be added later but it is much easier to add the entrances before the hive is assembled. I recommend one set of holes at opposite ends on each of the sides. This allows you to split the hive with a separator board and have an entrance for each end.

Step #5: Cut the ends

Cut the two pieces of ends. ***WOW!*** This step was easy.

Step #6: Build a jig that will hold the sides in position while you assemble the unit.

Lay out the end pieces using the previously cut separators as a pattern. After centering the separator on the end, make sure you drop the top down the ¾" that will provide a lip that will be used to hold the top bars from falling off the end of the hive. Screw the separator in place. Mark positions for the screws that will hold the sides in place. Then drill starter holes for the screws. The screws will actually be driven from the other side of the end. Make a second end jig the same way.

Step #7: Assemble the sides and ends.

The jigs that you built in the previous step are now used to hold the sides while you glue and screw them in place. Position the end jigs and add a side between them. Glue and screw the ends to the sides. When complete remove the separators from the ends.

Warning: Remove the separators ASAP. Glue may have leaked between the separator and the ends. If left too long the separator will be blued to the end or sides and may be impossible to remove without making a mess.

Step #8: Cut the bottom.

Note: The bottom is not glued to the sides or the ends. There is the possibility that you may want to clean or replace the bottom due to wear and tear. It is easier to do if the bottom is not glued in place.

Measure the width of the bottom from the outside edges of the sides. Rip a board to this dimension. Make sure the length of the bottom allows it to fit snugly against the end pieces.

Step #9: Install the bottom.

Since the sides are at a 22 degree angle to the bottom, drill starter holes using your eye to align the holes and screws. Screw the bottom to the sides.

Step #10: Extend the ends. (if needed)

On the TBH I made, the bottom of the TBH extended just below the ends.

To allow the hive to sit solidly I needed to extend the end pieces by adding a ¾" x ¾" extender to the bottom of the ends. This also keeps the bottom of the TBH from resting on any support.

Step #11: Install the window (Optional)

Note: We left the installation of the window until now, lessening the possibility of scratching or breaking it.

If you are using plastic, remove a ½" of the protective coating from the edges of the window. If not removed, the caulk will adhere to the protective plastic coating and not to the window.

Caulk the window in the recessed area that you routed for it. And allow it to dry.

Step #12: Paint the body

Hint: If you are using glass, then cover the glass area with masking tape before painting.

Two coats of exterior latex paint are recommended. It will extend the life of your TBH.

After the paint dries, remove the tape, or if you used plastic then the plastic protective covering from both sides of the window.

Step #13: Add a window cover

A window cover is needed to keep the hive dark and to provide some insulation.

Cut and paint a piece of plywood to cover the window. Use self closing cabinet hinges to keep the cover in place. Add a clasp or two at the top of the cover if the hinges will not keep it tight against the hive body.

Section #2– Top Bars

Parts (Thickness x Width x Length)

1. ⅛" x ¾" x 13" Starter strips (24)
2. ¾" x 1 ⅜" x 15" Top bars(26)
3. ¾" x ??" x 15" Spacer

Step #1: Cut the starter strips.

The starter strips are used to give the bees a guide to build their comb. If they follow it or not depends on how well you've trained your bees.

Hint: Because the starter strip is so thin, I used a pruning shears to cut and shape the ends. It was easier than using a saw.

Hint: Make some extra starter strips and bars. You never know when you are going to need an extra.

Step #2: Cut the top bars.

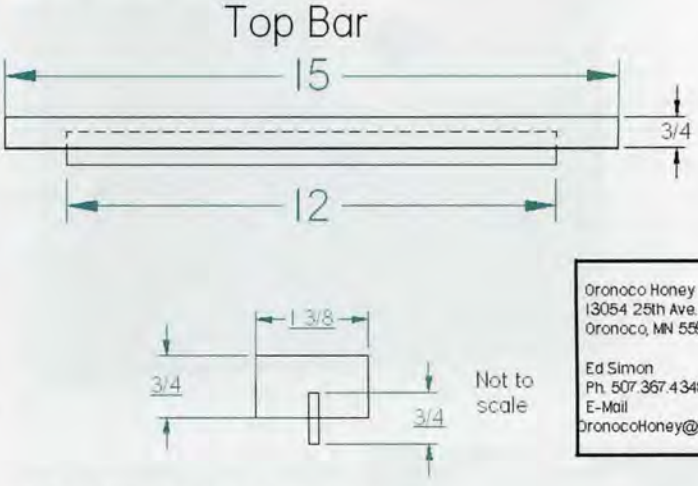
After cutting the top bar, cut a groove lengthwise in the center of the bar. This will be used to hold the starter strip. The groove should be just wide enough for you to slip a starter strip in with very little wiggle room. You can also bevel the ends of the top bars with a sander. This will give you a guide for your hive tool when you want to separate the bars.

Step #3: Assemble the top bars.

Glue the starter strips into the grooves in the top bars.

Step #4: Wax the starter strip

Add a layer of wax to the edge of the starter strip. This will give the bees an idea of where to place their comb. I used an old griddle that had a gutter around the edge. After melting the wax I dipped the strip in the wax. I wish I'd have thought of this before. It would have save me a lot of time.



Oronoco Honey
13054 25th Ave. NW
Oronoco, MN 55960

Ed Simon
Ph. 507.367.4348
E-Mail
OronocoHoney@PITel.Ne

Step #5: Finish the separators

Add a top bar to the two separators you used as a jig for aligning the sides and ends. Now is the time to cut the bottom off of the separators and adjust them to a snug fit.

Section #3– Telescoping top

Parts (Thickness x Width x Length)

1. ¾" x 2" x 38" – Top Sides (2)
2. ¾" x 2" x 17" – Top Ends (2)
3. ⅜" x 18" x 38" – Top (1) (or multiple boards) (any thickness will work)
4. ??" x 19" x 40" – Top Aluminum Cover (1)

We've finally made it to the top of the hive. You need to have something to protect the bees from the weather. Over the years, tops become warped, weather beaten and outright cruddy, regardless of the best intentions of the beekeeper. It's extremely embarrassing when you are showing your hives to a group of students and you can't get the top off because it is warped. The point I'm trying to make is that making the top a little loose can save a lot of time and embarrassment in the future.

Construction

Hint: The wood used to cover the top (part #3) does not need to be very thick. The thicker it is the heavier the top will be and a TBH top is considerable larger than a Langstroth telescoping top.

Step 1: Cut parts 1, 2 and 3 from your stock lumber. Be extremely careful that the parts are cut square (90 degree corners).

Hint: An extra ¾" on each dimension may make your manipulation of the top easier.

Step 2: Glue and screw the sides and ends to the top (part 1). The top (part 1) sits on top of the sides and end pieces.

Note: Now would be a good time to paint the cover.

Step 3: Lay the metal top on a flat surface and center the wood top leaving an equal border surrounding the wood top. Mark this with a pencil. Extend the corner lines to the edge of the metal.

Step 4: Using the tin snips, cut one of the extended edge lines on each of the corners.

Note: If you make a shallow "V" cut on each side of the line, the line, the corner fold will be a little neater.

Note: Cutting the exposed corners at a 45 degree angle removes some of the sharpness and finger cutting potential of the completed top.

Step 5: Bend two adjacent edges of the metal over to form the lip of the cover.

Step 6: Bend the corner tab that was formed in step 4 around the corner and tuck it under the side.

Step 7: Screw or nail the two lips in place on the wooden cover.

Step 8: Bend the remaining edges over to finish the cover. Screw or nail them in place. If you use screws then use the center punch and drill holes in the cover.

Note: The more your cover weighs the harder it is to manipulate.

Note: The width needed for the lip is your decision. Some things to take into account are:

1. Local wind conditions
2. Where your hand holds are on your supers
3. Do you put insulation or fiber board under the cover in the winter
4. Do you use a rock or brick to hold the cover in place
5. When you wrap your hives do you have extra wrapping material to hold in place

Hint: A trip to a local printing business may provide you with some aluminum plates that they use on the printing presses. The plates come in various widths and thicknesses depending on the size required by the press. They are used only one time and are then recycled.

Usage

Wind, rain, sleet and hail should not keep the telescoping cover from doing its job. A telescoping cover can last a long time. Take care of it and it will protect your hive.

Conclusion

Our bee club has used a TBH as a training tool for the last two years. The window allows everyone to look into the hive without getting suited up. If you do have to pull out a top bar then a minimum number of bees are disrupted. BC

Get a copy of Ed Simon's book Bee Equipment Essentials *with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from* ***www.BeeCulture.com****. Ed can be contacted at* ***Ed@TheBeeShed.com****.*

BEE GIRL

Sarah Red Laird has expanded to a 50-colony beekeeper but her primary interest is talking about bees, education of new beekeepers and bee habitat conservation. She is Executive Director of the Bee Girl organization, and their sole educator, with a seven-member Board and one University intern. She says she has truly found her niche in life keeping bees and educating others about the importance of bees and the joys of beekeeping.

Sarah's bee interests started very young with an aunt who had bees on her small farm in southern Oregon. While searching for a University with a resource conservation curriculum, she saw the opportunity to be a work study student with honey bees at the University of Montana. Mentors Scott Debham and Jerry Bromenshenk did provide the work opportunity and ended up employing her full-time in the Summer to do bee colony care for their research programs. One effort she worked on was the bomb-sniffing bee project demonstrating the feasibility of training bees to detect landmines for safe removal.

Sarah graduated with honors, as a University Scholar from UM's College of Forestry and Conservation with a degree in Resource Conservation, focused on community collaboration and environmental policy. As an undergraduate honors student, she chose Colony Collapse Disorder for her honors thesis project with grant funding from the University. The undergraduate thesis was selected for excellence so she got to present it at the National Conference on Undergraduate Research. Her title was, "How to Keep 100,000 Girlfriends, the Careful Relationship of a Beekeeper and Her Honey Bees."

Sarah was planning to continue her education into graduate school at Oregon State University but project funding was delayed. So instead she returned to Southern Oregon with the expectation that the project would be funded in the next cycle. She made tentative plans to return the next Summer to Montana to continue UM colony care. Expanding opportunities offering educational programs about honey bees and growing bee numbers changed her plans about graduate studies.

Through BEE GIRL she has found a way to combine her love of bees with her education actually putting into practice what she studied as an undergraduate. In a short time she has found she can make a difference encouraging youngsters to think about resources and teaching beekeepers and bee lovers through her nonprofit Bee Girl organization. Her own life choices embodies the Bee Girl mission of preserving honey bees and food and habitat resources by providing outreach, education,

Sarah Red Laird, BEE Girl.

support and mentorship for beekeepers, youngsters and communities in 18-hour long days and a packed travel itinerary.

Sarah teaches classes for beginning beekeepers in the Rogue Valley communities of southern Oregon. She works one-on-one with individual beekeepers and offers frequent classes on bee colony care, separately or in partnership with other groups. With a grant from the Ashland Food Co-op and support from the Southern Oregon Beekeepers association, Sarah has developed a Kids and Bees program for K-12 classrooms, libraries, home-schoolers, Summer camps, master gardener groups and others. She talks about honey bee biology and the importance of bees and bee pollination to our environment and food system. Her program includes activities to engage the senses and, when weather permits, includes a live bee hive.

As part of her outreach and partnering, she helped organize a Southern Oregon University Beekeeping Club and establish their first apiary. As club advisor she arranges field/research experiences to prepare students for graduate school or employment in the bee industry. She also has started programs at corporate organizations such as the Rogue Brewery and Rogue Valley Creamery, both which feature products utilizing local honey.

As Oregon Outreach Coordinator for the Bee Friendly Farming Initiative she is working on a Farming for Bees Initiative directed to help farmers and other land managers assist bees through conservation of bee habitat, establishment of nesting opportunities for native pollinators, reduced pesticide usage and directed

Dewey **Caron**

BEE Girl, Sarah Red Laird.

Sarah at ABF Kids' Day New Orleans.

plantings of bee forage. Non land-holding consumers are encouraged to purchase products with the Bee friendly logo.

Sarah is a mentor in the Oregon State Beekeepers Master Beekeeper Program **www.oregonmasterbeekeeper.org** and Regional Representative for the Southern Oregon Beekeepers to the State Bee Association (**www.ORSBA.org**). Last year, she coordinated the Halloween social entertainment, a bee-related costume contest that offered honey for trick-or-treaters. She also was a Honey show Judge. This year she will give presentations to both the OR MB Institute, a one-day event for Journey (intermediate-level) beekeepers and at the Association meeting itself, along with coordinating Our Movie night social.

Sarah has a variety of interests and has tried her hand at several adventures. She worked one Winter at Steamboat Ski School, was a Skagway, AK EMS fire, search and rescue squad member and with her dad, a hiking, fishing and kayaking guide in Alaska

These days when she is not tirelessly working with bees, beekeepers, kids, farmers, land managers, and policy makers, she ventures into Oregon/California mountains with a camera, large backpack, fishing rod, bike or snowboard, and her best friend, her yellow dog.

Sarah has taken on a new major national bee activity coordinating the American Beekeeping Federation Kids and Bees program. She has superceded Kim Lehman (the Bee Lady), who developed and coordinated the kids program for 19 years. The event, the Federation's major outreach activity to the youngest generation of potential beekeepers, invites school children, home schooled youngsters and family members of those attending the Federation meeting to "experience bees" during a morning of the Federation conference.

At the 2013 Federation meeting in Hershey, PA over 400 youngsters participated in the kids program, co-sponsored by the Federation and the Foundation for the Preservation of Honey Bees. Volunteers interacting with the kids included the four candidates of the Honey Queen program and the American Honey Queen and Princess. The youngsters had a chance to see and taste honey, see the insides of a beehive and live bees in an observation beehive, make a foundation candle, produce a tracing of beeswax foundation and develop a booklet using bee stamps among another dozen or so interactive opportunities about bees. Her 2014 effort in Baton Rouge included over 500 youngsters and their families. Some 30 Federation volunteers, again including the honey queen and candidates, assisted her with fun and interesting interactive learning activities on honey bees and bee products

With ABF and Foundation for the Preservation of Honey Bees (www.abfnet.org) funding, she has extended her youth initiative to organizations such as Pheasants Forever, a group dedicated to helping preserve and restore habitat for pollinating insects and wildlife. She organized a beestravaganza in youth village (located among over 500 display booths) and addressed the Youth Wildlife Conservation group. This Summer she will organize youth-centered programs at both EAS and WAS meetings.

Her programs have brought her international attention and recognition well beyond Southern Oregon. This Fall Sarah became the U.S. Ambassador of the International Bee Research Association's (IBRA) BEEWORLD project. She gave the keynote address at the inauguration of this new effort in January 2014. By connecting schools worldwide, the BeeWorld Project encourages schools and communities to share their learning experiences of bees.

Sarah at IBRA launch. (photo by R. Jones)

BEE Girl with home schoolers.

BeeWorld brings teams of beekeepers, outreach specialists and school teachers together to promote sharing of responsibility for conservation of nature, biodiversity and sustainability through bees and beekeeping, helping communities to gain a better knowledge of beekeeping and planting/creating suitable habitats.

Sarah has a passion for educating kids and is turning it into a way of life. In explaining why she has taken on this new responsibility Sarah said "My interest about bees comes from the belief that our future lays in the hands of our newest generation. If honey bees, other pollinators, and a sustainable food system are going to have a fighting chance, we have to start creating positive and fascinating experiences for kids, connecting them to the natural world around them, at a young age."

Sarah is realistic that not every kid that might attend her program will grow up to be a beekeeper but goes on to say "if they grow up to be a gardener who plants for bees, or a town mayor that allows beekeeping in city limits, that's a win!" Sarah has the boundless energy and drive for teaching youngsters and persons of all ages interested in beekeeping. She is finding a way to be able to do so on a full-time basis. GO Bee Girl! Thanks for helping to make a difference. BC

Dewey Caron, retired Professor of Entomology, University of Delaware, Past Chairman of the Board EAS, Past President WAS, now working with Apiculture Extension Oregon State University.

DO I KNOW . . .?

Ann **Harman**

No, but I should.

Admit it – bees know what they are doing. Sometimes in our eyes and mind they make some bad choices. But the bees have made good and bad choices for millennia. So has every other critter. I should think about what I know – and don't know – to keep my bees strong and healthy. Therefore –

DO I KNOW . . . where my bees are foraging? As they leave my hives they can go one-half mile in any direction (covering about 500 acres), or one mile (covering about 2000 acres), or two miles (covering about 8000 acres) or three miles (covering about 18,000 acres). Bees do forage in a big area! As I watch the bees leaving their hives I notice they fly in different directions. Where are they going?

DO I KNOW . . . what types of forage are in all those acres? They could include farmland, a town, a manufacturing area, a forest, just about anything. I see some bee plants from my windows and along familiar roadsides. Unfortunately many roadsides are mowed by the transportation departments. Some states do have a plan for roadside pollinator forage. That is a good idea since it not only saves the costs of mowing but it provides forage and shelter for many pollinators, not just honey bees. Besides the forage plants do look nice. I should contact my local highway department to see what their policy is. If none exists perhaps my local beekeepers club could encourage them to have a pollinator plants program.

DO I KNOW . . . if the forage is the same this year as last year? That meadow full of assorted wildflowers last year could be a wheat field this year, of no value for my bees. Unless I drive around throughout those acres once in a while I won't know about any changes, such as construction sites or changes in crops, both of which can affect bee pasture. Being complacent, especially in suburban areas, means bees may lack sufficient sources of nectar and pollen plants.

DO I KNOW . . . if forage has decreased significantly? Forests could have been clear-cut, housing developments created; forest fires and floods will destroy plant life. Climate change is also affecting plant life. This type of change is slow compared to fire and flood. Changes in the time and period of flowering are hard to notice over the period of a few years. But the changes do affect honey crop and food for bees.

DO I KNOW . . . if pesticides are being used in all those acres? Pesticide kills are usually a surprise to the beekeeper – suddenly piles of dead and dying bees. It would be difficult to find all the farmers and what crops they are growing and what they are using on those crops. In addition, spraying for the brown marmorated stinkbug can occur in both rural and suburban areas. The insecticides for the stinkbugs are lethal to honey bees. Homeowners with huge stinkbug problems probably never give a thought to any damage to honey bees as well as other pollinators. The sprays can drift onto flowering plants used by bees as well as other pollinators. The stinkbugs tend to aggregate in Autumn while seeking shelter for the Winter. I need to be alert to colony damage.

DO I KNOW . . . if anyone nearby is spraying for mosquito control? Homeowners with large acreage can have their property sprayed for mosquitoes. Sometimes mosquito spraying is done in suburban and even urban areas. Usually notice is given in those areas so that beekeepers can protect their hives if necessary. In rural areas homeowners that choose to spray can put bees at risk. It may be impossible for me to know if mosquito spraying is being done in the huge foraging area around my hives.

DO I KNOW . . . if I am in the throes of a severe drought and my bees need feeding? I need to put weather as a good reason for checking food stores throughout the year. Summer droughts affect nectar secretion and stunt plant growth and flowering. Feeding bees when they need it assures a good healthy population. In my area Autumn nectar and pollen plants are usually abundant. But if a current drought continues I may need to feed those bees much sooner than normal.

DO I KNOW . . . if my very best queen has been superseded? She was, fortunately, marked with the proper International color for the year. So it should be easy to find out if she is still at work or an unmarked queen is in attendance. If I do see an unmarked queen I need to decide if she is doing a good job or should be replaced before Winter bees start being produced. I should ask my local queen producer if a queen would be available in the next few weeks in case I need one.

DO I KNOW . . . if that big swarm I saw several months ago in a nearby tree came from one of my hives? I thought I checked for overcrowding and queen cells. But finding all the queen cells, in time, is difficult. Just one missed and a colony can swarm. Since my queens are marked, finding an unmarked queen could be a good clue if that colony swarmed.

DO I KNOW . . . if my honey supers are ready for next year's nectar flow? They were put away clean but I should check them carefully now in case I have to make some repairs. The coming Winter is the best time to repair equipment. I just need to put a reminder on my calendar and mark the ones now that need attention.

DO I KNOW . . . if I remembered to order more jars and labels after last year's harvest? Those

boxes on the shelves might not be full of jars. I do save the empty honey jar boxes for taking small quantities of jars full of honey to various places. I should check those boxes now before the suppliers get swamped with orders in the Spring

DO I KNOW . . . where I put those drawings I made for a new honey label? Perhaps they are buried beneath other papers on my desk. If I hurry up and find them I could use them now for Autumn honey sales. Perhaps I should look at new labels the equipment suppliers have. I might find one I like much better than the one I am currently using. And it's probably a much better label than my scribbled drawings.

DO I KNOW . . . of another place to market my honey? I do have honey in a couple of local shops and at the nearby Farmers' Market but perhaps I should explore other shops in a neighboring town. It will soon be time for Autumn festivals. I need to plan to be a vendor for honey at a few of them. Candles sell well in Autumn. Now is the time to make those candles and some ornaments. The shoppers at Autumn festivals are frequently buying items for the holiday season ahead.

DO I KNOW . . . if my *Varroa* treatments are working? This is the time of year that *Varroa* populations can damage the overall health of my colonies. I should do a mite drop sometime this month. There is still time to do *Varroa* control if it is needed. However, I do need to see what August temperatures are. In my area it is generally a very hot month and might not be suitable for any of the chemical treatments. Powdered sugar can be used at any time. Although some studies show it is not effective, at least it can't hurt the bees.

DO I KNOW . . . what the long-term weather predictions are for my area? Should I consult the various almanacs (the U.S. has at least 17 of them) or try to find out what the U.S. Weather Bureau is predicting? Although predictions are not always totally accurate at least area trends do give useful information. An unusually warm Winter can mean more Winter stores will be needed for active bees.

DO I KNOW . . . if small hive beetles are a big problem in my hives? Right now, I am not sure. Perhaps putting a small hive beetle trap in each hive will be useful. I have not seen any but I was not looking for them the last time I opened the hives. They are so quick to hide! Since I do not have a loose loamy or sandy soil perhaps I do not have a big problem. I did not notice any when I removed my honey supers and extracted them. However, I did take the supers off and extract immediately so honey was not available for any length of time.

DO I KNOW . . . where I can find the best price for sugar for Autumn feeding? Since sugar is put on sale occasionally at nearby supermarkets I need to keep track of the specials. Sugar keeps, as long as it is kept dry, so I can buy it any time for use later. But I should have a storage place safe from mice and ants. I need to buy some metal trashcans with tightly fitting lids.

DO I KNOW . . . if I have good pollen sources for rearing Winter bees? I will need to keep track of those good pollen plants during the next two months. The pollen stores in the hives also have to be sufficient for early brood rearing next Spring. I can always give pollen patties but a mixture of pollens does give good nourishment.

DO I KNOW . . . whether the feed supplements advertised in the catalogs are beneficial for my bees? I really don't know and really don't know how to find out.

DO I KNOW . . . where my favorite hive tool is? No. I have no idea where I put it. BC

Ann Harman keeps bees and tries to keep track of all of these other things at her home in Flint Hill, Virginia.

The Epicenter Of Beekeeping 1870-1900

David **Edwards**

PROLOGUE

For a period of time in the latter half of the nineteenth century, central New York State, encompassing parts of Otsego, Montgomery and Herkimer Counties, was the epicenter of beekeeping in the United States and quite possibly the world. It was here where we saw the greatest concentration of nationally prominent beekeepers, here where we saw major developments in the design, production and use of beekeeping equipment, here where we saw record shattering production and shipment honey.

It was here also that beekeeping concepts were introduced, techniques were developed and quality awards were earned. This is also the area where we saw the genesis of regional and national beekeeping organizations as well as efforts involving various contributions to the beekeeping literature in the form of journal articles, books and publishing.

Nowhere else were so many doing so much for beekeeping in such a small geographic area.

This is about the men who were instrumental in developing this emerging industry. Central to the developments noted above was the arrival on the scene of Moses Quinby, the "Father of Practical Beekeeping". Quinby arrived in St. Johnsville, Montgomery County, New York in 1853, the same year that he published his book "*Mysteries of Beekeeping Explained: Being a Complete Analysis of the Whole Subject.*" His friend and correspondent Lorenzo Langstroth published his book "*The Hive and the Honey-Bee*" that same year, which served to minimize, but not eliminate, any future charges of plagiarism between the two.

This time we will discuss the supporting cast of sideliners, small commercial operators and manufacturers who were associated in some way with the two major players. Next we'll focus on Moses Quinby, his life and work among the bees and his influence on the beekeeping scene locally, regionally and nationally. Then we'll give an overview of Quinby's most prominent acolyte, Captain John Hetherington, the most extensive beekeeper of his time.

For our purposes "Central New York" is defined as northern Otsego, western Montgomery, and southeastern Herkimer Counties, in a broad 10 mile radius from New York State Route 20 near Cherry Valley, extending as far south as the Town of Middlefield near Cooperstown, as far north as the Montgomery County/Fulton County line, east into the Town of Warren and west to about the village of Canajoharie. More precisely, as we will see, the major players were located in the Cherry Valley – St. Johnsville – Starkville triangle, no more than 12 miles apart.

Quinby

EPILOGUE

What made this part of New York State so attractive to bees and beekeepers? Did the beekeepers recognize good bee pasture and settle here? Or were the planets simply aligned properly? Quinby, Floyd, Hoffman and Root moved here, but Hetherington, Nellis, Van Deusen and Murphy were born and bred here. Elwood left and returned.

The key seems to be Moses Quinby. As we have seen, he traveled along the Mohawk River and Erie Canal at a young age to visit relatives in Ohio. As a beekeeper he undoubtedly paid attention to the vegetation along the way, possibly recognizing the value to bees. Living then in an area of poor bee pasture, he knew he had to move to be successful. Having relatives in Montgomery County probably made it a bit easier to make the move.

Quinby utilized the manufacturing talents of the Van Deusens and they in turn introduced their young nephew John Hetherington to Quinby to mentor. Quinby also took on John Floyd as a partner and together they may well have brought the Nellis family into the fraternity. Without Quinby, L.C. Root might have died a bachelor.

Hetherington, along with his two brothers learned from Quinby, influenced Murphy, and taught Elwood.

Nellis in turn recruited Hoffman.

In addition, most of these local beekeepers read papers at meetings

L.C. Root.

or published an occasional paper in the contemporary bee journals, Quinby being the most prolific.

These men were in the forefront of establishing and staffing organizations of beekeepers. At the second annual meeting of the Northeastern Beekeepers Association in June of 1871, Quinby was President, C.C. Van Deusen Vice-President, Nellis Secretary and Hetherington Treasurer. During the 1870-1900 period Nellis, L.C. Root and Elwood, in particular, served as officers of several of the prominent beekeeping organizations.

An idea of the influence of men from this part of New York state can be seen by perusing the list of officers of the New York State Beekeepers Association/Northeastern Beekeepers Association (as the name changed over the years) from 1870 to 1891.

Nellis.

President: Quinby (5 years); L.C. Root (5 years); Elwood (4 years); Hetherington

Vice-President: C.C. VanDeusen (2 years); Elwood

Secretary: Nellis (8 years)

Treasurer: Hetherington (4 years)

Many other less significant beekeepers lived and worked in the area, influenced to one degree or another by those mentioned in this manuscript.

And the bees? Why was this area such productive bee pasture? Several possible reasons exist.

... The area had good, productive, often virgin soil from river bottom to ridgeline, from wetland to meadow.

... Elevation within 15 miles ranged from 460 feet above sea level at St. Johnsville to 1345 feet ASL at Cherry Valley which probably extended the season for any particular food source.

... The Onondaga limestone belt across New York (outcroppings can be seen along New York State Route 20 near Cherry Valley) allows for excellent high nectar clover crops while the more acidic soils south of Route 20 favor buckwheat.

... The indigenous vegetation was useful to bees in a timely manner. Maple trees and willows provided early pollen, basswood trees were common and provided the most nectar of any wild plant in New York State, and a variety of wild weeds, berries, herbs, and other plants provided both constant and varied food sources.

Hetherington.

... Farms were plentiful. In the Town of Cherry Valley alone there were over 200 farms in the 1870s. Each farm tended to be self sufficient so had a variety of field crops including buckwheat, second only to basswood as a nectar source, an orchard, an herb garden, berries and clover, as well as fencerows and wild meadows.

... Probably most important though was the constant source of food, with no dearth 'between seasons', with food available from March through early October. There were maple, alder, poplar, willow, locust, in early Spring, apples and berries in late Spring, clover, thistle and sumac and basswood in early Summer, buckwheat, thistle, milkweed and thyme in July and August, ragweed and clover in parts of July, August, and September, asters and pumpkin in September, and goldenrod in parts of August, September and October and various weeds throughout the year.

... Insecticides as we know them did not exist.

... Mites were not an issue.

In a nutshell, good bee pasture which, along with the local herds of Holstein dairy cows that were bred for milk production, made this truly "the land of milk and honey" for a short period of time.

The party did not last forever. By early 1900s several of the prominent people were dead and the cold Winters and brood diseases were taking their toll. The growing beekeeping industry was moving west, chasing better weather and better yields.

Beekeepers followed the bees or changed their career path. Quinby had died in 1875, L.C. Root went to Connecticut in 1887; Hetherington died in 1903, his younger brother left for California sometime after

1910. Nellis also went to California. The Van Deusens died out before the turn of the century, as did Hoffman in 1907 and apparently Floyd. Murphy's career evolved into more business like pursuits.

Elwood's son Lewis reportedly carried on with beekeeping, but without the notoriety of his father. Lewis, a graduate of Cornell, was still involved in beekeeping in 1930 when he hosted the annual summer picnic of the Empire State Honey Producers at his home in Fort Plain. Ironically, it was the elder Elwood whose paper at the 1886 meeting of the New York State Beekeepers Association stated "..when a man died it was far better for him to leave his family a business other than beekeeping".

No where in American beekeeping have we seen a concentration of talent, commitment, knowledge and results, in such a small geography, such as those that were on display for just a few decades in central New York State. BC

David Edwards is a dedicated beekeeping industry historian living in Cooperstown, New York.

GLEANINGS

AUGUST 2014 • ALL THE NEWS THAT FITS

ELINA LASTRO NIÑO TAKES OVER DAVIS

The pollinator group at the University of CA, Davis, will be gaining key expertise in honey bee queen biology, chemical ecology, and genomics, with the arrival of Elina Lastro Niño as the new Assistant Professor in Cooperative Extension in Apiculture. Dr. Niño received her MSc from NC State University in 2006, and her PhD from Penn State Univ. in 2012, where she was mentored by Christina Grozinger. As a graduate student, she demonstrated that different components of the mating process (oviduct manipulation, insemination volume, insemination substance) drive different post-mating changes in honey bee queens. Furthermore, she showed that queens signal their mating status and mating quality to worker bees through their pheromones, and workers preferentially respond to well-mated queens. As the recipient of a prestigious USDA-NIFA Postdoctoral Fellowship, Dr. Niño expanded her program to study the socioeconomic factors affecting the success of local queen breeding programs, and spearheaded the annual Honey Bee Queen Rearing Workshop at Penn State and at the 2013 EAS conference. Dr. Niño is internationally recognized for her work on queen biology, and has collaborated broadly with several key honey bee researchers in the U.S. (including David Tarpy, Peter Teal, and Jerry Hayes), Israel, Europe and Australia. She is looking forward to working closely with the CA almond growers and honey bee breeders to develop sustainable approaches to bee management once she arrives in Davis in September 2014. "The UC Davis bee lab has such a long, outstanding history. I feel so honored to be able to contribute to this great program" says Elina.

SYGENTA GIVES UP ON UK

Chemical company Syngenta withdraws an application for the emergency use of its neonicotinoid seed treatment on winter oilseed rape after the UK government took too long to give the approval.

The company applied for a derogation from the European Union ban on neonicotinoids earlier this year to allow UK farmers to plant 446,272 acres of its Cruiser OSR this Fall.

The Farmers Guardian newspaper says the Department of Environment, Food and Rural Affairs' advisory committee on pesticides confirmed in May the criteria for an emergency authorization was met.

But it says that by the end of June, the government had not made a decision even though DEFRA Secretary Owen Paterson was reported as being in favor of the derogation.

Syngenta warned that with an early planting season expected, it needed a decision by end of June.

It said in a statement that following an assessment of the planting schedule for growers, it has decided to withdraw its application.

"While the Advisory Committee on Pesticides indicated that the criteria for emergency use has been met, there has been insufficient time to conclude on the conditions for verifying and auditing planting locations which were specific to this limited use application," the statement said.

"In making the application, Syngenta was clear that in order to supply product to British farmers and, importantly, to ensure its effective stewardship, approval from government was required by end of June."

"We are delighted that Syngenta has withdrawn its application to be allowed to use one of the banned neonicotinoids which has been shown to negatively impact bees and other pollinators," Soil Association head of policy Emma Hockridge said.

Alan Harman

CHANGE AT BELTSVILLE

After nine productive years, Dr. Jeffery Pettis is stepping down as Research Leader of the USDA-ARS Bee Research Laboratory (BRL) in Beltsville, MD, and will devote his energy to his research program and collaborations with colleagues and beekeepers. Dr. Pettis guided the Laboratory through the turbulent times of Colony Collapse Disorder and helped build a balanced staff devoted to improving bee management and bee health. He did this while maintaining a strong research program focused on queen and colony traits and managing bees for pollination. Drs. Judy Chen and Jay Evans will serve consecutive 120-day terms as Acting Research Leader of the BRL, prior to the naming of a new Research Leader for the group. Through this process the BRL will remain focused on maintaining close collaborations and connections with the beekeeping community as we all strive to reduce the impacts of stress and disease on bees.

CANADIAN BEEKEEPERS QUIT MOWING

The Nova Scotia Beekeepers' Association is going to be popular with men everywhere – it is asking homeowners to help bees by not mowing their lawns so often.

Association president Joe Goetz says the majority of people are well aware that it is in everybody's best interests to heed the message of the pollinators – theirs and ours is a stressed environment.

"Providing habitat for pollinators is a cost effective solution for businesses, agencies and individual property owners," Geotz says in an open letter to government and business leaders, media and the general public.

"One hundred years ago, lawns, graveyards and rifle ranges were covered with wild flowers and were mowed by sheep and cows," he says. "Today, at significant cost in labor, fuel and equipment maintenance, these spaces look like golf greens.

"Today we have the impression that a short cut, manicured lawn is the best thing that we can do. It might look nice but if we change our perception that manicured lawn is a green desert and has virtually no nutritional value for any pollinators at all.

"For pollinators, this is the epitome of a green desert."

Geotz says for those incurring the costs associated with mowing, financial costs could be lowered or eliminated by reducing the amount of grass cut.

"In the case of some venues such as rifle ranges and ditches, income could be generated by allowing farmers to turn green growth into hay," he says. "Through these examples, it is clear that providing natural habitat for pollinators is cost effective."

Simple management changes to how green spaces along roadsides, highway shoulders, rifle ranges, cemeteries, prisons, parks and other crown land could be of substantial benefit to bees and other wild pollinators.

"Implementing these strategies would also save money for taxpayers, business and home owners," Goetz says.

Alan Harman

INNER ... Cont. From Page 15

ure.

OK, what about labeling GMO foods as GMO foods. The companies responsible for making GMO crops in the first place don't want them labeled as such. So are they hiding something? They command the corn and soybean markets, along with cotton, alfalfa, sugar beets and other crops so practically everything would have the label if they had the label. And the people who sell those foods, the grocery people, seem to feel the same way. So is hamburger made from a cow that eats GMO alfalfa GMO beef? And its milk GMO milk? Maybe everything will be GMO? It'd be easier on all the label issues. Just put on it – may contain traces of GMO whatever crop.

So if you're selling honey, and you insist that you have pollen in your honey so you can prove it's honey, are you willing to bet, if you live within flying distance of a corn field, soybean field, cotton, alfalfa, sugar beets or any of the other GMO crops, that your honey doesn't have any GMO pollen in it? And will you put that on your label? I don't think you can have it both ways here, either. But maybe someone will figure that out. It's beyond me anymore. I'm going back to keeping bees. They're a whole lot easier to understand.

And if you read Peter Seilings article this month, you know I can go back to saying – It's August, keep your veil tight, your hive tool sharp and take care of the bees that take care of the bees that go into Winter.

The 12 Days Of Christmas Carol Contest!

On The First Day Of Christmas, My Bee Keeper Gave To Me,
A Beautiful Italian Queen Bee
On the Second Day Of Christmas, My Bee Keeper Gave To Me,
2 Empty Supers and a Beautiful Italian Queen Bee
On The Third Day Of Christmas....

You know how this goes – send us the 12 days of Christmas, each with a beekeeping theme, and we'll publish as many as we have room for in the December issue.

There are only a few rules for this contest:

1. Every day has to have a beekeeping theme
2. Spelling, rhyme, rhythm and meter count
3. Your entry has to be sing-able
4. It has to be original
5. Keep it in the spirit of the season – friendly and fun
6. All entries have to be here by Midnight, October 1, 2014, no exceptions
7. You can have as many as three different entries
8. We accept only electronic submissions. Each email must have the name, address, email and phone number of the entrant and each entry MUST have 12 Days in the subject line, and each email must have only ONE (1) entry. And send every one of those entries to **Kim@BeeCulture.com**.

That's it. All entries will be judged by tone deaf Bee Culture staff after midnight that night who have bee sampling some Christmas Cheer, kind of early, and maybe some other office folks.
We'll see who sticks around.

Prizes. YES there are PRIZES.
FIRST PRIZE – A Life time subscription to Bee Culture Magazine. Value – unknown, but probably less than a couple grand – maybe more if you're lucky, and young enough. But there's more! We are going to put the winning entry's lyrics ON THE COVER OF THE DECEMBER ISSUE SO THOUSANDS AND THOUSANDS OF FOLKS CAN SEE AND SING YOUR SONG!

SECOND PRIZE – A five year subscription to Bee Culture Magazine. Value – about $125 or so, maybe more if the price goes up.
THIRD PRIZE – A three year subscription to Bee Culture Magazine. Value – over $100 anyway.

So songbirds, get busy. You have only until October First, 2014. Now, if you had subscribed to our CATCH THE BUZZ, you would have heard about this way, way back in July, and had more than enough time to pen the perfect 12 Day Christmas Carol.

(The idea for this contest was stolen in its entirety from Farm and Dairy News. We admit it.)

Display Advertisers

800.289.7668

Executive Publisher – John Root
Associate Publisher, Senior Editor – Kim Flottum, Kim@BeeCulture.com, Ext. 3214
Assistant Editor, Design & Layout – Kathy Summers, Kathy@BeeCulture.com, Ext. 3215
Circulation – Dawn Feagan, Dawn@BeeCulture.com, Ext. 3220
Advertising Manager – Peggy Garnes, Peggy@Beeculture.com, Ext. 3216
Publications Assistant – Amanda DeSimone, Ashaffer@RootCandles.com, Ext. 3255

Contributors
Clarence Collison • James E. Tew • Ann Harman • Kim Lehman • Phil Craft • Larry Connor • Connie Krochmal • Jessica Louque • Jeff Harris • Toni Burnham • Ross Conrad • Jennifer Berry

POSTMASTER: Send address changes to
BEE CULTURE, The A.I. Root Co.,
623 W. Liberty St., Medina, OH 44256

Subscription Information
U.S., one year, $25; two years, $48. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Digital Edition $15. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), August 2014, Volume 142, Issue 8, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Subscriptions, Book Orders
V800.289.7668, Ext. 3220 • F330.725.5624
www.BeeCulture.com • info@BeeCulture.com

Advertising
800.289.7668, Ext. 3216; Peggy@BeeCulture.com

***COVER** – Jim Lambert aims to capture emotions, or tell stories with his photos. You can see his work at JRLPhotography.net. He lives in Denver, CO.*

Pepper And The Bees

Ed **Colby**

My sidekick Marilyn's niece ended her career as an extreme skier when she broke both legs jumping off a cliff at a Snowmass competition. We attended her May wedding near Taos. Galena married (of course!) a kayaker and Telluride ski patroller.

Her father rowed her to the ceremony on the banks of the Rio Grande, in a dory.

The "preacher" was a Grand Canyon river guide, the guests professional skiers and boaters. There were sunburned, sandaled women there you wouldn't want to arm wrestle. Everything was laidback and behind schedule.

I didn't tell any of my own Grand Canyon stories, like twice flipping my raft in House Rock rapid – with different wives! You're not going to impress the pros with that story.

Before we slipped away early under cover of darkness, a dazzling bride confided, "We've got 10 acres down by Sawpit. I'd like to get some bees." Ahhhh. Gentle reader, for those who've sucked life's marrow and now yearn to become wise, bees are the new frontier. Today nothing is more intriguing, more green, more hip, than keeping bees.

It wasn't always so. When I started 20 years ago, it merely confirmed what some friends already suspected – that I was nuts!

We'd just gotten back from Taos, and already Marilyn was muttering that our getaway was too short. It was three days! Didn't I twirl her on the dance floor and take her to those hot springs by the Rio Grande she'd been dreaming about? What does she expect in the merry month of May, when the bees run me ragged?

I got some new Sundance pollen traps with side drawers, to use for my four-way-pallet hives. These traps have wooden overhead covers, which keeps out most of the chalk brood, so the pollen typically comes out clean enough to eat for lunch. The traps had been sitting under a tarp for two months. When we got back, I said, "Dearest, I need those traps painted this week."

I pay Marilyn to paint, but sometimes I need to get her started. Then I try not to meddle.

The morning she finished, she announced, "I have to go to the Telluride Film Festival – today." *Have to go? Today?* This was the first I'd heard.

I watched her roll down the driveway in her '99 Saturn with three OK tires and one nearly bald. "Can you change a flat?" I queried. "I've got AAA," she called out cheerily, waving out the window. "Well, keep it under 55," I shouted. "She'll be back," I mused, "with stories."

This left me home alone with her blue heeler dog Pepper, and lots to do. I put him in the cab of my pickup and loaded a nuc in the back. Then Pepper yelped and came flying out the window, snapping madly at a bee! I thought, "This is crazy! Why torment the dear boy? Better to leave him home, even he if wants to come." Because he hates honey bees, and they hate him back.

I headed for the Silt Mesa yard. I brought empty honey supers, thinking the little darlings might be on a honey flow. But the dandelions had come and gone to seed heads, and these bees made not a dollop of honey. Now they were starving! Blame stormy weather, or an inattentive beekeeper. I had six frames of honey in the truck, so I parceled them out and headed home for more.

When I arrived, I was greeted by a strange dog! He looked a lot like Pepper, but his face was bloated like some pit bull mongrel. He had a wag in his tail. I reached for his throat, and it felt like it might be swollen, too, though I couldn't be sure. His lips felt like big fat rubbery pancakes. An allergic reaction? Maybe. I called the vet, but she'd taken off for the Memorial Day weekend. I keep my own allergic-reaction Epi-Pen, and I got it out. Then I decided to not panic. It'd been a couple of hours since poor Pepper got stung, and the danger of anaphylaxis should have passed.

Pepper and I went outside, and he started harassing the geese. This was a good sign! I called my neighbor Howard and said, "You need to take a picture of this!" Pepper growled and snapped at Howard's Australian Shepherd. Hey, I think he'll be all right!

Another hour went by. It was getting late. I put Pepper back in the house and ran back to Silt Mesa to feed the bees. "He'll be fine," I kept telling myself, and of course he was. He still had the pit bull look the next day, but by the morning after, he looked like Pepper again.

He still loves the truck, even though that's where this all started. But he stays away from my little darlings. He just hates 'em.