MRS. SUSAN HALL ROOT

JAN 2024

Catch The Buzz™

Bee Culture®

The Magazine Of American Beekeeping

www.BeeCulture.com

UC Davis – The Early Days

Extracting High Quality Propolis

What Beekeeping Taught Me in 2023

ROOT PUBLICATIONS

$4.99

ACORN™
BEEKEEPING EQUIPMENT

Ready Now For The 2024 Bee Season!

The New Standard of Excellence in Plastic Frames and Foundations

Call Today!
877-255-6078
www.acornbee.com

Acorn One Piece Plastic Frames

- Flatter, Stiffer, Sturdier
- Redesigned Mega Strong Ears Last Forever!
- 9-1/8" and 6-1/4" Sizes

Plastic Snap-in Foundations

- Fit well in 9-1/8" and 6-1/4" Wood Frames
- Optional Breakaway Communication Hole

Drone Combs

- Integrated Pest Management (IPM)
- Varroa mite control
- Queen Breeding
- 9-1/8" 6-1/4" Sizes

wendi.hafner@acornbee.com
626-602-6403
walter.hafner@acorneng.com
626-336-4561 ext. 4843
13818 Oaks Ave. Chino, Ca 91710

MORE BROOD! - MORE BEES! - MORE HONEY!

EXCELLENT BEE ACCEPTANCE!

Call Acorn Bee Today!
877-255-6078

VISA MasterCard PROUDLY Made in USA

Pierco
Genuine Beekeeping Equipment

Genuine Pierco
Manufactured in-house

FOR ALL YOUR BEEKEEPING NEEDS

CHECK OUT

www.Pierco.com

AgriSea Bee Nutrition

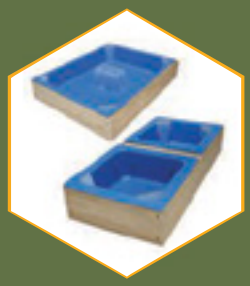
- Essential Amino Acid Profiles
- Individual Bee Mass (weight) Improved
- Reduction of Nosema
- No Residues in Honey
- Nutrients Sustaining Cell Metabolism

Pierco Genuine Beekeeping Equipment

Exclusive Supplier of AgriSea

MITE CONTROL

TOP FEEDERS



EXTRACTION

BEEKEEPING KITS

IN-HIVE FEEDERS

PROTECTIVE WEAR

WE OFFER DOUBLE & TRIPLE WAX

Frames - Plastic

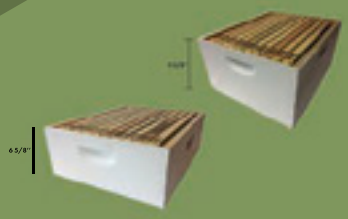
- Super Strong & Durable
- Safe - FDA food grade plastic
- Easy to use - No Assembly Required

Frames - Wood

- Stronger than Industry Standard
- New 1/2" thick end bars - 3/4" top bars
- Assembled, Glued, and Stapled

Snap-in Foundations

- Impervious to wax moths, rodents, and hive beetles
- Preferred by Professional Beekeepers
- Precision molded, perfect cells
- Easy to use - Snaps into wood frames



Commercial Grade Boxes

- Honey Supers & Hive Bodies
- Added Strength 1 - 5/8" Top Joint
- Honey Supers & Hive Bodies
- Added Strength 1 - 5/8" Top Joint

FREE SHIPPING *See website for details

Table of

January Bee Culture...

4 **Mailbox**

6 **Next Month**

7 **Honey Prices**

10 **Found in Translation**
An Interview with Dr. Hongmei Li-Byarlay
Jay Evans

12 **Convention Highlights**
CSBA 2023
John Miller

16 **A Closer Look**
Dietary Micronutrients
Clarence Collison

21 **Something**
Always Something
Stephen Bishop

22 **Getting Started**
In Beekeeping
David MacFawn

28 **The Story of a Very Young Beekeeper and Her Mother**
Meet Elizabeth and Rachel Downs
Dan O'Hanlon

30 **Bees and Women**
Mrs. Susan Hall Root
Nina Bagley

38 **Minding Your Bees and Cues**
Black Box Mysteries
Becky Masterman & Bridget Mendel

40 **The Early Days**
Bee Research and Extension Programs at University of California, Davis
The UC Davis Series
Elina Niño

46 **Bee Vet**
New Beginnings
Dr. Tracy Farone

52 **Off the Wahl Beekeeping**
A Swarm Vacuum
New(ish) Beekeeper Column
Richard Wahl

Cover Photo by Nina Bagley

800.289.7668
Executive Publisher – Brad Root
Associate Publisher, Senior Editor – Jerry Hayes, Jerry@BeeCulture.com, Ext. 3214
Layout and Design – Emma Wadel, Emma@BeeCulture.com, Ext. 3220
Advertising and Customer Service – Jennifer Manis, Jen@BeeCulture.com, Ext. 3216

Contributors
Clarence Collison • James E. Tew • Kim Lehman • John Miller • Ed Colby
Jay Evans • Ross Conrad • Tracy Farone • Bridget Mendel • Becky Masterman

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

Subscription Information
U.S., one year print, $34; two years print, $62; one year digital, $24; one year print and digital bundle, $44; two years print and digital bundle, $70. All other countries, (U.S. Currency only), one year print, $74; two years print, $148; one year digital, $24; one year print and digital bundle, $79; two years print and digital bundle, $158. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), January 2024, Volume 152, Issue 1, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Subscriptions, Book Orders – www.BeeCulture.com • info@BeeCulture.com

Advertising – 800.289.7668, Ext. 3216; Jen@BeeCulture.com

Contents

58 **For the Love of Bees**
Some of the ways backyard beekeepers benefit commercial operations and vice-versa
Ross Conrad

62 **Honey Production**
And Races of Honey Bees in Six Countries
Pablo Montesinos Arraiz

68 **What Beekeeping Taught Me In 2023**
Best Lesson Learned So Far
David Burns

72 **Leading a 4-H Beekeeping Project**
Get the whole family involved
Ettamarie Peterson

76 **Sensory Analysis**
A Method to Taste & Evaluate Honey
C. Marina Marchese

78 **The Giant Honey Bees of the Himalayas**
A Peek into their Fascinating Life
Manish Koirala

80 **2024 Almond Pollination Outlook**
Economic Outlook and Other Considerations
Brittney Goodrich

84 **Extracting High Quality Propolis**
An Innovative Approach
Dvykaliuk Roman

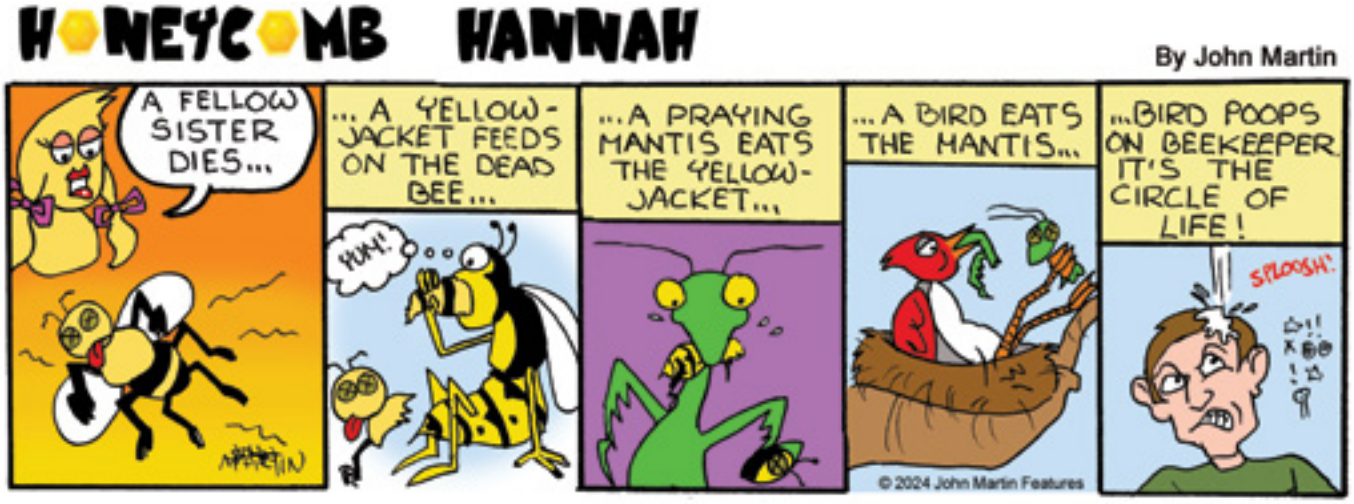
88 **A Conversation with Kim Flottum, Part 2**
Retired, Longtime Bee Culture Magazine *Editor*
James Tew

92 **Honey Recipe**
Honey-Graham Fruit Pizza
The National Honey Board

94 **Calendar and Classifieds**

95 **Index and Image Contest**
Holiday Hives

96 **Bottom Board**
A Belated Apology
Ed Colby



Bee Culture®
623 West Liberty St.
Medina, OH 44256
mailbox@beeculture.com

Improvement

This is primarily to Jerry. I'm sure you don't remember me but as you had just assumed the editor's job I emailed with a complaint about the magazine and the trouble I was having even to the point of dropping my subscription. Well, I just have to say I don't know what you have done but this magazine has been completely energized. You and your team have done a magnificent job of putting this on an amazing turnaround. I am not able to think of the words to express my gratitude. Job well done and please express my appreciation to Emma and Jennifer. Thank you all. I'm sure you have put in work that we don't know about.

Sincerely,
A Northern Maine beekeeper

October Co-op

The October issue has an error on page 80, under Case Studies of Successful Beekeeping. In the second column it mentions the Philadelphia Bee Co-op, co-founded by Kerry Boyce. I have researched this, being the previous president of the Philadelphia Beekeepers Guild, and consulted with the current president, Davie Harrod. There is no Philadelphia Bee Co-op that either of us is aware of, and a search on Google turns up no Kerry Boyce in Philadelphia. This needs to be corrected.

Respectfully,
Norris Childs

Dear Norris Childs,

I am writing to apologize for an oversight in my recently published article in the October issue of *Bee Culture Magazine*. As my first article, I was excited and eager to share insights and shine a light on urban beekeeping, a subject I hold in high regard.

On page 80, I referenced the Philadelphia Bee Co-op and mentioned Kerry Boyce. Upon further reflection and consultation, I realize there's no record of such a co-op or of Kerry Boyce in relation to beekeeping in Philadelphia.

The enthusiasm of having my first piece published might have gotten the better of me, and I deeply regret any confusion or misrepresentation my error might have caused. My intention was to spread positivity about urban beekeeping, and I genuinely apologize for any unintended misinformation.

Thank you for your understanding and patience. I assure you that I will exercise further diligence in my future writings.

Sincerely,
Michael Groover

NEXT MONTH

FEBRUARY

Region 1
- Assemble frames and boxes in a warm garage
- Add feed if needed
- Clear away snow from entrances
- Check hive weight, grab handhold and tilt up
- What equipment do I have? What needs painting / repairing?
- Put in honey frames if needed on a warm day
- Mite treatment when there is no brood
- Put ear on the outside of the brood box, tap and listen for buzzing

Region 2
- Clean up beeyard
- Check stored food reserves
- Work on equipment for Spring
- Check hive weight, feed if necessary
- Sample for mites, treat, sample again
- On a warm day, take a look at brood frames
- Relax before the season takes off

Region 3
- Check honey stores
- Hive inspection
- Do mite count, treat if needed, count again
- Feed syrup
- Clean and scrape boxes and frames
- Treat for Nosema
- On a warm day, do a hive inspection

Region 4
- Snow, snow, snow. Clear it away from entrances
- Check hive weight
- Nothing. Had them ready in October.
- Feed syrup
- Good time for an Oxalic Acid Dribble
- Read *Bee Culture*
- Place queen order
- Make some inner covers

Region 5
- Check Winter wraps
- Feed if needed
- Mite treatment after alcohol sample
- Remove snow from entrances
- Don't read bee blogs… mostly bad advice
- Read Jay Evans and Bee Vet in *Bee Culture*

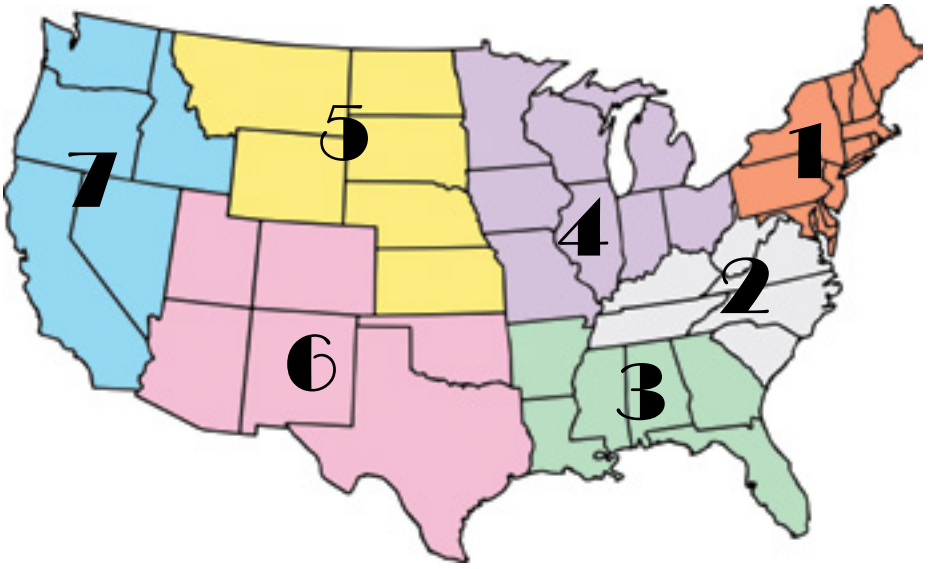
Region 6
- Get snow away from entrances
- Take a quick peek inside on a warm-ish day
- Prep swarm boxes
- Check for feeding
- Clean out dead bees from bottom board
- Check for those mice!

Region 7
- Check hive weight
- Feed if necessary
- Clean equipment and get it ready
- Clean up supers for Spring
- Remove deadouts
- Spring is coming
- Take a break

Honey Reporters Wanted

We are expanding our Honey Reporter population in EVERY region. We ask that you fill in most of the sections, most months, and our short survey at the bottom. We give you a FREE subscription for your service. So if you are interested fill out the form **https://forms.gle/EnZW531NHM7sbMUz8** OR send an email to **Jen@BeeCulture.com** and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.

Scan this to go straight to the form online!



JANUARY – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS										History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**	**Last Month**	**Last Year**
55 Gal. Drum, Light	2.69	3.75	2.73	2.90	3.02	2.28	3.00	2.28-3.75	2.88	2.88	2.95	2.88
55 Gal. Drum, Ambr	2.45	3.25	2.63	3.00	2.80	2.32	2.75	2.15-3.50	2.77	2.77	2.83	2.76
60# Light (retail)	240.65	338.33	232.25	213.00	200.67	236.13	350.00	132.00-290.00	246.68	4.11	255.52	230.62
60# Amber (retail)	234.20	283.00	231.00	231.67	132.00	242.02	237.50	132.00-375.00	239.61	3.99	245.07	227.21
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	96.13	115.20	105.75	94.50	87.36	99.00	-	46.00-144.00	99.18	8.26	102.15	104.95
1# 24/case	170.19	146.00	177.86	145.67	136.96	140.00	144.00	88.92-312.00	160.86	6.70	165.75	157.21
2# 12/case	137.77	142.00	177.33	130.80	173.76	151.50	168.00	90.00-288.00	149.49	6.23	161.44	143.53
12.oz. Plas. 24/cs	143.92	155.10	141.20	105.40	120.88	120.00	120.00	78.00-264.00	132.78	7.38	134.98	117.74
5# 6/case	151.27	240.00	180.00	131.63	143.19	135.00	-	101.95-330.00	156.28	5.21	170.63	160.17
Quarts 12/case	181.67	210.80	180.25	172.67	200.40	231.00	216.00	120.00-276.00	196.06	5.45	195.41	183.86
Pints 12/case	110.25	157.00	107.00	112.67	120.33	121.50	-	72.00-228.00	125.14	6.95	121.76	118.97
RETAIL SHELF PRICES												
1/2#	5.79	7.98	5.92	5.83	5.92	6.00	8.50	3.50-11.00	6.28	12.56	6.35	6.27
12 oz. Plastic	7.56	9.34	8.40	8.80	6.75	8.16	7.00	3.17-20.00	8.23	10.97	7.55	7.38
1# Glass/Plastic	9.80	11.68	11.21	9.17	9.85	10.44	13.00	6.00-16.00	10.50	10.50	10.43	9.98
2# Glass/Plastic	17.08	20.47	19.12	16.15	16.97	16.80	25.67	10.00-32.00	18.40	9.20	17.77	16.78
Pint	10.36	15.13	10.92	12.67	13.37	14.60	12.67	8.00-20.00	12.74	8.50	13.35	12.31
Quart	20.55	25.98	19.57	20.13	22.32	22.75	22.00	11.20-35.00	22.22	7.41	22.41	21.69
5# Glass/Plastic	37.65	42.72	49.25	30.08	38.85	35.00	-	20.00-65.00	37.61	7.52	37.79	36.68
1# Cream	13.12	13.00	13.90	11.80	10.99	15.00	14.00	7.21-21.00	12.98	12.98	11.40	11.62
1# Cut Comb	15.00	17.65	16.00	14.80	13.00	-	5.50	5.50-25.00	15.16	15.16	15.19	14.04
Ross Round	12.88	15.19	-	12.75	15.00	15.00	10.75	5.50-24.00	13.42	17.90	12.55	14.09
Wholesale Wax (Lt)	7.90	7.55	8.55	7.18	7.67	8.00	4.50	4.50-10.00	7.68	-	7.15	8.62
Wholesale Wax (Dk)	5.11	7.70	7.44	5.08	8.00	-	-	2.25-10.00	6.43	-	6.34	7.01
Pollination Fee/Col.	132.14	100.00	77.50	117.50	200.00	-	50.00	50.00-300.00	108.10	-	110.77	100.94
Price of Nucs	197.14	189.17	172.25	181.00	168.00	239.00	198.33	125.00-250.00	188.11	-	187.05	-
Price of Packages	159.13	137.50	115.63	145.00	155.00	185.00	180.00	105.00-215.00	147.30	-	156.33	-

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.

How do you compare to our honey reporters? All data collected is from October/November 2023.

Average Honey Flow Time and Amount per Region

Region 1:
Timing of Flow: Normal
Amount of Flow: Equally light and average

Region 2:
Timing of Flow: Normal
Amount of Flow: Light

Region 3:
Timing of Flow: Normal
Amount of Flow: Equally light and average

Region 4:
Timing of Flow: Normal
Amount of Flow: Average

Region 5:
Timing of Flow: Normal
Amount of Flow: Light

Region 6:
Timing of Flow: Normal
Amount of Flow: Light

Region 7:
Timing of Flow: Late
Amount of Flow: Heavy

Mite Treatment per Region

Region 1: Most used either an Unspecified Oxalic Acid product or an Oxalic Acid Vapor product.
Region 2: Most used no mite treatment due to honey flow.
Region 3: Most used no mite treatment due to honey flow.
Region 4: Most used an Oxalic Acid Vapor product.
Region 5: Not enough data was provided to conclusively decide what most reports used.
Region 6: Most used an Oxalic Acid Vapor product.
Region 7: Most used no mite treatment due to honey flow.

Top Blossoming Plants per Region

Region 1: Aster, Goldenrod, Chrysanthemum
Region 2: Aster, Goldenrod
Region 3: Goldenrod, Aster
Region 4: Aster, Mum
Region 5: Not enough data was provided to conclusively decide what the top blossoming plants were in this region.
Region 6: Aster, Goldenrod, Dandelion
Region 7: Not enough data was provided to conclusively decide what the top blossoming plants were in this region.

Overall Top Blossoming Plants

Goldenrod, Aster, Dandelion, Chrysanthemum, Cosmo, Mum, Sunflower

Bees Love

Global Patties

You will too

Keep your hives strong and healthy with less effort and low cost
Reduce winter loss and see faster spring build-up
Help your bees thrive despite drought and stress from mites and disease

Two North American Factory Locations

Plus depots across the U.S. and Canada to Serve You Best

BAY 2 - 8 East Lake Way NE, Airdrie Alberta T4A 2J3
Phone: 1-403-948-6084 - Fax: 1-403-948-6901

150 Parkmont West, Butte Montana 59701
Ph: 1-406-494-4488 - Fax: 1-406-494-3511

Call Us Toll Free in North America at 1-866-948-6084

We make protein and pollen patties to your specifications
using only fresh, high quality, proven ingredients. Satisfaction guaranteed.

Be sure to visit our website

www.globalpatties.com

For our locations, news, ideas, specials, and much more...

Your bees will thank you

BEEKEEPING INSURANCE SERVICES

APICULTURE INSURANCE PILOT PROGRAM

A Specialized Program for Beekeepers

Available Nationwide

We are Proud Members & Sponsors of:

- American Beekeeping Federation
- American Honey Producers Association
- California State Beekeepers Association
- Florida State Beekeepers Association
- Idaho Honey Industry Association
- Michigan Commercial Beekeepers Association
- Minnesota Honey Producers Association
- Montana State Beekeepers Association
- North Dakota Beekeepers Association
- South Dakota Beekeepers Association
- Tennessee State Beekeepers Association
- Texas Beekeepers Association
- Washington State Beekeepers Association
- Wisconsin Honey Producers Association, Inc.

Kevin Rader: Buzzus@beekeepingins.com

www.beekeepingins.com

Beekeeping Insurance Services A Division of Brown & Brown of Florida Inc.

FOUND IN TRANSLATION

An Interview with Dr. Hongmei Li-Byarlay

Listen along here!

Associate Professor and Project Director for Pollinator Health, Central State University, Ohio

Jay Evans, USDA Beltsville Bee Lab

Where are you from originally?

*I was born in Tianjin, China, and came to the U.S. to study for my Ph.D. in 2002.

How did you get interested in science?

*When I was a sixth-grader, I talked to my uncle and told him that I want to be a scientist! Maybe because I had read so many books on the weird creatures in the deep ocean and stories of UFOs.

Where did you go to school and what did you study?

*I went to Tianjin Normal University for my Bachelor's degree in Biology and Education (dual degree). My senior project was on the effects of metal contamination on bacteria in garlic roots. Then, I went to Nan Kai University for my Master's degree in Zoology. I studied micro-moths in Northern China and discovered four new species.

In 2002, I went to Purdue University in Indiana for my Ph.D. in Entomology and studied genetics and physiology of fruit flies with Dr. Barry Pittendrigh and Larry Murdock. In 2010, I started my postdoc training with Dr. Gene Robinson at the University of Illinois at Urbana-Champaign, studying behavioral genetics of honey bees. In 2013, I studied epigenetics and aging of honey bees with Drs. David Tarpy at NCSU and Olav Rueppell at UNC-Greensboro.

How did you start your career after school?

*In 2017, I got an offer from Central State University as a new Assistant Professor of Entomology. CSU had just gained their new status as a 1890 Land Grant Institution with USDA. I was very excited to start my own lab.

Which hot topics are you studying now?

*I am studying 1) the molecular and physiological mechanisms underlying the social behavior and ageing of honey bees, such as grooming behavior, aggression and foraging behavior, 2) active breeding efforts for selection of mite-resistant bees by selecting mite-biting stocks and 3) landscape ecology of pollinators and flowers.

Where have you traveled in your studies of bees and what was most memorable?

*I have traveled to China, Germany, Canada, Puerto Rico and many different states in the U.S. The most striking memories were observing and doing experiments with *Apis cerana* in China, and my trip to Puerto Rico to see and feel the gentle AHBs in reality. I really enjoyed interacting with all the hives there.

What are the biggest challenges facing beekeepers moving forward?

*The desire to find new solutions for mite management is so high, and there are many new ideas. I just hope we all think of new solutions by integrating the sustainability of our hives and our environment.

What gives you hope? What are the best recent discoveries in bee science?

*The government, bee scientists, beekeepers and non-profit organizations are all working together to find the best ways to help our bees, which showed the most love and funding support from the community.

Three of the most interesting discoveries from our lab are:

1)A new publication on **Single-cell dissection of aggression in honey bee colonies. https://www.nature.com/articles/s41559-023-02090-0**. We are all so excited to use a new sequencing technology to help us to understand bees in a deeper way.

2)Our lab's new pub about RNA methylation and discovery of long non-coding RNAs underlying bee aggression **https://bmcgenomics.biomedcentral.com/articles/10.1186/s12864-023-09411-4**

3)We showed that the mandibles (mouthparts) are different between high mite-biting honey bee workers and current commercial colonies. I am also working on a new manuscript to show the striking comparison of mouthparts between two different species of *Apis,* in hopes this sheds light on mite defenses. **https://doi.org/10.3389/fevo.2021.638308**

Any advice for future scientists?

*Stay curious and ask questions!

What are your hobbies and other interests beyond bees and science?

*I like running, reading with my kids, hiking and camping in national parks, and meditation. BC

CSBA 2023 Convention Highlights

John Miller

California State Beekeepers Association held their 2023 annual meeting in mid-November.

The program was top-notch! The President of Apiary Inspectors of America presented.

Honey Producers and the Federation both presented. Dr. Sammy Ramsey gave a talk *Every Beekeeper in North America* should download from YouTube. Randy Oliver gave an excellent presentation on his many interests and experiments. Randy is a national treasure.

Dr. Brandon Hopkins gave a presentation on nutrition via pollen substitution. Brandon Shannon gave a talk on utilizing adjuvants to improve *Varroa* treatments. Dr. Boris Baer gave a talk on creating a network, a university network to improve bee research. Zac Lamas gave a talk on how/why *Varroa* congregate on drones. Anne Marie Fauvel gave a presentation on Bee Informed Partnership research. Other speakers included Vincent Ricigliano from the Baton Rouge USDA-ARS laboratory, Mel Machado and Josette Lewis from Blue Diamond and Almond Board of California presented an almond industry update.

The program was a superb three-day learning opportunity.

We have questions from the presentations. The idea is: attend a presentation to stimulate questions.

Here are a few.

Brandon Hopkins presented on pollen substitute findings. A given pollen patty can contain different ingredients to achieve different goals. That's remarkable, except most production agriculture long ago adopted custom nutrition practices from apples to zucchini to poultry to fish bait. In five years we should have a menu of nutritional supplements to: enhance brood rearing; or enhance honey production; or improve honey bee longevity; or a pollen patty to stimulate pollen foraging. We are just beginning to understand hive management. There is a big WHY about nutrition and it's as simple as a box of rocks. In humans, and other animals Defective Nutrition = Pathogen Opportunity. A colony of bees experiencing optimal nutrition is more resistant to pathogens.

Dr. Boris Baer of UC Riverside brought his students to the CSBA meeting. Among them, Jessica Webb, who is working on Nosema, which I know we are all tired of hearing about – but Ms. Webb's approach is novel, using previously overlooked materials to control *Nosema ceranae*. Dr. Baer's idea is to stitch together several universities to do collaborative bee research work. This is a good idea.

Consider further that 40% of the bees in California in February are in North Dakota in July. How to continue the sampling of the longitudinal studies that may commence in California but need to be followed throughout the season?

On December 12, 2023, North Dakota State University received testimony from agriculture-related groups on existing positions to fund, or new positions to be considered. North Dakota produces a third of American honey production – but has no bee researcher and no bee research program. Dr. Baer's thinking need not be limited to a single university system, nor a single state. It's time to look beyond state lines.

American migratory beekeeping is the most mobile beekeeping industry on earth. American bee research should also be the most mobile on earth.

We know a lot about the treatment threshold to control *Varroa destructor*. We could do a lot more. For example, even in our own operations, debates can be spirited on WHEN best to treat. I am unaware, outside of a few queen breeders, of year-long, longitudinal *Varroa* sampling. 12 samples taken 12 times annually to document the seasonal population patterns of *Varroa*. Upon assessing five years of data – it will become clear when the optimum *Varroa* treatments are made. I don't know if that data is hiding in plain sight at Bee Informed archives; we may never know. Why did Bee Informed fail? Lack of funding starved it to death. Sad.

We know *Varroa* selects for seven day old drone larvae. Bring me a smell to repel Ms. *Varroa* from my seven day old drone. Many scientists now conclude we can't treat our way out of an out of control *Varroa* infestation. It takes too long; even after controlling the *Varroa*, the echo chamber of viral transmission among colony nest mates is persistent and malignant.

Over the prior decade, beekeepers spent a pile of money researching inert ingredients in tank-mix spray applications during almond bloom. We were conditioned to detest adjuvants. Brandon Shannon, a Ph.D. student at the Ohio State University presented on using adjuvants in

Varroa destructor control materials to enhance the efficacy of the materials. This is an adjustment in the thinking of adjuvants. Use less active ingredient material to achieve a higher level of control – at lower costs. We need better hive-health practices. Kinder, gentler, lethal treatments.

We know the next threat: *Tropilaelaps mercedesae* is on a human-assisted global range expansion. In every country, every *mellifera* hive encountering Tropi has perished. Current treatments are as damaging as infestation. Tropi was originally identified in rats. Tropi was originally classified as a parasite of rats in southeast Asia. There are more rats than beehives in southeast Asia. More rats are in New York City than beehives – in America. Consider: Tropi overwinters in rats instead of brood-free bee colonies. Following Spring, instant infestation!

Humans should refrain from assisting Tropi's total global domination strategy. *Mellifera* has no evolutionary experience with Tropi. Tropi will convulse global beekeeping. Tropi will convulse food security. Readers: *things can fail.* Even as this calamity unfolds, we aren't asking important questions.

Assume Tropi is discovered in the Long Beach, California area. Five-thousand boxes of freight depart Long Beach every day to 48 different state destinations and five-thousand addresses. Customs and border patrol are tasked with inspecting, detecting and protecting our borders. Animal Plant Health Inspection Service is tasked with identifying organisms customs detects. Beekeepers, Apiary Inspectors of America, Honey Bee Health Coalition, certainly N.D. Dept. of Ag & CA Dept. of Food and Agriculture should be in open, transparent Tropi conversations with these agencies. Capricious agency actions, in prior experiences include quarantines, depopulations, restrictions; and sadly lacking, fact-based decision making. Will history repeat? Probably. Will it work? So far, the success rate is zero. *There is no Tropi response plan.* Advantage: Tropi. Loss: Food Security.

If you think pollination fees are high now – wait.

We have beekeeping research challenges. We have funding challenges. We need to know a lot more about a lot of things. We need leadership; young, thoughtful beekeepers engaging with state beekeeping research committees – engaging with Project Apis m. – engaging with the 2023 Congressional Farm Bill. Donating money. We have a lot of work to do telling our story.

'I saw a bee last week; it was fine.' is a public perception. For people who like to eat, that perception will change. BC

Dadant

Beekeeping & Honey Bees - Our Business Since 1863

QUANTITY PRICING AVAILABLE

AP23®

Artificial Pollen 23

WINTER PATTIES

Dadant's winter patties are a multifunctional patty, high in carbohydrates and 3% protein to help keep your colonies strong through the winter months.

Contains: sugar, AP23 and Honey-B-Healthy

- Can be used in winter & early spring in place of candy boards
- Readily accepted by the bees
- Convenient for all beekeepers
- Currently available at your nearest Dadant branch location

★ MADE IN ★ USA

dadant.com

BRANCH LOCATIONS AT THE FOLLOWING:

• 51 S. SECOND STREET, HAMILTON IL 62341 • PHONE (217) 847-3324 • FAX (217) 847-3660 • TOLL FREE 1-888-922-1293 •
• CHICO, CA (877) 332-3268 • FRESNO, CA (877) 432-3268 • PARIS, TX (877) 632-3268 • SIOUX CITY, IA (877) 732-3268 •
• WATERTOWN, WI (877) 232-3268 • ALBION, MI (877) 932-3268 • WILLIAMSPORT, PA (877) 532-3268 •
• CHATHAM, VA (800) 220-8325 • FRANKFORT, KY (888) 932-3268 • HIGH SPRINGS, FL (877) 832-3268 •

MyApiary Manager™

Find hidden value in your data with prebuilt reports

Don't just rely on your gut. Know for certain with MyApiary Manager.

Learn more

Eliminate Paperwork
Our customers save over a day a week not having to chase work sheets

Save a day a week

Create in-depth reports
Turn your hive records into useful information with just a few clicks

Are your staff slacking off?
Achieve higher staff accountability without micro-managing

Constantly losing information
Keep all of your information in one easily accessible place

MyApiary™ SMARTER BEEKEEPING

Visit us at: **MyApiary.com** Call us at: **530 771 6993**
Smarter systems, smarter business, **smarter beekeeping**

A Closer LOOK

Dietary Micronutrients

Clarence Collison

Honey bees take dietary micronutrients (vitamins and minerals) from different natural floral resources and "dirty" turbid water to adequately meet their nutritional requirements. But the role of micronutrients for honey bee health is not well understood (Ricigliano, 2020). A Saudi Arabian study was conducted to determine honey bees' micronutrients preference in Summer and Winter seasons. Also, the impact of micronutrients on foraging behavior and brood increase was studied in different colonies. The results elucidated that honey bees exhibited a strong preference for a salt solution compared to deionized water during the Summer and Winter seasons. However, there was a notable switch in salt preference between seasons. Overall, honey bees showed significantly more foraging activity, more pollen collection and increased brood area after sodium consumption compared to other minerals in the Summer season. Further, pollen collection and brood area were significantly higher after the use of potassium in the Winter season. Thus, the food preference of honey bees is strongly linked with the seasons and the availability of floral resources. These data suggested that honey bees may seek specific nutrients during variation of the seasonal conditions (Khan et al., 2021).

The mineral requirements of honey bees are poorly understood. High amounts of potassium, phosphate and magnesium are required by all other insects, and so presumably are by honey bees as well. Excessive levels of sodium, sodium chloride and calcium have been shown to be toxic to honey bees. Again, all the required minerals can be obtained from pollen, although nectar also contains minerals. Dark honey contains higher levels of minerals. The optimal ash concentration for maximum brood rearing seems to be at 0.5%–1%. Pollen with more than 2% ash inhibits brood production (Huang, 2010).

Honey bees obtain inorganic elements mainly from pollen, and according to Imdorf et al. (1998) bees reared during pollen shortages contain similar quantities of most minerals compared to bees reared during favorable foraging conditions. This suggests other important sources of minerals like nectar and water or the existence of endogenous mineral pools in adults. Brood rearing significantly increased when Herbert and Shimanuki (1978) added 1% of pollen ash to a synthetic diet, but levels exceeding 2% appeared to be disadvantageous. The authors recommended a diet containing 1000 ppm potassium, 500 ppm calcium, 300 ppm magnesium and 50 ppm each of sodium, zinc, manganese, iron and copper for further investigation of the mineral requirements of honey bees (Brodschneider and Crailsheim, 2010).

The object of this study was to determine bee pollen's minerals composition and evaluate the effect of the botanical and geographical origin. The results showed that the predominant elements were K, P and Ca, comprising 42.5%, 31.2% and 15.7%, respectively, of the total mineral content. The analysis of 30 monofloral pollen species showed the effect of botanical origin, recording a large range among the species with the most characteristic being P (1362–9210 mg/kg), K (2684–11604 mg/kg) and Ca (446–4464 mg/kg). Their highest concentrations were found in *Phacelia tanacetifolia, Erica manipuliflora* and *Actinidia chinensis*, respectively. Furthermore, to determine the effect of geographical origin (soil, climate), monofloral pollen samples of *Sinapis arvensis* and *Cistus creticus* collected from different regions were analyzed. The highest ranges were observed in composition of *S. arvensis* and *C. creticus* pollen in K and Ca. The findings of this study prove that bee pollen is a notable source of minerals (Liolios et al., 2019).

Pollen is the bees' main source of micronutrients and includes minerals, vitamins and essential sterols. Pollen sterols are diverse and include, but are not limited to, β-sitosterol, stigmasterol, avenasterol and 24-methylene cholesterol (Vanderplanck et al., 2014; Villette et al., 2015). Micronutrients have received little attention, but there are some analyses of mineral composition (Bonvehi and Jorda, 1997; Day et al., 1990), and pollen is known to be richer in water-soluble vitamins (e.g., B vitamins) than fat-soluble vitamins (Roulston and Cane, 2000). Among the important minerals bees derive from pollen is iron, which accumulates at the periphery of the abdomen, partly as magnetite, with a suspected role in bee navigation (Wang et al., 2013). However, high iron concentration in pollen—for example, from heavily fertilized crops—may induce lipid peroxidation and reduce bee longevity (Jumarie et al., 2017). Secondary metabolites (i.e., toxins, polyphenols, etc.) tend to be present at higher concentrations in pollen than in nectar, but little is known

of their effects on honey bees (London-Shafir et al., 2003). Polyphenols such as the flavonol quercetin are ubiquitous in pollen (Bonvehi and Jorda, 1997; Wright et al., 2018).

Honey usually contains a variety of mineral substances. Ninety five samples of known geographic and botanic origin were analyzed. There were differences between the honeys produced in the different areas only with regard to Fe and Cr content. The concentrations of the other trace elements measured in the present study, Cr, Ni, Cu, Zn, Mn and Fe, were similar to the values found in other recent studies. Variation in trace element content in different honey types is primarily due to botanical origin rather than geographical and environmental exposition of nectar sources (Bogdanov et al., 2007).

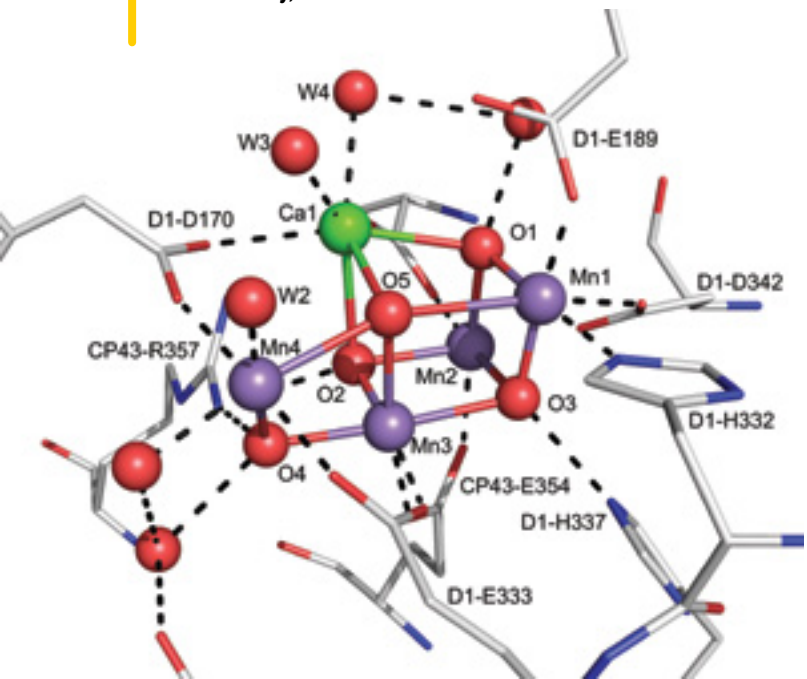
Honey bees prefer foraging at compound-rich, 'dirty', water sources over clean water sources. As a honey bee's main floral diet only contains trace amounts of micronutrients – likely not enough to sustain an entire colony – it was hypothesized that honey bees forage in dirty water for physiologically essential minerals that their floral diet, and thus the colony, may lack. While there are many studies regarding macronutrient requirements of honey bees, few investigate micronutrient needs. For this study, from 2013 to 2015, a series of preference assays were conducted in both Summer and Autumn. During all field seasons, honey bees exhibited a strong preference for sodium in comparison to deionized water. There was, however, a notable switch in preferences for other minerals between seasons. Calcium, magnesium and potassium – three minerals most commonly found in pollen – were preferred in Autumn when pollen was scarce, but were avoided in Summer when pollen was abundant. Thus, as floral resources change in distribution and abundance, honey bees similarly change their water-foraging preferences. Our data suggest that, although they are generalists with relatively few gustatory receptor genes, honey bee foragers are fine-tuned to search for micronutrients. This ability likely helps the foragers in their search for a balanced diet for the colony as a whole (Bonoan et al., 2017).

Honey bees require minerals for a complete diet. However, minerals from flowers can be inadequate in concentration and composition. Therefore, honey bees may drink 'dirty water' from natural sources such as puddles. Some research has attempted to simulate this through honey bee bioassays, but to date, these have tested minerals individually, not as mixtures as would occur in nature. Here, for the first time, we use honey bees in bioassays in which a range of mineral mixtures are presented together in choice experiments. Six minerals (NaCl, KCl, $CaCl_2$, $MgCl_2$, NH_4Cl, and KH_2PO_4) were used in mixtures to simulate different mineral stoichiometries, which may occur in 'dirty water', such as puddles, from which honey bees often drink. Based on the honey bee mineral tolerance ranges from the literature, these mixtures were offered in aqueous solutions at low, medium, high and mixed molar concentrations. Deionized water and sucrose were neutral and positive controls, respectively. Petri dishes were set up in containers in a laboratory. Twenty worker honey bees were placed into each container and observed for drinking behavior for one hour. Honey bees preferred the mixed molar treatment comprising a high Na:K ratio, a medium molarity of NaCl and a low molarity of the other minerals. This novel finding suggests that mixed mineral 'dirty water' should be investigated on a larger scale with multiple hives in the field and highlights the importance of stoichiometrically balanced honey bee diets (Cairns et al., 2021).

Managed honey bee colony losses are attributed to a number of interacting stressors, but many lines of evidence point to malnutrition as a primary factor. Commercial beekeepers have become increasingly reliant on artificial pollen substitute diets to nourish colonies during periods of forage scarcity and to bolster colony size before pollination services. These artificial diets may be deficient in essential macronutrients (proteins, lipids, prebiotic fibers), micronutrients (vitamins, minerals) and antioxidants. Therefore, improving the efficacy of pollen substitutes can be considered vital to modern beekeeping (Ricigliano, 2020).

Pollen substitute (PS) diets used by beekeepers typically contain soy, yeast, egg, wheat or lentils in an effort to provide essential nutrition and sustain colony growth during forage dearth or poor landscape conditions (Standifer, 1980). Soy flour is a common PS ingredient despite containing putative anti-nutritional factors, such as protease inhibitors (Sagili et al., 2005) and toxic sugars (Barker, 1977). Early PS formulations failed to match the nutritional efficacy of pollen and had low palatability (Standifer et al., 1973), whereas current commercial PS's have not been robustly tested. The development of novel PS's for honey bees should aim to reproduce the nutrition profile and functional characteristics of pollen in a sustainable formulation (Ricigliano, 2020).

Algae may be collected by bees to supplement macronutrition and micronutrition, although this has not been demonstrated beyond anecdotal observations that bees will interact with algae at turbid water sources. Nevertheless, microalgae represent a valuable source of vitamins (tocopherols, ascorbic acid, B vitamins) and minerals (sodium, potassium, calcium and magnesium) (Fabregas and Herrero, 1990). Microalgae are prolific sources of plant-based nutrition with many species exhibiting biochemical profiles that are comparable to natural pollen. This emerging feed source has been employed in a variety of organisms, including limited applications in honey bees. The phytochemical profile of microalgae closely resembles pollen, making it an attractive feed source to supplement honey bee nutrition. Similar to current PS's employed by



beekeepers, microalgae patties can be applied inside bee hives, above the brood nest (Ricigliano, 2020).

Nicohols and Ricigliano (2020) reviewed the literature and concluded that algae biomass appears to be suitable for use as a bee feed additive and as a source of health-stimulating natural products. BC

References

Barker, R.J. 1977. Some carbohydrates found in pollen and pollen substitutes are toxic to honey bees. J. Nutr. 107: 1859-1862.

Bogdanov, S., M. Haldimann, W. Luginbühl, and P. Gallmann 2007. Minerals in honey: environmental, geographical and botanical aspects. J. Apic. Res. 46: 269-275.

Bonoan, R.E., T.M. Tai, M. T. Rodriguez, L. Feller, S.R. Daddario, R.A Czaja, L.D. O'Connor, G. Burruss and P.T. Starks 2017. Seasonality of salt foraging in honey bees (*Apis mellifera*). Ecol. Entomol. 42: 195-201.

Bonvehi, J.S. and R.E. Jorda 1997. Nutrient composition and microbiological quality of honey bee-collected pollen in Spain. J. Agric. Food Chem. 45: 725-732.

Brodschneider, R. and K. Crailsheim 2010. Nutrition and health in honey bees. Apidologie 41: 278-294.

Cairns, S.M., S.D. Wratten, M. Filipiak, E.R. Veronesi, D.J. Saville and M.W. Shields 2021. Ratios rather than concentrations of nutritionally important elements may shape honey bee preferences for 'dirty water.' Ecol. Entomol. 46: 1236-1240.

Day, S., R. Beyer, A. Mercer and S. Ogden 1990. The nutrient composition of honey bee-collected pollen in Otago, New Zealand. J. Apic. Res. 29: 138-146.

Fabregas, J. and C. Herrero 1990. Vitamin content of four marine microalgae. Potential use as source of vitamins in nutrition. J. Indust. Microbiol. 5: 259-263.

Herbert, E.W. and H. Shimanuki 1978. Mineral requirements for brood-rearing by honey bees fed a synthetic diet. J. Apic. Res. 17: 118-122.

Huang, Z. 2010. Honey bee nutrition. Am. Bee J. 150: 773-776.

Imdorf, A., M. Rickli, V. Kilchenmann, S. Bogdanov, and H. Wille 1998. Nitrogen and mineral constituents of honey bee worker brood during pollen shortage. Apidologie 29: 315-325.

Jumarie, C., P. Aras, and M. Boily 2017. Mixtures of herbicides and metals affect the redox system of honey bees. Chemosphere 168: 163-170.

Khan, K.A., H.A. Ghramh, Z. Ahmad, M.A.A. El-Niweiri and M.E.A. Mohammed 2021. Honey bee (*Apis mellifera*) preference towards micronutrients and their impact on honey bee colonies. Saudi J. Biol. Sci. 28: 3362-3366.

Liolios, V., C. Tananaki, A. Papaioannou, D. Kanelis, M.-A. Rodopoulou and N. Argena 2019. Mineral content in monofloral bee pollen: investigation of the effect of the botanical and geographical origin. J. Food Measurement and Characterization. 13: 1674-1682.

London-Shafir, I., S. Shafir and D. Eisikowitch 2003. Amygdalin in almond nectar and pollen—facts and possible roles. Plant Syst. Evol. 238: 87-95

Nichols, B.J. and V.A. Ricigliano 2022. Uses and benefits of algae as a nutritional supplement for honey bees. Front. Sustain. Food Syst. 6:1005058. **Doi: 10.3389/fsufs. 2022. 1005058**

Ricigliano, V.A. 2020. Microalgae as a promising and sustainable nutrition source for managed honey bees. Arch. Insect Biochem. Physiol. 104: e21658.

Roulston, T.H. and J.H. Cane 2000. Pollen nutritional content and digestibility for animals. Plant Syst. Evol. 222: 187-209.

Sagili, R.R., T. Pankiw and K. Zhu-Salzman 2005. Effects of soybean trypsin inhibitor on hypopharyngeal gland protein content, total midgut protease activity and survival of the honey bee (*Apis mellifera* L.). J. Insect Physiol. 51: 953-957.

Standifer, L.N. 1980. Honey bee nutrition and supplemental feeding. In: Beekeeping In The United States, USDA ARS Handbook 335, pp, 39-45.

Standifer, L.N., M.H. Haydak, J.P. Mills and M.D. Levin 1973. Influence of pollen in artificial diets on food consumption and brood production in honey bee colonies. Am. Bee J. 113: 94-95.

Vanderplanck, M., R. Moerman, P. Rasmont, G. Lognay, B. Wathelet et al. 2014. How does pollen chemistry impact development and feeding behaviour of polylactic bees? PLOS ONE 9:e86209

Villette, C., A. Berna, V. Compagnon and H. Schaller 2015. Plant sterol diversity in pollen from angiosperms. Lipids 50:749-760.

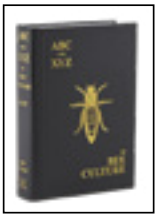
Wang, T-H, C-H Jian, Y-K Hsieh, F-N Wang, and C-F Wang 2013. Spatial distributions of inorganic elements in honey bees (*Apis mellifera* L.) and possible relationships to dietary habits and surrounding environmental pollutants. J. Agric. Food Chem. 61: 5009-5015.

Wright, G.A., S.W. Nicolson and S. Shafir 2018. Nutritional physiology and ecology of honey bees. Annu. Rev. Entomol. 63: 327-344.

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

Bee Culture®
The Magazine of American Beekeeping

Booklist 2024



ABC AND XYZ OF BEE CULTURE

SKU: X5-42 **$74.99**

42nd Edition of ABC & XYZ of Bee Culture Since 1877 Leading the Way to Successful Beekeeping. Over 800 pages packed with information. Hundreds of color photos and illustrations . A mix of reference, the how and why things are done and a history of how beekeeping got where it is today! A MUST for every beekeeper.

IN BUSINESS WITH BEES

Kim Flottum **$26.00**

SKU: X223

This book takes serious beekeepers past the beginning stages and learning curves and offers practical, useful advice to move your passion into a part-time or full-time career with measurable results. This **beekeeping business how-to guide** offers all of the in-depth advice you need, in one place.

AN EYEWITNESS ACCOUNT OF EARLY AMERICAN BEEKEEPING: THE AUTOBIOGRAPHY OF A.I. ROOT

SKU: X1 **$10.00**

Explore the birth of Modern Beekeeping from the perspective of Amos Ives Root. Beekeeping, Beekeepers, and a Profound Religious Conviction are all engaged. The first of many things we still do today!

FIRST TIME BEEKEEPING

Kim Flottum **$20.00**

SKU: X230

This absolute beginner's guide for first-time beekeepers will teach you how to set up and care for your first colonies, from choosing a location for your new bee colonies through natural bee care and harvesting beehive products.

THE NEW STARTING RIGHT WITH BEES

Kim Flottum & Kathy Summers **$10.00**

SKU: X84

This book's primary intent is a learning tool for beginning beekeepers, but it is an exceptional source of information for anyone interested in the fascinating world of honey bees.

QUEEN REARING ESSENTIALS

Lawrence John Connor **$22.00**

SKU: X177

In this post-Varroa, post-Colony Collapse Syndrome era, beekeepers everywhere are developing localized, mite-resistant bee stocks. Key to this is their ability to raise queen cells and queens.

WORK I KNEW I MUST

Tammy Horn Potter **$20.00**

SKU: X228

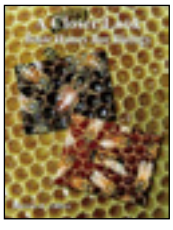
Jane Cole's "Reminiscence of Forty-One Years of Factory Life" and selections from A.I. Root's "An Eyewitness Account of Early American Beekeeping."

WHAT DO YOU KNOW?

Clarence H. Collison **$25.00**

SKU: X2

A comprehensive study guide for every beekeeper, at any level. Test yourself to see what you already know, and what you need to know. Everything you've ever wanted to know about Honey Bees, Beekeeping, Beekeepers and the world they inhabit.



A CLOSER LOOK - BASIC HONEY BEE BIOLOGY

Clarence H. Collison **$15.00**

SKU: X219

Collison has collected much relevant biology in one place, updating our knowledge of what makes bees so interesting and distinctive organisms. Suitable for master beekeeper programs, college-level courses and general knowledge beekeeping.

NATURAL BEEKEEPING

Ross Conrad **$35.00**

SKU: X220

Whether you are a novice looking to get started with bees, an experienced apiculturist looking for ideas to develop an integrated pest-management approach, or someone who wants to sell honey at a premium price, this is the book you've been waiting for.

*Find these books and more at **Store.BeeCulture.com/Books***

Prices as of December 1, 2023. Prices may be subject to change.

BEE COZY

WINTER HIVE WRAPS

Prepare for a productive spring.

Bee Cozy™ Winter Hive Wraps provide the perfect insulating layer your bees need to overwinter successfully and build healthier brood faster in the spring.

Ask for NOD Apiary Products at beekeeping supply stores across North America.

NOD
NATURES OWN DESIGN
APIARY PRODUCTS

Healthy Bees. Healthy Planet.

1-866-483-2929 | www.nodglobal.com

Something, Always Something

Stephen Bishop

It's always something. Just when you get your hopes up, something—always something—shows up to trample your blossoming hopes into smithereens. For once, I finally had a near perfect take of big beautiful queen cells, the cell cups filled to the brim with royal jelly. I had been grafting for years, mostly with middling results, so this was a big deal, which meant it was the perfect time for the heating element on my old Styrofoam chicken incubator to self-destruct.

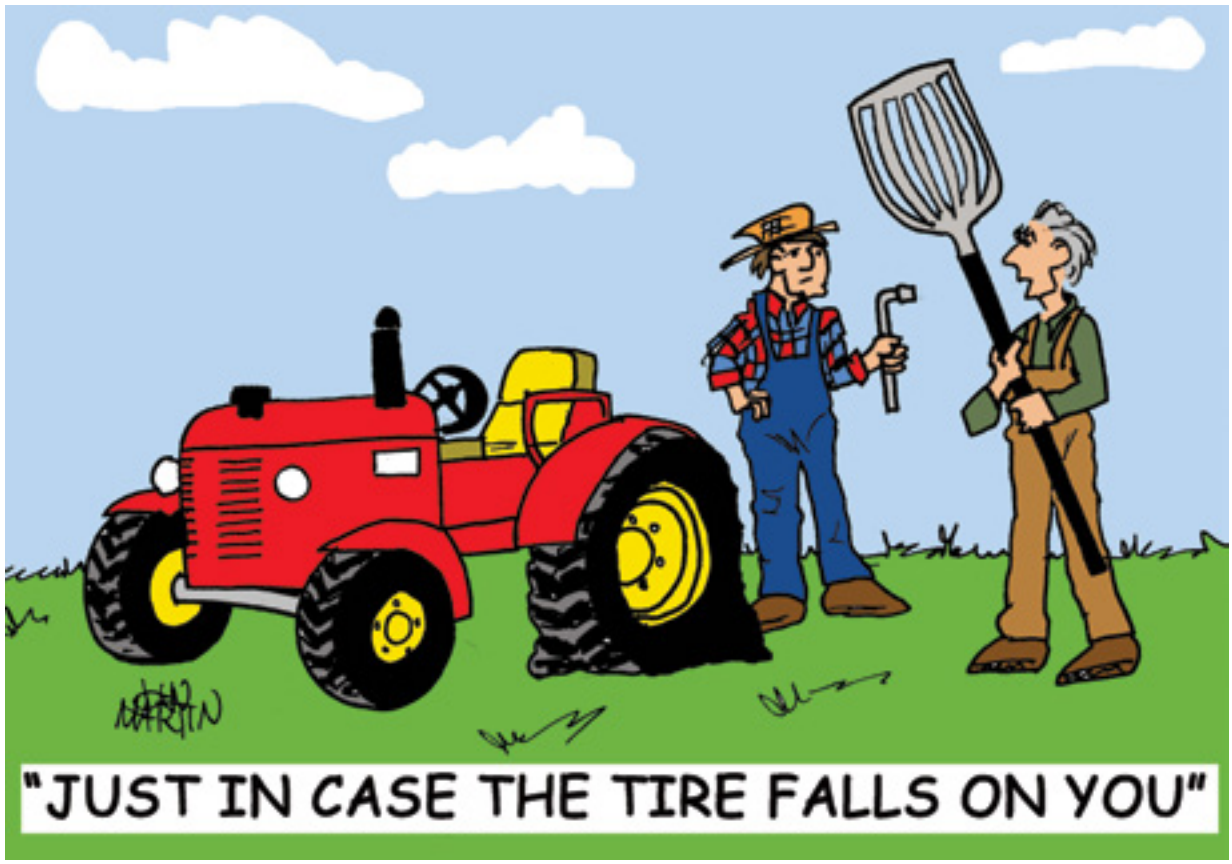
"Whe-oll, Whe-oll, Whe-oll," I could hear the little thermostat alarm wailing from across the backyard as I walked toward the outbuilding with the incubator in it. Sure enough, the temperature in the incubator had dropped overnight to a chilly 78 degrees, meaning my little queen larvae were probably shivering in their cells. I immediately uttered several words that cannot be written in this magazine, and then jumped in my truck and made a beeline to Tractor Supply. There, I forked over money for a new piece of overpriced Styrofoam with a functional heating element.

I think 95% of the people visiting Tractor Supply are there because "something, always something" just broke on their farm. It's the most universal and pernicious malady facing agriculturalists today. Yep, just when you think you're about to reach the promised land of black ink beneath your bottom line, "something, always something" in the red sea of unexpected expenses comes crashing down to wash away your hopes of profitability.

In my experience, when it doesn't have an alarm sound associated with it, "something, always something" usually has a hissing sound. Nothing good or pure or wholesome in this world ever hisses. Hissing is what wicked witches do, as well as rattlesnakes and opossums and rapidly deflating rear tractor tires. And a hissy fit is what men have when they hear a rear tractor tire hissing.

The problem is that rear tractor tires are more than just a financial encumbrance—they're a half-ton encumbrance. If one happens to fall over on you while changing it, someone will need to scrape you off the ground with a spatula. In bygone days, this problem was easily solved by requesting the services of a professional tire man with a boom truck and good liability insurance. However, most professional tire men these days have determined it's not worth the possibility of getting crushed to death by another man's tractor tire to make money. In my neck of the woods, even Dan the Tire Man has gone soft and given up tractor tire calls. When I called him, Dan said, "Ain't got the staff to do farm calls no more—and, to be honest, I don't want to do them either."

If you're in the grips of a "something, always something" pity party, it's good to remember that sometimes, despite alarms and hissing sounds, some things still work out. With the help of a neighbor, I was able to install a new tube in my rear tractor tire without either of us being flattened into a human pancake. And those big beautiful queen cells, which were in peril of being chilled, defied the odds and produced big beautiful queens. Sure, it would have been a lot easier if my incubator didn't malfunction and send me on a panicked scavenger hunt through Tractor Supply. But if farming and beekeeping were easy, everybody would be doing it. Without alarms blazing and tractor tires hissing, we'd never be able to appreciate the good days when everything works smoothly—or at least that's what I tell myself when "something, always something" happens and I want to throw a hissy fit. BC



Getting Started in Beekeeping

David MacFawn

Beekeeping is a science *and* an art. The best way to get involved with beekeeping is to take a beekeeping course from your local bee association. The local course will assist you in learning the *science* and help you develop the *art* skills. It normally takes two to three years to learn beekeeping. The new beekeeper should learn what a normal colony looks like and get assistance diagnosing the colony if it does not look normal. The new beekeeper should not rely on YouTube videos from unknown sources/teachers to learn about beekeeping. Among many things, the new beekeeper needs to determine what size hive equipment to use: ten-frame deeps/mediums/shallows, or eight-frame deeps/mediums/shallows; either plastic or beeswax foundation may be used.

To start, the new beekeeper should rent honey-extracting equipment from the local club or get another beekeeper to extract the honey, usually for a small charge. Honey-extracting equipment is expensive.

Ten-frame equipment is the least expensive per square inch of comb, but it is difficult to get the bees to draw out the outer-most combs. Dr. Tom Seeley, professor emeritus at Cornell University, found that bees in the wild have five to eight combs. As a result, it is believed that it is difficult to get the bees to draw out the outer-most combs in ten-frame equipment. Usually, the outer-most frames need to be swapped with an interior frame to assist in drawing out the comb. Also, the bees are less apt to swarm in ten-frame equipment or the swarming may be delayed longer than when using eight-frame equipment. Ten-frame equipment is also heavier than eight-frame equipment.

The depth of the equipment selected depends on your preference. Some beekeepers use all deeps. With deeps, weight is a concern but all frames are interchangeable. An alternative is to use all mediums, which is about two-thirds the weight of a deep, and again all the frames are interchangeable. Also, some beekeepers use a deep brood chamber and a medium feed chamber, and supers. The size of your feed chamber and super hive bodies should match your area's nectar flow and overwintering store requirements (Table 1).

	Deep Weight	Medium Weight	Shallow Weight	Depth Dimensions
Ten-Frame	80	50	40	9-⅝, 6-⅝, 5-11/16
Eight-Frame	64	40	32	9-⅝, 6-⅝, 5-11/16

Table 1

Standard Langstroth equipment has outside dimensions of 19-⅞" x 16-¼" (some manufacturers are 19-¾" x 16-⅛"). This means the outside dimensions of different manufacturers' equipment will generally fit due to the board nominal thickness (¾"). Different manufacturers' equipment depth may be different by ⅛" or less. This depth difference may result in the interior bee space being violated from the top of the frame top bars to the bottom bar of the super above. The same bee space issue can occur between the uppermost hive body and the inner cover/migratory cover. If you are purchasing equipment (deeps, medium, shallows) from different manufacturers, you need to assess the equipment's depth differences. If the space between super frames of different manufacturer's equipment is greater than ⅜" (9.53 mm), burr comb may be built. If the space is less than ¼" (6.4 mm), the space may be propolized shut.

Many beekeepers use nine-frame spacers in their honey supers (Figure 1). Nine-frame spacers result in the bees drawing out the comb past the edge of the frame's top bars. This allows easy uncapping of the honeycomb. Frame spacers should be used after the comb in the frames are drawn out or you may get burr comb between frames.

Figure 1. Note the nine-frame spacers. (Photograph courtesy: David MacFawn)

Frames should be glued and nailed together with high-quality waterproof glue so they will not come apart under heavy prying. The beekeeper can use a sheet of beeswax foundation in the frames or a two-inch beeswax foundation strip to promote the bees drawing out the comb with the natural 14% to 17% drone cells. Of course, plastic foundation can be used but at least a double beeswax coat is preferred, resulting in the bees accepting the plastic foundation easier.

- 7d[1] (2.25 in/5.715 cm) galvanized nail for nailing hive bodies and supers
- 4d (1.50 in/3.810 cm) galvanized nail for bottom boards
- 1¼-in (3.175 cm) x 17-gauge nail for nailing frame top bars to end bars or to attach top bars and bottom bars to end bars
- ¾-in (1.91 cm) x 18-gauge nail can be used for bottom bars or end bars, recommended for wedges or under the frame ear going from the end bar into the top bar
- ⅝-in nails (1.59 cm) used to attach the top bar wedge back to the top bar or with frame spacer

All hive body joints should be glued with high-quality waterproof glue and nailed. Gluing the joints helps ensure a tight, waterproof joint. The wooden fingers where the nails are placed should be drilled with a hole slightly smaller than the nail shank diameter. Drilling a hole will keep the wood from splitting. Some manufacturers pre-drill the holes. All woodenware should be primed with a high-quality primer and painted with at least two coats of high-qual-

[1]d stands for penny as in seven penny nail length/size. The term goes back to the Romans.

ity paint. Only the outer surfaces should be painted; the inside surfaces should not be painted since the bees will coat the inside surfaces with propolis. In the high humidity southeast, properly painted woodenware should last eight to ten years before needing repainting.

Beeswax or Plastic Foundation?

Bees prefer beeswax foundation over plastic. The bees use the beeswax to draw out the cells. Therefore, plastic foundation should be coated with a heavy beeswax layer. A lot of beekeepers use beeswax foundation in their brood chamber and beeswax-coated plastic foundation in their honey supers. Plastic foundation frames do not blow out in an extractor as easily as beeswax foundation.

Match the super size to the honey flow and overwintering honey requirements. Honey is what the bees consume to produce heat in the Winter. The bees eat the honey and shiver their wing muscles to produce heat.

For example, in South Carolina, the Spring nectar flow is typically 35 to 45 pounds per producing colony. Also, about 35 to 45 pounds of honey is the minimum amount of honey required for the colony to survive Winter. Hence, a lot of South Carolina beekeepers use a deep brood chamber with a medium honey feed chamber super. The drawback of this configuration is the frames from the deep frame cannot be interchanged with the medium frame honey super. If you use all medium supers/boxes for your brood chamber and honey supers, the frames are interchangeable. Deep brood frame does make it easier to find the queen and inspect the colony.

The new beekeeper can get started with a package, nuc (short for nucleus hive), an existing hive purchased from another beekeeper or a swarm.

Bees may be purchased in three-pound packages with a queen, nucs, established hives or a swarm capture. A three-pound package is often the typical way beekeepers get started. If a package is installed on frames with foundation, the bees will need to draw out the foundation (it takes an average of 8.4 pounds of honey to produce a pound of beeswax: about four deep frames require a pound of beeswax). This means the beekeeper will typically not make a honey crop the first year.

If a nuc is used to establish a colony, the beekeeper is typically getting five frames of drawn comb, bees, brood of various stages and a laying queen. This allows the beekeeper a head start, and they may make a honey crop the first year if the nuc is purchased early enough in the season.

Purchasing an established hive will allow a honey crop the first year if purchased early enough. However, be careful of diseases and pests. An experienced beekeeper should inspect the colony. The colony should also have been treated for *varroa* mites.

Capturing a swarm is certainly the cheapest way to get established. If the swarm is installed on drawn comb, you may get a little honey depending on when in the nectar flow the swarm is installed. If the swarm is installed on the foundation, usually it takes the balance of the nectar flow to draw out the comb. The later in the year a swarm is installed, the less likely it will survive the Winter.

Beekeeping can cost the new beekeeper $1,400 to get started (two hives). It is recommended that the new beekeeper establish two colonies. This will allow comparison between the colonies to help determine their status. Start-up costs (at the time of writing this article in 2022) include costs listed in Table 2.

Painting

The outside of the woodenware should be painted with high-quality latex or oil based paint. The inside of the woodenware should not be painted since the bees will coat the interior wood with propolis. Propolis is a resin collected from trees and shrubs. This resin is antiseptic and anti-fungal.

Extracting Equipment

Extracting equipment is expensive. For the first-year beekeeper, who may not know if beekeeping is for them, it is recommended that you rent a club extractor/equipment or pay another beekeeper with a honey house to extract the honey.

Disease and Pests

Refer to Honey Bee Health Coalition's *Tools for* Varroa *Management Guide* **https://honeybeehealthcoalition.org/wp-content/uploads/2022/08/HBHC-Guide_Varroa-Mgmt_8thEd-082422.pdf** for information on treating *varroa* mites.

Feeding

Feeding your bees for their survival is critical if they are out of food. Sugar syrup feeders and pollen feeders are important for feeding. Each type of feeder has its place.

Sugar Syrup Feeders

Pail feeders are inexpensive (about $10 for a two-gallon). However, they do require an inner cover. The pail feeder is inverted, and the pail sides are squeezed and released to create a vacuum so the feeder will not leak. Then the feeder is placed over the Porter bee escape hole on the inner cover. Pail feeders are easy to fill,

Table 2

	Qty	Cost	Total
Beekeeper Equipment			
Veil / Jacket	1	$113.25	$113.25
Hive Tool	1	$12.40	$12.40
Bee Brush	1	$6.75	$6.75
Smoker	1	$49.40	$49.40
Gloves	1	$27.75	$27.75
Total			**$209.55**
Hive Equipment			
Hive Bodies	2	$26.95	$53.90
Supers	6	$22.75	$136.50
Top Covers – Telescoping	2	$36.10	$72.20
Queen Excluder	2	$18.60	$37.20
Bottom Board	2	$12.25	$24.50
Inner Cover	2	$14.20	$28.40
Frames / Foundation – Brood	20	$3.95	$79.00
Frames / Foundation – Super	60	$3.65	$219.00
Misc. Equipment – Stands	2	$11.20	$22.40
Total			**$673.10**
Bees			
3-pond package w/ queen	2	$160.00	$320.00
Nuc	1	$200.00	$200.00
Total			**$520.00**
Grand Total			**$1,402.65**

Figure 2. A two-gallon pail feeder on top of the equipment stack. (Larry Coble Photo of David MacFawn)

transport and clean. Most beekeepers place a deep super around the pail feeder to prevent hive issues with weather. Tiny holes punched in the lid or a screen allows the bees access to the syrup. If you use a migratory cover without an inner cover as your standard configuration, you will need to use an additional inner cover to place the pail feeder on.

Frame feeders, also known as Division Board feeders, work well in warm weather. However, in cold weather, the bees may not be able to access the sugar syrup. Frame feeders are easy to fill when the feeder is placed on the side of the brood chamber or super. The super above is merely slid over, the frame feeder filled, then the super slid back into place. A float, such as a twig or a popsicle stick, or other material needs to be placed in the frame feeder to keep bees from drowning. Cleaning the frame feeder may be tricky since it needs to be removed from the hive.

Jar feeders work well in warm or cool weather because the bees are able to access the syrup even when clustered. In much of the southeast, it rarely gets below about 25° Fahrenheit so the sugar syrup will typically not freeze. When the bees move upward through the equipment stack in the Winter, and they exhaust their honey stores and reach the feeder, the bees can huddle under the feeder and access the sugar syrup. Jar feeders are inexpensive, the jars can be transported and cleaned easily. It should be noted glass jars may break in the beeyard causing an issue. Thick plastic jars are recommended; thin plastic jars will collapse.

Figure 4. A homemade jar nuc feeder on the left and a ten-frame four-jar feeder top on the right. (Photo courtesy: David MacFawn of Danny Cannon's equipment)

A ten-frame hive top feeder (also called Miller Feeders) with floats costs approximately $29.00. A two-gallon pail feeder costs around $10.00, plus an inner cover which costs around $15.00 means the beekeeper has about $25.00 initially invested. Therefore, a hive top feeder configuration is about four dollars more expensive than a two-gallon pail feed configuration. If you only have a few hives, it may not matter. A hive top feeder is easier to refill than a pail feeder which results in less management time.

Figure 3. A frame feeder on the left. (Photo courtesy: Larry Coble)

With hive top feeders, the bees access the syrup by climbing over the edge of the main reservoir inside narrow protected channels (covered in white plastic in Figure 5). These

Figure 5. A ten-frame hive top feeder. (Photo courtesy: Betterbee)

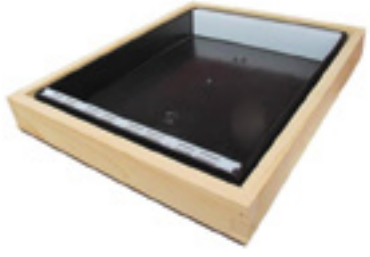


Figure 6. Five-gallon yard feeders. (Photo courtesy: David MacFawn of Larry Coble's feeders)

Figure 7. Holes in top of yard feeders. (Photo courtesy: Larry Coble)

channels will need periodic cleaning to combat any mold growth. The use of Honey-B-Healthy has been proven to reduce mold in all types of feeders. Hive top feeders will hold more than two gallons, and a pail can hold about two gallons. The feeder size is important if the beekeeper has outyards. Larger feeders are preferred for outyards, so you do not have to make as many trips.

Yard, or open, feeders should be at least approximately two hundred feet away from the apiary to prevent robbing other colonies. A yard feeder may be as simple as a bucket with straw, so the bees do not drown in the sugar syrup. However, the issues with yard feeders are:

- weak colonies may not get their fair share of the sugar syrup
- they may spread diseases
- bees cannot access the sugar syrup in cold weather when the bees do not fly (typically less than 48-50°F)

However, yard feeders have their place for time efficiency and reduced labor.

Boardman entrance feeders should only be used to dispense water. Feeding sugar syrup via a Boardman can cause robbing of the colony. Also, feeding sugar syrup via a Boardman in the Winter results in the bees not being able to access the syrup if they are clustered. Visible clustering occurs at 57°F. Boardman feeders are inexpensive.

Bees will require a two- to three-year time investment to learn the trade. It is recommended that a new beekeeper take an introductory course from their local bee club. Bees will also require about $1,400 to get started with two hives and equipment. The new beekeeper needs to decide on the equipment size, configuration, foundation type, feeders, if they want to invest in honey extracting equipment initially and many other items. BC

Figure 8. Boardman entrance feeder. (Photo courtesy: David MacFawn)

David MacFawn (**dmacfawn@aol.com**) is an Eastern Apiculture Society Master Beekeeper and a North Carolina Master Craftsman beekeeper living in the Columbia, South Carolina area. He is the author of *Applied Beekeeping in the United States* by David MacFawn, published by Outskirts Press **https://outskirtspress.com/BeekeepingTipsandTechniquesfortheSoutheastUnitedStatesBeekeepingFinance**

Dadant

Beekeeping & Honey Bees - Our Business Since 1863

6 5/8" Assembled Starter Kit

C52501P

Assembled Starter Kit

C52201P

MADE IN THE USA

Master Pollinator Kit

M58001

Hobby Kit #2

M59601

• 51 S. SECOND STREET, HAMILTON IL 62341 • PHONE (217) 847-3324 • FAX (217) 847-3660 • TOLL FREE 1-888-922-1293 •
• CHICO, CA (877) 332-3268 • FRESNO, CA (877) 432-3268 • PARIS, TX (877) 632-3268 • SIOUX CITY, IA (877) 732-3268 •
• WATERTOWN, WI (877) 232-3268 • ALBION, MI (877) 932-3268 • WILLIAMSPORT, PA (877) 532-3268 •
• CHATHAM, VA (800) 220-8325 • FRANKFORT, KY (888) 932-3268 • HIGH SPRINGS, FL (877) 832-3268 •

dadant.com

Check your mailing labels! Next to your renew code are your remaining issues left. We suggest renewing if you have 3 or fewer!

www.BeeCulture.com

The Story of a Very Young Beekeeper and Her Mother

Meet Elizabeth and Rachel Downs

Dan O'Hanlon

I had a wonderful talk with Elizabeth Downs, who started raising bees when she was six years old in Eddington, Maine. I also talked with her mother, Rachel Downs who has provided all these lovely pictures of her daughter and her bees.

Elizabeth said that she heard that a neighbor of hers, Mr. Fiacco, had beehives. Another neighbor who knew him took her over there. Mr. Fiacco showed her his bees, helped her get what she needed to wear and to use to keep bees, and then gave her a hive. I'll bet that he was as amazed as I was that she was completely unafraid of the bees. In fact, she was fascinated by them!

She began reading about beekeeping and going to bee clubs to listen to excellent longterm beekeepers explain to her and others about how to handle bees and make them better and safer. Now, at age 11, she has nine hives and hopes to have more. Elizabeth is a true beekeeper.

She really enjoys making honey and selling it, and occasionally giving it to people from her church who can't afford to buy it. She is also very happy to have bees since she understands that bees are very important to make a huge percentage of the food that people need to eat.

I asked Elizabeth if she had ever sold bees to anyone. She said that so far she hadn't, but this year she had a nuc she was taking through the Winter and said she might sell that if it made to next Spring.

In order to help the bees to survive, Elizabeth works hard to check on mites. She washes some in alcohol and checks on how many are in each hive. So far, since she uses the standard medication to kill off as many mites as possible, she has a very small amount of mites going into Winter.

I asked her how her mother, Rachel, helped her with her bees. She said that her mother helped her by driving her to bee meetings, by doing her math and inventory matters, and really helps when she lifts the heavy boxes filled with honey to be taken out.

Elizabeth ended our talk by telling me that bees have us feel all five of our senses. First, she said they make us feel. Now that is the worst thing because sometimes

they sting us. It's really not the sting that bothers her the most. It's the fact that after the bee stings her, it will die. But perhaps her favorite sense is taste because she sure does love to taste that honey. Then she says she loves to smell it also. Not far behind is to watch and see the bees flying in and out of the hive. And finally she enjoys hearing the buzzing when the bees are going in and out of their boxes.

I'm sure by now that you are as happy to know her as I am. Her mother thinks that lots of parents should be helping their children to learn how to be beekeepers or really any kind of farmer or gardener because so many of those people now are getting much older. She hopes that younger kids will learn before it is too late and all of them are gone. I certainly agree with that and admire Elizabeth and Rachel for what they have done. I hope that reading this will cause lots of younger children to do just that! BC

Bees and Women

Mrs. Susan Hall Root

Nina Bagley

Mrs. Root in her teens

Susan Hall was born in 1841 in Ely, Cambridgeshire, England. Her parents were Daniel and Mary Hall, both born in England. They had three children: Robert born in 1838, Susan born in 1841 and, after immigrating to America in 1848, Mary born in 1850. During 1815 and 1837, Ely was in general depression, an agricultural community with no work to be found. The townspeople had terrible living conditions and Ely laborers could no longer maintain themselves. The city of Ely's population was growing more rapidly than it was in the surrounding countryside. Infectious diseases plagued the countryside, then another Cholera outbreak began in England in 1848. There was a heavy death rate, increasing mortality between 1841 and 1848. This might be one of the reasons why Susan's father decided to embark on a journey to America with his family for better opportunities.

In 1848, Liverpool, England was the most significant immigration port in the world. Traveling from Ely, Cambridgeshire to Liverpool was 250 miles. Once arriving at the port, families waited in lines, sometimes for days just to get on a ship to sail to America. The journey could take forty to ninety days (about three months) with unfavorable winds and harsh weather.

When this occurred, passengers would often run short of food. Bread, biscuits and potatoes were provided by the shipping companies. The food was terrible and, at times, spoiled.

This was not a cruise ship. Passengers had about two square feet of space. It was dirty, with extraordinarily little ventilation, not to mention lice and rodents. It was a long, wearying journey for a young girl of eight, not knowing what the future would bring, leaving her homeland for an unfamiliar land.

Susan's father decided to farm and raise his family in Medina County, Ohio. In the new homeland, the family prospers and became community members, attending church and farming their land. As a young girl, Susan had no idea that she would grow up to be a driving force in one man's life or that that man would become a part of history in Medina, Ohio, the place her father would choose to bring his family to have a better life.

As a young girl, Susan had a schoolmate named Sara Root who was very fond of Susan. Sara felt that her friend Susan would make a good wife for her brother. Sara's brother Amos Ives Root was away for the Winter in Westville, Ohio, on the river, staying with a relative while attending high school. Sara wrote to her brother saying she had found one of the sweetest girls in all the world as a wife for him.

It was a little embarrassing for Amos I. Root when the two first met, knowing that this schoolmate of his sister knew what she had written to him. It was true love at first sight for both.

A.I. Root wrote: "Her honest simplicity and childlike innocence impressed me from the very first; and, as a matter of course, we two proceeded to get acquainted; and I, for my part, I fear, carried out the program so well that the dear sister was a good many times forgotten and 'left out in the cold'" (*Gleanings in Bee Culture*, 1923, pg. 58).

Amos would walk miles to Susan's family's farm in unbearable weather to spend a few hours in her company. He called on her once in the middle of the week and every Sunday night! Both Amos and Susan were attending school at the time. When visiting in those early days, staying late was much the fashion. Susan would politely tell Amos that her father went to considerable expense so she could attend a particular school for girls. She could not participate in her studies if he stayed so late, and how important it was for her to get a good night's sleep. Amos was reluctant to go home at the proper time. Finally, Susan said one evening: "Sir, it is time for you to go home."

Amos was offended and declared that if he went home, he would go and never return. Susan said, "All right. If you refuse to listen to the dictates of good common sense, it will probably be better for both of us that you should go away and never come back" (*Gleanings In Bee Culture,* Jan. 1923).

Susan was petite with a kind spirit who knew exactly who she was and what she desired. Having their first lover's quarrel, Amos left with his head up high and a stern look to teach her that he, Amos I. Root, was not to be dictated to in that manner!

It was a dark night, and he was walking quickly. His temper was getting the best of him and flaring up, which it had done most of his life. Amos started reflecting on how he acted and started to slow down a bit. It was the voice of reason or remembrance of his good mother's teachings. This is what his mother said: "Old Fellow, is it not possible you are taking offense at the wise words of the best friend you have on earth, and that, instead of being offended, you should recognize her as the one whose price is far above rubies?" (*Gleanings In Bee Culture,* Jan. 1923.)

Amos crossed the bridge, realizing his mistake. He felt a cold chill all over him, and he turned around, walking calmly back to Mr. Hall's farm as he hurried up to the house he had just left. Above the front door was Susan's window to her room. He picked up a pebble and gently tossed it up against her window. And the window went flying up just as he ex-

pected! He was always quite sure of himself, so this is what Amos I. Root said: "'Sue, I humbly beg pardon. You were right, and I was wrong. Will you forgive me?' Susan responded, 'All right. Good night.' And down went the window!" (*Gleanings,* Jan. 1923).

Amos thought she would come downstairs and give him a kiss of reconciliation; Susan planned nothing of the kind! It was a turning point in his life. Amos finally proposed that the two should be engaged. But Susan insisted that they both were too young to be getting married; Amos was 17 and Susan was 15. Kindly, she told Amos that he did not have the vitality for marriage. A.I. Root was sickly and frail as a child and as a man was not strong. She wanted to postpone marraige for a few years because she was not ready for marriage and wanted to complete her schooling.

A.I. Root would go off and find his way in the big wide world for the next couple of years, making a name for himself, giving lectures and expanding his mind to innovative ideas. He never let the idea go, knowing the two would marry one day. After his lecture tours were over. He returned to his father's small farm in the woods where he lived as a young man.

Susan's father feared that Amos could not make a living. Amos would prove him wrong. A.I. Root took a course in watch-repairing and, at twenty-one, started a watch-repairing shop under the pretentious name of A.I. Root & Co. He then proceeded to call on his true love, Miss Susan Hall. Susan's father was humbled, and he approved them of their marriage.

Three noteworthy events took place in 1861. Abraham Lincoln's inauguration on March 4, 1861. The Civil War started on April 9, 1861. And, A.I. Root and Susan Hall were married on September 29, 1861. Amos was twenty-one and Susan was nineteen years old.

As the sun rose that Autumn morning after Mr. and Mrs. Root married, they started with horses and carriage on a honeymoon trip. The two were by themselves. Amos put out his hand to Sue as he called her, and she looked smilingly up into his face while he spoke, "Sue, the agreement between us two that we have just entered into is the most sacred and solemn step in our lives. Let us fully consider the new relations that rest on the shoulders of both of us, and may God help us to bear with each other and to bear with patience the new responsibilities that are going to rest on us two. May we two, through thick and thin, for better or for worse, cling to each other." It was a boyish speech, but it was honest.

Mrs. Susan Hall Root would become his support, "wise counselor" and confidante throughout their marriage, including her husband's business affairs. Mrs. Root's hard work and excellent management of the home helped A.I. Root to meet his obligations when they were starting out as a young couple. They would build a homestead and live in Medina, Ohio.

A.I. Root would become a very influential man in many ways, especially in the world of bees. By 1885, the Root name was recognized around the world. Modest and simple in taste, Mrs. Root always avoided publicity, preferring the background of a beautiful home life she had with her husband and children.

Mrs. Root would spend the next sixty years being there for her husband while being an attentive wife and mother, giving birth to five children in twenty years: Ernest R. Root, 1862; Maud E. Root, 1865; Constance M. Root, 1872; Carrie B. Root, 1878; and, having her youngest child at forty-one, Huber Hall Root, 1883. The two would cling together for better or worse, just as they promised one another.

In August 1865, a swarm of bees passed over the A.I. Root & Co. One of the employees of Mr. Root asked jokingly what would you give me if I caught the swarm? Mr. Root replied, a dollar securely boxed. The young man brought A.I. Root the bees, securely boxed, and collected his dollar; the rest is history.

A.I. Root founded his bee company in 1869 in his hometown of Medina, Ohio to manufacture beehives and beekeeping equipment. The company was shipping four railroad freight cars of beekeeping equipment everyday, things were going well! A.I. Root was working sixteen-hour days, which sometimes made it difficult to be around him. He started the magazine *Gleanings in Bee Culture* on January 1, 1873. The first edition of A.I. Root's book *ABC and XYZ of Bee Culture* was published in 1879.

Mr. Root constantly worked and expected everyone around him to work just as hard! But that was impossible because Mr. Root was continually working and doing the work of five men until he would exhaust himself to the point that he made himself ill.

Mr. Root would say: "Had I gone on as an evil and angry spirit prompted me to do and not turn back to apologize to my dear wife, Sue, there would have been no A.I. Root Co. There would have been no five dear

Mr. and Mrs. Root after they were married.

children brought up in the fear of the Lord, and there would, in all probability, have been no A.I. Root now dictating these words" (*Gleanings in Bee Culture,* Jan.1923).

Mrs. Root's children, at some point, all worked for the family business. She was a devoted mother and the most meticulous housekeeper; dust and dirt were her enemies!

Mrs. Root's daughter Candice Root Boyden authored an article in *Gleanings* about her mother. The title was "Mother": "Sweet and modest as the violet of her nature England. Mother always kept herself in the background; only her husband and children, no matter how much credit they had accomplished, should go to her" (*Gleanings in bee Culture,* Jan. 1, 1922).

Candice remembered how, as a small child, her mother spent most of her time in the kitchen preparing delicious, healthy foods for the family. Mrs. Root would spend many hours standing over a walnut table with drop leaves while she prepared the family meals. At the end of the table was a shallow drawer to put spoons, cutlery, and other kitchen items. But Mrs. Root would use the drawer for more important things. Neatly filled with toys, the drawer's contents revealed her love and understanding of a child's nature.

The toys were not store-bought, as her daughter would say they were "Treasures, queer bits of metal and wood, an old steel puzzle made by Father, rubber balls, balls of string, little wooden boxes and a little shallow bowl carved from black walnut. But unselfishness, Mother's dominant characteristic, is revealed in the fact that the drawer, within my recollection, never held anything to help Mother in her work and save her steps." (*Gleanings in Bee Culture,* Jan. 1, 1922).

At the time, kitchens were compact, with all their cooking utensils and drawers close by to save the women steps in the kitchen. Mrs. Root was okay with the drawer, which was full of toys for the children. And she did not mind walking back and forth to the big pantry each time she needed something out of it. Mrs. Root often had very severe attacks of pleurisy throughout her life, weakening her heart. She was not a robust woman and sometimes did not have the energy to run around after the children, so the drawer kept their

Mr. and Mrs. Root having a picnic.

The Root Men: J.T. Calvert, Huber, Allen and Ernest Root.

Huber started the candles for the Catholic Church.

little hands busy and close to their mother.

Mrs. Root would fill a bowl with water and place it on the floor so the children could sail their boats. In the Winter, she would warm the water so their little hands would not get cold. She loved children and had a nurturing way with them.

Mrs. Root did not have the opportunity to attend college, but she took immense pleasure in her children and grandchildren attending college.

Mr. and Mrs. Root would not accompany their family to hotel dinners. They would not go to formal dinners or parties in their honor, but they loved simple picnics in the parks with family around them.

In 1901, A.I. Root built a cabin in the northern part of the Michigan woods and went there to live with his wife. In the forty years of married life, they would finally work side by side, enjoying each other's companionship.

A.I. Root did not like wintry weather; the cold bothered him. So, a few years after they built their Michigan cabin, they would make another cabin in Florida, where they spent their Winters. Mrs. Root did not like calling it a cabin, so she called it their cottage.

The fare from Cleveland, Ohio to Bradenton, Florida was $57.15 a tourist for a round-trip ticket for the Winter. The Roots loved going to their Florida cottage, but Mrs. Root was always overwhelmed with grief to leave all her children, grandchildren and great-grandchildren every Winter.

In the early 1900s, they would spend their Summers in Michigan and Winters in Florida.

Their sons, Ernest and Huber, were involved in the business of the A.I. Root Company along with their daughter Maude's husband J.T. Calvert who was the bookkeeper. Around 1900, Ernest took over as editor for *Gleanings* and kept the bee part of the company going while Huber, more of an inventor like his father, experimented with beeswax. Under Huber's guidance, the Root company started making candles at the request of the Catholic Church. The local priest was looking for better quality beeswax for their candles and a wick that burned longer. A.I. Root's sons were carrying the torch for their father so he never had to worry about money again and could devote his time to Mrs. Root, the Congregational Church, family, bees and gardening.

Mrs. Root, being in her seventies, enjoyed being outdoors, working in her garden in Florida, and enjoyed spending time with her husband. She enjoyed picking vegetables from her garden and sharing them with her family and neighbors.

Her children felt their mother was the most perfect and unselfish of anyone they had ever known. Mrs. Root captured the hearts around her. She had enough love to go around and

The Roots in their 70s.

was happy when she could help those that were needy, lonely, widowed or fatherless.

Her tender heart cared for the neighbor's chickens, cats and dogs and ensured they were all fed and cared for. And if Mrs. Root felt a horse was being mistreated, she would not stand for it. This most definitely caused her misery.

A.I. Root wrote: "May I be pardoned for saying that the dear little woman has most faithfully kept her part of the pledge year in and year out? Oh! What would I give if I could truthfully say, 'I have done as well, or even approximately as well?'" (*Gleanings in Bee Culture,* 1917, pg. 297).

Mrs. Root suddenly passed away on the evening of Tuesday, November 29, 1921 in Bradenton, Florida, where she and her husband had maintained a cottage for several years. The Roots had just returned to Florida a few weeks before her death. She was feeling exceptionally well and was particularly happy to visit her good friend for many years, Mrs. Ed Nettleton of Medina, who also vacationed in Bradenton, Florida, for the Winter.

Although the family knew it was coming for some time, her life was

Mr. and Mrs. Root with a grandchild.

swiftly ended; the family felt it was due to her arteries being weak from pleurisy attacks over the years.

Mrs. Root's aged husband was too feeble and was advised not to make the long trip back home with the body of his long-time companion.

Mrs. Root's funeral was held at the home of Ernest Root, her son, on Friday, December 2, 1921, at the old homestead. Mrs. Root was eighty years old. Mr. and Mrs. Root had their sixtieth wedding anniversary a few weeks before her death. She left behind her husband, five children, eleven grandchildren and four great-grandchildren. Mrs. Root was a Medina County, Ohio resident for over seventy years and a friend to all. Mrs. Root is buried in the Spring Grove Cemetery in Medina County, Ohio.

A few years later, Mr. Root caught pneumonia on his way home to Medina, Ohio from Bradenton, Florida. Being feeble, weak and bedridden for several days, the doctor was called, but Mr. Root, knowing it was time, looked at his son Ernest one last time, feeling at peace. He was ready to meet his maker and join his true love, Mrs. Susan Hall Root. A.I. Root took a deep breath and passed away on April 29, 1923, with his children by his side. A.I. Root is buried beside his wife in the Spring Grove Cemetery in Medina County, Ohio.

Ten to twenty percent of the people fleeing Europe in the 1800s did not survive. Not only did Mrs. Root survive, but she survived childbirth, raising five children, cooking and cleaning, washing and ironing in the mid-1800s, and tending to a husband who was constantly inventing and taking chances.

Mrs. Root's children would have children, and their children would have children, and it has continued for five generations.

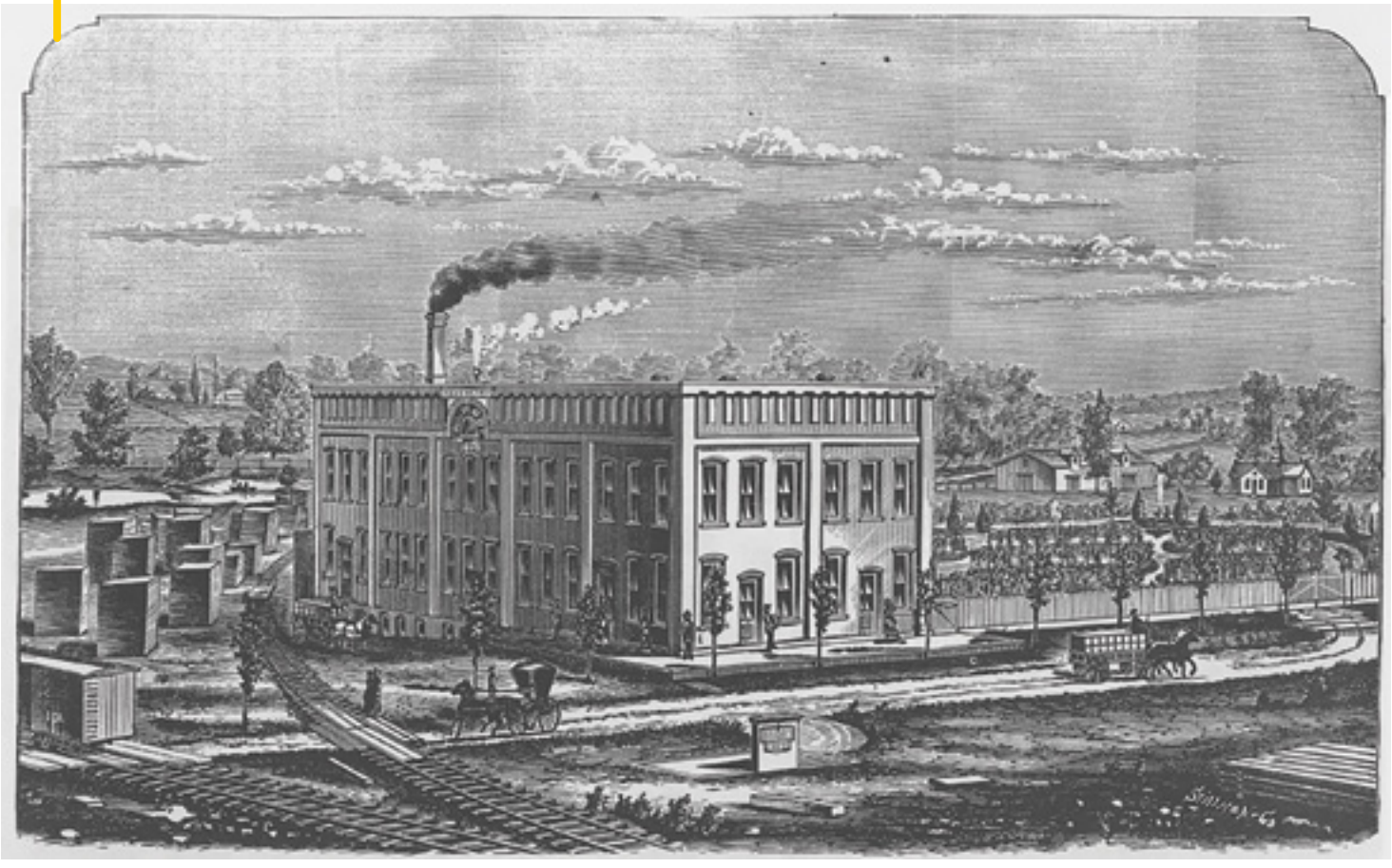
The A.I. Root Company is still in business today. The magazine is still being published but instead of *Gleanings in Bee Culture* it is called *Bee Culture: The Magazine of American Beekeeping*. Today, A.I. Root is the largest supplier of liturgical candles for Catholic churches. A hundred and fifty-four years later, Brad Root continues the family tradition like his father and grandfathers before him. He is the fifth generation of the Root family. So, the next time you light a Root Candle, think of Mrs. Susan Hall Root who was a friend to all.

I agree with A.I. Root that there would be no A.I. Root Co. if not for a tenacious young girl, Susan Hall Root!

"There is a great woman behind every great man." BC

Nina Bagley
Ohio Queen Bee
Columbus, Ohio

The Root Factory.



'tis the season to share our gratitude at

Kona Queen Hawaii

Mahalo Nui Loa!

Thank you so much for making us your 1st choice for Kona Italian & Carniolan queens

Stay connected for availability and updates

SCAN ME

808-328-9016 • INFO@KONAQUEEN.COM

www.konaqueen.com • @konaqueenhawaii • @konaqueenhi

INTRODUCING

Paradise Queen Hawaii

Your source for Varroa resistant genetics

VSH IS NOT A DIRTY WORD

It isn't a magical fix but Varroa Sensitive Hygienics (VSH) are part of the solution. The ability for honey bees to detect Varroa mites in sealed brood and uncap the infested cells disrupts the mite's reproductive cycle so the hives can help you help them. This significantly reduces the need for chemical treatments to combat Varroa mites.

BREEDING A SOLUTION

Our journey began as *Hawaii Island Honey Company*, key cooperators in a breeding program to further develop and enhance the VSH trait.
A company lab was built near Hilo, Hawaii to take our VSH breeding to the next level. The project originated with the USDA Bee Lab in Baton Rouge and later, VSH Pol-line was incorporated into the program.

NEW NAME, SAME GAME

Now under the same ownership as Kona Queen Hawaii, our mission continues in isolated breeding yards on the Hilo side of the Big Island. The Paradise Queen team is hard at work selecting the most productive colonies and steadily improving issues that have kept many away from VSH queens in the past.

PARADISE IS VARROA UNDER CONTROL

While we may never fully get away from chemical mite treatments, reducing the industry's reliance on these products is a crucial step in the right direction. Our VSH genetics can help you take back the power in the fight against Varroa mites.

WATCH FOR AVAILABILITY SUMMER 2024

808-328-9016 • sales@paradisequeenhawaii.com • www.paradisequeenhawaii.com

APISTAN®

APISTAN WORKS & HERE'S THE PROOF

95% Efficacy
Apistan, lab study: 95.72% Varroa mortality *(Insects, 2018)*

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

94% Efficacy
Apistan: 94.90% efficacy *(2019, Veterinary Bee Inspector, Spain)*

96% Efficacy
Apistan: 96.92% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

97% Efficacy
Apistan + 50 g Apiguard: 97.97% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

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

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

91% Efficacy
Apistan: 91% Efficacy (2016, FNOSAD, France)

95% Efficacy
Apistan: 95.22% (2017, FNOSAD, France)

Apistan should be used as part of an Integrated Pest Management Strategy
Pockets of resistance are possible, we recommend trialling Apistan on a couple of colonies before widespread use.

www vitabeehealth.com VitaBeeHealthNorthAmerica
VitaBeeHealth info@vita-europe.com

VITA beehealth NORTH AMERICA

Minding Your Bees And Cues

Black Box Mysteries

Becky Masterman & Bridget Mendel

We suppose most anyone who cares for animals pays some attention to the scatological: certainly farmers shovel out the barn religiously and city dog walkers can be seen happily strolling down the street with a green baggy of their pet's excrement.

But only the hearts of northern beekeepers swell with actual joy at the sight of poop upon freshly fallen snow. For beekeepers in cold climates, poop is a sign of Spring—of life winning out over death and all that.

Strangely, so can death signal life in our Winter bees. We mean—as the colony naturally dwindles in size over the course of Winter, some dead bees do accumulate outside the hive, with many finding their resting place inside on the bottom board. Or bees fly out on their cleansing flights (strangely, we begin the euphemism now) and, hit by a chilling wind, fall into the snow, never to return.

Yes, this sloughing off is part of the whole vital system the bees live by. Inside their wooden boxes, they shiver together, keeping themselves warm, making a well-designed coat out of themselves, consuming Summer's honey to sustain their shivering. And at the center of them all is the queen, who, in early Winter (November, December), may shut down her egg laying all together, or lay only tiny patches of brood.

Dead bees and bee poop are a sign of a live colony after a fresh snowfall. Photo credit: Ana Heck

From beekeeper to non-beekeeper it's often explained that bees keep their *cluster* warm—not their "house" or hive. The temperature inside the hive structure can match the outside of the hive—no matter how chilly—and yet the bees can regulate their group body temperature and survive. That miraculous fact said, insulating the bees does matter—and how to do it and how much it matters is always a lively debate.

Chronicles of late 1800's and early 1900's beekeepers describe the transition of wintering honey bees outside instead of in cellars or trenches (reviewed by Furgala, 1975). As this wintering debate continued, research looked for answers and demonstrated that bees in insulated hives have increased odds of survival. It also revealed that too much insulation might threaten food stores. Other studies showed that bees consume less of their stored honey in cold temperatures, or showed a nominal difference between insulating and not, implying that our anxieties about hive insulation are a touch anthropomorphic. More recent wintering research data collected in sophisticated experiments that account for viral threats to honey bees, demonstrates that indoor wintering is indeed beneficial for today's bees (Desai and Currie, 2016).

The fact is, we've seen bees overwinter in thickly insulated hives, or no insulation at all, save perhaps some banked snow (snow does provide wonderful insulation). That is, we've seen healthy bees survive. Sick or starving bees can be wintered in a palace but they still won't make it. Facts of life. The presence of mites in late Summer and early Fall (when Winter bees are produced) is one of our best indicators of the bees' overwintering prospects: mites winter along with your bees and although they do not reproduce when bees

Wintering bees consume honey to fuel their thermoregulation. Early wintering research reviews by Furgala (1975) discussed how beekeepers looking for lighter Winter benefited from their bees consuming less honey. Photo credit: Becky Masterman

are broodless, they do feed on the fat bodies of adult bees (Ramsey *et al.* 2019). Workers from colonies with higher *varroa* infestations and deformed wing virus levels have shorter life expectancies (Danait et al., 2012) and often won't make it until Spring. If the queen shuts down reproduction completely, the mites will wait to reproduce once she starts laying eggs again.

What is our traditional Minnesota Winter palace for bees? A hive stand that provides dead air space, a moisture board to wick out the water produced by respiring bees (moisture dripping on the cluster can kill them), a black covering to take advantage of solar heat, a windbreak to protect from heat loss, a reduced bottom entrance to allow for air flow, but discourage mouse traffic, and an upper entrance for cleansing flights (Furgala, 1975).

In January, our big, healthy colonies turn up the heat to about 92 degrees and start to rear their replacements in a tiny patch of cells surrounded by the thermoregulating cluster. This, after the Winter solstice, is when daylight starts returning too, seemingly cell by cell, small patches at first, determinedly, towards Spring. BC

References

Furgala, B. (1975) "Fall Management and the Wintering of Productive Colonies." *The Hive and the Honey Bee.* Edited by Dadant and Sons, Dadant, pp. 471-490.

Desai SD, Currie RW (2016) "Effects of Wintering Environment and Parasite–Pathogen Interactions on Honey Bee Colony Loss in North Temperate Regions." *PLoS ONE* 11(7): e0159615. **doi:10.1371/journal.pone.0159615**

Dainat, B., Evans, J. D., Chen, Y. P., Gauthier, L., & Neumann, P. (2012). "Dead or Alive: Deformed Wing Virus and *Varroa destructor* Reduce the Life Span of Winter Honey bees." *Applied and Environmental Microbiology*, *78*(4), 981–987. **https://doi.org/10.1128/AEM.06537-11**

Ramsey SD, Ochoa R, Bauchan G, et al. (2019) "*Varroa destructor* feeds primarily on honey bee fat body tissue and not hemolymph." *Proceedings of the National Academy of Sciences of the United States of America.*116(5):1792-1801. **doi:10.1073/pnas.1818371116**

Becky Masterman earned a PhD in entomology studying hygienic behavior at the University of Minnesota and is currently a host for the Beekeeping Today Podcast. Bridget Mendel joined the Bee Squad in 2013 and led the program from 2020 to 2023. Photos of Becky (left) and Bridget (right) looking for their respective hives. If you would like to contact the authors with your own wintering ideas or other thoughts, please send an email to mindingyourbeesandcues@gmail.com

Laidlaw Bee Facility

Bee Research and Extension Programs at University of California, Davis: The Early Days

The UC Davis Series

Elina L. Niño

Named after the "father of honey bee genetics" Dr. Harry H. Laidlaw Jr., the Bee Research Facility is a part of a larger, as I like to refer to it, Bee Complex located only a few miles away off of Central UC Davis Campus (West of Route 113 for those who might be familiar with the area). The Bee Complex is composed of the Bee Facility, UC Davis Bee Haven garden, a number of smaller research plots, several ancillary buildings for storage and most recently, a set of mobile trailers housing the Davis USDA Bee Lab. But as you know, it is the people that really make the program, and our program at UC Davis is a home to a number of researchers and extension specialists contributing to bettering bee health. This series aims to showcase all of the great work being done by the UC Davis Bee Program teams. But first, a little bit about our history!

While you have likely heard of the Bee Program at UC Davis, you probably don't know that its impressive history began long before many of us reading this issue of *Bee Culture* were even born. It is my pleasure to take you on a brief journey of the establishment of the UC Bee Program, as it has been shared with me by the late Robbin Thorp and Eric Mussen (to read a more detailed history written by Kathy Keatley Garvey, please visit **https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=39191**). Lastly, I will briefly introduce you to the current faculty members and their respective research and education programs, which we will expand on in the upcoming 2024 issues of *Bee Culture*. Many well-known and well-respected researchers and educators have conducted seminal works while at UC Davis. They helped make the UC Davis Bee Program what it is today and my current colleagues and I are eager to carry that legacy into the future. My hope is that you will enjoy reading this series as much as we are enjoying writing it for you.

The People: Early 1900s to Early 2010s

Let me take you back to the early 1900s (yes, I just said that, and yes it makes me feel old as well!), when George Haymaker Vansell (1892-1954) was a student at UC Davis. His interest in insect science led him to become the first instructor to teach an Entomology and Apiculture course at UC Davis from 1920 to 1931, highlighting the need for formal Entomology education. He was titled an Instructor in Entomology while also holding a position as a USDA employee at the Davis Experiment Station. Vansell was particularly interested in the field of plant-insect interactions, and has published a number of bulletins concerning honey bee forage. As avid beekeepers, most of you have probably heard at some point that honey bee colonies can

suffer poisoning when foraging on California Buckeye (*Aesculus californica*). Vansell's interest in this phenomenon resulted in several publications in which he discusses the symptoms of buckeye poisoning, and together with his colleagues, offers possible solutions for reducing damage to colonies. His work suggests that adult worker bees were usually not detrimentally affected; therefore, creating small colony units containing only adult workers and one frame of brood can lead to production of buckeye honey while simultaneously preserving some of the colony work force if the honey is extracted in a timely manner. Vansell and Todd also suggest that Italian x Carniolan hybrids faired a bit better during the production of the buckeye honey as compared to Italian x Caucasian hybrid colonies, but neither had successful recovery. Interestingly, throughout these research articles there is regular mention of the bears destroying colonies in the Sierra Nevada foothills, much like the beekeepers today still have to deal with these intruders. Prior to his sudden passing in 1954, Vansell had also completed research on fruit tree and seed crops pollination. A scholarship established in his honor has helped support many bee students in their fervent effort to advance the field of apiculture.

Around the same time period, Frank Edward Todd (1895-1969) served as the USDA apiculture research branch head at the USDA Pacific States Bee Culture Laboratory at UC Davis (1931-1942). He collaborated closely with Vansell on projects dealing with honey bee poisonous plants, and has advanced pollination of many crops including seed alfalfa, cantaloupes and tangerines. Perhaps most notably, he has reported observations of honey bee nectar collection on alfalfa and the, now well known, tripping mechanism of the alfalfa flower during attempted foraging by honey bees. While affiliated with the UC Davis Bee Biology Program, he modified the dead bee trap originally designed by Norman Gary, which is known as the "Todd Dead Bee Trap", and has been used in research on effects of various chemicals on bee mortality. Another USDA apiculturist worth mentioning was Edward Lloyd Sechrist (1873-1953). While working in the USDA Office of Bee Culture, he collaborated with researchers at UC Davis Bee lab on several projects that have included honey gathering and daily colony weight changes due to nectar collection. His most notable contribution to the field of apiculture is the proposition for United States standards for honey in 1927.

You probably noticed that the first researchers conducting honey bee and pollination research at UC Davis were actually most directly associated with USDA. However, in 1931, UC Davis hired John Edward Eckert (1895-1975) as a Professor of Entomology and Apiculture, who also served as the Department Chairman from 1934 to 1946. Eckert is well known for studying the flight range of honey bees and he reported extensive observations on this topic including the observation that honey bees prefer to stay close to the apiary in search of forage, but will fly up to 8.5 miles to the food source if necessary. Honey bee resource constancy was also noted by him. Eckert (affectionately called Eck by his peers and stakeholders) was well respected among beekeepers as he supported their efforts to protect colonies from pesticides, and has completed research on potentially harmful pesticide effects on colonies. He is also credited with pioneering antibiotic use in honey bee colonies for management of bacterial diseases, and spent time in Australia and Europe researching various ectoparasitic mites on honey bees including Tracheal mites (*Acarapis woodi*). Very apropos to this article, Eckert spent decades as the editor of the California column in *Gleanings in Bee Culture*. Among his many extension publications is the first edition of the *Beekeeping in California, Circular 100* from 1936, which has been updated over the years and is still used by many.

As mentioned before, the facility that is still being used by the Bee Program faculty, has been named in honor of Harry Hyde Laidlaw, Jr. (1907-2003) who joined UC Davis as a Professor of Apiculture in 1947. Laidlaw's research studying mutations leading to differences in eye color, pigment-free blind drones, differences in wing length, hairlessness and resulting identification of underlying molecular and biochemical pathways, have earned him an unofficial title of "The Father of Honey Bee Genetics". Arguably most impactful applied technology development, however, was the development of the first functional instrument for insemination of queen honey bees. This was made possible by Laidlaw's study of the queen morphology, and subsequent realization that the only

The Bee Facility Apiary

way the queen can be successfully instrumentally inseminated is if the valve-fold is held away from the median oviduct opening. His discovery has provided the means for successful bee breeding and has revolutionized the beekeeping industry. Northern California bee breeders still speak very fondly of Laidlaw. Speaking to his aptitude for innovation and leadership was his selection as the first Dean for Research in the College of Agriculture at UC Davis. He published several seminal queen rearing and bee breeding books, including my personal favorite *Queen Rearing and Bee Breeding,* written in collaboration with Robert Page, another alumni of our Bee Program. Lastly, in addition to the Bee Biology Facility being named after him, the Laidlaw family established an endowment in his name and in support of student research.

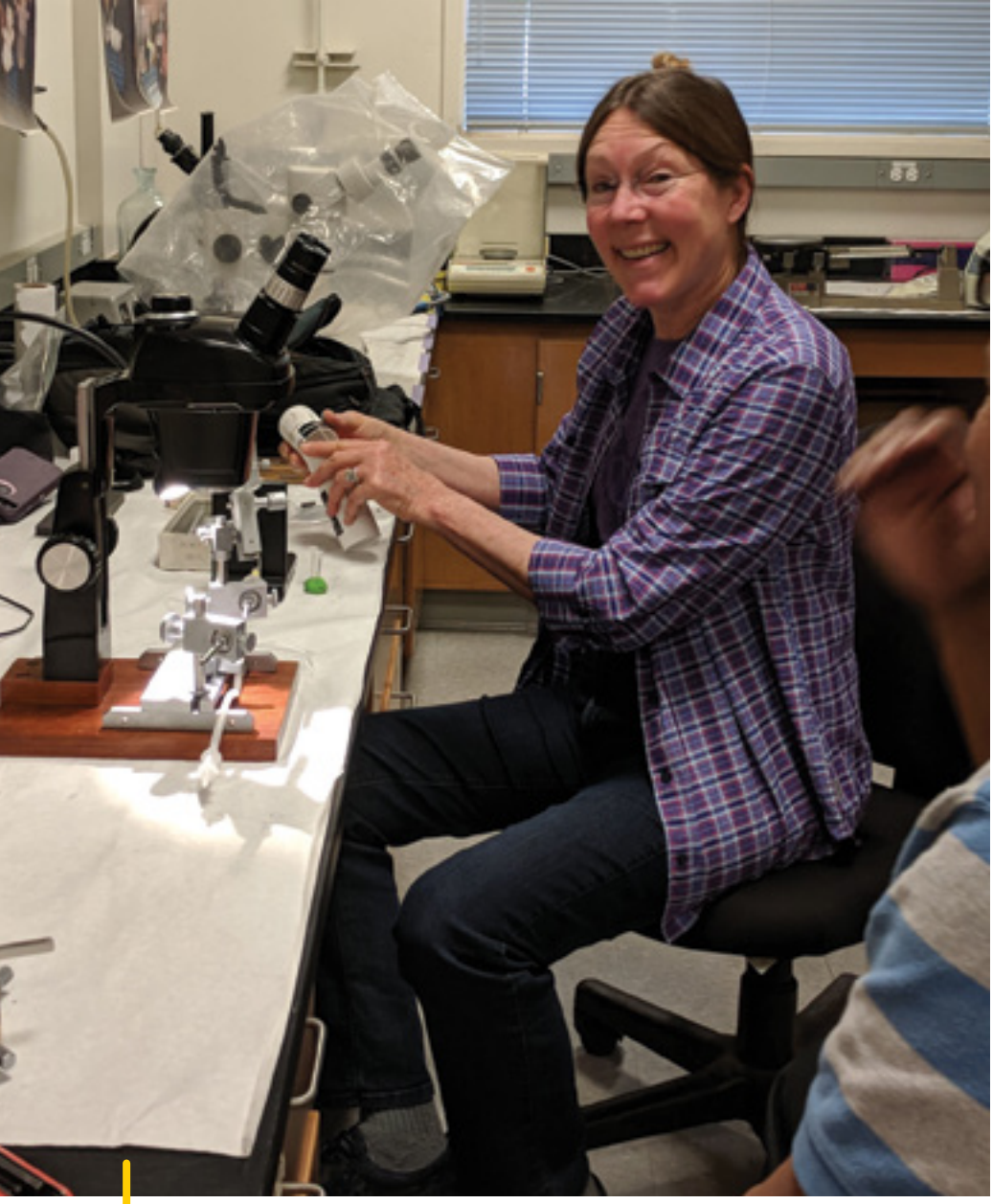
Robbin Thorp, Norm Gary, Larry Connor at the Bee Facility in February 2016

Fifteen years later, Norman E. Gary joined UC Davis as a Professor of Apiculture with special interest in studying honey bee foraging behavior and mating behavior of queens and drones. He was the first to identify queen mating pheromones, and to observe and describe aerial mating of queens and drones. During the medfly eradication efforts by California Department of Food and Agriculture, Gary began studying the impact of pesticide applications on honey bee health, which led to his design of the dead bee trap, later modified by Todd. Gary is also well known for his contributions to the film industry as he has been an adviser on sets of movies such as “Fried Green Tomatoes”, “My Girl” and “Candyman”, earning him the nickname “The Bee Wrangler”. He even has his own IMDb page. Gary has been retired since 1994, but he still occasionally visits the Bee Facility and even borrows bee colonies for small behavioral experiments. Much like his contemporaries Robbin Thorp and Eric Mussen were not, Gary is not very good at being “retired”, and has since published another one of my favorite book recommendations *Honey Bee Hobbyist: The Care and Keeping of Bees* (I have been lucky enough to have him sign my copy!).

Eric Mussen at the Honey Bee Research Facility (Photo by Kathy Keatley Garvey)

Joining forces with Laidlaw and Gary, Ward Stanger (1913-2000), an extension apiculturist quickly became a champion for the beekeeping industry. In the late 1960s and early 1970s he published extension works discussing the beekeeping industry in California, and comparing the bee breeding and queen rearing efforts in Northern California versus southeastern Gulf States. Stanger understood the value of optimal nutrition to bee health and need for pesticide protection, readily urging the U.S. government to allow for forage access and stricter pesticide regulations. He has also published recommendations for supplemental feeding of colonies to increase their productivity, and a manual on how to remove honey bees from structures.

In 1975, Christine Y. S. Peng joined the Entomology Department as the Professor of Apiculture specializing in insect physiology. I am sure that at this point many, if not all of you, are aware that antibiotics



Sue Cobey, March 2018

for management of honey bee bacterial diseases require a prescription from a veterinarian. But I bet you did not know that Peng was instrumental in selecting tylosin as a possible replacement antibiotic for oxytetracycline hydrochloride (Terramycin®) since *Paenibacillus larvae* started developing resistance to it. Peng has also made invaluable contributions in elucidating gamete physiology laying groundwork for successful cryopreservation of honey bee genetic material. Her research into honey bee nutritional needs has led to guidelines for seasonal feeding regimes, and her interest in parasitology has led her to explore *varroa* mite physiology and various management strategies.

I am pretty certain that Robert E. Page Jr. and his seminal works in honey bee genetics don't need much of an introduction to the readers of *Bee Culture*. Page joined the Department of Entomology faculty in 1989 where he also served as the Department Chair. There is not enough space here to write about his many research accomplishments so I invite you to read some of the hundreds of scientific articles or the four books that he has published thus far. His published works report on fundamental discoveries in honey bee behavior particularly regulation of foraging behavior, population genetics and the evolution of complex social behavior. Despite all his achievements and accolades he remains a refreshingly approachable colleague. His passion for honey bees particularly shines through in one of his latest projects "The Art of the Bee" YouTube channel (**https://www.youtube.com/@artofthebee**).

The Bee Program can't really be talked about without mentioning the contributions of Susan Cobey who was at UC Davis from 2007 to 2012. Cobey is a giant in the field of honey bee breeding and has worked tirelessly for decades to maintain and improve quality honey bee stock in close collaboration with the Northern California Bee Breeders. As a young eager doctoral student just discovering my interest in honey bee queen mating physiology, I deeply valued the opportunity to take the world-renowned Instrumental Insemination (II) course with Cobey while she was still working at UC Davis. Principles of II and many tips and tricks shared with me by Cobey are something I now share with the students in our own II courses. Her sustained efforts to improve the bee stock in the U.S. have led to the establishment of the New World Carniolan Breeding Stock that can be purchased from Northern California bee breeders.

Back in 2014, I joined the Department of Entomology and Nematology at UC Davis as the Extension Apiculturist, and to my delight I was able to spend a significant amount of time in the company of two great pollinator researchers and educators: Robbin W. Thorp (1933-2019) and Eric C. Mussen (1944-2022).

Thorp[1] joined UC Davis as a Professor of Apiculture in 1964 and his research interests were in pollination behavior of honey bees particularly in almond production. Later on, he shifted his focus to non-*Apis* bees with emphasis on bee systematics, bee conservation and pollination of vernal pool plants. Bumblebee conservation efforts have been in large part inspired by Thorp's research and he is cited as the main catalyst for successful petition for listing rusty patch bumblebee as an endangered species. Even though he retired in 1994, Thorp continued to come to work at the Bee Facility every day and continued to work on several projects. I have to specifically recommend two books he co-authored in his retirement: *Bumble Bees of North America: An Identification Guide* and *California Bees and Blooms, a Guide for Gardeners and Naturalists*. I am forever grateful to him for his guidance and advice, and for not minding me asking him a million questions while he was patiently identifying drawers-full of pinned bees for dozens of student and postdoc projects.

[1]To read more about R. W. Thorp, visit: **https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=30459**

CERTAN IS BACK

B402 / Certan

is the most advanced, effective and economical product for the protection of your combs from damage by wax moth

Concentrated solution of *Bacillus thuringiensis*

Proudly made in the USA

Completely harmless to humans and honey bees

B402®

Environmentally friendly

Efficacy of up to 100% against wax moth larvae

Leaves no residues in wax or honey

Only one application needed for complete protection

beehealth NORTH AMERICA

Vita Bee Health is a trading name of Vita (Europe) Ltd.

www vitabeehealth.com VitaBeeHealthNorthAmerica VitaBeeHealth info@vita-europe.com

Christine Peng and Elina L. Niño, January 2020

Similarly, I will forever harbor deep gratitude and appreciation for Eric C. Mussen[2]. He joined University of California Cooperative Extension in 1976 and quickly became a go-to person for the beekeeping industry in California. As he spent more time immersed within California beekeeping, many others such as government entities, non-profit organizations, commodity boards became reliant on him for scientific and practical information. In collaboration with other UC Davis bee researchers, he conducted applied studies immediately relevant for the contemporary beekeeping industry. Shortly before I came to the University, Mussen retired in 2014. I will always be grateful to him for introducing me to the California beekeeping community, for offering guidance, and persistent willingness to give advice while making sure I become fully integrated within the California beekeeping industry.

It was truly my great honor and privilege to learn directly from two great bee researchers and educators. There is absolutely no replacement for their innovation and ingenuity in tackling challenges plaguing bee health, and I only hope I can serve California stakeholders as well as they have. They are very missed!

The People: 2010s to Today

Currently, the Bee Program in the Department of Entomology and Nematology has three core faculty members charged with conducting research and formal and informal education on bee biology and health. Neal M. Williams joined the department in 2009 where he continues working on wild bee biology, native bee conservation and pollination biology. He is devoted to developing supplemental forage mixes to enhance nutrition of all bees in agricultural landscapes of California, as well as modeling potential risks and benefits to bees within California lands. Brian R. Johnson joined the department in 2012 with a strong background in bee behavior. At UC Davis, he continues to study the genetic basis of bee behavior, bee defenses, impact of number of stressors on bee health, spread of *Apis mellifera scuttelata* hybrids within California, and occasionally conducts projects involving other insects. Most recently, he has published a book *Honey Bee Biology* which is bound to become a staple reading for beekeepers and researchers alike, and his second book should be coming out soon, so keep an eye out for it. I joined the department as an extension apiculturist in 2014, and learned quickly that I still have much more to learn. California beekeeping is not for the faint of heart and I am really grateful for the super supportive California beekeepers whose backing has allowed me to develop my research and extension program to an advanced level. My team and I conduct research that is directly applicable to beekeepers, including *varroa* mite management, improved nutrition and enhanced crop pollination. Extension activities are done by all members of my team and they range from offering beekeeping courses and giving club presentations through the California Master Beekeeper Program, all the way to offering technical services such as bee testing and colony inspections through newly established UC Davis Bee Health Hub. Several other of our UC Davis colleagues conduct bee research and we often collaborate with Rachel Vannette and Santiago Ramirez, as well as the two new USDA Bee Researchers Arathi Seshadri and Julia Fine.

Thank you for letting me take you on this short, yet (you hopefully agree) impressive journey through the history of UC Davis Bee Program. Make sure you stay tuned for the next articles in this UC Davis series, and with the upcoming start of pollination season it seems only appropriate to continue with an article delving deeper into some of the bee health and crop pollination research being done in the E. L. Niño Bee Lab. “See you” next month! BC

[2]To read more about E. C. Mussen, visit: https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=52399

BEE VET

New Beginnings

Dr. Tracy Farone

To keep you warm this cold Winter month, our next lesson will be covering the reproductive systems of the honey bee. Unique to our typical domesticated species, honey bees have multiple ways to "make more bees," depending what perspective one is considering. Honey bee reproduction involves actions at the individual, at the superorganism, and/or at the beekeeping management level/s. The superorganism can reproduce itself by swarming or beekeepers can split colonies. Virgin queens must go on mating flights to interact with multiple drones, a dozen or more, to collect sperm for egg fertilization. Beekeepers can create new queens (and therefore new colonies) by mastering queen rearing and/or queen grafting. Some beekeepers and universities have even utilized artificial insemination (AI) of virgin queens to create new progeny.

Amongst all animals the reproductive system is the only system that is **not vital** for the survival of the individual. The reproductive system is the last system to receive an organism's resources. An organism will not try to reproduce if it cannot support itself. This is also true of the honey bee colony and why functional reproduction is such an important indicator of colony health. This study will focus on the anatomical and physiological systems of each individual involved, the queen, the drones and even the worker bees and the effects of their contribution to reproduction within the superorganism.

The Queen's Cabinet

What it is / What it does

Much like many animals, queens have paired *ovaries* that ultimately produce eggs (ova). Full development of the ovary only takes place after a queen has been mated. Mature ovaries increase in size up to eight times and occupy much of the abdomen in mature mated queens (1). Eggs develop through a physical migration of portions of the ovary called ovarioles. Queens have more in number and more developed ovarioles compared to other females (workers). These differences are largely controlled by hormones and the differences in food fed to queens (all royal jelly) versus workers.

By themselves, eggs convey half of the queen's genes passed on to her daughters and her sons. Healthy queens are champion egg layers that would put any chicken to shame. During the peak beekeeping season, queens can lay up to two thousand eggs per day, 1.5 million in their lifetime (2). As the egg matures, they move out of the ovarioles to the oviduct and ultimately through the genital chamber to the outside world. Prior to entering the genital chamber, the egg passes by the opening of the *spermatheca.*

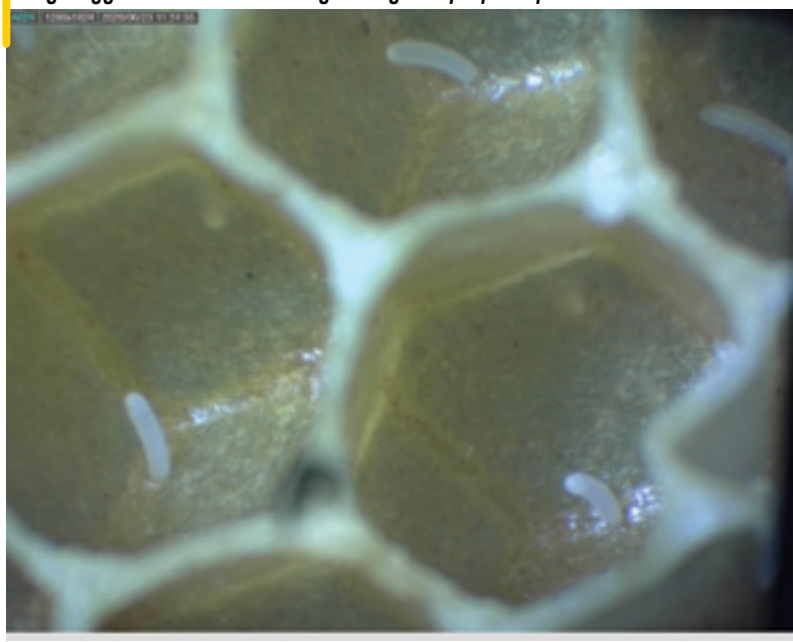
The spermatheca is an organ within the queen's abdomen that is capable of storing and preserving collected sperm over her lifetime. The spermatheca is connected to the oviduct within a chamber that contains a muscle and valve capable of allowing sperm from the spermatheca to meet the ova for fertilization… or not. Fertilized eggs result in a diploid individual (two sets of genes, from queen mother and daddy drone). Female honey bees are always diploid. Unfertilized eggs are haploid (no sperm, no genes from any drone, only genes from the queen mother) and result in male honey bees or drones.

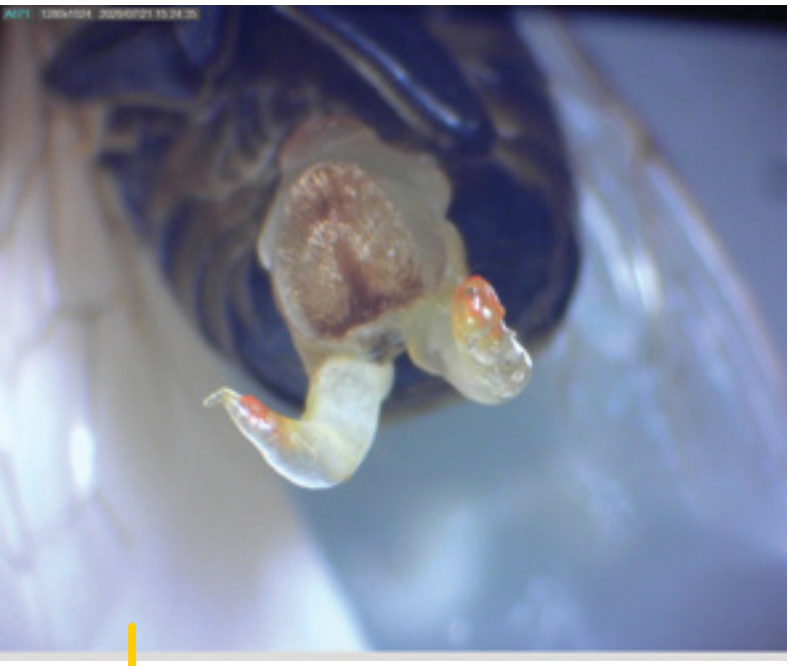
Five to ten days after hatching, virgin queens must go on one to three mating flights to obtain semen from a dozen or more drones. These matings often result in more sperm than the queen may need to store, and research suggests her reproductive organs ultimately mix and keep five to seven million sperm to fill her spermatheca while discarding any excess (1).

How it should look

While one cannot examine a live queen's ovaries or spermatheca. One of the best indicators of hive health is the presence of a normally laying queen. Mated queens have plump abdomens compared to virgin queens. Neuroendocrine changes, which occur after mating, change the queen's behavior, and tend to give them away. Queen mothers may move slower than virgins, have a retinue of attendants surrounding them due to their increased queen pheromone, and they may be observed laying an egg into a comb cell. Even if you do not see the queen, the presence of eggs within brood frames indicates that a laying queen has been present in the hive within at least the last three days. Normally eggs (and other stages of brood) may not be present in the late Fall and Winter months but

Single eggs in a comb cell are a good sign for proper reproduction





Drone endophallus

Lateral view of a drone endophallus exteriorized

should reappear in the Spring and Summer months. The presence of a healthy queen provides the colony with appropriate amounts of queen pheromone that helps to keep typical processes in the colony going on as normal.

Related Pathology

Queen failure is reported in beekeeping surveys to be one of the leading causes of colony collapse/failure. Lack of brood appropriate to season, hive aggressiveness, low population, generally weak hives and laying workers are all clinical signs consistent with queen issues. Older queens may fail due to deterioration of their reproductive ability to lay diploid eggs in proper quantities. "Poorly mated" queens may not have collected enough sperm to keep laying diploid eggs and/or provide genetically diverse offspring. Failure of a virgin/newly mated queen to return to her hive, excessive swarming, accidentally killing a queen and robbing are all common reasons for queen loss.

Drone brood

The Drone's Purpose

What it is / What it does

Drones, male bees, are often picked on for seeming to serve little purpose around the colony (other than sleeping, eating, drifting and having sex maybe once). However, providing genetic diversity is vital to colony survival. Like many other male animals, drones have testicles that produce millions of sperm (spermatozoa). Drones also have seminal vesicles that produce seminal fluid, which makes up much of the semen. A vas deferens carries the sperm from the testicle during ejaculation. Drones do not have a stinger. Instead, they have a large copulatory organ or phallus that is exteriorized during mating. After mating, the phallus breaks off from the drone's abdomen which essentially eviscerates and ultimately kills the drone. The phallus remains within the vagina of the queen and is referred to as the "mating sign." The next suitor drone will typically remove the previous mating sign before mating with the queen himself. This process continues until the freshly mated queen returns to the colony at the completion of her mating flight/s.

Side note Since drones lack a stinger, they make good models for handling bees. Use drones to practice holding/marking a queen or for showing honey bees to children. No sting!

How it should look

Mating signs may be seen as newly mated queens return to the hive. Workers typically remove mating signs soon after the queen's

return. Drones are typically present in healthy hives in the Spring and Summer months. The presence of some drones is a good sign in hives as healthy hives produce drones only when they have enough resources to support reproductive functions. Sexually mature drones will be drawn via pheromones to drone congregational areas (areas drones hang out and await virgin queens). Also drawn by pheromones, drones will compete to mate with a passing virgin queen. In the late Autumn, any remaining drones are removed from the hive to help save hive resources for the Winter.

Related Pathology

Drone brood, due to a longer developmental time, can allow for increased propagation of *Varroa* mites. Many beekeepers may remove or reduce the amount of drone comb in their colonies for this reason. A hive full of drones is trouble and headed for collapse. All eaters and no workers. Lack of a laying queen and the pheromones she produces can cause workers to start to lay haploid eggs, which results in producing only drones. Read on to workers…

The Workers' Yoke

What it is / What it does

You may be surprised that workers are included in reproduction, but they play a role as well. Workers are female but are considered sterile in the practical sense. Workers do have ovaries, but their ovaries are small and deactivated during pupal development. Under normal conditions, workers do not lay eggs.

Worker's role in reproduction is incredibly important in the rearing of the young. Workers build comb that house the brood, collect outside resources to provide food resources for the hive, and nurse workers provide for every need of developing brood. Nurses make food to be fed to the larvae through exocrine glands of their bodies. This is somewhat analogous to breast feeding in mammals. We also know that through trans-generational priming, workers play a key role in feeding queens pathogen particles that may enhance immune responses in offspring. Again, this process is somewhat analogous to immunity passed through mother's milk.

Swarms are one way honey bees reproduce

How it should look

Workers should dominate the population of the hive and be active in the various roles of the colony at seasonally appropriate times. Brood frames should consist of the highest density of workers, mostly nurses caring for the brood.

Related Pathology

If a colony becomes queenless for 35+ days, it may become a "laying worker" hive. Due to a pheromone imbalance, workers' ovaries will become active, and workers will start laying eggs. The eggs will often be laid irregularly, multiple eggs in a cell or even outside of the cell. However, because workers are not mated, they are only capable of laying haploid eggs which will become drones. A colony overrun with drones will quickly run out of resources, be overcome by disease and starvation, and ultimately collapse.

Bee "Births"

Before we leave this subject, I thought I would leave you with another analogy. One of the most exciting times in the study of the reproduction system in any animal is the birthing process. While honey bees do not go through a pregnancy and vaginal birth like mammals, honey bees instead have two types of "birth" in bees: when the egg is laid and then the incubation and "hatching" of the brood within the comb. Both processes can be witnessed within a hive and are always fun to watch.

Next month, we will navigate the digestive and excretory systems of the honey bee! BC

References and for further information

1. Collison, Clarence. "A Closer Look: Queen Post-Mating Changes." *Bee Culture Magazine*. April 2021. pp. 32-34.
2. Collison, Clarence. "A Closer Look: Queen's Reproductive System." *Bee Culture Magazine*. February 2022. pp. 32-34.

Collison, Clarence. "A Closer Look: Honey Bee Eggs & Oogenesis." *Bee Culture Magazine*. December 2020. pp. 33-36.

Collison, Clarence. "Drone Biology and Behavior." *Bee Culture Magazine*. March 2021. pp. 56-59.

Vidal-Naquet, Nicolas. Honeybee Veterinary Medicine: *Apis mellifera* L., 5m Publishing, 2015.

Beeinformed **https://beeinformed.org/wp-content/uploads/2023/06/BIP-2022-23-Loss-Abstract.pdf** Accessed November 1, 2023.

More on transgenerational priming: **https://www.dalan.com/media-publications**

Alternate sexual interactions in the bee world

Bumblebees make love in flowers

Off the Wahl Beekeeping

A SWARM VACUUM

Richard Wahl

Swarm Inevitability

It seems that once one gets into *managing* honey bees (the word "keeping" seems much too simplistic) there is the inevitability of eventually dealing with swarms. Whether those swarms are emanating from your own hives, or the result of a call from an excited friend or neighbor who knows you are a "beekeeper", sooner or later the capture of a swarm can become just as enticing as caring for the bees that you have. After all, the capture of a swarm is like getting a huge return on an investment at no cost for the additional bees, other than another hive to house them in.

As I have stated before, my initial foray into managing bees was the result of a swarm capture. For nearly all of the following years, I had swarms arrive near my beeyard. As more friends learned that I was keeping bees one individual asked for advice about bees entering her father's home around a basement window. Further discussion revealed that there was a small entry hole, at the brick exterior of the home, near a basement window and there was no interest in tearing out brick or drywall from the interior to get to the bees. I suggested the only possible option was to find a beekeeper with a vacuum system and see if they could help. I later learned that several calls to exterminators were declined as they would not destroy honey bees. A beekeeper was eventually found with a vacuum system who was then able to remove most of the bees.

A year or two later a different friend called to ask if I could help with bees entering his home at a first floor overhang. My first inquiry was whether he was sure these were honey bees. I always ask for a picture or some assurance before traveling to any location as there are just as many cases where calls for bee help result in the bees being yellow jackets or some other type of bee which might require an exterminator rather than honey bee capture. Not knowing the exact layout of my friend's home, I decided to at least take a look. He allowed me to remove a piece of wood plank fascia on the overhang and it was obvious the bees were entering a half inch space between two 2 x 4 studs and probably residing in the floor space between the first and second floors.

After a bit of watching, I again advised that if exterior or interior construction could not be removed the only option was to find a beekeeper with a vacuum system which I did not yet have. This friend again, found such a beekeeper who used most of a Summer day's daylight to vacuum as many bees as he could. Taking his catch home that evening he placed them in a hive. The very next day my friend called this beekeeper to say the bees had seemed to return. Upon checking his hive the assisting beekeeper found his captured bees had indeed left. It turns out the beekeeper only lived about a mile away from my friend and the bees had returned to his house. The old adage of moving bees at least three miles away to keep them from returning to their prior hive site would seem to have been proven true. The beekeeper was kind enough to repeat the entire capture process a second time and delivered them to a hive over 25 miles away. As it turned out, that site was only a few miles from my home and the assisting beekeeper was kind enough to call me to ask if I would like to see his vacuum system. We arranged a time when he would be visiting the new nearby hive location and he graciously drove a few extra miles to demonstrate his vacuum system at my home.

The complete set up of vacuum components. Notice the plywood frame insert on the left that will be reversed to screw over the bee entry point on the window frame.

Bee Vacuum Assembly

I was intrigued and I determined that making a swarm vacuum system would not be very difficult. I purchased a one horse power wet/dry shop vacuum and two eight foot pieces of two inch diameter corrugated plastic pipe. Smooth sided would be better, but at the time I could not find anything other than the corrugated style. A year or so went by with these supplies sitting in my garage when once again I received a call from an individual with honey bees entering his brick house just below a second floor window. I quickly assembled my bee vacuum system that evening with plans to go to the house the next day. The assembly was quite easy.

Screened base super with vacuum entry hole and adjustable suction hole.

As a base, I used a medium honey super, nailed a piece of luan (very thin plywood) to the bottom and stapled ⅛ inch hardware cloth to the top. Around the top edge, I added a ¼ inch strip of soft rubber insulation commonly used to seal window or door cracks. I drilled two holes in one end of the medium super. One hole accepts the vacuum hose while the other serves as a vent in order to

adjust the suction drawn by the vacuum. The vent hole has a thin, four inch plywood cover held by one screw so as to adjust the open space over the vent hole. I added tapered extended side cleats to hold an upper deep super in place over the bottom medium super. The upper deep super holds the frames that the bees are being sucked into.

The underside of the telescoping outer cover with a band of rubber insulation along the interior.

Over this upper deep, I made a telescoping outer cover of plywood. There is no need for an inner cover. The outer cover has a center sliding door to cover the hole for the two inch transfer plastic pipe tube. I also cut in two plastic windows in the top to be able to see how many bees were getting sucked into the upper deep. The outer cover also has that same ¼ inch insulation strip around the inner four sides to ensure the suction moves air through the pipe and screen of the bottom super. The outer cover was the only part that took a bit more construction effort since I wanted windows in it to see what the results were during use.

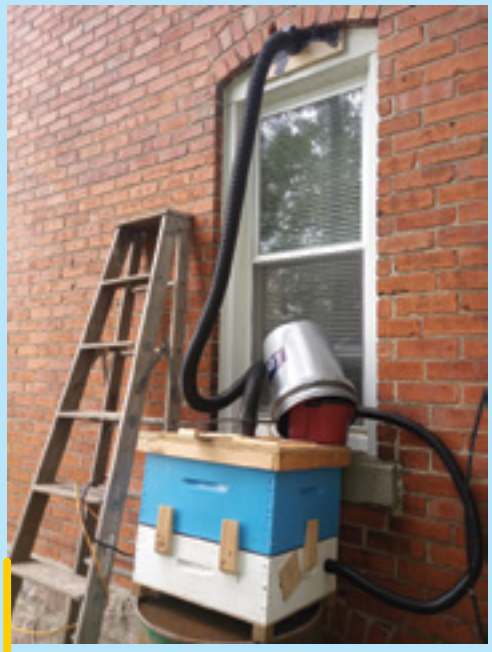
First Vacuum Use

Arriving at the house with bees, I sat the bee vacuum supers on a fifty gallon barrel under the spot where they were entering and exiting the brick exterior near a window. After an hour or so of trying to maneuver the two inch pipe tube to capture entering and exiting bees, I determined that process would be much to slow to catch many bees. I waited until after dark when I knew most of the foraging bees would have returned. I then used a large nail through the top edge of the pipe tube pounded into a crevice in the brick to hold the tube in place over the bee's entry hole. With an ample amount of duct tape the area surrounding the tube was sealed off so the only exit was into the tube which fed into the top deep super with ten frames in it. I turned the vacuum on to adjust the air inlet door and see that bees were getting sucked into the deep without damage to them. I instructed the home owner to turn the vacuum on as soon as able the next morning.

After running the vacuum for over a day, I had a nice collection of bees in the upper deep. Late that evening, I removed the vacuum, closed the top cover entry hole with my homemade door, removed my hose tube and loaded the supers into my pickup for the trip home. Although I am sure there were still bees remaining inside the brick interior, I felt I had collected most of them as I was told they had only started entering the home on the day previous to my arrival. I used a sheet of newspaper over a hive super in my beeyard and set the capture deep over the newspaper. By the time the bees chew through the newspaper they acclimate to the residing queen with no fighting between the original hive bees and the captured bees. I was quite sure the captured bee's queen had been left behind. The next morning, I removed my see through outer cover and replaced it with the normal inner and telescoping outer covers. After I left, the homeowner then sprayed an insecticide in the entry hole for several days until he saw no more bees and then sealed the hole. I was told several years later that he had not seen any more bees after my vacuum removal and his sealing of the entrance point. However, this was not the case in my next experience to use the bee vacuum.

Subsequent Uses

A year or so later I received a call from my son-in-law that honey bees were entering his father's empty brick house in a crack below a window. So off I went to set up my bee vacuum. My son-in-law traced the brick arch of a matching window on a piece of cardboard so that I could make a plywood shape that fit tightly over the entry point that would be directly screwed to the upper window framing. The surrounding area was again sealed with duct tape. Since my son-in-law boards horses, it is usually before sunrise and after dark when he tends to them. So for three consecutive days he turned on the vacuum before sunrise and turned it off after dark. Since he knew the bees had been entering the house for a few weeks I felt a longer time with the vacuum running would capture more bees. Having planned for this longer event, I had placed a frame feeder in the hive deep partially filled with water for the captured bees to drink if needed. I also added two frames of previously drawn comb honey for a food source for the bees. After the third day, I retrieved the vacuumed hive and with the paper method described before, added them to one of my apiary hives. From previous use, I had determined that setting the hole on the bottom super to about half open seemed to allow the best vacuum suction with the least damage to bees. There will be a few dead bees found lying on the screen of the suction super, but I would assume these were most likely older foraging bees that would have died soon regardless. The tube corrugation did not seem to have too detrimental effect on the bees.



Vacuum in use, notice the plywood insert plate at the window top and the bucket for rainy day pump protection.

I assumed my son-in-law would have closed off the entry point after I informed him I had retrieved the bees, but that assumption was incorrect. With three daughters showing horses at Summer county fairs, a work schedule and normal farm and family chores, he simply did not get back to sealing up the entry point on the empty house. He notified me about a month later that more bees were

back, coming and going from the same entry point. With a water source and food source in the capturing deep, the vacuum was again put to use over several days. After two days of vacuuming, I got a call that there were many more bees outside at the entry point than had been seen outside on the previous recovery try.

A quick inspection revealed that the bees had found two other nearby locations with cracks in the brick to enter and exit. After dusk that day I knew most of the foraging bees would have returned and either found their way back in or be hanging nearby outside. I collected as many of these outside bees as I could with the vacuum tube, sealed the secondary entrances with caulk and tape and continued to let the vacuum run for another two days. Through the outer cover windows, I could see that the frames were covered in more bees than I had ever recovered before with this method.

Apparently the bees, not having foragers return to inside the brick entrance and with the continual disturbance, decided to abscond from inside the house. After removing the vacuum tube from the window, I found almost no bees coming or going from the entrance hole and those still outside did not seem at all interested in re-entering the house. I do not know if the queen left the house as would be the case with absconding. The next time I use this method to capture bees, I will house them in a separate hive for a few days and check for a queen rather than immediately marrying them to an existing hive.

Lessons Learned

In summary, here are a few things I learned. Be able to adjust the vacuum suction as the gentlest suction is less detrimental to the bees. Provide a food and water source inside the collection hive if running the vacuum for more than a day. A longer number of days using the vacuum will result in the capture of more bees. If the vacuum is run for more than three days, the bees may decide to abscond from the interior of the house resulting in the capture of nearly all the bees. Use a five gallon bucket or inverted tote to cover the vacuum in case of a rainy day. Settle the bees into a new hive without being married to another hive as this will allow one to check to see if a queen was captured. Unless there is evidence of absconding, it is unlikely the queen will be captured. When attaching the thin plywood or luan to the bottom of the screened super, use screws instead of nails so it can be removed for cleaning. After three days or several uses, there will be an accumulation of some debris at the bottom super panel and screws would make it easier to remove and replace. I have now employed my vacuum on five occasions and the marriage of those bees to an existing hive has always seemed to strengthen the existing hive with no noticeable negatives. With very little construction effort and a small one-horse vacuum, I have been able to rescue bees that otherwise may have been destroyed. My goal for this article was to provide some insight for the use of a vacuum system. Using this vacuum system has provided me another experience in the management and collection of free bees. BC

Bees found alternate entry points about a foot above. These bees are still looking for the original entry point.

Bees seen through cover window with center entry hole closed.

For the Love of Bees

Some of the ways backyard beekeepers benefit commercial operations and vice-versa

Listen along here!

The beekeeping community is generally divided into two primary categories. There are commercial entrepreneurs and small-scale part-time backyard beekeeping enthusiasts. Commercial operators can be further broken down into full-time and part-time sideliners. It turns out that while all these groups all tend to have very different underlying motivations, they all share many similar types of knowledge and practices, and mutually support one another.

The similarities among these different groups and how they interact with each other is the subject of a 2023 paper authored by Kirsten Martinus, associate professor of the School of Social Sciences at the University of Western Australia. The paper titled, *'It's a love interest'—Enthusiasts and regional industry cultures of practice,* explores some of the similarities, differences and relationships between commercial and backyard beekeepers. While this study focused on a specific region of beekeepers in Western Australia, the information documented can be of benefit to beekeepers the world over due to the universality of the issues beekeepers face globally.

Dr. Martinus' work suggests that commercial beekeepers and backyard honey bee enthusiasts both stand to benefit by cooperating and working together to share knowledge and information. As Dr. Martinus notes, "the findings point to the importance of informal non-firm actors in place-specific problem solving through a culture of exchange and mutual endeavor. This suggests that developing a regional industry culture of practice and entrepreneurship may support collaborations between hobbyists or enthusiasts and local business counterparts, which in turn will enhance regional competitiveness, identity and placemaking." To put it simply, backyard beekeepers and commercial beekeepers can, and often do, support and benefit one another.


Ross Conrad

The Australian beekeepers studied shared a sense of local beekeeping tradition and long-time commitment, given that the majority use the Langstroth hive as opposed to alternative hive designs. For commercial operators, this was partly because other methods are not seen as commercially viable, due to the large capital investment in equipment required to change. It is also because some hive designs were not seen as authentic, as in the case of the Flow Hive.

Although much of the technology and management used in beekeeping is similar globally, this study acknowledges the importance of generalized regional variations depending on local weather, climate and whether colonies are located in urban, farmland or rural settings. *'It's a love interest'* notes that beekeeping "is an activity that requires both scientific and practical knowledge on bee behaviors, husbandry and hive care, as well as knowledge that is deeply embedded in 'place' such as weather, flowering times and places, and state and local laws around bee management and ownership."

Commercial beekeepers are widely understood to be "regional assets" or "resources" that can help local beekeeping groups and shape new industry paths. Meanwhile backyard beekeepers have the luxury of being able to experiment and explore novel beekeeping techniques since their apicultural activities are decoupled from their livelihoods. The lines between commercial and backyard beekeepers often gets blurred however, such as when commercial operators retire and transition to part-time, when professionals mentor backyard beekeepers, and when commercial beekeepers receive fresh insights through informal exchanges with part-time enthusiasts.

A relatively low conversion rate from backyard to commercial beekeeper was observed. A backyard beekeeper's commercial transition depends not only on "innovation but on willingness to upscale operations after acquiring skills and knowledge." Some of the greatest barriers to commercializing a backyard operation are related to finances, liability and beekeeping competence. My own observation is that many commercial beekeepers get their start working for a commercial beekeeping operation. This allows them to get paid while they build the skill level they need to be successful on their own.

We beekeepers are free to practice an ever growing array of different types of beekeeping management with hives of various styles, different types of bees, and hard chemical, soft chemical or non-chemical treatment options just to name a few. We also adopt a wide variety of underlying motivations for engaging in beekeeping activities. Backyard beekeepers may enjoy the intellectual, educational and social aspects of beekeeping, while others may simply be looking to provide pollination for their gardens. Commercial beekeepers are primarily concerned with earning a living, managing colonies efficiently and reducing the physicality of their bee work. They were found to primarily work collaboratively on issues that address profitability and business viability.

The study found that the "novel and diverse local and technical know-how, personal experience, scientific and technical skills and occupational backgrounds, and social and work networks" that backyard beekeepers bring to their craft may offer commercial beekeepers an "external and complementary knowledge source". The value of this contribution to the industry however, is not widely recognized. As one operator is quoted as saying, those in commercial bee-

The Australian beekeepers studied rely heavily on meetings, events and conferences to keep up on the latest research. However, while knowledgeable speakers are valued, a lot of information exchanges take place between programs, out in the hallways where beekeepers share ideas and management practices.

keeping "think hobbyists don't know anything, and hobbyists know they don't want to do it on a big scale."

The backyard beekeeping enthusiast plays an important role in improving community and social acceptance of beekeeping and helping to raise awareness of the importance of bee decline. They are more likely to get involved in honey bee related activities within their communities and this improves the industry's profile overall by increasing social awareness of the industry and the plight of the bees. Their community engagement helps to strengthen society's connection to beekeeping and the environment. This in turn can also help change local policies and laws that relate to beekeeping activities.

Dr. Martinus found that backyard beekeepers are generally less knowledgeable about bees and beekeeping than commercial operators, which may be why they are more willing to spend more time seeking and sharing knowledge. While backyard beekeepers tend to be quick to share know-how and experiences, commercial operators were found to generally be more protective of industry secrets and information.

Enthusiasts viewed the sharing of ideas and experiences as a way to enhance the beekeeping community. This process is facilitated through formal activities such as bee club and association meetings, classes and workshops and informally through mentorships. All this is in addition to more open access forms of accessing information through blogs, extension service and scientific websites, association or government newsletters and beekeeping journals and periodicals.

The primary focus of backyard beekeepers on basic beekeeping information makes sense given the steep learning curve necessary to get up to speed in bee culture. Less experienced beekeepers tend to be highly dependent on the knowledge of seasoned beekeepers and often adopt a "belief in the person". The study notes that most enthusiasts felt "they received more information than they passed on, and that information was 'unlocked' through a gradual process of increased community status and credibility as they gained knowledge, experience and skill." This process also impacts how a beekeeper is viewed within the wider beekeeping social network 'because everyone knows everyone'.

All too often we beekeepers can be judgmental and seek to establish an ego driven pecking order and try to improve our status amongst our peers. A quick and dirty method many of the Australian beekeepers studied used to evaluate another's commitment and profitability as a beekeeper is by assessing the number of years keeping bees (part-time)

Whether it's a few hives in the backyard or thousands, beekeepers of all sizes love their bees.

or the number of hives one manages (commercial). Of course, the use of such proxies to judge another's seriousness as a beekeeper is fraught with error and can often be wildly mistaken, but they are commonly used nonetheless.

While keeping bees typically is an isolated activity, learning how to keep bees has a strong social component. This study documented the beekeeping community's openness and willingness to share management techniques and has built into its ecosystem various opportunities for enthusiast-professional interactions at meetings, conferences and events, all of which serve to strengthen the overall beekeeping community. According to Dr. Martinus, "…hobbyists can be conceived as 'apprentices' engaged in legitimate peripheral participation where learning and mastery occurs through participation" in beekeeping. Furthermore, "…interactions between individuals produce a shared identity, related to both individual skill acquisition and an individuals' existence within a certain context of and having competencies within the group." Additionally, "…learning of practice then does not always occur in the same locality or in organized forms (e.g. work teams), but also informally through shared experience, passion or expertise and can occur across space and may include professionals, semi-professionals and hobbyists."

The sharing of beekeeping information and techniques is facilitated by the fact that we are all working with the same insects and have a similar base of knowledge. There is a wide network of both formal and informal opportunities where individuals can connect with each other, allowing beekeepers to share and obtain meaning through the active process of learning by tackling similar problems and issues. Knowledge sharing between non-commercial and commercial groups allows for the exchange of perspectives which can be critical to figuring out what will work in one's specific situation.

Dr. Martinus summarizes her work this way: "This research has found extensive direct and indirect interactions between hobbyists and operators, which have enhanced the value of hobbyist activities and have become channels for industry and

Historically, a beekeepers commitment and profitability have been judged by asking questions like "How many hives do you run?" and "How long have you been keeping bees?" In the age of varroa and neonicotinoid pesticides, a new question is often used to quickly evaluate ones seriousness as a beekeeper: "What percentage of your colonies did you lose this Winter/year?"

community appropriation. As firm external knowledge sources, hobbyists did not fit current understandings of how user innovators might support industry. This finding perhaps reflects the low-tech character of beekeeping, which allows hobbyists to engage in non-profit markets alongside commercial ones. Hobbyists were both market competitors forcing operators into niche markets focused on tourist, mono-floral, high-value honey and collaborators involved in adapting global scientific or practical knowledge to the Western Australian context given the commercial focus on small process or technical/mechanical changes to improve productivity. Hobbyist activities were also of wider societal benefit, lifting community science levels, counteracting climate change, and changing industry's operational context by changing policy and shifting societal images of bees and beekeeping."

According to Dr. Martinus, the results of her study can be used to strengthen the beekeeping community in a couple ways: First is through "Better support for interactions between hobbyists and industry … for example funding or in-kind support to grow mentoring or internship schemes. These appear critical in the transfer of practice between the groups; it also provides a source of low cost labor for industry, and encourages responsible beekeeping amongst new hobbyist beekeepers as a means to address biosecurity threats."

The second way her findings can strengthen the beekeeping industry is through "more appropriate policy in local governments – local laws on domestic keeping of animals particularly in urban areas, does often not adequately address beekeeping. This would recognize the importance of hobbyist beekeepers in the community (and bees in the environment). Related to this – the enactment of laws around urban beekeeping is often ad hoc, as local officials often do not understand bee behaviors and may be inclined to take an overly-cautious approach towards bees in urban areas in dispute resolution."

Despite the huge diversity in practices and motivations among beekeepers, we all are dealing with many of the same issues from how to handle swarms, deal with foraging dearths, diseases, pests, queen issues, honey harvesting, timing of nectar flows, pesticide poisoning, etc. Ultimately, we are all in the same boat. By valuing and capitalizing on our differences rather than judging or denigrating them, we stand to create a stronger, more resilient beekeeping industry. A valuable lesson that is applicable not only to our industry, but many other areas of our lives as well. BC

Table 1. Honey Production – Number of Colonies – Yield Honey Average by Colony

		Canada	Argentina	Mexico	Brazil	USA	Spain
1961-1970	*Production Kg*	19,125,200	21,900,000	31,290,900	7,386,500	115,147,000	9,207,500
	Colonies	394,926	709,000	1,371,958	295,520	4,975,400	641,484
	Average Kg	48.00	30.00	22.00	24.00	23.00	14.00
1971-1980	*Production Kg*	25,936,800	25,960,000	53,421,600	5,747,600	94,601,500	10,172,300
	Colonies	506,297	915,000	2,026,477	230,038	4,171,800	618,750
	Average Kg	51.00	28.00	26.00	24.00	22.00	16.00
1981-1990	*Production Kg*	36,617,500	41,492,200	60,323,700	12,023,000	89,776,300	17,888,000
	Colonies	645,952	1,370,000	2,382,971	493,000	3,763,000	1,310,400
	Average Kg	56.00	30.00	25.00	24.00	23.00	13.00
1991-2000	*Production Kg*	33,014,000	70,700,000	57,342,800	19,167,200	97,222,600	26,983,300
	Colonies	530,687	1,930,000	2,008,316	817,000	2,769,200	1,807,810
	Average Kg	62.00	36.00	28.00	23.00	35.00	14.00
2001-2010	*Production Kg*	35,896,000	80,700,000	56,541,800	32,839,100	75,912,700	32,380,700
	Colonies	596,771	2,923,000	1,775,309	907,500	2,505,500	2,345,254
	Average Kg	60.00	27.00	31.00	36.00	30.00	13.00
2011-2020	*Production Kg*	39,907,800	72,131,700	58,262,500	40,849,000	70,052,900	31,906,600
	Colonies	689,907	2,977,666	1,969,026	995,372	2,685,444	2,696,306
	Average Kg	57.00	24.00	29.00	41.00	26.00	11.00

Pablo Montesinos Arraiz

Honey Production and Races of Honey Bees in Six Countries

Introduction

In different ecosystems, under the influence of selection resulting from climate, flora and enemies, honey bees adapted to the prevailing conditions just as it happened with other wild animals and plants. This resulted in populations of bees called natural, geographic races or subspecies, isolated from each other, representing very different genotypes adapted to different ecological environments. So, throughout the world, bee races form the gene pool or genetic base available to bee breeders for population improvement (Ruttner, F., 1975).

The objective of this study was to analyze honey production, yield honey average by colony and growth rate of colonies from 1961 to 2020, relating them to the use or not of one or several races of honey bees, in Argentina, Brazil, Canada, USA, Mexico and Spain.

Methods

The information has been taken from the Corporate Statistical Database of the Food and Agriculture Organization (FAOSTAT). 2020, except for what refers to the number of colonies in Spain for the years 2019 and 2020, which has been from the Ministerio de Agricultura, Alimentación y Pesca of Spain, since these data were not available in FAOSTAT, at the time the query was made. To facilitate the interpretation of the information, Table 1 represents: Honey production – Number of colonies – Yield honey average by colony, in six periods of ten years each; and Table 2: Growth rate of colonies by decades.

Results

In Table 1, it can be seen that Spain has the lowest production and lowest yield honey average by colony in all decades (also at the production year by year from 1961 to 2020, FAOSTAT). The yield honey average by colony in Spain is between 11 and 12 kilograms less than the lowest averages in the other countries in the study. In Table 2, it is observed that all countries in the study show ups and downs in the growth rate of colonies by decades. Only Brazil stands out in the decade from 1981 to 1990, in which it had a growth of 133.3% and Argentina of 97.4% in the decade from 1991 to 2000.

Table 2. Growth Rate of Colonies by Decades

Decades	*Canada*	*Argentina*	*Mexico*	*Brazil*	*USA*	*Spain*
2020	711,257	2,983,247	2,148,420	1,031,216	2,706,000	3,102,113
2011	637,920	2,970,000	1,847,667	1,094,000	2,491,000	2,440,030
Growth Rate	*11.4%*	*0.4%*	*16.2%*	*-5.8%*	*8.6%*	*27.1%*
2010	620,291	2,970,000	1,842,130	1,000,000	2,692,000	2,438,550
2001	602,328	2,800,000	1,862,372	820,000	2,550,000	2,298,110
Growth Rate	*2.9%*	*6.0%*	*-11%*	*21.9%*	*5.5%*	*6.1%*
2000	599,863	2,961,821	1,875,731	824,000	2,622,000	2,125,100
1991	498,780	1,500,000	2,114,489	812,000	3,211,000	1,611,000
Growth Rate	*20.2%*	*97.4%*	*-11.2%*	*14%*	*-18.4%*	*31.9%*
1990	532,205	1,400,000	2,114,489	700,000	3,210,000	1,560,000
1981	633,500	1,300,000	2,532,200	300,000	4,213,000	1,013,000
Growth Rate	*-16%*	*7.6%*	*-16.5%*	*133.3%*	*-23.9%*	*53.9%*
1980	607,800	1,100,000	2,380,600	280,000	4,141,000	797,000
1971	396,420	800,000	1,618,000	242,376	4,107,000	512,200
Growth Rate	*53.3%*	*37.5%*	*47.1%*	*15.5%*	*0.8%*	*55.6%*
1970	407,560	800,000	1,665,700	253,000	4,634,000	447,700
1961	336,910	650,000	1,985,000	310,000	5,514,000	728,100
Growth Rate	*20.9%*	*23%*	*-16.1%*	*-18.4%*	*-16%*	*-31.7%*

Discussion

In all countries of the North American continent, several races of European bees have been traditionally used (Michener, 1973; Taylor, Levin, 1978; Hellmich et al., 1986; Quezada-Euan, Paxton, 1999; Gûzman-Novoa et al., 2007). To that European genome was added the genetic load of the African race *Apis mellifera scutellata* in its colonization journey, which began in Brazil in the 1950s through South America, Central America and the southern United States. These African bees crossed with European races, both in the wild and in apiaries, resulted in varieties of races generically called africanized meaning a cocktail of genes from *Apis mellifera scutellata* with genes from the European races *Apis mellifera carnica, Apis mellifera ligustica, Apis mellifera mellifera*. The limit to their movement was in Chile, southern Argentina and the northern United States due to the temperate temperatures to which they were not able to adapt (Taylor, 1977; Kerr et al., 1982; Sugden, Williams, 1991; Taylor, 1999, Pinto et al., 2005). Beekeepers in Argentina, Brazil and Mexico, as well as in the rest of the countries of South and Central America, base their honey production on bees that have a pool of genes from several races that have established themselves as ecotypes and on the development of breeding and selection queen programs, while still importing queens to maintain a constant flow of genetic variability.

In Canada, it is essential that, in all genetic improvement programs in animals and plants, the population of interest contains genetic diversity from which progress can be made towards the "selection" of desired characteristics. In short, "the raw material for all breeding programs is genetic variability" (Sheppard, 2019). To promote genetic diversity in queen selection and rearing programs and to address colony losses and replace weak queens, queens and packages of bees have been imported from Russia, in addition to those imported from Australia, New Zealand and USA (Statistical Overview of the Canadian Honey and Bee Industry, 2019).

The quantity and value of queen imports into Canada have increased significantly over the past two decades. Just over 100,000 queens were imported in 1998 and by early June 2017 Canadian beekeepers had already purchased 207,764 queens from the U.S. and another 18,216 queens from other international sources (Canadian Honey Bee Queen Bee Breeders' Reference Guide, 2018).

Honey bees in the United States are a heterogeneous mix of several races introduced from Europe, the Middle East and Africa, with four main ones standing out: Italian, Caucasian, Carniolan and Black. The current populations come from varieties and hybrids that were developed through crossbreeding and selection programs combined with geographical and climatic influences from those original races that gave them their name (Selecting the right type of bee, Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC) Fact Sheets). To these varieties and hybrids in the southern states, the genetic load of

Africanized bees that began to arrive in the nineties was added (Sugden, Williams, 1991; Taylor, 1999). Cobey et al. (2012) point out that the many problems currently facing the U.S. honey bee population are influenced by the need for genetic diversity at the colony, reproduction and population levels. Genetic variability has been reduced by three distinct bottleneck events, namely, limited importation of subspecies and queens, selection pressure from parasites and pathogens (particularly parasitic mites), and inappropriate commercial queen production practices based on a small number of queen mothers in the breeding population. Thus, they conclude that the decline in queen quality and the problems of "poor queens" can be significantly improved by addressing genetic bottlenecks in breeding systems, increasing the overall genetic diversity of the queen honey bee population. Therefore, it is necessary to continue importing queens of proven quality from the most commercial bee breeds: Italian, Carnica, Caucasian and Black. Even using semen from various subspecies of European breeds to inseminate virgin queens from already genetically established populations.

The fact that the honey production and the yield honey averages by colony in Spain are so low compared to the other countries analyzed, could be due to the fact that beekeepers basically use a single race, the *Apis mellifera iberica* and very few other European races, unlike beekeepers in the other five countries in the study, where beekeeping has developed based on imported races, varieties and hybrids, in addition to the use of their own domestic race(s), increasing genetic variability, through the importation and breeding of other subspecies of *Apis mellifera*. In 2003, there were 10 queen bee breeders who were not controlled by any government institution (Costa, 2003). In 2020 (personal communication), the number of queen bee breeders for wholesale sale in Spain do not exceed thirty. They mainly breed queens of the *Apis mellifera iberica* race and some of the Buckfast hybrid. The Ministerio de Agricultura, Pesca y Alimentación of Spain, for the year 2021 had 67 bee selection and breeding farms registered, but did not specify how many of them sold queens commercially.

The *Apis mellifera iberica* subspecies now is a hybrid resulting from the crossing of the so-called European or Western honey bee, *Apis mellifera mellifera* L, and the African bee *Apis mellifera intermissa* (Izquierdo et al., 1985; Santiago et al., 1986; Cornuet, Fresnaye, 1989; Orantes -Bermejo, García-Fernández, 1995). In Spain, according to Smith et al. (1991) and Franck et al. (1998), there is a decreasing gradient of African haplotypes from south (86.4%) to north (0%). Spain seems to be a region of contact and hybridization between the two subspecies *A. m. intermissa* and *A. m. mellifera* L, representing the African and Western European bee lineages respectively (Smith et al., 1991). According to De la Rúa et al. (2002), genes from African races have not recently been incorporated into the *Apis mellifera iberica*, a subspecies in which it is worth highlighting many other species are differentiated. Besides, there could have been a stagnation of genetic diversity, resulting in problems of homozygosity and lack of hybrid vigor in contrast to what has been clearly demonstrated that genetic diversity between colonies and intracolonies increases colony fitness and survival, production and productivity and reduces the impact of pests and diseases as several authors state (Fuchs, Schade, 1994; Mattila et al., 2007; Richard et al., 2007; Tarpy, 2003; Seeley, Tarpy, 2007).

Recommendations for Spanish beekeepers

- Increase genetic diversity by importing queens of the main breeds of commercial value *Apis mellifera carnica, Apis mellifera ligustica, Apis mellifera mellifera, Apis mellifera caucasica* and strengthen the selection and improvement programs for both breeding and commercial breeders.
- Define methodologies for reproductive and phenotypic zootechnical assessment of queens, which will facilitate the establishment of protocols with common evaluation criteria and standards and procedures for selection and improvement of breeding stock.
- Promote commercial mating stations for queen breeders.
- Determine how genetic diversity and gene flow between populations impacts the phenotype and productivity of colonies, and how such a condition of genetic variability is expressed in beekeeping management. BC

About the Author

Pablo Montesinos Arraiz is a retired professor of Apiculture, Faculty of Veterinary, Universidad Centro Occidental Lisandro Alvarado (UCLA), Venezuela.

References

Ruttner, F. 1975. Races of bees. In: The Hive and the Honey Bee. Edited by Dadant and Sons. Pp 19-38. Dadant and Sons, Hamilton, Illinois.

Data on Food and Agriculture. FAOSTAT. In, Food and Agriculture Organization of the United Nations FAO. 2020.

Ministerio de Agricultura, Pesca Y Alimentación 2021.Gobierno de España 2020.

Costa, C. 2003.Bee breeding and genetics in Europe. Bee World 84(2):69-85.

Michener, Ch.D. 1973. The Brazilian Honeybee. BioScience. Vol. 23, No. 9. 523-527. Published By: Oxford University Press.

Taylor, O.R. Jr., Levin, M.D. 1978. Observations on africanized honey bees reported to South and Central American Government Agencies. Bull Ent Soc Amer.

Hellmich, R.L., Danka, R.G., Rinderer T.E., Collins, A.M. 1986. Laying-worker production of drones in mixed colonies of africanized and european honey bees (Hymenoptera: Apidae). Ann. Entomol. Soc. Am. 79:833-836.

Quezada-Euan, J.J.G., Paxton, R.J. 1999. Rapid intergenerational changes in morphology and behaviour in colonies of Africanized and European honey bees (*Apis mellifera*) from tropical Yucatan, Mexico. J. Apic Res., 38:93-104.

Gúzman-Novoa, E., Goodman, R.D., Huang, Z.Y., Morse, R.A., Reid, M., Yoshida, T. 2007. Beekeeping in various parts of the world. In: Shimanuki, H., Flottum, K., Harman, A., editors. *The ABC & XYZ of Bee Culture*. Medina, OH:AI Root Co:83-99.

Taylor, O.R.1977. Past and possible future spread of Africanized honey bees in the Americas. Bee World. 58:19-30.

Kerr, W.E., Río, S.L.D., Barrio Nuevo, M.D. 1982. The southern limits of distribution of the Africanized honey bee in South America. *Am Bee J.* 122:196-198.

Sugden, E.A., Williams, K.R. 1991. The day the bee arrived. *Glean Bee Cult.* 119:18-21.

Taylor, O.R. 1999. Displacement of European honey bee subspecies by an invading African subspecies in the Americas. In: Hoopingarner, R, Con-

nor, L., editors. Apiculture for the 21st Century. Cheshire, CT: Wicwas Press, pp. 38-46.
Pinto, A.M., Rubink, W.L., Patton, J.C., Coulson, R.N., Johnston, J.S. 2005. Africanization in the United States: replacement of feral European honey bees (*Apis mellifera* L.) by an African hybrid swarm. Genetics. 170:1653-1665.
Sheppard, W.S. 2019. Towards the Reintroduction of European Germplasm. In, Honey Bee Genetic Diversity and Breeding Jointly published in the American Bee Journal and in Bee Culture.
Statistical Overview of the Canadian Honey and Bee Industry 2019. Prepared by: Crops and Horticulture Division Agriculture and Agri-Food Canada June 2020.
Canadian Honey Bee Queen Bee Breeders' Reference Guide. Published 2018. Authors, Miriam Bixby, M. Marta Guarna, Shelley E. Hoover and Steven F. Pernal.
Selecting the right type of bee. MAAREC Fact Sheets. Mid- Atlantic Apiculture Research and Extension Consortium.
Cobey, Susan W; Sheppard, Walter S; Tarpy, David R. 2012. Status of Breeding Practices and Genetic Diversity in Domestic U.S. Honey. In, Honey Bee Colony Health.1st Edition. Imprint: CRC Press. Chapter 4.
Izquierdo, J; Domínguez, A; Albornoz, J; Santiago, E. 1985 Discriminación entre poblaciones de abejas (Apis mellifera) de Asturias y la Submeseta Norte. Boln. Ci. Nat. IDEA 35, 87–101.
Santiago, E; Albornoz, J; Domínguez, A; Izquierdo, J. I. 1986. E´ tude biométrique des populations d'abeilles (Apis mellifera) du Nort-Ouest de l'Espagne. Apidologie 17, 79–92.
Cornuet, J.-M; Fresnaye, J. 1989. E´tude biométrique de colonies d'abeilles l'Espagne et du Portugal. Apidologie 20, 93–101.
Orantes-Bermejo, F. J; García-Fernández, P. 1995. Morphological variability of Apis mellifera iberica in different apiaries of southern Spain. J. Apic. Res. 34, 23–30.
Smith, D. R.; Palopoli, M. F; Taylor, B. R; Garnery, L; Cornuet, J.-M; Solignac, M; Brown, W. M. 1991: Geographical overlap of two mitochondrial genomes in Spanish honeybees (Apis mellifera iberica). J. Hered. 82, 96–100.
Franck, P; Garnery, L; Solignac, M; Cornuet, J.-M. 1998. The origin of West European subspecies of honeybees (*Apis mellifera*): new insights from microsatellite and mitochondrial data. Evolution 52, 1119–1134.
Smith, D.R; Palopoli, M.F; Taylor, B.R; Garnery, L; Cornuet, J.M. Solignac, M; Brown, W.M. 1991. Geographical Overlap of Two Mitochondrial Genomes in Spanish Honeybees (*Apis mellifera iberica*). Journal of Heredity, Volume 82, Issue 2, Pages 96–100.
De la Rúa, P; Galián, J; Serrano, J; Moritz, R.F.A. 2002. Microsatellite analysis of non-migratory colonies of *Apis mellifera iberica* from south-eastern Spain. J. Zool. Syst. Evol. Research 40:164–168 2002 Blackwell Verlag, Berlin ISSN 0947–5745.
Fuchs, S., & Schade, V. 1994. Lower performance in honey bee colonies of uniform paternity. Apidologie, 24, 155-168.
Mattila, H. R., & Seeley, T. D. 2007. Genetic Diversity in Honey Bee Colonies Enhances Productivity and Fitness. Science, 317, 362-364.
Richard, F.-J., D. R. Tarpy; C. M. Grozinger. 2007. Effects of insemination quantity on honey bee queen physiology. PLoS ONE, 2: e980.
Seeley TD & Tarpy DR. 2007. Queen promiscuity lowers disease within honey bee colonies. Proc. Royal Society of London, B., 274:67-72.
Cobey, Susan W; Sheppard, Walter S; Tarpy, David R. 2012. Status of Breeding Practices and Genetic Diversity in Domestic U.S. Honey. In, Honey Bee Colony Health.1st Edition. Imprint: CRC Press. Chapter 4.

A Closer Look

Basic Honey Bee Biology

X219

$15.00

www.beeculture.com

274 pages, color

Clarence H. Collison

Our newest edition!

The 42nd Edition of the

ABC and XYZ of Bee Culture

$74.99
Plus shipping

SKU: #X5-42

The ABC and XYZ of Bee Culture has been keeping beekeepers around the world successful since 1877!

- Over 800 pages packed with information
- Hundreds of color photos and illustrations throughout
- More than 50 contributors discuss everything honey bee
- This book is a mix of reference, the how and why things are done and a history of how beekeeping got where it is today
- A must for every beekeeper large and small

Get your copy today at

www.Store.BeeCulture.com/Books/

What Beekeeping In 2023: Best Lesson

I've been keeping bees for twenty-eight years and you would think I'd have it figured out and at my age, probably be well past learning anything new. However, last year was probably the year that I learned the most important lesson in beekeeping, and it probably isn't what you think.

When I started beekeeping, different opinions, products and methods were not readily accessible as they are now. Without platforms like YouTube and online forums, my learning was limited to learning from only a single person. That single source of learning, as good as it was, stands in stark contrast to the diverse perspectives which are easily available today. Having learned beekeeping from this single mentor, I respectfully wanted to stay true to his opinions and styles toward beekeeping. Also, because I was so new and knew so little, I was too afraid to veer off course and try anything beyond what he had taught me.

Through the years as I gained more knowledge and experience, I began to experiment and try a few slightly different approaches. It took me forever, though, to try a screened bottom board or a fancy J-Hook hive tool. Let's just say I had been pretty closed minded.

In 2023, I decided to become much more open-minded in beekeeping. After all, most of us do not enjoy closed-minded beekeepers who practically become bullies if you veer away from their opinions.

One area I have been so reluctant to change is in trying different types of hives. Out of respect for Rev. Langstroth and the fact that the Langstroth hive is all I've ever known, I just could never bring myself to try one of the many different types of hives that are flooding the industry.

Finally, I decided I would add four new types of hives into my apiary and try them out, experiment and determine if I liked them or not. Those three hives were just slight variations of a Langstroth hive, but one of these hives has been a ton of fun. It's a horizontal hive. My horizontal hive holds thirty plus traditional Langstroth frames. I like this because these are the same frames I use throughout my operation. What I enjoy most about my horizontal hive is that I do not have to lift heavy hive boxes (yes, I'm getting older) and the height of the hive is so pleasant to work and inspect.

When we are open to different perspectives, as I chose to become, we expose ourselves to so many different experiences and knowledge beyond what we already know. Beekeeping involves science, art and skill which is constantly changing and improving. When we are open to new ideas and methods, it benefits our personal experience in beekeeping. It allows us to rethink our own, perhaps close-minded viewpoints and make more informed decisions. Beekeeping requires adaptability and creativity. New ideas, products and beekeeping methods can inspire even

more innovation and lead to solving issues and problems from angles we may not have previously considered.

Being more open-minded is also about flexibility. Too many bee clubs are filled with obstinate rigidity and often, these very clubs stagnate and lose members. Being more flexible and approachable doesn't mean we can't still have our convictions; rather, it means we are able to question our beliefs in the light of new studies, science and arguments. It is understanding that no single person holds all the answers and that our own perspective is just one view among many beekeepers.

Beekeeping is a journey, and a lifelong learning process. We will never stop learning more about beekeeping. Choosing to be more open-minded allows us to have useful communication with others. When we approach these beekeeping conversations openly, we listen more attentively and consider the other person's viewpoint, leading to more constructive collaboration, rather than fights and arguments.

When the Langstroth hive began to replace the previous types of hives, believe it or not, it was not readily received. There were many beekeepers that resisted this new type of hive. Rethinking change, however, does not come without its challenges. It requires a certain level of vulnerability and the courage to admit that we may be wrong. As a content creator on YouTube, I know firsthand that we live in a world brimming with misinformation. As we become more discerning about the validity of the content we are consuming, we can begin recognizing what is credible, taking everything with a grain of salt.

Learning this new lesson in beekeeping—and in life—has taught me that change is not only inevitable but also necessary for growth. In 2023, by integrating new hive types and methods into my practice, I not only improved my beekeeping skills but also enriched my personal development. I learned that in the delicate balance between tradition and innovation lies some really good progress. Perhaps, most importantly, we learn to model the behavior of the bees we tend—we adapt, we overcome and we flourish. Maybe this will also be your New Year's resolution: an open mind, a willing heart and a hive thriving with possibility.

If you'd like to watch my videos on Winter tips visit: **https://honeybeesonline.com/davids-youtube-channel**. BC

Taught Me Learned So Far

Leading a 4-H Beekeeping Project

Ettamarie Peterson

4-H beekeeper teaching the public about the bees in my observation hive at Science Discovery Day.

Our chance to catch a swarm during our monthly meeting. The box is a plastic box with frame racks fastened inside it. I am pulling the branch down to shake the bees into the box.

You may have heard about 4-H. Maybe you were a member when you were young. It is America's largest youth development organization. It empowers nearly six million young people with the skills to lead for a lifetime. The 4-H motto is "To make the best better". My own children were first enrolled in it fifty years ago. My husband and I were active parents participating as project leaders. About twenty years ago my son wanted his two daughters to take up beekeeping as a 4-H project. He convinced me I could be the project leader as I had been a sewing leader for his 4-H club. I didn't hesitate because I knew it would be a fun project for them. There was only one other beekeeping project in the county. It was led by a fellow beekeeper in another 4-H club. We were both members of the Sonoma County Beekeepers Association when I invited his son to be a speaker one evening. I was very impressed with the young man's ability to make his presentation to all those adults. My fellow beekeeper encouraged me to start the project in our club years later. He became my co-leader for a few years when his son went off to college and was no longer a 4-H member. My young beekeepers and I learned a lot from him.

One of the first things I learned as a project leader was to use the talents of the children's parents. I have minimal carpentry skills but discovered over the years some of the fathers were builders and eager to share their skills teaching the beekeepers how to make nuc boxes, for example. I also learned to let my fellow beekeepers know what I was doing so that when they had extra equipment or dropped out of beekeeping, I was given lots of used equipment. Sometimes, I have been given equipment that is new or almost new. I discovered hobby beekeepers love to buy things and then find this hobby is not for them. My barn has a whole collection of donated boxes, frames, hive tools, smokers, suits and even two small honey extractors! People feel good donating to children.

I tell the children and their parents when they join not to buy equipment nor bees. I am called frequently to catch swarms every Spring. None of my 4-H beekeepers has ever bought any bees! This year, three of them were gifted packages of bees through Bee Kind, a local bee store. The store sells packaged bees that are pre-ordered. Two customers decided not to take their orders and there was a no refund policy. Katia and Doug Vincent, the owners told the customers about donating the bees to my 4-H beekeepers. We were also given two nucleus colonies this year by a Trevor Tauzer, a local commercial beekeeper who owns Honey Bee Genetics.

One of the exciting things our project did this year was to help Keller Estates Winery establish a small apiary. It was a great learning experience! The children were given three deep hive boxes to paint. Then, we stocked them

with a nucleus colony and a package donated by Tauzer Apiaries and a swarm I caught. They were able to learn the different needs each colony had. They did the hive inspections like pros because they had learned how to do them with their own and my colonies. The man at the winery who had invited us was very impressed with their skills.

Children as young as five years old are allowed to be in a 4-H beekeeping project. There are several ages in the group so older children can help the younger ones. This past year, my group had children from five years old to eighteen years old. I find that giving parents suits is quite important, especially if their children are in the younger age bracket. The parents stand by their little ones helping lift heavy parts of the hive but try not to take over when their child is using a hive tool to lift a frame, for example. Often the parents sit in on the meetings, but I don't let them answer questions during discussions. I do let the parents ask questions though, because they are learning along with their children. Our first lessons of the year are about the various roles the bees have in the colony.

Group of 4-H beekeepers learning to inspect one of my colonies.

I tell the children how long it takes to make a queen, a worker and a drone. Later during the year, when we are looking into the colonies and making decisions, I will ask them what they remember about these numbers and how it applies to what they are observing. Of course, I have lots of printed material I give them at their first meeting.

One time I discovered a frame of drone pupae I could give the 4-H beekeepers to examine for mites. They found lots and learned so much at that meeting!

I like to have lots of pictures and hands on materials because they help the children remember better and the younger ones are not reading yet. I have a working observation hive set up where we meet. They develop queen spotting skills and enjoy watching the pollen laden bees do their waggle dances.

In November, we make lip balms. In December, we make candles. I have a good size collection of candle molds so they can make various sizes of candles. The thing to remember on candle making day is have the children leave the candles in the molds on pieces of paper with their names on them. Candles cannot be taken out of the molds when they are still warm. I stress this at the beginning of the candle making lesson along with safety issues of handling hot wax. The older children are great at helping the younger ones at this meeting. If you have a small enough group and a good size kitchen, one meeting a year can be cooking with honey. Some years I have done this, but other years I have just had to talk about it and give them recipes to take home. Honey tasting is another fun meeting topic. I have collected honey from different parts of the world, so I am able to do this. People bring me honey, too.

January and February are the best months for cleaning equipment and getting it ready for use. If you have broken or wax moth-damaged equipment, show the children how to evaluate it. Teach them how to safely clean up equipment that is worth re-using. Emphasize sterilizing used equipment. I use a propane torch to do this so it is something parents can help with. Teach them how to put together new frames using glue and nails. I do not use a staple gun, especially with children! One father built us a handy frame holder box to assemble ten frames at a time. I like to teach them how to wire frames and use wax foundation. I have also shown them alternatives such as frames with a starter strip and barbeque skewers or plastic foundation. We have had problems over the year with some plastic foundation, so I teach them about adding extra wax to that foundation.

One meeting, a couple from the Sonoma County Beekeepers Association volunteered to come to our meeting to teach the children how to make swarm traps from pressed fiber plant pots. Now I teach that lesson every year, so each member has one to hang before swarm season.

Lessons about swarming and what causes it are very important. How to transfer a swarm into a permanent hive box is something each one learns after I bring the swarm to the child's apiary. The children also learn where to put the hive. About three weeks after the swarm is placed in its permanent location, the beekeeper and I do a hive inspection. This is the time to teach and emphasize note taking. I have a variety of hive inspection sheets I share with them at a meeting when we discuss the value of record keeping. Many 4-H projects involve record keeping. It is a habit all young people should acquire. I do emphasize that before each hive inspection they should have a reason for going into the hive and be prepared with all necessary equipment they might need, such as an extra honey super to add to a crowded hive.

Colony inspection at the Keller Estate Winery. They found the colony to the left needed a new queen so they were looking for a couple frames of young brood to take from this colony to make a new queen.

This year was extra special as during one meeting in April, I got a swarm call. Since it was swarm season, I told the children I had to see who was calling and apologized for answering my cell phone. When the caller told me he had a nice low hanging swarm and he was just a few miles from where I live, I asked the parents and the children if they wanted to go with me to capture the swarm. Of course, they all wanted to go! Some had their suits in their cars, and I had a box of suits and veils we could protect the others with. What a great, fun time we had getting the swarm! One boy needed the bees, so I instructed the parents how to come back at sundown to take them back to his empty hive. I explained they should put the swarm catching box next to the hive and then transfer them the next day. His bees are doing so well at the time of writing, that he will be taking a honey harvest in a week or so!

Many 4-H projects involve making or doing something to win prizes at the fairs. Of course, they are not going to show their bees like they do their other animal projects, but they can show off their skills with posters, photos, candles, beeswax molds or even jars of honey. Even my youngest beekeepers have won ribbons with their posters. They have also made posters at our meetings to use

My granddaughter entered this wax in the local fair when she was in our beekeeping project. Jessie is now a teacher of agriculture at Galt High School.

when we go to events. I have a lot of back issues of *Bee Culture* and *American Bee Journal* to cut up as well as bee catalogs. One event I especially enjoy having my young beekeepers attend is The North Bay Science Day. They take turns talking to the public about bees and pointing out the queen in the observation hive. Their public speaking skills get better every year they are in the project.

To become a project leader, contact your County Extension office to sign up. Ask them if there are any honey bee projects already going in your county. Your first year you might want to start off as someone's assistant just to see how to be a leader. You may discover there is no project in your county. Find the name of the nearest club to you and the contact information for its community leader. That is the person who will guide you through the process of becoming a project leader.

The 4-H enrollment year starts in September. Go to the club's community meeting where all the members will be signing up for the projects they want to be involved with. If you join later in the year, it is generally okay. Just work with the club to see what days of the month are free. I have found a Sunday afternoon works best because more parents are able to drive the children and it is still daytime, so we can open a hive if that is part of my lesson. You will be sharing the calendar with a variety of projects if it is a very active club. Members from other clubs can come to your meetings if they have a cross club paper signed. This is for insurance purposes. All adult leaders go though an orientation session that last about two hours. In our county, it is given several different times by Zoom so it is easy to take part in. The orientation lesson emphasizes child safety and how to be aware of possible child abuse and how to report it if necessary. It also trains the leaders to have a safe and inclusive environment so the youth can learn, and their goal be reached.

If you think you would like to be a 4-H beekeeping project leader and are hesitating because you just don't have the materials, I would be happy to share my extensive collection and give you ideas for meetings. My email is **ettamarie@petersonsfarm.com**. As I write this, I am thinking maybe we should form a group of leaders and get together via Zoom occasionally to swap ideas and techniques. I would love to hear from others to get fresh ideas for my group. Some of them have been in the project for four years and would love new things to do. BC

SENSORY ANALYSIS

A METHOD TO TASTE & EVALUATE HONEY

C. Marina Marchese

By now you may have heard that there's a new method to evaluate honey; it involves using sensory analysis which has been around for decades. Sensory analysis is used to taste and evaluate foods such as wine, olive oil, chocolate, coffee, tea and cheese. The method involves using your senses to describe and memorize the organoleptic characteristic of a honey by look, smell, taste, flavor and texture. If you've been to a wine tasting, no doubt you caught on quickly because the method is easy to learn but it can take years to master.

Sensory analysis was developed in the 1960's by a food scientist and professor at University of California at Davis, Rose Marie Valdes Pangborn. She developed it as a way to understand consumer preferences and it is widely used today. In 1978, Gabriel Vache, a beekeeper, and Michel Gonnet, a wine expert, applied sensory analysis to describe the characteristics of French honeys and published their work in a book titled *Le Goût du Miel* (The Taste of Honey). Fast forward to 1998, the International Honey Commission developed a honey sensory tasting panel and created the first honey wheel. A honey wheel is a tool for tasters with words to describe the aromas and flavors of a honey sample by placing it into a flavor family – fruity, floral, woody, chemical, animal, vegetal or warm.

Sensory analysis advanced rapidly in 1979 when the Italian Ministry of Agriculture (CREA) pioneered honey sensory training courses, updated the honey wheel and established The National Register of The Experts in the Sensory Analysis of Honey, a list of members who have completed the training. For the last forty years, Italy has been collecting chemical, pollen and sensory data about their honeys. The result is a standardized sensory profile or ID card for 18 Italian unifloral honeys by its botanical source. Italy's leading honey experts and anyone who completes the training has memorized these 18 honeys by smell and taste alone; much the same as a wine sommelier.

I first stumbled upon the Italian National Register of The Experts in the Sensory Analysis of Honey program back in 2012, on a trip to the Tuscan wine destination Montalcino. Upon entering, I was greeted by a sign that proclaimed it as The City of Honey. Coincidentally, the annual *Sagra del Miele* honey festival was in progress inside a Medieval fortress. I visited each beekeeper's table and

indulged myself by tasting as many honeys as I could; acacia, eucalyptus, lime tree, dandelion, sunflower and ivy honeys to name a few. At the time, I had no words to describe what I was tasting but I was keen to notice that every jar of honey was labeled by its botanical source.

I continued around the venue where a few people were displaying honey in wine glasses from lightest to darkest. They told me they were about to present a honey tasting and before I knew it, glasses of honey were being passed around for visitors to taste. We were instructed to look at the color, smear the honey around the sides of the glass and stick our nose inside to capture the aromas. Then, put a generous dollop onto our tongues, let it melt and swirl it around; inhale to move the volatile compounds to meet our olfactory bulb. As I swirled and sniffed, the presenter described the honeys; chestnut was reddish-amber in color, pungent and aromatic on the nose with notes of soap, wood, wet cardboard and tannic with a bitter finish.

Honeysuckle was straw-yellow in color, delicate, marked by notes of vegetal, dry hay, lactic and fresh nuts. Then I was introduced to the bitter strawberry tree honey – not so intense on the nose but in the mouth it was pungent, acidic with notes of burnt coffee, ash and wildly bitter. Previously, the only vocabulary I had to describe honey was yummy, delicious, complex and earthy and these skillful descriptors were poetry to my taste buds. I left that day with intentions to enroll in Italian honey school and in 2015, I completed all three levels of the program and became the first U.S. citizen to be accepted as a member of The Italian Register of Experts in the Sensory Analysis of Honey. This certification allows me to teach the Italian program and participate as a judge in honey competitions in Italy and recently at Apimondia, Santiago.

In Italy, honey is submitted for competition into categories by its botanical source, similar to the way other foods are judged and most beekeepers are trained and knowledgeable of what their bees are foraging on. So, thistle honey is judged with other thistles and heather with heather, etc. If the honey does not conform to any particular botanical source, it is entered into the wildflower category. The honey judges are familiar with the characteristics of each honey they are assigned. Winners are those honeys which conform to the established sensory characteristics for its botanical source.

One does not have to have super-senses to be a good honey taster; anyone's palate can be improved through sensory training, regardless of your experience. The training begins with a series of olfactory and gustatory exercises to sharpen your senses and memory. A guided tasting of 18 honeys emphasizes writing and memorizing detailed tasting notes. There are lessons about honey defects, crystallization, fermentation and much more. Honey is a complex and fragile substance and sensory training is valuable for beekeepers who want to have a deeper understanding of their own honey and acquire the tools to be competitive in the marketplace.

With the support of my instructors, I founded The American Honey Tasting Society, an educational organization which has been given the great honor to offer the four day Introductory Level I course in the U.S. Attendees receive a certification recognized by Italian Register permitting them to continue their journey to becoming a honey sommelier. The courses are academic and intense, the honey samples and exercises must be approved by the Register and are flown in from Italy. Presently, there are almost 50 U.S. residents who have gone through the first and second level of training, a handful of others will be completing the final course. We all have the same goal to elevate honey through education. BC

C. Marina Marchese is an author, beekeeper and founder of The American Honey Tasting Society.
For more information visit **americanhoneytastingsociety.com**
Or email: **AHTS.USA@gmail.com**

The Giant Honey Bees

Article Overview

In the remote cliffs of the Himalayas, a truly remarkable bee species thrives – the Himalayan Cliff Honey Bees. This article delves into the captivating world of these bees, exploring where they live, what they look like, their survival secrets and their unique contribution to the world of honey production, known as "mad honey."

Where They Live

Apis laboriosa are primarily concentrated in the Hindu Kush Himalayan (HKH) region of southern Asia (Gregory & Jack, 2021). They can be found within a specific geographical range that extends from western Nepal in the west to the northern borders of Laos and Vietnam in the southeast (Gregory & Jack, 2021). Furthermore, its habitat extends as far north as the northern border of India and even into southern China (Gregory & Jack, 2021).

Nestled in the Himalayas, the colossal *Apis laboriosa* Smith finds its extraordinary abode (Joshi et al., 2003). They have chosen a habitat like no other: the Himalayan cliffs. Colonies craft their nests under overhangs, a strategic maneuver that keeps them safe from predators. Remarkably, despite the harsh conditions of the Himalayan cliffs, including frigid temperatures and low-oxygen atmospheres, *Apis laboriosa* thrives in this unique habitat (Summers, 1990).

Nests are typically 1.5 m long and one meter wide and are often posited on southwest or southeast-facing vertical rock cliffs (Gregory & Jack, 2021). Their nests, typically situated at altitudes ranging from 2,500 to 3,200 meters above sea level, showcase meticulous construction. Each nest consists of a single, large wax comb featuring a substantial honey storage area at the top and a slimmer brood portion below, separated by a pollen-storing band (Joshi et al., 2003).

What They Look Like

Apis laboriosa stands as a true giant in the world of honey bees, dwarfing its close relative, *Apis dorsata* (Gregory & Jack, 2021). They are often celebrated as the world's largest honey bee with an impressive body length measuring slightly over three centimeters (1.2 inches) on average. Their scutellum, the dorsal side of their thorax, displays a striking dark brown to black coloration, adorned with long, yellowish hairs. As for their abdomen, all its segments feature a dark hue (Kitnya et al., 2020).

Survival Secrets

In the high altitudes of the Himalayas, *Apis Laboriosa* faces challenges, but a study by Lin et al. (2021) reveals their remarkable genomic adaptations. The research published in Genome Biology and Evolution highlights that *Apis laboriosa* has undergone more positive selection in numerous genes compared to the relatively smaller species, *Apis dorsata*. It also suggests that *Apis laboriosa* has experienced recent gene duplications, potentially linked to their survival in harsh mountain environments.

For most of the year, they're found more than ten meters above the ground on the cliffs. Typically, up to 100 or more colonies, each building a single nest, dot the precipitous heights. However, as the cold season approaches, a dramatic transformation unfolds. Between late November and early December, these colonies abandon their cliffside abodes and either move to sheltered spots beneath rocks or logs or descend to lower altitudes (Joshi et al., 2003).

Apis laboriosa, as a member of the subgenus Megapis, employs a fascinating defense strategy known as shimmering (Woyke et al., 2008). This mesmerizing behavior involves bees raising their abdomens sequentially, creating ripple effects across the nest's surface. The purpose of this display is to intimidate and potentially disorient predators, making it challenging for them to target a single bee for attack.

A daring honey hunter gathering nectar from the lofty cliffs where Apis laboriosa *nests precariously await their sweet bounty. OLTRE IL MURO: ARTE e FOTOGRAFIA: THE HONEY HUNTERS OF NEPAL https://no-miedo.blogspot.com/2012/09/the-honey-hunters-of-nepal.html*

Mad Honey

These Himalayan Cliff Honey Bees produce a distinctive "mad honey". This sought-after honey variety is gathered during the Spring at high altitudes, where specific plant species, like Rhododendron, produce grayanotoxins (Roubik et al., 1985). Consumed by humans, it can induce a range of effects, from euphoria to severe symptoms, collectively known as "mad honey disease" (Broscaru et al., 2018).

The production of mad honey, once a niche tradition, has gained recent tourist attraction, drawing

of the Himalayas

Manish Koirala

A Peek into their Fascinating Life

An Apis laboriosa *bee delicately sipping nectar.* Apis dorsata laboriosa *by L. Shyamal CC BY-SA 3.0*

thrill-seekers seeking unique experiences. *However, as the mad honey's allure reaches new heights, the race to gather it unsustainably threatens to take the bees to new lows.*

Why We Should Care

Apis laboriosa plays a vital role in pollinating mountain crops and local flora, contributing to the delicate balance of the ecosystem (Joshi et al., 2003). Their presence serves as an indicator of environmental health, as these bees require abundant supplies of nectar, water and pollen to flourish.

The conservation of *Apis laboriosa* is not just about protecting a single species but safeguarding a remarkable ecological niche. Their habitat faces multiple threats, including deforestation, landslides, and human activities like honey hunting. Such habitat degradation has directly contributed to the rapid decline of this unique species (Joshi et al., 2004).

Conclusion

With their massive size and crucial role in Himalayan ecosystems, *Apis laboriosa* face mounting challenges. As stewards of our environment, we must protect their unique habitat. Let's ensure the survival of these extraordinary cliff-dwelling bees by preserving the Himalayan cliffs, securing their place in our delicate ecological tapestry. BC

References

Lin, D., Lan, L., Zheng, T., Shi, P., Xu, J., & Li, J. (2021). Comparative Genomics Reveals Recent Adaptive Evolution in Himalayan Giant Honey bee *Apis laboriosa.* Genome Biology and Evolution, 13(10). **doi:10.1093/gbe/evab227**.

Joshi, S. R., Ahmad, F., & Gurung, M. B. (2003). The Himalayan Cliff Bee *Apis laboriosa* and the Honey Hunters of Kaski: Indigenous Honey bees of the Himalayas (Vol. 1). **DOI: 10.53055/ICIMOD.411**. Kathmandu, Nepal: International Centre for Integrated Mountain Development (ICIMOD).

Gregory, M., & Jack, C. (2021). The Himalayan Cliff Bee *Apis laboriosa* and the Honey Hunters of Kaski: Indigenous Honey bees of the Himalayas (Vol. 1). University of Florida, Entomology and Nematology Department. EENY-777. Published August 2021.

Kitnya N, Prabhudev MV, Bhatta CP, Pham TH, Nidup T, Megu K, Chakravorty J, Brockmann A, Otis GW. (2020). Geographical distribution of the giant honey bee *Apis laboriosa* Smith, 1871 (Hymenoptera, Apidae). ZooKeys, 951, 67.

Roubik DW, Sakagami S, Kudo I. (1985). Note on Distribution and Nesting of the Himalayan Honey Bee Apis laboriosa Smith (Hymenoptera: Apidae). Journal of the Kansas Entomological Society, 58(4), 746-749.

Broscaru L, Dobre C, Rösick F, Halilovic A, Gulba D. (2018). Mad honey disease. European Journal of Case Reports in Internal Medicine, 5(1), 000742. **doi:10.12890/2017_000742**.

Summers, S.D. (1990). 'Facing the Bees.' In International Wildlife, 20(5).

Woyke J, Wilde J, Wilde M, Sivaram V, Cervancia C, Nagaraja N, Reddy M. 2008. Comparison of defense body movements of *Apis laboriosa*, *Apis dorsata dorsata* and *Apis dorsata breviligula* honey bees. Journal of Insect Behavior. 21(6):481-94.

Hunters diligently collecting the prized mad honey. OLTRE IL MURO: ARTE e FOTOGRAFIA: THE HONEY HUNTERS OF NEPAL https://no-miedo.blogspot.com/2012/09/the-honey-hunters-of-nepal.html

2024 Almond Pollination Outlook

Economic Outlook and Other Considerations

Brittney Goodrich, Assistant Professor of Cooperative Extension,
Dept. of Agricultural & Resource Economics, University of California, Davis

In this article, I summarize some considerations for the 2024 almond pollination season, including a discussion on trends in almond orchard removals, and how to work towards a mutually beneficial agreement with growers who want to cut their pollination expenses.

Almond Industry Update

Many almond growers are feeling the stress of narrowing profit margins over the last couple of years. For context, the USDA National Agricultural Statistics Service (NASS) 2018-2022 average almond price was $1.98 per pound, far lower than the previous five year average (2013-2017) of $3.05 per pound. While almond prices have remained relatively low the last few years, input prices have increased substantially. Additionally, this year excessive pest damage rates have caused many growers to receive substantial quality-related price deductions. The current state of almond profit margins have slowed recent trends of expanding almond acreage.

The Almond Board of California and Land IQ estimate the removal of around 19,400 acres of almonds between April 2023 and September 2023, approximately 1.4% of the 1.4 million bearing acres in 2023. This is up slightly from 2022, when an estimated 17,900 acres were estimated to have been removed from April to September. According to the USDA NASS Nursery Sales report between June 2021 and May 2022, nurseries reported 40,000 acres of sales, with 25,000 for new orchards, 13,000 acres for replacing existing almond orchards, and the remainder replaced individual trees within existing orchards. Compared to removals in 2022, this suggests a net increase of roughly 20,000 acres, certainly leveling off compared to the rapid expansion of almond acreage seen in recent years.

To get a better idea of what is driving these removals, I dug a bit further into the Land IQ removals report. Typically, almond orchards are thought to last 25-30 years after planting. Older orchards are the most likely candidates for removal, however many have speculated the additional removal of younger orchards in the past couple of years due to water scarcity concerns from consecutive years of drought and expected limitations due to the Sustainable Ground Water Management Act. Table 1 shows the number of 2022 removals by the orchard age and shows a large portion of removals (72%) were orchards less than 25 years of age, and 42% of removals occurred in orchards less than 20 years old.

Figure 1 shows, for each county, the proportion of total acres removed in 2022 that were acres planted less than 20 years ago. It is clear that the southern San Joaquin Valley has seen a relatively higher proportion of young orchards removed out of total removals. This is not surprising given the southern San Joaquin Valley is generally more water stressed than the northern San Joaquin and Sacramento Valleys.

Table 1 and Figure 1 indicate that water availability coupled with narrowing profit margins may be driving growers in some areas to remove orchards earlier than in the past. Despite these removals, at least 1.3 million bearing acres of almonds remain going into 2024. Figure 2 displays bearing almond acreage by county for 2023. The counties of Kern, Kings and Tulare, which saw relatively high proportions of young acres being removed in Figure 1, still contain significant amounts of almond acreage (about 22% of the state's total).

Table 1. 2022 Almond Acreage Removals by Orchard Age

Orchard Age (Years after planting)	Acres Removed	Percentage of Total Removed Acres
<5	335	0.60%
5-14	5,018	8.30%
15-19	20,023	33.10%
20-24	17,853	29.50%
25+	17,190	28.50%
Total	60,419	

Source: Compiled from Land IQ 2022 Standing Acreage and 2022 Removed Acreage-Final Estimate

Estimated Colony Demand

Figure 3 plots the estimated demand for colonies based on bearing almond acreage each year from 2017 to 2024, as well as the total number of colonies in the U.S. on January 1. Estimated demand is calculated using two colonies per acre for traditional varieties and one colony per acre for self-fertile varieties (Shasta and Independence). For the 2023 almond bloom, roughly 1.4 million almond acres (6.6% in self-fertile varieties) required an estimated 2.6 million honey bee colonies for pollination (Figure 3).

As seen in Figure 3, estimated demand for colonies in 2024 is 2.7 million colonies, roughly 1.3% higher than the 2.6 million required in 2023. However, given the higher rates of removals of almond acreage in recent years and the timing of USDA reporting, this 2.7 million could be a slight overestimate. In recent years, it has seemed that self-fertile variety plantings as well as orchard removals have started leveling off the estimated demand for colonies. However, the colonies that will be required for almond pollination in 2024 represents virtually 100% of the 2.7 million colonies in the U.S. on January 1,

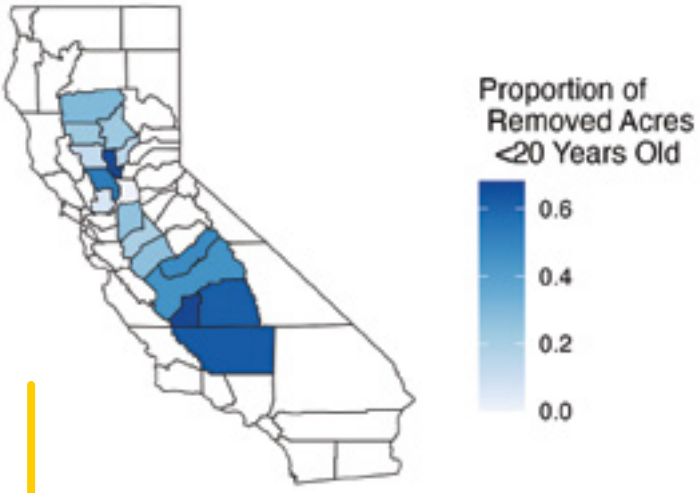


Figure 1. Proportion of Removed Almond Acres Less than 20 Years Old out of Total Acres Removed, County-level 2022
Source: Compiled from Land IQ 2022 Standing Acreage and 2022 Removed Acreage-Final Estimate

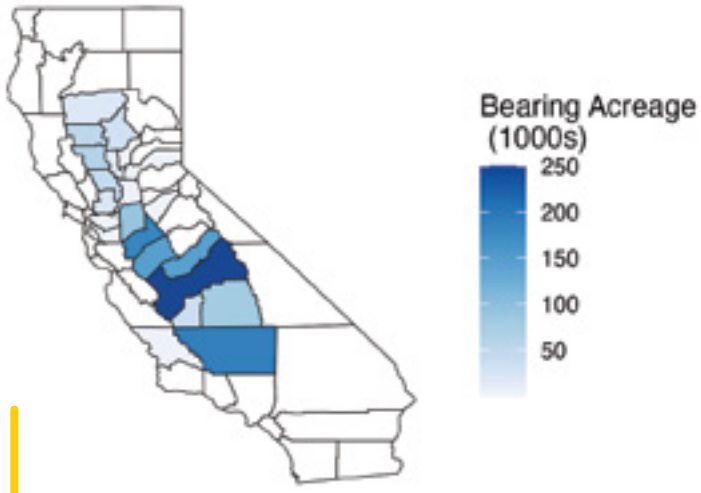


Figure 2. 2023 Bearing Almond Acreage by County
Source: Compiled from Land IQ 2023 Standing Acreage Initial Estimate

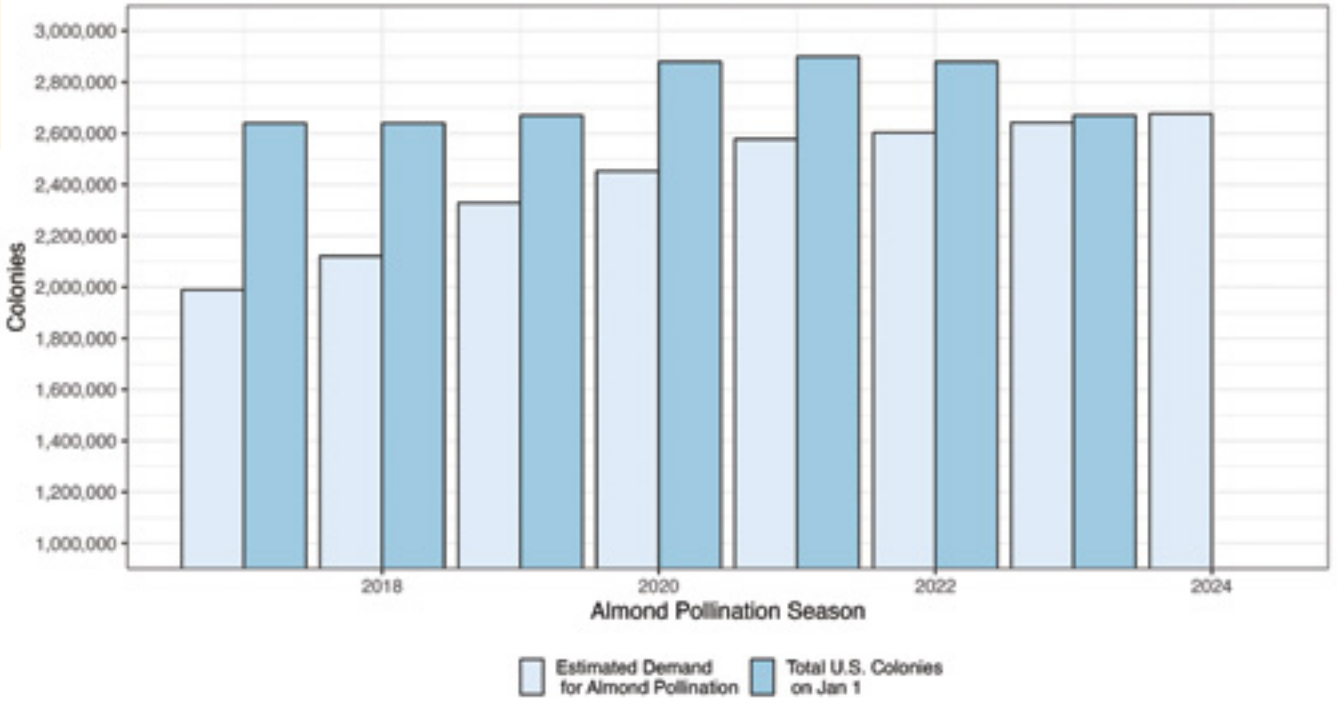
2023, so at least in the short run, it's unlikely this leveling off of demand will put downward pressure on pollination fees.

Colony Supply Issues

The primary influence on the supply of available colonies for almond pollination is colony health and populations throughout the U.S. Colony health issues can impact both the strength of colonies and the total number of colonies that survive the Winter. The Bee Informed Partnership reported the 2022-2023 Winter mortality rates for commercial beekeepers was 37.6%, the second highest colony loss rate since they have been conducting their survey. This loss rate is fairly noticeable in Figure 3, where for 2023 almond pollination the demand for colonies was almost equivalent to the supply on January 1, 2023.

Weather during the Summer months can have an impact on honey production, as well as bee health, due to the availability of nutritious forage. Figure 4 (next page) shows the U.S. drought monitor as of July 25, 2023, displaying drought conditions across large swaths of the U.S. Texas and Minnesota are major honey-producing states with some of the worst drought conditions. As of July 1, 2022, 194,000 colonies were located in Texas and 105,000 colonies were in Minnesota, totaling roughly 10% of the total U.S. population at that time. Beekeepers with colonies in the areas plagued by drought may suffer higher Winter mortality rates and lower colony strength of surviving colonies, in addition to higher costs of feeding.

Figure 3. Total U.S. colonies on January 1 and estimated demand for colonies for almond pollination, 2017-2024
Source: 2017-2022 Almond Acreage Reports, USDA NASS and CDFA; Honey Bee Colonies Reports, USDA NASS
Note: Estimated demand is two colonies per acre for traditional varieties and one colony per acre for self-fertile



Almond Pollination Fees

Table 2 shows the distribution of fees reported by colony strength requirement from the California State Beekeeper's 2023 Pollination Fee Survey. The average fee for the 2023 almond pollination season for the most common colony strength requirement (seven to nine frames) was $198 per colony, though this ranged from $185-$220 per colony. Smaller colony strength requirements of four to six frames received an average of $178 per colony, while higher colony strength requirements of 10-12 frames averaged $205 per colony. The overall projected average fee for 2024 is $209 per colony, higher than the $196 per colony overall weighted average for 2023, suggesting that beekeepers expect fees to increase slightly going in to 2024.

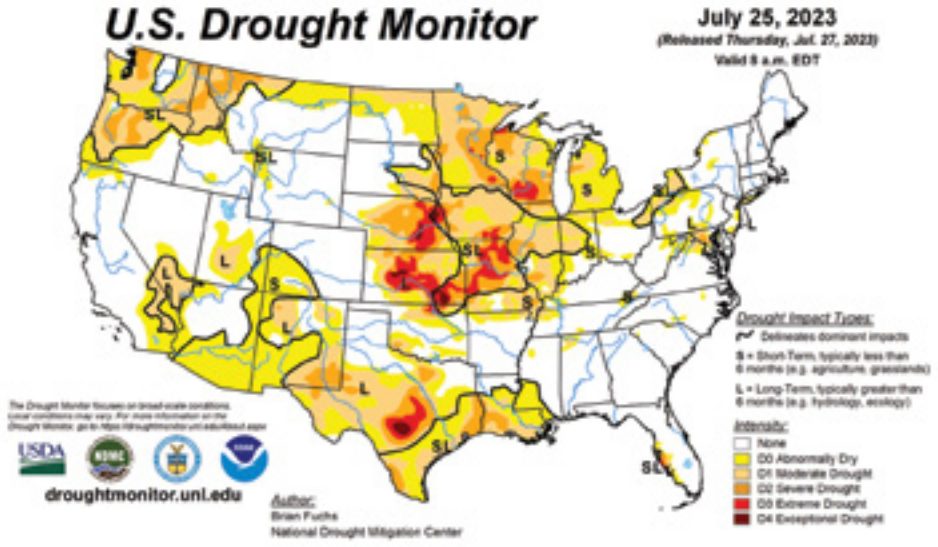


Figure 4. U.S. Drought Monitor, July 25, 2023

Hive Density, Colony Strength and Crop Insurance Requirements

Like the last few years, in 2024 growers may be looking to cut expenses due to low almond prices. I wanted to provide some guidance for beekeepers who may need to navigate cost-savings discussions with their growers. One major factor influencing a grower's pollination decision is compliance with their federal crop insurance policy. In 2022, 72% of almond acreage was insured through USDA Risk Management Agency (RMA) and the Federal Crop Insurance Corporation (FCIC), and to collect indemnities when a disaster occurs, growers must make sure they are adhering to the requirements of crop insurance. Failure to use an adequate number of bee colonies and/or frames per colony is not an insurable cause of loss, and will often be the first practice verified when a grower makes a claim.

USDA and FCIC allow for substitution between colony strength and hives per acre in their almond crop insurance policy. The current policy document states as a guideline that a producer should have at minimum two colonies per acre with six active frames, or its equivalent (See the USDA RMA Almond Loss Adjustment Standards Handbook 2019 and Succeeding Crop Years). Technically, that means one 12-frame colony per acre or 1.5 8-frame colonies per acre would satisfy this requirement. Almond growers can even deviate from this standard as long as they have consistently been using the same number of hives per acre and colony strength requirements and have had consecutive non-loss years (This flexibility in the policy allows growers to capitalize on benefits from self-fertile varieties that require fewer colonies per acre.)

I expect a large portion of growers in the past have been using the standard two hives per acre at an eight frame average. Table 3 displays a few combinations of hive density and colony strength that satisfy two conditions: 1. They meet the minimum standard defined by crop insurance (12 frames per acre), and 2. They result in cost savings compared to renting two hives per acre at an eight frame average. The pollination fees per hive are my estimates based on those reported in Table 2.

Table 3 shows there is flexibility when it comes to pollination expenses. Even using the lowest colony strength category (four frames) at three hives per acre can lead to cost savings for the grower at the right pollination fee per hive. What beekeepers should note is that profit margins for low colony strength hives can potentially be larger than those of high colony strength. Fewer inputs are likely required to provide a six frame hive compared to a 10-frame hive, yet the six frame hive brings in revenues of $30/frame compared to a 10-frame hive that brings in revenues of $23/frame. It is important to assess these considerations when contracting for pollination services.

Other Pollination Contract Elements

There are other ways beekeepers can work with growers to lower pollination expenses in return for lowering the beekeeper's risk in some way or simply providing convenience.

Table 2. 2022 Almond Pollination Fees by Colony Strength Category

Colony Strength	Number of Rentals	High Fee	Low Fee	Average Fee
4-6 Frames	3,006	$195	$170	$178
7-9 Frames	58,240	$220	$185	$198
10-12 Frames	5,016	$245	$185	$205
Mixed/Unknown	8,750	$215	$185	$188

Source: California State Beekeeper's Association 2022 Pollination Fee Survey as of November 12, 2023 (11 Responses)

Table 3. Sample Colony Strength and Hive Density Combinations that Meet Current Crop Insurance Requirements							
Colony Strength Category	**Hives/Ac**	**Average Frames/Hive**	**Frames/Ac**	**Pollination Fee ($/Hive)**	**Pollination Fee ($/Frame)**	**Pollination Cost ($/Ac)**	**Savings Compared to 2 Hives/acre at 8-frame average ($/Ac)**
Low	3	4	12	$135	$34	$405	$5
	2	6	12	$180	$30	$360	$50
Standard	1.5	8	12	$205	$26	$308	$103
	1.8	8	14.4	$205	$26	$369	$41
	2	8	16	$205	$26	$410	
High	1.5	10	15	$225	$23	$338	$73
	1	12	12	$245	$20	$245	$165
Source: Author calculations based on fee estimates using Table 2							

Table 4. Percentage of Beekeepers with Almond Pollination Agreements Containing Beneficial Clauses	
The grower agrees to...	**Percentage of Responses**
Pay portion of the pollination fee in advance	44%
Compensate beekeeper if theft occurs	11%
Apply pesticides only during inactive foraging times (e.g. evening, night)	33%
Minimum notification time before applying pesticides (e.g. 48, 72 hours)	29%
Not apply specific chemicals	18%
Pay extra fees if colonies must move due to pesticide application	12%
Pay damages for colony losses due to pesticide exposure	11%
Not tank-mix multiple pesticides	11%
Note: Participants could select more than one, so the percentages add to over 100%. Response rates varied by question and ranged from 82 to 91.	

Beekeepers can inquire whether growers have space to provide bee holding yards before bloom, whether growers are willing to reduce risk of colony theft by providing locked gates or other security measures in orchards, or whether they can help improve the health of bees through planting bee-friendly cover crops or taking extra precautions to prevent pesticide exposure. For example, Table 4 shows the percentage of respondents indicating they have beneficial clauses in their almond pollination agreements from a 2021 survey of commercial beekeepers.

Closing Thoughts

Even though times are tough for the almond industry right now, almond pollination services continues to require most of the total colonies in the U.S. and this does not look to change any time soon. As beekeepers renegotiate pollination contracts going into 2024, it's important to think critically about what is needed to make almond pollination a profitable endeavor.

I have written a number of these pollination outlook articles over the years, and have archived them and other resources on the following website: **https://almondpollination.ucdavis.edu/**

Scan the QR code with your smartphone camera to visit the website. BC

Innovative Approach to Extracting High Quality Propolis

Dvykaliuk Roman

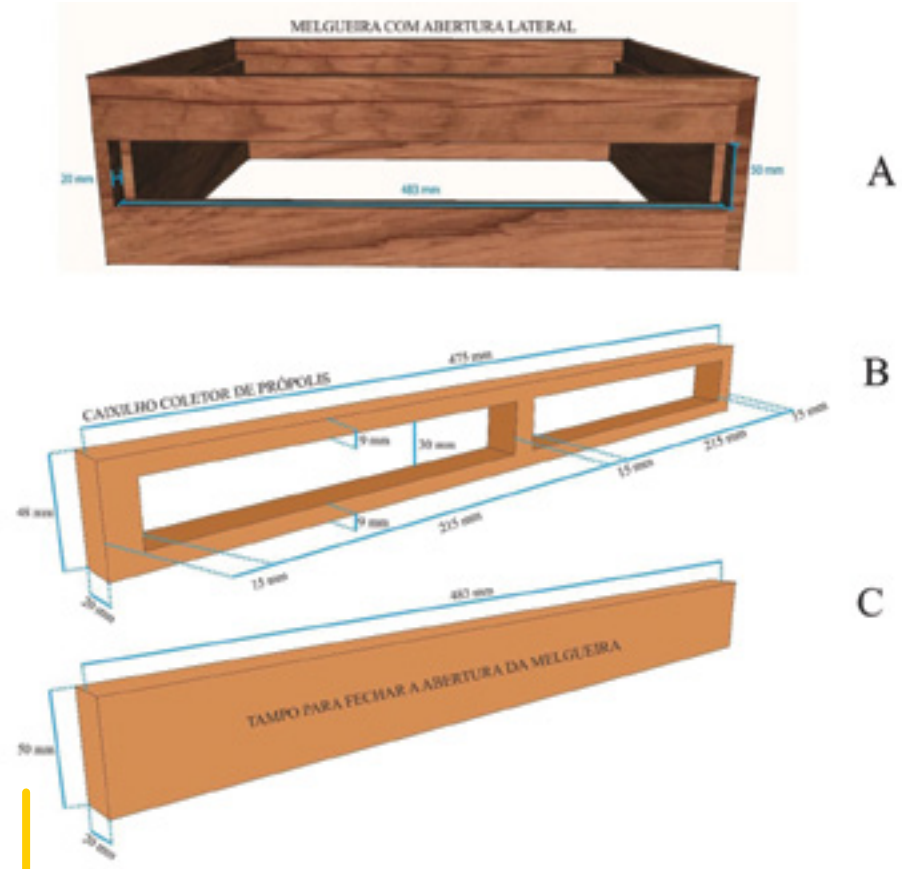


Fig. 1. A 3D model of CPI (Intelligent Collector of Propolis) (Breyer, 2016)
Notes: ***A – case for stacking the collector; B – Intelligent Collector of Propolis; C – insert board for closing the hole in the case***

Fig. 2. Green propolis obtained in Brazil (photo by the author, 2022)

Propolis is a sticky resinous substance collected from the buds, leaves and stems of wild plants and processed by bees, which has bactericidal properties and is used by bees to seal cracks in a hive, polish walls of wax cells and embalm corpses of enemies (mice, reptiles, etc.) (DSTU 4662, 2006). The sources of propolis are plants from which honey bees collect resin. However, not all plants that secrete resin are sources of propolis. The physical properties of plant resin, accessibility to bees, and anatomical features of a honey bee exoskeleton underlie the hypothesis of plant selection for propolis collection (Langenheim, 2003; Salatino and Salatino, M. L. F., 2017). In the mild climate zone Ukraine belongs to, honey bees collect plant resins mainly from *Populus nigra L., Populus tremula L.* and *Betula pubescens L.*, which determines chemical and physical properties of the yield. Subsequently, bees bring plant resins to the nest and use them to seal cracks or to build their structures (Isidorov et al., 2016; Przybyłek and Karpiński, 2019).

Using the bees' instincts to seal cracks in the nest, protect the nest from pests and the need to maintain the microclimate of the bee nest at the proper level, beekeepers collect propolis in industrial volumes mainly in two ways. The first one is to modify walls of hives and use collectors, and the second is to place nets (grids) over the honey bee nest (Breyer, 2016; Tsagkarakis et al., 2017).

In countries with a tropical climate, where the outside temperature resembles the microclimate of the bee nest, propolis collectors are placed on holes in the outer walls of hives (Fig. 1, 2).

Placement of this type of collector implies that products (honey, pollen) will not be taken from bee families. The presence of food in the nest helps to increase productivity of the bee family. Another important technological aspect is that propolis apiaries migrate to areas rich in plant sources

of propolis. It should be noted that such a method as moving to propolis sources is not used in mild climate zones.

Today, according to the state register, there are 54,406 beekeeping households in Ukraine with 2,579,453 bee colonies. Since registration is voluntary, these figures are not final. There are two ways to collect propolis in Ukraine: the first is to clean the nest elements (frames, parts of the hive, etc.) with a beekeeper's chisel; the second is to place elastic nets or plastic grids over the honey bee nest in the hives. The first method mentioned of extracting propolis is unproductive and outdated and yields in a small amount of propolis, which is mainly contaminated with wood splinters and parts of bee bodies. Such propolis is used for personal and technical needs. The second method, which uses special collection equipment, such as elastic nets and plastic grids, is more productive for big apiaries. At the same time, obtaining 300-500 nets or grids covered with propolis on a farm requires their cleaning. The lack of equipment to automate the process of nets or grids cleaning of propolis and the use of manual labor lead to higher product prices, lower quality and unprofitable production. The use of manual labor to clean propolis may be accompanied by a violation of sanitary and hygienic conditions due to the human factor.

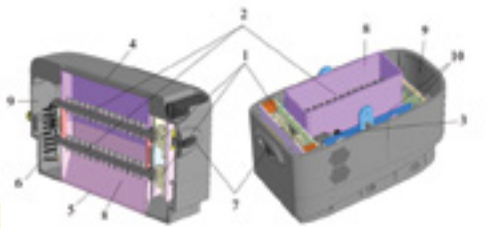


Fig. 3. Experimental 3D model of a device for collecting propolis.
Notes: *1 – a set of gears; 2 – lower and upper pair of shafts, protrusions of which fit one-to-one; 3 – an electric motor; 4 – a hole for inserting nets with propolis; 5 – an outlet; 6 – an electric cable; 7 – a switch; 8 – a protective chamber; 9 – a power cable compartment; 10 – a metal frame*

As part of our dissertation research on "Scientific and technical support of the process and equipment for propolis production" at the National University of Life and Environmental Sciences of Ukraine in 2020-2023, we designed, manufactured and tested a device for cleaning propolis-coated elastic nets (Fig. 3).

Manufacture of the device and its introduction into production help to fill in gaps in the technology of obtaining high quality propolis.

To extract propolis using the device, beekeepers follow the sequence of actions:

- place elastic nets in hives to collect propolis (it is recommended to use nets made of ethylene vinyl acetate (EVA));
- place nets on the upper bars of frames after they are cleaned of wax residues and existing propolis;
- inspect bee colonies as is customary on the farm;
- after the bees cover nets with propolis, shift them so that an entire net is covered with propolis (approximately 20-30 calendar days, depending on availability of the plant base and propensity of the bee family to accumulate propolis);
- collect nets from bee colonies and roll for easy transportation and further cooling (Fig. 4, B);
- for high-quality cleaning of nets with propolis using the device, it is enough to cool nets at a temperature of +5°C for 60-90 minutes, depending on the type of propolis;
- insert the cooled nets into the cleaning device (Fig. 5, A, next page).

After the cleaning is completed, nets are returned to the bee colonies, if necessary, and the obtained propolis is packed and stored for further use.

Fig. 4. Propolis obtained at Ukrainian beekeeping farms using the new technology (photo by the author, 2021)
Notes: *A – propolis purified from elastic nets using the device; B – elastic nets covered with propolis obtained from beekeeping farms in Ukraine*

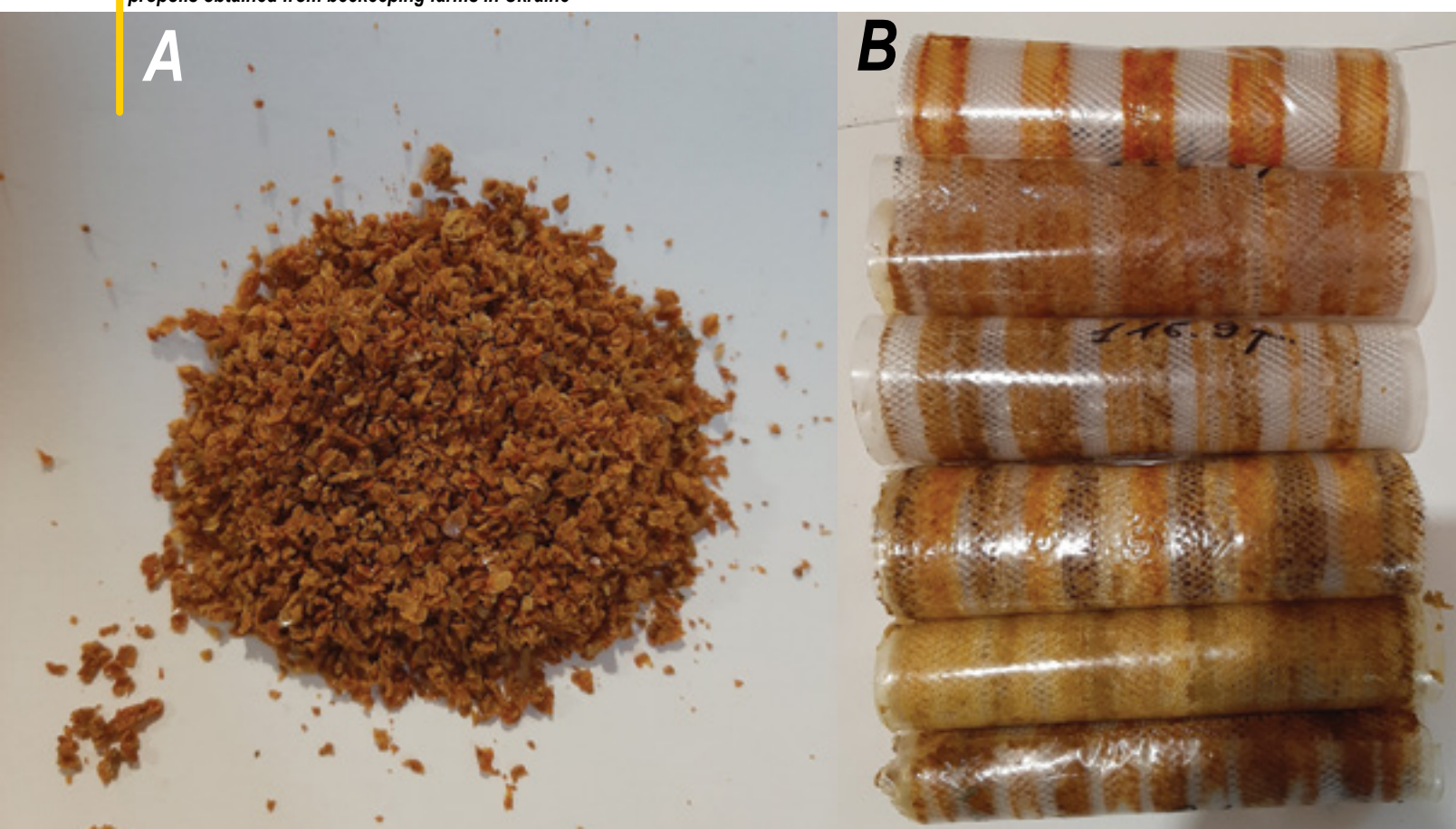


Fig. 5A. Image of QR codes for accessing the author's accounts on the internet. Note: *link to the author's YouTube channel*

Fig. 5B. Image of QR codes for accessing the author's accounts on the internet. Note: *link to the author's account in the scientific social network ResearchGate*

Nets in the device are cleaned mechanically. One net can be cleaned with the device 100 or more times without visible mechanical damage. The specially designed shafts of the device are pulled into the net and simultaneously bend it in a wave-like manner. During this bending, the propolis is shed in the lower tray. For comfortable work of the operator, the room temperature can be +20-22°C. In countries with tropical climates, it is possible to place the net cleaning device in honeycomb storages, where the temperature is always kept low, which will provide additional savings on room cooling. The propolis harvesting device can be used by beekeepers to clean 227 nets in one working day (eight hours). The developed device has been patented: patent No. 139736 "Device for collecting propolis" (UA). Details of the development and operation of the device were presented at the 47th Apimondia Congress (Istanbul) (PP-177).

For more detailed information on the operation of the device for cleaning nets from propolis and other research papers of the author, please use the link by QR code (Fig. 5, B). BC

Dvykaliuk Roman, Chairman of the Board of BeesAgro Controlled Pollination Association; PhD candidate of the National University of Life and Environmental Sciences of Ukraine; Kyiv, Ukraine.

E-mail: Roman.Dvykaliuk@delta-sport.kiev.ua

References

1. DSTU 4662:2006 "Propolis (Bee Glue). Specifications" (2007). Kyiv: State Standards of Ukraine
2. Salatino, A., & Salatino, M. L. F. (2017). Why do honeybees exploit so few plant species as propolis sources. MOJ Food Processing & Technology, 4(5), 158–160. **https://doi.org/10.15406/mojfpt.2017.04.00107**
3. Langenheim, J. H., 2003. Plant Resins: Chemistry, Evolution, Ecology, and Ethnobotany. Timber Press., Portland,OR, USA.
4. Isidorov, V. A., Bakier, S., Pirożnikow, E., Zambrzycka, M., Swiecicka, I. Selective behaviour of honeybees in acquiring European propolis plant precursors. Journal of chemical ecology. 2016. Vol. 42(6), P. 475–485. **https://doi.org/10.1007/s10886-016-0708-9**
5. Przybyłek, I., & Karpiński, T. M. (2019). Antibacterial properties of propolis. Molecules, 24(11), 2047. **https://doi.org/10.3390/molecules24112047**
6. Breyer, H. F. E., Breyer, E. D. H., & Cella, I. (2016). Produção e beneficiamento da própolis [Production and processing of propolis]. Boletim Didático, 1, 30. **https://publicacoes.epagri.sc.gov.br/BD/article/view/405** [in Portuguese]
7. Tsagkarakis, A. E., Katsikogianni, T., Gardikis, K., Katsenios, I., Spanidi, E., & Balotis, G. N. (2017). Comparison of Traps Collecting Propolis by Honey Bees. Advances in Entomology, 5(02), 68. 5. **https://doi.org/10.4236/ae.2017.52006**
8. Device for collecting propolis [Prystrii dlia zboru propolisu]: pat. 139736 Ukraine. № u 201910696; decl. 29.10.2019. publ. 10.01.2020. Bul. № 1. (in Ukrainian)

A CONVERSATION WITH KIM FLOTTUM, PART 2

Retired, Longtime *Bee Culture Magazine* Editor

Listen along here!

Part 1 Here!

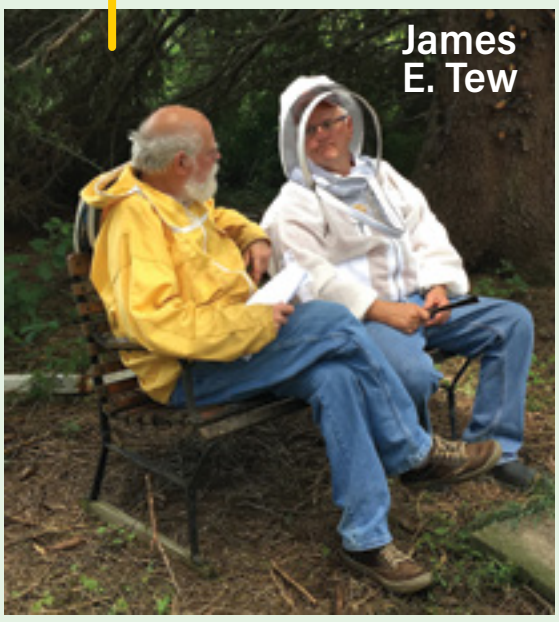
Last Month

Bee Culture readers, last month, Kim told us the story of his early years as editor of this magazine. Editor Jerry, the current manager of *Bee Culture*, stopped the first interview just after Kim introduced Charlie Gibbons, who was the White House beekeeper during the Obama administration years. This article, *A Conversation with Kim Flottum (Part 2)* picks up at that point…

Kim: When Michelle Obama said she wanted a garden out back, one of the people that worked there said, *"If you're going to have a garden, you got to have bees and I know a beekeeper who works here."*

They went and tapped on Charlie's shoulder and said, *"We need a beehive for the White House organic garden."* The elected people who lived in the White House had a dog and Charlie put the beehive where you would expect it – on the ground. Every time the dog came out, he would go sniff the entrance. I don't know if the dog ever got stung, but people thought it was probably not a good idea, so they made an eight foot tower to put the beehive on top of by the organic garden. When Charlie went to work bees, he had to climb a stepladder, but that was okay.

Jim Tew & Kim Flottum



I wasn't the only person that got invited there to work with the bees. Quite a few of the commercial and business beekeepers in the U.S. also got to come and visit and look and talk. That worked well.

Then not long after I started, three, four, five years, I got an article from a guy in England, and it was, *How We Stop Swarms in England.* The article was very British, very, very British. I liked it. The information was basic, but the presentation and how he used words wasn't basic at all. I published it and I got to know the author. The author's name was Peter. You met Peter when you were there.

Jim: I did. Peter Smith.

Kim: Then I got invited to my first National Honey Show in London. I was the speaker. The way the room was set up, all the chairs in the back, empty space right in front of the stage, the stage up above, and the speaker was over here on the right, a screen, standard lecture hall. I was looking at it because I was going to be next. *"Where's the steps? How steep are they? Where's my talk? Everything's set up."* Peter was what? Nine feet tall?

Jim: Yes, he was a tall man.

Kim: This big, tall guy (Peter Smith) comes over there and, in British English, he says, *"How do you do?"* I looked up at him and he says, *"You published an article of mine, thank you very much."* Kathy and I got to know Peter. When the meeting was over, he drove us around a little bit of the part of town we were in. Over the years we got invited to his place and to his meeting several times.

At that meeting, Peter introduced me to Jeremy Burbidge who runs *Northern Bee Books*. Now, I had an international publisher contact. He published books and he published a bee magazine. We put our heads together and it turns out we were a lot more alike than not – in terms of being a publisher and what people thought. We got along really well. I got to spread *Bee Culture*'s influence pretty much across England and that worked. He got to spread UK beekeeping across the U.S. and that worked well. I got to go over there a bunch of times.

He lives way north in England, but he has a Summer house as far south as you can get and still be in England and not have wet feet. That's how far south he lives. He lived less than a couple miles from… who was that monk in England?

Interviewer: Brother Adam?

Kim: Yes, Brother Adam – at Buckfast Abbey. You could almost see it (Buckfast Abbey) from his place. He was a little bit west of there, but it was that close.

Anyway, coming back to the U.S., I still was doing a fair amount of traveling and speaking. Almost all of this is because nobody else wanted it. I'm just one of the available ones to do this, so I guess I had nothing else to do.

Jim: You were the president during some dark times in the *Ohio State Beekeepers Association* with Africanized bees and predaceous mite introductions.

Kim: Thank you. I was. Africanized bees and mite introductions were bad.

Jim: It was a difficult time to be an officer in a bee group.

Kim: I had a good experience with a reporter asking about Africanized bees. The first Africanized bees in the U.S. were still very new when I got a call from a reporter at the *New York Times* about Africanized Killer Bees in the U.S. I had talked to this reporter before which is why she called me because I'm the only beekeeper she knew. We talked and I tried to calm her down, and I think

I did a little bit. The story that came out wasn't outright panic, but it was, *"Oh my God, are we going to die? Are we going to die?"* sort of thing.

A while later, she had a story in the *New York Times* about Charlie Gibbons, the White House's beekeeper. By the way, this is how I met Charlie. I said, *"I got to get ahold of her* (the New York Times reporter)." I called her up and she said, *"I can't tell you that it's the president."* I said, *"You owe me a story,"* so, she gave me Charlie's name. That was it, just his name. No address. No phone number. I went to my subscription person, and I said, *"Do we, by any chance, have a subscriber living in the Washington, DC, Maryland area, named Charlie Gibbons?"*

She looked and she said, *"Yes, we do."* I said, *"Do we have a phone number?"* My subscription person replied, *"Yes, we do."* I called him up. He'd taken the day off to go to the doctor. I called up and suddenly I'm talking to the president's beekeeper. How cool is that? That's how I met the White House's beekeeper who I discussed earlier.

Jim: You did that because of the *Bee Culture* subscription contact?

Kim: Yes.

Jim: The subscription address and phone number?

Kim: Yes. That got me in a lot of doors over the years. That got me in doors for two reasons. People were scared of what I would say in the magazine. I'm glad they didn't know that I was more scared than they were. I would never say anything, and that procedure worked fairly well.

Secondly, beekeeping events started to wind down, in terms of the industry settling down over Africanized honey bees and *Varroa* mites. The conflict over the honey board eased but then adulterated honey became a prominent national issue. To this day, that adulterated honey challenge hasn't gone away at all. I'm glad I'm not in the middle of that honey war because that's not going to go away.

I saw an ad just this week selling honey for a dollar per pound in a 50-gallon barrel. I need to say it wasn't U.S. honey. It was foreign honey. That's what U.S. honey producers are up against right now and that's not going to get any better with inflation and all the things being what they're going to be.

All things considered, I got out of this editor position at just about the right time in terms of domestic problems, and in terms of international problems. Personal problems? I never had any. A couple beekeepers, occasionally, would confront me with an issue, but by the time I wound down at Root, I had things where I wanted the magazine to be. I had the staff and I had the resources. I've made a lot of contacts over the years. Jim, I bet you I could go get a bee writer in twenty different countries today to write an article.

If there's something going on in Bulgaria, I know the guy and I can say, I established those contacts, and that meant, when you want to know something, who do you know, then call Kim. That worked well and still works to a large degree.

Jim: You routinely had large meetings in Medina featuring well-known beekeeping authorities.

Kim: Well, yes, we usually had a good crowd. We did an Ohio state meeting there and we had monthly meetings and we had two beeyards, and we had a lot going on in the Medina yard because John Root (the President of the Root Company then) supported it. John Root was the last beekeeping administrator at the Root Company. Everything that I did bees, he was behind 100%. He would say, *"Do you need a little more?"*

Yes. We had a lot of club members. They were from not just Medina, they were from Northeast Ohio, the whole corner of Ohio. One of them was a guy named Jeff Ott, who lived up in the Cleveland area or someplace. He got to know me. We talked and then a little bit later he asked, do you need any articles on anything here or maybe someplace else? Pretty soon he was writing routinely for me. He had a day job and a situation where he could take a week off and go to Mexico and see what was going on with the bees there. He went to Colorado. He went to Mexico. He did a lot of traveling that I couldn't or didn't want to do.

Then he got a job in Colorado. When he moved there, he still wrote for me but that tapered off because his job got busy. A couple years later, about three or four years ago, he came back to visit his family who still lives here. He came into my office, and he said, *"This is what I'm doing. How would you like to do a podcast?"* I just looked at him and I said, *"Well, what's a podcast?"* Because I had no idea. He took the time and the energy and the resources and taught me the basics of producing a podcast. The podcasts are named *Beekeeping Today* podcast and *Honey Bee Obscura*.

We figured it out between the two of us. He knew mostly all the things you can't see it, the microphones and the headsets and the wires. He knew all the electronic stuff, and what was being recorded, how to get it recorded and transcribed and on the web. He knew all of that. It helped that he is an excellent beekeeper. I knew the beekeepers. I wasn't sure what a microphone was when I started this project. He got me familiar with that. Now, I'm capable electronically. That's about it. Capable.

Jim: Yes. I agree with you on that.

Kim: Between the two of us put together, he knew how, and I knew who. This project has been a success. I saw this building and growing. The magazine was doing fine. It was time for me to retire from the Root Company.

At the time, I was over 70 and I needed to sit down. I spent a year looking for someone to replace me. I found three people with whom I was comfortable. They were sharp, intelligent, articulate and nonconfrontational. None of them would have caused a problem. Jerry Hayes was selected. I didn't even get the offer out of my mouth before he said, *"Yes, I want it. When can I start?"* He's the *Bee Culture* editor now.

He just stepped right in. He came in and spent a year with me at the company. I was able to show him about a third of what I know. Looking back, I missed so much stuff when telling him how to get this job done. He's had to learn the hard way, but now he's in charge. Once in a while, I'll offer an article or a piece of advice or something, but now he's in charge.

Kim: So, I'm still involved in the podcast, but I no longer travel to meetings. I haven't been on an

airplane in three years, and that's just fine with me. In fact, I won't even drive to a meeting. I'll do Zoom if people want. I've got probably 200 talks on the computer behind me, and I pick a subject. I'm good to go in most cases.

Now I'm here at home and I'm going through this lung thing that's causing me a bunch of problems. The medical theory is that it's going to go away. They're going to fix it, and I'm going to be back to normal. I'm not a betting man, but here I am – betting.

Jim: [laughs] I'm sure you are.

Kim: No other choice.

Jim: How old a man are you, Kim?

Kim: 76. Time flies.

Jim: Well, that's not old.

Kim: Okay? Why doesn't it feel that way?

Jim: Kim, you've given a good overview, but you can't just list everything that happened. How many years did you work for the Root Company?

Kim: I started in 1986 and I quit in 2020. That would be 34 years.

Jim: You did videos, you taught short courses, you developed a pollinator garden. In fact, you had a dynamic pollinator garden layout. You even developed a second magazine.

Kim: Yes. You and I, all things considered, have been so far ahead of the electronic distribution of material in this industry than anybody I can think of. We did the *Kim and Jim Show*, and we did instructional videos. The one thing you've done that I haven't done is initiate a *YouTube* channel. That's the only thing I haven't done. We've done everything else. We've written stories and we've written books. Kathy, my coworker, and wife, went to a bunch of national meetings doing the – what do you call it?

Jim: "*Facebook Live*."

Kim: *Facebook Live*. Right. We went to meetings and talked to all the vendors and two years later, the vendors still came up, when they'd see me and say, *"When you did that Facebook video at the Federation meeting, people still talk about that, so you made a splash."* It was because I had good people around me that knew more than I do and good people around me who wanted to help. We accomplished a lot in this industry that I say carefully, maybe now some of the people are beginning to catch up with.

Jim: Yes. You don't stay ahead if you don't keep racing. Even so, after a while, the race has to end.

Kim: What else did we do?

Jim: Well Kim**,** you and I had a car wreck on the way to a bee meeting.

Kim: Yes. We did. Almost a really bad one.

Jim: Yes. We were going to an *Ohio Farm Bureau* Commodity meeting, as I recall and, at 65 mph, we got broadsided, you and me. Kim, we missed that meeting. (It was not our fault. *Chuckles*.)

Kim: We've had a lot of calamities together, but I clearly remember that one.

Figure 2. Jim Tew and Kim Flottum capturing footage for a video session of the Kim & Jim beekeeping video series.

Jim: There's just so many things. You've mentioned Kathy several times. She's been an excellent coworker and a supportive wife for a long time for you. She should certainly be acknowledged in your successes. She was an integral part of the evolution of *Bee Culture*, too. You mentioned earlier that you started a second magazine, *Beekeeping, Your First Three Years*.

Kim: Yes, Kathy was fundamental to the magazine and to my career. That second magazine lasted, I want to say, five or six years. It hit during an economic downturn period that I had nothing to do with nor the industry had anything to do with. Unfortunately, it had to be dropped. If you have a copy hidden somewhere, keep it because there aren't any more.

Jim: It was a useful magazine that was enjoyable to read. Kim, you published a lot of books for the Root Company, and you published books that you authored.

Kim: Yes, I have. If you had told me in 1965, I was going to publish a book – any book, it'd take me 20 minutes to get up off the floor from laughing. I began to see the value of having not a permanent voice, but a voice that had almost all the facts in a book. Not everything, because tomorrow something's going to change, and next week something else's going to change. Most of what's in my book was true ten years ago and twenty years ago, and it'll be true 20 years

Figure 3. An acknowledgment of Kim's bee industry successes.

from now and that's what I wanted to produce.

One of the times I was with Dr. Morse, (Dr. Roger Morse, Beekeeping Professor, Cornell University) he had a big office with a big desk. He sat on one side of the desk and there was a bookshelf behind him that went almost to the ceiling. We were sitting chatting and he turned around and said, *"You need a new one, ABC."* The current edition, at the time, was like 11 years old. It hadn't been revised in a while.

John Root and his predecessors, his father and his father's brother had a schedule where they edited about a third of ABC every three years. They picked the oldest stuff and replaced it and left the rest of it alone. Well, I hadn't been there three years yet, so Roger said, *"Let's do this."* Do what I asked? *"Let's rewrite this book."* He did 75% of it all new. I did maybe 20%. Then he pulled in a lot of people, and I pulled in some people. Roger did a lot, and we came out with a new *ABC*, that was a hit and a half, but the cover looked just like the old ones.

A few years later, Shim (Dr. H. Shimanuki, USDA ARS bee scientist) came to me and he said, *"Are you ever going to do this book again?"* I said, *"No, you are."* He said, *"I'll be back in a month with a draft."* He was pretty much on time getting it back to me. I looked at the cover and I said, we are never, ever going to put this traditional cover on ABC again. I had a picture of a beekeeper, standing out by a beehive. This new version was to have that color picture, a shiny cover. That's the only one ever and probably the only one that will ever have a color cover.

Jim: [laughs]

Kim: Dr. Keith Delaplane (bee scientist, the University of Georgia) oversaw the editing of the current *ABC*, and he got *ABC* where I wanted it to be. He is a good scientist and a good beekeeper. He has good people working for him. He edited the *ABC* I wanted. I didn't want a science textbook and I didn't want a *how-to-stop swarming* book. I added a bunch of stuff from people that nobody knows or knew then. I think the last edition of *ABC* was pretty good.

Jim: Right, that last book was a good publication. It looked good.

Kim: Then among the other books I wrote, was *Backyard Beekeeper,* modeled after several, but not a lot, like several books already out there. Early this past Summer, I finished the fifth edition of *Backyard Beekeeper*, that'll be out in February 2024. Then, there was another one, *The Honey Handbook,* and that just focused on how to get as much honey out of a bee as you can. The last one I did was, *Common Sense Natural Beekeeping*, which was taking everything that's good for the bee and getting rid of everything that wasn't good for the bee. It turned out to be mostly natural, but not quite common-sense beekeeping.

Jim: I don't know. There must be one, but I don't know who else has had five-issue updates of the same beekeeping book. You know, a book that wasn't like *ABC* or *the Hive and the Honey Bee*. That's impressive, Kim.

Kim: Yes. Now, the *Beekeeping Today* and *Honey Bee Obscura* podcast projects have been entertaining for me. We presently have generous sponsors for the productions and Jeff does a great job editing the audio and posting the segments on the web. I'm enjoying working on them.

***Figure 4. The cover of Kim's popular beekeeping text,* The Backyard Beekeeper 4th Edition**

Jim: Kim, this review has truly been an educational process for me. There's no practical way to compress all your decades into a couple of simple magazine articles, but we surely tried. I have enjoyed listening to your experiences. Thanks for your time and memories. BC

Dr. James E. Tew
Emeritus Faculty, Entomology
The Ohio State University
tewbee2@gmail.com

Co-Host, Honey Bee Obscura Podcast
www.honeybeeobscura.com

Figure 5. Jim Tew and Kim Flottum at one of many, many bee meetings.

Honey-Graham Fruit Pizza

from the National Honey Board Website (https://honey.com/recipe/honey-graham-fruit-pizza)

Ingredients

- □ 1¾ cups all-purpose flour
- □ ½ cup whole wheat or graham flour
- □ 1 tsp baking powder
- □ ¼ tsp baking soda
- □ ¼ tsp salt
- □ ¼ cup (½ stick) butter or margarine, melted
- □ ⅓ cup honey
- □ 1 tsp vanilla extract
- □ 1 egg yolk, lightly beaten
- □ ¼ cup nonfat milk
- □ 1 (8 oz) package Neufchatel or reduced-fat cream cheese
- □ ¼ cup honey
- □ 3 cups assorted sliced or whole fresh fruits
- □ Toasted coconut or granola
- □ Optional honey or chocolate syrup

Serving Directions

Step 1
Spread topping onto crust to within ½ inch of edge.

Step 2
Arrange fruit over top.

Step 3
Sprinkle with toasted coconut and drizzle with honey, if desired.

Crust Directions

Step 1
Preheat oven to 375°F.

Step 2
In a large bowl, combine flours, baking powder, baking soda and salt. Mix well.

Step 3
In a small bowl, mix together melted butter, honey and vanilla. Stir into the flour mixture.

Step 4
Stir in egg yolk and milk.

Step 5
Form into a ball with hands.

Step 6
Place on a lightly greased pizza pan or baking sheet.

Step 7
With floured hands, press dough to form a 12-inch circle.

Step 8
Bake at 375°F for 12 to 15 minutes or until golden brown.

Step 9
Remove from pan. Cool on wire rack.

Topping Directions

In a small bowl, combine Neufchatel cheese and honey. Mix until well blended.

CALENDAR

ILLINOIS

Beekeeping Classes at MCC will begin on February 7, 2024. Classes will be available both in person on the main campus (8900 Northwest Hwy #14, Crystal Lake, IL) and at the extension Shah Center (4100 W Shamrock Ln, McHenry, IL) as well as online.

Four classes are available:

Beekeeping 101 is a four-evening class that provides a great foundation for the new beekeeper.

Seven Ways to Rear a Queen is an interesting challenge for the small-scale beekeeper wanting locally accommodated queens.

Comb Honey is for the beekeeper wanting a new, interesting (but old fashioned) challenge.

Beekeeping Field Study is a beeyard practicum giving a hands on, guided experience in handling honey bee colonies.

More information is available at **https://mchenry.augusoft.net/index.cfm?method=ClassListing.ClassListingDisplay&int_category_id=7&int_sub_category_id=38&int_catalog_id=3#grp_0**

• • • • • • • • • • • • • • • •

FLORIDA

The Palm Beach County Beekeepers Association presents the **South Florida Honey Bee Expo 2024** from Friday, February 16 through Saturday, February 17, 2024. The expo will be held at the Palm Beach Gardens campus of Palm Beach State College located at 3160 PGA Boulevard, Palm Beach Gardens, FL 33410.

Presenters include Ellen Topitzhofer (Cornell University), Petra Ahnert (author of *Beehive Alchemy*), Nathan Reid (Dalan Animal Health), Chris Werner (Indian Summer Honey Farm) Dr. Garett Slater (USDA-ARS Bee Lab in Baton Rouge), Branden Stanford (Florida Department of Agriculture and Consumer Services), Angie Thul (Florida Department of Agriculture and Consumer Services), Jennifer Hagen (University of Florida/IFAS Extension Lee County) and more!

The Expo will feature two full days of lectures and workshops. There will also be a Welsh honey and mead judging competition and a bee supply marketplace. An on-site apiary with live demonstrations will be available throughout the event.

For registration and additional information, see the Expo website: **www.honeybeeexpo.org**

• • • • • • • • • • • • • • • •

KENTUCKY

The **Louisville Beekeeping and Research Conference** by Apis Rescue is targeted to the last Saturday of January (1/27/24) from 9am-6:20pm EST. It will be held at University of Louisville Conference Center (old U of L Shelby campus) – 450 N Whittington Pkwy, Louisville, KY 40222.

The theme for this *in-person* conference is "In Pursuit of Survivability."

The conference provides an exceptional and affordable regional opportunity to see some of the finest beekeeping content provided in Intermediate, Advanced and Research tracts. Lunch and parking are included. There will be vendors and end-of-day door prices.

Speakers include: Dr. Clarence Collison, Dr. Farida Olden and Dr. Thomas Webster as well as EAS Master Beekeepers Kent Williams, John Benham, Leonard Davis DVM and Jake Barker.

Registration of $65 is *Required.*

Learn more and register at **https://www.apisrescue.org/events**

• • • • • • • • • • • • • • • •

MICHIGAN

Kalamazoo Bee School will be held on February 17, 2024 from 8am to 5pm.

Some of the benefits of attending include tracks for both beginners and experienced beekeepers, vendors, hands-on workshops and giveaways.

Go to **https://kalamazoobeeclub.com/bee-school-info/**for more information.

The **3rd Annual SBGMI Virtual Winter Conference** will commence on February 2, 2024 at 8am EST.

This conference features Dr. Stephen Martin, Troy Hall, David Peck, Dr. Kaira Wagoner, Ryan Williamson, Ang Roell, Cory Stevens and Randy McCaffrey.

All registrants automatically qualify for many great door prizes. Registration includes a 1 year of annual SBGMI membership, access to the conference recordings and many other great SGMI benefits.

The conference includes 9 hours of new and relevant content discussing all things queens and sustainable beekeeping practice.

To register, visit: **https://sbgmi.org/product/2024-sbgmi-winter-conference-registration**

Questions or comments, email **info@sbgmi.org**.

• • • • • • • • • • • • • • • •

MISSOURI

Eastern Missouri Beekeeper Mardi Gras Banquet will be held on February 9, 2024 at Aviator Hotel (6921 South Lindbergh, St. Louis, MO 63125).

Join the annual Mardi Gras Banquet, held the night before the 2024 EMBA Beekeeping Workshop. The evening will be a fun kick-off for the weekend and includes a buffet dinner, cash bar and attendance prizes. Our keynote speaker will be Michael Chippendale talking about the history of the honey bee. Partners and better halves are welcome. The cost is $30.

Sign up here: **https://easternmobeekeepers.com/single-event-pages/sep-2024-emba-beekeeping-mardi-gras-banquet/.**

Questions? Call 314-451-BEEK (2335)

Eastern Missouri Beekeepers Association 2024 Beekeeping Workshop will be held on February 10, 2024 from 8am to 5pm at Aviator Hotel & Conference Center (3921 South Lindbergh, St. Louis, MO 63125).

The 2024 workshop will provide instruction for beginning and experienced beekeepers. The courses will focus on beekeeping as a craft and the biology of the honey bee as a super-organism. The cost is $85 for the full day of learning and includes a continental breakfast and lunch.

For more deatils, visit **https://easternmobeekeepers.com/single-event-pages/sep-2024-emba-beekeeping-workshop/.**

Questions? Call 314-451-BEEK (2335)

Boone Regional Beekeepers Association is holding the annual beginning beekeeping class on January 27, 2024 from 8am to 4pm (snow date February 3, 2024). The class will be held at the Animal Science Res. Center, MU Campus, 920 East Campus Drive, Columbia, MO, 65201.

The cost to attend is $60/person or $90/couple. This price includes a beekeeping book, a beekeeping reference guide, a one year membership in BRBA, lunch, snacks, door prizes and meeting vendors.

No previous experience is needed. Topics covered will include Experience of a New Beekeeper, Hive Components & Equipment, Starting your colony, Diseases, Pests & Treatments, and more.

For more information email **booneregionalbeekeepers@gmail.com**. Get your tickets to this limited size class at **boonebees.ticketleap.com/beginning-beekeeping/**

Their monthly meetings are held on the third Sunday of the month at 2:30pm.

Go to **https://www.boonebees.com/upcoming-events** to get the information on the next meeting.

• • • • • • • • • • • • • • • •

NEW YORK

Southern Adirondack Beekeepers Association (SABA) Spring Seminar will be held on Saturday, March 23, 2024 from 8am-4:30pm at Hudson Valley Community College TEC-SMART in Malta, NY 12020.

The seminar will includes guest speakers, a raffle, vendors, door prizes and more!

For more information and updates, see: **https://sababees.org/**

• • • • • • • • • • • • • • • •

PENNSYLVANIA

Western PA Beekeeping Seminar will be held on February 9-10, 2024 at Gateway High School (3000 Gateway Campus Blvd. Monroeville, PA 15146).

Early bird tickets go on sale in September 2023.

For more information, please visit **https://www.beavervalleybees.net/yearly-happening-wpa-sem**

• • • • • • • • • • • • • • • •

SOUTH DAKOTA

The Black Hills Area Beekeeper's Club will be hosting the annual Buzz in the Black Hills Conference on Saturday, February 24th, 2024 from 8am-4pm in Rapid City, SD.

Go to **https://www.eventbrite.com/e/copy-of-buzz-in-the-black-hills-conference-tickets-673898758327?aff=ebdsoporgprofile** for more information.

• • • • • • • • • • • • • • • •

WISCONSIN

Save the date for the **Central Wisconsin Beekeepers Association's Beekeepers Conference** on Saturday, March 16, 2024 from 8am to 4pm. The conference will be held at Northcentral Technical College – Wausau Campus.

The two highlighted speakers are Kamon Reynolds, co-founder of the North American Honey Bee Expo and the founder of Tennessee's Bees and Dr. Adam Ingrao, co-founder and national director for the Heroes to Hives program and an instructor for the Great Plains Master Beekeeping course through the University of Nebraska.

The conference will include other speakers including David Peck from Betterbee, Greg Burns from Nature's Image Farm and William Werning from Wisconsin Sustainability as well as many others.

For more information on the conference and registration, go to **https://www.cwbees.com/bee-conferences.html**

• • • • • • • • • • • • • • • •

ABF

The 2024 ABF Conference and Tradeshow will officially begin on Wednesday, January 10th; however, there are some scheduled special tours on Monday and a "Dinner and a Show on Tuesday.

Online pre-registration will close on December 31, 2023.

The registration price includes several speacial inclusions:

- Social events with meals included on Tuesday, January 9 and Wednesday, January 10
- Honey judging class to teach how to judge honey
- Dr. Judy Wu Smart "Science Policy and Advocacy Training for Beekeepers" workshop
- Sold out Vendor Expo
- Friday will be an entire day of "Beginning Beekeeping Classes"

Additional sessions for additional costs:

- "Encaustic Painting" instructions by George Hansen
- Forklift Certificaiton taught in both English and Spanish
- Tour of the Baton Rouge Bee Lab
- Commerical Breakfast, proceeds will be given to Research Fund
- House of Blues, Offsite social event

CLASSIFIEDS

FOR SALE

- 3 lb package with queen $140 each, 1000 -5 frame nucs and splits $150 each full of bees, available March 2024. Contact Tim Holt, Siloam, NC, **(336) 710-4904, timholt@surry.net**, or pick up in Statesville, NC
- Ram 5500, 39K miles, 17-6 foot aluminum flatbed, 4-wheel drive, like new. Beekeeper's dream! **218-764-3400.** Leave message, will text pictures

Contact Jen Manis to place an ad: Jen@BeeCulture.com

Display Advertisers

A Closer Look 66
ABC and XYZ of Bee Culture 67
Acorn Beekeeping Equipment ..... Inside Front Cover
All My Bees 55
American Bee Journal 71
American Honey Producers 70
Autobiography of A.I. Root 86
Aves – Fix It 71

B & B Honey Farm 69
Bee & Butterfly Habitat Fund 27
Bee Culture Advertising 29
Bee Culture Bookstore 19
Bee Culture Magazine 5
Bee Culture Subscriptions 55
Bee Smart Designs 75
Beekeeping Insurance Services 9
Beeline Apiaries 70
Betterbee 51
BL Plastic Containers 13
Blue Sky Bee Supply ..... Inside Back Cover
B-Z Bee Queens and Packages 56

C. F. Koehnen & Sons 65
Catch the Buzz 13
Complete Bee 70

Dadant – Kits 26
Dadant – Winter Patties 14
Dakota Gunness 86

Ernst Seeds 5

Farming Magazine 4
Forest Hill Woodworking 11

Gardner Apiaries 4
Global Patties 8

Hardeman Apiaries 56
Honey Bee Health Coalition 27
Honey Land Farms 13
HoneyBee School 5
Humble Abodes 54

JZs BZs Honey Company 4

Kona Queen 36

Liberty Tabletop 60

Mann Lake ..... Back Cover
Maxant Industries 27
Meyer Bees 87
Miller Bee Supply 48
MyApiary Manager 15

Nevada State Conference 91
NOD 20

Olivarez Honey Bees Inc 55
Olivarez – Help Wanted 69
OxaVap 70

Paradise Queen Hawaii 36
Pierce Beekeeping Equipment 50
Pierco Frames 1
Project Apis m 93
Propolis etc. 60

Queen Right Colonies 71

R Weaver Apiaries 71
Rayonier Land License 39
Resilience Queens 87
Roberts Bee Company 48
Rock Bridge Trees 13
Ross Rounds 57
Rossman Apiaries 57

Sailor Plastics 35
Simpson's Bee Supply 87
Spell Bee Company 4
Strachan Apiaries 18
Sullivan's Queens 71
Sunshine Honey Bees 54
Superior Bee 83

Tauzer Apiaries 5

Vita Europe – Apistan 37
Vita Europe – B402/Certan 44

Wicwas Press 4
Wilbanks Apiaries 50
Work I Knew I Must 86

Z's Bees 51

Image Contest – Holiday Hives

How To Submit:

Email your images to **Jen@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)

We've started an image gallery! This month, we want to see any and all pictures you have of your **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.

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.

See the website for the complete schedule: **https://abfnet.org/abf-2024-schedule-2/**

For registration, go to: **https://abfnet.org/2024-abf-conference-registration/**

For special Monday tours: **https://abfnet.org/2024-abf-conference-frame/**

ABF Registration Pricing	Regular through December 31, 2023		On-Site after December 31, 2023	
Registration	Member	Non-Member	Member	Non-Member
Individual Registrants Full Conference	$295.00	$355.00	$345.00	$405.00
Individual Registrants Day Rate	$175.00	$215.00	$200.00	$240.00
Student, Educator, ABRC, AIA				

* 10% discount for active military and first responders.

A Belated Apology

Ed Colby

Some years ago, when I was president of the Colorado State Beekeepers Association, I bumped into a rock star honey bee researcher at an American Beekeeping Federation conference. I invited him to speak at our state meeting later that year in Colorado. He accepted, and we agreed on a stipend. Some time later, when I contacted him to nail down the details, he confessed that he'd inadvertently gotten double booked but said he could talk at our Winter meeting instead. And oh, by the way, he'd doubled his fee. Our conversations were cordial and all, but this didn't sit right with me.

At the 11th hour I found a replacement speaker for the Summer meeting. He gave an excellent nuts-and-bolts talk on how to keep our little darlings alive. No one complained that our advertised speaker didn't show up.

We live and we learn. I might forgive, but I wouldn't forget. I won't say I held a grudge, because life's too short for those. But I figured this cutting edge researcher and engaging speaker would – as long as I walked this good Earth – be doomed to have an asterisk next to his name.

Not so fast Ed! Imagine my surprise when six weeks ago he texted me a most gracious apology! This sad story apparently ate at him even more than it inconvenienced me. For five years he wrestled with this – a debt unpaid you might say.

I accepted his apology. He gets out my way from time to time and said he'd like to take me to dinner. I told him I'd be honored.

We all make mistakes that we live to regret. But in a world gone mad with hatred and revenge, each of us can still hold the twin candles of contrition and forgiveness. Brotherly and sisterly love is the pathway to peace and happiness. Whether you're religious or not, what the early Christians called *agape* speaks to the heart. What you say and do matters. You can change the world. You can make it a better place. Really and truly you can.

A year ago, I told you that *Varroa* mites had their way with too many of my colonies, and I pledged to do better this year. I did not keep my word!

On October 24, I sugar-shake tested two hives. One tested 100 and the other 80 mites in 300-bee samples. They'd received a prior Apiguard (thymol) treatment, but I wrote 'em off as a lost cause and didn't even bother giving them a second 50-gram dose. I was disgusted with myself for letting things get out of control. I figured they'd go downhill in a hurry and then I wouldn't have to fret about them anymore. I'm trying to downsize my operation anyway. Maybe this was Mother Nature's way of helping me achieve my goal.

A few days ago, on November 9, I was shocked to discover that both hives were still practically boiling over with bees. In November! When I re-tested, the 100-mite hive count was down to 60, but – most remarkably – the formerly 80-mite hive tested at only 20 mites. This made no sense to me. There was a little bit of capped brood in both colonies, and no sign of curly-wing virus, which is easy to spot.

Okay. Miracles can happen. Otherwise we wouldn't be here on Earth, any of us. The experts will tell you that colonies do not bounce back from extremely high *Varroa* infestations, and I'm no expert – just a poor sideliner trying to get 85 colonies through the Winter.

I crossed my fingers and gave both colonies four Apivar (amitraz) strips. What did I have to lose?

At the Colorado bee meeting meet-and-greet last night, I cornered University of Minnesota post-doc bee researcher Katie Lee. She is so cool, not to mention smart. She listened patiently to my tale of two *Varroa*-ridden colonies. She liked that I found no curly-wing. She said what I wanted to hear: Every colony is different. Every situation is different, so you never know. The odds are stacked against me, but still...

Any mite count in double digits sets off alarm bells inside my head. But maybe this year's string of high-mite hives is indeed a blessing in disguise. It gives me an opportunity to experiment. Most *Varroa* are hidden away in the capped brood where they're hard to kill, merrily mating and raising their young. In some colonies, I scraped off the capped brood and treated the exposed *Varroa* with an oxalic acid dribble. I did this even late into Autumn. This takes care of the mite problem, but the experts will tell you this is a no-no, because colonies need Fall-emerging long-life Winter bees to make it through the tough months ahead. Plus, you can knock the stuffing out of your mites, but will this fix the virus problems that they introduced? I don't know. I can't swear to it, but maybe Katie rolled her eyes when I told her about scraping brood. Well I'm sorry. I did what I felt I had to do.

Talk is cheap. Winter survival is the test. I'll keep you posted. BC

Blue Sky bee supply®

There's still time for *a little beekeeping*

WINTER PATTIES WITH HONEY-B-HEALTHY

Use for colonies that have run low on stores in the wintertime and those needing to feed in emergency situations.

Available in:
1 lb patty / $3.95
40 lb box / $76.95

VARROX OXALIC ACID VAPORIZER

If you have more than 10 hives or just want the very best, this is the vaporizer for you.

$164.95

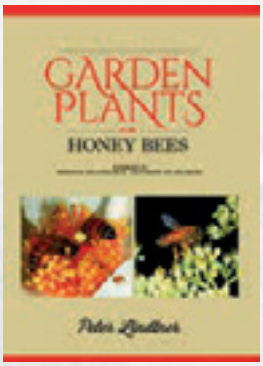
...and a LOT *of learning!*

DVD VIDEO

MY HIVE TOOL 4-DVD SET
$39.95

QUEEN REARING THE BEST WAY DVD
$19.95

SWARM PLUS DVD
$25.00



GARDEN PLANTS FOR HONEY BEES
Hard cover, 398 pages
$44.95

INCREASE ESSENTIALS 2ND EDITION
Paperback, 176 pages
$25.00

Caps

PRINTED METAL CAPS
Available in 2 designs & 2 sizes! 58mm to fit our 12 oz. skep jar or 12 oz. hex embossed cylinder. 43mm to fit our 3 oz. skep jar.

Plastic

a PLASTIC PANEL BEARS
2 oz Panel Bears
$70.21 / 160 Ct. Case
WITH Caps
6 oz Panel Bears
$211.20 / 660 Ct. Case
No Caps
12 oz Panel Bears
$127.95 / 365 Ct. Case
No Caps
16 oz Panel Bears
$91.95 / 200 Ct. Case
No Caps

b DECO EMBOSSED JUGS
5 LB - $103.95 / 72 Ct. Case
3 LB - $127.95 / 126 Ct. Case *No Caps*
1 LB - $140.44 / 300 Ct. Case *No Caps*

CLASSIC PLASTIC JARS

c 32 oz - $79.95 / 110 Ct. Case
No Caps
16 oz - $96.95 / 225 Ct. Case
No Caps

d SQUARE PLASTIC
16 oz - $225.95 / 343 Ct. Case
With Lids

Glass

e GLASS 3 OZ. MINI MASON
$22.95 / 36 Ct. Case
Lids now available in Gold, Black or White

f GLASS 12 OZ. HEX EMBOSSED CYLINDER
$11.95 / 12 Ct. Case
Gold Metal Lids Included

g 12 OZ & 3 OZ GLASS SKEP JARS
12 oz Skep Jars $16.95 / 12 Ct.
3 oz Skep Jars $14.95 / 24 Ct.
Gold Metal Lids Included

h MUTH JARS
4 oz - $31.95 / 36 Ct. Case
8 oz - $14.95 / 12 Ct. Case
16 oz - $22.95 / 12ct. Case
Includes Corks

i CLASSIC GLASS JARS
8oz - $19.10 / 24 Ct. Case
16 oz - $10.60 / 12 Ct. Case
32 oz - $15.75 / 12 Ct. Case

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

Honey Bottling

FOR BEES. FOR HONEY. FOR EVERYONE. | (877) 529-9BEE | WWW.BLUESKYBEESUPPLY.COM

Quality Nutrition | Higher Honey Yields | Ready to Use | Protein Rich

A PRODUCT BY MANNLAKE

5% NATURAL POLLEN

15% CRUDE PROTEIN

High protein content to promote brood rearing

NEW! ULTRA BEE plus

HIGH PROTEIN NATURAL POLLEN SUBSTITUTE

MADE IN USA

Contains 5% natural, USA pollen, irradiated to prevent the spread of honeybee diseases

HONEYBEE FEED IN CONVENIENT PATTY FORM

Same great formula as Ultra Bee with the addition of natural USA pollen!

CONTAINS NATURAL POLLEN FOR HEALTHIER, STRONGER BEES!

FD316	Ultra Bee Plus Patties With Natural Pollen, 2100 lb
FD313	Ultra Bee Plus Patties With Natural Pollen, Single
FD315	Ultra Bee Plus Patties With Natural Pollen, 40 lb

Scan To Shop

THOUSANDS of products

EXCLUSIVE online sales

MANNLAKE
MANNLAKELTD.COM

800-880-7694

SIX RETAIL locations

CUSTOMER SERVICE for all your needs