

HOLIDAY SPECIAL INTERVIEW ISSUE

DEC 2022

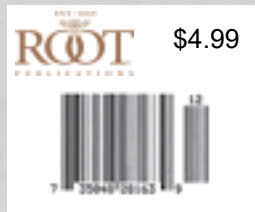
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Virgil
Dr. Schmehl
Troy Hall
Stuart Roweth





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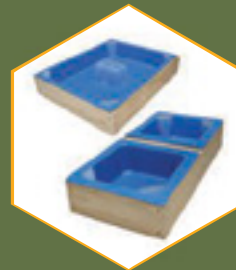
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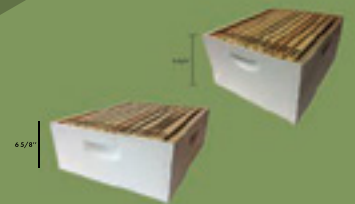
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Table of December Bee Culture...

- 8 **Mailbox**
- 10 **Next Month**
- 11 **Honey Prices**
- 13 **AHPA**
Chris Hiatt
- 13 **CHC**
Rod Scarlett
- 14 **Study Hall**
From the Editor
Jerry Hayes
- 16 **Found in Translation**
The Big Sleep
Jay Evans
- 19 **A Closer Look**
Honey Bee Viruses
Clarence Collison
- 24 **Off the Wahl Beekeeping**
Products of the Hive
New(ish) Beekeeper Column
Richard Wahl
- 30 **Must History Repeat?**
Nothing new under the sun.
John Miller
- 32 **Kid's Corner**
All the buzzz...
Kim Lehman
- 34 **Apiary Inspection**
Montana Department of Agriculture
Alyssa Piccolomini
- 35 **Beekeeping Burnout**
Beware!
Stephen Bishop
- 36 **Minding Your Bees and Cues**
A Diachronic Ouija –
Zoom Interview with Virgil
Becky Masterman & Bridget Mendel
- 40 **A Conversation on Pesticides with Dan Schmehl**
Pollinator Ecotoxicologist
James Masucci
- 44 **The Life and Legacy**
of Eric Mussen
Kathy Keatley Garvey
- 48 **The Beekeeping Journey of a Research Molecular Biologist**
Lelania Bilodeau PhD
Earl Hoffman

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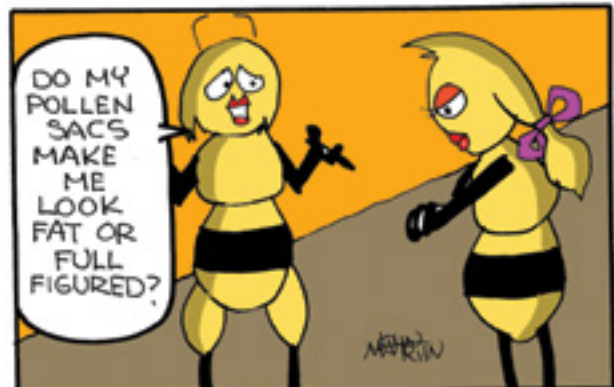
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Martin Haerter

Contents

- 52 **An Interview with Troy Hall**
of Hall Apiaries
Jeff Kennedy
- 56 **Bee Vet – Merry Christmas!**
*Bees in Christendom, the
Spiritual Health of Honey Bees*
Dr. Tracy Farone
- 58 **Interview with an Inventor**
Stuart Roweth
Tina Sebestyen
- 62 **The Best Tasting Honey**
in the World
Ross Conrad
- 65 **Honey Shows Part 1**
The Value of Showing Honey and Beeswax
Brutz English
- 67 **Notes from a NewBeeK**
Second Deep Tilting Platform
Dick Vermeulen
- 70 **Processing Propolis**
Could it be any easier?
Greg Carey
- 74 **The Royal Glands**
of the Honey Bee
Ed Erwin
- 76 **Being Diverse**
A Recap
Emma Wadel
- 78 **Mechanical Speed Controller**
Build it!
Ed Simon
- 82 **Stuck**
on Trees
Alyssum Flowers
- 84 **At What Cost?**
Three Stories
Jeremy Barnes
- 89 **Beekeeping in the
United States**
*A review of a classic beekeeping book that
is available to you – FOR FREE!*
James Tew
- 93 **Honey Recipe**
*Honey Caramel Corn
a.k.a. Fay’s Fiddle Faddle*
Fay Jarrett
- 94 **Calendar and Classifieds**
- 95 **Image Contest**
Holiday Hive Images
- 96 **Bottom Board**
The IRS
Ed Colby

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By John Martin



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(*Insects*, 2018)

Apistan, field study: **84%** efficacy
(Apiguard: 86%; Apivar: 79%; HopGuard: 64%),
@ Mississippi State University
(*Insects* 2018)

Apistan: **94.90%** efficacy
(2019, Veterinary Bee Inspector, Spain)

Apistan: **96.92%** Efficacy
(2018, Veterinary Bee Inspector, Spain)

Apistan + 50 g Apiguard: **97.97%** Efficacy
(2018, Veterinary Bee Inspector, Spain)

Apistan: **97%** Efficacy (2014, FNOSAD, France)

Apistan: **93%** Efficacy (2015, FNOSAD, France)

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Commercial Beeks

In the November 2022 issue of *Bee Culture Magazine*, two letter writers took umbrage at commercial beekeepers. One of the letters stated and I quote, “*Large scale commercial beekeepers have two primary goals-to maximize income from pollination and minimize the effort to maintain the hives and extract the honey. We were all taught to keep bees just like that by the big boys.*” The other letter writer stated, “*The big boys need to treat bees like livestock and keep all the colonies alive and the honey production high because it impacts on their profits, but not necessarily good for the bees.*”

We hobbyists, sideliners and commercial beekeepers are all members of the beekeeping family. Commercial beekeepers make an honest living transporting their honey bees to assist in pollinating monoculture crops such as almonds, apples, pears, cherries, oranges and cranberries, to name a few. Without this extremely valuable resource provided by our commercial beekeepers, such crops would be far less productive, and their cost to the consumer would be prohibitive.

Now, mind you, the commercial beekeepers did not create monoculture farming. However, by providing pollinators for these crops, in truth they assist in sustaining this form of agriculture. Is there a better way to farm and keep prices within reach of the average wage earner? Apparently not at this time. Would the ideal be to move away from monoculture farming while holding the prices of agricultural goods at reasonable levels? Of course. But the reality is no one has come up with a way to achieve this goal.

What are farmers to do? It is not practical to have small individual farms growing almonds on just a few acres of land. Such farming would cause the price of almonds as well as a host of other crops to skyrocket.

Consider the cost involved for commercial beekeepers in manpower and equipment to carry out their services. Bee colonies must be tended to while sitting on pallets in groups of four per pallet, and then these pallets have to be loaded onto flat bed trucks, driven to assigned locations, then unloaded and set down on a tract of land where their pollinating work begins. After the pollinating season ends, these colonies have to be hauled back to bee pastures to collect food for the Winter and are then often hauled south before once again being reloaded on flat beds for another season of pollinating food crops so we can enjoy a diverse diet of food.

Commercial beekeepers care and tend to their bees more so than many small size beekeepers for after all, bees are their livelihood. They, like hobby beekeepers, would like nothing better than to minimize treatments in order to maintain low populations of *varroa*. After all, treatment protocols are expensive and labor intensive. And all things being equal, if commercial beekeepers could make a decent living keeping their bees home, they more than likely would.

We, the consumers of products such as apples, cherries, pears, oranges and lemons, owe our commercial beekeepers a vote of THANKS for all that they do. Hats off to all those commercial beekeepers whose honey bees pollinate a wide variety of crops that enables us to enjoy a diverse diet which likely contributes to our longevity.

Al Avitabile (not a commercial beekeeper), co-author of The Beekeeper's Handbook

.....

Tone

I am a new beekeeper who really enjoys *Bee Culture Magazine*. Thank you for all the great work.

One recent article titled *The Reliability of Science* (Part 1, *Bee Culture* May 2022 issue: <https://www.bee-culture.com/the-reliability-of-science-part-1/>) struck me as both

awesome and worrisome. The first part, especially Conrad's comments regarding the limits of science, was spot on and I appreciate his illuminating it and elucidating it so well.

However, later in that article when he got into corruption and pseudo-science, it came across rather namby-pamby. Conrad tossed some accusations out which had the tone of a guy complaining in a bar about Big Brother and how he was wronged. Conrad is likely quite right about what he is saying, but the tone of his argument was not good. More importantly though, he didn't answer the "so what?" question. He did not enable the reader to know what to do with the concerns raised.

I believe so much else in this great magazine will help me be a better beekeeper. This just isn't one of those pieces.

*Kind regards,
Rich*

From Ross

Hi Rich,

Thank you for taking the time to read *Bee Culture Magazine* and for sharing your thoughts about my recent article series on science.

If the tone of the article was off, it was probably due to my frustration over our lack of progress dealing with numerous profoundly challenging issues we face collectively ranging from pesticides to climate destabilization, all of which have been made worse by compromised science that has muddied the waters and derailed many a good effort to address them.

Most of the time when I write articles, it is to inform and shine a light on issues that are not often covered by other beekeepers who write for *Bee Culture*. As a result, I often take on advanced topics that I don't have the answers for, but I hope to start a conversation within the beekeeping community in an effort that through our collective knowledge and wisdom we may find some solutions.

Regarding your question about what to do with the information presented, I felt that I was addressing this by making passing reference to a couple ideas that the reader might be able to use. One was to be wary of jumping to conclusions that somebody is right when they claim that a study is fake simply based upon the sincerity they seem to express and our history of fraudulent science.

Another was to consider looking into published works for oneself to determine the extent to which industry participated in the study and therefore the likelihood that the work may be compromised before acting on it as if it were fact.

If it is solutions you are looking for, then I am not your man. I don't have all the questions and rarely have any of the answers. Part of the reason I write is to educate myself, as well as others. Writing requires me to think more clearly and deeply about my subject and sometimes this process helps me to come to a new and more comprehensive understanding of an issue.

I suppose I could have made a reference to other "so what" ideas such as the value of trusting in your personal experience despite what the science says, or the need for us to consider the idea of developing an alternative economic model that might remove the incentive to falsify science for profit. However, I don't want to underestimate the intelligence of the readers and assume that they can't come up with such ideas themselves without me having to spell everything out for them. I am much more likely to provide more concrete ideas of what to do when I am writing about specific beekeeping issues with which I have much more experience than I do a subject like science, in which I am simply a sidliner having conducted a couple citizen science trials and regularly make use of published papers for my own edification and to support points I make in my articles.

Also, you mention that you are new to beekeeping, and the science articles are really not written for the beginning beekeeper. Thanks again for taking the time to get in touch. I hope I can do better in the future.

Ross

.....



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Virus

Letter to the Editor:

Dr. Lamas's (USDA Beltsville) research shows that virus is spread throughout the colony; from bee to bee, from *varroa* mite to *varroa* mite, from *varroa* mite to bee and bee to *varroa* mite. His research also shows *varroa* mites are on drones in the early season and we have been testing nurse bees. Later in the Summer when drones diminish, the *varroa* mites migrate to the worker/nurse bees. Hence, we have been testing for mites incorrectly.

"What we're doing now isn't working. The pressure is on the mites to adapt and they are. Dr. Sam Ramsey's latest research shows that and it's a little unsettling." (Susan Crook, SC Master Beekeeping Program)

That is why I am pursuing Dr. Tom Seely's thoughts and techniques. We are going in the wrong direction with chemical controls. The bee survivors/bee tolerant are on target.

IPM is starting to unravel... this needs some thought. The economic threshold is not working. We should be keeping the mite levels low year-round and not treating them only when the mites get to a certain threshold. By then, it is too late; the virus is already established at a high level within the bees.

David E. MacFawn



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NEXT MONTH

Region 1

- Catch up on *Bee Culture* reading
- Be sure hive insulation is in place
- Clean bottom board entrance
- Check hive weight for honey stores
- Feed if needed
- Pray
- Hay bales for wind break
- Repair equipment
- Clean snow away from entrances
- Sleep in

Region 2

- Keep feed on
- Oxalic dribble for *varroa*
- Repair and build frames
- Be sure entrance reducers are in place
- Order honey containers
- Assemble comb honey supers for Spring
- Check for deadouts

Region 3

- Check hive weight for honey stores
- Put SHB traps in
- Just leave them alone if you have done your job
- Assemble woodenware
- January is coming... now what?
- Treat with Formic Pro for mites
- Feed, feed, feed
- On a warm day, take a peak inside
- Read books and *Bee Culture*

Region 4

- Hope for live bees in a few months
- Get bees ready for California
- Attend bee conferences
- Lift back of hives to check weight
- Clean out entrances
- Add candy boards as needed
- Improve your goals for next year
- Assemble frames, repair boxes

Region 5

- Pray
- Prep for California
- Enough food to get to March
- Block the Winter wind
- Establish upper ventilation
- Order queens
- Relax before real work begins again
- Treat with Formic

Region 6

- Feed as needed
- Prep equipment for Spring
- Alcohol wash for mite check
- Order queens for Spring
- Check for deadouts
- Check hive weight
- Protect from weather
- Get ready for another DRY year

Region 7

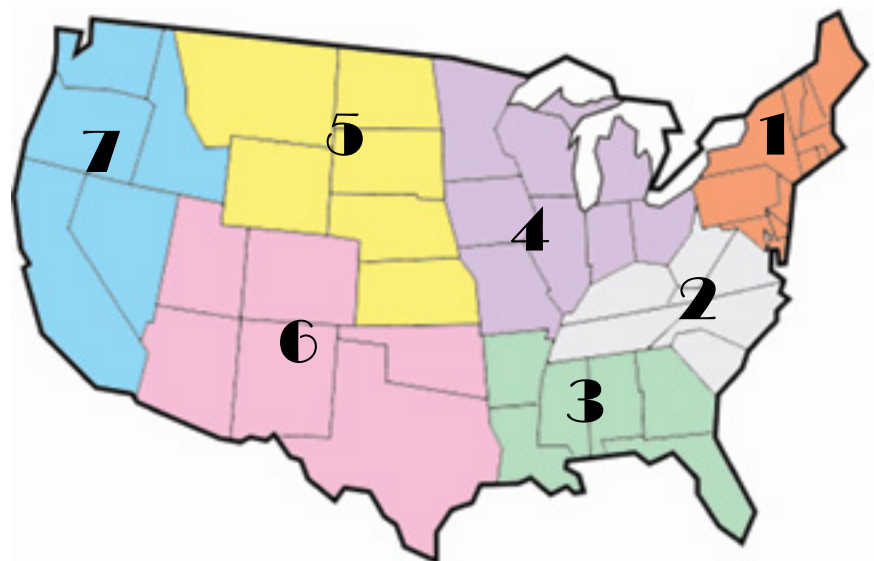
- Leave them alone
- Establish upper ventilation to stop condensation
- Check for feed reserves
- Don't open hive in cold weather
- Feed fondant if necessary
- Clean dead bees out of entrance
- Last check before almonds
- Let's hope 2023 is amazing! In a good way!

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DECEMBER - REGIONAL HONEY PRICE REPORT

REPORTING REGIONS - 2022											SUMMARY			History	
	1	2	3	4	5	6	7				Last Month	Last Year			
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS											Range	Avg.	\$/lb		
55 Gal. Drum, Light	2.59	2.23	3.35	2.94	2.89	2.73	3.68	2.00-4.50	2.86	2.86	2.95	2.29			
55 Gal. Drum, Ambr	2.47	2.23	2.93	2.88	2.61	2.65	2.50	1.90-4.00	2.64	2.64	2.83	2.33			
60# Light (retail)	233.46	229.34	247.25	216.56	216.25	186.93	310.00	120.00-350.00	229.14	3.82	249.55	205.10			
60# Amber (retail)	232.31	227.50	239.67	213.29	250.00	214.60	237.50	120.00-310.00	227.60	3.79	242.64	204.68			
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS															
1/2# 24/case	104.98	104.80	90.00	84.17	64.80	100.00	-	64.80-200.00	97.55	8.13	112.74	99.90			
1# 24/case	163.76	164.40	144.67	133.51	160.06	127.74	144.00	96.00-325.00	149.34	6.22	160.87	146.69			
2# 12/case	163.13	240.00	135.40	113.45	123.84	123.00	156.00	84.00-300.00	146.59	6.11	149.36	127.87			
12.oz. Plas. 24/cs	130.70	148.00	115.00	100.84	98.08	92.28	117.60	60.00-240.00	118.00	6.56	122.83	110.11			
5# 6/case	167.48	168.67	102.00	126.98	126.87	136.50	-	96.00-280.00	152.23	5.07	158.99	146.37			
Quarts 12/case	214.36	207.14	178.50	168.92	170.59	134.40	205.50	120.00-330.00	189.89	5.27	195.85	167.72			
Pints 12/case	103.00	148.50	99.75	97.17	98.08	144.00	115.00	60.00-180.00	109.69	6.09	119.96	98.45			
RETAIL SHELF PRICES															
1/2#	5.95	6.29	5.32	5.41	4.00	7.50	-	3.00-10.00	5.86	11.72	6.31	5.58			
12 oz. Plastic	8.01	8.02	7.25	6.83	5.51	9.33	6.38	3.95-16.00	7.52	10.03	7.71	6.65			
1# Glass/Plastic	9.83	9.88	9.32	8.18	9.29	10.08	9.50	5.69-18.00	9.42	9.42	10.03	8.63			
2# Glass/Plastic	16.88	16.65	16.39	15.29	16.45	16.00	17.00	7.99-26.00	16.43	8.22	18.09	14.77			
Pint	11.44	12.80	10.56	11.82	9.22	13.00	11.25	5.00-22.00	11.49	7.66	12.43	11.15			
Quart	22.59	21.78	20.06	21.31	18.31	23.00	21.30	10.00-40.00	21.29	7.10	23.09	19.16			
5# Glass/Plastic	36.44	34.79	36.85	31.22	23.58	38.75	-	15.00-58.50	34.59	6.92	35.36	32.24			
1# Cream	12.51	11.75	10.49	10.85	10.50	12.00	14.00	7.82-24.00	11.86	11.86	12.72	10.79			
1# Cut Comb	15.35	11.80	14.73	14.75	9.00	-	-	6.00-26.00	14.49	14.49	15.46	14.31			
Ross Round	13.65	13.37	15.00	11.33	7.00	-	15.25	7.00-24.00	13.16	17.55	13.35	12.04			
Wholesale Wax (Lt)	9.67	9.48	8.25	7.49	6.67	5.50	5.95	3.00-18.00	8.28	-	8.58	7.45			
Wholesale Wax (Dk)	8.00	6.65	7.17	6.49	6.00	5.33	-	3.00-16.00	7.03	-	7.54	6.31			
Pollination Fee/Col.	87.50	78.40	100.00	173.33	-	-	50.00	50.00-275.00	103.15	-	111.78	93.23			

Please note: anywhere within each region that there is a '-' it is because no information was sent to us for that specific item in that region.

REPORTING REGIONS - 2021											SUMMARY			History	
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55 Gal. Drum, Ambr	2.27	2.20	2.41	2.29	2.50	2.50	1.85	1.75-3.15	2.33	2.33	2.26	2.06			
60# Light (retail)	221.15	191.23	205.00	196.38	165.00	192.13	202.50	120.00-300.00	205.10	3.42	206.75	211.40			
60# Amber (retail)	221.25	186.78	187.50	195.57	203.59	181.18	212.47	120.00-285.00	204.68	3.41	204.33	204.64			
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS															
1/2# 24/case	103.32	101.57	96.00	79.50	126.60	96.00	113.97	61.20-194.90	99.90	8.32	96.81	87.94			
1# 24/case	158.44	200.64	139.75	110.55	197.67	95.92	144.00	48.00-300.00	146.69	6.11	141.37	145.03			
2# 12/case	143.85	187.23	108.17	106.11	75.92	108.00	132.00	40.00-264.00	127.87	5.33	128.13	129.29			
12.oz. Plas. 24/cs	110.73	156.60	102.00	94.65	94.32	107.88	114.00	72.00-240.00	110.11	6.12	112.10	108.96			
5# 6/case	157.34	192.12	135.00	118.56	113.16	73.00	173.94	73.00-330.00	146.37	4.88	146.08	136.63			
Quarts 12/case	185.69	207.98	131.50	143.00	155.08	146.34	183.00	119.08-300.00	167.72	4.66	166.62	160.80			
Pints 12/case	93.98	121.78	84.00	87.64	101.33	88.00	96.00	60.00-180.00	98.45	5.47	98.71	104.61			
RETAIL SHELF PRICES															
1/2#	6.10	5.95	5.50	5.16	3.96	3.84	5.76	2.68-9.19	5.58	11.16	5.60	5.35			
12 oz. Plastic	7.04	6.97	6.53	6.48	5.94	5.44	7.07	2.99-12.00	6.65	8.86	6.48	6.54			
1# Glass/Plastic	9.38	9.15	8.44	7.63	8.73	7.12	9.00	5.00-17.00	8.63	8.63	9.08	8.56			
2# Glass/Plastic	15.67	16.46	14.88	13.94	9.93	10.89	15.50	6.78-30.00	14.77	7.39	15.14	14.36			
Pint	12.16	12.79	9.95	10.22	10.52	12.33	9.60	4.00-22.00	11.15	7.44	12.38	11.44			
Quart	22.15	21.22	17.40	17.54	18.88	15.33	19.07	8.00-42.00	19.16	6.39	20.56	19.06			
5# Glass/Plastic	32.95	37.22	36.39	28.67	28.10	21.45	34.24	12.48-60.00	32.24	6.45	32.02	29.63			
1# Cream	11.75	9.25	8.50	10.50	7.75	10.00	14.00	7.50-18.00	10.79	10.79	10.58	10.86			
1# Cut Comb	15.05	12.80	12.30	13.67	9.00	15.41	15.41	8.00-25.00	14.31	14.31	13.23	13.89			
Ross Round	12.63	7.30	15.00	13.50	12.02	12.02	13.75	7.00-17.00	12.04	16.06	11.22	11.15			
Wholesale Wax (Lt)	7.95	6.03	10.12	7.16	6.17	4.17	6.67	3.00-23.20	7.45	-	6.72	7.50			
Wholesale Wax (Dk)	6.75	5.53	8.17	6.05	6.00	3.50	7.65	3.00-15.00	6.31	-	5.23	5.79			
Pollination Fee/Col.	85.91	74.00	95.00	130.00	90.00	110.36	50.00	30.00-225.00	93.23	-	90.21	87.68			



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Kevin Rader: Buzzus@beekeepingins.com
www.beekeepingins.com



American Honey Producers Association

www.ahpanet.com

Hello fellow beekeepers! Hope your Fall mite treatments and feeding went well. I wanted to give an update on the anti-dumping suit and the almond industry. As a group, packers are appealing the critical circumstance determination for Vietnam and two companies (from Argentina and Brazil) are appealing their duty rate. AHPA and Sioux filed an appeal on the low India rate, and we are pleased with the judge who was assigned to the case. We hope to get a higher tariff on Indian honey.

With the drought continuing out west, water restrictions and fees being applied and a huge carryover (7-800 million pounds), the almond industry is in a state of hurt, to put it bluntly. I will be

charged \$100 per acre this year for the water pumped out of my well to grow my almonds (\$500 was the proposed rate so it could have been worse). The low prices being paid out are also hurting growers. There are still lingering supply chain effects being felt from COVID, and a recent strike at the Los Angeles port caused containers to be diverted to Long Beach. The long shoreman union is being accused of slow-down tactics at the port also. All of this is not helping getting almonds out of California. I have seen some older orchards being taken out along with orchards that have questionable water. The new acreage planted coming into production in 2023 minus the acres being pulled will still be a

net increase; we just don't know the amount yet. Over the last four years, new bearing acres coming into production has run between 300,000 to 350,000 acres. We were due to see some slowing, but with these low prices, water restrictions/fees and input costs (fertilizer tripled this year for me), there are a lot fewer trees being planted.

With that said, there are a few reasons I think its too early for almond pollinators to say the sky is falling as there are several reasons why supply could still be tight. The first is that some North Dakota outfits are losing between 40-60% of their hives already going into Winter. In addition, the hurricane in Florida, which has caused the most financial damage

in the history of our country of any hurricane, has also killed many hives. Besides fewer east coast hives coming to almonds, the cost of trucking will keep some home. At \$5 a mile for the roundtrip journey from Florida or Georgia you are talking around \$28,000! The record high honey price will have some staying in Florida for oranges, just making nucs to sell or pollinating blueberries. It's a tough time for us and Ag in general, but the almond industry has made it through tough times before, as have beekeepers. Heck, my father grew his business in the 80's on 50¢ honey. We can do it again; we have to. 🐝

Chris Hiatt -President, American Honey Producers Association



Canadian Honey Council

Despite a particularly good Summer and an extremely long, warm Fall, many beekeepers across the country are going into the Winter with some trepidation. For many, the long, hot Summer should have resulted in above average honey crops, but initial reports belie those expectations. While there were average honey crops reported sporadically, overall results appear disappointing. Certainly, a major cause was the fact that commercial operations were forced to

split strong colonies in the Spring. Still, crop conditions were good, although moisture levels varied. Of course, while beekeepers struggled to recover numbers, in many instances it was just impossible to get back to 2021 levels. Thus, fewer colonies meant less honey.

Yet, it appears that by Fall, numbers have recovered and Canada may see a small drop on total colonies going into Winter, a testament to beekeepers

who suffered through a 45.5% Winter loss this past year. Throughout the Summer and Fall, beekeepers were continually urged to check *varroa* levels and treat sooner rather than later. By the end of August, when Winter preparations were getting started, *varroa* levels seemed to be well under control and colonies seemed quite strong. An unexpectedly warm September and October however may have had profound consequences

in some operations. High mite counts were reported in some yards, despite undergoing rigorous rounds of treatments. Across the country, various Tech Transfer teams were doing testing evaluations. We can only wait and see how things turn out next Spring, but in the meantime the push to develop new mite control products has only intensified. 🐝

Rod Scarlett -Executive Director, Canadian Honey Council



Merry Christmas, Happy Hanukkah, Los Posadas, Soyal, Kwanzaa or whatever you celebrate in this crazy world to bring honesty, respect and love to each other. Keep doing it!

POLLEN... BEE BREAD?

QUESTION

Jerry,

I really searched for information on this! Is some pollen stored as is, or is it ALL made into bee bread? Some sources mention that the bees add their mouth enzymes to the pollen, right away, to help preserve it, but not all sources called this "Bee Bread" – reserving that title for when the pollen was mixed with honey. I did find a research paper that said, "We found that bees preferentially consume fresh pollen stored for less than three days, (Anderson, et al., 2014, p. 23) from a study titled, *Hive-stored pollen of honey bees: Many lines of evidence are consistent with pollen preservation, not nutrient conversion*. In this article, it sounds like not all the pollen stored is yet bee bread. Jeannie S.

ANSWER

There is no such thing as 'fresh' pollen stored in a honey bee colony. All pollen collected by the bees visiting flowers is groomed off the bees body hairs and liquids from midgut that contain, bacteria, yeast and fungus, and then enzymes are added so it can start to meet long term storage. It is now sticky and packed around their



corbicula on large rear legs to begin the fermentation storage preservation process, even as the foragers fly back to the colony. This process makes the pollen not able to fertilize a seed embryo any longer. Once the cell that these multiple loads of now beebread are unloaded into, remember it's not pollen anymore that can fertilize a seed embryo, is full of a thin layer of honey that may be added to the top as another preservation technique.

QUEEN FECUNDITY

QUESTION

I am a third year beekeeper. For the last two years after getting started, the 'expensive' queens I have purchased quit laying workers mid-Summer. They become drone layers. I have gotten mentor(s) from our local club to come out and take a look. They say "Yep, you got a drone layer, you need to buy another queen." I do and it happens again. What is going on?

Richard H.

ANSWER

Glad you didn't put me in an awkward spot. Lets take a look at DCA's Drone Congregation Areas. These are locations where drones, honey bee males, get together from colonies in a couple mile radius and fly around waiting for a virgin queen to locate the area, fly into it and attract multiple drones to mate with. It may take a few separate trips to get 15-20 drones to contribute sperm to fill up her sperm holding organ called a spermatheca. If there are a few beekeepers in an area, or even a few feral colonies, then local beekeepers colonies will contribute enough drones for queens produced for swarming or supercedure or a few beekeeper queen rearing opportunities. Now, lets say there are multiple commercial queen producers in an area who

produce thousands of queens to sell. Lets say that a Queen Producer in the peak season produces 1,000 queens per week (this is actually a low number). If we use the low number of 15 above, that means that they will require 15,000 Drones per week to sacrifice their lives and mate with 1,000 queens. And this is week after week. No way.

My suggestion to you is get your mentors to tell you who in the local area is a reputable and experienced small queen producer and give them a try.

TOOLS GUIDE – 8TH EDITION

QUESTION

I have listened to everyone that I know of about *Varroa* control. I have used all the products they have told me to use. I even bought one of those OA vaporizers. I saw *Varroa* on my bees last week. I need some better advice.

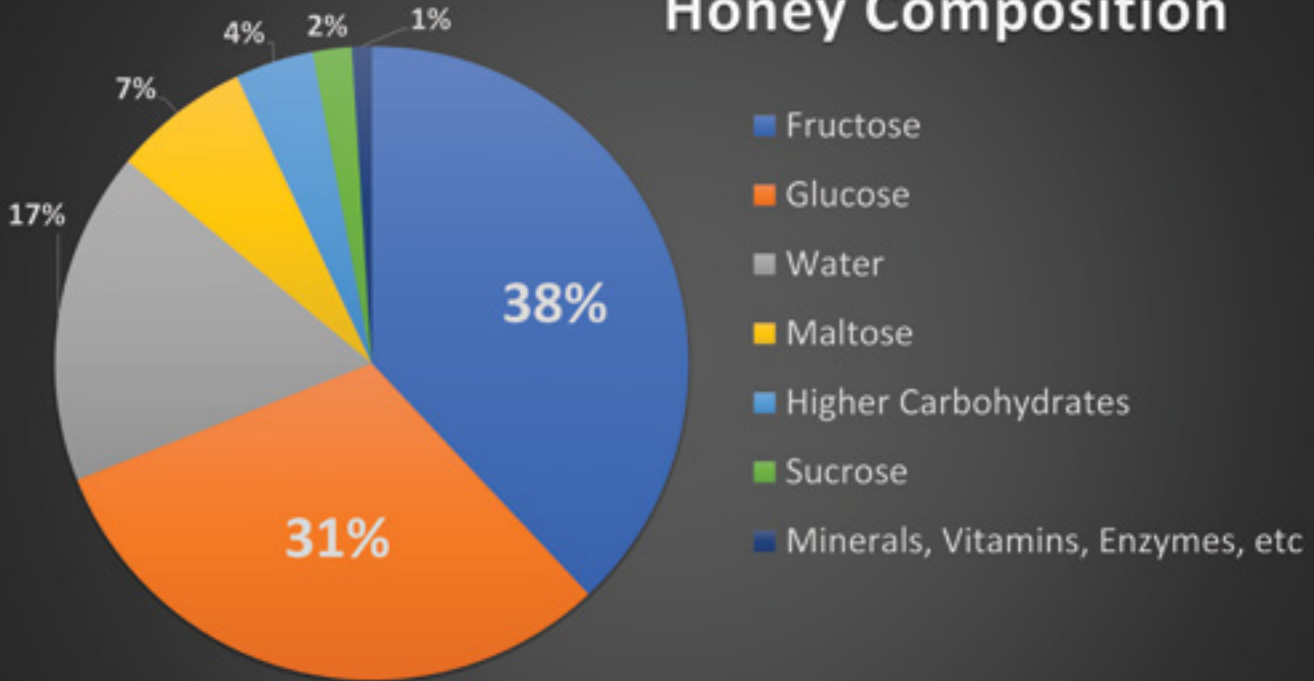
Bobby R.

ANSWER

Go to https://honeybee-healthcoalition.org/wp-content/uploads/2022/08/HBHC-Guide_Varroa-Mgmt_8thEd-082422.pdf and there you will find the Brand New 8th Edition of *Tools for Varroa Management Guide* ready in time for Christmas. Print it out. If you can't print it out, send me an email and I will send you a copy. It is all here. You don't need to go on the web, listen to podcasts, or other people. Sampling, what to do at certain times of the year, products you can choose yourself, options etc., etc. are all there. I guarantee you if you follow this Honey Bee Health Coalition Guide for *Varroa* control consistently you will not lose colonies from *Varroa*. It may be other things but it won't be *Varroa*.

From the Editor, Jerry Hayes

Honey Composition



BEEKEEPER REGISTRATION

QUESTION

We have registration through our Dept of Ag. for honey bee colonies. It costs hardly anything but why do they want this done and what value is in it for me?

Kamar M.

ANSWER

Long, long ago on a planet far, far away I was Chief of the Apiary Section of the Florida Dept. of Agriculture and Consumer Services (FDACS). At the time, we had about 300,000 colonies and a couple thousand beekeepers. Nobody does anything if they can't show value. FDACS was well aware of the value of managed honey bees to Florida agriculture and to its environment. Pollinator dependent agriculture is easy to see the value of all the fruits and vegetables Florida growers grew for consumer nutrition and value. But, they also knew of the value of those honey bees pollinating in the environment – plants, producing fruits, seeds, nuts, foliage that fed deer, squirrels, thousands of birds and help with carbon sequestration and water quality. But, only healthy, active and robust honey bees can give the most value. Our apiary in-

spectors were great. Our philosophy was that we were not the 'Bee Police', but rather part of Univ. of Florida, Dr Jamie Ellis' Lab, sharing educational outreach. Of course, there were rules and regulations for beekeepers to follow with management of pests, parasites and disease, but building trust, confidence and consistency between apiary inspectors and beekeepers was how the industry improved. Hopefully most states follow this model.

HONEY CRYSTALLIZATION


QUESTION

A friend told me that when honey crystallizes the solid part is all sucrose and the other part is all fructose. Is this true?

David S.

ANSWER

"It is natural for honey to crystallize since it is an over-saturated sugar solution. The two principal sugars in honey are fructose (fruit sugar) and glucose (grape sugar). The content of fructose and glucose in honey varies from one type of honey to the other. Generally, the fructose ranges from 30-44% and glucose from 25-40%. The balance of these two major sugars is the main reason

that leads to crystallization of honey, and the relative percentage of each determines whether it crystallizes rapidly or slowly. What crystallizes is the glucose, due to its lower solubility. Fructose is more soluble in water than glucose and will remain fluid. When glucose crystallizes, it separates from water and takes the form of tiny crystals. As the crystallization progresses and more glucose crystallizes, those crystals spread throughout the honey. The solution changes to a stable saturated form, and ultimately the honey becomes thick or crystallized." (See graph above) From https://bvbeeks.org/wp-content/uploads/2015/11/Honey_Crystallization.pdf 

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FOUND IN TRANSLATION

The Big Sleep

Jay Evans, USDA Beltsville Bee Lab



Listen along here!



In most of the northern hemisphere, beekeepers have put their colonies to bed for the Winter and are eagerly anticipating their Spring awakening. Unfortunately, only two-thirds of colonies that go into Winter come out alive, leading to silent Springs for large and small beekeepers and impacting early pollination events. The only upside, for some, is a booming market for package bees and nucleus colonies. The causes of Winter losses are many, and determining which threats are most important is an active research topic.

This research takes three forms: 1) Direct experimental tests of potential killers, 2) Correlative studies of possible causes within and outside colonies and 3) for the extremely patient, long-term studies of Winter losses at the apiary or neighborhood level across different habitats. The ultimate goal of this research, and of beekeeper observations of their own losses, is to manage bees and their environment in healthier ways. A

short-term goal, if less satisfying, is to simply have a better grasp of how many colonies will be on hand before making commitments to pollinate or placing early orders for new Spring bees.

Experimental manipulations of colonies followed by a wait-and-see for Spring are challenging and expensive. To date, these experiments have pointed towards *Varroa* mite treatment as the single most important, and largely doable, management step needed to improve Winter survival, with nutrition, queen health and pesticide exposure all playing roles. These small-scale experiments are mirrored by insights from the Bee Informed Partnership's Colony Management survey (www.beeinformed.org). Beekeepers remain the single most valuable player in maintaining colony health.

What about neighborhood or landscape causes for Winter losses? With increased tools for hive-monitoring tools and vital governmental

resources for mapping reported land uses (e.g., the USDA's Cropland program, <https://nassgeodata.gmu.edu/CropScape/>), predicting landscape forces that sustain or kill bee colonies has become highly useful. I have highlighted the 'Beescape' project before (www.beescape.org), an effort to show beekeepers what is within foraging distance of their colonies. With parallels in other parts of the world, Beescape can guide apiary placement and nutrition management, and is also simply fascinating in a 'Zillow' sort of way in showing the best neighborhoods for raising bees. Land-use maps have been used to assess landscape features that favor bee health in habitats ranging from the western bee 'breadbaskets' to Philadelphia. As an example of the former, Dan Dixon at the University of North Dakota and colleagues from the U.S. Geological Survey mapped land use changes surrounding known apiaries across eastern North Dakota in *Land conversion and pesticide use degrade forage areas for honey bees in America's beekeeping epicenter* (2021; PLoS One; <https://doi.org/10.1371/journal.pone.0251043>). They used this information to develop a 'Quality Index' for apiary sites, noting where colonies were likely to be exposed to insecticides and other threats and where they would be less vulnerable to those threats. As expected, areas with more natural forage, including those managed through the USDA's Conservation Reserve Program, presented healthier forage options within reach of resident beehives. This recent work mirrors prior work in the same region, showing the importance of healthy forage for honey bee survival and honey production (i.e., recent work led by Autumn Smart from the



University of Nebraska with the USGS team, *Landscape characterization of floral resources for pollinators in the Prairie Pothole Region of the United States*, 2021, Biodiversity and Conservation 30:1991-2015, <https://digitalcommons.unl.edu/entomologyfacpub/949>).

Given the decent insights from experiments and landscape-level surveys, why would anyone wait on decades-long surveys to identify the causes of colony losses? First, these surveys are the best for showing changes in forage and climate over the long term. They also help separate threats beekeepers and bees can address from those they cannot. A brand-new 10-year survey from Germany points out some known risks while also finding a surprising twist. Jes Johannesen and colleagues, in *Annual fluctuations in Winter colony losses of Apis mellifera L. are predicted by honey flow dynamics of the preceding year* (2022, *Insects* 13, 829, <https://doi.org/10.3390/insects13090829>), merge hive monitoring and weather data with actual colony losses (as reported in surveys) to explore connections across years.

First, the authors make the case that management practices and bees are fairly homogenous, and hence variation in colony losses likely reflects climate or other environmental

external variables. This is perhaps more true in Germany than in the U.S. Counter-intuitively, years in which bees started to return with forage sooner, i.e., 'early Springs', were linked with both larger colonies and heavier Winter losses the following Winter. This result likely reflects longer growing seasons for *varroa* mites and the delayed impacts of those mites. When 'start date' is factored out, colonies that gained weight the fastest in a three-month Spring flow had higher odds of surviving Winter, so colony growth itself remains a good predictor of colony futures. In a sign that local conditions are critical, colony losses in August correlated with losses the following Winter in the same apiaries. It would be nice to see disease data for these colonies; perhaps they had high virus, nosema or other loads that might have been a predictor of bad news by the following Spring, if not a trigger for disease control that Fall. The most surprising result involved year-to-year changes. Apiaries with low losses one year tended to have higher losses the next, and vice versa. Their best guess for a cause of this odd trend was that prior or alternate years might act as a purge for locally bad colonies, and the survivors would be, at least momentarily, over-achievers. Again, these surveys did not involve actual sampling, so it is hard to test that idea. I hope your own colonies fare well this Winter and are buzzing when you check them in 2023. ☺





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Viruses are obligate intracellular infectious agents that rely on their host machinery for multiplication (i.e., transcription, translation and replication). By doing so, they can cause significant damage to their hosts and express a variety of symptoms. In honey bees, viral infections have been reported to affect diverse traits, such as morphology, physiology and behavior; in severe cases, viruses may lead to increased mortality at the individual as well as colony levels (Beaurepaire et al., 2020). For example, wing deformities and shortened abdomens are characteristic symptoms of deformed wing virus infection (De Miranda and Genersch, 2010). However, some bee viruses have been recently discovered that show no apparent symptoms, or only mild symptoms, in infected honey bees (Levin et al., 2016; Remant et al., 2017; Levin et al., 2019; Beaurepaire et al., 2020).


Viruses with RNA genomes predominate in honey bees. These viruses typically consist of small icosahedral particles (17, 30 or 35 nm) that contain a positive-sense, single-stranded RNA genome (De Miranda et al., 2013; Bailey, 1971; Bailey and Ball, 1991). After attaching to and penetrating into their host cells, these viruses generally replicate by injecting RNA directly into the cytoplasm. The host machinery (e.g., ribosomes) will then transcribe and generate new viral proteins, that will be assembled as a viral particle, released from the infected cell and will start infecting new cells. More recently, RNA viruses with a negative-sense, single-stranded genome, which are generally more difficult to propagate in vivo, have also been identified in *Apis mellifera* (Levin et al., 2016; Remant et al., 2017; Levin et al., 2019). Additionally, a few viruses with a DNA genome have been identified in honey bees. These DNA viruses differ from RNA viruses in the way they replicate. Once within their host cells, DNA viruses are transported to the host nucleus to be transcribed and translated (Beaurepaire et al., 2020).

At least 24 honey bee-associated viruses have been reported (Tantillo et al., 2015) including seven viruses that are widespread. These are Acute bee paralysis virus (ABPV), Deformed wing virus (DWV), Sacbrood virus (SBV), Black queen cell virus (BQCV), Israeli acute paralysis virus (IAPV), Chronic bee paralysis virus (CBPV) and Kashmir bee virus (KBV) (Tantillo et al., 2015; Chen and Siede, 2007; Guo et al., 2020).

RNA viruses impact honey bee health and contribute to elevated colony loss rates worldwide. Deformed wing virus (DWV) and the closely related *Varroa destructor* virus-1 (VDV1), are the most widespread honey bee viruses. VDV1 is known to cause high rates of overwintering colony losses in Europe, however, it was unknown in the United States (U.S.). Using next generation sequencing, Ryabov et al. (2017) identified VDV1 in honey bee pupae in the U.S. They tested 603 apiaries in the U.S. in 2016 and found that VDV1 was present in 66.0% of them, making it the second most prevalent virus after DWV, which was present in 89.4% of the colonies. VDV1 had the highest load in infected bees compared to other tested viruses, with DWV second. Analysis of 75 colonies sourced in 2010 revealed that VDV1 was present in only two colonies (2.7%), suggesting its recent spread. They also detected newly emerged recombinants between the U.S. strains of VDV1 and DWV. The presence of these recombinants poses additional risk, because similar VDV1-DWV recombinants constitute the most virulent honey bee viruses in the UK.



A Closer LOOK



Honey Bee Viruses

Clarence Collison

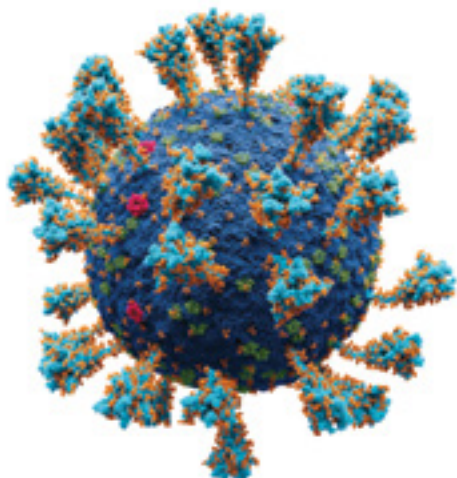
The honey bee is commonly infected by multiple viruses. Carrillo-Tripp et al. (2016) developed an experimental system for the study of such mixed viral infections in newly emerged honey bees and in the cell line AmE-711, derived from honey bee embryos. When inoculating a mixture of iflavirids [sacbrood bee virus (SBV), deformed wing virus (DWV)] and dicistrovirids; Israeli acute paralysis virus (IAPV), black queen cell virus (BQCV)] in both live bee and cell culture assays, IAPV replicated to higher levels than other viruses despite the fact that SBV was the major component of the inoculum mixture. When a different virus mix composed mainly of the dicistrovirid Kashmir bee virus (KBV) was tested in cell culture, the outcome was a rapid increase in KBV but not IAPV. They also sequenced the complete genome of an isolate of DWV that covertly infects the AmE-711 cell line and found that this virus does not prevent IAPV and KBV from accumulating to high levels and causing cytopathic effects. These results indicate that different mechanisms of virus-host interaction affect virus dynamics, including complex virus-virus interactions, superinfections, specific virus saturation limits in cells and virus specialization for different cell types (Carrillo-Tripp et al., 2016).

Kashmir bee virus (KBV) is a potentially lethal virus of honey bees that has recently come to prominence

as one of several viruses closely associated with colony collapse because of infestation with *varroa* mites (Ball and Bailey, 1997). Like most honey bee viruses, KBV is thought to persist as an in-apparent infection within the bee community, until stress or an alternative vector (such as *varroa*) causes it to become epidemic and lethal. The geographical and host origins of KBV are obscure. It was discovered in 1974 as a contaminant in preparations of Apis iridescent virus from the Asian hive bee (*Apis cerana*) that multiplied to high titers when injected or fed to adult *Apis mellifera* bees (Bailey and Woods, 1977). Although it was suspected that KBV originated in *A. cerana* and SE Asia, the detection of KBV, or its serological relatives, in natural populations of *A. mellifera* from around the world (Ball and Bailey, 1997; Allen and Ball, 1995), as well as *A. cerana* from India (Bailey and Woods, 1977; Bailey et al., 1979), bumble bees (*Bombus* spp.) from New Zealand and European wasps (*Vespa germanica*) from Australia (Anderson, 1991) has made this difficult to prove (De Miranda et al., 2004).

KBV is serologically and biologically closely related to acute bee paralysis virus (ABPV) (Allen and Ball, 1995; Anderson, 1991). Like KBV it was discovered as a contaminant, during transmission studies of chronic bee paralysis virus (Bailey et al., 1963) and is extremely lethal to adults and larvae, both by injection and in larger doses by feeding (Bailey et al., 1963). It is common in seemingly normal, healthy colonies and has been heavily implicated in *varroa* induced colony losses, primarily in Europe in the 1980s (Ball, 1985; Allen et al., 1986; Ball and Allen, 1988; Bailey and Ball, 1991). *Varroa* can transfer ABPV among adults and pupae with 50–80% efficiency, depending on the sensitivity of the detection method used. This efficiency drops with successive transfers and there is no noticeable latent period between acquisition and transmission, which suggests that there is no virus replication in the mite (De Miranda et al., 2004).

Lake Sinai virus (LSV1) and LSV2 were discovered in honey bee samples obtained from a migratory commercial beekeeping operation with sites near Lake Sinai, South Dakota. These viruses were the most abundant pathogens detected in a 10-month honey bee pathogen monitoring study carried out in the U.S. in 2008-2009. In that sample cohort, LSV2 was the most abundant virus with peak levels in April and January, whereas LSV1 infections peaked in July (Runckel et al., 2011). While the pathogenicity of LSVs is not well understood, LSV1 and LSV2 loads were higher in Colony Collapse Disorder (CCD) affected colonies, as compared to unaffected colo-



nies (Cornman et al., 2012). Since the discovery of LSV1 and LSV2, the LSV group has been expanded to include LSV3 (Cornman et al., 2012), LSV-Navarra (Granberg et al., 2013), LSV4, LSV5 and several LSVs discovered in Belgium (Ravoet et al., 2013; Ravoet et al., 2015). LSVs have been detected in the U.S., Spain, Belgium and Turkey (Cornman et al., 2012; Runckel et al., 2011; Granberg et al., 2013; Ravoet et al., 2013; Ravoet et al., 2015; Tozkar et al., 2015), as well as in multiple bee species (Ravoet et al., 2014; Daughenbaugh et al., 2015).

Slow bee paralysis virus (SBPV) is characterized by the paralysis of the front two pairs of legs of adult bees, a few days before dying, after inoculation by injection (Bailey and Woods, 1974). The virus is associated with and transmitted by *Varroa destructor* (Bailey and Ball, 1991). Despite this association, SBPV is rarely detected in bee colonies (Bailey and Ball, 1991; De Miranda et al., 2010). SBPV can also be detected in larvae and pupae but produces no symptoms in these (De Miranda et al., 2013).

Cloudy Wing Virus (CWV) symptoms consist of opaque wings of severely infected adult bees, with lower titers resulting in asymptomatic infected bees (Bailey et al., 1980; Bailey and Ball, 1991; Carreck et al., 2010). It cannot be propagated in larvae or pupae. It has an unpredictable incidence, no regular associations with other pathogens or pests. Like chronic bee paralysis satellite virus it has a small particle and very small genome, but they are serologically unrelated and their single capsid proteins are of different size (Bailey et al., 1980; De Miranda et al., 2013).

Knowledge of the spreading mechanism of honey bee pathogens within the hive is crucial to understanding bee disease dynamics. The aim of Ribière et al., (2007) was to assess the presence of infectious chronic bee paralysis virus (CBPV) in bee excreta and evaluate its possible role as an indirect route of infection. Samples of paralyzed bees were (i) produced by experimental inoculation with purified virus and (ii) collected from hives exhibiting chronic paralysis. CBPV in bee heads or feces (crude or absorbed onto paper) was detected by reverse transcription-PCR. CBPV infectivity was assessed by intrathoracic inoculation of bees with virus extracted from feces and by placement of naive bees in cages previously occupied by contaminated individuals. CBPV RNA was systematically detected in the feces of naturally and experimentally infected bees and on the paper sheets that had been used to cover the floors of units containing bees artificially infected with CBPV or the floor of one naturally infected colony. Both intrathoracic inoculation of bees with virus extracted from feces and placement of bees in contaminated cages provoked overt disease in naive bees, thereby proving that the excreted virus was infectious and that this indirect route of infection could lead to overt chronic paralysis. This is the first experimental confirmation that infectious CBPV particles excreted in the feces of infected bees can infect naive bees and provoke overt disease by mere confinement of naive bees in a soiled environment (Ribière et al., 2007). 🐝

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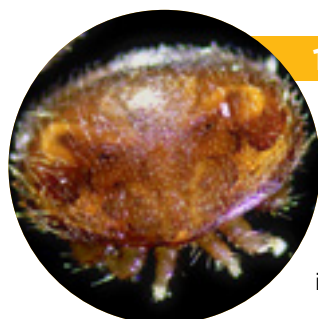
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Are Your Colonies Ready to Overwinter?

Successfully overwintering your colonies can be a complicated task. From large commercial operations to backyard hives, beekeepers need to prepare for wintering in the heat of the summer. Seasoned beekeeper, Tom Nolan shares his key steps to getting bees ready for winter—so you can be cracking into stronger, healthier colonies in the spring!



Tom Nolan is the Founder and Past President of the *Urban Toronto Beekeepers Association* and lead Sales Representative for *NOD Apiary Products*. His personal mission: to ensure the sustainability of honey bee health. Tom shares his enthusiasm for honey bees by educating beekeepers on best management practices, Varroa control, swarm catching and by volunteering at an organic farm—all while running his successful beekeeping operation: *Hivetown Honey*.



1. MONITOR MITE LEVELS

Determining your colonies' mite counts is critical to inform if you should treat before the winter brood is produced. Ideally, mite counts should be performed monthly. Use a simple alcohol wash, sampling from a frame with older larva (just before capping) to get the best example of a hive's mite count. The typical threshold to prompt treatment is 1-3% infestation—about 3 to 9 mites in a sample of 300 bees.

2. TREAT FOR VARROA MITES

Flexibility is key for fall treatment. *Mite Away Quick Strips™ (MAQS)* and *Formic Pro™* allow you to treat at the end of the honey flow (2-3 brood cycles before Queen goes off-lay), while the last super is still on. The ready-to-use strips make for easy application and quick treatment periods. *MAQS* and *Formic Pro* are all-natural products made with formic acid, killing Varroa mites in the dispersal phase (phoretic) that are found on adult bees and mites under the brood cap, where they reproduce.



3. ENSURE PROPER FEED

Providing your colonies with ample feed stores is essential to keep honey bees healthy over winter. You should commence feeding after your last honey pull, in late summer or early fall. There are a variety of feeders available, 2:1 liquid sucrose in a bucket top feeder is a tried-and-true method for overwintering. Remember: do not feed during *Formic Pro* or *MAQS* treatment period and ensure hives are well-fed before winter wrapping.

4. WRAP YOUR HIVES WELL

Bee Cozy™ Winter Hive Wraps prevent unnecessary heat loss, conserving feed stores over the winter and assisting your bees to brood up faster—so you can split earlier in the spring and be ready for the honey flow. Wrap once temperatures are consistently below cluster point (50°F/10°C), and remove when temperatures are consistently above cluster point and the possibility of snap freezes have passed.



Want to hear more?

Contact us to book Tom as a guest speaker for your Bee Association:

info@nodglobal.com

Learn more about *Mite Away Quick Strips*, *Formic Pro* & *Bee Cozy Winter Hive Wraps* at www.nodglobal.com



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New(ish) Beekeeper Column

Uses of Honey

The primary reason most new beekeepers get into the management of bees is to ultimately collect some honey. Initially, this might be to get just enough for personal use as an alternate sweetener (in place of granulated sugar) for baking, added to a cup of tea or even for the hope of harvesting a little extra that can be given to friends or sold at those ever present local farm markets or Fall craft bazaars. As the awareness of the benefits of this very natural sweetener have grown, so has the interest in many more individuals maintaining beehives for their own purposes.

The most frequently asked question I get when I take honey to sell at a local farmer's market or retail craft store is, "Is it local honey?" Since I am lucky enough to have several farmers markets and numerous Fall craft bazaars in my immediate area the answer is, "Yes, I am quite local" usually able to add a given mileage of how near my apiary is. Why is there such interest in the honey being from a local source? There is a common belief that the residual pollen that stays in the honey produces an anti-allergic response. One could logically assume that small amounts of honey with its inherent pollen content might provide some element of anti-allergic defense. For a number of years when I first began selling honey, an elderly cousin of my father would buy a sixteen pound lot each year. He said he would take a tablespoon with his breakfast each morning as he believed it contributed to his continued health and longevity. He lived in good health to the age of 96. I once asked him how he came about this belief. His response was that as a young man he was once told by an elderly gentleman he knew that his secret to an old, healthy life was, "I eat a tablespoon of local honey each morning." And that man he knew lived in good health to the age of 99. I have no medical background and would advise consulting with a practicing doctor before relying on this as any substitute for other medical interventions. But when paired with many of the other homeopathic remedies that I grew up with as a child in

Off the Wahl Beekeeping PRODUCTS OF THE HIVE

Richard Wahl



Bottled jars of honey ready for labeling and sale.

my household, I cannot help but believe there may be a grain of truth to this. While growing up, honey was a reliable tonic for sore throats or even to treat a bad sunburn. There are many studies that have found honey to have antibacterial properties, thus allowing injuries to heal without infection. There are also sources that can be found in many publications that laud the health benefits of using a naturally produced food product such as honey. One simply needs to look up unique or unusual uses of honey to find a host of different applications. One of the favorite uses of honey is in the making of lip balms or skin creams. Again, there are numerous websites that provide recipes for these substances. But it is not uncommon to see homemade lip balms or creams being sold by vendors who have added these items next to their honey sales.

Cut Comb Honey

When I first started selling honey at local craft bazaars and farmer's markets, I was occasionally asked if I did cut comb honey. This apparently, was a familiar product that some of the older generation had grown up with and I then had to figure out exactly what it was and if I wanted to add it to my honey sales. The cut

wax comb is edible, just like honey, and there is a belief that it has its own health benefits. Cut comb honey is exactly that, capped honey that is cut out of the honeycomb frame or from the top bar with the comb intact. This obviously does not work with commonly used plastic foundation or even with wax foundation that has wire supports through it, although some beekeepers use plastic filament fishing line that can be gently pulled out before the comb is cut. Thinner wax foundation can be purchased from most of the larger bee product companies or the bees can be given the space to start their own comb usually with a starter strip at the top to get them going. The best tender comb is made early in the nectar season and so the smaller comb frame supers or honey supers should be put on the hive as soon as the first good, Spring nectar flow occurs. Deep supers are not normally used for this due to the fragility of the comb in a larger frame. As soon as one sees snow white comb being made by the bees it is time to set cut comb frames on the hive. It is also a good choice to only put cut comb frames on very strong hives that will have a tendency to draw out new comb much faster than a hive that is just getting established. Another trick

used by experienced beekeepers is to put nine frames evenly spaced in a ten frame super (or seven in an eight frame super) to get the bees to draw the comb out deeper. Once the comb is filled with honey and capped, it is cut out of the frame in squares that are then often placed in clear, square containers or jars sometimes with the remaining space filled with honey.

peanut butter and mayonnaise salad dressing. The texture and color are the only difference from natural honey. The only ingredient in creamed honey is honey, there are no other additives. Creamed honey has smaller crystals that are round and smooth rather than that of the rougher texture of crystallized honey. Creamed honey can only be made from natural

honey and cannot be made from most of the store bought, pasteurized honeys as most pasteurized honeys do not have a tendency to crystallize easily. There are several ways to make your starter for creamed honey. One method is to buy "seed" creamed honey from a known source. Seed creamed honey is merely a jar or container of previously creamed honey that you will use as the basis to make

more creamed honey. It will be whitish in color, almost like mayonnaise. Once you have "seed" creamed honey, simply add one part of the creamed honey to seven to ten parts of your natural honey and maintain it at an ideal temperature of 50°F to 57°F (10°C-14°C). Stir this mixture three or four times with intervals of several hours between stirrings. In time, the mixture will take on a creamy white texture and is ready to be bottled. I like to start a batch and stir it each morning for about a week. The more often it is stirred and the longer it is allowed to develop, the creamier and more stable it becomes.

One can also begin with their own crystallized honey. Crystallized honey simply has larger granulated crystals which hold a rougher texture much like undissolved sugar, and in fact crystallized honey could be thought of as a super saturated sugar. A jar of crystallized honey left un-warmed can become a solid mass. Depending on the flower source, some honey will crystallize more rapidly than others. Clover honey tends to crystallize much faster than say, a tupelo honey which is very slow to become solid. Warming crystallized honey will bring it back to its normal state. However, temperatures above 110°F (43°C) can begin to destroy some of the valuable enzymes in natural honey. To turn crystallized honey into creamed honey, put the crystallized honey into a stand mixer with a whisk attachment and mix on medium speed for twenty minutes. An equal amount of un-crystallized honey can be added for a larger amount of creamed honey. A more tedious method used before the advent of mixers was to use a mortar and pestle with a bit of arm strength to crush the crystals. In either event, after about twenty minutes of mixing, a smooth creamy honey will result which can then be used as "seed" honey to make even more creamed honey. Many creamed honey aficionados like to use creamed honey as a spread on toast, bagels, rolls or muffins, add it to their tea, bowl of oatmeal or granola bowl. Those selling creamed honey as part of their product selection often charge prices as much as one and one-half more than that for the same amount of natural honey. The added cost is due to the additional processing steps.

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Honey as a Rooting Hormone or Yellow Jacket Trap

Many beekeepers are just as interested in their pollinator plants as they are their bees. One interesting use of honey that I have found is to replace powdered plant cutting root hormones with honey. When taking a cutting that will normally root with the use of a synthetic rooting hormone, which is then placed in soil, substitute the cut end dipped in a bit of honey instead of the hormone. The natural anti-bacterial qualities of honey reduce the tendency for the cutting to rot off and at the same time, provide the necessary moisture content at the tip of the cutting to assist it getting off to a good start.



Cut comb with no honey backfill in plastic case.

To ensure no hive beetle or wax moth eggs remain alive in the cut comb, it is advisable to freeze the comb at least overnight to kill any potentially hidden eggs. If the entire frame is frozen before cutting, wrapping it in plastic keeps the condensation out of the comb during the thawing process. A very sharp hot cutting tool is a must when cutting the comb in order to damage as few cells as possible. Cleaning the cutting tool after every cut also aids in making neat, clean cuts. Naturally there will be honey drips from the cut cells so working on a metal cookie sheet or over a piece of aluminum foil is a must, as long as the foil does not also get cut. The cut comb can be placed in containers and sold with or without additional honey backfill. If selling cut comb without honey backfill, care must be taken to not damage, squash or have honey drips on the comb as the cut new comb is very fragile and tender.

Creamed Honey

First of all, what is creamed honey? Honey that has crystallized with very small, smooth crystals is called creamed honey and is also known as spun, whipped or churned honey with a texture somewhere between



Finished creamed honey being poured into sales container.

Plant cutting dipped in honey.



There is always that bit of honey left in the pie plate or container the strainer was left sitting in after use. This residual bit of honey that can be collected in the clean-up process and be put to good use in this manner. Residual waste honey can also be used in wasp and/or yellow jacket bee traps. At the top of a two liter plastic soda bottle where the curved area becomes a straight vertical side, make a cut completely around the bottle. Add one banana peel, one cup vinegar (or apple cider vinegar or apple juice) to one-half cup honey (or sugar) and one cup water to the remaining soda bottle. Invert the cut top and insert upside down into the remaining plastic bottle with the cap removed. Tape, staple or make cuts and folds to keep the inverted part above the liquid level in the bottle. Set this in an area where yellow jackets or wasps are a problem. For some reason, honey bees and other native bees do not seem to be attracted to this mix, but yellow jackets in particular are. They can get in through the narrow neck, but can't find their way out. This is especially useful in Spring when new yellow jacket queens have emerged and are looking to start a new nest or during honey collection when opening hives seems to draw more yellow jackets and wasps.

Yellow jacket trap.



Bee's Wax

Another easily obtained product of the hive is beeswax. Once you reach the point where you are removing honey supers from the hive and decapping frames to extract the honey, the cast off wax cappings

can be processed and the wax, once cleaned, used or sold. In our area, cleaned wax normally sells for around the same price per pound as one can get for their pound of honey. Wax can be melted down, cleaned and used to paint new foundation, make candles, lotions and creams or for other uses. I have cleaned wax using a variety of methods which I explain below. Two notes of caution:

1. Any container used to catch or separate debris from the wax or to catch the rendered wax will be almost impossible to use for any other purpose in the future. Previously melted wax is very difficult to completely remove from any surface.
2. **Never melt wax over an open flame as the vapors and wax itself are very combustible and can cause a fire or ignite by spontaneous combustion if in a small enclosed area.**

There are a variety of wax cleaning methods. I have tried using a solar wax melter which is no more than a closed box with a clear glass or Plexiglas top with the wax sitting on a screen mesh covered with a double layer of white cotton t-shirt or other tight weave cloth material. As the wax melts it will drip through the cloth material and the screen into a tub or pan below. The wax comes out very clean but it takes a hot, sunny, Summer day and can take days to complete even in my enclosed, very warm Summer greenhouse.

The tried and true method is to place as much raw wax as possible in a large pot. Add water to fill the pot to halfway and bring it to a boil over a hot plate. This is best done outdoors as there will be an odor given off. Once the wax and water are at a rolling boil it can be poured through a double cloth, old honey strainer or triple cheesecloth into another container to get rid of most of the debris. A five gallon bucket works well with a standard painter's cloth strainer. I use wooden snap clothes pins around the top edge of the bucket to hold the paint strainer above a point where the wax will not reach it. This is particularly important

if there is a lot of debris in the wax as the debris weight can pull the paint strainer lower into the bucket. The finer remaining debris can be scraped and rinsed off the bottom of resultant wax block after it cools. To get it really clean, it may take a second boil. After the first boil, the worst debris will be on the bottom, with a thin layer of sludge honey and then the wax floating on top. After a day or so your block of floating wax should come free from the side of the receiving container. If it doesn't come out easily just warm the sides of the bucket or container with a blow dryer for a bit. I have also been told that a large urn coffee strainer works well. My final melt is normally using an old turkey roaster as described below.



A slab of finished beeswax taken from an old turkey roaster.

Another method is to find a used turkey roaster at a garage sale. Use a piece of metallic window screen to form a depression under the cover of the roaster with a cloth layer over the screen. I use a double layer of washed white cotton T-shirt as the cloth layer which seems to catch any remaining wax debris. Be sure to have water in the roaster to about half full, but with room for the wax to float and not touch the screen. Bring the water to a boil and then set the roaster on the lowest setting – in about eight hours the wax should melt through. Be sure to check and add water if needed. Allow it to cool overnight and the shrinking, floating wax will usually be

Used turkey roaster.



free from the sides of the roaster. It may take a second melt and replaced cloth to get the wax really clean.

Do not use clothes other than white as colored, print material may not be color fast. Don't ask how I know this. Once the wax is clean it can be re-melted in a clean pot and poured into molds for candles, or used to paint new foundation, make lotions and creams or just sold.

Other Products from the Hive

Anything other than honey in its various forms that can be taken internally may follow an entirely different set of regulations. Legally, to sell other orally taken substances may require specific FDA regulations and production procedures in specialized facilities, not your typical home or honey house. Thorough research must be done to ensure all food laws, manufacturing facility requirements, documentation and labeling requirements are met if selling additional product lines. Careful study and research is also recommended even if only using any of the items noted below for your own use.

Bee Pollen

Often seen in bee sales catalogs are bee pollen collectors. Some beekeepers make it a point to collect pollen which can be used as a topping on cereals, yogurt or salad, or in smoothies or similar drinks. Bee pollen is a natural mixture of bee secretions, honey, enzymes, wax and flower pollen.

Take care if using pollen products as they may cause allergic symptoms. Make sure any labeling and regulatory rules are met as stated above if selling bee pollen.

Propolis

I make it a habit to scrape off the side, top and bottoms of my honey frames as well as the super indent rest where the frames sit after every honey harvest. This makes it easier to correctly space the honey frames in the cleaned super upon their next use. Most of the collected residue is propolis. As noted on page 70 in the September issue of *Bee Culture Magazine*, propolis has its own properties and use. Propolis is a resin-like material made by bees from the secretions of poplar and cone-bearing trees. It is renowned for its health benefits and is used by the bees to seal cracks

in the hive and seems to help the bees fight against bacteria, viruses and fungi in the hive. I once worked with a new beekeeper and explained to her teenage son that propolis has a numbing effect if eaten raw. Ever the adventurous type, the teenager plopped a gum-sized bit in his mouth that I had just scraped of a newly removed honey super. Needless to say it numbed the left side of his mouth and his speech was a bit slurred for a few hours after chewing on that bit of propolis. Once collected, propolis can be dissolved and used as a tincture. Numerous sources explain the process of making the tincture and its uses or benefits which are outside the scope of this article.

Royal Jelly

Royal jelly is a whitish milky substance made by worker honey bees that is rich in carbs, protein, amino acids, fatty acids, vitamins and minerals. Royal jelly is used as food for the queen bee. As such, it takes many queen cups where the bees are feeding royal jelly in order to collect enough to get sufficient quantities to sell. Royal jelly is normally collected when larva are about four days old. As such, it is quite expensive and outside the scope of what would be expected of a new beekeeper.

Bee Bread

Bee bread is a mixture of pollen, nectar and honey and is the main

food source for the honey bee workers and larva. Bee bread consistency can vary greatly based on the source of the plants where bees are foraging. The harvesting and production of bee bread as a sales item is outside the scope of this column for beginning beekeepers and as such, I will leave the topic for the more advanced beekeeper.

Bee Venom

In addition to pollen, propolis, royal jelly and bee bread, bee venom is also used as a component of apitherapy. Specialists in this field have seen bee sting venom as potential for treating inflammation and central nervous system diseases, such as Parkinson's disease, Alzheimer's disease and amyotrophic lateral sclerosis. Once again, this is far outside the scope of the new beekeeper and my only experience with bee stings is that it seems my arthritis problems disappear for quite a number of days after receiving a bee sting, which I try to avoid despite the resolution. All told, the honey bee (*Apis mellifera*) is an amazing creature with many of the hive products still being understood and researched for further applications. I hope this article has provided a greater understanding of the potentials still remaining along with some that may be readily employed by the new beekeeper. Have fun with your bees and try a new beehive by-product or two in addition to honey. 🐝



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MUST HISTORY REPEAT?

John Miller

Our experience, as individuals and in societies, is informed by history. 'Nothing new under the sun', we've often heard. Many observers now reference the Cuban Missile Crisis of 1962 with the current situation in Ukraine. How Nikita Khrushchev, with bombast and bluster – painted himself into a rhetorical corner from which he could not escape (in today's parlance it's called an off-ramp) without a humiliating loss. Within two years, Khrushchev was deposed.

Meanwhile, a little closer to home, American beekeepers are on the verge of repeating, or learning from history. *Tropilaelaps mercedesae* (Tropi) is an ectoparasitic mite expanding its range.

Similar to the range expansion *Varroa destructor* took 40 years ago. Beekeepers large and small have fought to control *Varroa* globally – ever since. The range expansion of *Varroa* is now mirrored in a weirdly eerie similar pattern. It's coming. We are so very unprepared.

An internet search will come up with a presentation by Dr. Sammy Ramsey.

Everyone who grows food, or likes to eat food, should watch *Tropilaelaps* presentations.

I cannot think of a similar moment in American beekeeping history. Call me an alarmist.

I think we are at an inflection point. Remember a decade ago when President Obama called for an 'All Hands On Deck' effort to do something with and for honey bees? More forage, better science, a beehive at

the White House! Consider a similar effort in 2023; only this time – the effort comes from the beekeepers. It will require working together – an idea for beekeepers to grasp – but we can do it.

<https://doi.org/10.1093/giga-science/gix008> describes the Draft genome of the honey bee ectoparasitic mite.

Taking the fight to Tropi will be expensive. Taking the fight to Tropi will cost a fraction of the cost of battling Tropi once she arrives state-side. My children and grandchildren should not have to fight Tropi the way I stupidly fought *Varroa*.

We're going to need some cash. A bunch of it. We're going to need to coordinate and collaborate. We need many sets of eyes on this bug. Geneticists to probe for weaknesses in Tropi – a vulnerability. Chemists – experts who know how difficult it is to kill a bug on a bug.

Molecular biologists with the skills to train available instruments on the target. Entomologists trained in parasites of other insects. Multiple disciplines needed.

Lots of money needed.

Right now, in California and North Dakota – state tax revenue is robust. California has perfected the Kleptocracy form of government. Big tax surplus in California. North Dakota enjoys a robust energy sector, and an equally robust extraction taxation scheme. Lots of money in lots of buckets in CA/ND. CA & ND in American beekeeping – they're siamese twins. CA can't do without

ND bees. CA bees need somewhere to go after Spring – to ND. ND used to be the last, best place. It's now the least, worst place. Disclosure: I am the President of the North Dakota Beekeepers Association. Our ND Honey Promotion Fund has money in it – looking for a good Tropi project. ND is a leading State organization funding bee research. Buzz Landon is President of CA State Beekeepers Association. CA is a leading State group funding bee research.

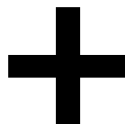
Idaho is a solid funder of bee research. Oregon beekeepers fund bee research. If the top ten State bee research funding groups ever shared a common challenge: Tropi is it. For the first time in history: **State Groups: please talk with each other!**

A coordinated approach with California Department of Food and Agriculture Secretary Karen Ross should help. Ag Association Management Services (AAMSI) represents CA State Beekeepers Association. Chris Zanobini leads AAMSI. He is a wise man.

We need not be hysterical. Simply factual is hysterical enough with Tropi.

The notoriously frugal North Dakota Legislature meets in January. ND is rightfully proud of the fact that ND is the #1 honey production state – by about a solar system – in America.

A coordinated approach to ND Legislature should help. Maybe it's a grant – administered by NDSU in Fargo. ND has a pretty good Ag Genome Center in Fargo.



In November, Senator John Hoeven (R) was re-elected to the U.S. Senate. Control of the Senate will soon change; and John Hoeven will write portions of the 2023 Farm Bill. A coordinated approach to funding bee research – sufficient funding to take the fight to Tropi in Thailand – as a preventative measure – is a sound expenditure of taxpayer money. If you think food is expensive now; wait.

Another way for beekeepers to help beekeepers is to support ‘temporary refrigerated beehive storage’ as an allowed use in the Farm Stored Facility Loan Program (FSFLP). In 2018, Senator Hoeven supported the expanded use of the FSFLP. USDA ignored the request to expand the eligible uses of FSFLP: https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/2022/farm_storage_facility_loan_programs_fact_sheet_july_2022.pdf

American beekeepers can place beehives in refrigerated buildings to control *Varroa* through a brood break, made possible by placing hives into a cold, quiet, dark space for several months – creating brood-free conditions in beehives. This method of mite control may be one of perhaps

very few controls for Tropi. Construction costs for indoor buildings can be \$150/psf. Correct: a 20,000 square foot building; capacity: 20,000 hives; may cost \$3,000,000 to build. Cost of funds are shown in the FSFLP fact sheet. Interest rates in the FSFLP are lower than any other lender. Beekeepers should have access to this assistance.

The Animal and Plant Health Inspection Service is tasked with protecting our shores from bad bugs and bad plants. The ports serving ocean-going vessels are a prime target for species expanding their global range. If there is a potentially more devastating bug out there than Tropi – I want to read about it. Trap lines of pheromone lure pots should be invigorated.


The value of the best beekeeping outfits in America will be halved the day after Tropi is found in America. That’s one estimate.

The Apiary Inspectors of America: Beekeepers and the Inspectors **should be speaking with each other**. Call me an alarmist; but I sincerely believe we, all of us, could work together on Tropi.

The Office of the Chief Scientist, USDA evaluates the best of emerging science, established science – and where best to apply that science – to control agricultural threats. There is a little money appropriated for USDA-OCS; and more should be appropriated in the 2023 Farm Bill.

You know who else has a powerful voice? Hobbyists. Home production beekeepers. Beekeepers in all 50 states have an opportunity to speak out in support of bee research funding. Not a one-n-done one year and then on to the next shiny thing. This one is real.

Consider spending \$20 million a year for three years to prevent a parasite that will cost \$100 million a year forever... like *Varroa*; only worse.

The 35-year experience with *Varroa* has been miserable. It’s still miserable. Millions of hives perish every year from *Varroa*. Beekeepers don’t have to go through the same experience with Tropi. To prevent history from repeating, we must differently approach the challenge. In 2022, Australian beehives found to be infested with *Varroa* are being burned. History knows how that will turn out. Prevention > Redemption. 



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Hello Friends,

Enjoy sharing time with your family and friends!

Bee B. Queen

Bee B. Queen Challenge

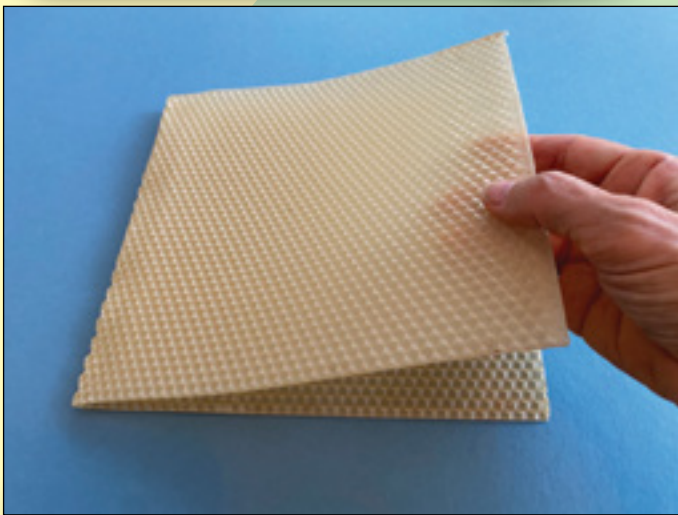
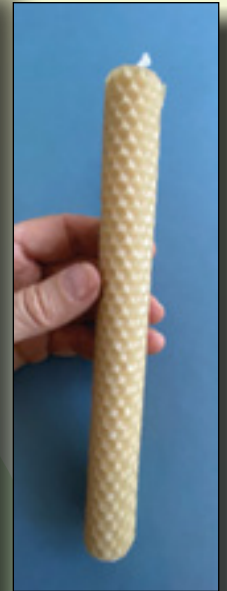
Ask your family and friends to tell you about an experience they have had with bees.

Rolled Candles

Rolling beeswax foundation, wax sheets stamped with the base of a cell, is a simple, safe, and inexpensive way to make lovely candles without the need for hot melted wax. They make great gifts or can be used as an activity at family gatherings.

You Will Need

- 1 beeswax sheet, also called foundation, 8" x 16"
- wick, 2/0
- scissors
- hair dryer, optional



1. Fold the beeswax sheet in half with the short ends together. Bend back and forth until it breaks. Each piece will make one candle.



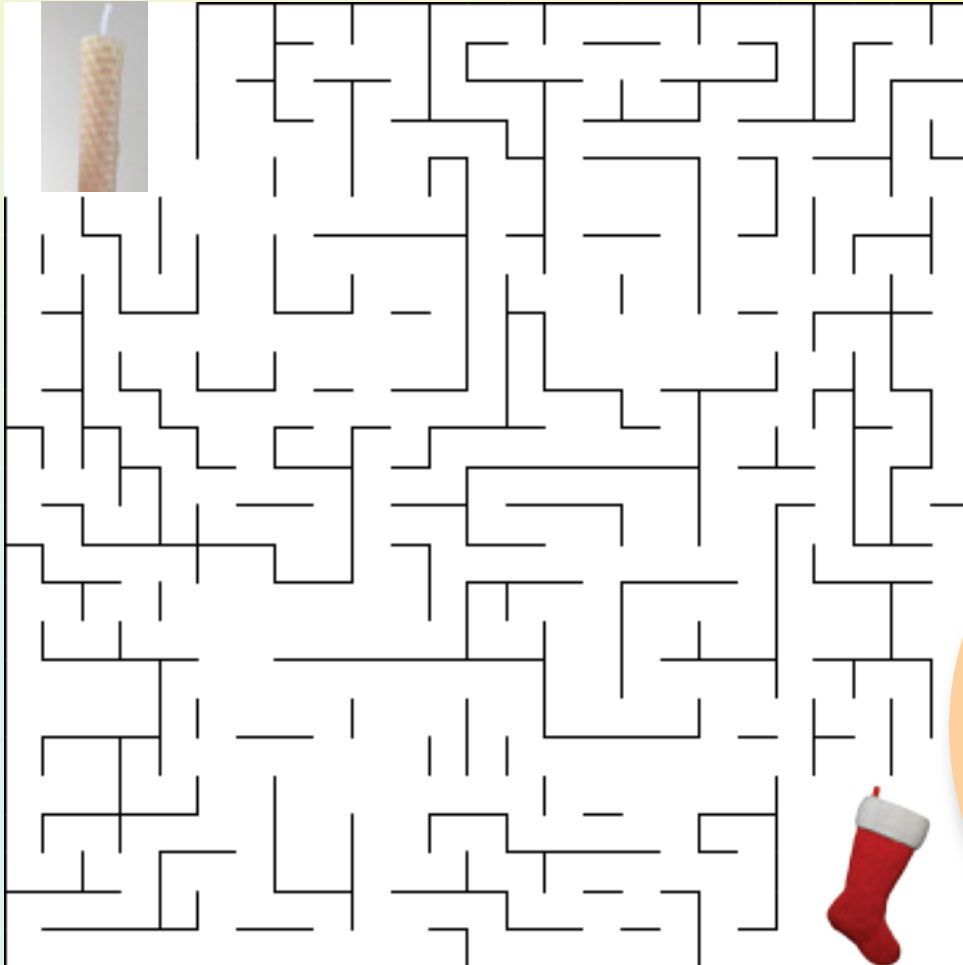
4. Tightly roll the wax using both hands to exert even pressure. If the beeswax sheet is cold, blow hot air over the wax for a few seconds with a hair dryer before rolling.
5. Use the warmth of your fingertips to gently press the wax seam closed.



2. Lay the wick on the torn edge of the wax. Cut it a little longer than the end of the sheet.
3. Use the tips of the fingers to crimp and press the wax around the wick.

... Bee Kid's Corner

Put the Candle in the Stocking



Produced by Kim Lehman

www.kimlehman.com

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December 2022

Pressley, 6



Where do the bees get the wax?

That is the question. It comes from their bodies. And they don't get it from their ears. The wax is produced from eight glands in the worker bee's abdomen. The wax scales come off the bee's body between the segments in the abdomen.

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Send two self-addressed stamped envelopes and the following information to: Bee Buddies, PO Box 117, Smithville, TX 78957.

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



Decorate the outside of a rolled candle by cutting colored wax sheets into shapes and strips. Press on the surface of the candle with your fingertips.



Apiary Inspection Montana



Apiary Inspectors of America



Alyssa Piccolomini,
State Entomologist

Montana is a vast and diverse state of mountains, river valleys, forests, plains, badlands and caverns and our beekeepers are unique enough to fill nearly every niche of the state. Currently, the state has 584 registered beekeepers, 94 of them are commercial operations and the remainder are comprised of side-liner and hobbyists, with nearly 260,000 colonies across 6,790 locations. As of July 2019, all beekeepers, regardless of number of colonies kept, are required to register their hives with the Department and the number of new beekeepers applying for registration certificates increases every day. The state is also unique in that it is one of the few states that still has a radius law associated with its locations. Although not all registration categories have a radius barrier, commercial locations of differing operations may not be placed within three miles of one another. The application of the radius law allows for spacing between varying operations which is believed to aid in minimizing pest and disease dispersal amongst colonies.

The Apiary Program at the Montana Department of Agriculture employs one full-time State Entomologist that serves as the “bee inspector” for both honey bees and alfalfa leafcutting bees and employs one seasonal honey bee inspector. The State Entomologist collaborates frequently with the Montana State Beekeeper’s Association and various hobbyist beekeeping groups distributed throughout the state, as well as participates in the USDA-APHIS National Honey Bee Survey and often, works with university researchers.



Montana typically ranks in the top five honey producing states and sees strong honey flows primarily in July-August, especially when large acres of sweet clover bloom occur throughout the state. Nearly all commercial beekeepers in Montana migrate from Montana to California in October-November to fill almond

pollination contracts in the Winter months and some move northward from there and pollinate a variety of stone crops in Oregon and Washington. Montana is known for producing wheat but also grows canola, sainfoin, alfalfa, barley and a variety of pulse crops. 🐝



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Beware of Beekeeping Burnout

Stephen Bishop

Not that I'm jealous, but I don't get all the hullabaloo over bees' work ethic. Sure, a bee may transport pollen to and fro 50,000 times over its sixty-day lifespan, but by the time I retire, I may have pushed paper to and fro a gazillion times over my 30-year career—and yet you rarely hear us paper pushers lauded as hard-working, industrious creatures.

And I don't get those beekeepers who say humbly, "Well, the bees did all the hard work." I say humbly, hogwash. Bees don't lug sixty-pound supers around on 95-degree days while baking in a bee jacket. Nor do they lug cases of honey to the farmers' market on Saturday mornings to peddle honey to the masses. And, let's be honest, some patrons of the farmers' market just need to be told, "Buzz off!"

ME: *[trying to remain polite]* "Not worth 20 dollars? If you knew all the hard work that went into that quart of honey, you'd probably say it's worth more."

CUSTOMER: "Well, don't the bees do most of the work?"

ME: "KA-BLOOM" *[it's hard to write phonetically the sound of a beekeeper's morale imploding]*

Best I can tell, my bees work four months out of the year—March, April, May and June—then they shut down shop and goof off in the dearth, then eat and mingle with each other all Winter. Meanwhile, a lot of us sideline beekeepers work full-time jobs all year long just to afford our beekeeping addiction, and yet the bees steal all the credit.

I hate to admit this, but lately I've been feeling a little resentful toward all the press that bees get about being endangered and on the verge of extinction. You know what's on the verge of extinction after honey harvests? Beekeepers' backs, and I can't remember the last time I saw the press writing about the chronic back problems that beekeepers face. Heck, if they need a catchy scientific name to drive traffic to their articles, may I humbly suggest: "SCCD" Spinal Column Collapse Disorder. Basically, it's when a beekeeper's lower vertebrae abscond from normal alignment and leave behind only a few pinched nerves and a big chiropractor bill.

And let's not forget the parental responsibilities that many beekeepers face that bees just don't. Bees emerge from the womb of their hexagonal cells as fully capable members of society. There's no tantrums of the terrible twos, no pre-teen drama, no teenage wasteland, no adult child living in the basement eating them out of house and home. Sure, I guess drones fit that latter category, but

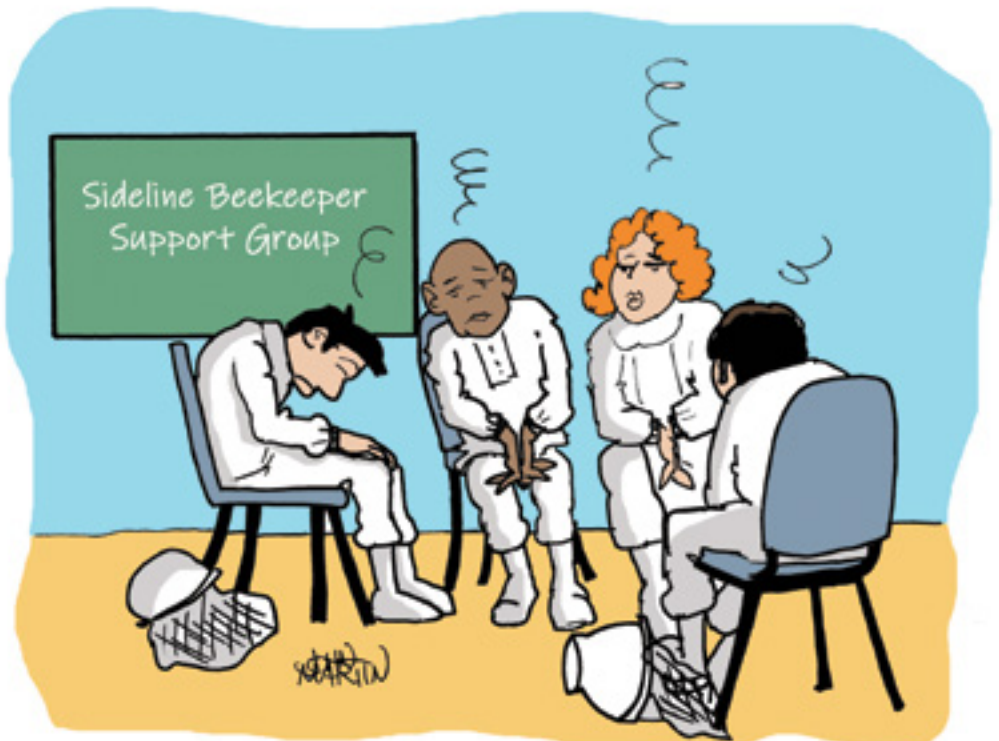
even then, the worker bees usually kick them out before they turn 35 years old.

For me, trying to balance sideline beekeeping with working a full-time job and corralling a toddler who has more energy reserves than a small solar system—well, all that, feels like hard work. Add to that the call from my neighbor about a cloud of bees plundering her trash can, and you've got a recipe for burnout. Yep, no one ever told me when I was a new and aspiring beekeeper that one day I would be dumpster diving through my neighbors' trash to excavate Coke cans, but that's how far I've fallen.

So, Public Service Announcement: beekeeping burnout is real. In fact, if you find yourself exhibiting any of the following symptoms, you may need to seek help:

- 1: You no longer peruse beekeeping catalogs, but immediately hand them off to your toddler to use as a coloring book.
- 2: You're too tired to run away or mount any defensive flailing against bees chasing you, so you surrender yourself as a pin cushion.
- 3: You are experiencing critical memory lapses, beyond run-of-the-mill hive tool misplacement. For instance, you may have so many hives scattered throughout countryside farms, you are now misplacing hives.
- 4: You have withdrawn inwardly and no longer converse with your bees while working hives.
- 5: You experience resentment toward your coworkers and write humor articles about them, maligning their work ethic.

If you experience any of these behaviors, it's best to find a relaxing activity to destress. If beekeeping was your relaxing activity, I suggest joining a sideline beekeeper support group. 🐝



Minding Your Bees And Cues

A Diachronic Ouija – Zoom Interview with Virgil Becky Masterman & Bridget Mendel

For the interview issue of this magazine, we chose to contact the ancient Latin poet Virgil (who lived slightly before Christ). Below, we are sharing the unedited transcript of our interview. As you'll see we had a few technical glitches for which we ask your forgiveness; this was our first time using Zoom's time-travel feature, Ouija-Zoom.

More shocking than some of his outdated ideas are how relevant many of his sentiments are to modern beekeepers... approximately two thousand years later!

Becky: Hello from the future! Thanks so much for making time for this Ouija-Zoom. Well why don't you start by telling us how you got into beekeeping?

Virgil: [transcript unclear, something about the gods]

Bridget: Okay, we kind of lost you there Virgil, are you still there? Maybe try turning your video off?

Becky: Is his screen frozen or is that just a marble bust of... himself?

Virgil: Hi sorry, Oija-Zoom doesn't work very well here! I'm in Mantua visiting my dad's horse farm. [takes sip of wine]

Becky: Oh hi there! We can hear you now! Good morning, and thanks so much for agreeing to do an interview with us. So what time of year is it back there in 32 B.C.? We are here in Minnesota in the Fall of 2022...

Virgil: ...when the golden sun has driven Winter under the earth, and unlocked the heavens with Summer light!

Becky: Wow, Spring! Lovely! Okay, let's go right into some management stuff. Our audience is a lot of beginner beekeepers. Can you talk a little about site selection for someone who is just getting into bees?

Virgil: First look for a site and position for your apiary, where no wind can enter (since the winds prevent them carrying home their food) and where no sheep or butting kids leap about among the flowers, or wandering cattle brush the dew from the field, and wear away the growing grass. But let there be clear springs nearby, and pools green with moss,

and a little stream sliding through the grass, and let a palm tree or a large wild-olive shade the entrance, so that when the new leaders command the early swarms in their Springtime, and the young enjoy freedom from the combs, a neighboring bank may tempt them to leave the heat, and a tree in the way hold them in its sheltering leaves.

Let green rosemary, and wild thyme with far-flung fragrance, and a wealth of strongly-scented savory, flower around them,

Bridget: Wonderful, thanks. I love that you mention having lots of flowers blooming near the hive! That's so important. Can you talk more about the stream thing? What if folks don't live near a little stream and pools green with moss? Can they still have an apiary, or could they just maybe put out a bucket of water?

Virgil: Whether the water flows or remains still, throw willows across the center, and large stones, so that it's full of bridges where they can rest, and spread their wings to the Summer sun, if by chance a swift Easterly has wet the lingerers or dipped them in the stream.

Bridget: And circling back to planting flowers: can you talk more about habitat? Besides finding a good location, how should we be thinking about habitat for our bees?

Virgil: He whose concerns are these, let him bring thyme and wild-bay, himself, from the high hills, and plant them widely round his house: let him toughen his hands himself with hard labor, let him set fruitful plants in the ground himself, and sprinkle kind showers. And for my part, if I were not at the furthest end of my toil, furling my sails, and hurrying to turn my prow towards shore, perhaps I too would be singing how careful cultivation ornaments

The importance of bee habitat is featured in Virgil's work.
Photo Credit: <https://pxhere.com/nl/photo/1256075>



rich gardens, and of the twice-flowering rose-beds of Paestum, how the endive delights in the streams it drinks, and the green banks in parsley, and how the gourd, twisting over the ground, swells its belly: nor would I be silent about the late-flowering narcissi, or the curling stem of acanthus, the pale ivy, and the myrtle that loves the shore.

Bridget: Thanks, V! It's true that planting habitat is hard, but important work for beekeepers. And yes, we mustn't be silent about the importance of late blooming flowers!

Virgil: I'm not done!

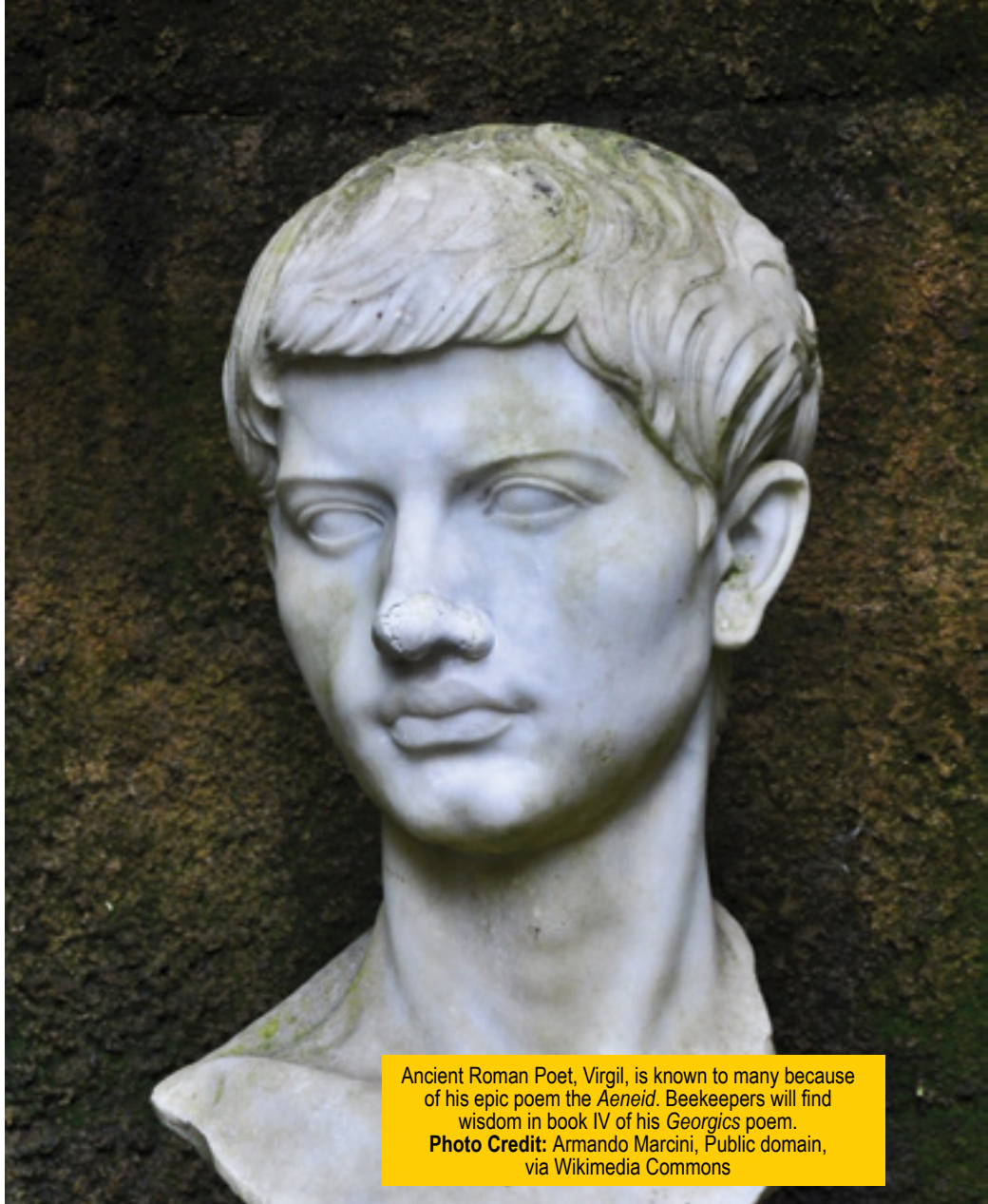
Bridget: Apologies, continue...

Virgil: I recall how I saw an old Corycian, under Tarentum's towers, where the dark Galaesus waters the yellow fields, who owned a few acres of abandoned soil, not fertile enough for bullocks to plow, not suited to flocks, or fit for the grape harvest: yet as he planted herbs here and there among the bushes, and white lilies round them, and vervain, and slender poppies, it equaled in his opinion the riches of kings, and returning home late at night it loaded his table with un-bought supplies. He was the first to gather roses in Spring and fruit in Autumn: and when wretched Winter was still splitting rocks

with cold, and freezing the water courses with ice, he was already cutting the sweet hyacinth flowers, complaining at the slow Summer and the late zephyrs.

So was he also first to overflow with young bees, and a heavy swarm, and collect frothing honey from the squeezed combs: his limes and wild-bays were the richest, and as many as the new blossoms that set on his fertile fruit trees as many were the ones they kept in Autumn's ripeness. He planted advanced elms in rows as well, hardy pears, blackthorns bearing sloes, and plane-trees

already offering their shade to drinkers.



Ancient Roman Poet, Virgil, is known to many because of his epic poem the *Aeneid*. Beekeepers will find wisdom in book IV of his *Georgics* poem.
Photo Credit: Armando Marcini, Public domain, via Wikimedia Commons

But I pass on from this theme, confined within narrow limits, and leave it for others to speak of after me.

Becky: Wow, excellent plant list, and great point about using sub-par agricultural land for planting bee food. I know you are furling your sails and all, but if you change your mind about retirement, we'd love to have you join our Minnesota Beekeeper's Habitat Committee! Your passion about planting for bees is contagious.

Virgil: [sips from goblet]

Bridget: I'm still stuck on your comment about the importance of late blooming flowers. Can you tell our readers any other fav Fall flowers?

Virgil: There's a meadow flower also, the Italian starwort, that farmers call amellus, easy for searchers to find:

since it lifts a large cluster of stems from a single root, yellow-centered, but in the wealth of surrounding petals

there's a purple gleam in the dark blue: often the gods' altars have been decorated with it in woven garlands:

its flavor is bitter to taste: the shepherd's collect it in valleys that are grazed, and by Mella's winding streams.

Boil the plant's roots in fragrant wine, and place it as food at their entrances in full wicker baskets.

Bridget: Ah. The Michaelmas daisy! We've got a ton of different kinds of purple asters blooming right now in Minneapolis. We don't typically boil aster wine for the bees... we just let them gather nectar? But.. Thanks for the idea?

Becky: Okay switching gears a little. Here in Minnesota, we get a lot of questions about entrance size, entrance reducers etc. What are your opinions on hive entrances?

Virgil: Let the hives themselves have narrow entrances, whether they're seamed from hollow bark, or woven from pliant osiers: since Winter congeals the honey with cold, and heat loosens it with melting. Either problem's equally to be feared with bees: it's not for nothing that they emulate each other in lining the thin cells of their hives with wax, and filling the crevices with glue made from the flowers, and keep a store of it for this use, stickier than bird lime or pitch from Phrygian Ida.

Becky: Actually Dr. Marla Spivak and her lab have been working a lot on the "glue made from flowers" aka propolis. Would you be interested in reading any of her papers on the importance of propolis for bee health?

Virgil [sips from goblet]

Becky: Cool, we'll put links in the chat. [<https://beelab.umn.edu/spivak-lab/publications>] Meanwhile, was it a good year for honey harvest in ancient Italy?

Virgil [silently pours urn of honey over statue of self while staring at the screen]

Becky: Okay so I'm guessing it was a good year! Not so great here in Minnesota. 2022 was not a great year for honey for us, and now lots of new beekeepers are asking if they can maybe harvest a few combs from the brood nest. What do you think?

Virgil: If you fear a harsh Winter, and would spare their future, and pity their bruised spirits, and shattered fortunes, who would then hesitate to fumigate them with thyme and cut away the empty wax? The more is taken, the more eagerly they devote themselves to repairing the damage to their troubled species, and filling the cells, and building their stores from flowers.


Becky: We totally agree: better to leave enough for the bees and pray to Apollo for a good harvest next year. Okay, we need to be mindful of Virgil's time travel. Thanks so much Virgil, we appreciate you!

[logoff into various dimensions]

For the full transcript of Virgil's thoughts on beekeeping, please refer to *Georgics IV*, from which we have pulled all of Virgil's quotes:

https://www.poetryintranslation.com/PITBR/Latin/VirgilGeorgicsIV.php#anchor_Toc534524374

There are many translations of *Georgics IV* which is part of a four-part series of agricultural poems, simply known as the *Georgics*. The

translation we chose is a more modern one, completed by Anthony Kline. 

Acknowledgements

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Credit

Kline, A. S. (2001). Virgil: *Georgics*. Retrieved October 6, 2022, from <https://www.poetryintranslation.com/PITBR/Latin/VirgilGeorgicsI.php>



Becky Masterman led the UMN Bee Squad from 2013-2019. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. Photos of Becky (left) and Bridget (right) looking for their respective hives. Please share any thoughts about Ouija-Zoom or your beekeeping superstitions via email to mindinyourbeesandcues@gmail.com



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Dan Schmehl, a pollinator ecotoxicologist and beekeeper, discusses pesticides and honey bees.

A CONVERSATION ON PESTICIDES WITH DAN SCHMEHL – POLLINATOR ECOTOXICOLOGIST

James Masucci

As a graduate student, Dan was very anti-Ag. Anything that would harm bees was bad. After getting his PhD, Dan did a post-doctoral fellowship in Jamie Ellis' lab at the University of Florida studying honey bee husbandry – how to keep honey bees healthy. His research focused on pesticide effects in lab studies. It was as a post-doc that Dan began

to realize the complex relationship between agriculture and honey bees. Agricultural lands are intensively managed, and growers require crop protection products. Growers also require honey bees to provide the pollination needed to obtain optimal crop yields. So, Dan's focus changed to addressing the questions, "how can you have both crop protection and honey bee health?"

At the time, Dan was critical of the large agricultural companies for having honey bee initiatives without having the necessary honey bee experts. He came to realize that the way for him to have the most impact in this space was to have a hand in the development of new crop protection products. He could be the one driving the necessary initiatives to make agriculture safer for honey bees.

When he joined Bayer in 2015 as a pollinator ecotoxicologist he was concerned about whether the company would listen and act on his ideas, and whether his integrity would ever be put in question. Thus far, his concerns have been unfounded, and he feels confident in the safety profiles of the chemistries now entering the market.

In conversation, Dan always gives a balanced response to questions regarding pesticides and honey bees. So, I thought he could provide us all with some perspectives on the risks we face with pesticides and what we can do about it.

I first asked him to describe the present pesticide landscape. What is the pesticide risk now for honey bees?

"Compared to 30 years ago, acute bee kills (walking up to a yard of dead colonies), are less frequent and more sporadic. This is the result of safer chemistries and improvements in best management practices. For example, better planting equipment has resulted in less dust emission during corn planting, and many growers are spraying pesticides in the evening when bee foraging is reduced. It is likely that the number of bee kills is under reported and may be due to the dependence of beekeepers on the landowner (you don't want to bite the hand that feeds you). This is a problem. The only way to solve pesticide/honey bee issues is to know about them and to investigate them. However, word of mouth seems to confirm the reduction in bee kills," said Dan.

Does this mean that pesticides are no longer a concern to beekeepers?

"No," says Dan. "Right now, there is a lot of research into sublethal effects on honey bee colonies." And Dan admits that this is an area of uncertainty. There isn't any clear answer. For a while, it seemed like every article written on honey bees was saying how pesticides impacted some aspect of the colony: the queen's ability to lay, a bee's ability to navigate, a bee's ability to forage, etc. It is possible that some of these effects could be the cause of a poorly performing colony, even if the colony survives.

But sublethal effects are difficult to study and even more difficult to determine relevancy. Methodology is critical. Dan gave me an example from his own research as a post-doc at the University of Florida to highlight some of the complexities of doing these studies. He studied the

One of the best things to come out of Bayer's acquisition of Monsanto was that I became friends with Dan Schmehl. Dan's a pollinator ecotoxicologist for Bayer, who has done some incredible work testing the effects of potential new agrochemicals on bees. We share a passion for honey bees and consider ourselves "bee buddies." Like me, he is not only a bee researcher, but a beekeeper as well. He has three different apiaries and got 1,000 pounds of honey this year. In addition, he sells a few nucs and generates some lovely candles. His beekeeping and love of bees helps him be a better researcher. His goal is not only to provide appropriate tools for growers, but to ensure that he wouldn't mind their use next to his own hives. Some of his bees are next to fields of corn and soy, so that scenario is a distinct possibility.

Dan considers himself a "child of CCD" (colony collapse disorder). At the time (2007) he was an entomology graduate student at Penn State University where his interests were plant/insect interactions. While there, a commercial beekeeper, Dave Hackenberg, came to the university saying that something different was happening to his hives. The era of CCD had begun, and Penn State started getting funding in 2007. Dan started studying the effects of pesticides and nutrition on honey bees. He fell in love and his career in bees was launched.

effects of seven pesticides on larval development. He used the maximum doses that were detected in the field from pollen and wax and measured “everything” – from gene expression to brain size. He saw effects. But are they meaningful? First, some of his doses were determined by the level of pesticide reported in the wax, but the larvae in his study were exposed to the pesticide in the diet so the exposure level may not be environmentally relevant. Second, sometimes the effect of the lower dose was more severe than the higher dose. That calls into question the validity of the test. Toxicology tests rely on a dose response. You start with a dose that has no effect and you have multiple doses until you get to the dose that has maximum effect. The more toxin that is present, the more severe the symptom, up to the maximum. If you don’t see the expected dose response, you cannot be confident in the result, or in the pesticide levels that may cause toxicity to bees. That’s not to say the chemical isn’t involved, but additional studies are needed to answer the question.

Take blueberry pollination as an example. It’s been known for decades that bees come out of blueberry pollination in poor health. EFB levels tend to be high and brood patterns are poor to non-existent. For just as many decades, fungicides have been blamed by many beekeepers for this effect, yet researchers aren’t showing convincing evidence that fungicides are the cause. In fact, as they point out, the modes of action of fungicides have changed over the decades but the effect hasn’t. Who do you believe? I asked Dan about this.

Blueberries provide zero nutrition for bees. Yet the growers require the beekeepers to stay in the blueberries for six weeks (two brood cycles). “This is insane,” Dan said. “It is stressing the crap out of the bees. Plus, the weather is horrible for the bees (cool and wet). So, the bees are incredibly stressed even without exposure to the pesticides. It’s possible that the weather and poor nutrition may increase the sensitivity of the bees to pesticides, and there are ongoing studies to investigate this possible interaction.” We both wondered if the same weather conditions and pesticide applications occurred in canola, a nutrient rich crop for bees, would we see the same effect?

What can be done?

Dan says good communication between growers, applicators and beekeepers is key. Knowing what is being applied and how helps the beekeeper respond. Plus, growers and applicators should be thoughtful of when the bees are needed in the crop. Don’t keep them longer than they are needed and time treatments around the presence of the bees. Apply a product in the evening when bees aren’t out foraging on the crop and drift effects would be minimal. Use chemistries that are less prone to interactions when spraying multiple chemistry and use chemicals with safer profiles.

But what about the average beekeeper?

“For most of us, the hobbyists and sideliners that don’t do crop pollinations, the risk is relatively small. Personally, I have hives next to soybeans, corn and pastureland and haven’t had an issue,” said Dan. In fact, Dan coauthored a pesticide survey and risk assessment for hobbyist beekeepers when he was at the University of Florida (Demares, 2022). Dan thinks the biggest risk for the hobbyist beekeeper is probably from mosquito sprays. Most of the backyard bee kills reported in the news over the years were a result of mosquito sprays. If they are spraying in your area, find out what they are spraying and try to get them to spray at night. You can cover your hive

(i.e., with a sheet) temporarily while the spray is happening to avoid drift but be careful not to leave the cover on too long or the hive will overheat.

How do I know if I have a pesticide event?

“If you walk into your yard and there are piles of dead bees in front of all the colonies, that is a good indication of a pesticide kill (see picture below). If this happens, you should take pictures and call your state regulatory agency. Hopefully, they will come and investigate, find the cause, and everyone will learn from it,” Dan said.

But how do you detect a sublethal pesticide event?

“Sublethal effects look a lot like everything else that impacts your hive. Spotty brood... Is that a pesticide? Is it a failing queen? Is it *Nosema*? *Varroa*? Knowing that something looks different is the first step. But linking a colony’s decline/death directly to a sublethal effect of a pesticide is near impossible. The good news, if you suspect a sublethal pesticide effect, it is likely something else. What you need is a longer duration of study. First, do all/most of the colonies in the yard show the same symptoms? It is likely that they are foraging on the same stuff, so most of the colonies should be affected in the same way. Is the symptom specific to a specific yard? Again, the pesticide exposure is probably a local exposure. If you’re seeing the


Pesticide kills like this one, caused by drifting insecticide from an aerial spray, still happen. Although the frequency of these catastrophic kills is declining, there is still the issue of sublethal effects of pesticides. How likely are we to experience such an event and how do we identify one if it happens? I asked Dan Schmehl, an ecotoxicologist, for his thoughts on the subject. Photo by Tony Jadczyk.



same symptom in many locations, it is probably something else. Is this a long-term trend? Does this happen every year in the same location? If so, there is something specific to that location and pesticide exposure would be a suspect,” said Dan.

If you suspect pesticide issues, you should report them. Dan said that they need to know about the issues. Even if most of the issues reported cannot be traced back to a pesticide, the magnitude of the reporting may be meaningful.

I ended the conversation with a simple question, that I knew didn't have a simple answer. *If you had a pie chart of the different stressors that were impacting the bees, how big of a slice would it take to represent pesticides?*

Bottom line, he didn't know. For most beekeepers, it would be small. For those involved in pollinations and have their bees on intensely managed land, it would likely be larger. Overall, the risk is small, and, unless there is a catastrophic pesticide event, pesticides are one of multiple stressors in the hive that may interact to exacerbate colony health concerns. So, if your bees are in an area where pesticides are normally applied, find out what is used, how much risk that poses to your bees and see if they will apply the pesticide when your bees are less active. The best defense is to keep your bees as healthy as possible, allowing the colony to cope with low-level pesticide exposures that might occur. 

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THE LIFE AND LEGACY OF ERIC MUSSEN

Kathy Keatley Garvey

“During my entire apicultural career of more than 75 years, from beginning to student to retirement 26 years ago, I cannot recall any apicultural professional in the United States who has accomplished more than Eric Mussen (May 12, 1944–June 3, 2022) in terms of his beneficial contributions to all apicultural activities.”

So said Norman “Norm” Gary, emeritus professor of entomology at the University of California, Davis (UC Davis), on the passing of Eric Mussen, a 38-year UC Cooperative Extension apiculturist and faculty member of the UC Davis Department of Entomology and Nematology.

Mussen, diagnosed with metastasized liver cancer on May 31, 2022, died June 3 at his home in Davis. He was 78.

Although Mussen retired in 2014, he continued his many activities up until a few weeks prior to his death. For nearly four decades, he drew praise as “the honey bee guru,” “the pulse of the bee industry” and as “the go-to person” when consumers, scientists, researchers, students and the news media sought answers about honey bees.

Colleagues described him as the “premier authority on bees and pollination in California, and one of the top beekeeping authorities nationwide,” “a treasure to the beekeeping industry” and “a walking encyclopedia when it comes to honey bees.” News media, including *The Lehrer Hour*, *BBC*, *Good Morning America*, National Public Radio

(*Science Friday*), *The New York Times*, *Boston Globe* and *The Los Angeles Times*, sought his expertise.

The department’s Celebration of Life and Legacy of Eric Mussen, held recently in the Putah Creek Lodge, drew a standing room-only crowd who shared and applauded him as a bee scientist, family man, athlete, angler, birder, photographer, humorist and a singer (doo wop).


Born in Schenectady, N.Y., Eric received his bachelor’s degree (1969) and master’s degree (1975) in entomology from the University of Minnesota and went on to earn his doctorate in entomology from the University of Massachusetts in 1975.

Mussen, who preferred to be called “Eric,” considered the beekeeping and almond industries his family. His family, both blood-related and industry-related, came out in force as Team Eric to pay tribute to their hero, their mentor, their confidant and their friend.

“Eric was a giant in the field of apiculture,” said Steve Nadler, professor and chair of the UC Davis Department of Entomology and Nematology. “The impact of his work stretched far beyond California.”

“The world is a lesser place without Eric,” said UC Davis distinguished professor Walter Leal, a former chair of the entomology department who produced and live-streamed the webinar, now posted on YouTube at https://youtu.be/Kj5NuQ_rBuo.

“Eric was a cherished friend to everyone here, to the UC Davis community, to his colleagues, to scientists and researchers, to agricultural growers and 4-H-ers and to beekeepers and bee enthusiasts everywhere,” Chancellor Gary May told the crowd. “He meant so much to the university and his work benefited us all. He represented the absolute best of UC Davis. He was an internationally recognized expert, dedicated to his work and passionate about helping others and making the world a better place to be. His legacy will endure. It will endure through his research contributions and extension activities that



These three UC Davis faculty members co-founded the Western Apicultural Society in 1978. From left are Eric Mussen, Becky Westerdahl and Norm Gary. Mussen, who served six terms as president, died June 3, 2022.



Eric Mussen and his wife, Helen, pose in front of Miss Bee Haven, a sculpture created by artist Donna Billick of Davis in the UC Davis Bee Haven. This image was taken in 2017 when the Western Apicultural Society met at UC Davis for its 40th anniversary celebration. (Photo by Kathy Keatley Garvey)

served beekeeping operations across California and the nation. It will endure through the practices he helped put in place, sharing information with beekeeping groups. It will endure through the next generation of apiculturists he helped inspire. We'll remember his impact as the 'honey bee guru.' Much more than that, Eric will be remembered for his generosity, his kindness and his passion."

Emcee Gene Brandi of Los Banos, CA, a family friend and an icon in the national bee industry, praised Eric's newsletter, "from the UC Apiary," as "a renowned publication that provided valuable information to beekeepers all over the country. We were very fortunate to have that." The newsletters are online at <https://bit.ly/3Es3juX>.

"Eric made a difference," said Brandi, who served with Eric nearly four decades on the California State Beekeeping Association's Board of Directors. Brandi, who currently chairs the Foundation for the Preservation of Honey Bees, Inc., also served as president of American Beekeeping Federation and chaired both the California Apiary Board and National Honey Board. "To paraphrase a good friend of mine, (beekeeper) John Miller, 'The people who really make a difference in this life are those who make things better. Eric Mussen made things better for the honey bee, beekeepers and the entire beekeeping industry and for that we are very grateful.'"

Timothy "Tim" Mussen described his father as "a strong, caring and reliable man who devoted his life to serving as a scientific expert in his field... it was clear to me that my father cared deeply for both of his families: his biological family at home and his professional bee biology family... If he were to provide some life advice, it would probably be: First, to pursue your interests. Second, to cherish your time that you have together. And the third would be to save the bees."

Bob Curtis, former director of Agricultural Affairs, Almond Board of California, and a friend and colleague

of Eric's since 1976, said that "Eric Mussen spent a long career helping people and changing the landscape of beekeeping. He left a legacy of gentle guidance, integrity, partnerships, mentorships, productive communication, towering knowledge and love and respect from the people he touched."

"When people asked him questions, he listened, he really listened," Curtis said, adding that he "served an extremely diverse clientele as he listened to and guided everyone who came to him." They included professional beekeepers, scientists, students, 4-H youth, bee hobbyists, fellow Extension advisors, news media "and many, many more."

Curtis noted that Eric was a "huge mentor for the almond industry and taught us best bee pollination practices. He kept up with the literature and current happenings in the industry. Many people considered him the top Extension person in the nation, if not the globe dealing with honey bees. Among his many achievements, he was instrumental in helping almond board develop the influential 'Honey Bee Best Management Practices for California Almonds' which is considered state-of-the-art guidance in agriculture."

"But the most resonant part of his legacy is not the almonds or even the respect he earned as a global authority on honey bees," Curtis said. "It was the relationships he created. It seemed pretty clear that he saw the bee industry—and in essence, those the bee industry served, including almonds—he saw us as family and he took care of both the bees and us."

Helene Dillard, dean of the UC Davis College of Agricultural and Environmental Sciences, characterized Eric as a "revered and inspirational scientist" who "embodied the essence of what it means to be an Extension apiculturist... His legacy will live on in the department and the world of apiculture."

Ettamarie Peterson of Petaluma, a past president of the Sonoma County Beekeepers' Association and a 21-year 4-H beekeeping project leader, described Eric as "a great friend and teacher to all of us. When we invited him to come to our meetings, he always came. Even though he retired in 2014, Eric was always ready to answer our questions. We were fortunate to have him almost annually at our meetings."

His talks, Peterson pointed out, were "straightforward and laced with humor. We will always remember him as a brilliant beekeeping teacher who educated so many of us."

Peterson, who educates 4-H-ers as young as five years old, lamented that beekeepers often begin their hobby around age 50, but the "zero" should be dropped. "When you see little 5-year-old girls do hive inspections—and petting the bees—you know that Eric is probably smiling on those children and saying 'Atta girl.'"

Glenda Humiston, vice president of UC Agriculture and Natural Resources, lauded Eric as "the epitome of UC Cooperative Extension. He was highly respected for his research-based knowledge of bees and other pollinators. He always made himself available to speak at Farm Advisor Field Days, at Master Gardener events and at 4-H community club meetings. News reporters found Eric to be an invaluable source. He always made time to talk to reporters whether it was Dan Rather or the local small newspaper."

"Eric very patiently explained complex things like colony collapse disorder in language that everybody could understand," said Humiston, adding that she admired "his passion for his work and his contributions" and "I am grateful for all he did."

Extension apiculturist Elina Niño, who succeeded Eric in 2014, expressed her gratitude, commenting that "it was my honor to know him. He was a great educator and very passionate about science, biology and the beekeeping industry here in California and across the nation."

Eric, who co-founded the Western Apicultural Society (WAS) in 1978 with fellow entomology faculty members Norm Gary and Becky Westerdahl, served six terms as president. "Eric was a strong leader," Gary said, "and his activities helped to establish UC Davis as the cornerstone of beekeeping educational activities in the West. Eric's role in supporting California's commercial beekeeping industry is legendary! He helped to solve many problems faced by this industry, the largest and most intensive pollination industry in the world. Beekeepers frequently disagreed on the best strategies for their industry. Eric had unbelievable skills in promoting effective communication between all segments of this industry, resulting in the most productive pollination activities ever developed, and involving commercial beekeepers from many other states as they complemented California bee pollination."

Bee breeder-geneticist Susan Cobey of Washington State University, formerly of UC Davis, noted that "Eric was an icon of the beekeeping industry and beyond, a career shaper, problem solver, the information man who always had an answer or would find one and always given with integrity, regardless of the issue, biological or political, to whoever posed the question and need. His contributions, impact and love from the people he touched will live, continuing to contribute and benefit their lives. His spirit is with us."



Randy Oliver of Grass Valley, owner of ScientificBeekeeping.com, shown here in the UC Davis apiary, said, "Eric Mussen was not only a longtime friend and collaborator of mine, but a model for me. He was a beloved and exemplary Extension apiculturist, with his engaging presentations, interpreting the science for the benefit of beekeepers. His monthly newsletter was an important source of information to not only California beekeepers, but also to many across the United States and around the world. Eric always made time to happily share information with anyone who asked." (Photo by Kathy Keatley Garvey)

In a 2015 letter of support for an award nomination, Cobey wrote of Eric: "During his 38-year career at UCD, Dr. Mussen has been the go-to person for information and scientific knowledge in apiculture and various related fields. His ability to communicate complex issues, provide accurate information and present the choices available towards problem solving, made him a valuable and reliable resource for the beekeeping industry nationwide." Highly honored by his peers, Eric received scores of university, regional and statewide honors.

Randy Oliver of Grass Valley, owner of ScientificBeekeeping.com ("beekeeping through the eyes of a biologist") said: "Eric Mussen was not only a longtime friend and collaborator of mine, but a model for me. He was a beloved and exemplary Extension apiculturist, with his engaging presentations, interpreting the science for the benefit of beekeepers. His monthly newsletter was an important source of information to not only California beekeepers, but also to many across the United States and around the world. Eric always made time to happily share information with anyone who asked."

"I really appreciated his courage in difficult times; he was willing to stand up for what he believed was fair and right," said entomology professor Diane Ullman, a former department chair. "He was a great supporter of women in leadership and women in science, and a great supporter of students. He had a quiet courage and would really stand up for his beliefs."

Jackie Park-Burris of Jackie Park-Burris Queens, Inc., Palo Cedro, a leader in the queen bee breeding and beekeeping industries, said she met Eric more than 40 years ago "and from day one he was mentoring me. He was the bee guy for the entire country! Eric was the bee industry's connection to the scientific world. Eric understood both camps and he connected them. Eric

had incredible integrity that I have never seen matched. Because of that integrity, beekeepers felt confident in sharing their problems with him, knowing their secrets were safe. Eric always voiced the opinion he felt was right, even if it wasn't the most popular.”

Park-Burris said that “Eric told me that he looked at the bee industry as his family. When my son attended UC Davis, he and Helen made sure Ryan knew he could contact them if he needed anything. Eric even came to a function on campus that my son was in charge of to show support.”

“We loved him,” Park-Burris said. “What a sad loss for us all.”

Eric is survived by his wife, Helen Mussen, sons Timothy Mussen (Noelle) of Rancho Cordova, and their children Amber and Alex; Christopher Mussen (Jacqueline Silva), of Davis; his younger brother Alan Mussen (Lynda) and their daughter, Allie and husband, Nick Arnold, all of Peru, N.Y.; as well as other relatives in New York and Michigan. 🐝

Memorial contributions may be made to the California State 4-H Beekeeping Program, with a note, “Eric Mussen Memorial Fund.” Checks may be made out to:

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Longtime friends Norm Gary, emeritus professor of entomology at UC Davis, and Eric Mussen, a 38-year UC Cooperative Extension apiculturist, play around with a smoker at the 2017 Western Apicultural Society meeting that they hosted at UC Davis.
(Photo by Kathy Keatley Garvey)



In this 2014 image, taken at the Western Apicultural Society meeting, Eric Mussen presents an award to Susan Cobey, then a bee breeder-geneticist at UC Davis, and now with Washington State University. Cobey said of the June 3, 2022 passing of Mussen: “His contributions, impact and love from the people he touched will live, continuing to contribute and benefit their lives. His spirit is with us.” (Photo by Kathy Keatley Garvey)



THE BEEKEEPING JOURNEY OF A RESEARCH MOLECULAR BIOLOGIST –

Earl Hoffman

Dr. Bilodeau, thank you for agreeing to this *Bee Culture Magazine* interview. I understand that you go by Lanie because it is easier to pronounce. Let me just use Lanie, it will be easier for me too.

Lanie, please share some of your background and tell us why you became a beekeeper.

Honey bees are fascinating, it's wonderful to work with these fantastic insects.

I started working with honey bees in 2006. My original academic work was in Maryland with a Bachelors and Masters degrees in biology, Towson State University. I earned my Ph.D. degree, University of Louisiana at Lafayette in 2000. I am the first in my family to be a beekeeper.

I am so very happy to be working here at the USDA - ARS Baton Rouge Bee Laboratory, we have a great team here.

I have always liked honey bees. I'm now the Research Leader/Location Coordinator here at the honey bee lab.

What is your passion about honey bees and beekeeping? What motivates you?

I'm motivated to have a positive impact for our honey bees and beekeepers. My passion for bees centers around the strategies bees use to fight off disease and to overcome other stresses. I want to enhance their ability to use those tools through breeding.

How many years have you been with bees and how many beehives do you and your team run?

I have worked with bees since 2006, so 16 years. I did not work honey bees during my childhood. Each year I learn more about the bees. My connection is leading my team to improve honey bee health through breeding. We have roughly 900 hives at the Baton Rouge lab.

I understand you also work with commercial beekeepers, what have you learned from that experience?

Working with commercial beekeepers has helped me gain perspective on the needs of the beekeeping industry and appreciation of the scale of their needs. That helps us stay grounded and keep our work focused on having impact not only on honey bee health, but on the beekeeping industry.

Since you're a honey bee scientist, tell us about some of the experiments you have done with honey bees.

I developed a pathogen detection assay to distinguish and quantify *Nosema ceranae* and *Nosema apis*, and a sampling method to avoid external contamination of bees.

I helped to characterize complementary sex-determiner allele profiles for the Pol-line and Hilo honey bee stocks, for use in breeding decisions. I also developed a global nomenclature system for complementary sex-determiner alleles in honey bees.

I characterized the genetics of the Russian honey bee stock and developed a stock identification assay using genetic finger print markers. This helps in the certification program of the Russian Honey Bee Breeders Association.

I have identified genes that are tied to traits that help bees resist the *varroa* mite. These genes are being developed for use in breeding.

Our nemesis the *Varroa* mite, Lanie, please explain your thoughts on *Varroa* mites.

Varroa mites are a big problem in the industry, as you know. Our goal is to breed bees and develop a resistant stock for the beekeepers to use. We are making good progress, and working on issues related to *varroa* from lots of angles. We are documenting amitraz resistance in mites and developing management strategies to combat this. We are also developing edible vaccines for the viruses that *varroa* mites vector and breeding bees that are resistant to virus infections and have high resilience.



Dr. Bilodeau

LELANIA BILODEAU, PHD

I believe you have experience with *Apis mellifera scutellata*, the African bee, tell us more please.

Currently, *Apis mellifera scutellata* is not an issue in Louisiana. We have completed work here at the bee lab to define defensive behavior markers. I worked with Australia to screen for africanized bees.

How do you include your family and friends in your beekeeping journey?

My family always asks “how are the bees?” My children do visit the honey bee lab. My daughter developed a science fair project (a *nosema* study) that was very successful in competition. She came in second place in the Louisiana State Science Fair. She is studying to become a high school biology teacher.

Lanie, what is the most important thing you have learned so far about honey bees?

That teamwork is the key to thriving!

Which classes on beekeeping have you taken so far, Lanie?

The technicians here at the honey bee lab are fantastic. I have learned most of what I know about beekeeping from them. Its been a great journey.

I understand you attend many different beekeeping industry conferences, tell us more!

I attend the yearly conferences of the Louisiana Beekeepers Association, Mississippi Beekeepers Association and ABF or AHPA as often as I am able. There is always so much to learn and share at these conferences. They are a great opportunity to talk to beekeepers and connect with the Industry.

Lanie, you have experience with different races of bees, what types and why?

We have several stocks of honey bees that we manage and use in our research and breeding work. Some of them are Italian, POL line, Hilo, Saskatraz and Russian. We compare stocks of bees in much of our research.

Since you're not a migratory beekeeper, how do you overwinter honey bees in Baton Rouge, Louisiana?

We leave honey in the Winter for our hives and supplement their feed when needed, using pollen patties and sugar syrup. We are working with microalgae as an alternative nutritional source. We are also assessing the affects of cold storage in buildings in Russian honey bees.

Please tell us how you captured your first swarm of honey bees?

I, myself, have not captured a swarm. Here at the Honey Bee Lab, when our bees swarm, we catch them.

What is your greatest success in your beekeeping journey?

I can say that the *Nosema* assay and the Russian bee genetic stock identification have been a big success.

What is your greatest challenge in your beekeeping journey?

Trying to breed bees that are resistant to *Nosema ceranae*. We tried to develop *Nosema* resistance for two years, but did not have success. *Nosema* is so variable that is a bear to deal with.

Lanie, last question: What are your goals for the next five (5) years? With your bees and your bee journey?

I hope that in the next five (5) years we will be close to releasing our next stock. We are working to enhance multiple traits. We desire to expand our world class research programs here at USDA. We are always looking for ways to collaborate with other research groups. Last, we hope to have more interviews with our fantastic team here at the Baton Rouge Honey Bee Lab. There is a lot of opportunity here.

Thank you so very much Dr. Bilodeau for taking the time to share your bee journey with *Bee Culture Magazine*. It was wonderful speaking to you. 🐝

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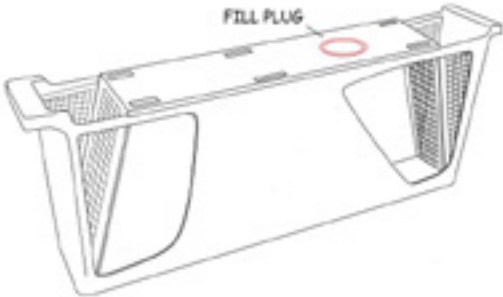
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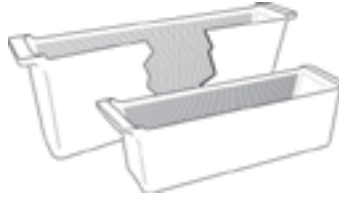
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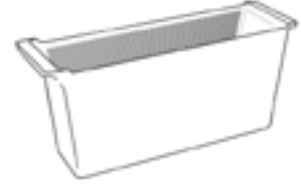
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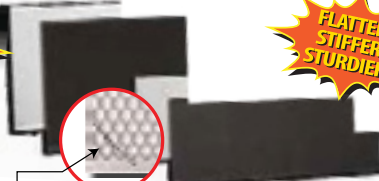
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We are living in an unprecedented time. A time of immediate gratification, where almost anything you could possibly want to know or own is just a Google search or click away. We are saturated with negative media coverage and overstimulation is the new norm. The beekeeping industry is no exception. The multitude of social media platforms that vie for our attention have spawned a plethora of self-proclaimed “experts” spewing information to uninformed newbies. Although there are outliers in every group, the bulk of these “experts” are in it for the recognition and limited fame that comes with being a content creator on YouTube. Call me old fashioned, but I prefer to take advice from the real, salt of the earth beekeepers that actually do this for a living, and have at times risked EVERYTHING to get to where they are at today.

When *Bee Culture*'s editor, Jerry, asked if I would be interested in reaching out to a fellow beekeeper to

interview for this month's issue, there was one such beekeeper that immediately came to mind. This wasn't because he is a close, personal friend of mine. To be totally transparent, prior to this interview, he and I hadn't conversed since I purchased queens from him back in 2019. I chose him because he is modest, wise beyond his years and how he has conducted himself during times of prosperity and near total devastation, could serve as an example for all of us. Since a lot of the specifics of honey bee genetics, husbandry practices and equipment are covered time and time again, I focused more on the often-overlooked business side of beekeeping.

Troy Hall is the owner/operator of Hall Apiaries located in the Upper Valley Region of New Hampshire and Vermont. Troy has been a commercial beekeeper since 2010 and during this time, he has been predominantly treatment free. Troy warns that his

approach to beekeeping has been anything but easy, with lots of hard work and little pay. This rang especially true during the first couple of years as he was developing a treatment free program for his apiary. Troy honed his craft studying under famed Vermont beekeeper Kirk Webster, whom first introduced me to Troy's work. He currently runs multiple apiaries throughout his region with specific yards for honey production (300 colonies), nucleus colonies (350) and mating nucs (388). Troy was gracious enough to take time out of his busy schedule and sit down with the readers of *Bee Culture* to discuss the trials and tribulations of operating a small scale, treatment free, commercial operation.

JK: I find myself on the cusp of transitioning from a sideline to a small-scale commercial operation and have several questions related to the business side for folks such as yourself that are making a living

An Interview with

from their bees. I know that you took the leap almost from the start when you were just 18 years old so perhaps you had less risks involved at that time of your life. I'm curious to know what some of the challenges were that you first encountered on the business end (cash flow, equipment, infrastructure, etc.)? How did you get your business plan moving forward (conventional bank loans, USDA micro loans, etc.)?

TH: Early on, my biggest challenge was cash flow. I had very little cash in my business account, just enough to cover month to month expenses at times. I was hesitant to take out a loan not knowing what the potential of my apiary was. I needed to prove to myself and let my business prove to me that it was viable and could stand on its own. Being in my early 20s at the time I had a very small budget at home, I didn't need much and my overall debt was low. To get the whole thing moving forward I needed to produce a honey crop and sell a surplus of queens to generate revenue to reinvest back into my business for next season. Once my business was established, I took out a USDA micro loan to help cover the expense for a honey house and workshop.

JK: What is the most important piece of equipment in your operation that you wished you would/could have purchased earlier?

TH: My truck. I started with a half ton and moved up to my current truck, a ¾ ton (2016 Ford F250) with a flat bed. It is my opinion that in order for it to be a good bee truck, a flat-bed is essential. There was always the itch for a better extractor or a bigger facility early on but I had to make do with what I could afford. I feel some people can get into trouble early on in their business venture with bees by not being disciplined enough to really weigh needs and wants.

JK: Your business model reflects a combination of nucleus colony, mated queen and honey sales. Now twelve years into it, is this still a viable business model? Are there aspects that you hope to scale up/back in the coming years as the enterprise grows?

TH: It is. This model (nucs, queens and honey) has been the productive engine that has enabled me to have revenue in tough years and in the good years I was able to reach up and grab onto the next level above me in my business plan. I am reaching a level now where it's been really fun and it's amazing to look around at all I have and accomplished completely from my bees paying for it all. Going forward, the demand for honey,

queens and local overwintered nucs is very high so I am always trying to increase production and keep the workload manageable for me while still doing most of the work with the help of a few other helpers.

JK: If you could offer up just one little pearl of wisdom to a sideline beekeeper that's considering taking the leap into full-time employment with their bees, what would it be?

TH: Stay above reproach in all your business endeavors. Be honest and reputable, stand behind what you produce and sell, there is room for everyone at the table. Keep your love and passion for bees the focus as your business grows. It's the heart of what keeps me going. Tell yourself, "I do not know all the answers."

JK: I have heard you say in another interview that you don't make a lot of money. You have even said that you aren't worthy of an \$80,000 a year salary. Can you explain what you mean by this and in your opinion, what perks does a lesser paying career in beekeeping offer that the suit in the high rise, netting six figures annually misses out on?

TH: Being that I started from nothing and grew what I have today from the sole merits of my bees, I have a hard time with people starting a bee business expecting to make a lot of money. I am not saying you can't, there is plenty of opportunity for people to make a good living and life style around being a beekeeper. My point being, it's the mindset of becoming a farmer. This is lost on our culture today. Most people feel they need to make \$80,000 or six



figures to live a comfortable life. That is not true. You can do very well and live happily with less. Some of the perks for me are, I am my own boss, working alongside the honey bee and immersed in nature, working with my hands, and mind.

JK: In your experience, what have been some of the toughest challenges in operating a sustainable apiary in a cold, northern climate? Have you seen that certain genetic lines perform better in a colder climate than others?

TH: Winter mortality has been the toughest challenge. Things have changed over the last few seasons. There is a greater pressure on the bees from mites and the environment. The genetics that survive and thrive here are the Carniolan and Russian strains.

JK: Do you have any specific advice for that third year beekeeper who wants to start dabbling into producing their own queens and working towards a sustainable apiary?

TH: Master the art of raising good queen cells; this is dependent on following a scheme with setting up and managing your cell builders from one year to the next. Some years, the bees raise cells with very little effort, other years it feels like I must coax along or stimulate them due to the environmental impact on the bees from one season to the next.

JK: Being a predominantly treatment free beekeeper, I have heard you say that you can't be treatment free without rearing your own queens. Can you expand on this a bit?

Troy Hall of Hall Apiaries

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TH: It's not entirely, but it often feels like a numbers game. You need to spread the risk over a large population. To do this, I need to raise my own queens from my own tested stock that is surviving and thriving in my apiary from one season to the next. I need to raise as many daughters as I can and get them installed in nucs to overwinter. Nucs typically don't struggle with high mite pressure due to the brood break upon making them up and the timing of our seasons when the queens shut down for Winter. Having an ample supply of nucs in the Spring allows you to replace your losses with your own bees. If I had to buy bees every year, I would be out of business.

JK: Treatment free is a romantic concept with a devote following. We all have our own beliefs/disbeliefs on this method and its effectiveness, so this interview isn't the time or place to unpack all of that. Can you define for me what treatment free means to Troy Hall and his operation?

TH: To manage an apiary without the use of chemical treatments for *varroa* and other ailments. In all honesty, it is becoming very hard to maintain a treatment free paradigm over the last two seasons. As I mentioned before, I feel there has been a change in the mite/virus complex plus the environmental stressors playing out on the bees.

JK: I have heard you say in the past that when you decided to commit to being treatment free, you knew the risks that were involved and were prepared to lose everything and possibly have to start over. Prior to the Spring of 2021, you experienced colony losses that were in line or just a tad higher than the national average annually, however; coming into 2021, you had some concern about the health of your colonies that were coming out of Winter. Will you share with us what you think happened and how you responded?

TH: I lost just about all my apiary in the Spring of 2021. The Fall of 2020 was a very dry one here. So, nutritionally the bees were stressed to the max. Being nutritionally stressed funnels all the mites onto a smaller population of bees when the queens reduce the overall number of eggs laid. This was the perfect storm for failure. (I was feeding pollen sub and syrup all along when things got tough). It was too late as the problem was already baked in by September when I started seeing crashing colonies throughout my apiary. This was the first time I had ever witnessed this type of event, for I had experienced bees being nutritionally stressed in the previous season of drought. Overall, I feel it was mites/virus and drought that killed off my bees.

JK: What are our biggest challenges in beekeeping today and where are we headed?

TH: We need mite resistant bees. We need more beekeepers (queen breeders) all over the country and world on the frontier of breeding for these bees. Beekeepers using their wit and creative abilities to solve these problems. We need to band together to keep our industry going.

JK: Troy, I appreciate your willingness to be interviewed today and additionally, want to commend you for being the person that you are. You have built a sound operation that offers quality queens and great honey, but more important to me than this, is that you are morally and ethically sound. The level of transparency that you have shared with our audience today will help countless readers such as myself whom are toeing the edge of that sideline/commercial line. We've already went deep into the weeds for this article so let's end with some rapid fire, fun stuff!

JK: Favorite hobby outside of beekeeping?

TH: Music/playing guitar.

JK: Favorite movie?

TH: *As Good as It Gets*

JK: Favorite non-beekeeping book?

TH: *The Pilgrim's Regress* by C.S. Lewis.

JK: What famous deceased person would you most want to meet?

TH: Theodore Roosevelt.

JK: If you weren't a beekeeper, what would you be doing for a living?

TH: Running a saw mill. 🐝

BEE YET

Merry Christmas!

Bees in Christendom, the Spiritual Health of Honey Bees

Dr. Tracy Farone



Poor mental and psychological health is an ever-increasing public health crisis in our country and world. As a college professor, I am on the front lines seeing this epidemic as it manifests in our young people. The statistics are appalling. Poor psychological and mental health even affects our animals. However, in talking with other beekeepers, one common theme I hear from them is the peace they receive when tending their bees. Recently, I had the opportunity to explore perhaps one reason why. After discovering that honey and bees have over 60 references in the Bible, (making them on par with camels...) I decided to take a closer look. This Fall, I signed up to create and deliver a five week chapel series at our College on "Honey and Bees in the Bible". In addition to the opportunity to teach the community some fun facts about honey bees, we also get a chance to see what the Almighty thinks of bees. Well, spoiler alert... He's a fan.

The series' presentations each include the following: Introduction to topic and outline, Fun bee facts/demo, Scriptural references and re-



flections, Relevance and application to our faith and walk and a Question/comment period. Five major themes are covered, one per week. The themes are: 1) Community: The Fruits of Hive Work, 2) God's Provision: The Land of Milk, Honey & Health, 3) The Fall: Disease in the Garden, 4) God's Prized Possession: The Sweetness of God's Love for Us, and 5) Stewardship: Our Relationships with God's Creation. I am sure just about any beekeeper could easily see how honey bees could be used to demonstrate these themes.

Turns out there are two basic types of references to "bees" in the Bible. The first category is not a reference to honey bees or honey at all but to hornets or wasps. These Biblical verses represent God's judgment, protection, promise and power. Generally, God getting after someone. Here's some references to check out: Exodus 23:28, Deuteronomy 1:44, Deuteronomy 7:20, Joshua 24:12, Psalms 118:12, Isaiah 7:18.

However, most verse references in the Bible to "bees" are about honey and/or honey bees. Honey and honey bees are used as images to convey God's blessings, God's love, strength, wisdom, things of great worth and even references to Christ. Some Biblical names, like "Deborah", the name of the famous and only female leader of Israel in the time of the Judges, means "bee" in Hebrew.

After attending the *Bee Culture* conference recently, I learned that I worked for a company, A.I. Root, who produced beeswax candles especially for churches. The Catholic church

and other churches require candles to be made primarily of honey bees' wax due to the purity, value and holiness that only beeswax represents. Pretty cool, huh?

Since honey bee colonies demonstrate individual roles and purposes within a united community with more difficult tasks taken on through time, they are also a beautiful illustration of the Body of Christ and the sanctification process. Here are a few verse references: 1 Corinthians 12:25-27, Matthew 18:20, 20:26-28, 22:39-40, Galatians 6:2, Romans 12:5, John 15:12-13.

Honey bees demonstrate our relationship to the land and God's provision through crop pollination and hive products. Here are some references: Exodus 3:8 3:17, Deuteron-



omy 8:8, 11:9, 26:15, 27:3, Leviticus 20:24, Ezekiel 20:6, Jeremiah 11:5. Other references illustrate honey as a good gift or food. Some examples: Proverbs 16:24, 24:13, Matthew 3:4, Mark 1:6, Exodus 16:31. Honey is also considered to be of great value in the Bible, Ezekiel 27:17, 2 Chronicles 31:5, Genesis 43:11, as well as, a source of strength and wisdom: 1 Samuel 14:27-29.

Certainly, everything is not always perfect in the garden. As beekeepers we face depressing losses due to a myriad of honey bee diseases and environmental decay, but the Bible addresses that too. From the Fall in Genesis chapter 3 to the anticipated redemption of creation in Romans 8:18-22, beekeepers can take heart.

Even with loss, there is still redemption and with redemption comes joy. Consider the dances of the honey bee when they have discovered a good thing. That honey, so carefully made, never really goes bad. Life can even emerge from death.

One of these redemption stories and probably the most famous bee story in the Bible is found in Judges 14, the story of Samson and the bee “swarm” in the lion carcass. Since becoming a beekeeper, I have a different take on the story than before I was a beekeeper. The bees in the lion are referred to as a “swarm”; however, the text goes on to explain that the bees had built comb within the carcass. So, beekeepers would

know this was not just a swarm, but an established colony that may have come from somewhere else but found a more permanent refuge in a dead lion. A hundred years ago, a more agricultural audience would have understood honey bee processes more fully and its massive theological implications to Israel and Christ. I am afraid more modern audiences have lost much of this agricultural piece, and therefore also would not fully understand the theological impacts in the passage. Beekeepers to the rescue! Here are some references to the sweetness of honey as compared to God’s redemptive love: Psalm 81:16, Psalm 19:10, 119:103, Song of Solomon 4:11, 5:1.

Finally, good stewardship is probably an easy and obvious principle for honey bees to illustrate. They are such a key piece to our ecological and agriculture systems. Proper stewardship for honey bees and the environment is top of mind for any beekeeper, but it may be easier said than done. It is a task we are challenged to take on (Genesis 1:26-30), and perhaps sometimes less is more (Proverbs 25:16, 25:27).

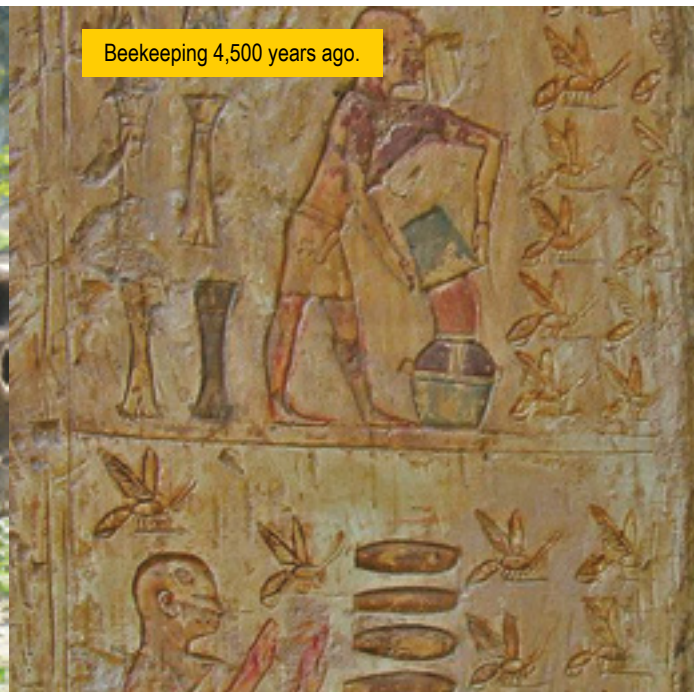
During this Christmas season, I hope this article inspires you to take a look at the spiritual side of honey bees and how they may demonstrate the bringing of peace, love and joy into your life and the lives of others. I’ve provided the outline and references for you to explore and maybe share



with others who may need a pick me up. Merry Christmas everyone and a blessed New Year! 🐝



Cylinder bee hives.



Beekeeping 4,500 years ago.

I first became acquainted with Stuart Roweth, who lives in England, after reading about his invention, the Bee Gym, on someone's blog page several years ago. I ordered several of them, and Stuart and I began corresponding via email. Stuart's interest in beekeeping began in 2011 with his propensity for inventing things. He has two other inventions: one is a double pot system allowing trees to survive on terraces and balconies, and the other is a multiplication engine for young students. Then he met a young man who started telling him about his adventures in beekeeping, and of course mentioned our arch-nemesis, *Varroa destructor*. Stuart started his beekeeping career the right way, with a mentor, and in joining a bee club. He did a little research, and after seeing the size of the mites in relation to their hosts, he thought it might be possible to build something that would help the bees rid themselves of mites. He came up with an idea, and made his first Bee Gym out of wood. It was a little contraption that looked like a tiny cattle guard with an entrance reducer that forced bees through a small gap, and had strings that would catapult the mites off the bees' backs. Initial success was encouraging, 119 mites in

Interview with an Inventor

Stuart Roweth

Tina Sebestyen

one day. He made videos of the bees, and saw that they were choosing to go in the restricted area of the Bee Gym, and that they were grooming themselves there. When he learned a little more and knew that mites are underneath bees more than they are on their backs, he knew he needed to do something more.

Now, he needed to find a way to knock the mites off of the bees' undersides. One idea was to use little brushes, but using an old mascara brush of his wife's, he found that the mites had too good a hold and were too low to the bee to be removed with a brush. Fingernails were perfect, and he got the idea of little plastic flippers that bees could use to scrape mites off, whether purposely or accidentally when walking over the device in the hive. His wife worked in film and television, and in her workshop, they molded a little prototype that would hold both strings and flippers, out of two-part plastic. They made about forty of them, and gave them out to

beekeepers. This was then superseded by a 3D printed design which was used to make an injection molding tool. They made about 5,000 of the square Bee Gyms, devices that go in the entrance and have both strings and flippers.

At this point, Stuart needed investors and beekeepers for testing, and found both. Vita Bee Health and the Devon Apicultural Research Group (DARG) did some testing, as did several individual beekeepers, like myself. Stuart decided to try placing grooming devices on brood combs, and invented the Mini Gym, a small bar that connects through the comb to a matching bar, both with mite flippers. He sent me several and I placed them in my hives, saving one pair for my observation hive. I saw the same thing that Stuart was learning through watching hundreds of hours of video of the bees with Gyms. The bees spend a lot of time on them. At first, it looked to me like the bees were trying to remove the flippers,

Inventor Stuart Roweth holds his creation, the Bee Gym.





The first Bee Gym that is meant to go in the entrance so that the bees must walk through it.



The Slim Gym. We originally placed three on top of the frames, now hung between brood frames, and used in conjunction with the square Bee Gym in the entrance.

and after about a week, they gave up on that and just spent time rubbing on them. Sometimes it looks like the bees are walking over them incidentally, as part of the hive architecture, which would still mean some efficacy. Once the bees get used to having the Mini-Gym in the hive, it really looks like they are purposely rubbing and grooming themselves on it.

This wasn't enough for Stuart, who had more ideas brewing after a video conference with some of his testers, who thought that placement of the devices was critical. He created the Slim Gym, a grooming device to be placed on the top bars between boxes of the brood chamber. Again, he sent me several to try. I placed them on my hive bodies, with some concern about how hard it would be to clean the inevitable bur comb off of them, and how often that would be. I was pleasantly surprised to find that though some colonies do put wax on

them, it isn't much, and is easy to scrape off, once a season, after soaking in borax. I was even more pleasantly surprised to find that mite numbers stayed low all season (though as we beekeepers know, it might be the Gyms, and it might be one of a thousand other variables). This Spring, Stuart's idea was to hang the Slim Gyms vertically between bars or frames, so that they would be right in the brood area, where mites like to hang out waiting to infest growing bee larvae and where we normally place treatment strips.


I counted for mites in all of my colonies, then started stapling the Slim Gyms to the top bars of frames, and found that this method works great for top bar hives, too. I decided that I wanted to also try drilling holes in them, and hanging them from

a toothpick, so that the grooming device would be more equally spaced between the frames. After two weeks, I counted mites again, and counts in all colonies had dropped. Now, at the end of Summer, as always, some colonies have maintained low mite numbers, while some have risen. Only one colony with Slim Gyms has high numbers, and they are so high, I would normally count that as having received a mite bomb. Stuart suggested that I move the Slims around in the brood chamber, as it might increase their use. I must admit that I have not gone totally treatment free as Stuart requested at the beginning of this testing, but have treated when necessary over the past few years, mostly only using OA vapor in mid-Winter for those few hives with more than two mites per 300 bees.

Stuart is careful not to claim that this is "the" answer to mites, but says that he has created another tool for

our Integrated Pest Management toolbox. He wants to be responsible in his advice, and suggests that when mite numbers rise above certain thresholds, chemical treatment should be done. He also acknowledges that some beekeepers will flat-out refuse to use any kind of treatment, and this is a tool for them and others to experiment with. I asked him what other kinds of IPM his other testers were using, and it is all across the board, from drone brood culling to sugar dusting. He loves that this empowers us, allowing us to taking back control and do something positive for our bees. The aim of the project is year-round *varroa* control. It leads to a different kind of beekeeping regimen, and it is more enjoyable, because we have the means in our hands to solve some of the problems for our bees.

I asked Stuart how his own bees were doing. He says that treating for mites interferes with the testing of the Bee Gyms, so he is bravely going without treatments, but uses drone brood culling and the grooming devices, and has not started introducing mite resistant queens yet. He has one colony that is seven years old, and another that is six, without collapse. Most of his other colonies are two to three years old. Stuart claims they have all become sustainable over the last few years as the Bee Gyms have become more effective. He has observed that mite numbers seem to be controlled better the longer the colonies survive, which made me wonder whether the bees become more adept at using them over time, or whether he thought they might also serve as training devices for more frequent grooming. He seemed cautiously hopeful.

I asked Stuart about how difficult and expensive it was to get a patent, since that might be something that would discourage a would-be inventor. He says that patents are easier to get and less expensive (at the start) in the UK than they are here in the U.S. I asked about future iterations of the Bee Gym, and whether he might have considered getting a GoFundMe page. He has definite steps in mind for the future of the Bee Gym, but wants to get better testing and hard numbers before moving forward. I think Stuart can be a motivational model for all of us; to put our ideas to the test, and not to be afraid to try. 

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The Best Tasting Honey in the World

Here's a subjective headline for you. For most beekeepers, the best tasting honey in the world is the honey they harvest from their own hives. All the planning, worry, sweat, stings and sore muscles that go into every jar accentuates the taste of one's own honey. But how well does the taste of that honey stand up to others when judged by a group of people who know nothing about you or your honey and have to evaluate your honey solely by taste? That's a question the Center for Honey Bee Research can help you answer. The non-profit organization located in Asheville, North Carolina is the host of their annual black jar international honey contest.

For those of you not familiar with the term, a black jar contest is a honey contest that is supposed to be judged solely on the taste of the honey. I say "supposed to be" because I entered a black jar contest once down in Florida and my honey was disqualified because it was raw honey that had crystallized. Clearly not all black jar contests are judged solely by taste, but there is one honey contest that really is judged only on taste, and that is the one held by the Center for Honey Bee Research. I had a chance to speak with the winners of the Center for Honey Bee Research's 2022 black jar contest, Genevieve and Richard (Rick) Drutchas of Worcester, Vermont.

After serving as the first full-time bee inspector for the state of Vermont, Rick Drutchas developed a small commercial beekeeping busi-

ness that lasted about 20 years. In 2010, he sold most of his beekeeping business but kept his favorite apiary spots and now, at age 72, works to keep about 100 colonies.

I asked Rick why he decided to enter the Center for Honey Bee Research black jar contest. "The honey contests at honey shows go on about how clear it is, or if there's a little foam at the top, or if there's a nick in the lid of the jar: all kinds of silly stuff. This is a contest where they're just going for flavor and that felt good." As Rick explains entering the contest was kind of an afterthought. "We had heard about the contest but then forgot about it. Then as the deadline was coming up, we just grabbed some honey out of a five gallon bucket from our home yard, threw it into some plastic quarts and sent it off."

According to Genevieve Drutchas, the honey that netted them the grand prize was not their typical Vermont honey. "We took a late Fall crop from our home yard last year and it was really interesting - kind of a buckwheat, japanese knotweed, goldenrod mix. We had a field that Rick had put buckwheat in that the bees really loved and the river along our place was just loaded with knotweed as so many places are now, so it was pretty clear where the honey came from in such a short time frame and it was definitely a beautiful and interesting flavor spectrum... I love the japanese knotweed flavor. To me, it's sort of reminiscent of an elder-flower syrup but this honey had a couple of different flavors, and when I say that what I mean is you would have like a seven second experience. There was a first hit, then a second hit and then there was the aftertaste. There were a lot of different flavors in there... and it definitely had that nice silky cream that you sometimes get in the later Fall honeys—a fine crystal and very creamy. You know how a goldenrod can be almost silky like lingerie when it crystallizes? It had that kind of consistency."

After speaking with Rick and Genevieve, I managed to catch up with the Executive Director of the

Center for Honey Bee Research in Asheville, Carl Chesick, to ask him about the contest and the judging process that evaluates over 600 entries from across the globe. "It varies from year to year. We never know exactly who's going to enter. We've had 42 different countries around the world that have been competing in various years. Our categories are not fixed because we base it on what entries we get. We take a look at all the entries and figure out what categories will give the fairest chance to everybody... we have 10 categories and the category winners get \$150, a custom ribbon with their name printed on it, a certificate and bragging rights. (The grand prize winner got \$5,500 - RC) We have a lot of preliminary rounds, always with at least five judges. They don't know anything about where the honey's from. The highest scoring go on to subsequent rounds until we get down to the 30 finalists. While the judges don't know, I know what the categories are because I get all the entries from around the world, so a lot of times they're geographical, like we had Europe, Africa, the Far East, that kind of thing. We also had a category that Genevieve and Richard won in, creamed honey. Years ago we didn't have a creamed honey category because here locally, people think anything that is solid is honey that has gone bad. So we've been doing an educational thing since then and what we realize is people really like creamed honey, provided that the particles are fine enough, and sometimes it's accidental and sometimes they really work hard to get that. So if we get an entry that's already crystallized, I look at it and take a little taste and see if it's got fine particles or not. If it's fine enough then it will go as a creamed honey.

"Now the judges don't get to see the honey, but when you've got creamed honey you can't put it up against liquid honey and expect that it's going to even out apples-to-apples. We get a lot of honey's that are really dark and are strongly flavored honeys so we usually put those in the preliminary rounds where they're against each other so they get an apples-to-apples judgment. It is only in the finals where there's going to be dark honeys against water white honeys.

"Mono-floral is a category usually. A couple years ago, since we have



Ross Conrad

sourwood down here, we had like 110 entries that specified they were sourwood. So, they had to go together and that was a really competitive category that year... If the honey has a uniqueness like a dark honey, or a creamed honey, or a mono-floral honey where they've stated it's from a particular source then those are all going to be categories, but the rest of them, if one's from Holland and one's from Wisconsin, I feel like they should go in different categories and it's subjective. It's the board looking at the entries and trying to decide what's the fairest way to break them up."

The judges don't know what the categories are and solely judge each honey on its taste. Once their ratings have determined the top three entries in each of the 10 categories, they go on to the finals. Once a winner in each category is determined, the 10 category winners go up against each other for the grand prize.

According to Chesick, "We don't let the judges talk to each other about the honey because the first year or two they did, and they were like 'ooh that's good' or 'that one's got whatever' and the alpha people would influence all the rest of the judges and the scores were all the same. So we said right, you can't make faces and you can talk to each other about anything you want in between the tastings but you can't talk about the honey."

I asked Genevieve what advice she would offer to those who might want to enter next year's 12th annual

black jar international honey contest. "What the judges seem to be going for is the interesting raw flavor spectrum and we're in that moment right now with nectar sources changing as they are with the climate crisis weather and invasive species. The winners have been all over the place from classic Italian rural honeys to unusual varieties that a beekeeper in New Zealand who's not a manuka maker, he's making another unusual smaller nectar sourced honey and he's won twice. I think what they're looking for is interesting honey that still fits that classic spectrum of yum, a crazy delicious honey kind-of deal but they work pretty hard to have different people in all the realms of tasting so a whole lot of people are giving you feedback on your honey when you enter the contest and that alone is a valuable thing."

She went on to reflect: "At this point in Rick's beekeeping life this (recognition) was really meaningful. With all the changes in beekeeping and just choosing this life-style in Vermont, it was really meaningful in a sweet way to win something like this."

Next year's black jar contest is expected to feature a grand prize of \$6,000. The festival event where the category finalists will square-off against each other is scheduled for June 4, 2023 at Salvage Station in Asheville, N.C.

Note: The interview quotes in this article were lightly edited for clarity and length. 🐝



This year's trophy for the best tasting honey in the world goes to Richard and Genevieve Drutchas.

Ross Conrad is author of *Natural Beekeeping* and co-author of the *Land of Milk and Honey: A history of beekeeping in Vermont*



Rick Drutchas checking on some of his nucleus colonies.

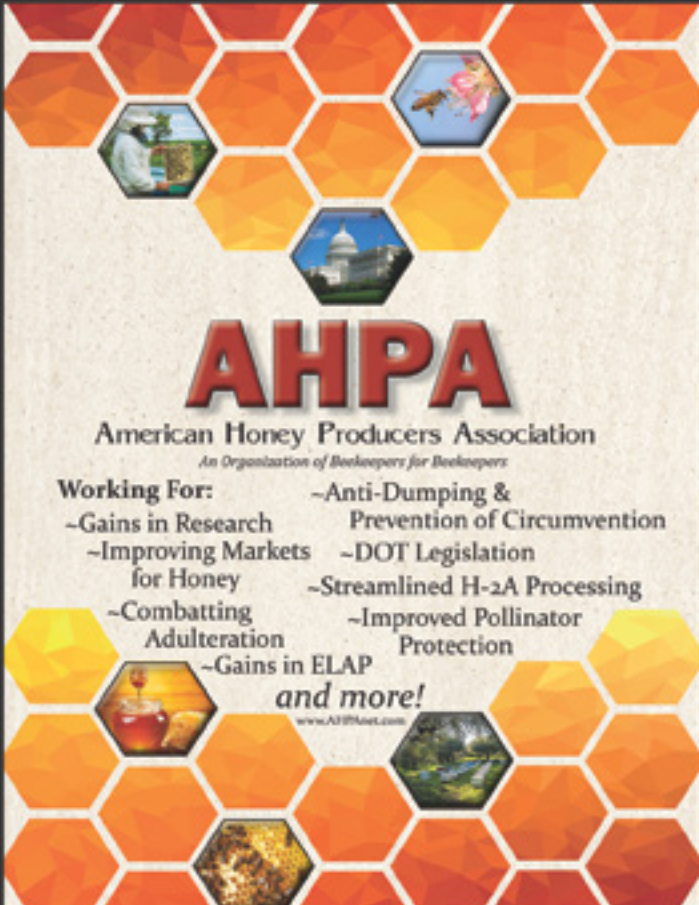
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Honey Shows Part 1: The Value of Showing Honey and Beeswax Brutz English

I love honey shows! I find honey shows to be fun, exciting and often full of wonderful surprises! I personally enjoy the challenge of planning, organizing and putting together honey shows almost as much as I love judging exhibits. I wish more beekeeping clubs and associations, especially at the local level, would host more honey shows each year. I believe a honey show is one of the most valuable activities a local beekeeping club can incorporate into its annual schedule of events, and I'm going to take a few paragraphs to explain to you why that is.

Let's start off with a not-so-straightforward question, what is the fundamental purpose of having a honey show? Now lots of things come to mind. Honey shows are fun, competitive events for club members. Honey shows provide a venue for beekeepers to show off their products and skills. Honey shows provide beekeeping clubs and organizations an opportunity to recognize their members' achievements. Honey shows can be a great tool for public outreach and generating publicity. All of those are among many perfectly valid reasons for an organization to put on a honey show. However, I submit to you there is something more... an even better, more valuable reason to have a honey show. Consider this from the standpoint of beekeeping education; what if the purpose of the honey show is to teach beekeepers how to be better producers of hive products? And what if I told you THAT made better beekeepers out of honey show exhibitors? In fact, a honey show can be (or certainly can be a part of) the most practical, enduring and comprehensive educational program your beekeeping club or association offers throughout the year, and year after year.

Good honey shows have an instructional element inherently built into them, and good honey judges want to help exhibitors improve and do better. Most honey shows use a judging or scoring system that provides the exhibitor with some level of feedback on their exhibit(s). Usually, this is a score sheet or comment card that spells out what was wrong or why the exhibit was marked down. Hopefully, the comment card or score sheet offers some constructive criticism as to what the exhibitor might improve on going forward. Many honey show exhibitors want the feedback from the judge more than they want ribbons and awards. Meaningful feedback, given in a positive, constructive

way does two things: one, it educates the exhibitor, giving them valuable instruction and direction; and two, it motivates the exhibitor to keep at it and make the necessary adjustments and improvements to pursue greater success at future honey shows. The result is with each successive year, we see the same exhibitor(s) presenting vastly improved hive product(s).

Not only do we see exhibitors improving on the items they brought last time, but we constantly see exhibitors expanding their range of products year after year. The first year or two, an exhibitor will bring in some extracted honey. Then after a few shows, that exhibitor will show up with some creamed honey, or maybe an exhibit of comb honey. A year or two after that, they will enter a wax block or a bottle of mead. We find people who exhibit in honey shows tend to rapidly diversify their product offerings. They not only use the feedback they get from the judges at the honey shows, but they also study and research on their own how to make new things between shows. These individuals spend this extra time and effort studying, learning and honing their skills between honey shows so they can be prepared for, and be successful at, the next honey show!

Now you might say, all this self-improvement is fine and dandy for the individual exhibitors, but how does all of that benefit my beekeeping club or association? I hope the answer is self-evident. Any honey show





exhibitor with any measurable experience will tell you very quickly, one cannot hope to produce winning honey show exhibits without access to the highest quality honey and beeswax. The only way to get honey and beeswax worthy of showing is by maintaining healthy, robust colonies of honey bees. Hence, to be a successful exhibitor, one has to become a pretty good beekeeper. Much of the study and self-improvement I described in the previous paragraph is devoted to better beekeeping practices and management. Success at the show bench starts in the bee yard. One must learn the appropriate and proper methods of harvesting, extracting, processing, packaging and handling all manner of hive products. Ultimately, honey shows serve to make more competent, well trained and all-around better beekeepers!

If you are a big-picture person, there is a trickle-down effect to all of this. Almost every beekeeper produces something from their hives. Maybe it's honey. Maybe it's candles. Maybe it's lip balms. It doesn't matter what we're producing. What does matter is almost all of us give away or sell some of what we produce to someone else be it a family member, a friend or a neighbor. By participating in honey shows, exhibitors learn to make higher-quality products. When we distribute those superior products to others out in our communities, they (our consumers) develop an appreciation for the high-quality hive products we have provided. That creates and raises consumer confidence in our local hive produce, which in turn elevates the value and importance of beekeeping and honey bees within our local communities.

There you have it. All the information you need to convince your local beekeeping club or association to put on a honey show! In my next article, I am

going to explain exactly how to put a honey show together. Don't fear, it need not be a gargantuan task, nor does it necessarily take a Herculean effort. A local honey show can be as simple and informal as your club wants it to be. I will go over the basics and provide links and resources to help put a great honey show together! 🐝

Brutz English is a Senior Welsh Honey Judge from Georgia. He has been judging honey shows for over ten years. He has judged more than fifty state, national and international level honey shows and scores of local honey shows over his judging career. He is the Program director for the Welsh Honey Judge training program at the Young Harris-UGA Beekeeping Institute, and a founding member of the American Honey Show Training Council. He can be reached via email at brutzenglish@gmail.com.



Notes from a NewBeek

Second Deep Tilting Platform

Dick Vermeulen

I did bee school and got my beautiful nuc on May 7th this year. Fed them 60 pounds of sugar and gave them a reasonably good looking home. Very excited to see if I can be a beekeeper and lend a hand instead of getting in their way. The first 10 frame deep ran out of room on June 2nd and I added the second deep. My queen was laying well and the population was expanding nicely. When I lifted my second deep off my one and only hive the last week of June, something had definitely changed.

At bee school, Lincoln showed us a two level hive stand so you can tilt the second deep on to a platform and avoid lifting the box. I didn't need that! How heavy can it be? 60 pounds. I am not that weak. I can lift it – no problem. Well you know I did lift it, I had to put it someplace so down it went on top of my inner and outer covers already on the ground. That was pretty easy going down and not killing any bees. Putting the hive back together, I now have to bend over and lift the 60 pound box up into place and not crush any bees! Did the box get heavier sitting on ground? Okay maybe that two level hive stand is not such a bad idea after all!

All seasoned beekeepers know frames run front to back – so if you place the tilting platform on the side of the hive and tilt the box in that direction – all the frames will mush together and you're going to kill some bees and get a head bump or two. Being a newbeek, I didn't realize that until after I built my platform, installed it on my hive stand and opened the hive. I was able to twist the second deep 90° until I could set it down on the platform and have the frames hanging vertically. The bees were happy I didn't kill any – this time. But I thought a redesign could

find a better solution that only required the box to be tilted, land squarely and have the frames hang correctly.

My new idea for the platform places it on the front of the hive. I can pry the back end of the second deep apart and rotate it forward on to the platform and be done. By rotating on the front edge of the box, I lift half the weight. Easy to scooch it forward six inches to give more room to inspect the bottom deep without bumping into bees on the bottoms of the frames in the titled box. Perfect.

Well maybe not! If I had remembered anything from my physics courses I should have known that when you place a 50 pound load out on an unsupported beam solidly connected to the bottom box that simply rests on the hive stand – it causes rotation. As I was setting the second deep down on this newly designed platform the back end of the bottom box began to lift and the whole colony started to fall forward. I caught it in time and pushed it back. That would have caused more than a one or two head bump disaster. This better idea will shortly be going into my kindling pile.

I have come to the conclusion that moving some heavy boxes around is part of the beekeeper's craft. I need to learn how to do it efficiently and minimize the amount of bending over. Back to my first platform design. Also dusting off the Bowflex and bicycle trainer. Yep, not that strong.

If you ask the bees what I am doing, I am sure you would get some interesting answers. I think they might ask me to just build blue bird houses and leave them bee. 🐝

My redesigned platform on the front of the hive that did not work.



The platform



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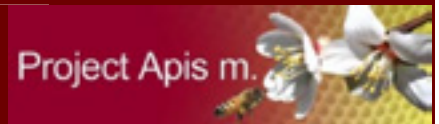
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Not many of the beekeepers in our area collect and process propolis. I suspect this is so of beekeepers as a whole. Some have even developed genetic lines that reduce the collection of that sticky mess that makes frame inspections a little difficult. A few have noticed that propolis is good for the health of the hive and serves a definite purpose which is why the bees collect it. These folks rough up the inside surface of their hives to encourage propolis collection. This discussion will be about the process of processing propolis and leaves all those other issues for another time.



I learned of propolis and its processing from, beekeeper and founding member of the Association of Southern Maryland Beekeepers (ASMB), the late Jerry Worrell. Jerry insisted that properly processed propolis be free and clear of all foreign debris and wax. To be clear what we are talking about are hive scrapings, pure and simple. I know there are propolis traps on the market which provide a fairly clean initial product but can end up with bee parts, small hive beetles, etc. in the mix. I segregate my scrapings upon collection into two groups, clean and not clean. I do this because life is too short for me to spend it trying to pick an insect part or paint chip out of resin. I use the second group for filling those cracks and crevices that you hear folks talk about pests laying their eggs in where the bees can't police them up. I use the clean propolis for processing for personal use, fair entries and sometimes for market. Again, we're on about the processing, not those other issues.

Let's get on with it. All three of our local fairs require a minimum of two ounces of propolis for an entry. I recently processed a batch specifically for this purpose. The photos here are of that process.

I start by collecting at least five ounces of clean propolis because mine usually renders out about one-to-one wax to propolis. I then make sure I have a clean Pyrex bowl. A Pyrex measuring cup has a handle which would be handy, pun intended, but I have a bowl. I use a heat gun that I have marked the dial for the proper setting to heat and melt the propolis. Please don't



PROCESSING PROPLIS COULD IT BE ANY EASIER?

Greg Carey

ask the temperature. I never measured it. I just set it for a slow melt and no smoke. Insert all the warnings you have heard here about never turning your back on beeswax that is being heated. Consider yourself warned.

I pour the wax from the first melting and then knead the ball with my small wooden spatula. I keep doing this until no more wax will drip from the bowl after kneading. You may think that the propolis is now wax free. You would be wrong.

Next, I cover the ball with water and heat it again until there is wax floating on the hot water. I let this cool and lift the cool wax from the bowl. This step is repeated until I get tired/bored of fooling with it.

Now, the final step is to pour the water off and warm the propolis until it is moisture free and very soft. Once it is dry, I pour/scrape it onto a plastic sheet and roll it flat. The propolis should be jet black without any sign of wax on the surface. It is now ready for use, or, in this case, entry into the fair for exhibition and judging.






I was not completely satisfied with this entry, you probably noticed the slight brown appearance in the photos, but the judge thought it was worthy of the blue ribbon. I always agree with the judge. There are two more fairs to go. We'll soon see if the judges agree with each other.

Here is something you can use even if you do not plan to process propolis for your use. When the kids ask "Why?" when you tell them to never put a propolis ball in their pockets, show them this photo (bottom photo on the right). It may feel solid in your hand when it is cool but add just a little body heat for a few minutes and you will

end up with a coin stack that can't be knocked apart and a waterproof pocket. Don't ask how I know this.

Let's get back to the title for a moment before departing. There is no hard work in the processing of propolis. It can be done without breaking a sweat. However, all the heating, cooling and kneading of the propolis ball is tedious and time consuming. I am sure you picked up on the word "bored". This is the way I do it. If you know a quicker, less tedious, "easier" method, I will listen.

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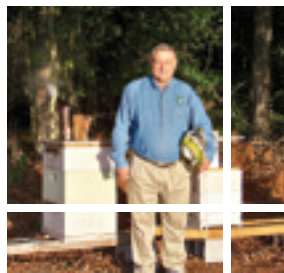
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THE ROYAL GLANDS

Ed Erwin

of the Honey Bee

The hypopharyngeal glands could easily be considered “The Royal Glands of the Honey Bee,” since they secrete a substance known as royal jelly. In 1792, Francois Huber of Switzerland coined the term “gelee ryale” – royal jelly. Royal jelly is distinguished by its high levels of enriched nutrients. The jelly is a viscous substance secreted by worker nurse bees and is the essential food for the queen bee, honey bee worker and drone larvae. This gland is responsible for delivering the rich royal jelly proteins that stimulate their growth and development and plays an essential role in the diet and caste differentiation of honey bees.

Located in the head of young nurse worker bees, the hypopharyngeal glands consist of a pair of long food glands coiled in the sides of their head. They are found bilaterally in front of the brain, between their compound eyes that are located below the pharynx, which is an opening near the respiratory and digestive tracts. The gland is composed of two cell units connected to the secretory duct in the bee. Each unit is composed of thousands of secretory units and duct cells designed to produce and discharge the jelly.

These glands are also sometimes known as the “brood food glands.”

The age of the worker bee has an effect on the activity and physiology of the hypopharyngeal glands.

The structure of the glands begins developing about a week before they emerge as adults and continues to change until they die. The glands are well-developed in nurse bees and they gradually decrease in size in the foraging stage of life.

For bees, pollen is the primary source of the ten amino acids and lipids they need to build protein, while nectar is considered the bees’ source of carbohydrates. Pollen is stored in the hive and consumed throughout the life of the bee. Most of the pollen is eaten by nurse bees. The nurse bees use the nutrients absorbed from the pollen and bee bread to secrete royal jelly from their hypopharyngeal glands. Bee bread is a mixture of honey, nectar, enzymes, bacteria and yeast that begin to grow on the pollen. This mixture allows the pollen to germinate into a sticky porridge-like ingredient – being an important component of the food for larva.

When the honey bee emerges from its pupal stage it is considered an adult. After about three days the jelly is mixed with bee bread and fed to the workers and drones until they spin their cocoons. Conversely, queens receive a steady diet of royal jelly throughout their larval development. It causes the queen bee to grow twice as large as a worker bee and gives her a longer lifespan than the other bees.

The worker honey bees also produce invertase in the hypopharyngeal glands. Invertase is a salivary enzyme that hydrolyzes sucrose and other enzymes, which oxidizes into glucose and acid. Research has shown that invertase is also a honey preservative.

Consumption of pollen and carbohydrates is dependent on the bee’s age. During the first three to five days of an adult worker’s life, pollen is consumed and the body weight increases by 25 to 50%. During this period, the bee’s body fat increases along with the development of their hypopharyngeal glands and other internal organs.

Nutritional Composition and Benefits of Pollen

On average, pollen contains about 22-23% protein which has significant nutritional value and is needed in the chemical processes essential for life. Pollen is also a source of nucleic acids, DNA and RNA, lipids, vitamins, minerals and carbohydrates.

If sufficient pollen is not available and the quality of pollen protein content necessary for development is poor, it will cause a loss of weight. Growth will also be stunted resulting in a reduced lifespan. It is important that bees eat a variety of pollens in order to receive all the necessary amino acids to produce healthy bees. Most pollen is missing a few of these amino acids, creating the need for a variety of pollens.

If the quality and quantity of natural pollen is unavailable, due to Summer droughts or freezing Winter, you should consider providing substitute pollen.

In order to ensure the bees have sufficient nutrients needed to raise brood you should begin feeding substitute pollen two to three months prior to the first freeze. During this period “Winter bees” are being raised that will live longer than Summer bees. These bees need a complete diet for their immune systems and fat stores to survive the Winter.





Hypopharyngeal glands, side view.
From www.honeybee.drawing.org



Hypopharyngeal glands.
From www.honeybee.drawing.org

Continue feeding a month after the first freeze and then again two weeks before the blooming of pollen bearing plants in Spring.

A good pollen substitute will contain up to 60% protein along with other nutritious ingredients found in natural pollen, which is twice the concentration of normal pollen. Providing your bees the supplemental pollen can allow the hive to build up worker bees prior to the honey flow in the Spring.

Harvesting Royal Jelly


Royal jelly is principally considered a commercial product sold worldwide and is highly perishable, and one of the most difficult of all foods to harvest. This accounts for its scarcity and high prices.

Extraction requires: cutting open the honey comb cells, extracting the jelly and then proper storage. A good explanation of this process can be found at Beekeepinglove.com under the blog section titled: *How to Harvest Royal Jelly From Bees? – Everything You Should Know.*

Benefits of Royal Jelly to Humans

Although the use of royal jelly used by humans is controversial, it is believed that it boosts the immune system and memory. It's also thought to improve the cardiovascular system, promote longevity and reinvigorates the body. A major ingredient of royal jelly is pantothenic acid which is useful in treating some bone and joint disorders. When this acid is injected,


symptoms of rheumatoid arthritis tend to subside. When royal jelly is combined with pantothenic acid better results have been reported.

As a human diet item royal jelly use has increased significantly by people who want natural, healthy foods, and nutraceuticals which are foods containing health-giving additives and having medicinal benefits. Royal jelly is nutritious and enriched with nutrients. It has also been used as an alternative medicine in treating menopausal symptoms. Royal jelly is also a good source of bifidobacteria, which are the beneficial bacteria that support digestive health. Royal jelly can be taken by capsules or directly. It tastes a little like honey, but with sour, bitter or acidic complex flavors that taste like medicine. 


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BEEing Diverse

Emma Wadel

As I hope many of you are aware, we had our annual October event entitled *BEEing Diverse: Inspiring Leaders in Beekeeping* on September 30 and October 1, 2022. I am happy to report that it went fantastic!

Over the past three years, *Bee Culture* had been trying their best to host this event. Unfortunately both in 2020 and 2021, it was canceled due to the public safety concerns from the still on-going, COVID-19 pandemic. They chose to completely cancel rather than move it to a completely virtual event because they didn't want to lose out on the spirit of having the event in-person, especially with the speakers we did. I am thankful they chose to postpone!

For anyone who does not know, I am the designer for *Bee Culture Magazine*. I started here in September 2021, just as they canceled the event that year. I got to spend the remainder of the year learning everything I could from Kathy and for some reason that didn't include almost anything about the event. I got a couple small notes here and there for it, but since we weren't planning it, it wasn't at the forefront of the teaching. Learning the magazine was much more important. But that's okay since Kim and Kathy are close by and always ready to help!

That being said, from behind the scenes it was wild, chaotic, crazy, basically any synonym you want to apply during the planning and lead up to the event. Since *Bee Culture's* entire team is new as of November 2019, none of us have ever planned this event before. Two of us hadn't even attended one! Luckily, back in early June, Kim came in and gave us a rundown of what we need, when we need it and a best course of action to get going. From there we enlisted the help of some people around the A.I. Root Company (if you didn't know – that's the company *Bee Culture* is owned by!). We needed help with getting our conference room booked, making sure we could actually get

in the room, set-up of tables and chairs and a million other tiny details but most importantly, making sure we had food for everyone! A sincere thank you to all of the Root employees who were involved in helping us with this event. We could not have done it without you!

As we planned and time flew by, so many little details kept coming into play that none of us had even thought about! I can't tell you how many pages of notes I filled up as we had meeting after meeting about the event. An event of our size (we had about 75 people in person) isn't the biggest event, especially in the bee world, but for three people with minimal experience, it was tough! Planning 14 speakers, in-person and virtual tickets, catering, social media, many Amazon purchases for everything from hand sanitizer to table cloths and everything in-between was difficult to juggle while also putting out a monthly magazine, a daily email blast, some renewal mailings, posting articles online, plus everything Jerry and Jen do. I even went on a week vacation in there!

But overall, we somehow did it and we have received only positive comments. So many people were glad to finally be able to meet in person and have that many speakers with such a wide range of knowledge and expertise to share stories with and ask questions. We are so glad we finally made this happen and it was a great success. We want to do it again in the future, but check back in a few months to see if it's a yearly event... we're still tired.

Before I go, I wanted to announce that we will have the recordings of each talk available for purchase on our store website (www.Store.BeeCulture.com). I am writing this on November 7, and so far I have five recordings done out of 15 total recordings. Unfortunately, based on our previous knowledge of technology and programs, software limitations and various other reasons, I am the only



Jerry specifically requested jelly donuts when we were planning all of the food!

one who can work on these. While I do that, I am also doing the rest of my job, so it's a very slow process. We also had a surprise technical issue (because what good event happens without one), we almost didn't have our microphone system. That being said, it was up and running but not at top quality. Our amazing IT person was able to get it up about two days before we started. But the day of, we noticed a slight buzz in the background and when he went to fix it, the microphone system broke again for about 10 minutes so we collectively chose that a microphone with a small buzz was better than no microphone at all. With this detail explained, the buzz was more apparent in the recordings than we originally anticipated. It's not the worst thing in the world, but some of our speakers are soft-spoken people. We want to offer the absolute best product possible, so I am going through and editing everything, and at the same time, I am transcribing and subtitling each talk. Because of this, the recordings are taking significantly longer to finish and upload than we had originally thought. We will have them up on our store as soon as all the recordings are ready. Please be patient with us with the timing of this because as of now, I cannot guarantee or even estimate a date. We will make sure to let you know on our social media pages, in our daily email Catch the Buzz and in the magazine as soon as they are all ready! Until then, we hope you join us at our next event! 🐝

- A Recap

To see more images, please visit www.BeeCulture.com!



Speaker Tammy Horn Potter giving a demonstration on how to use a tree branch to catch a swarm.



The speakers on Friday, Sept. 30, except for Director Pelanda.



Every speaker from Saturday, Oct. 1 and Nina who spoke on Friday morning. She helped answer a question from the audience.

Almost every seat was filled! A fantastic turnout!



BUILD A MECHANICAL SPEED CONTROLLER

Ed Simon

A few Falls ago, Ron Stevenson and I were watching some beekeepers use their homemade extractor to process honey 122 frames. It worked extremely well. But an operator needed to hold the variable speed drill they were using to power the extractor at a constant speed. Even with breaks and switching operators, this was extremely difficult and unbelievably tiring.

Two weeks later, we decided to solve their problem and relieve the operator of this tiring task by motorizing the extractor. Before we could tackle motorizing the extractor, we needed to develop a device for the variable speed drill that would allow the operator to set and hold a constant speed. The Mechanical Speed Controller is the result of this decision.

Note: The drill used for this article and the subsequent extractor motorization is a ½" – zero to 600 RPM variable speed drill.

Parts – Speed Controller

1. 1 ¼" x 4" – Controller U-bolt (1)
2. Sliding plate – U-bolt plate (1)
3. Welded guide nut (2) (larger thread diameter than the adjusting bolt)
4. Fixed plate – U-bolt plate (1)
5. Fixed plate welded nut (2) – Same size as the speed adjusting bolt
6. Fixed plate nut (2)
7. Fixed plate lock washer (2)
8. Fixed plate nylon lock nut
9. ¼" x 3" – Speed adjusting bolt (1)
10. Speed adjusting bolt nylon lock nut (1)
11. Wing nut (11)

drill handle at the drill's trigger location.

Note: U-bolts come with a matching U-bolt plate and two nuts. But an additional plate and two nuts of the same size for this assembly to be used for the second plate.

Step 2 – Add guide nuts to the sliding plate (part 2).

Note: The welded guide nuts (part 3) must have a larger inside diameter than the diameter of the speed adjusting bolt (part 9).

Destroy the threads of the guide nuts and the end ¾" of the speed adjusting bolt. This is so the speed adjusting bolt will not catch on the threads as it is turned. Then weld these guide nuts to the center of the sliding plate.

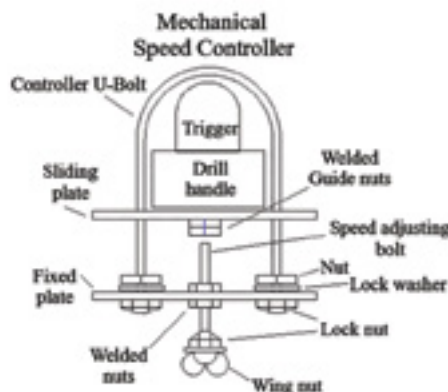
Step 3 – Assemble the speed adjusting bolt (part 9).

Add the wing nut (part 11) and the lock nut (part 10) to the speed adjusting bolt.

Step 4 – Add the welded nuts (part 5) to the fixed plate (part 4).

Drill a hole larger than the diameter of the speed adjusting bolt (part 9) in the center of the fixed plate. Then weld these nuts to each side of the fixed brace over the hole.

Hint: Tack the nut(s) in place and test the speed adjusting bolt for smooth operation. When satisfied, finish welding them in place.



Note: The nuts welded to the sliding plate are not attached to the adjusting bolt. They are used to keep the adjusting bolt from slipping on the sliding plate.

Problem

The variable speed trigger on the drill worked great except the trigger could only be locked at the maximum speed. This was unacceptable, it would tear the frames apart at the high speed. What was needed was a way to use the available drill trigger to start at zero RPM (revolutions per minute) and slowly increase the speed until the desired RPM is achieved. Then the device needs to keep the RPM consistent at this operator selected speed.

Note: The parts sizes listed are for the controller described in this article. You may need to adjust these sizes to accommodate your drill.

Construction

After selecting the controller U-bolt, additional parts are added and the device is ready to be attached to your variable speed drill.

Note: It is assumed that you are currently using or have a variable speed drill that satisfies you for the use in your application.

Warning: Perform a test run before permanently welding anything in place to be sure the device will work as expected.

Step 1 – Select a controller U-bolt (part 1).

Select a U-bolt for the controller that slides very snugly over your



Step 5 – Assemble the speed controller.

Add the adjusting bolt to the fixed plate. Then, add the sliding plate and the fixed plate assembly to the U-bolt. Use fixed nuts (part 6) and lock washers (part 7) and the nylon lock nuts (part 8) to keep the fixed plate (part 4) in position.

Checkpoint

The speed adjusting bolt should fit into the guide nuts and be able to move the sliding plate by turning the adjusting bolt.

Step 6 – Add the speed controller to your drill.

Install the controller over the drill’s handle and trigger. Use the speed controller to vary the speed of the drill. You should be able to vary the speed from zero to maximum revolutions for the drill. If the speed controller moves on the drill handle, you may need to add tape or any other material around it to hold it in place.



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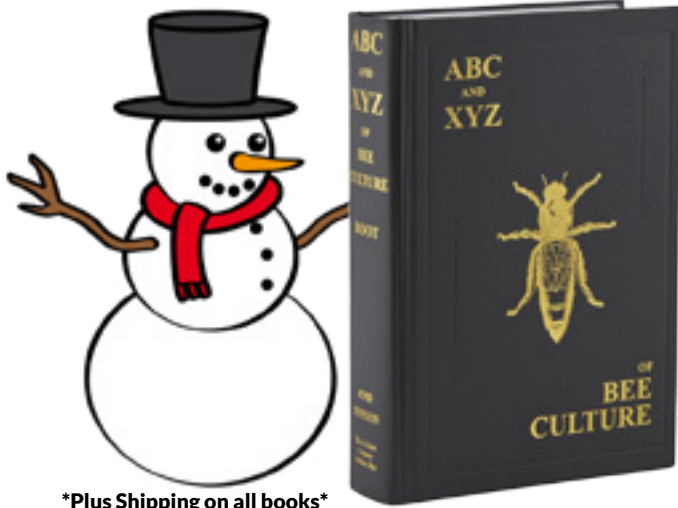
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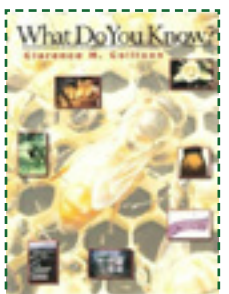


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Stuck on Trees

Alyssum Flowers

While some of us are inside with cold or freezing temperatures outside, honey bee colonies are very busy trying to keep the queen and the center of the cluster a toasty 93°F. Hopefully they have sufficient stores of honey and bee bread to maintain the energy required to keep the queen and 10-20,000 bees alive for the Winter. Winter preparedness begins in August by keeping *varroa* mite levels low and the health of the colony high, providing supplemental feed if necessary for the new bees to be “fat” and healthy, and providing Winter protection if necessary. Allowing bees to “help” themselves by storing propolis is part of the solution.

Propolis has been found to be highly beneficial in to honey bee colonies as it has antimicrobial properties. Feral colonies found in trees or walls of buildings are wrapped in what is called a “propolis envelope”. The inside “walls” and ceiling of the tree void (or building wall void) is varnished with a thick layer of propolis which provides waterproofing as well as a barrier from pathogens and prevents the wood from further decay. Only the area underneath the colony where dead bees and debris accumulate has none. Here, mold may be seen growing on the discarded residue.

Propolis is comprised of plant resins collected by honey bees from trees and other plants combined with wax and other substances secreted by the bee. Just as pollen differs in each plant species, the chemical composition of the resins vary as well, so that the propolis contains a complexity of both volatile and non-volatile plant compounds. Resins are used by the plants as a

Resin from plant on hind legs of honey bees.
<https://beelab.umn.edu/propolis>



defense against pathogens and insects which may attack it. Healthy plants produce resins with better defense compounds than stressed plants. These plant compounds are then used by the bees to defend the colony from multiple pests and pathogens.

The resins can be excreted as sap at wound sites or on the stem, branches or leaf axils. It is also found on axillary buds, leaf bracts, stipules or the base of fruit or flowers of different plants. Soybeans and peonies are some of the favorite sources of this precious liquid.

Resin dripping from a cherry tree.
<https://epod.usra.edu/blog/2022/06/the-resin-of-the-cherry-tree.html>



The key tree families sought after for the resin include Pines, *Populus spp.* (poplar, aspen, cottonwood), *Prunus spp.* (apples, peach, cherry, rose, etc.), *Acacia spp.* (Wattles – in Australia and hot climates), birch (*Betula spp.*), alder (*Alnus spp.*), horse chestnut (*Aesculus hippocastanum*), elm (*Ulmus spp.*), ash (*Fraxinus spp.*), oak (*Quercus spp.*) and beech (*Fagus spp.*). European horse chestnut (*Aesculus hippocastanum*) and willows are also documented but bees will find resins in plants wherever they are available. Evergreens are also common sources of resin.

Not only is the propolis used for its antimicrobial benefits, but it is valued as a glue and caulking compound to seal cracks and crevices in the colony to protect it from drafts and invaders. Beekeepers can testify that it seals frames and boxes tightly and can be very difficult to “unstick” if the hives are not opened frequently. At warmer temperatures, the propolis is soft and gooey like taffy and becomes a sticky mess on hive tools and gloves, while it is hard and brittle when cold. Bees will also use propolis to encase animals that enter the hive that are too big to remove. Mice and snakes are common victims to be entombed in propolis, preventing them from decaying since that would introduce bacteria into the colony.

Propolis has been used in human medicine for centuries, probably since honey bees were first used by ancient Egyptians. It is eaten directly out of the hive or frozen and broken into pieces then made into tinctures, salves and ointments to be used on wounds. It is also taken orally for improved health and to fight infections. It can be purchased in toothpaste or in pill form as well. A great deal of research has been done and continues to determine health benefits to humans as well as the honey



Propolis on edge of hive box.
<https://entomologytoday.org/2018/11/28/propolis-how-beekeepers-encourage-better-hive-health/>

bee colony. Recent research is investigating if honey bees consume the propolis themselves for protection against disease. The bottom line is that trees are not just valued for pollen and nectar, they are also a vital source of other products to maintain colony health. 🐝

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At What Cost?

Jeremy Barnes

The visit of Karl von Frisch and his wife, Margarete, to the United States for two months in 1949 as guests of a number of Ivy League schools, proved to be a journey of mutual admiration. Karl gave a series of talks, including his discovery of the language of the bee dances, and he was by all accounts a superb speaker. He in turn, was impressed by America's abundance, especially in the light of the dark backdrop of post-war recovery in Austria and Germany, and the sense of progress and optimism exuded by the people. According to his biographer, Tania Munz, writing in *The Dancing Bees*, Karl saw a washing machine for the first time, and "a machine that could be filled in the evening with ground coffee and water and then set to begin brewing early in the morning. When the coffee finished dripping into the carafe the device doubled as an alarm clock and woke its lucky owners to the smell of fresh coffee."

Certainly there was a prevailing sense in America that scientific advances had not only won the war against the Axis powers and Japan, but were improving exponentially the daily lives of its citizens. With few exceptions, that optimism suppressed any thought of the risks and costs that came with such advances, and when concerns were expressed, many industries mobilized aggressively, and often dishonestly, to counter them.

I offer three stories as evidence, the first of which is that of DDT. Developed in 1939 and initially used during World War II to clear malaria-causing insects from South Pacific islands for American soldiers, DDT was effective in that it killed hundreds of different types of insects rather than targeting only one or two. In 1948, the Nobel Prize in Physiology or Medicine was awarded to a Swiss scientist, Paul Müller, "for his discovery of the high efficiency of DDT as a contact poison against several arthropods."

Meanwhile Rachel Carson, a former marine biologist with the U.S. Fish and Wildlife Service, received a letter from a friend who was concerned about the numbers of birds dying on Cape Cod as a result of DDT spraying. When her investigative

articles were rejected by a number of magazines, she spent four years writing the book that would become *Silent Spring*, detailing the process by which DDT entered the food chain and led to cancer and genetic damage. She ended with an appeal for further study before making any decisions with potential environmental impacts.

The book was first published 50 years ago and serialized in *The New Yorker* in 1962, initiating calls from readers for governmental action. In response, the pesticide manufacturing companies devoted three million dollars (in today's money) to discredit Carson, an attack spearhead by E. Bruce Harrison, who will feature in the third story. An attempt to sue the publisher to stop publication of the book failed. One executive for the American Cyanamid Company complained that "if man were to faithfully follow the teachings of Miss Carson, we would return to the Dark Ages, and the insects and diseases and vermin would once again inherit the earth." Monsanto produced a parody of *Silent Spring* titled "A Desolate Year," claiming that disease and famine would run amok in a world where pesticides had been banned. In a 1963 editorial entitled "The Myth of the 'Pesticide Menace'", published in *The Saturday Evening Post*, a former science editor, Edwin Diamond, raised rhetorical questions such as why "an industrialist or a scientist... would poison our food and water — the same food and water he himself eats and drinks?"

Many of the attacks, we now know, came from biostitutes — scientists who were rewarded handsomely by the chemical companies to write occasional articles casting doubt on Rachel herself and her work. Her integrity and her sanity were questioned; she was called 'radical, unscientific, disloyal and hysterical.' In *Time*, for example, her argument was called 'unfair, one-sided and hysterically overemphatic,' and it was claimed she had a 'mystical attachment to the balance of nature.' Some even questioned why she, an unmarried woman, would be concerned about genetics! The campaign against the book had an unintended effect: sales had reached one million by the time she died.

Eminent scientists rose to her defense and President Kennedy ordered the President's Science Advisory Committee to examine the issue, leading to Carson's eventual vindication. In 1980, President Carter posthumously awarded her the Presidential Medal of Freedom.

Sadly, in 1961 she had been diagnosed with malignant breast cancer which had metastasized and which she kept a secret, knowing that the companies would use it against her. Rachel died in 1964 without seeing the fruits of her actions. In 1970, the Environmental Protection Agency was formed and two years later DDT was banned. And the dialogue had shifted; the question was no longer *if* pesticides were dangerous, but rather, which ones.

In *Silent Spring*, Rachel had described how DDT remained in the environment even after rainfall, a claim confirmed by a PSU research team that confirmed the presence of DDT in our soils almost 40 years after it had been banned. In 2007, samples collected from honey bee colonies affected by CCD showed 87 different pesticides found in the wax. The average was nine pesticides per sample and they ranged across the chemical spectrum of every category and type. In August of this year at EAS in Ithaca, NY, Scott McArt mentioned that 17 insecticides and 10 pesticides were found in the apple blossoms of New York orchards, 20 in California almond orchards and 35 in New England's blueberry fields. And, he added, there is a synergy between fungicides and pesticides — the former interfere with the detoxification process as enzymes in the bee gut break down the toxins.

Rachel Carson's research and her fears were well founded.

Second story. In 2011, a report on CBS confirmed public suspicions that for fifty years tobacco companies had known that cigarette smoke contained cancer-causing particles. This places the industry's initial awareness at the same time as Rachel was writing *Silent Spring*. The CBS report focused on a study published in the September 27, 2011 issue of *Nicotine & Tobacco Research*, in which UCLA researchers had examined dozens of internal tobacco industry documents

Karl von Frisch



made public after a 1998 court case. “They knew that the cigarette smoke was radioactive (as early as 1959) and that it could potentially result in cancer, and they deliberately kept that information under wraps,” wrote the study’s author Dr. Hrayr S. Karagueuzian, professor of cardiology at UCLA’s cardiovascular research laboratory. “We show here that the industry used misleading statements to obfuscate the hazard of ionizing alpha particles to the lungs of smokers and, more importantly, banned any and all publication on tobacco smoke radioactivity.”

The radioactive particle in question – polonium-210 – is found in

all commercially available cigarettes and inhaled directly into a smoker’s lungs. An independent study by the UCLA researchers found the radioactive particles could cause between 120 and 140 deaths for every 1,000 smokers over a 25-year period. “We used to think that only the chemicals in the cigarettes were causing lung cancer,” Karagueuzian said, but the research suggested these radioactive particles were targeting “hot spots” in the lungs to cause cancer.

Their study outlined how the tobacco industry was also concerned by polonium-210 and went so far as to study the potential lung damage from radiation exposure. The indus-

try could have removed this radiation through techniques discovered decades previously but chose not to, on the grounds partly that they would be “costly and dangerous for the environment,” but mainly, according to Karagueuzian, that the tobacco industry was concerned such techniques would make the absorption of nicotine by the brain more difficult, depriving smokers of the addictive nicotine.

Indeed David Sutton, a spokesperson for Philip Morris, confirmed on *ABC News* that the public health community had known about this particle for some time, justifying it on the grounds that “...polonium-210 is a naturally occurring element found in the air, soil and water and therefore can be found in plants, including tobacco.” The FDA was not convinced – the resultant *Family Smoking Prevention and Tobacco Control Act* gave it the power to remove harmful substances, with the exception of nicotine, from tobacco. It’s an old lawyer’s mantra that when losing the argument, attack the person. When Bruce Harrison labeled Rachel Carson as ‘radical, unscientific, disloyal and hysterical,’ what was he saying? That it was radical to put the health and well-being of the soil, water, air and all life ahead of a company’s bottom line? That her methods were unscientific because they conflicted with the results of company-employed scientists who were being well paid to promote the welfare of the industry? That she was disloyal because she was incorruptible and refused to bend to industrial pressure? And she was hysterical because she was a woman!

It is comforting to know that the ultimate victory was for science and public health in the face of corporate profits, but the damage that was done in the meantime, both to the environment and to individuals worldwide, is incalculable. Nor, as the tobacco story shows, did the chemical industry learn any kind of ethical lesson from this experience.

Third story. Thirty years ago, E. Bruce Harrison, widely acknowledged as the father of environmental Public Relation, addressed a room full of business leaders in Washington, DC. At stake was a large contract with the Global Climate Coalition (GCC) which represented the oil, coal, auto, utilities, steel and rail industries; the

pitch was for a communications partner who could persuade the public that global warming, as it was then labeled, was not a significant issue, even though these respective industries had done enough of their homework to know that climate change was real and escalating.

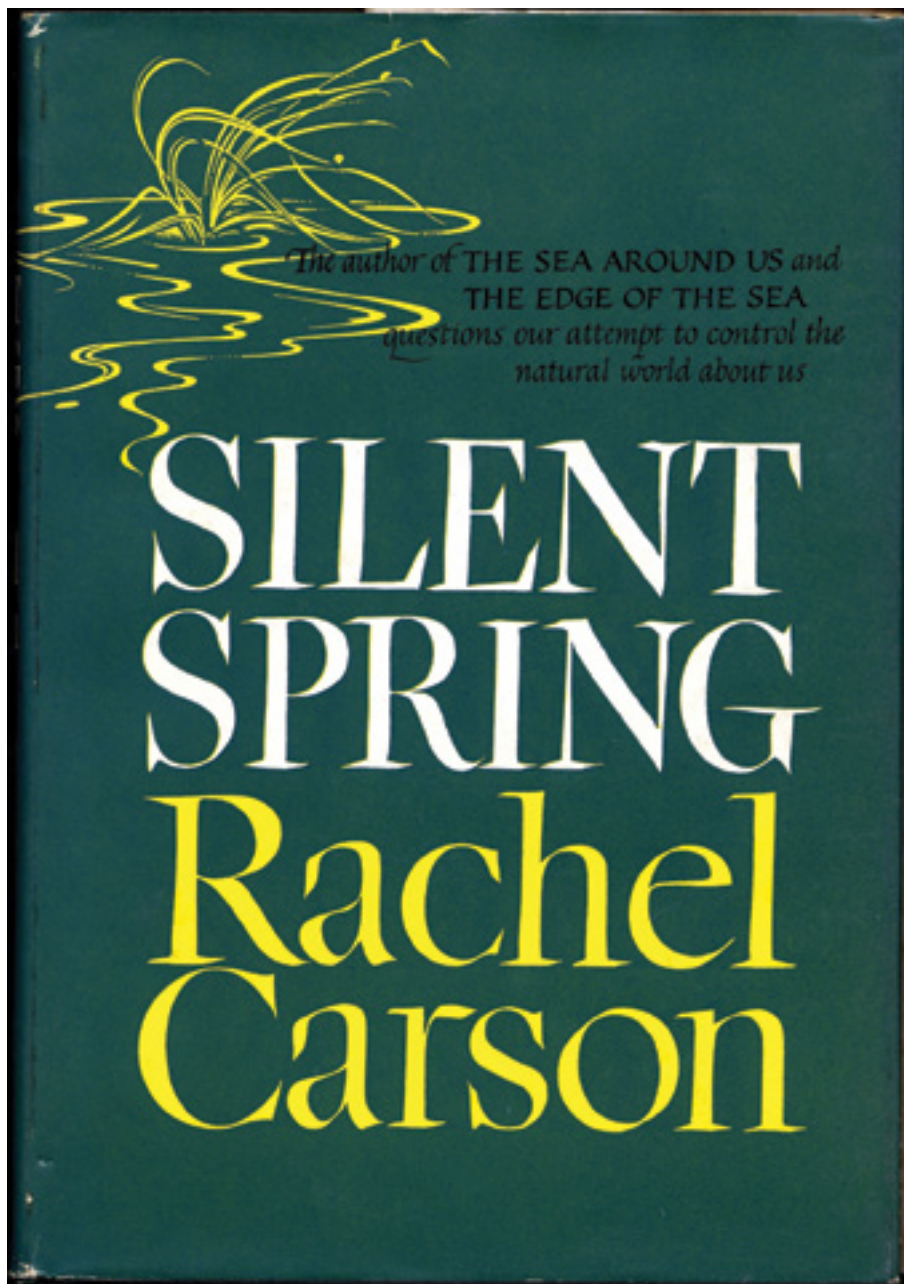
The GCC had been formed in 1989 as a forum for members to exchange information and to lobby policy makers against actions to limit fossil fuel emissions. Initially, it saw little cause for alarm – President George H.W. Bush was a former oilman and his message on climate was the same as that of the GCC: there would be no mandatory fossil fuel reductions.

But that changed in 1992. First, in June, at the Earth Summit in Rio de Janeiro, the international community created a framework for climate action. Secondly, in November, the presidential election brought environmentalist Al Gore to the White House as vice president. Clearly the new administration would attempt to regulate fossil fuels and the Coalition, recognizing that it needed strategic PR communications, put out a bid for a public relations contractor.

The details of that 1992 meeting are revealed in a three part documentary titled *Big Oil v the World*. Drawing on thousands of recently revealed documents, it was first shown on *Front Line* on April 22nd, 2022 – Earth Day.

Sixty years earlier, not only had Harrison spearheaded the attack on Rachel Carson's *Silent Spring* but his PR company, founded in 1973, had discredited research on the toxicity of pesticides on behalf of the chemical industry and on the effects of smoking on human health on behalf of the tobacco companies.

Harrison reminded his new team that he had taken the lead in opposing tougher emissions standards for car makers by reframing the issue. The same tactics would help beat climate regulation – persuade the public that the scientific facts were not settled and that policy makers needed to consider how action on climate change would, in the GCC's view, negatively impact American jobs, trade and prices. The strategy of fear-based misinformation was implemented through an extensive media campaign, everything from placing quotes and pitching opin-



ion pieces to direct contacts with journalists. "A lot of reporters were assigned to write stories," one of the team members later explained, "and they were struggling with the complexity of the issue. So I would write backgrounders so reporters could read them and get up to speed." And the press provided a willing platform. One of those assigned to write 'counter perspectives that were not in the mainstream' later said, "Journalists were actually actively looking for the contrarians. It was really feeding an appetite that was already there."

Within a year, Harrison's firm claimed to have secured more than 500 specific mentions in the media. The 'scientific uncertainty' caused some in Congress to pause on advo-

cating new initiatives, and one of the environmental activists later wrote, "What the geniuses of the PR firms who work for these big fossil fuel companies know is that truth has nothing to do with who wins the argument. If you say something enough times, people will begin to believe it."

In 1995, Harrison wrote that the "GCC has successfully turned the tide on press coverage of global climate change science, effectively countering the eco-catastrophe message and asserting the lack of scientific consensus on global warming." Thus was laid the groundwork for the biggest campaign to date – opposing international efforts at Kyoto, Japan, in 1997, to negotiate emissions reductions. There was a consensus

among scientists that human-caused warming was now detectable but 44% of U.S. respondents to a Gallup poll believed scientists were divided. With the political arena poisoned by public antipathy, Congress never implemented the Kyoto Accords. It was a major victory for the industry coalition.

In the same year, Harrison sold his firm and the GCC began to disintegrate as some members grew uncomfortable with its hard line. But the tactics, the playbook and the message of doubt were now embedded and would outlive their creators. Three decades on, the consequences are all around us. According to Al Gore, "it is the moral equivalent of a war crime. It is, in many ways, the most serious crime of the post-World War II era, anywhere in the world."

How different would our world be today if we had addressed the issue openly and impartially at the outset?

If there is one statement that most typifies the opposing horns of this dilemma it is that from an executive of the American Cyanamid Company: "If man were to faithfully follow the teachings of Miss Carson, we would return to the Dark Ages, and the insects and diseases and vermin would once again inherit the earth." The implication is that Rachel Carson's moderate, well-researched appeal for further study before making any decisions with potential environmental impacts was radical, irresponsible and doom-laden. Her suggestion that exercising reasonable caution with chemicals, that putting first the health and well-being of humanity and of our natural resources, would reinstate 'the Dark Ages,' is insulting to all those who have been damaged by their indiscriminate use. Yet, this is the power of the

profit motive, this is the impact of short term quarterly performances to satisfy shareholder expectations in the absence of long term rewards. The indifference of many to our fellow creatures on this earth, human and otherwise, as well as what we will do for money, is shameful, even knowing that the truth will out eventually. As Dave Goulson writes in *Silent Earth*, with three million tons of pesticides going into the global environment every year, some of which are thousands of times more toxic to insects than any that existed in 1962, "(Rachel Carson) would weep to see how much worse it has become."

Nor do we often see abusive corporations and industries held accountable, even as there are exceptions such as judicial rulings against some of the tobacco giants (a large sum levied against the companies) including Juul e-cigarettes in September, and glyphosate manufacturers (large sums in favor of individual law suits). The amounts might have been reduced on appeal but they were not overturned.

These contemptuous behaviors are significant for beekeepers, not only because of their impact on our charges but also because a honey bee community offers a stark contrast of environmentally responsible behavior. Everything in the colony is motivated by the survival of the super-organism in as strong and as healthy a form as possible, and it utilizes the surrounding resources in ways that not only facilitates healthy reproduction but in such a manner that not so much as a leaf is harmed.

And what of the two men featured in this essay? Karl von Frisch was professor of Zoology at the University of Munich when Hitler came to power in 1933. In an effort to purge

government of Jews 'and other undesirables', and based on an abuse of science, the Nazi government required all civil servants to provide proof of their Aryan descent. In 1940, and after months of searching, the Nazi office for genealogical research found that his maternal grandmother had been of Jewish descent, even though her parents had converted to Catholicism three years before she was born, presumably to secure a better future for their family in a society that was primarily Christian. Von Frisch, a practicing Christian all of his life, was a declared 'a Quarter Jew' because Nazi 'science' was based exclusively on blood, no matter how distant, rather than on cultural heritage or religious belief, no matter how genuine.

The personal threats and trials he faced during the Second World War make for depressing reading, and he continued his research only because he convinced his connections in the Nazi hierarchy that his research on honey bees was vital for the agricultural effort needed to support the front line troops. When he visited the U.S. in 1949, he was welcomed by most as one of the 'good' Germans (again, a term from the times), one whose life had been devoted to science in its most pure and thorough form. As he said in one of his Ivy League lectures, "A bee's life is like a magic well: the more you draw from it, the more it fills with water."

And E. Bruce Harrison, who died last year, aged 88, and whose life was devoted to denying scientific authenticity? In 2003, a sub-genus of mosquito was named *Bruceharrisonius*. Anyone who has been locked in a small dark room with a mosquito knows just how irritating such a small critter can be. 🐝

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BEEKEEPING IN THE UNITED STATES

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Why this book?

Why trot this book out of retirement? Each December, *Bee Culture* typically features various current honey bee keepers and related scientific and educational staff. I usually choose to tell the *Bee Culture* readers about beekeeping figures who are no longer with us or are retired from working in our apicultural field, but who at one time, were prominent figures in our industry.

I don't know why I began doing this, but it's probably because I am now, myself, a senior citizen beekeeper. I can look backward as easily as I can look forward. During my career, I have had the honor of knowing and working with many, many beekeeping authorities who are no longer with us. About once a year, I say to you readers that "*We are standing on their beekeeping shoulders,*" and most of you do not even know who "*they*" were. The authors of the chapters in this book were some of those supporting bee people.

was an idea for the time. It is a *Who's Who* of Agricultural Research Service Researchers of that period. These authors were noted researchers, teachers and frequent speakers at meetings and conventions. They were the "*in-crowd*" of beekeeping research and information distribution.

This readable book was written before tracheal mites, *varroa* mites, Africanized honey bees, small hive beetles, neonic insecticides and Colony Collapse Disorder. At best, there were only simple computers and telephones available.

The book authoritatively captures U.S. Beekeeping just before our industry began the "*Big Transition.*" After the time of this book, everything changed – including the ARS's research direction. All things beekeeping had to change to keep up with the unfolding honey bee management world.

Abstract of Beekeeping in the United States

Martin, E. C., E. Oertel, N.P. Nye, and others. 1980. *Beekeeping in the United States*. U.S. Department of Agriculture, Agriculture Handbook No. 335 (revised) 193 p., illustrated. <https://archive.org/details/Beekeeping.in.the.United.StatesD7>

(Circa 1980) *In the United States about 200,000 people keep almost five million colonies of honey bees and produce 200 million to 250 million pounds of honey annually. Beekeepers derive income from the sale of honey, renting of colonies for crop pollination, production and sale of queen bees and packaged bees, and to a minor extent, from the sale of beeswax, pollen, bee venom, propolis and royal jelly.*

This handbook provides readers with a better understanding of beekeeping in the United States. Some of the topics discussed are the life history of the honey bee; bee behavior; breeding and genetics of the honey bee; queens, packaged bees and nuclei; managing colonies for high honey yield and crop pollination; diseases



Listen along here!

and pests of honey bees; and effects of pesticides on honey bee mortality. This handbook also lists beekeeping organizations and some statistics on bees and honey.

Some modern-day beekeeping numbers

Today, in the United States there are anywhere from 115,000 to 125,000 beekeepers. According to the USDA reports, 2.71 million honey-producing colonies in 2020 generated 148 million pounds of raw honey. According to the National Honey Board, per capita consumption of honey in the United States is approximately 1.51 pounds per year¹.

A typical Jim Tew disclaimer

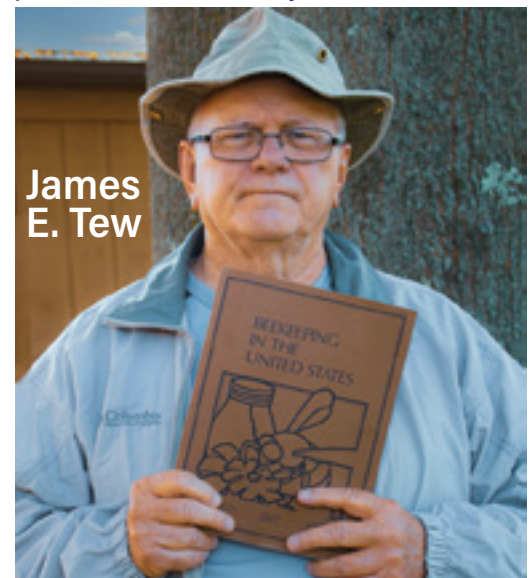
Bee Culture readers, my comments here are not a historical review of the USDA Agricultural Research Service's honey bee program. Neither are my comments here intended to rank or highlight one individual above (or below) another. There are too many respected people who contributed to this book for me to research and review each one. My

¹<https://www.agmrc.org/commodities-products/livestock/bees-profile#:~:text=In%20the%20United%20States%20there,million%20pounds%20of%20raw%20honey.>



Figure 1. *Beekeeping in the United States*, Agricultural Handbook Number 335

So, why this book and not some other? It is a quiet classic. Printed copies are still common, but importantly, it is digitized and is available just using simple archival searches. I have provided a URL in the next section. I don't know whose idea it was to put this text together, but it



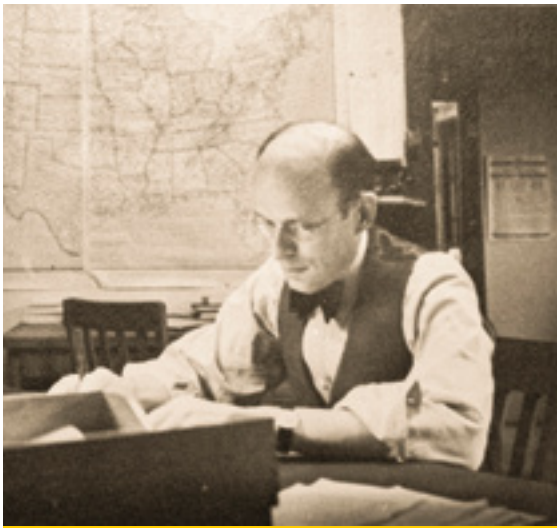


Figure 2. Dr. Everett Oertel, circa 1942 Baton Rouge, LA

comments here are personal and are only selected memories of my interactions with some of these notable individuals. As it were, “*This is my story.*”

E.C. Martin

Dr. E.C. (Bert) Martin spent most of his career in Michigan at Michigan State University. Later, he served as Staff Scientist, National Program Staff, Science and Education Administration. He was a researcher, copious writer and teacher. At the time of the publication of “*Beekeeping in the United States,*” (1980) he had already retired. Yet, his contributions appear throughout this publication that I am reviewing. My limited memory of him was as a quiet, pensive man. Yet, he had a profound effect on my personal career.

In 1977, as a young graduate student at the University of Maryland, while being mentored by Dr. Dewey Caron, Dr. Martin notified me that a position in a *Commercial Beekeeping* training program was about to open at The Ohio State University in Wooster, Ohio. I immediately contacted OSU and began the process of applying.

Upon being interviewed, the OSU review committee wanted to know how I learned of the job opening *before it had been posted.* I confessed the “heads up” that Dr. Martin sent me. I was awarded the job and went on to work for the Department of Entomology, at Ohio State for about the next thirty-four years. To this day, I feel like my early application submission impressed the search committee as much as my academic credentials. Thank you, Dr. Martin.

Everett Oertel

Born in 1897, Dr. Oertel was older than my beloved grandfather. At the Bee Lab in Baton Rouge, I only knew him as a doddering old man, who came to the lab every day and reflected on nearly anything. He spent nearly all his career at the Baton Rouge Bee Lab.

During World War I, he served with the United States 32nd Division in the American Expeditionary Forces in France. He was awarded the French Croix de Guerre with silver star, Presidential Citation and the Purple Heart.

I didn’t know any of this. To

me, he seemed to have become the national de facto beekeeping historian – probably due to his age – but I know that in his earlier life, he was a productive honey bee researcher particularly in honey bee metamorphosis.

Even in old age, he was alert and involved in conversational beekeeping. He was committed to all things honey bees. In retirement, he played a significant role in compiling this text. He has been gone since 1988, yet here I sit, reading his contributions to beekeeping in this book. Thank you Dr. Oertel.

S.E. McGregor

In my defense, I met Dr. McGregor on multiple occasions and sat in on several of his presentations, but apparently, I never snapped a photo. I offer the included photos that I found on the internet.

While I do not know details, as a young man in the mid-1970s, I was aware that Dr. McGregor was working on a tome that would list major crop plants and give specifics about each plant, including pollination requirements. It took him years to compile the necessary information and diagrams.

At long last and after many delays, the seminal text was released in 1976. It did not disappoint. *Insect Pollination of Cultivated Crop Plants*, as a basic information source, is still alive and fundamentally useful today. The updated version can be found online at the citation listed elsewhere in this article². Additionally, the book is readily available in printed format at bee supply outlets. So, how are these

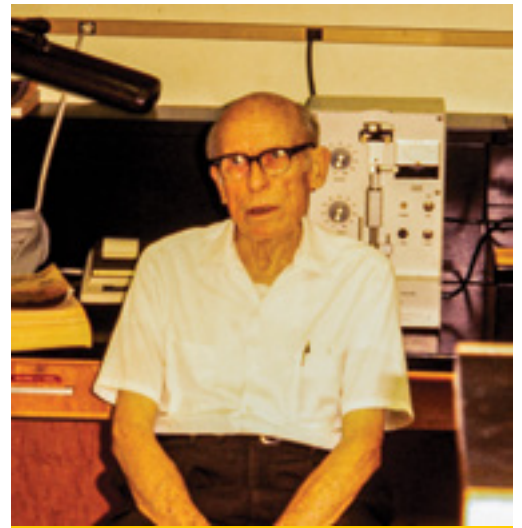



Figure 3. Dr. Everett Oertel as I knew him in the 1980s.



Figure 4. Dr. S.E. McGregor, as a young man, circa mid-1940s



Figure 5. Dr. McGregor as I knew him.

 ²McGregor, S.E. *Insect Pollination of Cultivated Crop Plants.* <https://www.ars.usda.gov/arsuserfiles/20220500/onlinepollinationhandbook.pdf>

two books related? An abbreviated version of this book was presented as a chapter entitled *Pollination of Crops in Beekeeping in the United States*.

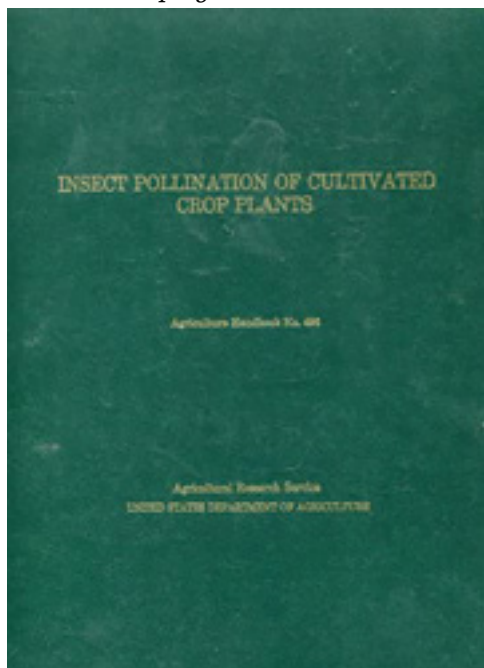


Figure 6. A rare hardcopy of Dr. McGregor's pollination book

J.W. White, Jr.

Jonathan W. White, Jr. has the distinction of being the last honey chemist for the U.S. beekeeping industry. He was a prolific researcher and chemist. Dr. White was born on September 29, 1916 and passed away on September 2, 2001. A native of State College, Pennsylvania, and a Pennsylvania State University alumnus, he is recognized for his outstanding contributions to apiculture and honey research during his sixty-year career³.

³Jonathan W. White, Jr. <https://aspace.libraries.psu.edu/repositories/3/resources/10387>



Figure 7. Jonathan W. White Jr., circa 1958

Go to the web, and key in his name. There will be abundant listings presented on all aspects of honey chemistry and honey handling. In virtual format, his reputation lives on, but today, few latter-day beekeepers know of his contributions.

His co-authored chapter with Landis W. Doner in *Beekeeping in the United States*, entitled *Honey Composition and Properties* continues to be foundational information concerning honey chemistry, quality and food value.

H. Shimanuki

What can I say? Dr. Hachiro Shimanuki was a walking, living library of beekeeping information. He knew the general beekeeping literature better than anyone I have ever known. He sat on my review committee at the University of Maryland and was a part of my professional life for many years. Without his permission, I would like to write that he was a significant mentor in my academic life. I have not seen him in many years, but I appreciate all he did for the U.S. beekeeping industry (and for me).

In the book I am reviewing, his chapter was on *Diseases and Pests of the Honey Bee*. Even in its current outdated format, his information is relevant today. For many years, he was the Lab Leader at the USDA ARS Honey Bee Laboratory at Beltsville, Maryland. If he was not directly involved in a particular study, he was frequently a co-author. A list of his USDA published works is posted at:

<https://www.researchgate.net/scientific-contributions/H-Shimanuki-45223384>



For decades, Dr. Shimanuki, and the lab for which he was leader, was the “go-to” source for any pathological and pest-related bee questions. He attended hundreds of meetings across the world. He was there for the tracheal mite establishment, the *varroa* invasion and the migration of Africanized honey bees. He was an obvious choice for authoring this disease and pest chapter in the USDA's general beekeeping book.

Thomas E. Rinderer

Tom Rinderer was the lab leader at the Bee Breeding and Bee Stock Research Center at Baton Rouge. For clarity, this was the same facility where Dr. Oertel, whom I reviewed already, also worked. Dr. John Harbo and so many others also performed research at that facility. Advances in honey bee queen instrumental insemination and breeding were common study topics.

Dr. Rinderer, from this lab, was pivotal in Africanized honey bee (AHB) studies as the U.S. beekeeping industry prepared for the arrival of the AHB. Before my time at Ohio State, Dr. Rinderer was a student of Dr. Walter Rothenbuhler at The Ohio State University where he began developing his honey bee genetic skills.

The chapter that Dr. Rinderer and Dr. Harbo submitted in *Beekeeping in the United States* is still educational and fundamental today. For those just beginning in beekeeping genetic studies, this simple, readable format, that describes complex breeding strategies, would be a perfect place to start. For example, Russian bee stocks are used in the U.S. industry today due, in part, to Dr. Rinderer's efforts to select and introduce the stock into this country.

I hate this...

I hate doing this, but I must stop and I must stop well before many other contributors to our knowledge wealth are acknowledged. They're in the book. Have a look. Their contributions were as significant as those whom I have selected to discuss.

Figure 8. Drs. Tom Rinderer and “Shim” Shimanuki (mid-1990s) at the Beltsville Bee Lab in Beltsville, Maryland



Why this book?

I end where I started. Why review this old book? Because it is a time capsule of the “pre-*varroa*” way of U.S. beekeeping. Each chapter was written by an authority of the day. It was comprehensive having unusual chapters on topics like *Moving Bee Hives* or *Showing Honey at Fairs*. It has lists of nectar and pollen producing plants. It’s a good all-around text.

After 1980, it was never updated. I suppose too many things had changed. The internet was growing. Other organizations were forming. Bee life moved on, but this book, still available to you, remains the same, locked in time. It is not a “how to” book and oddly, it has no index, but it presented some of the best information of the day by some of the best authorities of the time. I like this forty-two-year-old book. Thank you for letting me remember these people and their contributions. 🐝

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The Ohio State University
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Co-Host, Honey Bee
Obscura Podcast
www.honeybeeobscura.com



Honey Caramel Corn

a.k.a. Fay's Fiddle Faddle

Fay Jarrett

Ingredients

- 1 cup honey
- 1 cup unsalted butter
- 1 cup dark brown sugar (gives a darker color)
- ½ teaspoon salt
- 1 teaspoon vanilla (I use Mexican vanilla for a stronger flavor)
- ½ teaspoon baking soda
- 8 quarts puffed hollis (I prefer Snyder's brand)

Directions

Step 1

Melt butter in a large sauce pan.

Step 2

Stir in brown sugar, honey and salt.

Step 3

Reduce heat to medium (low boil) for five minutes.

Step 4

Remove from stove.

Step 5

Add baking soda and vanilla. Mixture will get very puffy.

Step 6

Place puffed corn in a large baking pan or roaster.

Step 7

Pour caramel mixture over the puffed corn and stir together.

Step 8

Bake in oven at 250°F for one hour. Stir every 15 minutes.

Step 9

Cool on cookie sheets with wax paper.

Step 10

Once cooled, store in airtight containers.



Note:

This recipe can be doubled. Makes great gifts for the Holidays! Enjoy!

CALENDAR

◆EVERYWHERE◆

Have a happy holiday season! We have no calendar updates to share with you. If you are interested in putting your next association meeting, beginner class, bee conference or whatever it is you are holding in our calendar, contact Emma@BeeCulture.com and we would be happy to put your event in here and our online calendar. And don't worry, it's FREE!



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<i>Bee Culture</i> Christmas Collections 80	Mann Lake Back Cover	Sullivan’s Queens 69
<i>Bee Culture Magazine</i> 73, 94	Maxant Industries 27	Superior Bee..... 49
Bee Smart Designs..... 87	Miller Bee Supply..... 54	Tauzer Apiaries..... 68
Beekeeping Insurance Services ... 12	Mother Lode Products..... 50	UMT Master Program..... 64
Beeline Apiaries 50	NOD – Advertorial..... 22	Vita Europe - Apistan 6
Betterbee – Lyson 61	Old Sol Apiaries 69	Vita Europe - B402/Certan..... 3
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Blue Sky Bee Supply Inside Back Cover	OxaVap..... 64	Winters Apiaries 15
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C. F. Koehnen & Sons..... 39	Project Apis m..... 69	
Complete Bee – Global Patties..... 64	Propolis etc..... 29	
Complete Bee – Nozevit 68		
Cowen Manufacturing..... 61		
Dadant – Kits..... 7		
Dadant – Smoker 18		
Dakota Guinness..... 72		
Draper’s Bee Pollen..... 49		

Image Contest - Holiday Hives

We’ve started an image gallery! This month, we want to see any and all pictures you have of **Holiday Hives**. Please make sure that your image is nice and big! We may pick your image for the gallery, or you have the chance to get on the cover! So get creative.

Try out lights around your hives. Throw some stockings up. Maybe you find a turkey checking out your hives. We want to see all the holidays from Thanksgiving to New Years. And if you’re lucky, you may be the featured cover for next year’s December issue!

How To Submit:

Email your images to Emma@BeeCulture.com

Use the subject “**Image Gallery**”

Please include in your email:

- The image as an attachment (we will not consider it if it is embedded)
- Your First and Last name
- Your mailing address
- Your renewal code (if you know it)

If your image is chosen:

For the Gallery:

You will get three months added to your current subscription.

For the Cover:

You will get twelve months added to your current subscription.

At 6 o'clock this morning on our way fishing, Paul was all lit up. When he tried to pick up a 28-hive bee yard bound for the California almonds, at a location where he's kept bees for 40 years, the new landowner told him the bees belonged to her. She said they were included in her land purchase. Then she told him to clear out, or she'd have him arrested. Now, with the sheriff and the brand inspector involved, a key party remains to be found – the previous owner – before this mess can get resolved and the little darlings returned to their rightful owner.

Here in western Colorado it's customary to give the landowner honey in exchange for an apiary location. This agreement is sealed with the sacred bond of a handshake. That's the way we do it. When one of my landowners suggested that her attorney draw up an agreement, I demurred, insisting that her word and mine ought to suffice. After hearing Paul's story, maybe I should have taken her up on her offer!

Beekeeping is all about timing. Wait until October to treat for *Varroa* mites, and you'll likely lose some colonies. This season, I spent a lot of time and effort persuading bees to make lovely cut-comb honey. They plugged a bunch of supers. But I left that honey on the hives too long, and when I harvested it in October, half of it was gone. The bees had dragged it down into the brood chamber, or eaten it.

I knew better. What was I thinking? But this was a lesson I won't soon forget. Failure is the greatest teacher.

Taxes are all about timing, too, and I know better. I got a little behind. You can be up to three years late filing, and if the IRS owes you money, they'll pay it with no penalties and even pay you interest. But if you slip even one day beyond three years in arrears, they keep your refund. I learned this the hard way.

Last week, I spent the better part of three days preparing my 2019 return. I'd misplaced some important documents, like my Social Security income statement and my earnings statement from *Bee Culture*. Then I pulled an all-nighter, in order to meet a deadline. It was like being back in college, with a term paper due the next day.

I did learn some interesting things in the wee hours, like the per diem rate for meals at the Apimondia bee conference in Montreal. I got to calculate my qualified business income deduction. It's actually pretty simple, even though the government does its best to make it complicated. An unanticipated shocker came when I ran across a receipt for 30 bee hives I sold to Paul in 2019. I owed him some money. He deducted it from his payment but misplaced a decimal point, so that he deducted only 10 percent of what I owed. Three years later I caught the error, and now I get to make it right.

By now you're probably wondering why I don't hire an accountant, and sleep easy. In the middle of the night I was thinking the same thing. I finished at 3:30 a.m., satisfied to learn that I was entitled to a nice refund.

I have no idea how my brain works. I awakened with a start at 6:30 with the realization that I'd omitted some bee earnings from my return. Why would that pop into my head now, with my taxes just completed? So on very short sleep, I re-worked all my numbers, including that convoluted formula for determining the taxable portion of my Social Security income.

I probably made some calculation mistakes, which the IRS will surely point out to me. But hey, got 'er done!

Five weeks ago I discovered a colony with a 100-mite count in a 300-bee sugar shake sample. There was no brood. I assumed the queen had shut down for the Winter. Other than having way too many mites, it appeared to be a thriving colony. Because two thirds of the mites in a colony with brood are hidden inside the capped brood and don't get counted, a 33-mite count in a colony with brood is about the same infestation level as a 100-mite count in a broodless hive, where the mites have no place to hide.

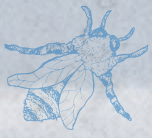
The experts will tell you that my colony was doomed, from mite-vectoring viruses. I take that with a grain of salt. I've saved many a colony with brood and a 30-mite count. You treat, you cross your fingers, you say a little prayer. I gave this one four Apivar amitraz strips.

Today, five weeks after I put in those Apivar strips, I opened this hive and did a follow-up mite test. The count was six. Not bad! Only problem was that 90 percent of the bees were gone, and the survivors had curly-wing virus. This time the experts were right.

I mailed my 2019 taxes on deadline day, just before the post office closed at noon. Praise all the saints! It was only later that it hit me: 2019 taxes are due in 2020, so my three-years-late doomsday date for forfeiting my refund was October 15, 2023, not October 15, 2022. I didn't have to stay up all night after all. This was a miscalculation on my part but also great news! It means I'm closing the gap. Knock out 2020 and 2021, and I'm all caught up. 🙌

Not sure what to get that hard-to-please favorite beekeeper on your Christmas list? *A Beekeeper's Life – Tales from the Bottom Board*, is an attractive paperback collection of the best of Ed Colby's *Bee Culture* columns, with photos. Signed copies are available from the author at Coloradobees1@gmail.com.

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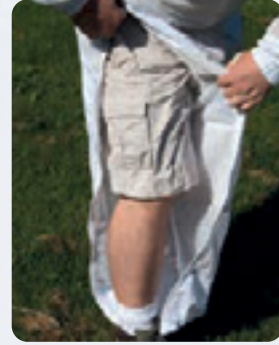
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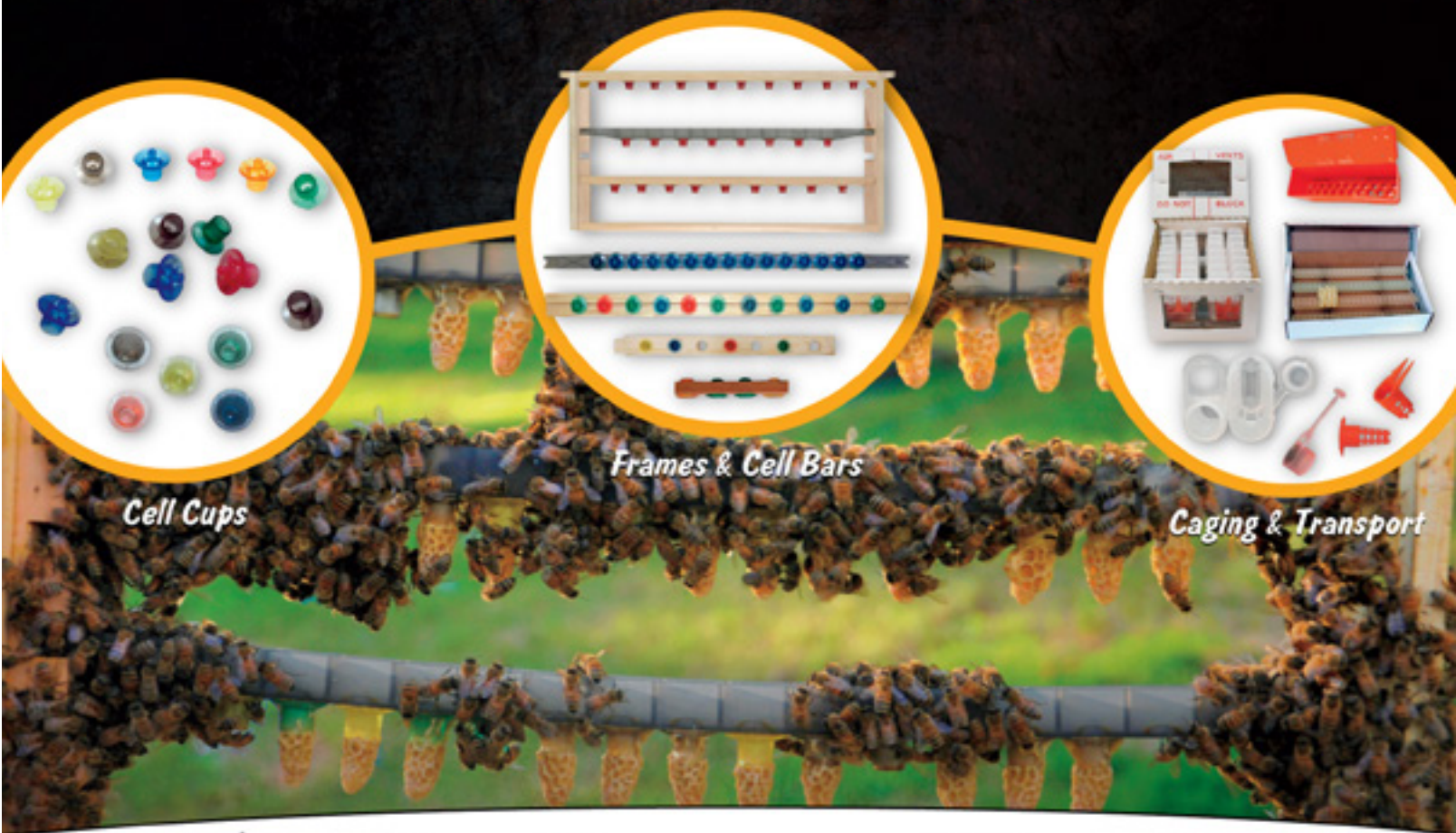
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