ALMOND POLLINATION 2019

ROOT PUBLICATIONS

FEB 2019

Catch The Buzz™

Bee Culture®

The Magazine Of American Beekeeping

www.BeeCulture.com

COLOSS

Bee Informed

Honey Bee Health

ROOT PUBLICATIONS $4.99

We write over 88% of the Beekeepers in the program Nationwide.

BEEKEEPING INSURANCE SERVICES

APICULTURE INSURANCE PROGRAM

A Specialized Program for Beekeepers

Available Nationwide

Offering All Forms of Insurance Including:

- ✳ USDA Apiculture
- ✳ Property
- ✳ General Liability
- ✳ Automobile
- ✳ Life Insurance
- ✳ Home & Farm Insurance

We are Proud Members & Sponsors of:

- ✳ American Beekeeping Federation
- ✳ American Honey Producers Association
- ✳ California State Beekeepers Association
- ✳ Florida State Beekeepers Association
- ✳ Minnesota Honey Producers Association
- ✳ Montana State Beekeepers Association
- ✳ North Dakota Beekeepers Association
- ✳ Texas Beekeepers Association

Kevin Rader: Buzzus@beekeepingins.com

www.beekeepingins.com

888-537-7088

Betterbee®

Beekeepers Serving Beekeepers®

800-632-3379

betterbee.com

2019 catalogs are now available! Call or visit our website to request your free copy.

woodenware • protective gear • labels • containers • extractors • candle molds

LYSON

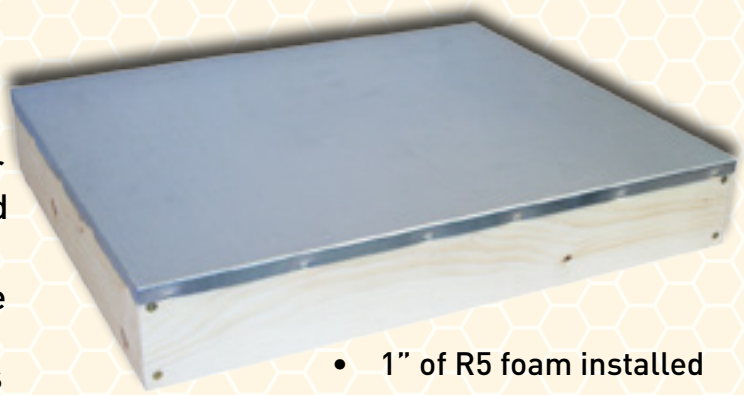
- Armpit zipper venting
- Protected back vent panel
- Zippered pockets
- Thumb holes in cuffs
- Adult & child sizes
- Chin strap

New for 2019:

Insulated Outer Cover

Finally, a rugged cover that can be used year round! Keep the bees warm in the winter and cool in the summer!

This outer cover has R5 foam enclosed in the cover to reduce condensation in the hive. It also has notches on both sides to allow bees to escape through the inner cover notch.



- 1" of R5 foam installed
- 26 gauge galvanized steel
- Provides extra insulation
- 10 & 8 Frame available

DELIVERED TO YOUR DOOR!

Whether you're just starting your first hive, or you're looking to expand your apiary, we've got the package bees and queens you need. We have packaged bees with your choice of Italian, Purebred Russian or Russian Hybrid queens; and we have marked or unmarked Italian and Russian hybrid queens available for purchase. All available for delivery to your door!

NEW for this year, we're also offering packages of Saskatraz bees direct from California! These 3 lb packages come with a young, naturally mated Saskatraz queen. Saskatraz bees are known for excellent honey production and good wintering ability.

Package Bees

- #3 package w/ Italian Queen*
- #3 package w/ Purebred Russian Queen*
- #3 package w/ Russian Hybrid Queen*
- NEW! #3 package w/ Saskatraz Queen^

*Marked only / ^Unmarked only

Queens

- Italian Queen*
- Russian Hybrid Queen*

*Marked & Unmarked available

CALL TODAY TO ORDER YOURS!

Kelley Beekeeping

SERVING THE BEEKEEPER SINCE 1924

1-800-233-2899

www.kelleybees.com

ACORN™
BEEKEEPING EQUIPMENT

Ready Now For The 2019 Bee Season!

The New Standard of Excellence in Plastic Frames and Foundations

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

Acorn One Piece Plastic Frames

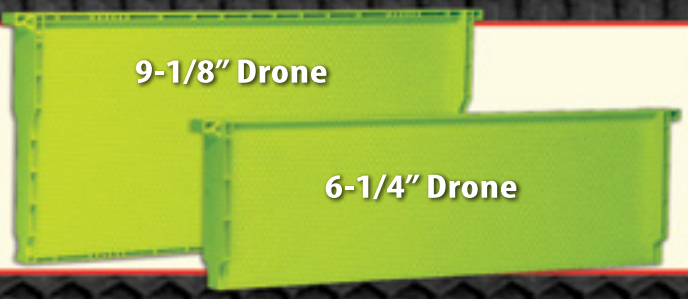
- Flatter, Stiffer, Sturdier
- *Redesigned Mega Strong Ears Last Forever!*
- 9-1/8" and 6-1/4" Sizes

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" and 6-1/4" Sizes



Nick Lissaman
25 years experience
nick@acornbee.com
www.acornbee.com
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

BEEKEEPER TESTED

ULTRA BEE

HIGH PROTEIN POLLEN SUBSTITUTE

BEEKEEPER TRUSTED

FREE SHIPPING

MADE IN USA

STRONGER BEES HEALTHIER HIVES

Scientifically developed to provide the best bee nutrition, Ultra Bee has been shown to match natural pollen's results in the field. Give your bees the nutrition they deserve!

- Highest protein content available
- Balanced amino acid profile
- USA ingredients only
- FDA certified
- Available as patties or dry feed

A balanced amino acid profile means your bees can utilize ALL of the available protein!

ULTRA BEE DRY

1 LB CANISTER	$ 9.95
10 LB PAIL	$29.95
50 LB BAG 1-3	$89.95
4-10	$85.95
11-39	$80.95
40 - 159	$77.95
160+	$73.95
1500 LB TOTE	$1495.95

CRUDE 58% PROTEIN

ULTRA BEE PATTIES

10 LB BOX	$30.95
40 LB BOX 1-3	$78.95
4-10	$72.95
11-48	$68.95
49+	$65.95
BULK PACK 2100 LB	$2595.95

CRUDE 18% PROTEIN

MANN LAKE
WE KNOW BEES

800-880-7694
www.mannlakeltd.com

Hackensack, MN • Wilkes-Barre, PA • Woodland, CA • Marshall, TX

*Free shipping applies to most orders over $100 sent standard ground service within the lower 48 states. Prices effective 2/1/19 thru 2/28/19 and are subject to change without notice.

Bee Culture

February Features . . .

Page 49

Page 56

800.289.7668
Executive Publisher – John Root
Associate Publisher, Senior Editor – Kim Flottum, Kim@BeeCulture.com, Ext. 3214
Assistant Editor, Design – Kathy Summers, Kathy@BeeCulture.com, Ext. 3215
Social Media, Event Specialist & Subscription Coordinator – Amanda DeSimone, Amanda@BeeCulture.com, Ext. 3255
Advertising – Jean Newcombe, JNewcombe@BeeCulture.com, Ext. 3216
Publications Assistant – Kelsey Kelly, KKelly@rootcandles.com, Ext. 3220

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

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

Subscription Information
U.S., one year, $25; two years, $48. Newsstand price: $4.99. All other countries, (U.S. Currency only), $20.00 per year additional for postage. Digital Edition $15. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), February 2019, Volume 147, Issue 2, 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 – 800.289.7668, Ext. 3220 • www.BeeCulture.com • subscriptions@BeeCulture.com

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

Shaking packages at Olivarez Honey Farm, April 2017. Summers photo

Frames - Plastic

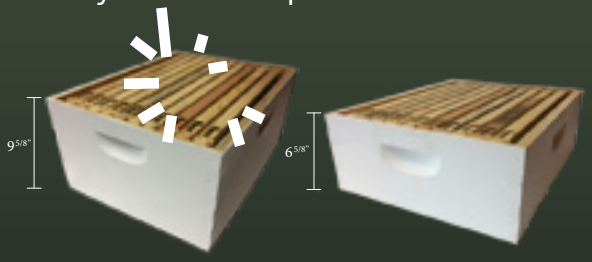
- Super Strong and Durable
- Safe - FDA food grade plastic
- Easy to use - No Assembly Required

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
- Pacific Northwest Ponderosa Pine
- Assembled, Primed, & Painted

Pierco®

Genuine Beekeeping Equipment

EST. 1977

Buy Pierco - Buy Quality
Factory Direct Store
New Lower Prices - Buy Now and Save!

FREE SHIPPING * See website for details

Check us out at: www.Pierco.com

FOR ALL YOUR BEEKEEPING NEEDS

HOBBYISTS / SIDELINERS / COMMERCIAL BEEKEEPERS

We Offer DOUBLE & TRIPLE WAX

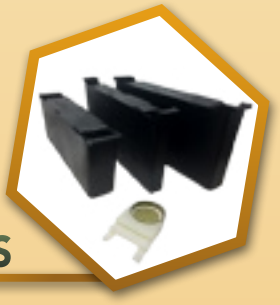
SUPERDFM

PROTEIN SUPPLEMENTS

BEEKEEPING KITS

EXTRACTING & BOTTLING

PROTECTIVE WEAR



FEEDERS

Call or Visit us at:

Factory/Store Address: 680 Main St. | Riverside, CA | 92501

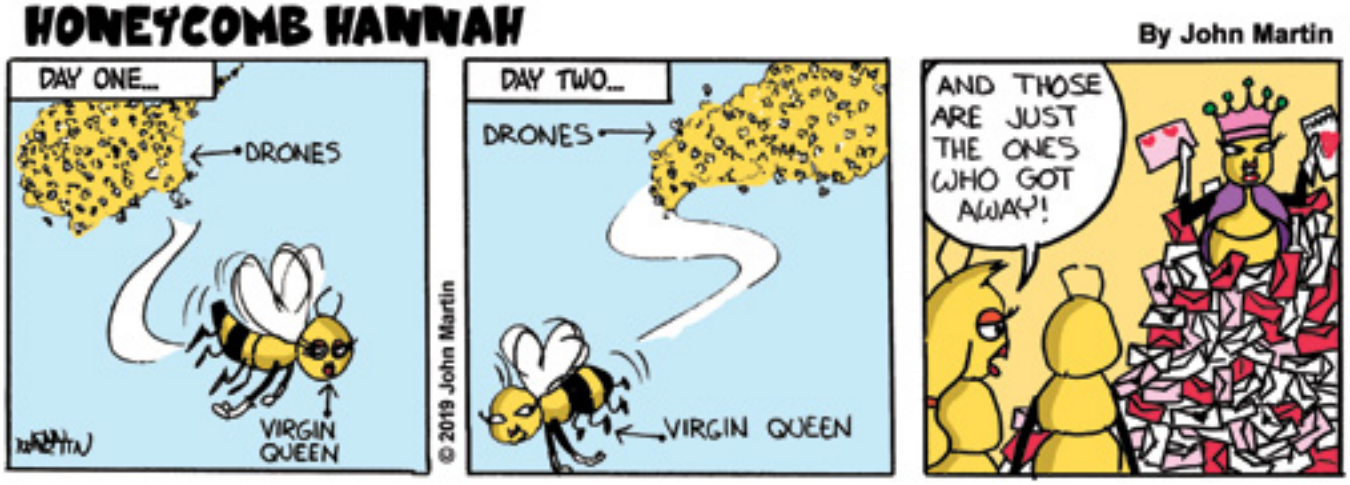
Get Connected | (909) 575-2013 Made in the USA

Bee Culture's Best . . .

Page 89

Page 86

In Every Month –



Beekeeping & Honey Bees

—Our Business Since 1863—

NOW OFFERING FREE SHIPPING on purchases of $100 or more. Some items do not apply.

Dadant & Sons has served the beekeeping industry for over 150 years.

From humble beginnings, our company has expanded to 10 branch locations nationwide and 4 manufacturing facilities located near Hamilton, IL.

Since 1863 we've produced and sold the best beekeeping equipment available to beekeepers throughout the world. To this day, we still believe that *"it pays to furnish good goods."*

Dadant

Online dadant.com | **Toll-Free** 888.922.1293

Missouri Pollinator Steward Program

Missouri is the first state in the nation to launch a pollinator steward program designed for the general public. Besides its wider scope, Missouri's Master Pollinator Steward program takes the innovative approach of partnering with conservation-oriented groups such as bee clubs to educate the public about pollinators, their foraging needs and role in our natural environment.

The Missouri Master Pollinator Steward Program officially launched fall of 2018. Ten contributing authors wrote the five chapters and associated hands on activities designed to capture those nine out of 10 people who want to help pollinators but don't want to keep honey bees, the largest of the pollinator groups. One out of every three bites of food we eat is from bee pollination, which helps plants reproduce through fruit, seed and nut production.

Lack of plant diversity and poor nutrition sources are among the major challenges impacting bees worldwide.

The five chapters include an overview of insects; relationship between pollinators and nature; native bees; honey bees, and pollinators in nature and agriculture.

To host a program, conservation-oriented groups such as Master Gardeners, Master Naturalists and bee clubs can work with their University of Missouri Extension Councils to request the program in their area; to get class participants registered and to host the sessions either as individual classes or as two day-long sessions.

The suggested cost of the program is $90 per person. The recommendation is that $25 goes back to the local sponsoring group; another $25 is a required University of Missouri state fee. The remaining $40 is used to cover expenses such as printing and supplies. Any surplus funds will be kept by the local extension office.

Other steering committee members include Travis Harper and Bob Pierce, University of Missouri Extension specialists; Mike Conroy, Sedalia Beekeeping Association; Jim Duever, Boone Regional Beekeeping Association; Bob Lee, Master Naturalist representative; Amber Edwards, Conservationist educator, and myself as the master gardener representative.

Missouri State Beekeepers Association approved the program concept in 2015.

For more information on Missouri's master pollinator steward program, visit **https://extension2.missouri.edu/programs/programs-master-pollinator-steward**

Guidelines on how to set up a Master Pollinator Steward program class are here: **https://extension.missouri.edu/pollinator**

A narrated program overview has been posted here: **https://youtu.be/0AvESofVLuI**

For more information, contact James Quinn at **quinnja@missouri.edu**

Charlotte Wiggins
Rolla, MO

Russians On Tribal Land

What do Russian honey bees have in common with a midwestern Native American tribe? The answer is . . . location, location, location! Doug and Shawn Way have been keeping bees on Pokagon Potawatomi tribal land in Dowagiac, Michigan, for three years and have found it a perfect location for breeding the lines needed for the Russian Honey bee Breeders Association.

The Pokagon Band of Potawatomi have been a federally recognized tribe since 1994, just three years before the Russian honey bees arrived in the U.S. The Pokagon are descendants of the allied Potawatomi tribes of southwest Michigan and northern Indiana.

They are not only a young tribe in terms of federal recognition; with a median age of 18 and life expectancy of 65 – they are young in terms of membership as well. Jennifer Kanine, director of natural resources, wants to help them grow old and healthy.

"Nutrition in the past 20-30 years has declined,"Jennifer says, "Natives are prone to diabetes and

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

other diseases, and health needs to be at the forefront."

When Jennifer refers to health, she is talking about healthy lifestyles as well as a healthy environment. Along these lines, community members are offered access to a Health Services Center as well as nutritious crops grown organically on tribal farmland. These crops are desirable to outside sources and supplement the citizens' commodities. Jennifer mentions the term *food sovereignty*, "A nation can only be sovereign if it can feed its own people."

For helping them fulfill that goal, the Ways are rewarded with a year round habitat for their bees in a secluded location ideal for their mating requirements. They have also partnered with fellow beekeeper Steve Lesniak to provide beginner beekeeper instruction, hosted a hive building workshop, and invited tribal members to their honey house.

It's a great relationship, one I treasure and look forward to for the future.

Shawn Way
Mishawaka, IN

Belmont Beekeepers Club

My name is Jeff Brinton and I am currently an inmate at Belmont Correctional Institution in Ohio. I am also the Vice President of our institutional beekeeping club. I wanted to write to your publication to see if you might be interested in doing a story on us in an upcoming issue of *Bee Culture*.

The Belmont Correctional

Beekeepers Club (BCBC) has been in existence for approximately one year. We currently have three hives in our apiary, however, one hive never actually housed any bees, and we lost the bees in the other hive during the recent cold snap, leaving us one functional hive heading into Winter. Our plan is to have eight to 10 hives in the apiary by next Summer.

The BCBC is made up of about 38 inmate members and two staff advisors. In January, we will be welcoming 24 new members into the club. In addition to club activities and meetings, one of the staff advisors, Mr. William May, also teaches weekly classes on bees and beekeeping.

We are also generously provided educational instruction from guest speakers from the Tri-County Beekeepers Association and the Harrison County Beekeepers Club. Both organizations have been instrumental in helping the BCBC get off the ground this year.

As a side note, Mr. May, our staff advisor, was also named the Ohio Correctional Education Association (OCEA) Teacher of the Year for 2018. We are very proud of him.

I have no authority to schedule a visit here. However, if anyone would be interested in visiting us, I can provide contact information to Mr. May.

Jeff Brinton
St. Clairsville, OH

Pollinator Patch

This is a view of my pollinator oasis garden from Ohio Prairie Nursery. This was the second year photo. I love sitting on the porch and watching all the critters that visit the garden.

Larry Arbogast
Jerusalem, OH

Not Everything You Read Online Is True!

Abraham Lincoln

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

A&O FORKLIFT

WWW.HUMMERBEE.COM

THE CLASSIC HUMMERBEE IS BACK!

TUNED HYDRAULICS, A BRAND NEW TRANSFER CASE DESIGN, AND IMPROVED ARTICULATION JOINT MAKE THIS HUMMERBEE EVEN BETTER. ORDER NOW FOR QUICK DELIVERY!

Engine - Kubota Diesel!

Hydraulics - 2 speed!

Drive - 4X4!

Lift - 2,000 lbs!

CALL US TODAY!

800-943-8677

Hummerbee®

Rough Terrain Forklifts

New For The New Year –

ZipNetBags.com has a new beekeepers' product – a MADE-IN-THE-USA 36"X26" double layered 100% polyester tulle net fabric bag with a 36" zipper for transporting bee nucs inside a vehicle. The bags may also be helpful when collecting a swarm.

Obviously, the purpose of the bag is to prevent bee strings. Should any bees get out of the box, they'll be contained in the net bag. Of course, no one expects to have a wreck or will probably have a wreck when transporting bees, but there are other ways for bees to get out of nuc boxes. For instance, baby bees can often get out of the air holes in some nuc boxes. Depending on the age of the nuc box, other gaps or openings are possible that could allow release of bees inside a vehicle.

Encourage those transporting bees in a sedan-type vehicle to contain bees in these unique fabric bags which ensure the bees have plenty of fresh air while containing the bees and their stingers inside the bag.

Wholesale and volume prices are available. Price of 1-24 bags is $12.95 each + shipping. 25 to 99 bags are $10 each + shipping. 100 or more bags are $9.50 each + shipping. Suppliers might consider renting or leasing the bag by crediting an account when the bag is returned. Of course, the bag is very light and very foldable for easy return mailing.

ZipNetBags.com – check it out!

Honey Bee Health Coalition releases two new resources to help beekeepers make informed hive management decisions:

- a best management practices guide for hive health and
- a decision support tool for taking on the honey bee's most dangerous parasite.

Learn About Beekeeping Best Practices

An expert team of beekeepers, entomologists, extension and regulatory agents, bee suppliers and apiary inspectors produced and reviewed Best Management Practices for Hive Health: A Guide for Beekeepers, which is available for free download.

"The guide includes information about safety considerations, apiary setup and maintenance, pesticide exposure, pests and diseases, queens and nutrition," said Dewey Caron, University of Delaware emeritus professor of entomology and wildlife ecology, Oregon State University affiliate professor, and the guide's lead author. "These best management practices will be updated periodically to ensure beekeepers have access to the best possible resources and strategies."

American Honey Producers Association vice president Chris Hiatt praised the guide.

"Learning and understanding these techniques is vital for beekeepers, and there is a lot of questionable information out there that's not based on the latest best practices," Hiatt said. "The guide both promotes in-hive practices that strengthen bee populations and encourages beekeepers to communicate and work with farmers and landowners to improve bee health. The guide and other Coalition tools help beekeepers get their mite levels under control, which in turn helps neighboring beeyards by reducing mite drift."

Kentucky state apiarist Tammy Horn Potter said, "There is a saying in the beekeeping world: you'll be a beginner for 20 years. However, these best management practices can shorten that learning curve exponentially. The guide helps all beekeepers – from hobbyist to commercial – establish and maintain the conditions necessary for healthy hives. It is full of photos and graphics, and each chapter is followed by a summary of 'Key Points to Remember' as well as resources should beekeepers seek more information."

Explore the *Varroa* Management Decision Tool

The Coalition also launched a free, mobile-friendly tool to accompany its *Tools for Varroa Management guide*. The *Varroa* guide, first released in 2015 and now in its seventh edition, helps beekeepers implement practical techniques to control the *Varroa* mite, one of the honey bee's most destructive pests.

"The *Varroa* guide is downloaded thousands of times every month, but in talking to beekeepers, we find many are still confused about which treatments are right for their situation and conditions," said Mary Reed, Texas Apiary Inspection Service chief apiary inspector. "With this new tool, they can input their hive conditions and management preferences and receive a list of techniques and treatment options that fit. They can then study their options using the provided information and videos before making a decision."

Reed joined James Wilkes, HiveTracks CEO and chief science and technology officer, to help the Coalition develop the tool.

"The tool guides beekeepers through five questions to determine relevant treatment options and provides information they need if they don't know the answers," Wilkes said. "As the beekeeping community moves toward the best practice of regularly monitoring and managing *Varroa*, this tool will help all beekeepers make wise treatment choices."

About the Honey Bee Health Coalition

The Honey Bee Health Coalition brings together beekeepers, growers, researchers, government agencies, agribusinesses, conservation groups, manufacturers, brands and other key partners to improve the health of honey bees and other pollinators. Its mission is to collaboratively implement solutions that help achieve a healthy population of honey bees while also supporting populations of native and managed pollinators in the context of productive agricultural systems and thriving ecosystems. The Coalition focuses on accelerating the collective impact of efforts in four key areas: forage and nutrition; hive management; crop pest management; and communications, outreach and education.

The Honey Bee Health Coalition is a project of the Keystone Policy Center, a nationally recognized nonprofit that brings together diverse stakeholders to find collaborative, actionable solutions to public policy challenges.

HONEY BEE HEALTH COALITION

Don't Answer That Phone Or Email

The Government Shutdown

Kim **Flottum**

American Beekeeping Federation and American Honey Producers Association Annual Meetings (January, 2019). Each of the USDA-ARS laboratories with a focus on bee health had representatives planning to speak at these meetings, along with EPA and USDA-APHIS regulators. The shutdown has prevented all, including newer scientists, from attending the major stakeholder meetings. Many USDA researchers are conducting and planning major field experiments in commercial operations and being able to connect face to face with the commercial beekeepers to share current progress and to make concrete plans ahead of spring, when all the work has to be done, is much more effective in person. Planning these large-scale field experiments is a lot of effort and a big commitment for the beekeepers. It's not something that can be done off the cuff and the timing is critical. An absence of a chance to meet directly makes things more difficult for commercial beekeepers who are already going well out of their way to help out research goals.

Scientific Collaboration with USDA and others: Collaborators and students who are dependent on coming into federal labs or regulatory offices, or getting data or analyses from the same, are all impacted, reducing productivity and output for the year well beyond USDA. These gaps prevent scientists from doing the work that they need to be doing to be able to adhere to their deadlines, which are not concerned with whether the federal government is operational or not. As one tangible effort, the National Honey Bee Health Survey, sponsored by USDA-APHIS but managed by University of Maryland employees, carries out virus and disease diagnostics in connection with USDA-Beltsville, and these diagnostics do not procede during a shutdown.

American Bee Research Conference (January, 2019): Many USDA scientists were scheduled to present at this meeting, and discuss current research trends with university colleagues. The President of the American Association for Professional Apiarists, the sponsors of ABRC, is a USDA employee whose absence increased burdens on other members. This would have been the first meeting to present research data for five to 10 USDA employees and students.

Bee Disease Diagnostic Service (Beltsville). The Director of this service was scheduled to provide an annual review of disease trends and submissions to the Apiary Inspectors of America at their Annual Meeting on January 12, and discuss updates and risks for bee disease. The Service itself was ended on December 22, pending the return of federal funding. Approximately 30 samples had been received by January 15, and were on hold pending the reactivation of this service. By late January, samples from beekeepers in the south and those preparing for almond pollination are expected to increase. This service is vital for confirming the presence of regulated brood diseases and for giving beekeepers a post-mortem analysis of bee colonies.

Overall Scientific Effort: USDA-ARS supports three dedicated honey bee research laboratories (Baton Rouge, Louisiana, Beltsville, Maryland, and Tucson, Arizona) and an equal number of scientists working on honey bees and other pollinators across multiple locations. Combined with a large number of students, volunteers, and visiting scientists, USDA houses approximately 200 individuals devoted to bee research. Research by all of these individuals was sidelined by the furlough, impacting laboratory research, writing and analysis, planning for the field season, longitudinal studies of disease and wintering. Younger scientists were especially impacted, on the financial level (many are still paying school loans) and in terms of getting their research programs established and first data for analysis. Visiting scientists were also impacted, many visit federal laboratories using their own funds, and during a shutdown these individuals either continue to pay rent in hopes of a chance to do their projects, or return home to start what might be a year-long process for approval to return. These projects, by USDA requirements, are established to benefit US agriculture and so the loss is both personal and scientific for the industry.

Grant funding: Many bee research projects depend on competitive grants (at least 1/3 of the research output for USDA and University research), and the closing of grant offices at USDA and the National Science Foundation has limited the opportunities to plan and apply for grants, and stopped current funds and funding agreements for established grants. BC

*USDA employees are not allowed to communicate with **anybody** in their capacity as USDA. Yet some have been furloughed but must continue to work without pay if they have emergency jobs – taking care of animals, for instance.*

What a mess!

Dadant

Here at Dadant we pride ourselves on producing top of the line honey bee feeds to fortify colony health and build resistance to the problems prevalent in today's apiaries.

AP23®

Artificial Pollen 23

WINTER PATTIES

with HONEY-B-HEALTHY

AP23 Winter Patties are a high carbohydrate feed for honeybee colonies light on stores during the winter months. Contains Sugar, AP23, and Honey-B-Healthy.

M0016010PHW – Ctn/ 10 patties $22.95

M0016040PHW – Ctn/ 40 lbs.

1 - 9	$59.95
10 - 35	$49.95
36 +	Call

- Can be used in winter and early spring i in place of Candy Boards
- Readily accepted by the bees
- Convenient for all beekeepers

AP23® Pollen Substitute

AP23® is a high protein feed developed for all levels of beekeepers. It helps maintain colony strength by boosting populations, which result in better crop pollination and honey crops.

PATTIES

M0016010PH – Ctn/ 10 patties

1 - 3	$34.95
4 - 10	$32.95
11 +	$30.95

M0016040PH – Ctn/ 40 pounds

1 - 20	$79.95
21 - 39	$69.95
40 - 159	$66.95
160 +	CALL

M001601500 – 1 tote $2,100.00

DRY FEED

M0016005 – 5 lb bag

1 - 10	$19.95 ea.
11 +	$19.50 ea.

M0016040 – 40 lb bag

1 - 3	$77.95 ea.
4 - 10	$76.50 ea.
11 - 39	$70.95 ea.
40 - 159	$68.35 ea.
160 +	$65.50 ea.

Brood Builder Pollen Substitute

PATTIES

M0014610H – with Honey-B-Healthy
$20.95 / 10 pack

M0014640H– with Honey-B-Healthy
40 lb. box

1 - 20 ctns	$63.95
21 - 39 ctns	$54.95
40 - 159 ctns	$52.95
160 +	CALL

M0014640HHN –
with Honey-B-Healthy & Nozevit
$83.95 / 40 lb. box

DRY FEED –

M0014625 – 25 lb bag

1 - 5	$39.95 ea.
6 - 10	$37.95 ea.
11 +	$33.95 ea.

Above prices for Illinois only.
Check your local branch for pricing.

www.dadant.com

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 • WAVERLY, NY (877) 532-3268 •
• CHATHAM, VA (800) 220-8325 • FRANKFORT, KY (888) 932-3268 • HIGH SPRINGS, FL (877) 832-3268 •

INNER COVER

I've been attending one or the other, and sometimes but rarely both, of the National meetings in January almost every year I've been here. This year I traveled to Phoenix to attend the American Honey Producers meeting. Kathy and Jean went to the American Beekeeping Federation meeting in Myrtle Beach, so we had them both covered.

I've tried doing a booth for our books and the magazine a couple of times at these meetings, but mostly I send ahead a bunch of magazines and find someplace to put them for people to take. Usually three or four of our advertisers are happy to hand them out, and they generally disappear by the end of the week. One thing about sending a heavy box of magazines to a meeting – it's always a one-way trip. They never come home.

Since our January issue was delayed a bit this year because of the calendar printing, I brought along enough for each for the vendors, along with a calendar for each and that was enough. I spent a day talking to the 30 or so vendors at the Honey Producers meeting while Jean spent more time talking to the 80 or so vendors at the Federation gathering, and all of us spent time listening to speakers, and of course visiting with friends we only get to see every couple of years or so.

For the last 20 years or so most of these talks, almost anywhere, have been simply listing more problems, worse problems, harder work, less money . . . Nobody knows the trouble I've seen . . . Occasionally there was some good news, but almost always it was overshadowed by yet another catastrophe in the making and more research was needed and more money for that research was the name of the game. I get that, and I've always understood that life in the beeyard has been tough, and tougher this year than last.

But this year was different.

Yes, there are still issues with keeping bees alive. It's expensive and it means more work than just popping tops once in a while just to see what's going on. But the difference this year was that there appear to be more solutions than problems. You got something going on, well friend, here's at least three ways to fix it. Three, maybe more.

If you've been at this for some time, say a couple of decades, you will recall that at one of these meetings the reports from organizations working in the beekeeping industry were few and far between. And that was because there were few groups to give those reports. The two National groups certainly, maybe the state group where the meeting was being held, something from USDA (but mostly not as an organization but rather only a few of the scientists working for the USDA), and usually something from the National Honey Board about their latest promotional programs – and that was about it. The rest of the time was filled with individual speakers – University professionals reporting on their research, maybe someone from a chemical company talking about the latest products they had, or beekeepers who were doing something innovative in their operations – new equipment, techniques, or relations with local, even federal government groups that made life better for them.

That's changed big time. Now, there are non-government organizations hat raise funds from not only beekeepers but from corporations who both want the beekeeping industry to thrive, but want the rest of the world to know they are supporting bees and beekeepers. That group would be Project Apis m who has organized, along with the National Honey Board, hundreds of thousands of dollars to fund research projects all over the map.

Then consider the three groups who have formed to provide information and research on solving all those problems that used to be on the list. The Bee Informed group has folks in the field measuring things, fixing things, teaching, showing and doing things to help beekeepers be better, faster, smarter than they were or could be without this kind of help. And the Honey Bee Health Coalition (with a news release about this in this issue) has a brand new Honey Bee Health book, compiled by beekeepers, scientists, industry engineers and others to give you everything you need to raise better bees, and it's free. Actually, all of this is mostly free, or at least only at cost. The BIP program has some aspects that if you use them you will need to cover the costs of analysis, but not the cost of the information you'll get once your samples have been analyzed. Free information on keeping your bees alive from all of these folks. That wasn't here 30 years ago.

But wait, there's more. Really.

Now, there is even an international organization with its sights on getting the right information to beekeepers worldwide who can use it. That would be the COLOSS group (COLOSS is short for colony loss). They have worked on a variety of problems – *Varroa* and small hive beetle to name two – bringing together research from various universities and industry groups, analyzing it and then spreading it where needed. The

Solutions.

latest on small hive beetles is in an article here this month from a recent meeting in Florida. So there's four non-government groups working to get you information to fix problems in your beeyard, for your bees. And mostly, you don't pay a penny for any of this information.

But wait, there's even more. Really.

When all we were doing was listing problems, the problems we were listing were pesticides, pests, pathogens and poor forage. The pesticide issues haven't been solved, but most growers are more aware of what they are doing than 20 years ago, and most actually are doing something about it. Moreover, here's where government has stepped in and is beginning to throw its weight around – in some countries anyway. However, our EPA seems to have been derailed when it comes to common sense and safety, in all manner of things, and pesticides are not being dealt with nearly as well as in, say France, the UK and most of the EU who have been doing good by getting rid of, or at least sharply curtailing the use of the worst of crop protection chemicals. So keep this on the list.

But the pests and pathogen issues have been addressed quite well by those groups I've mentioned, and the last one, poor forage, is being addressed by other groups looking out for our honey bee's lunch. The Pollinator Stewardship program, and the Pollinator Protection program, along with some of the groups already mentioned are working to provide more and better forage in more and more places to replace the land lost to corn and soybeans almost everywhere. Seed mixes, planting and growing instructions, and more are coming from these groups to make living a bit easier for our bees, and beekeepers. And all of them aren't government supported or funded or organized. Volunteers, and beekeeper support is what keeps them up and running. So if you can, give a bit today to help. Actually, you can donate to any of these groups that are making your life easier, better, smarter, faster and longer. You, and your bees will be glad you did.

•

There's one more thing to add to this, and that's been the plethora of electronic gadgets that are showing up. We've been working with the folks heading toward the genius hive, but there are several folks working on these types of inventions. Monitoring your hive, a beeyard, your help, your medication applications, your colony losses, splits made, inhive temperature, humidity, sound, smell, pests, diseases, bookkeeping info and more, with a cell phone from home is now possible. Or, you might have to send it to the cloud that will download it to a webpage you set up so you can do more than one thing at a time, over time. All this isn't free however, but when you look at the vast increase in accuracy, amount of information you can gather, and what you can do with that information, the benefits far, far outweigh the costs. If you haven't yet, start exploring the world of digital beekeeping. It's even bigger than you thought.

•

Probably by the time you read this the government shut down will be over – maybe. If not, what an even bigger mess. If it is, what a mess it made and left behind.

I've been in the middle of planning meetings for most of 30 years. Small county meetings with one speaker and make sure there's coffee, to week long EAS meetings with hundreds of attendees, dozens of speakers and presenters, meals, travel, housing, rooms, vendors, honey shows, schedules, registration and registration bags with stuff, sponsors, breaks, entertainment, banquets, beeyards and bees, insurance, year-long promotion and planning, and all the rest.

Both of the National meetings are like that every year. The Federation is bigger than any other bee meeting here I believe, but the preparation and planning and the rest are similar. And somebody, at both of the meetings spent a chunk of their year getting speakers organized. Who, speaking about what, when, in what room. And after you got them there, made sure there was a hotel room to stay in, fed them and then when it was all over, got them home. For some speakers, you had to make sure they got paid, and their costs covered – some before, some after – the event.

So I can't imagine what happens when a whole raft of USDA speakers, at the very last minute, cancels. Suddenly you have lots of holes to fill, or lots of talks to cancel, or lots of people not doing what they said they would do. What a mess. And the after effects of some of this are long term. I encourage you to read the list of some of what happened, or is still happening, during the shut down to our tiny industry. It's on page 14 and you may have read it already. It's not just speakers. It's information to those who need it to make sure things are going well and getting done. Travel plans go to heck, research projects are either canceled or delayed, students can't make their presentations, what a mess.

And it should NOT go without saying – the meeting planners at both meetings made it work. Holes were filled, speakers found, topics covered, and information shared. But lots of information was missed because only the speaker had the right information. But for the most part it worked just fine. Good job folks.

KIM FLOTTUM

In Business with Bees

How to Expand, Sell, and Market Honey Bee Products and Services Including Pollination, Bees and Queens, Beeswax, Honey, and More

$26

www.beeculture.com

PROVEN STRATEGIES FOR MAKING MONEY WITH BEES!

It's Summers Time –

January, Travel and Chickens

As I write this it is mid-January and we have just returned from both big meetings. Kim went to the American Honey Producers meeting in Phoenix and Jean, our advertising coordinator, and I went to the American Beekeeping Federation Conference in Myrtle Beach, SC. This was different for us – we usually all go to the same location – but it worked pretty well. It gave *Bee Culture* a presence at both locations.

The ABF meeting seemed well attended. I wasn't able to get an actual number, but it was crowded and the vendor area was always busy. They had about 80+ vendors and Jean was able to talk with almost all of them over the three days we were there.

The hotel was a couple of blocks from the ocean and so we had a nice view to wake up to every morning. On Friday afternoon we were able to get away and take a nice long walk, finally making it to the beach.

I sat in on more talks than I probably ever have at a meeting like this. Often we have a vendor table or other duties keeping us away. I have to say I really enjoyed the sessions. There is a lot of really good research going on with folks that are trying to make our lives as beekeepers better.

The BIP people are gathering great data and if you're not involved in their survey yet, you probably should check it out. Dennis vanEngelsdorp has about 15 people working with him in Maryland and the more data they can gather from beekeepers, the more important things they can discover. Check them out.

Because of the government shut down the USDA people that were scheduled to speak could not attend. Others did a good job of stepping up though and giving extra talks.

ABF does a good job of organizing things. Registration was flawless, the venue was convenient and easy to get around. One major problem was the sound system – it was terrible and as the week went on each speaker that got up to talk made some sort of comment about it. Most trying to be funny, but it was very frustrating to both speakers and attendees.

Of course these January meetings always contribute to the craziness of an already busy time for us here at *Bee Culture*. And we know and appreciate that this causes you frustration when you don't get that January issue and calendar as soon as you'd like. We do our best, but this year in particular we had extra hazaards get in our way. Some were minor health things we had to deal with and some were just annoying happenings that we couldn't control. So we apologize for the delay, but hopefully you all have your calendars now and we promise to try and do better next year.

We had great photos, as always, for the calendar contest. I hope that you enjoy the pictures and the information. I made one mistake – well so far that's all I've found – and I need to apologize for that and give you the correct information. In the month of July the Western Apicultural Meeting is being held in Ashland, OR (not Bowling Green, KY). In my haste to get done I messed up their location. The dates are correct and you can google them and find out more about the upcoming conference. July is a busy month this Summer.

We do our very best here at *Bee Culture*, but we're not perfect.

We got hit with a nice dose of Winter this week. It made for an interesting drive home from the airport. We had gotten spoiled because we were well below the snowfall average during all of December and the first part of January. But now it's bitter cold – we'll hit some single digits this week for lows – and snow. Not a lot of snow yet, but we've got a long way to go.

I think it was the day after Christmas that we got our first seed catalog and they've been arriving almost daily ever since. We got the tree list from our Soil and Water people. So we are thinking Spring now. I also got my chick catalog.

We're at 17 chickens right now. One just disappeared shortly before the holidays. Just gone. She could be living next door for all we know. That neighbor has chickens and never really seems sure which ones are hers and which ones are not. Or she could have been snatched. She was one of the middle group, so about four years old. We still have four that are almost seven years old, several of the four-year-olds and eight that will be two years old.

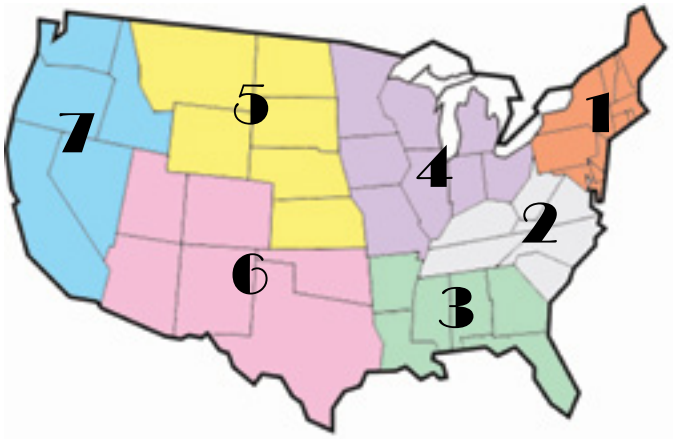
This Spring we're going to partially raise a dozen Rhode Island Reds for a friend of ours. She is elderly and doesn't like doing the baby chick part of the journey. So we'll keep them until the weather is nice and they are a little more sturdy. We'll probably get a few more to add to our flock and we're going to try ducks again.

There is a young local family that breeds the Call ducks that we like and we'll be talking to them soon. We had six before and lost all of them to some sort of predators. So hopefully we'll be better prepared and more careful this time. These little ducks are so cute. They are miniature in size and just adorable. We all felt horrible when we kept losing them.

Now is the time we start really getting anxious for Spring, at least here in Northeast Ohio. Spring is a busy time in every respect for us. We have a lot of Spring meetings and we try and make it to as many as we can, the monthly deadline and the quarterly deadline. And then there's the beekeeping and the garden and the chickens. We'll see some of you in St. Louis very soon, some at the Tri-County meeting here in Wooster, OH. Kim is going to Georgia. Both of us are going to North Carolina in March, California in April and possibly May and it just goes on and on. And we're really excited about our October event this year. Watch for the details. It's the 150th anniversary of the A.I. Root Company and we have some very specail guests coming to our event to celebrate.

Hope to see you on some of our travels. I wish you all a safe and easy rest of the Winter.

FEBRUARY – REGIONAL HONEY PRICE REPORT



Since many of our reporters keep bees to pay for keeping bees, it's instructive to occasionally observe what it is they are selling, because if it works for them it would probably work for you. This is year nine for this survey, and, like the BIP surveys, though the sample size is small and volunteer, enough data over time begins to tell the story. Too, our reporters come and go so the sample size is constantly changing, which occasionally rearranges the data.

The wax business is essentially unchanged, with retail wax blocks easily moving the most wax for beekeepers, slowing sales of less profitable bulk wax. We suspect that when somebody figures out how to process propolis like they do in New Zealand that market will explode, but for now it remains pretty small. Pollen, as a sale item was down a bit, one hopes because it's staying home and not being sold. Of course honey sells too, but the bump in wholesale honey seems to have taken a bit off retail, chunk, and comb, but crème and stix sales are up.

We noted the continued slide of selling bee supplies. The universe changed this year with big players merging, some exiting the stage and some changing the way they play the game. The internet is a constantly growing force for mom and pop operations that has to be dealt with at the same time.

A few more people are selling queens, which is good, and nucs and those who pollinate are steady. The almond pollination business is even more serious this year, and prices are showing the value of a strong colony in January. Almond acres are increasing, and the article this month on demand shows that more colonies will be needed every year for some time.

Generally, no surprises. That's a good thing.

	Candles	Ornaments	Wax Blocks	Honey Stix	Pollen	Propolis	Bee Supplies	Packages	Queens	Bulk Wax	Lotions	Soap	Creme Honey	Honey Retail	Comb Honey	Chunk Honey	Nucs	Pollination	Honey, Wholesale
% Reporters Selling																			
2010	28	17	54	28	28	13	20	9	15	48	20	10	35	90	66	38	28	-	-
2011	39	20	53	39	35	21	21	10	15	42	19	11	35	90	67	40	26	37	-
2012	35	21	53	37	32	15	53	10	22	44	18	13	21	94	62	34	23	32	-
2014	32	12	51	30	31	21	55	17	27	42	25	10	29	93	54	42	29	34	-
2015	30	14	56	28	32	17	40	15	27	40	17	5	30	90	62	38	32	33	-
2016	35	14	62	26	30	16	44	15	26	47	22	14	36	94	55	34	31	33	-
2017	27	13	52	27	25	12	36	13	20	30	22	13	27	83	48	40	28	23	52
2018	36	13	57	29	33	20	31	18	29	53	20	13	23	88	58	32	29	33	59
2019	32	10	61	35	23	17	19	16	30	41	23	21	32	86	53	29	31	32	67

REPORTING REGIONS								SUMMARY			History	
	1	2	3	4	5	6	7				Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								Range	Avg.	$/lb		
55 Gal. Drum, Light	2.28	2.16	2.14	2.34	2.28	2.20	3.00	1.74-3.00	2.20	2.20	2.19	2.27
55 Gal. Drum, Ambr	2.14	2.12	2.01	2.33	2.14	2.01	3.00	1.35-3.00	2.10	2.10	2.08	2.11
60# Light (retail)	220.89	183.40	194.17	195.25	220.89	194.71	250.00	144.00-325.00	207.28	3.45	195.51	193.95
60# Amber (retail)	215.06	185.62	190.00	185.69	215.06	187.83	210.00	132.00-325.00	201.62	3.36	194.51	196.89
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	93.96	75.25	86.96	68.75	93.96	90.00	93.96	57.60-144.00	87.13	7.26	88.23	81.76
1# 24/case	138.67	107.13	124.92	108.47	138.67	139.73	148.20	86.40-211.20	128.55	5.36	121.69	120.98
2# 12/case	124.51	95.08	113.12	101.80	124.51	109.61	114.00	79.20-192.00	113.42	4.73	107.73	107.68
12.oz. Plas. 24/cs	108.85	97.33	96.33	90.00	108.85	106.74	103.20	66.00-172.00	98.71	5.48	94.64	97.69
5# 6/case	132.56	108.50	119.62	120.70	132.56	123.00	132.56	65.00-210.00	127.63	4.25	116.67	124.21
Quarts 12/case	175.59	144.96	133.67	134.40	175.59	159.38	192.00	109.20-280.00	156.57	4.35	149.01	140.58
Pints 12/case	97.75	92.83	75.40	81.00	97.75	88.05	108.00	65.00-140.00	93.00	5.17	93.39	90.93
RETAIL SHELF PRICES												
1/2#	5.39	4.48	4.78	4.25	5.09	5.20	7.00	2.38-9.00	5.09	10.19	4.87	4.65
12 oz. Plastic	6.74	5.33	5.92	5.58	4.66	6.34	5.90	2.89-12.00	6.03	8.04	5.77	5.87
1# Glass/Plastic	8.45	6.76	7.54	6.42	6.89	7.45	8.75	4.50-14.00	7.65	7.65	7.47	7.33
2# Glass/Plastic	13.24	10.58	12.62	11.09	12.99	10.42	15.50	6.89-21.00	12.54	6.27	12.49	12.28
Pint	11.70	9.44	8.57	12.22	10.67	9.89	11.13	6.00-20.00	10.40	6.93	9.71	9.89
Quart	18.99	16.64	15.20	13.88	19.00	18.52	20.86	9.00-32.00	17.48	5.83	17.51	16.91
5# Glass/Plastic	29.09	25.38	34.39	26.50	25.25	27.37	29.09	12.50-48.00	27.92	5.58	26.14	27.54
1# Cream	10.87	8.50	8.00	9.40	11.74	7.25	10.50	5.99-18.00	9.74	9.74	9.24	9.96
1# Cut Comb	13.50	9.33	10.19	10.90	16.00	11.25	14.50	6.00-24.00	12.00	12.00	11.74	10.46
Ross Round	9.34	6.90	9.34	9.00	9.34	10.50	12.49	6.00-13.00	9.18	12.24	9.79	9.44
Wholesale Wax (Lt)	6.99	4.98	5.61	5.90	6.99	6.50	7.75	3.00-12.00	6.47	-	6.12	6.45
Wholesale Wax (Dk)	5.63	4.83	4.26	4.75	5.63	3.17	5.63	2.00-10.00	5.26	-	4.91	5.32
Pollination Fee/Col.	90.13	72.50	72.00	97.50	90.13	92.00	67.50	30.00-160.00	85.25	-	79.95	80.86

NEXT MONTH

Welcome to NEXT MONTH, where our Honey Reporters share a line or two about what they will be doing this, and certainly NEXT month with their bees. Advice is given for each region so you can see what others are doing where you are, and, of course in all the rest of the regions. Check these out. These reporters are successful in business.

Region One
- Check for mites
- Check fences
- Feed sugar syrup and pollen patties and dry feed
- Inspect each hive
- Re-treat
- Start queens
- See if they are alive
- Order *Varroa* treatment and apply as early as possible
- Have honey left for rest of winter
- Ventilation
- Check weight
- Check activity and flights on warm days
- Snow belt use snow to insulate and wind block
- Make sure the hive entrances are clear of snow

Region Two
- Check queens
- Mite check
- Check for food stores both carbs and protein
- Check to see if queen is laying properly
- Inspect all the colonies
- Treat for *Varroa* with oxalic acid
- Make sure the frames are clean.
- Split/ requeen
- New boxes
- New foundation for comb replacement
- Treat for mites
- Check hive for honey supply and location in hive
- Keep feed on until Honey flow starts
- Replace bad woodenware
- Good ventilation

Region Three
- Mite treatment late in month
- Pull strips
- Add honey suppers
- Equalize
- Remove Q cells and or make splits
- Treat swarm with oxalic acid
- Install bottom screening
- Check stores and feed
- Treat for *Varroa*
- Feed Honey B Healthy

Region Four
- Make sure they have food, Feed if needed
- Equalize
- Treat, weather permitting, before or at beginning of maple flow
- Oxalic acid vapor before major brooding
- Parasite and disease check

Region Five
- Feed sugar board
- Treat for mites
- Unwrap the hives from winter

Region Six
- Finish new equipment and repairs
- Feeding if hives light
- Check for *Varroa* mites
- Requeen
- Order new packages

Region Seven
- Check bees for moisture/food
- Requeen failing hives
- Clean bottom boards
- Check food stores
- Check for mites, treat if necessary
- Check to make sure the hive is queen right and how her pattern is

Honey Reporters Wanted

We are expanding our Honey Reporter population and need new reporters in EVERY region. We ask that you fill in most of the wholesale or retail or both sections, most months, and our short survey on the back. We give you a FREE subscription for your service. So if you are interested send an email to **Amanda@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 Honey Price and Beekeeping Management Report there is monthly.

BEE TALK

Welcome to BEETALK, Where Bee Culture Answers YOUR questions. Got a question for our regular writers? Send it to me, KIM@BeeCulture.com, and I'll send it to all of our regulars. So we'll provide an answer that will come from this or that part of the country, or from a beekeeper, a bee researcher, or a bee business person. You'll get all kinds of Perspectives to the question. All kinds of experiences, all kinds of locations, all kinds of answers. It is, quite simply Beekeepers having a BEETALK. What could be better, and who better to answer your questions! Send in your questions to me, at KIM@BeeCulture.com, and put BEETALK in the subject line. That's all it takes to be part of the grandest BEETALK you can imagine.

Question 1

Winter so far around here has been warmer, much warmer than usual. Is this good, or bad for my bees. We usually have inches of snow and days and days below freezing, but seldom below Zero?

Within normal seasonal variations, I don't sense that seasonal differences affect the bees too much. Prepare for Winter as you usually would with abundant stores and disease and mite control programs in place. Your bee colonies' chances for survival are good. Don't forget, some Winter loss is normal. *Jim Tew, OH*

Warm Winter bees eat a lot (bad). But they get to fly and defecate (good). Take your pick. *Ed Colby, CO*

The downside of Winter is a continual brood presence which could sustain mites and make it harder to treat effectively. Also, if bees are flying during Winter they are using stores and not finding much in flower. Bees can also get too much of a head start and suffer from chilled brood when Winter finally does hit. *Jay Evans, DC*

This can actually be more good than bad. Smaller clusters have a better chance of survival since temperatures are warmer and food consumption is almost equal. It takes lots of energy to keep the cluster warm in freezing temperatures. However, if brood production begins too early without proper bee populations and coverage, chilled brood may result. It's a good idea to keep an eye on food stores and cluster location. *Jennifer Berry, GA*

It's bad in our bees because they eat through food stores faster and try to start laying brood earlier, so when it gets cold again everybody dies. *Jessica Louque, NC*

In Washington, DC, much warmer Winter weather means that the bees are probably able to fly: this is a mixed bag. There is no forage for them here through the Winter, so they burn through their stores. I compare this to taking your car out on the highway, driving for miles, and never filling the tank. On the other hand, they can take more frequent cleansing flights, reducing the risk of dysentery. If it is warm, I'd feed fondant and (taking a page from Charlie Brandts and Wayne Esaias) provide a little bit of liquid food up top as well. *Toni Burnham, DC*

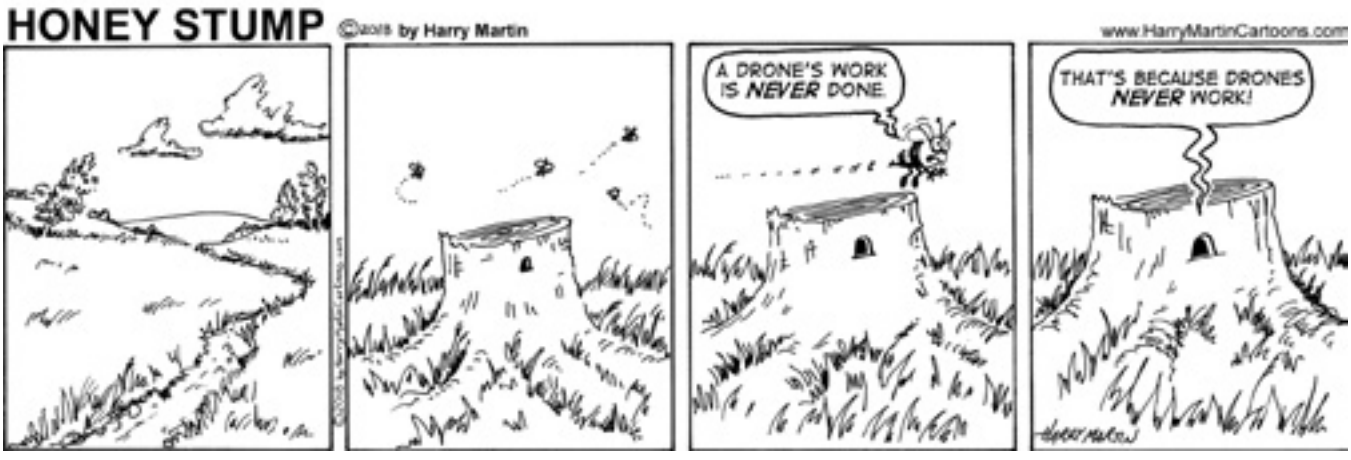
Temperatures above 40° will cause the bees to be more active than normal and as a result, they will use up more of their stored honey and pollen than normal. I would keep a close eye on the hives and be ready to feed if necessary. *Ross Conrad, VT*

Question 2

I've got pollination contracts for the first time this year using every one of my 45 hives. What do I need to do to make sure they are ready in May for apples, here in the Midwest?

Control *Varroa*, split strong colonies to reduce swarming, assure adequate food stores. *Ed Colby, CO*

Mite treatments and make sure they have plenty of stores, equalize in early Spring and hope they get a boost before they are needed. Be vigilant for brood presence in early Spring



and/or ready to buy replacement queens from a reliable source since it will likely not be enough time to trust making splits. *Jay Evans, DC*

Feed, feed, and feed some more. *Jennifer Berry, GA*

When we use bees for pollination, we try to boost them as much as possible beforehand and then split them down to a really strong 15 frames or so. This gives them room if they grow and is still big enough to complete the pollination successfully if they get smaller. *Jessica Louque, NC*

This is a tough situation. There will inevitably be some hives that will either die over winter, or emerge in spring weak and really not good enough to rent. Moving frames of bees and brood around to equalization may weaken strong hives too much and/or spread disease. I suggest you work to cultivate a reputation for high quality and integrity and line up additional strong hives from another lcal beekeeper that you trust to make up for any shortfall that occurs in your apiary this spring, rather than try to slip any sub-par colonies by your pollination customer. *Ross Conrad, VT*

Question 3

First year. I got packages ordered, equipment ordered and much of it assembled and beeyard location picked out. What am I missing?

In my experience, installing packages is a routine beekeeping procedure – even easy. But, sometimes rainy or cold weather can make package installation more exciting than you would like. Pick out some YouTube installation examples and follow suit. Be aware that such videos will probably make package queen release look routine, too. Be careful at this point. I would suggest that the new package installer particularly focus on queen installation procedures. Spend more time understanding queen release procedures and how to react when things go awry. For sure, leave the queen caged for a longer period than what some internet instructions recommend. It is not easy (or cheap) to quickly get a replacement queen. *Jim Tew, OH*

Beg, borrow or steal some drawn comb to help your little darlings get started! Sign up for a beekeeping class. *Ed Colby, CO*

Sugar, to make lots of syrup so they draw out what sounds like foundation frames. And/or a mentor with clean drawn frames to add a couple to each hive. *Jay Evans, DC*

Join a club, find a mentor, get your hands in a hive, be prepared to feed your bees, read everything you can about managing *Varroa* (the #1 reason our bees die) but be careful who you get your information from. There are plenty of "wanna bee experts" out there streaming false information. *Jennifer Berry, GA*

Sugar to feed? Watching YouTube videos on package installations? Sugar spray bottles, maybe a pollen patty or two. *Jessica Louque, NC*

The recipe for first-year beekeeping is simple, but not easy. You need a good course, a good community, and a good mentor. Then everything you have done already. You face an uphill challenge getting your bees through their first Winter: both they and you get a better shot when you are connected to folks who have been watching bees in your green spaces for years. Please know: at this point, the Internet has killed almost as many bees as *Varroa* (btw, do you know what *Varroa* is?) *Toni Burnham, DC*

Finish getting all your equipment ready, and be prepared to feed immediately upon installation unless you have frames of honey from healthy disease free colonies available to use as feed. Gather plenty of smoker fuel and make sure it's dry, find a hive stand, and if bears are a potential issue, get that electric fence set up BEFORE you install the hive, keep reading everything you can get your hands on, take more classes, attend more bee meetings, and don't forget to line up a mentor to help guide you through this critical first season. *Ross Conrad, VT* BC

A Closer Look

Basic Honey Bee Biology

X219

$29.95

www.beeculture.com

274 pages, color

Clarence H. Collison

A Closer LOOK

GUT MICROBIALS

Clarence **Collison**

While honey bees support a diverse microbial community, the impacts of most of their associated microbes on honey bee health remain unresolved.

Honey bees harbor a specialized gut microbiota (microorganisms of a particular site or habitat) that is spatially distributed in different areas of the alimentary canal. The honey bee gut microbiota is surprisingly simple and consistent, with seven species (categorized by clustering at 97% sequence identity of the 16S rRNA) accounting on average for >90% of the entire gut community in bees sampled across continents (Kwong et al. 2017b). This microbiota is primarily composed of four Proteobacteria (*Gilliamella apicola*, *Snodgrassella alvi*, *Frischella perrara*, and *Bartonella apis*), which mostly resides in the ileum (anterior part of the hind gut), and two Firmicutes (*Lactobacillus* spp. Firm-4 and Firm-5) and one Actinobacterium (*B. asteroides*) which are predominantly found in the rectum (Kešnerová et al. 2017). These specific locations suggest that bacteria occupy different metabolic niches in the bee gut and potentially engage in syntrophic interactions (Kwong et al. 2014; Kwong and Moran 2016). Syntrophism is a biological relationship in which microorganisms of two different species or strains are mutually dependent on one another for nutritional requirements.

Recent research results on the potential involvement of bee gut communities in pathogen protection and nutritional function have drawn attention to the impact of the microbiota on bee health. However, the contributions of gut microbiota to host physiology have not been fully determined. The honey bee gut microbiota has marked effects on the host. It promotes host weight gain and hormone signaling under laboratory settings (Zheng et al. 2017) and stimulates the immune system of the host (Kwong et al 2017a; Emery et al. 2017).

While honey bees support a diverse microbial community, the impacts of most of their associated microbes on honey bee health remain unresolved. Evans and Armstrong (2015) used pairwise inhibition assays to identify honey bee bacterial symbionts (an organism that is closely associated with another) that inhibit a primary pathogen, the Gram-positive bacterium *Paenibacillus larvae larvae* (causative agent of American Foulbrood). Four bacterial taxa isolated from bee larvae appeared especially promising with respect to inhibition of *P. l. larvae* and, in fact, completely inhibited *P. l. larvae* growth in pairwise plate assays. These isolates were identified by 16S ribosomal RNA sequencing as *Stenotrophomonas maltophilia*, *Acinetobacter* sp., *Brevibacillus formosus* and *Bacillus fusiformis*. A Polymerase Chain Reaction (PCR)-based survey confirmed that these bacterial isolates are present in bee larvae, at frequencies ranging from 2% (1/48) for *B. formosus* to 79% (39/48) for *Acinetobacter* sp. An understanding of the distributions of these co-occurring bacteria could elucidate variation across colonies in susceptibility to American foulbrood disease.

In addition, supplementation of colonies with these naturally occurring bacteria or their antagonistic products could provide a novel way of controlling foulbrood disease.

Gut microbial communities can greatly affect host health by modulating the host's immune system. Kwong et al. (2017a) tested whether the gut microbial symbionts of the honey bee can induce expression of antimicrobial peptides (AMPs), a crucial component of insect innate immunity. They found that bees up-regulate gene expression of the AMPs apidaecin and hymenoptaecin in gut tissue when the microbiota is present. Using targeted proteomics, they detected apidaecin in both the gut lumen and the hemolymph (blood); higher apidaecin concentrations were found in bees harboring the normal gut microbiota than in bees lacking gut microbiota. In *in vitro* assays, cultured strains of the microbiota showed variable susceptibility to honey bee AMPs, although many seem to possess elevated resistance compared to *Escherichia coli*. In some trials, colonization by normal gut symbionts resulted in improved survivorship following injection with *E. coli*. Their results show that the native, non-pathogenic gut flora induces immune responses in the bee host. Such responses might be a host mechanism to regulate the microbiota, and could potentially benefit host health by priming the immune system against future pathogenic infections.

Gut microbiomes of adult honey bees include core residents such as the betaproteobacterium *Snodgrassella alvi*, alongside transient parasites such as the protozoan *Lotmaria passim*. To test how these species affect microbiome composition and host physiology, Schwarz et al. (2016) administered *S. alvi* and/or *L. passim* inocula to newly emerged worker bees from four genetic backgrounds and reared them in normal (within hives) or stressed (protein deficient, asocial) conditions. Microbiota acquired by normal bees were abundant but quantitatively differed across treatments, indicating treatment-associated dysbiosis (microbial imbalance).

Pretreatment with *S. alvi* made normal bees more susceptible to *L. passim* and altered developmental and detoxification gene expression. Stressed bees were more susceptible to *L. passim* and were depauperate (lacking in numbers or variety of species) in core microbiota, yet supplementation with *S. alvi* did not alter this susceptibility.

Microbiomes were generally more variable by the genetic backgrounds in stressed bees, which also showed opposing and comparatively reduced modulation of gene expression responses to treatments compared with normal bees. These data provide experimental support for a link between altered gut microbiota and increased parasite and pathogen prevalence, as observed with honey bee colony collapse disorder.

Host-symbiont dynamics are known to influence host phenotype. Variation in life history across honey bee castes may influence community composition of gut symbionts, which may in turn influence caste phenotypes. Kapheim et al. (2015) investigated the relationship between host-symbiont dynamics and social behavior by characterizing the hindgut microbiome among distinct honey bee castes: queens, drones, and two types of workers, nurses and foragers. Despite a shared hive environment and mouth-to-mouth food transfer (trophallaxis) among nestmates, they detected separation among gut microbiomes of queens, workers and drones. Gut microbiomes of nurses and foragers were similar to previously characterized honey bee worker microbiomes and to each other, despite differences in diet, activity and exposure to the external environment.

Queen microbiomes were enriched for bacteria that may enhance metabolic conversion of energy from food to egg production. They proposed that the two types of workers, which have the highest diversity of operational taxonomic units (OTUs) of bacteria, are central to the maintenance of the colony microbiome. Foragers may introduce new strains of bacteria to the colony from the environment and transfer them to nurses, who filter and distribute them to the rest of the colony. Their results support the idea that host-symbiont dynamics influence microbiome composition and, reciprocally, host social behavior.

Syntrophism is a biological relationship in which microorganisms of two different species or strains are mutually dependent on one another for nutritional requirements.

Nectar and pollen collected by honey bees are processed and matured within the nest through the activities of honey bee-derived microbes and enzymes. In order to better understand the contribution of the microbial community to food processing in the honey bee, Lee et al. (2014) generated a metatranscriptome of the honey bee gut microbiome. The function of the microbial community in the honey bee, as revealed by metatranscriptome sequencing, resembles that of other animal guts and food-processing environments. They identified three major bacterial classes that are active in the gut (y-Proteobacteria, Bacilli and Actinobacteria), all of which are predicted to participate in the breakdown of complex macromolecules (e.g. polysaccharides and polypeptides), the fermentation of component parts of these macromolecules, and the generation of various fermentation products, such as short-chain fatty acids and alcohol. The ability of the microbial community to metabolize these carbon-rich food sources was confirmed through the use of community-level physiological profiling. Collectively, these findings suggest that the gut microflora of the honey bee harbors bacterial members with unique roles, which ultimately can contribute to the processing of plant-derived food for colonies.

In the highly social honey bee, it is unknown to what extent the hive environment and older worker individuals contribute to the generational transmission of core gut bacteria. Anderson et al. (2016) used high-throughput sequencing to investigate the effect of nest materials and social contact on the colonization and succession of core hindgut microbiota in workers. With only brief exposure to hive materials following natural eclosion (emergence as an adult from the pupa), gut bacterial communities at three and seven days contained phylotypes typically found in the guts of mature adults regardless of treatment. Continuous exposure to nest materials or direct social interactions with mature adults did not affect the diversity or abundance of gut bacterial communities at the scale examined. Similarly, a common pollen supplement fed by beekeepers during pollen dearth had no effect. A consideration of unique OTUs revealed extensive microbial succession independent of treatment. The dominant *Lactobacillus* strain at three days was largely replaced by a different strain at day seven, revealing the colonization signature of a pioneer species. Similar but less pronounced patterns were evident in less abundant OTU's, many of which may influence community succession via alteration of the gut environment. Their results indicate that the process of bacterial community colonization in the hindgut is resilient to changes in the nutritional, hive, and social environment. Greater taxonomic resolution is needed to accurately resolve questions of ecological succession and typical proportional variation within and between core members of the gut bacterial community.

Studies of newly emerged worker bees have demonstrated that their guts are colonized by a consistent core microbiota within several days of eclosure. Powell et al. (2014) conducted experiments aimed at illuminating the transmission routes and spatiotemporal colonization dynamics of this microbiota. Experimental groups of newly emerged workers were maintained in cup cages and exposed to different potential transmission sources. Colonization patterns were evaluated using quantitative

2019 Price List

Gardner's Apiaries
Spell Bee Co. LLC

510 Patterson Road • Baxley, GA 31513
Ph: (912) 367-9352 • Fax: (912) 367-7047

ITALIAN QUEENS		*#3 Packages	
100+	$23.00	100+	$85.00
25 -99	$24.00	25-99	$89.00
10 - 24	$26.00	10-24	$92.00
1 - 9	$28.00	1-9	$95.00

*Prices above do not include shipping charges

Pick-up Packages

#3 . . . . . .$85.00

Pick-up Queens . . . . . $23.00 Cells $4.00
Clipping . . . . . $4.00 Marking $4.00

Please call or write for shipping details or truck prices.
Terms: 10% down. Balance due two weeks prior to shipping.

The gut microflora of the honey bee harbors bacterial members with unique roles, which ultimately can contribute to the processing of plant-derived food for colonies.

real-time PCR (qPCR) to assess community sizes and using deep sequencing of 16S rRNA gene amplicons to assess community composition. In addition, they monitored the establishment of the ileum and rectum communities within workers sampled overtime from natural hive conditions. The study verified that workers initially lack gut bacteria and gain large characteristic communities in the ileum and rectum within four to six days within hives. Typical communities, resembling those of workers within hives, were established in the presence of nurse workers or nurse worker fecal material, and atypical communities of noncore or highly skewed compositions were established when workers were exposed only to oral trophallaxis or hive components (comb, honey, bee bread). The core species of Gram-negative bacteria, *Snodgrassella alvi*, *Gilliamella apicola* and *Frischella perrara*, were dependent on the presence of nurses or hindgut material, whereas some Gram-positive species were more often transferred through exposure to hive components. These results indicate aspects of the colony life cycle and behavior that are key to the propagation of the characteristic honey bee gut microbiota.

Honey bee colonies are exposed to a variety of agricultural ecosystems throughout the year and a multitude of environmental variables that may affect the microbial balance of individuals and the hive. While many recent studies support the idea of a core microbiota in guts of younger in-hive bees, it is unknown whether this core is present in forager bees or the pollen they carry back to the hive. Additionally, several studies hypothesize that the foregut (crop or honey stomach), a key interface between the pollination environment and hive food stores, contains a set of 13 lactic acid bacteria (LAB) that inoculate collected pollen and act in synergy to preserve pollen stores. Corby-Harris et al. (2014) used a combination of 454 based 16S rRNA gene sequencing of the microbial communities of forager guts, crops, and corbicular (pollen basket) pollen and crop plate counts to show that (1) despite a very different diet, forager guts contain a core microbiota similar to that found in younger bees, (2) corbicular pollen contains a diverse community dominated by hive-specific, environmental or phyllosphere bacteria that are not prevalent in the gut or crop, and (3) the 13 LAB found in culture-based studies are not specific to the crop but are a small subset of midgut or hindgut specific bacteria identified in many recent 454 amplicon-based studies. The crop is dominated by *Lactobacillus kunkeei*, and Alpha 2.2 (Acetobacteraceae), highly osmotolerant and acid resistant bacteria found in stored pollen and honey. Honey stomach taxa at low abundance include core hindgut bacteria in transit to their primary niche, and potential pathogens or food spoilage organisms seemingly vectored from the pollination environment. They concluded that the crop microbial environment is influenced by worker task, and may function in both decontamination and inoculation.

The honey bee gut microbiota is mainly host specific, with only a few species being shared with other insects. It currently remains unclear how environmental/dietary conditions affect the microbiota within a honey bee population over time. Therefore, the aim of the study of Ludvigsen et al. 2015 was to characterize the composition of the midgut/pyloric microbiota of a honey bee apiary throughout a season. The rationale for investigating the midgut/pyloric microbiota is its dynamic nature. Monthly sampling of a demographic homogenous population of bees was performed between May and October, with concordant recording of the honey bee diet. Mixed Sanger-and Illumina 16S rRNA gene sequencing in combination with a quantitative PCR analysis were used to determine the bacterial composition. A marked increase in α-diversity was detected between May and June. Furthermore, they found that four distinct phylotypes belonging to the Proteobacteria dominated the microbiota, and these displayed major shifts throughout the season. *Gilliamella apicola* dominated the composition early on, and *Snodgrassella alvi* began to dominate when the other bacteria declined to an absolute low in October. In vitro co-culturing revealed that *G. apicola* suppressed *S. alvi*. No shift was detected in the composition of the microbiota under stable environment/dietary conditions between November and February. Therefore, environmental/dietary changes may trigger the shifts observed in the honey bee midgut/pyloric microbiota throughout a season.

Recent research into the microbial communities naturally populating the bee gut raise the question as to whether there is a correlation between microbial community structure and colony productivity. Horton et al. (2015) used 16S rRNA amplicon sequencing to explore the microbial composition associated with forager bees from honey bee colonies producing large amounts of surplus honey (productive) and compared them to colonies producing less (unproductive). As supported by previous work, the honey bee microbiome was found to be dominated by three major phyla: the Proteobacteria, Bacilli and Actinobacteria, within which they found a total of 23 different bacterial genera, including known "core" honey bee microbiome members. Using discriminant function analysis and correlation-based network analysis, they identified highly abundant members (such as *Frischella* and *Gilliamella*) as important in shaping the bacterial comminuity: libraries from colonies with high quantities of these *Orbaceae* members were also likely to contain fewer *Bifidobacteria* and *Lactobacillus* species (such as Firm-4). However, co-culture assays, using isolates from these major clades, were unable to confirm any antagonistic interaction between *Gilliamella* and honey bee gut bacteria. Their results suggest that honey bee colony productivity is associated with increased

It currently remains unclear how environmental/dietary conditions affect the microbiota within a honey bee population over time.

bacterial diversity although this mechanism behind this correlation has yet to be determined. BC

References

Anderson, K.E., P.A.P. Rodrigues, B.M. Mott, P. Maes and V. Corby-Harris 2016. *Ecological succession in the honey bee gut: Shift in* Lactobacillus *strain dominance during early adult development.* Microbiol. Ecol. 71: 1008-1019.

Corby-Harris, V., P. Maes and K.E. Anderson 2014. *The bacterial communities associated with honey bee (*Apis mellifera*) foragers.* PLoS ONE 9(4): e95056. doi:10.1371/journal.pone0095056

Emery, O., K. Schmidt and P. Engel 2017. *Immune system stimulation by the gut symbiont* Frischella perrara *in the honey bee* (Apis mellifera). Mol. Ecol. 50: 735.

Evans, J.D. and T.-N. Armstrong 2015. *Inhibition of the American foulbrood bacterium,* Paenibacillus larvae larvae *by bacteria isolated from honey bees.* J. Apic. Res. 44: 168-171.

Horton, M.A., R. Oliver and I.L. Newton 2015. *No apparent correlation between honey bee forager gut microbiota and honey production.* PeerJ 3:e1329. doi:10.7717/peerj.1329

Kapheim, K.M., V.D. Rao, C.J. Yeoman, B.A. Wilson, B.A. White, N. Goldenfeld and G.E. Robinson 2015. *Caste-specific differences in hindgut microbial communities of honey bees* (Apis mellifera). PLoS ONE 10(4): e0123911. doi: 10.1371/journal. pone.0123911

Kešnerová, L., R.A.T. Mars, K.M. Ellegaard, M. Troilo, U. Sauer and P. Engel 2017. *Disentangling metabolic functions of bacteria in the honey bee gut.* PLoS Biol. 15(12): e2003467.

Kwong, W.K. and N.A. Moran 2016. *Gut microbial communities of social bees.* Nat. Rev. Microbiol. 14: 374-384.

Kwong, W.K., P. Engel, H. Koch and N.A. Moran 2014. *Genomics and host specialization of honey bee and bumble bee gut symbionts.* Proc. Natl. Acad. Sci. USA 111: 11509-11514.

Kwong, W.K., A.L. Mancenido and N.A. Moran 2017a. *Immune system stimulation by the native gut microbiota of honey bees.* R. Soc. Open Sci. 4: 170003. **http://dx.doi.org/10.1098/rsos.170003**

Kwong, W.K., L.A. Medina, H. Koch, K.-W. Sing, E.J.Y. Soh, J.S. Ascher, R. Jaffé and N.A. Moran 2017b. *Dynamic microbiome evolution in social bees.* Sci. Adv. 3: e1600513.

Lee, F.J., D.B. Rusch, F.J. Stewart, H.R. Mattila and I.L.G. Newton 2014. *Saccharide breakdown and fermentation by the honey bee gut microbiome.* Environ. Microbiol. 17: 796-815.

Ludvigsen, J., A. Rangberg, E. Avershina, M. Sekelja, C. Kreibich, G. Amdam and K. Rudi 2015. *Shifts in the midgut/pyloric microbiota composition within a honey bee apiary throughout a season.* Microbes Environ. 30: 235-244.

Powell, J.E., V.G. Martinson, K. Urban-Mead and N.A. Moran 2014. *Routes of acquisition of the gut microbiota of the honeybee Apis mellifera.* Appl. Environ. Microbiol. 80: 7378-7387.

Schwarz, R.S., N.A. Moran and J.D. Evans 2016. *Early gut colonizers shape parasite susceptibility and microbiota composition in honey bee workers.* Proc. Natl. Acad. Sci. USA 113: 9345-9350.

Zheng, H., J.E. Powell, M.I. Steele, C. Dietrich, and N.A. Moran 2017. *Honey bee gut microbiota promotes host weight gain via bacterial metabolism and hormonal signaling.* Proc. Natl. Acad. Sci. USA 114: 4775-4780.

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

Economic Outlook For 2019 Almond Pollination Season

Brittney **Goodrich**

With every new year comes the realization that almond orchards will be in full bloom before long. This article summarizes some considerations for this year's almond bloom, as well as what to expect in terms of colony supplies and pollination fees in the years to come.

USDA estimates that there were 1.1 million bearing almond acres in 2018. According to the USDA Cost of Pollination Survey, 1.5 million colonies were used in almond pollination in 2017, with an average 1.6 colonies/acre. This is down from the 2016 average of 1.7 colonies/acre. These values suggest that the number of colonies demanded for almond pollination in 2019 will be close to 2 million. For some context, this is nearly three-fourths of the total U.S. honey bee colony population on January 1, 2018.

The supply of colonies for California almond pollination relies heavily on out-of-state apiary shipments which have been steadily increasing with almond acreage. According to apiary shipment numbers provided by the California Department of Food and Agriculture (CDFA), 1.8 million colonies were shipped into California for the 2018 almond pollination season. As of November 28, 2018, approximately 661,000 colonies have already been shipped into California for the 2019 almond pollination season. This is a decrease of about 2% from colony shipments that had arrived in California by November 28, 2017. Figure 1 displays colonies shipped during September through November from five states that beekeepers commonly ship colonies into California prior to the new year (mostly states with cold winters). Shipments from these states seem to be down slightly from last year, however not by a large amount.

Figure 2 shows a histogram of apiary shipments into California from April 2016 through November 28, 2018. The beginning of shipments for the 2019 almond pollination season look very similar to the previous two seasons. There has been a trend of increasing colony shipments closer to almond bloom. This reflects increased colony shipments from warmer states (Texas, Florida, Georgia) where beekeepers do not have to worry as much about harsh winter weather and can wait longer to ship colonies.

Colony Shipments by State

Figure 3 shows the number of colonies shipped into California for the 2018 almond bloom from each state. The top five states shipping colonies into California included Idaho, North Dakota, Washington, Florida, and Oregon. Figure 4 shows the trends in colony shipments since 2008 from some of the top supplying states.

As seen in Figure 4, 2018 was the first year since pre-2008 that any state had shipped more colonies to California than North Dakota. For the 2018 almond bloom, Idaho shipped 339,000 colonies compared to North Dakota's 278,000. I have talked with a few beekeepers and pollination brokers, and I believe this is due to beekeepers in some of the colder states shipping colonies into the Pacific Northwest states prior to entering California. For example, Table 1 shows Pacific Northwest colony shipments for 2017 almond pollination compared with colony populations reported by USDA. The total number of colonies shipped is often two to three times the colony populations at various points during the year. I suspect some of this is due to the industry's movement towards cold storage of bee colonies, which can reduce *varroa* mite populations and decrease colony losses over the Winter.

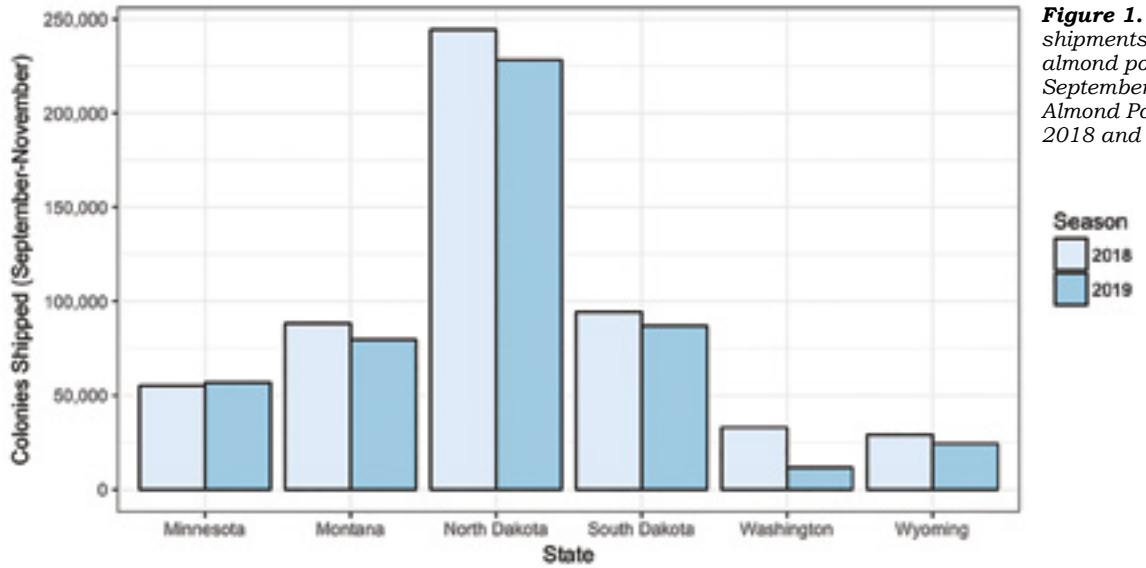


Figure 1. *Honey bee colony shipments into California for almond pollination during September through November, Almond Pollination Seasons 2018 and 2019*

Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

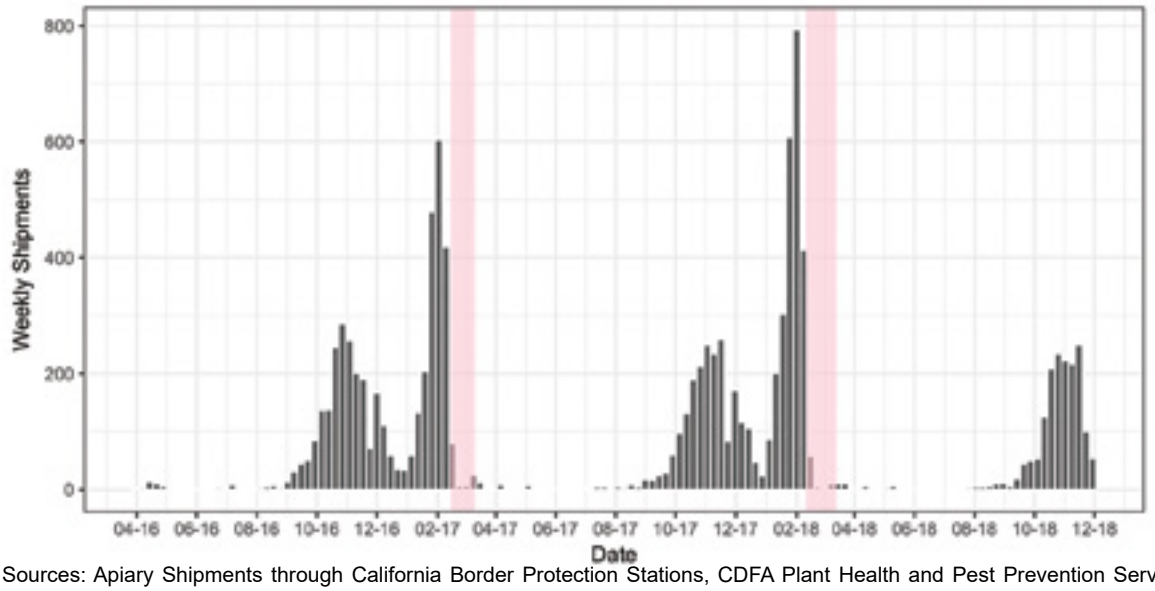


Figure 2. *Histogram of weekly apiary shipments into California, April 2016 - November 2018 (Almond Bloom Period for Central California highlighted).*

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; Blue Diamond Grower's Crop Progress Reports

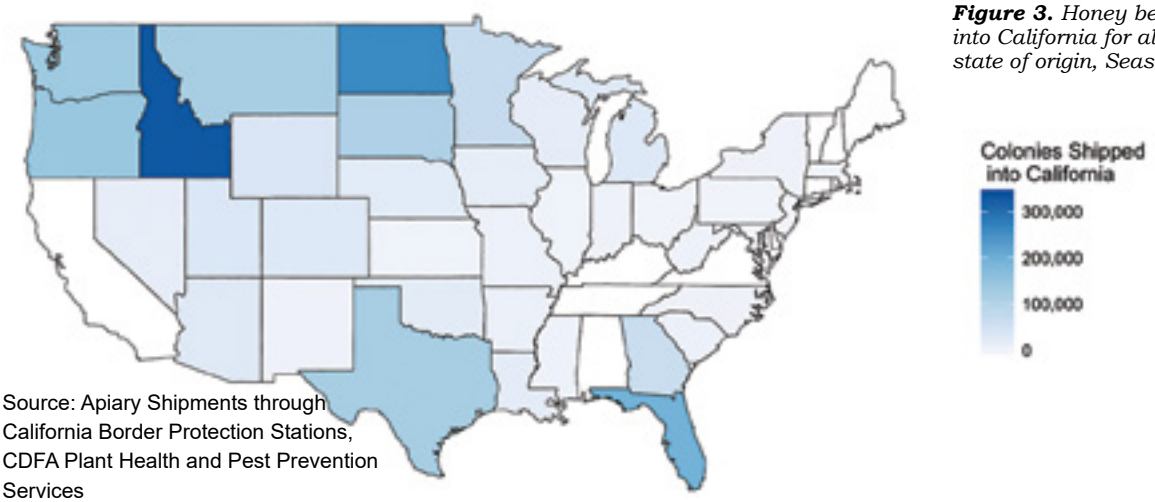


Figure 3. *Honey bee colony shipments into California for almond pollination by state of origin, Season 2018*

Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

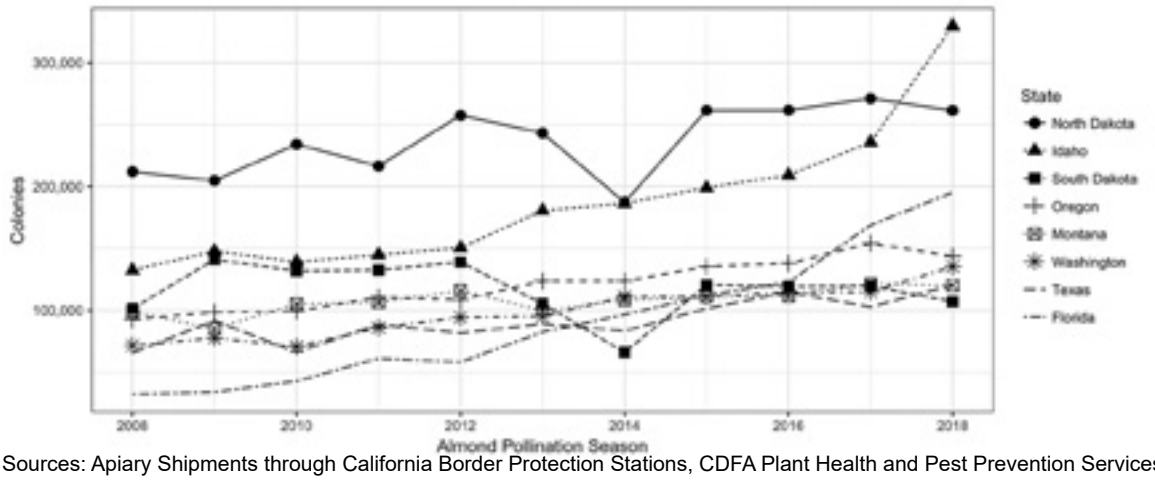


Figure 4. *Honey bee colony shipments into California for almond pollination from eight states with largest number of colonies shipped in 2018, Seasons 2008-2018*

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services

Table 1: Pacific Northwest State Colony Populations and Colony Shipments into California for the 2017 Almond Bloom

State	Shipments	Colonies Shipped	Number of Colonies		
			July 1, 2016	October 1, 2016	January 1, 2017
Idaho	560	235,695	79,000	121,000	95,000
Oregon	485	154,161	107,000	98,000	71,000
Washington	341	114,892	57,000	65,000	68,000

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; USDA Honey Bee Colonies Report 2017

As for the future supply of almond pollination services, Figure 5 displays estimates of the number of colonies that did **not** participate in 2017 almond pollination in each state based on honey bee colony shipments compared with USDA honey bee colony populations (Note: Figure 5 does not account for any winter mortality). Most non-participating colonies are located in the eastern U.S. In some areas with a large number of available colonies, ex: Florida, Georgia and Texas, beekeepers may have opportunities for honey production during almond bloom, so it may take higher pollination fees to get those remaining colonies to participate. Now, one will notice that there seems to be a large number of colonies still available in the upper Midwest states. As I mentioned earlier, I suspect a large number of these colonies are not available (NAs) in reality, and are actually being shipped through the Pacific Northwest states due to milder winters and/or cold storage.

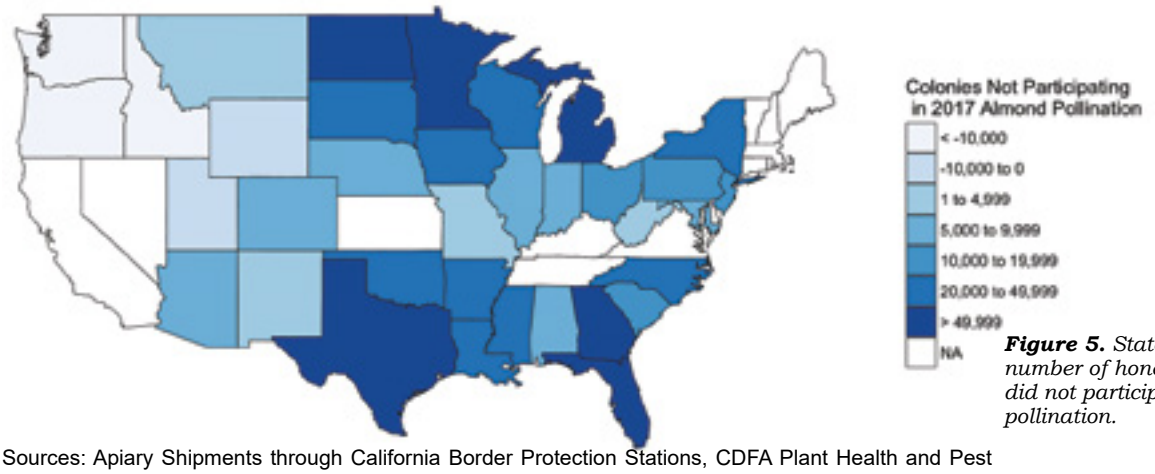


Figure 5. *State estimates of the number of honey bee colonies that did not participate in 2017 almond pollination.*

Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; USDA Honey Bee Colonies Report May 2017

NAs exist for Delaware, Nevada, New Hampshire, and Rhode Island because USDA does not publish honey bee populations for these states.

Supply Issues

The primary influence on the supply of available colonies for almond pollination is colony health and populations throughout the U.S. In my research, I have found evidence that increases in state average winter mortality rates decrease the number of colonies shipped into California from that state for almond pollination.

An estimated 65-85% of commercial honey bee colonies are located in North Dakota and South Dakota during the Spring/Summer months for honey production (Bond,Plattner and Hunt, 2014). Thus, weather during this time period can have an impact on honey production, as well as bee health, due to the availability of forage. In the article I wrote for *Bee Culture* last year, I discussed a drought in the Dakotas and Montana which likely would affect bee health and colony populations for the 2018 almond pollination season. During May through September 2018, an average of 16% of the area in Montana, North Dakota and South Dakota was in a moderate drought or worse. The equivalent number for 2017 was 53% of the area. Thus, this season is looking much better in terms of bee health coming from these major honey-producing states.

Another potential issue that could impact colony shipments was Hurricane Michael which devastated areas of Florida's panhandle in October of 2018. University of Florida Extension estimates that 50,000 colonies were located in this area, though it remains unclear how many colonies were actually affected by the hurricane. Florida supplied roughly 195,000 colonies to California almonds in 2018. Thus, the hurricane has the potential to impact up to a quarter of those colonies. If colony shipments from the panhandle of Florida are decreased, this will require additional colonies from elsewhere in Florida or other states.

Almond Pollination Fees

The average fee for the 2018 almond pollination season reported by the California State Beekeeper's Association (CSBA) was $190 per colony. This was up by 3% from the 2017 average pollination fee of $184. In comparison, the USDA Cost of Pollination survey reported

Table 2: Average Distance and Round Trip Per-Colony Shipment Costs by Region

Region	Average Distance (Miles)	Minimum ($/Colony)	Average ($/Colony)	Maximum ($/Colony)
Pacific Northwest	781	9.62	11.71	13.81
Mountainous	896	6.30	13.44	18.32
Southwest	1,049	10.08	15.73	22.12
Plains	1,560	22.17	23.41	25.55
North Central	2,125	27.73	31.88	36.27
Southeast	2,349	26.85	35.23	41.85
Northeast	2,960	40.68	44.40	49.16

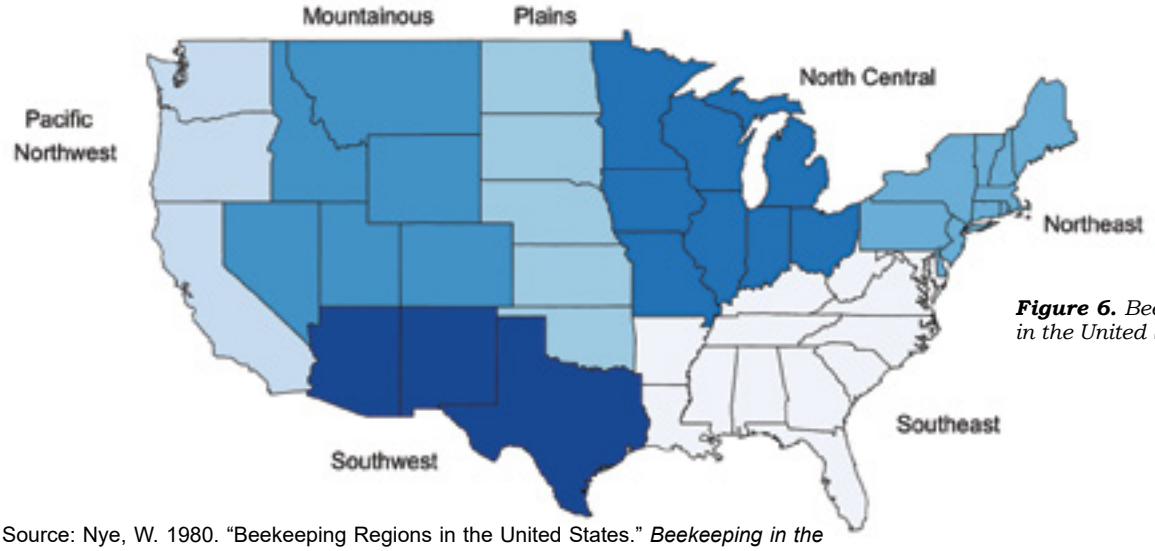


Figure 6. *Beekeeping Regions in the United States.*

Source: Nye, W. 1980. "Beekeeping Regions in the United States." *Beekeeping in the United States*. USDA Agriculture Handbook 335:10–15.

2017 average almond pollination fees slightly lower than CSBA at $171 per colony. The 2018 CSBA pollination fees ranged from $165 - $210 per colony. The variation likely is due to differences in contracted colony strength. Colonies that average 8 or 10 active frames tend to receive a premium over those that average 6 active frames (See Goodrich and Goodhue (2016) for more information on colony strength in almond pollination contracts).

The CSBA survey respondents projected 2019 almond pollination fees to be around $198 per colony. In some preliminary research, I explore the future demand for almond pollination services. According to the USDA Almond Acreage Reports, I estimate that 148,000 additional colonies will be needed by 2020. If that is the case, I estimate that almond pollination fees will have to increase by 7.9% over their 2017 value to increase colony shipments. This would mean an average per-colony fee of around $200 by 2020. This estimate seems to be right on track with the CSBA projections for the upcoming season.

Many almond growers likely cringe at the thought of paying over $200 per colony for almond pollination. So here is some information to help illustrate why prices continue creeping upwards. Table 2 shows average distances and estimated per-colony shipment costs for each region in the U.S. (Figure 6) using a shipment cost of $3 per mile and 400 colonies per shipment. Recall from Figure 3 that colonies are now being transported from as far as the northeastern U.S. to participate in almond pollination. At a $200 pollination fee, the beekeeper from the Northeast is receiving $150-156 per colony once shipment costs are accounted for. This does not include any inputs to prepare colonies for almond pollination (labor, food, pest treatments) nor does it include hotel rooms and transportation costs of beekeepers and equipment. Not to mention the potential risks to honey bee colony health that almond pollination introduces. So, one can see that $200 per-colony revenue can dwindle down pretty quickly.

Other issues for 2019 almond pollination and beyond

Bee Thefts

Bee thefts continue to be an issue for beekeepers, especially when colonies are in close proximity in remote almond orchards during bloom. Due to this threat, it may be a good idea for beekeepers and/or pollination brokers to offer a discount on the pollination fee to locate in almond orchards or holding yards that contain a locked gate. I know of some beekeepers and brokers who already do this, so keep this in mind if you know of growers with gates that lock.

Bee Where Program

Beginning January 1, 2019, both California and out-of-state beekeepers are required to register their colony locations with the county agricultural commissioner. Previously, this had been required, however the California Agricultural Commissioners and Sealers Association had no authority to penalize non-compliance. The appropriate fine for non-compliance is still under discussion, but it could range from $50 to $1,000. It is my understanding that fines will not be awarded until the 2020 almond pollination season.

The registration cost is $10 per beekeeper, no matter how many colonies. The goal of this program is to help minimize pesticide exposure for honey bee colonies by alerting beekeepers when pesticide applicators plan to apply chemicals nearby. Additionally, this will provide better information on the true causes of bee kills when pesticide exposure does occur.

I suspect most beekeepers will be given information regarding the Bee Where Program when they pass through California Border Protections Stations. Participating this year is a good idea so that beekeepers can test out the online registration and give feedback to make the process more streamlined in the future.

For more information and to register hives online visit: **https://beewherecalifornia.com/**

Summary

Almond pollination can be a profitable endeavor for many beekeepers. However, it is important to enter into pollination agreements that are mutually beneficial for you and the almond grower. Give careful consideration to the colony strength requirement and number of colonies you contract so that it won't be excessively costly to you to meet your obligations. A fee of $210 for a 10-frame average may sound great, but may not be profitable for you once the costs of inputs are considered.

The number of colonies required for almond pollination services continues to be a large percentage of the total colonies in the U.S. If demand for almond pollination services continues to increase, expect higher pollination fees in the coming years. Communication with your almond grower is key to a profitable and sustainable pollination relationship. Know what your grower intends to do if you are not able to meet colony numbers or colony strength requirements. Discussing these difficult topics in advance can alleviate the stress and potential court costs of future disputes. BC

References:

Bond, J., K. Plattner, and K. Hunt. 2014. *"Fruit and Tree Nuts Outlook: Economic Insight. US Pollination Services Market."* USDA Economic Research Service Situation and Outlook FTS-357SA.

Goodrich, B. and R.E. Goodhue. 2016. *"Honey Bee Colony Strength in the California Almond Pollination Market."* ARE Update 19(4): 5-8. University of California Giannini Foundation of Agricultural Economics.

Trust & Integrity In Bee Data

Building The Genius Hive

Joseph **Cazier,** Walter **Haefeker,** James **Wilkes,** Edgar **Hassler**

Introduction

Over the last few articles we published in *Bee Culture,* we have been discussing concepts like BeeXML, an open data standard for bee data, and some risks and rewards for sharing that data. In this article, we tie it all together by looking at ways to enhance trust and data integrity through good policy, software design, and new technologies that can help.

To do this, let's first review what trust is and how it is created. Then discuss how good policies, software design, and emerging technologies can help facilitate those factors in a way that provides integrity to the system and builds public trust, which results in a willingness to share data.

Have you tried to clean up spilled honey? Data sharing is like spilling honey on the ground. Once data is shared it is hard to undo. Photo by James Wilkes

Trust

Trust is defined as the willingness of a party (trustor) to be vulnerable to the actions of another party (trustee) based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.[1] When sharing data, especially sensitive data as outlined in our last article "*Risks and Rewards of Data Sharing for Commercial Beekeepers"* in the January 2019 Issue of *Bee Culture*, trust is critical.

It is only through an abundance of trust that the data needed to build a Genius Hive (as outlined in the first article in this series, "*The Path to a Genius Hive*," in the April 2018 issue of *Bee Culture*) can be collected, analyzed, and given back to the community to benefit beekeepers everywhere. Beekeepers will not want to put themselves in a potentially sensitive position by sharing data without trust as trust minimizes the risk-harm and risk-likelihood that could occur. They will certainly want to see a high likelihood of benefits from a concept such as the Genius Hive.

Since trust is therefore at the heart of building the concepts of BeeXML and the Genius Hive, let's spend some time exploring the Trust Model presented in Figure 1. Note that this trust model draws on some of the work published in a peer reviewed journal article titled, "*A Framework and Guide for Understanding the Creation of Consumer Trust*[2]," and adapted for use here.

Creation of Trust

According to trust research, there are three main factors that lead to the creation of trust. In turn, trust has three dimensions upon which it can be created. This section focuses on creation of trust, of which there are three primary bases: *Process*, *Characteristic* and *Institutional*. We define these below:

- **Process Based Trust** is created through a process of interaction and experience between organizations and customers. Successful experiences build trust for future exchanges. For example, if consumers have done business with an organization in the past, and been satisfied, they are more likely to trust that it will go well in the future and have a higher level of trust (or distrust if it went poorly).

[1]Mayer, R. C., Davis, J. H., and Schoorman, F. D. (1995). *An integrative model of organizational trust*, Academy of Management Review (AMR), 30(3), pp. 709-734.

[2]Cazier, J. A. (2007). "A Framework and Guide for Understanding the Creation of Consumer Trust". *Journal of International Technology and Information Management*, 16(2), 45-56.

Joseph Cazier, Ph.D is the Chief Analytics Officer for HiveTracks.com and Executive Director of the Center for Analytics Research and Education at Appalachian State University. You can reach him at ***joseph@hivetracks.com***

Walter Haefeker is a professional beekeeper from Upper Bavaria, board member of the German Professional Beekeepers Association, as well as President of the European Professional Beekeepers Association.

James Wilkes, Ph.D is the founder of HiveTracks.com, Computer Science Professor and Sideline Beekeeper.

Edgar Hassler, Ph.D is the Associate Director for Technology at the Center for Analytics Research and Education at Appalachian State University. You can reach him at ***hassleree@appstate.edu***

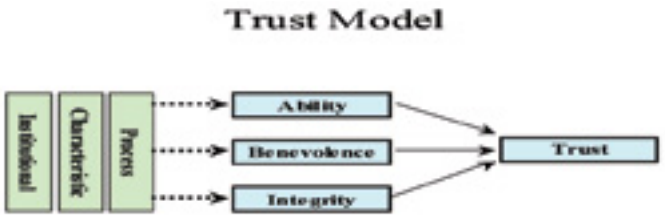


Figure 1. *A Model for the Creation of Trust*

- **Characteristic Based Trust** is created through a sense of shared communality with the other party. This can be similar values, background, ethnicity, or experience. Trust is increased by having something in common with the other party or by possessing a characteristic the trustor finds desirable.
- **Institution Based Trust** is created through the use of a third party. This can be a government agency, a bank, or some other organization that assures the trustworthiness of the target organization. In this case there is a transference of trust, because a person trusts the institution and the institution stands behind the organization, the organization benefits from that trust.

These methods of trust production can be very important as we try to understand and improve trust as it relates to bee data. It is also important to understand that each of these methods of trust production is separate and distinct. As such, each method offers a different mechanism and tool that we can use to build trust with beekeepers. These methods of trust production can also be combined with an understanding of the dimensions of trust to become even more relevant to business practice.

The Dimensions of Trust

Not all methods of trust production affect trust in the same way, and trust is not as simple as someone trusting or not trusting. Trust is not one dimensional. Rather, trust is a complex multidimensional construct that can be affected in different ways from different trust production methods. Having a good understanding of these facets of trust and how they interact with different trust production methods can help us develop and implement a better trust management program.

These dimensions are defined as follows:

- **Ability** is the group of skills, competencies, and characteristics that enable a party to have influence within some specific domain. While the ability dimension includes domain level expertise, it is not limited to that dimension. Factors such as quality, innovativeness, prestige, and others can influence the perception of ability.
- **Benevolence** is the extent to which a trustee is believed to want to do good for the one trusting him/her, aside from a self-centered profit motive. Do people believe that the organization sincerely wants what is best for them, or do they believe they are being manipulated solely for the good of the organization? Benevolence can be a very important part of trust.
- **Integrity** is the trustor's perception that the trustee will adhere to a set of principles that the person trusting them finds acceptable. It is not just that they have principles, but the principles are ones that are acceptable to the trustor.

Each of these dimensions has an important role to play, distinct from each of the others. For example, if a person needed to go to a medical doctor and believed the doctor had high trust on the dimensions of integrity and benevolence, but not on ability, a person would not be likely to trust the doctor. Results would likely be the same if the person had a high perception of trust in the doctor's ability, but a low one on integrity and thought he/she might be sold services not needed. Thus, it is very important to be cognizant of all dimensions of trust and the methods of creating them.

In the next sections, we look at how good policies, thoughtful software design, and technology can be used to build a system for collecting the data needed to build a genius hive while promoting trust.

Good Policies

There are many good policies that can help promote trust, and thus data sharing. These include good data, internal vs. external needs, data abstraction, need-to-know, privacy, and data ownership.

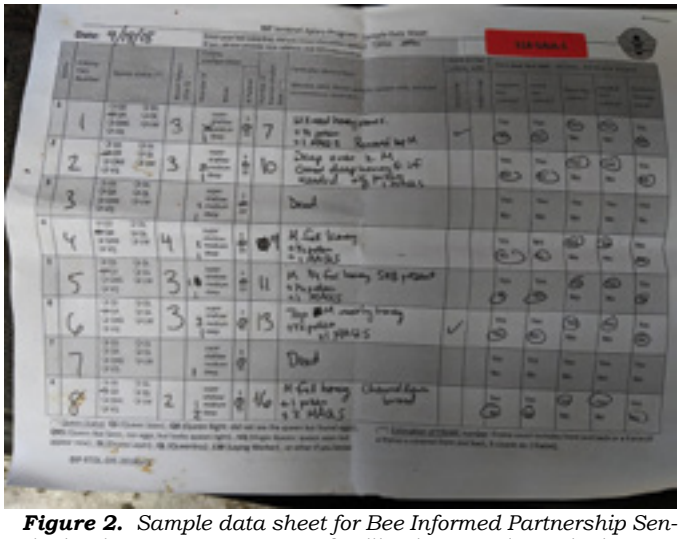


Figure 2. *Sample data sheet for Bee Informed Partnership Sentinel Apiary program. Non-profits like the BIP rely on the benevolence factor to increase participation.*

Figure 3. *The data collected for this research apiary includes longitudinal management data and colony outcomes (Hive Tracks),* Varroa*, nosema, and viral sampling (BIP), and hive scale data (Solution Bee).* Photo by James Wilkes

Good Data

The first essential policy is to promote, in every way possible, good data and good record keeping. If good data does not exist, it cannot be shared. If bad data is shared, it can cause more harm than good.

One of the most fundamental rules for data processing is "garbage in – garbage out." The system can only provide useful actionable data if capturing and maintaining the data is part of the day-to-day operation and not an afterthought. Regular "data hygiene" is a prerequisite to meaningful reporting and analytics as well as sharing of the data externally. If the internal data are not current and accurate, then sharing will be of limited value. Additionally, it will be difficult to benefit from data shared by others.

All Types Of Beekeepers Can Benefit

Hobbyists can develop a deeper understanding of their hives by tracking their activities and observations, leading to better engagement with their bees and the community. Good policies for commercial beekeepers start with capturing the data as part of routine business operations, including having staff properly equipped and trained. This may involve tablets to capture data at the apiary or at least clip boards with worksheets. In addition, it is always wise to document the state of an apiary before leaving. Any smartphone will capture the GPS location and time stamp. If this is a standard practice, it is extremely helpful to use relatively big and simple hive IDs, which are readable in the photos.

Why the photos? This relates to the next important policy: checking the data regularly for consistency. Mistakes and omissions will inevitably happen. The photos provide an opportunity to double check that the data in the system match reality.

But photos are just one way of doing that. Having regular inventory intervals helps to detect mismatches. If such checks rarely show problems with the data, then the frequency of these additional steps can be reduced. If the system is developed by an external vendor, the documentation should include a section on data hygiene and the best practices to achieve clean actionable data.

The habit of keeping good records, preferably in a standard format, increases the *Integrity* dimension of trust. Since we know a beekeeper keeps good records (characteristic based trust), we have more trust that what they choose to share is good data. Similarly if they are using a good system to track their bees (like HiveTracks.com), we might trust the data more since an institution (HiveTracks.com) is standing with them and sharing some of their trust.

Internal vs External Needs

It is also important to differentiate internal vs external data needs. There are many internal data elements that can help a beekeeper run their business better. The additional effort of capturing of data can only deliver additional value – if the data are accurate and up-to-date.

However, not all of these needs are relevant to external users of data. Data used to drive decision making in day-to-day operations are fundamentally different from data compiled to comply with external regulatory requirements. For example, when was the last time anyone consulted their tax filings to make an operational business decision not related to taxes? Taxes are prepared primarily for external, not internal, uses.

Additionally, most people feel the same about being pushed to do extra work and analysis to share required data for government and other regulators in the form that they need it as they do in preparing their taxes. They also do not want to share sensitive data from their internal business operations.

From a policy point of view, we need a system that can help the beekeeper keep track of internal data they need to run their business, or manage hives for hobbyists, that will also automatically generate the data for required reports and data sharing while also protecting internal sensitive data. Such a system could help the beekeeper track and process the data for both purposes while protecting what needs to be protected. This would increase trust on the integrity dimension for the beekeeper through institutional based trust (the tool) and for the regulators on ability as they know they have a good system to keep track of data and report it in the way they need it.

Data Abstraction

This summary reporting feature would help with another principle, that of data abstraction. Data abstraction is essentially taking all of the data available and pulling out the relevant simple parts. By abstracting the essential parts of the data, we can provide what is essential to government entities, researchers, nonprofits, and others who need data to help the bees while protecting the internal detailed data needed for the beekeeping operation. Having these controls in place would increase trust on the benevolence dimension as beekeepers would know those so designated are only taking what they need and respecting the beekeepers' privacy.

Need-to-Know

The most primitive approach to data sharing would be that everybody has access to all the data all the time. As discussed in previous articles, this scenario creates a lot of disincentives for sharing or even using software systems at all. In an environment where everybody has access to everything, a complete snapshot of the business data may walk out the door on a USB stick. Thus, it is very important that a system implement different levels of access and record those access attempts.

Access to data on a need-to-know basis is not only a good idea inside an enterprise, it should also be the guiding principle for sharing data with outside entities. Bureaucracies tend to request data without first thinking about how they want to use them and what disincentives they may create to providing accurate data. Overreaching reporting and registration requirements can lead to reduced cooperation and may actually encourage the creation of two sets of books.

A much more promising approach is to think about the purpose of the data sharing first and then define the least amount of data that will accomplish a clearly defined objective. In data sharing, less is more because the smaller the requested data set, the more likely the full cooperation. Such interactions also help build trust on the integrity and benevolence dimensions.

Privacy

The right policies for guarding this data treasure do not begin when an external entity seeks access. Given the tools technology has to offer, "less" does not only apply to the volume of data but also how personally identifiable the data are. It may be necessary for some information to be shared with full owner information, such as with financial or tax implications. However, other data, such as for disease control, may be (mostly) reported without identifying the hive owners, rather just the approximate location of the hive.

The right level of identification should be applied to each application. Good software and controls can help with this process, and good data collection systems can help manage the right level of data abstraction for each application.

Data Ownership

The best data system will respect the rights of the creators of the data to maintain ownership of the data they help generate. It seems like such a simple concept, but is rarely practiced in the world today. Users should be able to review the data stored in a system and control how much is shared and to what degree of abstraction. Additionally, those who share data, such as in efforts to create a Genius Hive, should have a path to benefit from the usage of their data for these purposes.

Software Design

In addition to the good policy principles outlined above, there are several good design principles that can help with trust and the usage of a system to collect data. These principles mainly work on the ability dimension of trust by showcasing good software and include:

- *Ease of Use:* best case for ease of use is that all of the data is collected with little to no interaction required by the user, but that can also lead to distrust because the user might not be aware of what is being collected. Seeing what is being collected needs to be as easy as having it collected.
- *Usefulness:* more data = more useful? more data = more privacy risk? How does this play out at the different levels of data sharing from the individual on out? Not all data is equal and you can have too much data that distracts you from focusing on the important things. A system that helps you focus on the right data is critical for success.
- *Enjoyment:* this could be seen as a negative as individuals likely are willing to give up more privacy if enjoyment goes up proportionately, but does that have to be the case? On the flip side, enjoyment will likely lead to better data collection and feed into more enjoyment. Does it build trust or mask issues?
- *Open API:* having an open API (Application Program Interface) with appropriate data sharing that is limited to relevant abstracted or summarized data with the organizations can help make data sharing easier, more useful, and even enjoyable to be in line with the principles above.

Figure 4. *Detailed hive scale data during a Sourwood flow in North Carolina. Very useful information for the beekeeper and provides enjoyment, but presents a risk for outside competition for nectar flow.*

There are also several important security and privacy features any system should have which include at least the following:

- *Best Practices*: are best practices being used in software design and implementation (or even perceived to be used)? For example, a system may be very functional and provide all of the privacy, etc., but the look and feel may not convey the right message.
- *Data Security*: using https? Using best practices for security of cloud infrastructure? Reputable server service? AWS, Digital Ocean, Heroku, or . . .? Trust server providers? Modern security requires a multilayered approach to safeguard all aspects of data.
- *System Security:* authentication, authorization (access controls), access audit trails, etc., can help control data access to a need-to-know basis.
- *Backup:* how is the data being backed up to ensure against loss? Having good technology to store and protect data is crucial.
- *Intermediary*: is there a trusted third party to provide verification of trust? Or can the third party be more like an open source community with self policing, especially if the systems are more distributed in nature rather than one central data repository.
- *Encryption*: Encryption can be a critical part of good data collection and storage, reducing the risks of unintended data sharing. An even better situation is when the person providing the data has the only key to decrypt it and thus near absolute control over who sees it. When using encryption, a key question (no pun intended) is: who holds the key? If this is done right, even a cloud service provider hosting the data would not be able to decrypt and access the information unless the owner explicitly granted permission. Just as encryption can be used to create a virtual private network (VPN) over public infrastructure, it can also enable the creation of virtual privacy on a centrally-hosted service. While in use, the data have to be decrypted at some point. It is a good design principle to try to limit how much of the data is in the decrypted state and for how long.

These features generally work on the ability dimension of trust, but collectively can affect integrity as well. Below are a few factors that also help with trust. They generally work by improving the benevolence dimension of trust, often through their characteristics or process:

- *Tool provider*: who provides the tool? Is it the private sector, government, or non-profit?
- *Purpose*: it is important to know why data are being

collected and what it will be used for. If it is a purpose the owner supports, this will help trust through a concept called *Value Congruence*, which can increase characteristic based trust on both the integrity and benevolence dimensions.

- *Clear Privacy Policies*: clarity in privacy policies and practices (good practices) along with a perception that they are actually followed increases both the integrity and benevolence dimensions in characteristic based trust.
- *Transparency*: transparency is about exactly what data is collected and how one does or does not share with third parties, which is often used to circumvent the responsibility of the original data collector.
- *History:* if it is the private sector collecting data, are they a trustworthy actor? Is there a history of working in the area, good reputation, credibility with users?

All of these tools and good design principles can be used to increase trust and data sharing in a responsible way. However, there are a few more emerging technologies that can help even more in the future. These are discussed in the next section.

BIP team members mapping an apiary with a drone to evaluate mite loads versus hive position in the apiary. Photo by James Wilkes

Emerging Technologies

In addition to the ideas above, there are new developing technologies related to beekeeping that can impact trust and data collection. We discuss some of the key technologies below.

Remote Sensors

Every year we see more and more remote sensing technologies on the market that have the potential to make data collection more enjoyable, easy to use, and useful (see first points above). Eventually, these technologies will mature and become affordable enough to be deployed widely. Already HiveTracks Commercial software developers are in the process of adding RFID sensor capability.

This will make collecting data related to bee health and business operations much more efficient. However, the resulting multiplication of data will also make building trust based on the principles outlined here more important than ever.

Data Standardization Efforts

As mentioned in earlier articles, there is an effort, lead by Walter Haefeker and joined by all of the authors on this article as well as many other distinguished contributors, to help create a data standard for all data related to bees. This effort will make it easier to select data to be shared, know what is useful to share, and know what should be kept private for different situations. It will also make it much easier to define what to share to control bee data. It would be difficult to overstate how important this project is for the future of bee data, trust, and data sharing.

Blockchain

Blockchain is a new emerging technology the combines encryption, authentication, and privacy and data control; it also provides for incentive alignments. It can help with data integrity, lower transaction cost, and help maintain privacy and control of data. A detailed discussion of blockchain is beyond the scope of this article, but we hope to come back to it in a future article.

Polymorphic Encryption and Pseudonymisation (PEP)

PEP is a cutting edge technology being explored in the medical industry that avoids some of the issues associated with traditional encryption while also introducing measures to obscure the source of the data even after decryption. A full discussion of PEP is beyond our scope here; however, one can see the promise of such a system in the familiar medical context.

Briefly, patient data is encrypted in such a way that each physician who requires access can be granted access via a different key, thus avoiding a shared key. Additionally, the decryption key supplied to a provider may only decrypt a relevant portion of the data; thus it becomes possible to mask the identity of the patent and/or details not relevant to a given situation.

This also opens up the possibility of sharing data for research purposes while still maintaining control of one's data. Should research findings directly impact a patient, PEP provides a means for that information to be relayed back to the patient without revealing their identity – essentially establishing a double-blind arrangement between researchers and the patient and increasing trust

Figure 6. *A little sister beekeeper trusting her older brother beekeeper while installing new queens.* Photo by James Wilkes.

by increasing the ability and integrity dimensions of trust for keeping data secure.

Conclusion

Trust is critical to ecommerce and data sharing. There are several ways to build trust, and each of these tools, principles, and policies can help. Taking advantage of these tools for our data sharing will allow us to create an environment where there is trust in the systems we will use to collaborate on managing bee health and pollination.

It is also important to remember how critical data sharing can be. It is only by pooling and sharing our data, at least the essential aspect of it, that we can know what is working, make good policies, and build systems to guide our beekeepers to use the best tools and techniques available to manage their bees well.

We look forward to a bright future where we can all share the right data, while protecting what should be protected, in a way that we can all benefit by applying these principles and technologies.

Finally, special thanks to *Project Apis m.* for supporting a portion of this work with a *Healthy Hives 2020* grant, to leaders at HiveTracks.com for sharing their thoughts on this topic and to the editors of *Bee Culture* for publishing this work. These efforts would not have been possible without visionary groups like this one providing support and resources. BC

FOUND IN TRANSLATION

Winter Stirrings

Jay **Evans**, USDA Beltsville Bee Lab

Some people say spring starts with the mating of great-horned owls in late December. These people are greatly outnumbered. For most of us, February is a month of darkness and cold extremities. Still, it is the first month for wishful thinking and definitely a month for all plans and equipment to be in place for a successful takeoff of new packages and overwintered survivors alike. Your bees are stirring by then as well, and there is new research detailing just how much they are doing to be ready for Spring flowers.

In temperate regions, including much of North America, worker honey bees are rarely seen outside during Winter. They might search for the few available flowering plants, but mostly they will defecate and return home promptly. This does not mean bees are ignoring the oncoming spring and the need to renew and rebuild. In fact, colonies often start bouts of egg-laying and brood rearing in the middle of Winter. It is an interesting management and breeding problem to sort out whether mid-Winter brood rearing harms or hurts colonies, whether certain breeds are more prone to flipping the brood switch mid-Winter, and the specific cues bees use to start their engines.

Alphonse Avitabile (still mentoring in Connecticut and the co-author of a leading beekeeping book) sacrificed colonies monthly through a Connecticut Winter for a 1978 study in the *Journal of Apicultural Research* entitled 'Brood rearing in honey bee colonies from late Autumn to early Spring' (**https://doi.org/10.1080/00218839.1978.11099905**). Avitabile described substantial Winter brood activity, with sealed brood averages in the thousands per colony from January onward. This was despite the presence of a true Winter in his apiaries (average high temperatures of 41, 36, and 38°F for December, January and February, respectively, today and perhaps even colder in the mid-1970s). Similarly, Lloyd Harris followed brood production in Canadian honey bee colonies entering Winter in Manitoba, Canada, also describing his findings in the Journal of Apicultural Research (**https://doi.org/10.3896/IBRA.1.48.2.01**). Italian bees from California were subjected to average 'high' temperatures of 18°F by the time the study ended in December. Still, they persisted in egg laying, showing an average of ca. 1000 sealed brood cells when sampled on December 5. Soon after, they were moved to warmer conditions in a climate-controlled warehouse (43°, constantly), and brood numbers expanded and continued until spring (as described in a follow-up paper from 2010 in the same journal (**https://doi.org/10.3896/IBRA.1.49.2.04**).

Fabian Nurnberger and colleagues used an experimental approach to determine when and why bees restart brood rearing in late Winter. They describe their results in the open-access journal *PeerJ* in a 2018 article "The influence of temperature and photoperiod on the timing of brood onset in hibernating honey bee colonies" (**10.7717/peerj.4801**). These researchers followed honey bee colonies in Würzburg, Germany (average high temperatures of 39, 37 and 41°F in December, January and February). They used controlled rooms to manipulate both temperature and the day length perceived by bees. While there were complicated interactions between forced day-length and temperature, they showed in general that temperature was the strongest predictor of the initiation of brood rearing. Once bees committed to brood rearing, they continued to do so even when temperatures were reduced substantially, and the authors propose this as a risk to rebooting brood rearing in the face of an unpredictable climate.

Many beekeepers treat their colonies for *Varroa* mites midwinter, especially with oxalic acid treatments which are highly effective against exposed mites but ineffective against mites in sealed cells. If treated colonies harbor patches of sealed brood, oxalic acid treatments could miss substantial numbers of mites. This concern was addressed by Hasan Al Toufailia and Francis Ratnieks in England, as part of their continuing efforts to identify sustainable ways to control mites (highlighted in another *Journal of Apicultural Research article,* "Towards integrated control of varroa: 5) monitoring honey bee brood rearing in winter, and the proportion of varroa in small patches of sealed brood cells", **https://www.tandfonline.com/doi/abs/10.1080/00218839.2018.1460907**).

Monitoring colonies in Sussex (high temperatures of 46, 45 and 45°F in December, January and February, respectively) they confirmed that December is the quietest month in terms of brood activity, with between nine and 52% of colonies having any brood at all across four study years. Variation across years in December brood incidence likely reflects warmth in late Fall and continued pollen availability. Substantial brood rearing began in January, where all colonies in each of four years had some sealed brood, averaging 1400 cells each across all years. From a management standpoint, oxalic acid treatments in

December would have a more lasting impact on mite levels than treatments in January or any other month. The authors even suggest gouging out the small pockets of Winter brood prior to mite treatments as a way to achieve better *Varroa* control. They provide detailed methods and justification for broodless oxalic treatments at **https://www.youtube.com/watch?v=2fMP9QjNy94**.

Another adverse outcome of Winter brood-rearing is that female mites could both increase their progeny and improve their own health. While some *Varroa* mites no doubt survive months hitchhiking on adult bees, *Varroa* populations as a whole suffer severe Winter declines as female mites reach their limits and die. Winter brood provides a significant bridge for declining mite populations. Crudely, if there are 1400 sealed worker brood during January, approximately 110 bees will emerge daily, or 3410 in the whole month. Assuming 30% of these cells contain mites, with two female mites/cell emerging on average, these Winter brood cells can be factories for >2000 new mites in January and maybe twice as many in February. These mites are younger and presumably more fecund than mites born months earlier. And their moms might benefit as well, since a bout of reproduction involves feeding on plump bee pupae, arguably a richer food resource than overwintering adult bees.

Early starts on brood rearing are likely to be positive on the whole, since a younger and larger bee population will be ready for Spring flowers. Still, there is a downside in terms of mite numbers and compromised mite treatments. Next year, start your Spring oxalic treatments in early December, before the owls mate. BC

BIP – Sentinel Apiary Program

Calling All Beekeepers!

Kelly **Kulhanek**

What is the Sentinel Apiary Program?

The Sentinel Apiary Program is a colony health monitoring program that helps inform beekeeper management decisions, while simultaneously providing the Bee Informed Partnership (BIP, www.beeinformed.org) with some of our most valuable data. Beekeepers enrolled in the Sentinel Apiary Program monitor four or eight colonies in one apiary for six months. Each month, participating beekeepers take a sample of about 300 bees from each Sentinel colony. They also provide us with information about their colonies including queen status, brood pattern, and frames of bees, as well as any management they have recently performed, such as feeding, treating, supering, etc. Samples are then mailed to our lab at the University of Maryland where we process them for *Varroa* and *Nosema*. Beekeepers receive a report of their results within two weeks so they can make timely management decisions. To date, 189 beekeepers in 31 U.S. states have taken almost **7,000** samples from Sentinel colonies! For more details, please visit our website: **https://beeinformed.org/programs/sentinel/**

2018 Program Summary:

The 2018 Sentinel Apiary Program was the fourth year of the program and was a great success. The program included 64 beekeepers sampling 418 colonies, for a total of 1,901 samples.

We were thrilled to find that 2018 Sentinel Participants had significantly lower *Varroa* loads than the historical national average, and the lowest *Varroa* loads of **any year** of the program. **This speaks clearly of the value of monthly monitoring and actionable, near real-time data.**

Why join the Sentinel Apiary Program?

Enrollment in the program includes all the materials you need to take your samples, pays for all the labor for us to process your samples in our diagnostics lab, and for the helpful handouts on how to evaluate and track the health of your colonies. **Our participants say that Sentinel acts as extra incentive to do thorough colony health checks every month, and that their record keeping and beekeeping have improved as a result.** We all think we will remember that the second colony from the left was queenless and the third from the right needed feeding, but once you leave the yard, sometimes it's hard to even remember your hive tool. Sentinel data sheets and reports are designed to help you keep track of exactly what's happening in each of your colonies so you can perform optimal management. This program is perfect for individuals and ideal for bee clubs as the sampling and colony assessments are perfect opportunities for training new beekeepers and the monthly results provide an excellent platform to share and discuss at each meeting. **Sentinel helps you be the best beekeeper you can be.**

Contribute Valuable Data to Honey Bee Science:

Sentinel Apiaries produce some of the most valuable data BIP collects. No other database has this much detailed information on this many colonies for this amount of time. Sentinel is unique because participants track the same colonies for at least six months, if not multiple years. These longitudinal data allows us to ask specific, interesting questions about landscape effects on colony health and the efficacy of beekeeper management practices. Longitudinal data is considered the gold standard for research in our community. **We would not be able to do this research without Sentinel Apiaries**. Here are some of the ways we have begun using the four years of Sentinel Data we have collected:

1. Investigation of inter-apiary *Varroa* transmission. Sentinel data revealed rapid increases in *Varroa* populations that cannot be explained by normal mite reproduction, indicating a possible outside source of

Map of 2018 Sentinel Apiary Locations. Colors indicate different climate zones as designated by NOAA.

Author Kelly Kulhanek holding a sample from the UMD Sentinel Apiary at Beltsville, MD.

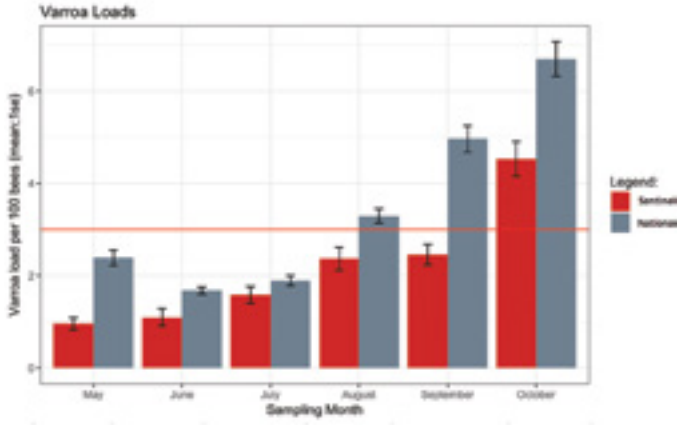
Preliminary results of experiments on inter-apiary mite transmission. Red arrows indicate distance and direction traveled by bees from crashing colonies, potentially bringing mites to new apiaries.

mites. **This has led us to begin investigating the extent to which *Varroa* from highly infested/crashing colonies spread to nearby apiaries across the landscape.**

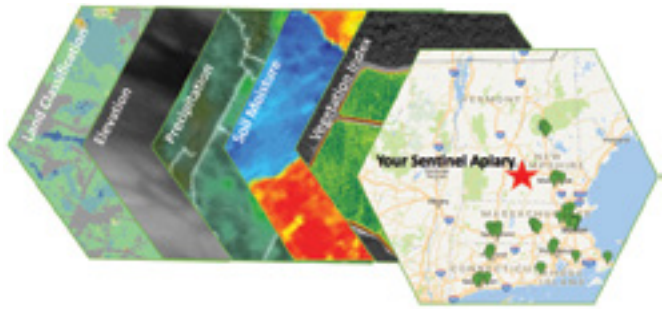
2. Correlation of internal physical symptoms to mortality using historical Sentinel samples. We save ~10% of all Sentinel samples as a historical record, and recently a PhD student in our lab, Anthony Nearman, has made exciting headway in correlating internal abnormalities (such a sting gland swelling, see image) in these bees to colony mortality. **This could pave the way for a new method of colony sampling to better predict mortality.**
3. Collaboration with NASA-DEVELOP to investigate landscape effects on Sentinel colony health using NASA-Earth satellite imagery. This summer we had the amazing opportunity to work with NASA to develop a tool which can intake information about your Sentinel Apiary and show us a variety of landscape factors around it such as precipitation, soil moisture, and land cover. **This will allow us to make correlations between the landscape, colony health, and how the effectiveness of management practices varies across**

Beekeeper Testimonies:

"It was very valuable for our beekeeper association



2018 Sentinel Participants (red) compared to the historical national average (gray) monthly mite loads.



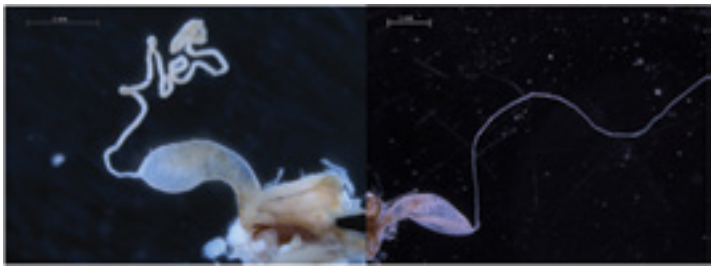
Example of what the NASA-Developed tool will look like: allowing us to determine a radius around Sentinel Apiaries to look at surrounding landscape factors.

to participate in the Sentinel Apiary Program. We learned how quickly *Varroa* mite numbers can increase in late summer and into fall, and how important it is for the beekeeper to monitor for *Varroa* both before and after treatment. "Before" because we want to know the number of mites per colony to see if we are at or close to the threshold for treatment and "After treatment" because we need to know if the treatments have been effective". – *Lindsay, Maryland*

"Participating in the Sentinel Apiary Program has brought a discipline to our practice of beekeeping for monitoring *Varroa* infestation not only in a single hive, but the whole apiary. We have learned if we treat a couple of hives in the apiary, we need to treat them all to have any sizable impact on *Varroa* due to drifting or robbing. Our apiary participating in the Sentinel Apiary Program is a teaching apiary and the sampling program has been a very effective teaching tool in developing better beekeepers." – *Scott, Missouri*

How to join:

We are accepting new and existing participants for 2019! Please visit our website at beeinformed.org/sentinel to fill out an application form and submit payment. Pricing is at cost (we do not profit off this program) at $275 for four colonies and $499 for eight colonies. Email the program director Dan Reynolds at **danrbrl@umd.edu** with questions. BC



Comparison of a swollen sting gland (left) to a healthy sting gland (right). Internal symptoms like these seem to be good predictors of colony mortality.

I Consider On Time To Be When I Get There.

The Risky Business Of Pesticides

There Are Consequences Of Pesticides That Stand Beyond Fence Lines

Jonathan **Lundgren**

It is easy for a farmer to justify applying a pesticide to their field. "Margins are thin, and pesticides are too cheap not to apply." "The guy down the road lost an entire field last year to armyworms." "The co-op will put it on for me, so that I don't have to worry about it." "Just put some insecticide in the tank when you spray the fungicide; it will be an insurance against anything bad happening."

The first problem with this is that there is no perceived consequence for using agrichemicals. If farmers (or beekeepers or homeowners, etc.) can purchase a product, and it has all of its safety information on the side of the jug, then it is generally assumed somebody is watching and the chemical is safe. Safe both for the environment and humans.

The second problem is scale. Outcomes of decisions made on individual farms spillover to neighbors, begin to aggregate and swell across landscapes and regions as farming communities unify in their decision to apply an agrichemical, be it fertilizer, insecticide, herbicide, fungicide, etc. The amplification of these decisions substantially heightens the degree of risk posed by an agrichemical.

The unforeseen risk of pesticides

I started my career as a graduate student working on risk assessment of genetically modified Bt corn. This was a new technology that changed how we managed pests. A gene from an insect disease called *Bacillus thuringiensis* (Bt) is inserted into corn plants, defending it from key pests like European corn borer and corn rootworm. It was my PhD dissertation to assess the risk of beetle-specific Bt corn events against beneficial beetles; predatory lady beetles, specifically.

Try as we might, we really struggled to find an adverse effect of one type of commercial Bt corn on my lady beetles. And we published that there were no adverse effects of Bt corn on lady beetles.

However, since Bt corn was first commercialized, insect populations and diversity have plummeted in many places on earth, while insecticide use continues to rise in North America. Farmer profitability has diminished. And pollution continues to rise.

Thus, I would argue that the real environmental risk posed by Bt corn was never its toxicology (although GM crop varieties may have some physiological changes that make them different from conventional varieties). Instead, the biggest risk posed by Bt corn is that it changed agriculture in ways that supported the simplification of landscapes. Allowing farmers to grow corn year after year (pests normally helped to drive crop rotation). The implications of this simplification for biodiversity loss and the resilience of farms is now pretty evident.

But how could we have predicted this risk and evaluated it prior to the release of this technology?

Risk assessment is completely constrained by a very narrow set of questions. So a product can be deemed safe until we ask the right question or the technology is available to actually perceive the risk that is posed. Often times, the risk posed isn't fully understood for decades after it is released into the environment (e.g., DDT was deemed safe by the best technologies of the day).

Context matters for risk assessment

The scale of an environmental exposure affects the degree of risk that is posed. It is easy for a farmer to think that the decisions on their farm are siloed. That the consequences of decisions made on a farm are somehow contained. But when decisions made over a watershed or region are examined in aggregate, it is easy to see how our food production system can influence bigger things like climate change, or society-wide human health issues, or pollutants in the Ogallala aquifer or the Gulf of Mexico.

Risk assessments are usually made based on data generated in a petri dish. But when an organism is in the real-world, the risk scenario changes substantially. There are all kinds of other stressors an organism faces in the environment that affect its susceptibility to a pesticide. First of all, organisms are never exposed to just the active toxic ingredient (a.i.). The a.i. is always combined

in a formulation, which changes its' toxicity. But toxicity assays are almost always done on the a.i. alone. In the field, a honey bee might be hungry, or too hot or cold, or it may have just been nailed by a fungicide, or exhausted from flying for miles. Data generated in the laboratory are frequently an inapt representation of field populations of an organism.

Science on risk can be manipulated

Some pesticide companies do not play fair, and there is a strong motivation for them to preserve their technologies. When you consider the sheer acreage that corn represents, the potential profits that are generated are staggering. For general purposes, let's assume that a genetically modified bag of corn is $100 more than a conventional hybrid (this is probably an underestimate), and it takes 1 bag of corn to plant two acres. 92% of corn acres were genetically modified in 2018, and we planted 89 million acres. That means that revenues from genetically modified corn seeds could conservatively be estimated at around $4.1 billion annually, just for corn. Neonicotinoid seed treatments were initially assessed as $10 per acre for corn; this accumulates $410 million dollars revenues annually from corn, since nearly all of the nation's acres of this crop are treated with this insecticide (unnecessarily, in almost all cases).

So how would a company influence the dialogue regarding pesticide science?

There is no such thing as a perfect research study, and when a study comes out that provides inconvenient data regarding a product or agenda, then it isn't hard to discredit a study by pointing out its deficiencies.

If there are problems with every study, then how is science useful for decision making? Decision makers rely on a preponderance of evidence; repeating a study multiple times, and looking at the resulting pattern in the data. But science is for sale, and the discussion can be influenced when companies fund research that suggest that alternative explanations may be causing the problems actually resulting from pesticide exposures.

Finally, the scientific dialogue is controlled when scientists that persist in conducting research on controversial topics are publicly destroyed for any of a number of reasons. There is no incentive for conducting controversial research; scientists get paid the same whether they count lady beetle spots or investigate risks of pesticides. But they and many they care about may keep their job longer if they focus on something safe, like counting the lady beetle spots.

With the stakes as high as they are, the relative investment in preserving the life of a product for even one more year is often incentivized and justifiable to a company. For example, a $2 million center that points out all of the ways apart from pesticides that bees are dying is a small investment for a company generating these sorts of profits. Or annual gifts of $20,000 to key scientists at universities across the country as a good will gesture or to generate data that distorts the discussion on agrichemicals is a good business decision.

The final word

When I began my career, I foolishly believed that we could predict the risk of pesticides. After conducting risk assessments for 20 years, I can attest to two truths. First, we cannot predict the environmental effects of a pesticide in complex natural systems. And second, nobody is watching the safety of agrichemicals. I am not saying that we should ban pesticides. But I encourage farmers to recognize there are consequences of pesticides that extend beyond the fence lines of their farms and we cannot see all ends in a risk assessment scenario. Respect these chemicals, and only use them as a last resort. It is an expense, after all. BC

Dr. Jonathan Lundgren, Director of the Ecdysis Foundation (a 501.c.3), Owner of Blue Dasher Farm, Estelline, SD; ***Jgl.entomology@gmail.com***

Hands On Pollinator Health

The Honey Bee Health Coalition and The Ent Society Explore

In August 2018, the Honey Bee Health Coalition (Coalition) and the Entomological Society of America's Plant-Insect Ecosystems (ESA P-IE) Section co-hosted a three-day field tour in North Dakota to showcase the Bee Integrated Demonstration Project and its partners along with other collaborative efforts to study, develop, and promote solutions impacting pollinator health.

This Summer's tour called "Collaborative Approaches for Pollinator Protection and Productive Agriculture," was built on the success of a 2017 pollinator-focused field tour organized by ESA P-IE. This year's tour brought together roughly 50 people from 16 states and Canada. Participants included beekeepers, farmers, researchers, apiculturists, regulators, students, and representatives of beekeeping and commodity crop associations, chemical agriculture corporations, seed companies, conversation nonprofits, research agencies, and universities.

North Dakota was chosen because it is the top honey-producing state and the epicenter of the beekeeping industry in the summer. Plus, 90 percent of the state's land is used for agriculture, mostly in the form of commodity crops.

The tour began in Bismarck on August 13 with presentations from state agriculture officials about the commodity crop and beekeeping industries in North Dakota.

State apiary inspector Samantha Brunner spoke about resources as suitable honey bee forage in the state has halved in the last 20 years while the number of honey bee colonies has more than doubled and continues to rise. This has negatively impacted both honey bee and native pollinator populations. Brunner also shared an online map that allows pesticide applicators to input when they plan to spray and automatically notifies nearby registered beekeepers. While some sprays have proceeded unchanged, she said, the tool has made it easier for conscientious applicators to coordinate with beekeepers.

"Those doors of communication have been blown wide open," she said.

Also that evening, North Dakota State University (NDSU) professor and extension entomologist Janet Knodel presented on insect pests in North Dakota crops.

Over the next two days, participants visited a U.S. Geological Survey research center, explored **Bee and Butterfly Habitat Fund** forage plantings, heard about how the **Bee Informed Partnership** helps beekeepers use the Coalition's Tools for Varroa Management Guide, learned about the **North Dakota Pollinator Plan**, and toured a commercial honey processing plant. The tour's final stop was a research site shared by NDSU and USDA Agricultural Research Service scientists who investigate sunflower pollination and other managed and wild bees.

The tour highlighted the Coalition's **Bee Integrated Demonstration Project**, which pairs farmers and beekeepers, helps them implement best practices, and encourages them to communicate and coordinate efforts to promote pollinator health. Many of the Coalition-member organizations on the tour have helped implement or fund the Bee Integrated Demonstration Project since its start in the Spring of 2017. Several tour stops featured the project's partners and practices, including those related to forage, *Varroa* mite control, crop protection, and beekeeper-farmer collaboration.

Tour participants visited two farms where the landowner had set aside area to plant forage designed specifically for honey bees, monarch butterflies, and other pollinators; the forage also provides benefits to a broader range of wildlife species. In each case, landowner and the beekeeper using the land also had increased their communication and gained a better understanding of their challenges and shared goals.

One of those sites participates in the Bee Integrated Demonstration Project. Landowner Harold Schulz, who partnered with beekeeper Randy Verhoek for the project, said he grew up in the 1930s and 40s on the farm he showed participants.

"I didn't realize what kind of trouble the bees were in," he said. He was happy to help the bees and thrilled that other animals, including white tail deer and pheasants,

have also been using the 10 acres of pollinator habitat he planted on his 220-acre property. He plans to maintain the pollinator acreage indefinitely.

One participant captured the group sentiment around seeing the Bee Integrated Demonstration Project in action when he said the Schulz Farm stop was a culminating experience and that now the goal was to build interest in the project's ideas and replicate its success.

On the tour's final day, commercial beekeeper Zac Browning praised the efforts of the landowner and the farmer who had maintained pollinator forage around his apiary.

"They've recognized that this here was not the best farmland, but it has the potential to be terrific land for bees and pollinators and even for water and soil health," Browning said.

He added that communication has helped farmers and beekeepers find common ground and work toward solutions.

"They're trying to protect their livelihood, and we're trying to protect ours, and, in situations like that, communication is all we have. When there's relationships then we've got a fighting chance," he said.

Most participants traveled roughly 250 miles together on a bus and were able to network and share insights between Bismarck and Fargo.

In surveys after the tour, participants wrote they were happy with how much they gained. Knodel said, "I really enjoyed meeting everyone and hearing about their pollinator efforts in other areas." Another participant wrote, "I was encouraged to see the landscape stewardship practices being used to improve pollinator health as a response to declining pollinator numbers in recent years." University of Utah entomology graduate student Tien Lindsay said, "My most valuable take away was it is not about one versus the other. More can be done if we take the time to collaborate and understand."

Another participant, Chad Boeckman, a research scientist at Corteva Agriscience, wrote, "I was struck by the factors that ultimately drive landowners to take action, despite those landowners having a great respect and appreciation for conservation." He said he would love for tour participants, as well as partner organizations working on pollinator health, to explore these factors (summarized in key takeaways, below) in more depth and find ways to make it easier for landowners to take action that benefits pollinators.

Several themes and key takeaways emerged from the tour:

- **The value of habitat** Participants noted the impact of seeing and hearing about pollinator habitat loss as well as seeing examples of pollinator forage and habitat in the field. Speakers emphasized dramatic landscape changes over the last 20 to 30 years that have reduced forage for pollinators through changes in agricultural and other land use. Participants also experienced firsthand various examples of pollinator forage and habitat in the field, observing the variety of flowering plants visited by managed and native bees as well as examples of various forage management strategies.
- **Farmer motivations to plant habitat** The tour highlighted that personal outreach, an interest in wildlife and/or pollinator conservation, opportunities to use marginal farmland for other purposes, and access to seed and technical assistance all help contribute to landowners' interest in and ability to plant habitat. Tour participants were interested in further exploring these and other factors that attract landowners to habitat and pollinator forage programs and make it easier for landowners to participate.
- **Commercial beekeeping challenges** Speakers and tour participants highlighted challenges facing commercial beekeepers including: Reduced habitat and forage; Increased resource competition as beekeepers have concentrated in geographic areas, especially in North Dakota; Increased difficulties managing and treating varroa mite infestations; Increased economic pressure to provide pollination services that involve stressors such as long-distance travel and exposure to other colonies, which increases the risk of the spread of pests and diseases.
- **Collaboration** Participants were thrilled to physically see the results of long-term partnerships and emphasized the need to encourage and incentivize farmer-beekeeper communication and coordination, continue to grow and develop relationships and partnerships, promote collaborative models and replicate their successes, and find more opportunities to close gaps between people and organizations working on different aspects of the same pollinator health issues.
- **Inspiration** The tour was a source of hope and positivity for many. Participants said they were inspired and uplifted by the positive impacts of collaboration and communication; interest in honey bees and healthy productive ecosystems; practices intended to help pollinators that also benefit water and soil quality, ecosystem diversity, and other environmental goals; and land stewardship and care for bees, plants, and wildlife.
- **Understanding** Participants said experiential learning helped increase their knowledge and understanding of the impact of agriculture, beekeeping, and environmental stewardship practices in North Dakota on the rest of the country and the world; innovations and ground-breaking efforts in North Dakota; research implications for practical and industrial applications; changing land uses and habitat impacts; and incentives and barriers to change practices for farmers, landowners and beekeepers.

About the Field Tour Hosts

Among four sections within the **Entomological**

Society of America, the **Plant-Insect Ecosystems (P-IE)** section is the largest, constituting roughly 39 percent of ESA members, and includes entomologists working on crop protection, host plant resistance, plant pathology and vectors, biological control, and pollinators. The P-IE section established a Pollinator Initiative in 2015 with the goal of providing technical educational materials to members and to leverage this knowledge to the public, media, policymakers, and other key stakeholders. The ultimate goal is for P-IE to become a lead national expert organization for the dissemination of such knowledge by the end of the decade. To help achieve this goal, the P-IE section sponsored a 2017 field tour in Mississippi about pollinator health and integrated pest management, and the 2018 field tour builds on the previous tour's success.

The Honey Bee Health Coalition is facilitated by Keystone Policy Center and brings together beekeepers, growers, researchers, government agencies, agribusinesses, conservation groups, manufacturers and brands, and other key partners to improve the health of honey bees and other pollinators. Its mission is to collaboratively implement solutions that will help to achieve a healthy population of honey bees while also supporting healthy populations of native and managed pollinators in the context of productive agricultural systems and thriving ecosystems. The Coalition is focusing on accelerating collective impact to improve honey bee health in four key areas: forage and nutrition, hive management, crop pest management, and communications, outreach, and education. BC

COLOSS

Takes On The Small Hive Beetle

Malcolm **Sanford**

The new lab wasted little time getting on the world's honey bee research and extension stage via an invitation extended to the Small Hive Beetle Task Force of what is known as COLOSS (prevention of honey bee COlony LOSSes, **www.coloss.org**),. This was the first time an international event of this nature would be held in the U.S.A.

A unique international association, COLOSS is a non-profit entity governed by the present statutes and, secondarily, by Articles 60 et seq. of the Swiss Civil Code. It is politically neutral and non-denominational. Originally a European Union initiative, it has now severed most of those ties and become an independent entity in its own right. The Association aims to improve the well-being of bees (in particular the western honey bee *Apis mellifera*) at a global level by advocating for honey bees through various governmental legislators and administrators. It helps coordinate international research efforts and disseminates knowledge and training related to apiculture, and in the process promotes youth development and gender balance among those studying, or actively involved in promoting, honey bee health.

Based in Berne, Switzerland, COLOSS is composed of scientific professionals (e.g. researchers, veterinarians, extension agents, etc.) and students that are actively involved in researching honey bees and their culture. Members may be from any geographic region. Requests to become affiliated can be addressed to the **Executive Committee**. The Association's resources come from membership fees, grants and donations, and earnings from workshops, conferences and **other events**.

Currently COLOSS has 1200 members from 95 countries and a growing list of special task forces, which include *Varroa* mite control, honey bee toxicology, bee breeding, and pollen diversity in bee nutrition, among others. Two of the most recent concerns are the Asian hornet

(***Vespa velutina***) recently found in Europe, and now, the subject of this workshop, the small hive beetle (***Aethina tumida***) now detected in Italy.

COLOSS has a number of projects in the mill, but it's most significant is publishing what is called the BEEBOOK, a unique venture that aims to standardize research methods. This practical manual has compiled close to 1700 standard methods in fields of honey bee research and seeks to be the definitive, still-evolving, how-to-do-honey-bee-research document. Presently BEEBOOK is composed of three volumes, which consist of 31 peer-reviewed chapters, authored by 234 of the world's leading honey bee experts, representing 34 different countries.

This three-day small hive beetle workshop featured a jam-packed program, including lectures, demonstrations, training sessions, small-group brain storming and a Skype session from Italy. Finally, there was time for some intensive socializing to compare notes and the meeting was topped off by a visit to one of the premier beekeeping supply houses in the central part of the state.

The program was headlined by Amanda Hodges of the University of Florida Entomology and Nematology Department, who heads the University of Florida, Biosecurity Research and Extension Laboratory. She has authored and co-authored over 100 extension publications related to arthropod diagnostics and invasive species.

According to Dr. Hodges, the scale of introduced arthropods in Florida is extensive, with something like 2.5 species per month being detected in the state. A major port of entry is the Miami area with its great number of shipping arrivals and an international airport. A major risk at the moment is related to imported cut flowers. Exacerbating this process are the effects of climate change in Florida and something called "propagule pressure," which is quite high in the **Sunshine State**. This can be boiled down to "bugs like it hot."

Dr. Hodges stated that in spite of a number of introductions that have caused concern, there are recent examples of biological control that are working, including potential breeding for tolerance to **soybean rust** and

Certain paper towels on the top bars actively entrap beetles.

introduction of insects that feed on a plant called "**Florida's Kudzu**," the **introduced air potato**. The best defense she concludes is early detection and going for eradication at the beginning of an outbreak rather than later. These strategies are easier said than done, and presently neither of these are practical for small hive beetle in Florida.

The history of small hive beetle in Europe appears to center around recent introduction into Italy at the present time, where surveillance is continuing. Peter Neumann, President of the Association, took a look at early detection. The beetle has now been found on all continents so this has not worked well in most affected areas. Several problems have surfaced including failure to reimburse beekeepers in Italy and elsewhere for losses due to attempts at eradication, identification issues (false negatives), and breakdown in communication between beekeepers and regulators.

Discussion revealed that

Here the "shake and bake," deposits all bees onto a counting board, separating them from beetles.

A Day Without Sunshine Is Like, Well, Night!

beekeepers and researchers quickly move on to controlling the beetle when it becomes apparent that early detection has failed. Trapping continues both for detection and treatment. The best trap is a live beehive. Other in-hive traps are potentially valuable and several are found on the market. Soil treatment using **permethrin** is gaining some proponents (Guard Star® is one permitted use), as is keeping bees out of the shade, where beetles appear to be more prevalent and active. Finally deploying Brawny Dine-A-Max paper towels®, which entangle beetles is also used as a control measure by some beekeepers.

There continues to be no good threshold data (number of beetles causing significant harm) consistent with damage to a honey bee colony, an important consideration for those looking to use integrated controls. Correlation with colony collapse disorder (**CCD**) is also unknown. Sampling to determine populations of beetles in colonies is not definitive without heroic measures used in research colonies as demonstrated at the meeting. There's also no answer to determine what initiates egg-laying by female beetles or what bee or beetle demographics affect populations.

In-hive treatment with a chemical called **fipronil** is now a widespread "off label" use, especially in the U.S. Because it can kill bees and potentially contaminate hive products, honey bees must not be allowed to contact the material, which is often deployed in CD ROM cases that only the beetles can fit into. Screened bottom boards are also in use, but their effectiveness has not been determined. It was emphasized that there is no labeled chemical control for small hive beetle.

So far, perhaps the best control method is a strong bee hive, with a high bee to comb ratio. Small mating nuclei are especially vulnerable. In conclusion, the amount of still unknown information about small hive beetle biology, as well as detection and potential control means that a huge research effort is needed, a major goal tailor-made for the task force to tackle.

There are areas of the world where small hive beetle is not problematic. These include its native South Africa and other places inhabited by tolerant honey bees.

Dr. David de Jong of the University of São Paolo at Ribeirão Preto Brazil provided a discussion of the beetle in Mexico (Coahulia 2007) and (Yucatan 2012) where there are few problems at the moment, presumably due to being populated with Africanized honey bees. The dry soil conditions found in those areas may also be responsible for minimal beetle larval development. Now found in both São Paulo and Rio de Janeiro states, few Brazilian beekeepers report problems with the beetle, basically reiterating the idea that the Africanized honey bee is not affected to any degree in those regions. There are no reports that the stingless bee population in Brazil is affected.

Several areas of ongoing research were revealed at the meeting. Audrey Sheridan of Mississippi State University is looking at sex pheromones and other chemical or possibly physical attraction **in beetles**. The males emerge first after pupation; females might produce a sex attractant. If so, can it be characterized? There could in fact be none, and some other way of attracting males to females is employed. Possible triggers might include using antennae in yet unknown ways and/or use of an alternative pheromone, such as honey bee "footprint" substance. Homosexual activity may be involved (or not) and why is there no egg-laying observed in Winter? This is a tropical insect, which might provide part of an answer to that query.

Charles Stuhl of the U.S. Department of Agriculture (ARS) laboratory on the University of Florida campus provided an update on producing a bait that might attract and kill beetles manufactured from a yeast that is associated with the beetle. This research has been going on for a time under direction of the late Peter Teal, who has a room named after him in the new laboratory. It looks like significant progress might well be announced soon. Apparently a manufacturer for the bait is being sought.

Karsten Stief, Veterinaeramt Heidenheim, Felsenst., Germany is designing a larval trap. Because larvae have to leave the colony to pupate, this is one area where they are vulnerable. In some honey houses, larvae that leave filled supers are attracted to light on a concrete floor and can then be shoveled into water where they drown. The experimental trap is testing just how mobile larvae can be. Questions persist about how they climb out of their own "slime." Is it possible to perhaps even eradicate the beetle via an efficient larval trap?

A Skype call from Giovanni Formato, a veterinarian in the Istituto Zooprofilattico Sperimentale del Lazio e Toscana · Apiculture Unit, discussed a number of diagnostic tools being used for small hive beetle. These include expanded beehive inspections, but they are hampered by inclement weather, which is time consuming, and suffer from lack of collaboration between beekeepers and authorities.

Other areas of research include evaluating inside-the-hive traps mentioned before, and seeing what can be done via soil treatments (fungi that are plant extracts). The latter can be manufactured from materials that are already registered for use in organic agriculture. Nematodes are also not being ruled out.

With the preliminaries out of the way, the meeting turned to a listing of specific projects that the task force could take on. An annotated bibliography was suggested along with a listing of current regulations already in force in specific geographic regions. The latter idea resulted from experiences where uninformed bureaucrats made decisions based on incorrect or outdated information. Others included a standardized rearing procedure and genetic testing protocol, perhaps needed to see what variants of the beetle exist around the world. Finally a comprehensive review article is needed, something the COLOSS group is adept at **producing**.

The final minutes of the meeting

showed the final tasks selected:

TASK A: Ring test for molecular diagnostic tool(s): Need a standardized diagnostics procedure for small hive beetle.

Questions to be looked at: (1) how to get a good DNA sample from colonies (bees, debris, from flowers, from other bees; what matrix is best to sample? how sensitive is the test?), (2) test a variety of molecular markers, (3) test a variety of beetle sources, (4) make sure test is robust enough to limit false positives/negatives (by including other *Aethina* species). An **Elisa test** or **LAMP** may currently be in progress?

TASK B: Tools for Small Hive Beetle Management

Much like that produced by the Honey Bee Health Coalition for *Varroa*, small hive beetle information needs to be consolidated into a single source.

Questions to be looked at: (1) What is alarming and what is not (i.e. what is "normal" or acceptable when beetles are present?) (2) What options (in and outside hives, i.e. honey houses) exist for control measures? (3) What basic beetle biology life cycle steps are not known?

It was noted that sources for small hive beetle information already exists. Present at the meeting was Michael Hood, Professor Emeritus at Clemson University whose book: *The Small Hive Beetle, Aethina tumida Murray* was published by Northern Bee Books in **2017**. His Top Twenty Small Hive Beetle Management Recommendations presumably would be a basis for many of the tools eventually developed.

TASK C: Determine in-hive trap efficacy

Need a list of available traps and their relative effectiveness.

Questions to be looked at: (1) Which traps to test?, what standardized protocol(s?), various attractants, what killing agents to use? (2) How traps can be used for diagnostic purposes and for management purposes?

TASK D: Review article listing predictive markers for colony collapse due to beetles

Need definitive answers as to how small hive beetle and Colony Collapse Disorder (CCD) might be related.

Questions to be looked at: (1) Are there potential triggers/predictive markers for Colony Collapse Disorder? (2) What predisposes a colony to host beetles (i.e. what attracts them to colonies vs apiaries)? and (3) What predisposes colonies to collapse?

In addition to the tasks above, the following organizational actions are or will be put into play:

1. Develop an annotated bibliography (Endnote, Google Drive, **Zotero**, Password Protected. (Completed Oct 10th 2018)

2. Develop a picture database of small hive beetle (see COLOSS website, **bugwood**, (others can link their albums **here**)

Update the COLOSS webpage with appropriate details.

The final day of the meeting as the hurricane began devastating Florida's panhandle, was given over to a visit to D&J Apiary near Umatilla, **Florida**. The trip and site visited was far away enough from the storm not to be affected.

Umatilla has long been a focal point for beekeeping in Florida based on the extensive citrus plantings in the area. Devastating freezes in the late 1980s took out most of the orchards and much of the citrus industry abandoned the area, moving south of Orlando. D&J continues its over 30 years of service to beekeepers in the region and state. and puts on a number of classes for the beekeeping public.

The Small Hive Beetle Task Force meeting sported over twenty participants from as far away as Nigeria. There are approximately 70 members in total contributing to its mission.

Fortunately, the program now has a willing ally in Florida with considerable resources at its disposal, the brand new honey bee laboratory. Everyone is invited to visit.

The next Small Hive Beetle Task Force meeting is scheduled for 9 and 10 October, 2019 in Lamezia Terme, Italy. There will also be discussions at the next annual COLOSS meeting, to be held next September in Montreal as part of Apimondia 46. BC

I did not see that one coming . . .

One Tew Bee, LLC

The Colony That Would Not Die

"I can hear you!"

Many years ago, I had what was to be a *"typical surgical procedure."* It went seriously wrong, and it would appear that I had a (very) close call. No problem for me. I slept through the entire event. But…when I awoke, the pain and discomfort level immediately let me know that things were not right. From my darkened room in the intensive care wing, I could hear a low, muted conversation between my surgeon and my neighbor who is a gastroenterologist. My surgeon was saying, *"Many unexpected things went wrong in his procedure that made the process complicated."* He continued the conversation by quietly saying, *"This is one that I will never forget!"* All the while, I was trying to say, *"I can hear you! I can hear you!"*

Like my surgical experience, this colony is one that "I will never forget."

One memorable colony sent a mouse up my pantleg. I will never forget that colony. Another colony – while face-to-face with a four-year old, veil-protected, little girl, sent an angry bee up my right nostril. The kid was not impressed. I will never forget that colony. Yet another colony was literally lost for nearly thirty years, and when found, was alive and in good health. I will never forget that one either. Of all the thousands of colonies that have been a part of my bee life, I only truly remember a specific few. I recently added another bee colony to my life's unforgettable bee colony list.

I didn't see this colony memory coming

During the Spring of 2017, I had a beautiful swarm move into empty equipment that I had stacked in my apiary. I was there and savored the moment. Free bees! This swarm had probably left another beekeeper's hive and had decided to move to my facility. All was good. I made photos. It was a powerful swarm and quickly developed into a juggernaut. It was feisty, but it was powerful. No surprises there. I made a split. All was successful. All was enjoyable – except bees from the colony seemed to be stinging a bit much. As the colony grew, the number of stings grew. At full strength, this beautiful colony had developed a very annoying stinging personality. It was hostile all the time. It seemed to be keeping the other colonies upset. Alternatively, maybe other colonies were keeping the big colony agitated. There were so many flying bees, it was difficult to tell.

Then it happened. Bees from the powerful, rogue colony attacked my neighbor as he mowed his lawn. (at least I thought it was the big, beautiful colony doing the deed) That was the limit. I had to do something. It had to go and go quickly. I considered destroying the colony, but I blinked. I was not totally sure that it was the villain hive.

I decided to move the suspect colony to a new location about an hour away. This was a frustrating, time consuming, pile of work. Honestly, I didn't care if the colony died. *(I know, I know – requeen, etc. I had many reasons for my decision not to requeen that I discussed in Bee Culture, June, 2017.[1])* Once it was relocated, life in my apiary returned to normal. I chose the right colony as the troublemaker. Out-of-sight, out-of-mind. I ignored the troublesome colony that sat alone 40 miles from me.

The bear attack

During June, 2018, *(I wrote about this event in: Bee Culture, August, 2018.[2])* a bear totally destroyed my beautiful, abandoned, annoyingly, frustrating colony. This was a complete surprise to me and, no doubt, to the bee colony. There had been no bear sightings in this area in nearly 100 years. The hive equipment was scattered and robbed. A stench of dead, decaying matter, and feces pervaded the area. Yet another frustrating task compliments of this *free-swarm* colony.

Of course, it was raining. The area was disgusting

[1] "A Beekeepingly-Unnerving Event" (Near the article end) https://www.beeculture.com/some-beeyard-thoughts-observations-and-updates-2/

[2] "A Beekeepingly-Unnerving Event" (Near the article end) https://www.beeculture.com/some-beeyard-thoughts-observations-and-updates-2/

and soggy wet – but this site was not my property, so I tried to clean up. As I neatened things up and restacked equipment, I thought to myself, *"at least this colony is finally gone."* Honestly, I didn't think it would even survive the 40-mile relocation, but it clearly had. But now it was bear-destroyed and finally out of its misery.

In the cool, rainy weather, as I restacked scattered equipment – without warning – I moved an upturned deep only to expose about one-two pounds of the maddest bees I have recently encountered. I was not wearing protective gear – why? The bees were most certainly dead – none needed. Well they were most certainly not dead and protective gear was quickly needed.

It was late June. All major flows were long over. I could kill this colony now or just let it die a (somewhat) natural death. Since, at the moment, I had no ready way to destroy it, I just left it to deal with its own fate. On June 27, 2018, I essentially abandoned the colony – again. Once more, Out-of-sight, out -of-mind.

Your bees are alive . . .

My good friend, Bob, a beekeeper himself and also the land owner, gave me a surprise phone call in mid-September, 2018, to tell me that the rogue, un-killable hive was ***still*** living. *Good grief! What is it with this colony??* I had no idea the colony even had a queen, but I did know that the colony had very little – if any – food stores. They might very well be alive now, but this unit would become a winter kill statistic next spring. Even so, I opted to make the 80-mile round trip to put some stores on a colony that didn't have a future. Truly, I had good intentions. Then, Thanksgiving, family visits, leaves falling, home chores, and home bees – you know the drill – out-of-sight, etc. They never got supplemental feed.

Some cold weather hit early – and it hit hard

Several cold spells came early and were significant. Temperatures dropped to the mid-teens at a time when my lawn still needed mowing. I would occasionally think of the colony, oh so far away, and accept the fact that this colony with such an annoying personality was finally dead. For the first time, I had a guilt pang. This was a continuingly, frustrating colony that had caused extraordinary amounts of work, effort, and pain – but, the colony had never quit trying to survive. I should have found time to go down there. Wow, guilt has a bitter taste. But alas, bees without stores could not survive this.

Your bees are (still) alive . . .

After all this saga . . . after all this colony had endured, on December 6, 2018, another phone call from Bob told me that colony was still alive. Okay, this is truly strange. The bee cluster simply had to be hanging onto the very edge of life. It simply had to be. I conjectured there could be no food stores. Except for a spotty fall flow, there was nothing. Nothing! I, too, then became alive. This bee cluster deserved a better beekeeper.

The absolute best I could do was make the trip two days later. I felt certain that the colony would die within those two days. Like a movie with a sad ending, this colony would go through all of this turmoil and then die just as the supply truck was en route. Maybe for the first time, I worried for this stingy colony. Two days later, with a full deep super, Bob and I loaded up for the ride.

It was cold, rainy, and muddy at the site

Every time I have interacted with this beehive, it has been rainy, ugly and sometimes, painful. Why would I expect any difference?

It was cold, far below clustering temperature. Even so, having some clear, painful memories of being whimsical with this beehive and having been suitably admonished for that oversight, I gently removed the outer cover. I noted a good sign on the outer cover. here was a bare spot right in the lid's center that was free of snow.

That meant that the colony had, at least, been alive within the past few days. I cautiously cracked the inner cover and exposed – what??

A hivetop "snow hole." The colony is presently alive – most likely.

You know it was alive

You know it was alive or I would not have written this article. What you did not know is that the colony was not only alive, but alive *and well*. I kid you not. I kid you not. Counting this piece, I have three published articles about this colony – all its trials and tests – and it not only survived but looked good. In fact, not only did it look good, it looked very good. I have been fiddling with bees and their biology for forty-five years, and I predicted that this colony would be dead on multiple occasions. Other than to be left alone, this colony needed nothing from me.

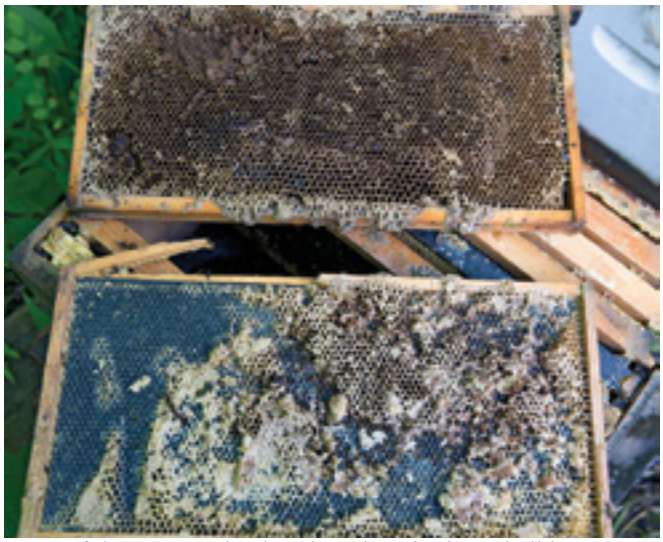
The cluster was centered. There was honey in frames on all sides. The cluster was compact and clean. There were no indications of dysentery or dead bees on top bars. The landing board was clear. There were no dead bees near the hive front. I hefted the hive from the back and discovered the hive had good weight, not dead weight, but certainly heavy weight. Without breaking the cluster, this bee colony appeared to be perfect.

How in the bee world could this colony have recovered from nothing in June to this extent in December?

The mystery nectar/pollen flow . . .

I have said many times in several articles that I try to first select the simplest of the possible answers to a given problem or question[3]. I also like the old adage, *"If you hear hoofbeats, think horses, not Zebras."* If I follow that advice, the answer is simple – the mystery flow came from common autumnal species that were in full view. These Fall plants are primarily asters and goldenrod.

[3]Occam's Razor: *The Law of Parsimony*. The problem-solving principle that the simplest solution tends to be the correct one.



Some of the poor combs that the colony had to rebuild.

Know this. Bob and I have had beehives on this spot for approximately 10 years. A flow like this one has never occurred. Yes, yes, I am fully aware that big flows come along occasionally. In fact, if you posed the situation that I have outlined above to me, I would listen intently and then speculate that you had a great flow from traditional plants not particularly known for great flows (in your area).

But you see . . .

During the same couple of months, I was getting correspondence from John H. an Alabama beekeeper whose colonies are 850 miles from this colony. He was observing that a good Fall flow was occurring from Elaeangus species. In fact, there were some blooms bleeding over into December. My *Elaeangus* species here in Northeast Ohio bloom in the Spring through late Spring. My colony was trashed by bears on June 20th or so. For the desperate bees to profit from that flow seems late for a surplus from Autumn Olive *(Elaeagnus umbellate)* that normally blooms in March-April. Did that flow go well into June? That's a stretch, but making nearly a full deep of honey from routine sources from June to December is a stretch, too.

But I do know this . . .

My colony that looked like this June 27, 2018

The hive disheveled and all stores robbed.

This is what the colony looked like on December 7, 2018

The colony re-hived and recovered.

This is what it looked like inside the hive on December 7, 2018

A clean, healthy compact cluster.

It only gets more intriguing . . .

It's clear by now that I don't really know from which plants the pollen and nectar flow came, or the dates that the flow was available to the bees. I thought the colony was dead. It was essentially abandoned. Until this colony does something else, my saga ends at this point. I do plan to put some extra stores on the deserving colony in late January to early February. Again, since I am now un-nerved, maybe I should just leave it to fend for itself. It's done fine so far.

Final thoughts and considerations . . .

1. Did this colony do well, in part, because it was isolated? No robbing. No drifting. No swarming (this season – at least)
2. Did this colony do well because I was not a *"helicopter"* beekeeper. Other than by the bear, the unit was never opened at this new site.
3. In the two years that it has been in my life, this colony has never been treated for mites. Did the complete setback in June disrupt mite biology?
4. Did this colony do well because all its honey stores are

recent and fresh – not the reserve stores that I hold back from the previous season?

5. Was this colony just very lucky. After all, it (apparently??) did not lose its queen. Or did it? Could it have possibly been queenless and that allowed the foragers to store some surplus stores before the demands of brood feeding started.
6. Should I practice more "out-of-sight out-of-mind beekeeping?
7. I don't know. But I do know that this colony should not be alive.
8. I do know that I will not forget this colony – ever.

Please note . . .

For the first time in a while, I have written a bee article that has a happy ending. Cheers for me and the rogue colony. BC

Dr. James E. Tew, Emeritus Faculty, Entomology, The Ohio State University and One Tew Bee, LLC; **tewbee2@gmail.com; http://www.onetew.com; https://youtu.be/R2b-gtyOeV0**

A video chat –
https://youtu.be/R2b-gtyOeV0

All The Buzzz in...

Bee B. Queen Challenge

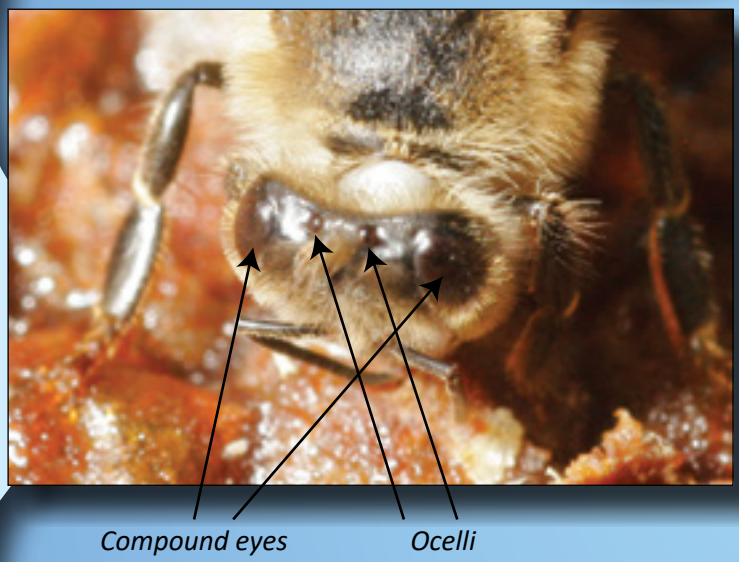
Send me a rebus letter.

Eye Eye Matie

The eyes of a honey bee are completely different than our own eyes. First of all we only have two eyes. Bees have five eyes: two large compound eyes on the side of their head and three simple eyes, called ocelli, on their foreheads. Imagine what you would look like with three more eyes on your forehead!

The compound eyes of a honey bee have thousands of tiny lenses or facets. The facets help the bees see color, movement, and patterns. In other words compound eyes are like thousands of eyes all in one. Scientists believe the images from all the facets are joined in the bee's brain to make one image kind of like a mosaic rather than the clear images that we see. Overall, the compound eyes of a honey bee are not as good as our eyes at seeing fine detail, but they can easily spot color and flowers while moving very fast.

The ocelli have single lenses and use light to help the bee find the way home or to specific flowers. These eyes can also see ultra-violet light.



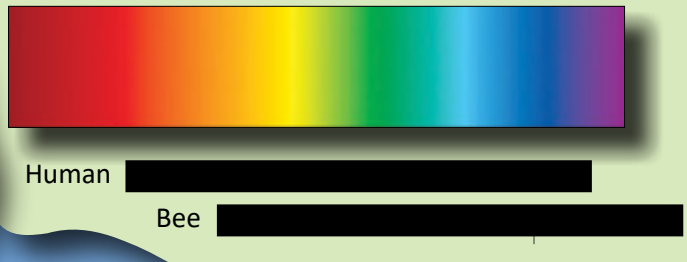
Worker bees have 6,900 facets in each eye, and drones have 8,600 facets.

A Rainbow World

Bees can only recognize six colors: yellow, blue-green, blue, violet, ultraviolet, and a color known as "bee's purple," a mixture of yellow and ultraviolet. Bees cannot see red.

People can see seven colors; red, orange, yellow, green, blue, indigo, violet (otherwise known as ROY-G-BIV).

Infrared Red Orange Yellow Green Blue Purple Ultraviolet



Try This at Home

Bees can see something we cannot. They can recognize colors in the ultraviolet spectrum. Ultraviolet patterns on flower petals help to attract bees to help the flowers with pollination.

Using ultraviolet light we can view the floral "landing strips" that are visible to bees but not to humans. Take a UV flashlight and some flowers into a dark space or create a lightless location outside under a heavy blanket. Shine the UV flashlight on each flower to observe the nectar guides if present.

... Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
February 2019

Bee Buddy

Lily Barcak, age 13, keeps bees along with her mom in Eagle River, Alaska. Together they attend the Midnight Sun Beekeeping Club to learn more about beekeeping. Learning about honey bees as part of her homeschooling education is a hands-on experience. What can be more exciting than to see newly emerged honey bees and developing larvae while learning about the workings of the hive and social insects? Well, extracting honey. Since Lily loves to bake, the honey they harvest comes in handy. Her entire family along with her mom, dad, seven brothers, and three sisters enjoy the creations Lily makes in the kitchen. Here are two of Lily's favorite recipes.

Marshmallows

1. Line a baking sheet with parchment paper and spread **1 tablespoon of arrowroot** evenly over the parchment.

2. Pour into a bowl **½ cup water** and sprinkle **3 Tbsp. unflavored gelatin** over the top. Allow the gelatin to absorb the water for 10 minutes.

3. Combine the remaining **½ cup water** and **1 cup honey** in a saucepan. Bring to boil over medium-high heat and boil for 15 minutes, or until a candy thermometer reads 240°F.

4. Turn a mixer on low, and with it running, slowly pour the hot honey syrup down the side of the bowl. Add **1 tsp. vanilla**, then increase the speed of the mixer to medium-high and beat for 8 to 10 minutes. The mixture will turn from brown to white and triple in volume.

5. Turn the marshmallow crème out onto the prepared baking sheet and smooth it with a spatula. You need to work quickly before the marshmallow starts to set. Allow the crème to cool and set at room temperature for 6 hours.

6. Rub the top of the marshmallows with 1 tablespoon of arrowroot powder. Lightly grease a sharp knife with coconut oil and cut into 24 pieces. If the marshmallows are still sticky, toss the pieces gently in the remaining **1 tablespoon arrowroot** to coat them. Serve immediately. *From Celebrations by Danielle Walker*

Granola

3 cups regular oats
1 cup unsweetened shredded coconut
½ cup sliced almonds
¼ cup wheat germ
¼ cup sunflower kernels
¼ cup plus 2 Tbsp. honey
¼ cup vegetable oil
2 ½ Tbsp. water
2 Tbsp. brown sugar
¾ tsp. vanilla extract
¼ tsp. salt
1 cup raisins

Combine first 5 ingredients in a large bowl. Stir well and set aside. Combine honey and the next 5 ingredients. Pour over honey mixture and stir well. Spread mixture evenly in a lightly greased 15 x 10 inch pan. Bake at 350° for 25 minutes. Cool. Stir in raisins. Store in airtight container in a cool, dry place up to 1 ½ months. *From the Ultimate Southern Living Cookbook*

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)

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

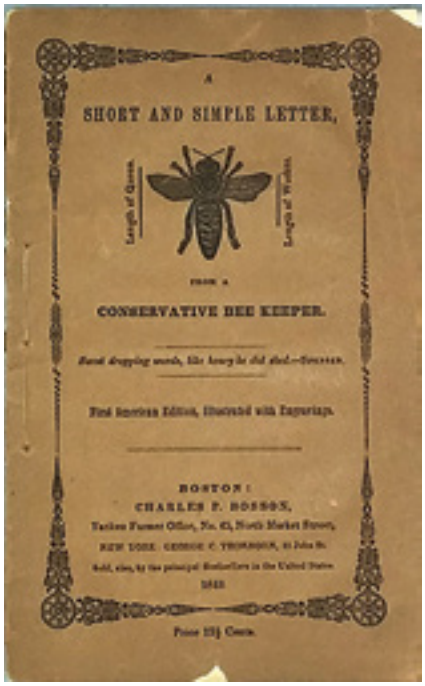
Send all questions, photos and artwork to: beebuddiesclub@gmail.com or mail to the above address.

In The Early Days

Peter **Borst**

Most narratives of the birth of beekeeping in the U.S. start with Langstroth and his invention of the hive with moveable frames. However, beekeeping in the new nation was already well established by 1853, when he published his book, "The Hive and the Honey-Bee." The state of the art was considerably advanced. Philip Mason states in his "American Bee Books," colonial beekeepers had access to current British texts on the subject of practical beekeeping. One of the earliest was a chapter on Bees in the book "The Complete English Farmer," by George Cooke.[1]

The 1830s saw the publication of many periodicals devoted to informing the public of the current state of agriculture in the expanding country. Among these were journals like "The Farmer's Monthly Visitor" from Concord, NH, and "The Monthly Genesee Farmer" of Rochester, NY. I mention these two in particular because in 1838, they reprinted nearly verbatim an article from a British publication called The Suffolk Literary Chronicle.


A
SHORT AND SIMPLE LETTER,
Length of Queen
Length of Workers
FROM A
CONSERVATIVE BEE KEEPER.
BOSTON:
CHARLES P. BOSSON,

William Charles Cotton's short piece was entitled "A Few Hints About Bees," but it crossed the Atlantic and appeared in U.S. magazines within the same year. This illustrates the fact that information about honey bee management was eagerly sought by American beekeepers, and also that such information was very quickly propagated in those days, even before the widespread adoption of the telegraph (first patented in 1837).

What is notable about Cotton's essay is the theme: *the humane treatment of honey bees*. His first principle was "Never kill a bee," which stood in opposition to the standard practice of many centuries which was to kill many of the best colonies to harvest the honey, leaving some of them to survive Winter and cast swarms in Spring, and repopulate the empty hives from which honey had been taken.

The technique which he promoted was to burn pieces of dried out giant puff balls, creating smoke which pacified the bees without killing them, as would the traditionally used fumes of burning sulfur. He says: "I myself was told by a Bee-master that he always saw the ghosts of the Bees the night after he burned them." But he was interested in more than avoiding cruelty, he proposed that beekeepers could get much more honey by not killing the bees. Interestingly, he credits the effect of smoke to making the bees "drunk" and assures us that while drunkenness may be bad for men, it's harmless to bees as they sober up in twenty minutes and have no headache afterwards.

Cotton also recommended moving hives into cold, dark quarters for Winter, stating that they would consume less honey than if left out of doors. Also, that fewer bees would be lost from being tempted out by the bright sun on a cold Winter day, only to be "caught by the cold winds, fall to the ground, and never rise again." Further, he declared the importance of dryness and ventilation to the survival of the bees.

My Bee Book

It is understandable, therefore, that Cotton's work on bees would be among the first to be printed in the U.S., namely "*A Short and Simple Letter, From a Conservative Bee Keeper*" (1841, first American Edition). He developed his work to become "*My Bee Book*," which was published the following year. In it, he includes his "Letter to Cottagers," expanded to about 40 pages, and which he has prefaced with a list of "bee books" running some eight pages and another seven pages of proverbs such as "Every bee's honey is sweet," and "A dead bee maketh no honey." This is followed by several appendices, running hundreds of pages.

The style of beekeeping that W.C. Cotton employed used plain simple boxes, instead of the traditional straw "skep" hives. On this topic, he has much to say.

Now some of you do not fancy wooden boxes, because you say the Bees do not like them. Now I would ask whether wild Bees live in wooden trees or in trusses of straw? Believe me, they choose what is best for them. They choose wood; and wooden boxes, if thick enough, are warmer in Winter, cooler in Summer, freer from insects, and more handy than straw Hives.[2]

He assures us that the "price of the wood is small when set by the side of the labour." Cotton tells us that by making proper hives, one need not consider the far greater cost of building a bee house to keep them in. In fact, he writes that bee houses prevent the hives from warming in the Spring, and are far too hot in the Summer. Although he describes other keepers adding room at the top of their hives, he prefers to add extra boxes to either side of the main box, in the manner of "barns where they lay up their spare honey."

Cotton reveals a knowledge of bees based upon experience. He says the long continuance of cold in Winter is good for them, but damp cold will cause them to suf-

A masthead from T.B. Miner's periodical, 1853.

And, a cut showing the process of transferring bees from box to frame hive.

fer. He also knows that nectar is provided by flowers to attract bees and flies, which carry "the dust" from flower to flower, without which there would be no apples. This fact was not completely accepted by growers until the 20th century.

Cotton was a record keeper, as well, weighing hives on the first of the month through Winter, to track their honey consumption. He relates the fact that there is little point in planting for bees, as "no cottager can grow enough to be of much help." Far better to be in the vicinity of clover, or lime trees, even if the beekeeper owns scarcely any land of his own. He even includes instructions on weighing the hives in Fall in order to feed enough back to make up the deficit.

The story takes a sharp turn here: in 1841, Cotton left England for a position as chaplain in New Zealand. He helped develop beekeeping there, as honey bees had only recently been imported. He continued to write and published "*A Manual for New Zealand Beekeepers*," in 1844. He returned to England soon after and lived there the remainder of his life.

It's clear that Langstroth was familiar with him, because he wrote that "*In Cotton's 'My Bee Book*,' there is a cut illustrating a hive in which two colonies had built in the same manner" as he was describing in his book. What is remarkable is that this information was available in the 1840s, well before the Golden Age of Beekeeping of the latter part of the century. So, who profited from this knowledge?

Beekeeping in New York City

Thomas Miner was an early American beekeeping pioneer, a resident of Ravenswood, now the Astoria neighborhood of New York City, on the east shore of the East River. Not much is left to hint at the tree lined streets and gardens. In 1846, he began writing for the NYC monthly "*The American Agriculturist.*" His book, "*American Bee Keeper's Manual*," came out in 1850. While Miner does not quote Cotton directly, it's pretty clear that he is familiar with the work. He states glibly that:

Of all the various styles of hives used in England, and on the continent, I find none that I can recommend to the bee-keeping community.[3]

Perhaps it boils down to expense, but Miner settled on the simplest possible hive. Using inch thick boards, he constructed a box closed on all sides but the bottom. This is set on a table, but raised slightly at four corners, allowing the bees to exit in any direction. The second story is pretty much the same with holes cut so that they can move up into it to store honey. This second box he calls the "super," for storifying. In England both box hives and straw skep hives were expanded upwards; an upper chamber is also called an "eke." When the super became filled, one would run a long knife or brass wire beneath it to cut through the combs, and remove the box filled with honey. Alternately, beekeepers got the bees to fill jars with comb honey by placing them over the holes in the lower box, making an attractive package.

Intriguingly, Miner describes a bar hive, not unlike the one that Langstroth would soon invent. From the picture it even looks like a modern hive, but there aren't frames enclosing the combs, just wooden bars from which the combs would hang. This type of hive is what inspired Langstroth's design: because the bees would also attach the combs to the walls of the hive, he was forever cutting them loose, only to be soon reattached. Miner lets us know he regards even a bar hive as "entirely too complicated." He wants a hive that does not require an "engineer to put in order and oversee" like many of the "gim-cracks of the present day."

He also denounces multi-storied hives used "in some part of New Jersey." The proponents of these hives claim that they can get more than one super filled in a season, to which Miner concedes might be possible if one resided upstate where white clover is grown in abundance, but not Long Island where the honey harvest is meager. In fact, he finally smartened up and moved to the region along the Mohawk River, where huge crops of honey were being produced from clover and buckwheat. He spends a great deal of time describing the various complicated hives, and in the end suggests that none is a good as a hollow log which serves as well or better, and costs nothing.

The primary difference between Miner and Cotton is the placement of the super above rather than beside the main box. He states that when done correctly, the queen rarely goes above whereas she frequently will move into a box attached to the side. He also describes the vexing

cases where the bees will not enter the supers, though they appear to be crowded in their quarters. He assures us that there usually is a good reason, "that our eyes are closed to." Finally, he gives the plan for retrieving the honey from the bees: simply place the box filled with honey in a protected place where the bees can see light; they will abandon it and fly home.

Mr. Miner places appropriately strong emphasis on "pasturage;" that is, the availability of honey bearing plants. Nothing the beekeeper can do will make up for this lack. He proclaims incomparable white or Dutch clover (*Trifolium repens*) and suggests that if this is lacking it would be useless to start an apiary. He admits that this grows almost everywhere, but nowhere as abundantly as upstate, in the Mohawk Valley. Miner also mentions basswood (Tilia spp) as another great source of honey. Where clover and basswood abound "is the apiarian's true El Dorado." In agreement with Cotton, he suggests that planting for bees is of no use, except buckwheat, the grain of which was in high demand, as well as the honey.

As I mentioned, Miner moved upstate. There he found little success as a beekeeper and turned his attention to publishing. Eventually, he returned downstate; his obituary said he died "at his beautiful home in Linden, New Jersey."

Mr. Miner was perhaps the oldest of American authors on beekeeping and contributed largely during a long and useful life to raise up agriculture in all its branches to the proud position it now occupies among the national industries.[4]

Beekeeping in New Hampshire

While Miner was working out the details of keeping bees in New York, John Searle of Franklin, NH, was doing the same, to the north. A lengthy piece by him was included in "The Farmer's Monthly Visitor," where, in 1839, he claims 33 years of experience managing bees. Mr. Searle prefaced his article:

To all who love to look upon nature's works, and with us believe they are subject to physical laws; who love industry and frugality, and do not esteem themselves too wise to learn; who wish to live not only for themselves, but also for their fellow-men — this Improvement in the art of raising the industrious Bee is very respectfully dedicated by: Your fellow laborer, and humble servant, J.S.[5]

It seems pretty clear that these early beekeepers were all reading the same books. Searle goes to great length to give the plans for a large bee house in which to house many colonies. He says that it doesn't overheat in Summer, but perhaps he had it in a shady spot. His hive is also a simple box, open wide on the bottom, and with passages to allow the bees to move upwards, or laterally, combining these two techniques for expanding the hive space. The sideward expansion was principally to get the queen to lay eggs in more than one box, which allowed the beekeeper to separate them and form new colonies in this way.

Most of these early beekeepers noticed that the queen seldom moved through small holes in the lid, so comb honey could be produced in various sized containers. The size of the containers varied and often they would be boxes with glass sides, which enticed customers to buy them.

Hives Along the Mohawk

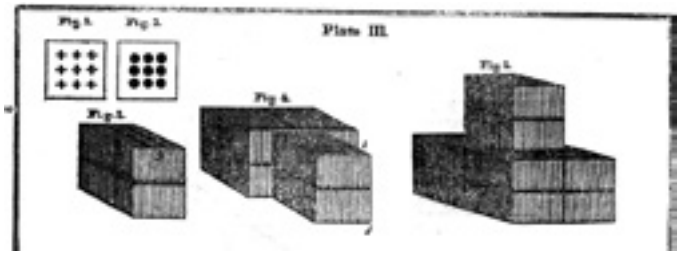
Moses Quinby was born in 1810, and lived for a time at Coxsackie, up the Hudson River from New York City. The name lends itself to the Coxsackie virus, first identified in that town. It was there he entered the honey business, using box hives much like his above mentioned peers. In 1853, he published his book "Mysteries of Bee-Keeping Explained," the product of twenty years' experience. Mr. Quinby states at the outset that beekeeping is considered by many to be a hazardous enterprise. After a particularly bountiful harvest he was told by an older friend: "It is not to be expected you will have such luck always; you must expect they will run out after a time."

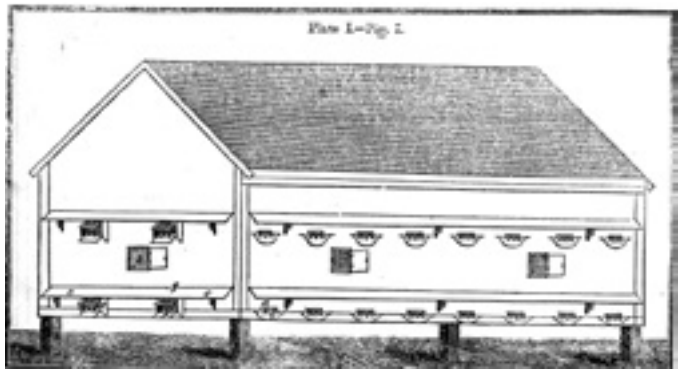
Thankfully, Mr. Quinby did not believe in luck but in Yankee ingenuity. Above all, he was averse to the complicated "patent hives" of the day. Like Miner, he had tried them all and declared:

The first obstacle in the way (after the right is obtained) is the construction. It will be necessary to get a mechanic, and a workman too. The one I shall recommend, without paint, will not cost, or need not, over 37½ cents, with cover, etc. Now, if we wish hives for ornament, it is well enough to expend something for the purpose; but it is well not to refine too much, as there are limits which, if passed, will render it unfit for bees.6

Authors wrote countless words on the question of which hive to employ, condemning any but one of their own making. And yet, almost all of these early beekeepers also had a firm grasp on the basic techniques of honey bee management, and the biology of the hive. Quinby was skilled in the use of tobacco smoke, calling it "the best means of charming them I ever found." This he wisely applied before going into the hives, be-

Hives below, and bee house illustrations from John Searle's work.

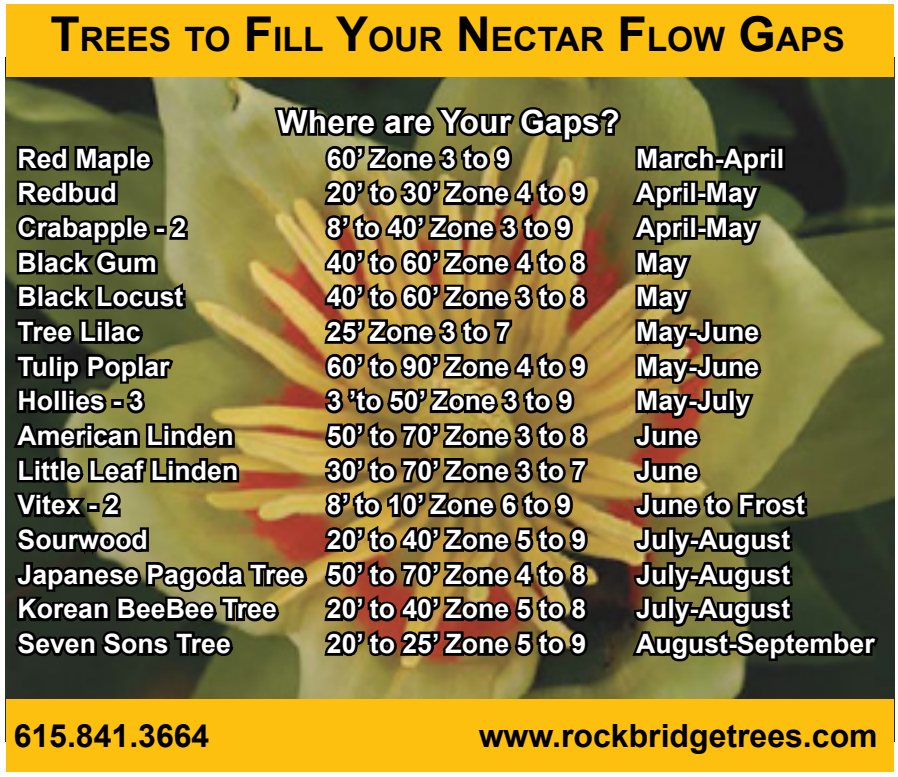


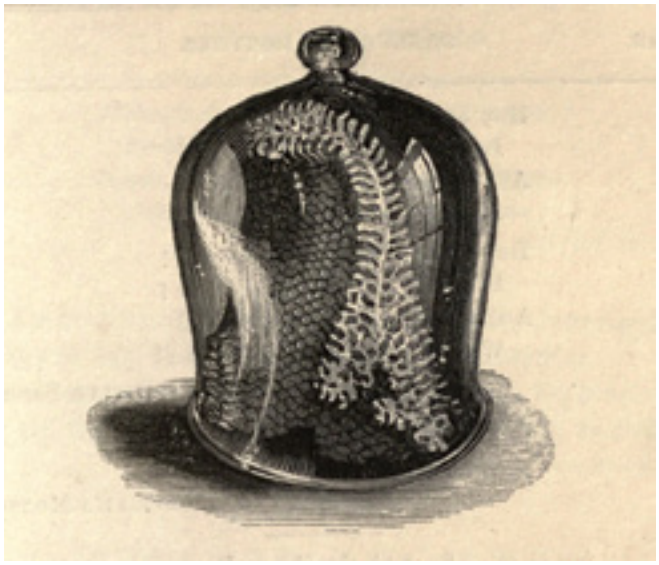


Olivarez Honey Bees/Big Island Queens is seeking motivated beekeepers to join our Hawaii team! Experience preferred. Self-motivator and ability to work in a team environment a plus. Positions are full time, salary based on experience. Great Benefits Package. Prior work history and references required. Advancement opportunities available. Submit resume to **info@ohbees.com or Olivarez Honey Bees Inc/Big Island Queens, P O Box 847 Orland Ca 95963, Fax: 530-865-5570, Phone 530-865-0298**

If You Don't Have A Seat At The Table You're Probably On The Menu. — Elizabeth Warren

The Future Is Decided By Those Who Show Up – So Show Up, Raise Your Hand. Volunteer





Glass jar with honey comb.

Early cabinet hive.

cause it is better to dim their senses before one pokes at the combs. He was able to work unhindered by stings, in most cases needing no veil or gloves at all. As many beekeepers know, Quinby went on to perfect the bellows smoker, which changed very little in the ensuing century. Though he did not obtain patents, nevertheless Quinby was an enthusiastic businessman. He wrote:

To give the bees all necessary advantages, and obtain the greatest possible amount of profit, with the least possible expense, has been my study for years. I might keep a few stocks for amusement, even if it was attended with no dollar and cent profit, but the number would be very small; I will honestly confess then, that profit is the actuating principle with me.[6]

One thing that Quinby is less well remembered for was his description of the symptoms and treatment of brood disease. Unfortunately, with box hive beekeeping, the disease was usually discovered in the late stages. For this reason, once the frame hive was perfected, laws were passed requiring its use to facilitate the regular inspection of the brood combs. Quinby also experimented with the shaking treatment which involves shaking the bees off the diseased combs and placing them in brand new equipment. He further reported that while the bees thus treated usually recovered, they seldom produced as well as the healthy colonies not subjected to radical displacement to a new hive.

The Eureka Moment

Around 1850, the beekeeping world was to change radically. Miner, Quinby and Langstroth all published their books. Curious how their paths differed. Miner went to publishing, Quinby kept expanding his holdings and was shipping tons of honey down the river to New York City. Langstroth was the master of the inner workings of the hive, which led to his perfection of the frame hive.

Many of the beekeepers of the time regarded a frame hive as just another complicated waste of time and materials, but Quinby immediately saw its merit. He quickly converted his plain box hives to frame hives, because of the immensely greater control the new system afforded an enterprising beekeeper. Even so, the revolution needed time to take hold, as evidenced by this, from 1858:

I visited an apiary, not long since, in Clinton County, State of New York. There were some thirty-five or forty colonies scattered over the garden, and there was scarcely one hive, or box, in the whole, that resembled a proper beehive; but they were composed principally of old tea chests, nail kegs, sap buckets, flour barrels, raisin boxes, powder kegs, &c.[7]

By the 1870s, beekeeping journals were starting up from coast to coast and people like A. I. Root, the Dadants, and W. T. Falconer, began manufacturing and selling beekeeping equipment using these journals as vehicles to promote their products. The Golden Age of Beekeeping had begun. BC

Notes

[1]Mason, P.A. 2016. *American Bee Books*. Boston: Club of Odd Volumes.

[2]Cotton, W.C. 1842. *My Bee Book*. London: R. Clay.

[3]Miner, T.B. 1850. *The American Beekeeper's Manual*. New York: CM Saxton.

[4]*The Bee-Keeper's Magazine*. 1878. New York: A. J. King & Co.

[5]*The Farmer's Monthly Visitor*. 1839. Concord, NH: William P. Foster.

[6]Quinby, M. 1853. *Mysteries of Bee-keeping Explained*. New York: CM Saxton.

[7]Kidder, K.P. 1858. *Kidder's Guide to Apiarian Science*. Burlington, VT: SB Nicholas.

Buying and Selling
Bees In The 21st Century

Bill **Ruzicka**

PACKAGES, NUCS, SPLITS, AND SWARMS were created for traditional northern beekeeping when the bees were gassed and killed after the first frost in late August or early September. All of the honey was extracted and the combs were sorted and prepared for spring packages bought from California. This practice was all based on **having fully drawn comb not using foundation.**

NEW BEES: Someone forgot to tell you that packages, splits, nucs, and swarms in dry areas need to be placed in fully drawn comb. The bees will not continue to draw out foundation when the honey flow ends in mid July. You should be buying bees on fully drawn combs to be successful. (See lesson 6) It takes an astonishing seven to eight lbs of honey to create 1 lb of wax.

BUYERS AND SELLERS: Make sure the donor colonies are treated a month before sales with low dose continuous release formic acid treatment by MiteGone. It not only cleans the donor hive from both mites but also prevents reinfestation.

ARTIFICIAL SWARMS are the best way to replace any bees that you lost or as a way to increase the amount of hives you have. A full size colony will produce a full or better crop in the summer when placed into **DRAWN DEEP COMB WITH STORES.** This process of artificial swarms eliminates the transfer of diseases like AFB. You are getting an established over-wintered laying queen and bees.

There is no transfer of equipment, only bees. The queen is laying 2000 eggs a day and will not stop. She must be transferred onto nice clean drawn comb to continue to lay and within three days she will have laid three frames of brood. I will explain how it is all done in lesson 5, a section called **ARTIFICIAL SWARMS.**

In the late 70s, I bought a 100 hive outfit and went through all the normal sources of acquiring bees. The operation had only 20 live colonies and a lot of old equipment of various sizes. Imagine that each bottom board had its own entrance reducer; all reducers were a different length. You simply sat in front of each hive and tried them until one fit. This type of beekeeping did not mesh with my upbringing and education. Therefore, over the Summer and Winter I sorted everything and standardized and fixed what was usable. On the advice from Leo Fuhr, I requeened all 20 colonies and ensured they were well fed and stocked for winter to ensure that I would be able to do a lot of splits in the spring.

Lesson 1 – Splits and Hive Arrangements

I wintered all 20 colonies in two rows side to side

and back to back. Each colony was two supers high and I winterized all the hives everything in one gigantic Winter wrap of insulation and black paper. This arrangement taught me a lesson in drifting.

In the Spring, the end hives were booming and the center hives were very weak needing a lot of boosting. Therefore in the Spring, we changed the hive configuration into groups of four arranged in a circle to prevent drifting, like above. By late May we were able to split them into 50 honey producing hives.

Lesson Learned: I adapted this model to all my yards as it eliminates drifting.

Lesson 2 – Packages and Equipment –

This was in the late 70s when packages were typical in northern beekeeping in Canada and U.S. Everybody in the north after first frost in late August gassed their bees, extracted all the honey and sorted their equipment

Winter insulation.

to receive packages in Spring. Each year Ernie Fuhr took his truck in late March and went to California to buy 2500 packages. 2000 for him and 500 to sell. He always stopped at his parent's place in Vernon. That is where I got my first 50 packages and installed them on well prepared boxes with drawn comb and gallon feeders full of feed on top. They took off nicely and produced honey.

Therefore, I decided to do the same thing the following year but I did not have enough drawn comb. I did have a lot of new foundation that I had made over the Winter. I fed the hives the same way as I had done in the past and then relied on honey flow for the hives to build. By mid August, the hives should have been booming but instead the bees confined themselves to the four to five drawn frames I had given them. That is when I learned that it takes seven lbs of honey to create one lb of wax. Doing a lot of feeding from mid-August until the end of September brought them up to six to eight frames of bees. I created an inner feeder and set these small hives on top of my stronger two high colonies for the Winter. I packed them in four packs made of plywood and 1" corolite walls and 3½" fiberglass insulation in plastic bags on top to Winter. I learned how to Winter small colonies and how much it cost to draw foundation.

Lesson Learned: Do not put the packages on foundation only unless YOU provide plenty of heavy feed**. 64% Heavy feed doesn't crystallize or ferment.**

Heavy syrup is 16 kg sugar into 20 liters of finished syrup (not into 20 liters of water) or 35 lbs of sugar into 10 ½ US gallons of finished syrup (not into 10½ U.S. gallons of water). To mix heavy syrup, mark (draw a line) on a large mixing container at 20 liters or 10½ gallons. Fill this container to about half with hot water and then add the measured sugar mixing as you add. Then top off the mixture with hot water to your mark (line).

Lesson 3 – Nucs

I did my share of nucing when I was reducing my operation from 500 hives to 280. It was a nice way to sell surplus equipment. But in the late 80s when the first mites came and borders were closed, the BC bee breeding industry started to form. In my accounting mind, I could not justify making and selling nucs. Why?

In the Central Okanagan, in the bush on non-irrigated lands, to make and draw a perfect brood frame, cost me at that time, $10. Therefore four frames would cost $40. Selling nukes at that time for $45 did not make much sense to me. As a result, I developed the practice of selling artificial swarms. We will return to them in lesson 5.

But now back to nucs. If you are just starting with all new equipment and foundation, in areas with honey flow throughout the Summer, you forfeit any honey production and need to be prepared to provide the bees plenty of 64% heavy feed. Next you have to find a reliable source of bees. Talk to beekeepers and ask many questions. **Do not buy a four-frame nuc on anything other than deep frames.**

NUCS: THREE FRAMES IN APRIL OR FOUR FRAMES IN LATE MAY.

A-Indisputably the best are nucs made after pollination from over-wintered hives with queens reared in June the previous year. With proper feeding or a reliable honey flow they will draw foundation and produce honey for Winter.

B-Nucs With New Queens are quite common and work; however, they are a little slower in their development as young queens may require more time to swing into full production. Some queens may fail, but those who survive the Summer and are full size colonies in August, with proper treatments, like Formic, sufficient Winter stores, and Winter packing, will be good for the following year.

C- Nucs With Early Mated Queens are also common but may be badly mated. The reason for this is that there are not enough mature drones in April or early May. I tried for several years to run two-queen colonies. I would create extra units on top of the standard hive.

Only in the first year did I have 140 mated queens out of 200 by mid May. This miracle never happened again and some queens ran out of sperm and became drone layers. This may happen in both B & C options. Always ask your supplier if he will replace queens if they fail by mid July.

D- Nucs By Mid July Are Called Splits. They are usually well developed units with reliable Queens. They will build up to strong winter colonies and produce honey well in the next two years. They will require re-queening in the second summer by proven queens reared in June.

Lesson 4 – Natural SWARMS

These are a great way to increase your numbers. And **YES, the SWARM will do what all swarms do, build a new home and draw out comb.** You just have to provide plenty of 64% heavy feed

The Queen has prepared herself for the swarm flight by reducing the amount of eggs she lays for several days until she stops entirely. She can wait until her worker bees build a new house with fully drawn comb to start laying again. On the day of swarming, the bees have gorged themselves on honey and then on a nice afternoon they are off to find new home. Any three cubic feet of space will do for the bees. This can be a chimney, under stairs, an old car, or box. How to catch them will be another lesson. What I have described above does not happen with Artificial Swarms.

LESSON 5 – ARTIFICIAL SWARMS

Artificial swarms are a better way to replace bees you lost or as a way to increase your numbers. You are getting a full size colony which will produce a full honey crop in the summer when installed into DRAWN DEEP COMB WITH STORES. This process eliminates the transfer of diseases like AFB. It has an over wintered queen with bees. There is no transfer of equipment, only bees.

The queen is laying 2000 eggs a day and will not stop. She must be transferred onto a nice clean drawn comb to continue lay. Within three days she will have laid three frames of brood and have five frames of bees. They will make the remaining 10 combs ready for her. This way you can start your beekeeping in late May, when there is a honey flow. Within seven days after you pick up your swarm, you will need to add second box.

ATTENTION: The difference between the artificial swarm and an actual swarm is that neither the bees nor the queen has time to prepare for swarming. The bees do not gorge themselves on honey. The queen is laying eggs at a rate of 2000 a day. That's about one egg every 43 seconds. It will damage the queen if she does not have nice cells in which to lay eggs.

On the other hand, if you give her quality combs you will have three frames of brood in three days. The hive will also need a lot of food at this point. You need to provide plenty of 64% heavy feed.

HOW WE DO IT

First, we work with our customers to prepare the SWARM box correctly. Swarms can be put into any sized equipment but inner feeders fit only in deep boxes.

In the picture, you can see my two frame feeder with a capacity of four liters. These feeders are 40 years old and made of wood. This feeder can also be moved into the center of the box and divide the hive into two mating nucs. Now you can easily buy two frame plastic feeders. Put one such feeder against the side of the box. Then two outside combs (the one next to the feeder and the one next to the outside wall) should be honey combs. Next to them should be a frame of pollen each. That leaves you with space in middle of the box for four of your nicest frames that are ready to receive eggs and bees. The better you prepare this box, the better results you will have.

The bottom board is fastened to the swarm box so the unit can be carried around without it coming apart. The full size entrance must have a full size screen that is easily removable and installable.

The top of swarm box is covered with carpet or a potato sack and a telescoping top cover so it can be bee sealed for transport to the customer's destination.

In April when we prepare two high hives for pollination standards we treated them with Oxalic. When they are back we put on Queen Excluder and brown honey box to stop them from natural swarming.

On a nice day in late May we remove our hive from where it is placed in the beeyard and put the prepared customer's box in its place and open the screen. We find the queen and transfer it with all the bees onto customer's comb into the customer's box. We shake 60% of the bees from all of the combs into the customer's box. In addition, the entire field force will return to the customer's box by the end of the day. All of the combs that were shaken are placed on different hive to incubate. We usually stacked three hives worth of brood onto a fourth to incubate. Three days later, we check all of the customer's swarms for a queen and eggs. Then one evening, the hives are loaded for transport.

All that is left behind are tall (five to six boxes high) incubators with brown honey boxes on top. We extract those and their dandelion honey after second shake so it does not crystallize in comb.

Ten days after the incubators were made they are shaken to produce a second round of swarms. These incubators are very strong colonies and in addition to making a second swarm, multiple three frame nucs are made from the residual brood and bees. These nucs receive a queen cell, mate Queens, and spend the Summer growing into next year's colonies to pollinate and sell. Whole process starts again.

Checking for queens.

Incubators.

PERFORMANCE AND HISTORY

In 1988 we ran a 10 swarms test. In 1989, 100 swarms went to the Peace River area averaging seven pounds of bees each and they did great. In 1990, John Gates from the BC Apiculture Program ran tests and found Artificial Swarms a very workable system. The method was originally published in BeesCene in April 1991 and republished in 2013.

From 1991 to 1997 we produced 450-500 swarms each year for a variety of buyers. Most buyers wanted truck load quantities 80-150 or 200-250 for five ton trucks. Only in 1995 did we have a larger order 500. The customer had a class eight truck and semitrailer. It took the whole night to move his double bottom equipment from all the yards to the loading dock. Then a fork lift

New for 2019

100% weatherproof
Nest and stack

NO MORE FOLDING

Top feeding options

under lid vents

Lid locks

3 X the airflow

Give your bees a professional look

WWW.BEE-PROS.COM

Blue Sky bee supply®

Dadant

MANN LAKE
WE KNOW BEES
An Employee Owned Company

loaded the hives onto the trailer. It was 4:00 am and day light when this massive load left. I vowed that I would never do that again! Depending on year, the artificial swarms had on average 7.4-8.7 frames of bees and 2.9-3.7 frames of brood three days after shaking.

In 1981 I decided to reduce my operation and sell the equipment in the form of four frame nucss. When I got down to 280 hives, we exchanged frames for many years with the PHILPOTS in Alberta and made 450 – four frame nukes into their prepared boxes.

In 2013, I reduced my operation further to 72 single colonies over wintered for pollination. With increasing problems with AFB, we were back to the method of Artificial Swarms which eliminates AFB transfer.

LESSON 6 – RETIRING AND SELLING FULL SIZE COLONIES

In 2018, at the age of 78, because of health reasons, I decided to sell my remaining 82 hives and operation in bits and pieces including the contracts. To those who are in same boat, I recommend it. Selling whole size colonies worked extremely well, and led to the creation of a . . .

. . . BEE BREEDER'S CIRCLE.

This group of local beekeepers will keep our local Vernon stock alive. We actually recreated the local Vernon stock improvement program where 20 of the best hives of the descendants of Vernon stock are brought into a breeding circle to produce nine queen cell builders and provide 18 graft combs of different mothers to produce future generations. I will mentor this group and have bees in my beeyard in Summer to play with.

For the benefit of the buyer and the seller I will do a cost benefit analysis of buying nucs and foundation against full size colony and income from it against selling the whole operation in 2018 prices. You can be the judge of what deal is better.

FULL SIZE COLONY that will produce honey - $400.00

Includes a standard deep box, top cover, bottom board, 10 fully drawn combs (including honey, pollen and approximately six combs of brood in various stages of development), our local Vernon stock bees, and an over-wintered mated Vernon stock queen.

Buying full size colonies you have the choice of second box of foundation or drawn comb.

If you are in an area with abundant honey flow over whole Summer, then you can use your new equipment with foundation, and forfeit honey production for drawing comb and feed the hive if required. In semi arid areas with limited honey flow I recommend purchasing used equipment and fully drawn comb.

Beekeepers who bought drawn second box had sizable honey crop for the beekeeper.

Average in wetter parts was 90 lbs in dry areas 50 lbs. You forfeit this for drawing foundation.

Box of drawn comb – used for expansion and wintering. $100.00

Includes a standard deep box, eight fully drawn frames two with food, and a two-frame four-liter feeder/divider/comb honey producer with comb honey sections.

The honey comb producing system in the feeder eliminates the need to take the feeders out for Summer and stops bees from filling feeders with burr comb. Instead of burr comb you get comb honey.

The picture illustrates. On left is the box with starter wax put in the feeder in the Spring when the feeder is empty of feed. On the right, is a finished comb section taken out before the first feed in late August. This system can also be adapted to plastic two frame feeders

Metal Queen Excluders: boil washed $**10.00**

Extracting Supers: Fully drawn and wet from honey $ **45.00**

Never used for brood. Usually two extracting supers are required per colony.

Cost to buyer or income to seller for complete package $600.00

Cost of new equipment and nuke. $450.00

Add Shipping and you forfitted 50-90 pounds of honey local price?

Four-frame Nuc $225.00.

Average cost for any size new box with assembled frames and plastic foundation is $65.00 you need two deep for brood and two ediums for honey $230.00

Add two-frame feeder $25.00

Queen excluder metal $10.00

Bottom board $15 top cover metal insulated $45 $60.00

You be the Judge. BC

COURSES:

You can take my course; **TO BE OR NOT TO BE A BEEKEEPER, THAT'S THE QUESTION?**

It costs $30 and is done on-line and on the telephone. It will lead you through the do's and don'ts of beekeeping before you spend thousands of dollars only find out you don't have the ability or don't want to be a beekeeper. It will probably be the wisest money you ever spent.

COLLEGE OR COMMUNITY COURSES may not be a wise decision. Anyone can decide to put on courses in beekeeping. They may or may not have any credentials. So ask who he/she is and if that person has certification as a beginner instructor by the BC Honey Producers or your State / Provincial Association. I participated with Lance Cuthill in the creation of this designation. It may not be the best in the world but it ensures that teachers are qualified, wrong ideas are not taught, or personal profit achieved from the sale of bad nucs and queens.

Bee Culture's
Pollinator Coloring Book

$15.00

X218 – Visit

www.beeculture.com

Bee Culture

The Magazine Of American Beekeeping

24 8½" x 11" pages to color and design. Birds, bats, bees, butterflies, flowers, dragonflies and more. Heavy Duty, non-bleed paper.

CREATING A BEEKEEPER MEETING

Ann **Harman**

Well, you did it! You volunteered to be Meeting Chairman. Now what? It all depends on whether your club is the State Association or a County or Local group. Some parts of the planning are the same, but some are totally different. One of the differences is when to start planning. State meetings could really use up to two years in advance for plans, while a small local meeting could use several months. All too often the small local clubs succumb to panic – "Who can we get to speak next month?"

Let's start with the local club, a somewhat simpler plan than a larger state meeting. How many times a year does the local club actually meet? The week of the month as well as the day of the week do influence how many meetings a club will have. Traditional events, such as a Christmas party or a Field Day need to be considered.

Keeping records can be a big help in planning. It is always possible to change what the club has always done. If the Christmas party had 45 people five years ago but only 16 last year, perhaps that event should be dropped or changed. Meeting planning should involve the whole club. Ask the members! Send out a survey. Some cannot attend every meeting throughout the year but they do know what sorts of activities would be of interest.

Keeping records also helps in choosing speakers. Looking back through several years you see that Beekeeper Burt has spoken every year – on the same topic. Perhaps it is time to give him a rest for a year or two. Attendance was low at his last two talks. Don't be afraid to ask the members if anyone has a specialty they could present. Some people just do not volunteer but are happy to be asked. It's worth a try. Someone may be making mead, doing things with wax, having success and failure with bee plants. At a meeting have the members jot down one (maximum two) topics they would like. Make no promises since speakers have to be found either in the club or in nearby ones.

Reach out to surrounding local clubs and ask about their program topics and speakers. Better yet, exchange electronic newsletters with as many groups as possible! If one of their members lives within reasonable driving distance you just may have acquired a speaker your club has never heard before. By the way, does the club's treasury have enough funds to at least pay mileage and perhaps a small honorarium? The Meeting Planner should always be in touch with the club's treasurer.

Another way of saying thanks to a speaker from a distance away is for the officers to take the speaker to dinner before the meeting. If a good speaker with an interesting topic does not want to drive at night, is there one of your members who lives close enough to provide transportation? A Meeting Planner needs to "think outside the box" to liven up the year's programs.

Does your state have a state apiarist and regional inspectors? With all the new information appearing about mites, diseases and treatments, having a presentation on bee health is important. Inspectors can be busy so ask when a talk would be most suitable.

Business meetings, with election of officers, must be done according to the club's Bylaws. Sometimes the business meetings involve some serious items such as revision of Bylaws. Most beekeepers consider these as uninteresting or even boring. Pay special attention to these meetings. Arrange for some door prizes. Throughout the year collect items and have a silent auction or a Chinese auction. Make it a party with members bringing cookies and cakes. It could even be a cookery contest with a nice prize. Promise the members that the business will be short but emphasize the importance.

During the Summer months many clubs will have a picnic or a Field Day at someone's apiary. Be sure to check your insurance to avoid a surprise if an accident occurs. these events are part of your club's activities is attendance still reflecting the enthusiasm for them? The membership of clubs changes over the years. New beekeepers appear and others leave. What worked five years ago may not work now. The weather for outdoor activities needs to be considered in planning for them.

It can be difficult for local clubs to have a meeting place that has equipment for speakers, such as for showing Power Point presentations or even a speaker system for a very large room. Sometimes laptops and projectors can be borrowed or brought by a member. What is essential is asking the speaker, well ahead of the meeting, what is needed. If the presentation is a demonstration are there some tables suitable for it? If there is a time limit on the available meeting room the speaker should be made aware of it so that the time for the presentation and any question session can be completed without

having to ask the speaker to hurry up or to stop before finishing.

State beekeeper meetings are somewhat similar to local club meetings but actually involve much more advance planning. Sometimes one of an officer's duties is to be Meeting Planner. No matter how chosen, it could help to have an assistant to take care of some of the details. And there are many more items to consider to make the meeting a success. So let's start considering those details to see why it could take up to two years to make plans.

Some states have one main meeting a year, others may have two. Or one formal meeting and another like a field day. The meeting locations tend to move throughout the state to attract attendance from the local clubs of the area. Are the meetings one-day or two days? Or a Friday afternoon and all day Saturday? Do the days need changing? Here again, records of past attendance will help in planning.

At every state meeting have a Suggestion Box visible and supplied with some paper and pens. Also make a survey sheet that is handed to attendees. Encourage everyone to take advantage of both, reminding all that it is their association and information is welcome. But make no promises.

One reason for advance planning is the availability of a venue. Hotels with meeting rooms and conference centers, community colleges, universities, all tend to have meetings scheduled one or even two years in advance. Many of these venues have conference planners to help you select meeting areas and costs. If you find one that is suitable, make reservations!

What makes a venue suitable for a state meeting? Lots of questions arise – do the answers make it suitable? Main auditorium – how many people, breakout rooms for workshops, speaker-friendly auditorium and also breakout rooms, allowed to put signs up outside and inside to guide attendees, facilities for lunch, parking for cars and vendor trucks, suitable space for vendors, area for registration, area for special events such as a honey show. True, no venue may be perfect. However try to choose the one with the smallest number of problems. With two years until the meeting it is possible to select a good venue reasonably close to the desired area.

Another reason for a two-year time frame is availability of speakers. Your members want to hear "the famous ones." They may be university or government researchers or are known to give fantastic presentations. These people are busy! They are in demand! Actually the researchers have work to do and cannot find the time to travel to too many meetings. If you ask well in advance you may be successful in having that speaker that everyone wants to hear.

At some point the program needs to be planned. A general plan is to have registration at the beginning of the day, some opening remarks, speakers, break time, speakers, lunch, afternoon speakers or breakouts, break time, speakers or breakouts, end of day. Let's look at two problems: one where timing can be a problem and one that every speaker dreads.

In general the first day of a big meeting starts with a short welcome and any important announcements. This is followed by the first speaker, usually one of the "famous ones." This speaker has been allotted 45 minutes maximum for presentation *including questions*. So that is what the speaker has planned. However, what if the person giving the short welcome and announcements rambles on and on, well over the allotted time. Now the first speaker has a problem to keep the meeting running on time: discard the question time and perhaps rush through some parts of the presentation. *Keeping the meeting on time is not the responsibility of the speaker but is on one of the officers or the meeting planner*. If there are so many announcements some can probably wait until after break time. Running on time is essential to a good meeting.

What does every speaker dread? Being the "after lunch" speaker. Box lunches are a good way to do a meeting lunch. They keep people at the meeting venue so that the afternoon session can start on time with the audience present. If lunch is "on your own" it means most will leave the venue to find lunch at a suitable place. Unfortunately beekeepers like to talk to their friends so that many do not return to hear the speaker or they return and find their seats during the talk. With the box lunch, everyone may attend the presentation and some will promptly fall asleep. Assorted musical snores are scattered throughout the audience. Right after lunch is the best time to have small breakouts that can include workshops or some activities, not a formal talk.

The Meeting Planner is responsible for calculating the expenses – speaker costs, such as transportation, meals, hotel, honorarium. Therefore, working closely with the Treasurer is essential. Finding helpers is also important. Transportation for the speakers who are flying to and from the meeting needs to be arranged and should definitely be on the list of "Speaker Care" items. Also, making sure speakers have access to a restaurant before or after the meeting is critical. A club member can be asked to make those arrangements.

Having a Vendor Coordinator means that the vendors, large and small, have suitable spaces and that their respective spaces are clearly labeled. Some venues will have facilities for vendors to unload their supplies and also to park trucks and trailers. Giving the vendors information on facilities in advance makes their tasks easier.

Now that all the details have been covered, it is time to let members know about the meeting and the speakers they have been waiting to hear. The state association may have a newsletter or a journal. How often is it published? Actually, does anyone read it? If it comes via snail mail it will get set aside "to read later" and get buried under other "read laters." Via email it may come at a suitable time. But did that email actually get read or did it join the "read laters?" Short email reminders – especially featuring the "famous speaker" are important.

Was the website updated with glowing details of the meeting? You can reach people on Facebook all the time today. Make use of it. Send out Tweets, each one naming a different scheduled presentation or workshop. These two tactics may well reach more people than visit the webpage or read email notices. Make use of **all** the available ways to reach people today. Your speakers will be impressed with the enthusiastic attendance.

It's February – time to get busy for planning a meeting! BC

Imagining The Unimaginable (Part 2)

A World Where Honey Bees Thrive

In the September 2018 issue of *Bee Culture* we explored what a world in which honey bees and pollinators are scarce might look like. This month we take the opposite tack and look at what a world would look like where pollinators are able to flourish and prosper. After all, if you can't imagine or envision the solution to a problem, there is no way you can manifest the solution into reality.

Respecting the Natural World

What would it mean to live in a world where pollinators thrive? The answer for pollinators and all individual organisms certainly has to do with their ability to live, flourish, and reproduce. It means that we humans would have to change our thinking and attitudes and accept a certain kind of moral respect for the myriad of pollinators from flies, beetles, butterflies, and moths, to bats, birds and even small mammals; not just bees. Since pollinators require a healthy ecosystem to flourish, all the nonhuman entities, the plants and animals in the wild, need to be valued for their own dynamics and contributions that are independent of human purposes.

But how do we figure out what is good for a specific species or an entire ecosystem? And how does one go about balancing the divergent responsibilities we have toward various human and nonhuman entities? Nature and natural entities are not able to speak for themselves. The best we humans can do is to hypothesize about what is best for other beings based on what we have learned from science and experience. Here, the biophysical and ecological limits of the planet can give both a moral motivation for respecting nature and an indication about how to go about this. In fact, the present destabilized condition of the whole biosphere is a symptom of our troubled relationship with other living organisms and, at the same time, an indicator that provides clues regarding the paths we can follow to rebalance our relationship to the natural world.

First . . .

The initial step is for us to admit that interests other than human ones are important and should be taken into account. This step has been initiated by Ecuador, the first country to recognize the rights of nature in its constitution. Rather than treat nature as private property under the law, Ecuador's "Rights for Nature" articles acknowledge that nature with all its various life forms has the *right to exist, persist, maintain and regenerate its vital cycles*. Further, the constitution provides that – we the people – have a legal and moral authority to enforce these rights on behalf of ecosystems.

The designation of rights given to nature mean that the commonly held view that prioritizes the world around us, by what it can do for us, is no longer held by the majority of people. All too often our current capitalist economic system does not seek to protect the natural world but instead values human convenience and profit, often described as "wise use". This perspective all too often leads to the destruction, degradation, fragmentation, and exploitation of ecosystems and the plants, animals and minerals that inhabit them. In a world where pollinators thrive, beekeepers and all farmers would be encouraged and supported in having off-farm sources of income. In the old days, prior to the development of industrial beekeeping/farming, most people were farmers/homesteaders, but these beekeepers and farmers typically had other professions that they practiced at the same time. Having an alternative source of income reduces the stress that is created by the incentive to push livestock and crops in order to maximize profits, compared to when the farm or apiary, is the sole source of income. Another way that beekeepers avoid situations where they may be tempted to push their bees to make more money is by avoiding going into debt and paying interest on loans. The Muslim observance that charging interest on loans (or bonds, money exchanges, etc.) is evil and forbidden becomes main stream. The biblical practice that wipes away all debt every seven years, known as Jubilee might even be adopted.

Development . . .

This means that to create a world were pollinators thrive, rather than accept the continuous destruction of pollinator habitat in the name of growth and development, the health and well-being of pollinators and other wildlife (both flora and fauna) becomes an integrated part of all building and development projects. For example: Pollinator plantings are always first and foremost considered when designing landscaping for a project. Setting land aside for wildlife, maintaining wildlife corridors, and

practicing construction techniques that are the least disruptive, non-toxic, and highly energy efficient becomes the norm rather than the exception.

Agriculture . . .

Human-scale farms based on ecological agricultural practices have replaced the industrial farms that dot our landscape. The incredibly inefficient and wasteful industrial agricultural practices that burn more calories of energy than the calories of food energy they produce, are replaced with more efficient organic, biodynamic and permaculture techniques. (Shepon 2016, Lipinski et al. 2013, Pimentel 2003). Rather than a constant annual increase in pesticide use, (Atwood 2017) fewer and fewer toxic chemicals are spread throughout the countryside each year. In the few instances where chemicals are used, evidence must be provided to prove that pesticide use is necessary and then the least toxic and persistent pesticides are utilized and at the minimum levels required to do the job. Because of these changes, biodiversity in and around farms is increasing rather than decreasing. (Hooper 2012, Reich 2012)

Stressful long-distance migratory beekeeping is no longer necessary since most orchards and farms are able to obtain adequate pollination from the wild and native pollinators that live on and round the farm. To supplement the wild pollinators some honey bees are available locally, typically right on the farm, to make up for the few situations where native pollinators are unable to do the job on their own, as well as to provide the farm with honey, bees wax and other valuable hive products.

Farms become more productive due to the elimination of food waste as a result of small or misshapen fruit and vegetables that are not marketable as a result of inadequate pollination. Farms are also more productive because now these smaller-scale farms are able to harvest several crops from a single piece of land each season rather than just one. By not having to spend so much money on pesticides, and running and maintaining expensive farm machinery, farmers are able to instead invest it in hiring more help creating plenty of work for the unemployed and under-employed.

Industrial agriculture.

Climate Destabilization . . .

The reduction in pesticide use that would need to be associated with a world were pollinators flourish also increases the health and abundance of soil micro-organisms which in turn increase the amount of carbon that plants are able to sequester in the ground. Since almost all farms are using carbon sequestration farming techniques such as constant cover cropping, no-till, low or no-pesticide and chemical fertilizer use, and intentional carbon grazing (mob grazing) of herbivores, many of the problems associated with the destabilization of the climate from green-house-gas emissions are greatly reduced and carbon build-up in the atmosphere is reversed. Because of this, the protein content of pollen reverses its decades long decline and begins to increase, improving the nutritional health of our pollinators.

Human health . . .

Most of the issues that aggravate our nation's health care crisis, have been resolved. More people are working on farms and so they are getting plenty of fresh air, sunshine and exercise. Since most food is now eaten within 100 miles of where it is produced, it is fresher and tastes better. Foods are also healthier to eat since they have fewer chemical pesticide residues (Baker 2010, Kouba 2003) and a greater abundance of nutrients. (Worthington 2004, Crinnion 2010, Średnicka-Tober 2016)

There are fewer wars and violent conflicts throughout the world now that food scarcity has been largely eliminated. Refugees and migration that come about as a result of economic stress is greatly reduced as people all over the world are able to more easily find work, many on local farms.

Re-queening . . .

Nature and its denizens are no longer seen as a passive substrate that can be endlessly appropriated, manipulated, and controlled by humans. The dependence and dynamic relationships between human beings and the natural world have been reconsidered, as have the values we ascribe to nonhuman entities. Thus, in a world were pollinators thrive, honey bees are not treated disrespectfully and many common management techniques that push them in order to maximize profitability, while reducing their health and well-being at the same time, are no longer practiced. Beekeeping best management practices have been rewritten and radically changed.

For example, since each queen has its own unique set of DNA and carries the genetic code for the super organism, every colony, whether full size or nuc, is rightfully considered an individual. Each colony is valued and respected for its intrinsic worth rather than the profit that can be squeezed out of it. Therefore, nucleus colonies are no longer viewed as a "half a hive" and regularly "harvested" for brood, bees, queens, honey, or other things for use in another colony. Rather than create nucleus colonies in order to replace yearly losses, nucs are made primarily in an attempt to keep all the booming overpopulated hives from swarming.

When pollinators are thriving, killing the queen that heads a colony and replacing her, effectively killing

Where pollinators thrive.

the old colony and substituting a new one, becomes unnecessary since most of the rationale for re-queening no longer exist. Each colony is allowed to live out its life in full.

Sugar feeding/taking honey . . .

In a world of thriving pollinators, bees primarily die of "natural" causes, such as failing to successfully replace their queen after swarming. Feeding rarely is required since there is an abundance of forage available throughout the season and beekeepers are careful not to harvest too much and to leave plenty of honey for the bees to see them through times of dearth.

Finally.

For a world to exist where pollinators thrive, today's beekeepers must lead the way – reducing the systematic paving of the land in concrete, supporting small scale ecological-agriculture, avoiding pesticide use, growing a garden, keeping out of debt, becoming a producer not a consumer, recognizing and speaking up about the terrible state of things and a willingness to work with others to make and support changes today that will create the world we, and the pollinators, need for a healthy tomorrow. It is not necessarily our responsibility to complete this work, but it is our responsibility to move the ball forward in a graceful and relentless way. BC

Ross Conrad is the author of Natural Beekeeping: Organic Approaches to Modern Apiculture, *2nd Edition*

References:

Atwood, D., Paisley-Jones, C. (2017) *Pesticide Industry Usage and Sales 2008-2012 Market Estimates*, US Environmental Protection Agency (EPA) Washington, DC

Baker, B.P., Benbrook, C.M., Groth, E. III, Lutz BenBrook, K. (2010) *Pesticide Residues in conventional, integrated pest management (IPM)-grown and organic foods*: insights from three US data sets, Food Additives & Contaminants, 19:5, 427-446, **DOI: 10.1080/02652030110113799**

Crinnion, WJ (2010) *Organic Foods Contain Higher Levels of certain nutrients, lower levels of pesticides, and may provide health benefits for the consumer*, Alternative Medicine Review 15(1):4-12

Hooper, D.U., Adair, E.C., Cardinale, B.J., Byrnes, J.E.K., Hungate, B.A., Matulich, K.L., Gonzalez, A., Duffy, J.E., Gamfeldt, L. & O'Connor, M.I. (2012) *A global synthesis reveals biodiversity loss as a major driver of ecosystem change.* Nature, 488, 105–108.

Kouba, Maryline (2003) *Quality of Organic Animal Products*, Livestock Production Science, Vol. 8 pp. 33-40

Lipinski, B., Hanson, C., Waite, R., Searchinger, T., Lomax, J., Kitinoja, L. (2013). *Reducing*

Food Loss and Waste." Working Paper, Installment 2 of *Creating a Sustainable Food Future*. Washington, DC: World Resources Institute. Available online at: **https://www.wri.org/publication/reducing-food-loss-and-waste**

Pimentel, David; Pimentel, Marcia (2003) *Sustainability of meat-based and plant-based diets and the environment*, American Journal of Clinical Nutrition: Vol. 78, No. 3: pp. 660S-663S

Reich, P.B., Tilman, D., Isbell, F.I., Mueller, K., Hobbie, S.E., Flynn, D.F.B. & Eisenhauer, N. (2012) *Impacts of biodiversity loss escalate through time as redundancy fades.* Science, 336, 589–592.

Shepon, A., Eshel, G., Noor, E., Milo, R. (2016) *Energy and protein feed-to-food conversion efficiencies in the US and potential food security gains from dietary changes*, Environmental Research Letters, Vol. 11, No. 10 **http://iopscience.iop.org/**

"But seek ye first the kingdom of God, and His righteousness, and all these things shall be added unto you." – Matthew 6:33

THE STORY OF A.I. ROOT

In The Jewelry Business

A.I. **Root**

A.I. and his wife, Sue.

An old gentleman once gave me some advice that has been of benefit to me all my life. He was a money lender. I went to him with my father to borrow $500, in order that I might go into business as a partner with the man I was working for. My father was to sign the note with me. When I told why I wanted the money, Mr. Beekman said something as follows:

"My young friend, I have money to let and lending money is my business. With your father for security it will be all right, but I want my money to do good and not harm. I should like to give you a little advice, but judging from past experiences with young men I fear it will do no good."

I urged him to go on.

"Well you have doubtless heard hard stories about me. Perhaps you have heard me called hard names. It is because if I loan money at a reasonable rate I must have it back according to agreement. I should go bankrupt myself if I did not insist on this. If I understand it, you have already had a good job and fair pay."

Jewelry shop on Medina's Town Square.

I assented.

"Well, even though I have money lying idle and want to have it earning something, I would advise you, at your age, to stick to work and earn the money instead of borrowing. By the time you have earned $500 or something like it, you will know better how to take care of it and might be able to start in business alone."

He then turned to my father and remarked that, "Boys in their teens seldom listen to any such advice."

Right here I surprised both my father and Mr. Beekman by saying:

"Mr. Beekman, I not only thank you from the bottom of my heart, but I am going to take your advice." As father and I drove home, he said I had lifted quite a little from his mind by the course I had taken. In a year or a little more, the man with whom I had intended going into business ran away leaving debts right and left unpaid.

When I first commenced business, the inspiring motive was not love for Jesus Christ. It was simply love for a bright young woman about 18 years old who lived off in the country across the river.

That was not a very bad incentive, I admit, but if it had been Jesus Christ it might have included the other love also. Her father feared I would never make a living. Said I (I guess it must have been one moonlight night when we stood by the gate), "We will see."

So when I opened the jeweler's repair shop I solicited repairing of all kinds. I fixed doorlocks, umbrellas, parasols, coffee mills, etc. If someone suggested he had better perhaps throw the implement away and buy a new one, I would say, "Oh no, don't throw it away, I will fix it and it shall not cost you very much. If I had nothing else to do I would work a couple of hours on an old coffee mill and charge only five cents. I made the charge so low because I did not think the article was enough

Handmade chains.

value to warrant more than a five-cent charge. I was bound to build up business, and I did it, too.

No matter where you are nor how you are situated, if you are lame, blind or deaf or even if you are sick, you can be helpful to those about you and gain the apprenticeship in that great trade of helping others. "Not to be ministered unto, but to minister." Let that be the motto of your life, and Jesus Christ will see that you are well paid. Yes, "good measure, pressed down, shaken together, running over." Now, go and look after your wife's clothes wringer this minute lest this advice simply go in one ear and out of the other without having accomplished anything.

There were two other jewelers in our little town of Medina, and the two at the time were almost "one to many." There was some merriment about my starting a third watch-repairing establishment, but I borrowed a ladder, hung up my sign on a suitable post in front of the window of a vacant store; and before I got down from the ladder I had a job cleaning a watch; and I do not believe I have ever been out of a job since that time. In fact, I tried so hard to keep up with my work I was soon obliged to work evenings as well as all day.

Interfering in a Horse Trade

One Summer day a stranger came in from the West with a covered wagon. He was leading a pretty little pony which he wanted to sell, to enable him to get to his destination. In those days "horse jockeys" were common things, and some of those fellows loafing around the street planned to beat this poor man out of his pony. They offered him a good price but wanted to turn in a gold watch. He brought the watch to me and asked if it was really a good watch. I told him that it was a low carat gold, something that jewelers knew at that time as Philadelphia gold. Then he asked me if it was worth $50.00. I told him $15.00 would be nearer its actual value.

Well, the trade was broken up, and then for the first time in my life I learned that it might be sometimes a little dangerous to butt in and break up a horse trade. After a while the man who owned the watch marched into the store with a crowd of toughs and gave me a blowing up. He said I was only a backwoods farmer who had never learned the trade and that my whole place was only a one-horse institution anyway. I remonstrated with him and told him the plain truth about his watch, but it only made him the uglier and more abusive. I was so indignant, that I trembled all over and my voice shook so I could hardly talk.

After the crowd had gone and left me alone, a lady came in and I remember how I calmed myself down and tried to talk naturally to my customer. She had a little piece of jewelry that in those days was called a microscopic photograph. She said she had had it repaired several times, but they always got the motto twisted or slanting. She cautioned me to be sure to have the motto stand horizontally as I held it up toward the sky, then she went out saying she would call for it later on. Without any thought of what was coming, I held that little piece of jewelry up to my eye and gazed towards the sky through the big glass window. What do you think it was that she called a motto. This is what I read as if it were painted across the sky:

"But I say unto you, love ye your enemies, do good to them that hate you, bless them that curse you and pray for them that despitefully use you." I recalled having heard the same words before when I attended Sunday school as a child, but it had been so many years since that I had forgotten all about it, and then in those days I had not seen the beauty and grandeur of those precious words. Now that I was a man and vexed in spirit I took in their full import. I saw the application at once, and the words were like a drink of cold water to a person stranded in the desert.

The Smooth Stranger

A smooth-tongued chap came into my store one day with a piece of common iron rod, for a cane. On the end of this rod was a coating of silver perhaps as big as a silver dime. He informed me that he had a secret for silver plating that would put silver on iron or any other metal in any desired thickness in a few minutes and that the silver tip on his iron rod had been put on by this process.

I became very much excited and scraped up all the money I could get a hold of, to raise $50.00 to buy the secret. I made a bargain before witness, however, that if, after reading over his recipe, I did not consider it reasonable, he was to let me off or coat the other end of the iron rod in a like manner right before me, and show me how it was done. He was going to put the money in his pocket, but I told him to hold on. When I came to read the secret I found that it was something known to jewelers for years and what was familiarly known as the cyanuret process. My indignation arose at once and I told him before witness that he was a swindler, a liar and a thief. Maybe I was not Christian like but I did not profess to be a Christian at the time. He told me quietly to be careful what I said and was so gentlemanly about it that I began to fear I had made a mistake. Finally I told him I would give him $100 if he would coat the other end of the rod in a like manner by the same process.

He very smilingly told me it would afford him the greatest of pleasure to show me my mistake and to accept my apology, and bowed himself out with such composure that I was in great trouble for fear he would succeed. He said he would go to the hotel and get his apparatus. I watched nervously for his return.

In about half an hour a neighboring jeweler came to my back door with $25.00 in his hand saying he had got it all ready to hand to an agent for a silver plating process, the agent representing that I had just paid him $50.00 for a shop-right for the same thing. My neighbor said he had almost handed the agent the money, for the man seemed so honest and straightforward, but to be perfectly sure he excused himself for a few minutes and went out of his back door, across into my door.

I was in a fighting mood by this time and together we started for my neighbor's shop. The man stood in the door, but when he saw us both coming at a rapid rate, he put off with such a lively speed that we gave up the pursuit.

The Man Who Wanted to Trade Back

One time an elderly gentleman came into the store to buy a watch. He had never carried a watch and was therefore entirely inexperienced in such matters. After spending an hour or more, I supplied him with one that seemed to suit him. He paid the price asked and went home apparently well pleased.

The next day he came back and the conversation was something as follows:

"Mr. Root, suppose I decide I do not wish to keep the watch just now after all. How much money must I pay you to trade back?"

"Why, the watch runs well, does it not?"

"Oh yes, at least I suppose it does. Yes, it is just with your clock to the minute. There is no trouble with it so far as I know, but I should like to know just how much money I must pay you to take it off my hands."

It was something of a struggle I confess. I had worked hard, perhaps two hours to make the sale and I did not at all relish taking the watch back and giving him his money. However, as I had sold the watch at a small profit I concluded that the most gentlemanly way would be not to make any change, as it was returned in perfect order, therefore I told him he could have his money back without any charge for my time if he decided he really did not want it. I therefore counted out the exact sum and laid it before him on the counter.

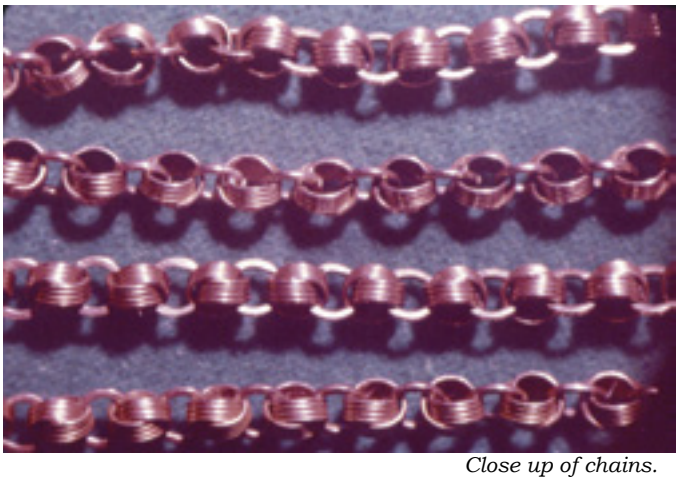
You should have seen his face as he burst into a laugh and put the watch back in his pocket. Then he explained to me the whole circumstance. It seems that he had decided on the purchase without saying a word about it to his grown-up children and when he exhibited it to them and told them he had patronized a town jeweler without having someone experienced in watches to go along with him, they declared he had been swindled outright, and that the watch could not be worth half what he paid for it. He insisted that the man he traded with looked honest, and he said he believed he was honest. Finally one of the sons said:

"Now, look here, father, you go right back to the jeweler tomorrow and ask him how much money you will have to pay him to trade it back. If he does not admit by his reply that he swindled you to the extent of five or 10 dollars we will conclude with you that he is an honest man."

They worried him so much that he concluded to test his new friend to that extent. The children, of course, had to own up that they were beaten, but they declared that it was a most remarkable thing to find a jeweler who would "swap back" without a bonus. Well, he exhibited that watch with great pride to all his friends and acquaintances, and he told the story enough so that it brought others to my store to buy watches. Dear friends, it was a better advertisement for me than any notice I ever put in the papers, and yet I did not know it at the time. "Oh ye of little faith, wherefore do ye doubt?" A man who is honest and fair and upright not only has the love of God in his heart to cheer him on his pathway through life, not only has the confidence and esteem of his fellow men, but he actually makes more money.

Attitude Toward Business Competitors

Some time later, before my conversion, another jeweler and I had a newspaper controversy, and I occupied column after column in our county paper telling the people how good and smart I was and how bad and how unfortunate my brother jeweler was. Both of us paid for these newspaper notices at so much a line, and threw away our money that way, besides throwing it away in selling things at a price less than we could afford. Does a Christian ever get into such jangles? If he does, it seems to me his Christianity is rather weak.



Close up of chains.

Customers who wanted to buy articles of some value would go first to one store and then to the other. One rainy day, after my conversion, when trade was dull, someone wanted a piece of plated ware worth 10 or 15 dollars and, in order to get me to lower my price, the woman mentioned the fact that Mr. W. had a beautiful one that he had offered at so much. What ought a Christian to do? I prayed God to show me and the still small voice said, "Do good to those that hate you." Mr. W. doubtless hated me because I had tried to injure him in the past and had tried to get away his customers and break down his trade in every way I could. I told the customer that it was not unlikely that Mr. W. had got something nicer than I had and perhaps he had succeeded in getting it cheaper than I bought my goods, that I was quite willing she should trade with him for he was a young man just starting in business and I should be glad to see him get along well. The lady looked up in astonishment, but I assured her that I really meant it, and at my advice she bought the goods of my neighbor.

Do you think I felt bad because I had lost the sale? Not at all. God sent into my heart a flood of peace and happiness that was worth more than all the money I ever received in all my life. I kept this up until my neighbor finally concluded that true religion was something worth having, and God crowned it all by enabling me to lead that man to the feet of the Savior.

Did my business suffer meanwhile? Bless you, no! No man's business suffers because he takes a friendly interest in the business of his rival, and delights in turning trade into his hands. I know that I have not kept up that spirit through all my religious life. If I had I should be a happier man than I am now, and very likely I should be a richer man in dollars and cents.

Although I was in the jewelry business for 18 years, to tell the truth I was never much of a friend to jewelry of any kind. I do not know that I wish to criticize the taste of others, but whenever I received money for jewelry it gave me no such satisfaction as it did when I received it for a beehive. BC

Bees Love Solar

Solar Sites Shine!

Rob **Davis**

New opportunities for honey bees and beekeepers are rising like the sun. Partly driven by uncertain crop commodity prices, more are more farmers are choosing to lease multi-acre sections of their land for photovoltaic (PV) solar arrays. With increasingly intense weather, farmers are smartly diversifying their revenue in order to stay afloat and help prevent the suburban sprawl that has been permanently converting farmland into flower-free turfgrass lawns, streets, and strip malls.

But it's what's under the panels that might interest bees and beekeepers the most. By collaborating with several of the nation's most expert honey bee scientists including Drs. Marla Spivak, May Berenbaum, and Dennis VanEngelsdorp, Fresh Energy and our partners are getting more and more solar projects to use a "pollinator-friendly solar scorecard" to inform the vegetation plans for what is grown under and around the panels. Solar farms need vegetative cover that will be resilient to downpours as well as droughts over more than 20 years. Specific seed mixes for pollinator-friendly solar farms have to vary from project to project based on availability, soil, climate, slope, and height limitations, but, thanks to pollinator-friendly solar scorecards, will always be meaningfully beneficial to pollinator health.

PV solar is the kind you see in camping equipment and rooftops that directly convert sunlight into electricity – which then goes into a battery, a home, a business, or onto the grid. In a growing number of states, school districts, churches, and local businesses can save money by getting more and more of their electricity from the sun. And because solar panels never need to be broadcast treated with insecticides, land adjacent to these sites can be well-suited for organic and specialty crop farming or locating an apiary.

The practice of locating honey bee hives on solar farms originated in England, where developers like Eden Renewables continue to manage several pollinator-friendly solar farms and apiaries. The practice jumped the pond to Ontario, Canada a few years later, and is now becoming more popular throughout the United States. Old Sol Apiaries (OR), Bare Honey (MN), and Bee the Change (VT) are among the first.

Beekeepers are all too familiar with NIMBY problems. Some people want to help the bees – or encourage the change to renewable electricity – as long as it happens somewhere else. In this way solar projects and beekeepers are natural allies – both strongly supporting development and management of landscapes that sustainably support humans, our livestock, and wildlife. BC

Rob Davis is the director of the Center for Pollinators in Energy at Fresh Energy. The nonprofit has an extensive archive of information on this topic at ***BeesLoveSolar.org****.*

Best Practices for Solar Farm Apiaries

1. Ensure it is a pollinator-friendly solar site.
- Ask the developer to provide a completed copy of your state's pollinator-friendly solar scorecard, or a scorecard from a state with similar climates and soils. When in doubt, contact Rob Davis at the Center for Pollinators in Energy – **davis@fresh-energy.org**.
2. Have more than a handshake.
- Draw up an agreement with the landowner or solar company that includes the apiary location and your right to access, any planned movement of the hives, as well as price and pre-payment arrangements for a portion or all of the honey.
3. Offer professional packaging options.
- Many solar companies will love to have their name or the project name on a jar or other packaging option that they can share. Some solar companies are even providing honey to the people who get electricity from the site.
4. Location, location, location.
- Place and orient the hives to ensure bee droppings do not accumulate on the panels and bees do not interfere with regular operations and management.
- Request to closely inspect nearby panels for droppings at least once per year.
5. Know the landscaper or ecologist.
- Exchange phone numbers with the vegetation management contacts.
- Agree who will be managing the vegetation near the hives to be free of any invasive or noxious weeds.
6. Keep it separate.
- Extract and keep the honey from the pollinator-friendly solar farm separately from other honey.
- Consumers strongly support solar energy and creating habitat to help save the bees. Honey from solar sites encourages the adoption of pollinator-friendly solar as a best practice.
7. Take precautions
- Have liability insurance and provide a copy to the landowner and/or solar company.
- Install two or more swarm traps at 6' off the ground nearby.
8. Engage with local media and the community.
- Partner with clean energy non-profits and the solar company to educate more people about the importance of solar sites that provide healthy forage.
- Take and share photographs and video of the site. Tell a story with each shot by including the flowering vegetation, the bees or hives, and the solar array.
- Tag your social media posts with **#BeesLoveSolar**.

SUBSCRIBE NOW!

BEEKeeping Magazine – Your First Three Years

Hand Delivered by Trusted Federal Agents

RIGHT TO YOUR MAILBOX!

GET FOUR ISSUES FOR

ONLY $20

(That's 30% off the Newsstand Price!)

CALL NOW: 1.800.289.7668, ext. 3220

Visit: Store.BeeCulture.com/Magazine

ORDER ONLINE AT:
www.BEEKeeping3.com

SEND A CHECK TO:
Beekeeping3
623 W. Liberty St.
Medina, OH 44256

CALENDAR

♦INTERNATIONAL♦

Beekeepers' Caribbean Safari, Trinidad & Tobago, February 12-21. Discover the riches of the Caribbean on the 11-day Safari. The cost is £1965/person.

For information safari@beesfordevelopment.org.

The 5th Edition of the International Symposium on Bee Products in conjunction with Apimondia will be held in Malta May 7-10.

For information **ttps://msdec.gov.mt/en/beeCongress/Pages/default.aspx**.

♦ALABAMA♦

The AL Cooperative Extension System will hold its 24th Annual Beekeeping Symposium at the Clanton Conference and Performance Arts Center, 1850 Lay Dam Road, Clanton on February 2.

Speakers include Tammy Horn Potter, Reed Johnson, Charlie Parton, Larry Connor and others.

For information visit **www.aces.edu/home-garden/beekeeping/** or contact Lindsey Tramel, 334.844.4450.

♦ARIZONA♦

The 12th Annual Organic Beekeeping Conference will be held March 1-3 at the YMCA Camp in Oracle. The cost is $240/person which includes two nights lodging, meals and presentations. The cost is the same even if not staying at the camp.

For information **http://groups.yahoo.com/group/organicbeekeepers/** or Dee Lusby (evenings) 520.748.0542.

♦GEORGIA♦

Young Harris Beekeeping Institute will be held May 22-25.

Speakers include Francis Ratnieks, David Tarpy and Wyatt Mangum.

For information and registration visit **www.ent.uga.edu/bees**.

Georgia Beekeepers Association will hold their Spring meeting February 15-16 in Augusta at Augusta University Summerville Campus.

Speakers include Jennifer Berry, Kim Flottum and Jennifer Tsuruda.

For more information visit **www.gabeekeeping.com**.

♦ILLINOIS♦

Will County Beekeepers Association Bee Prepared 2019 – a full day of workshops for all levels, March 23, at Weitendorf Agricultural Education Center, Joliet Jr. College.

For more information and to register visit **willbees.org**.

♦INDIANA♦

Indiana Bee School XVII will be February 23 at Decatur Central High School, 5251 Kentucky Avenue, Indianapolis. Registration begins at 7:00 a.m. and program starts at 8:30 a.m.

Speakers are Tom Seeley and Jeff Pettis. Sessions for beginners and advanced. Over 30 vendors. Pre-registration is $35/member and $45/non-member including lunch.

For information and to register visit **http://indianabeekeeper.com** or contact Mike Seib, 317.432.5342 or **beekeeper.indiana@yahoo.com**.

♦MICHIGAN♦

MI Beekeepers Association will hold its Spring Conference, March 8-9 at Kellogg Hotel and Conference Center, East Lansing.

Keynote speaker is May Berenbaum.

For information and to register visit **ww.michiganbees.org**.

♦MISSOURI♦

The Midwestern Beekeepers Association will hold their 24th Annual Beginning Beekeeping Workshop, February 23 at Drumm Farm Center for Children, Nelson Hall, 3210 South Lee's Summit Road, Independence.

The cost is $65 and $50 for each additional family member. Lunch, materials and a one-year membership are included in the fee.

For information and to register visit **www.midwesternbeekeepers.org/** or contact Bob Williams, 816.331.6634.

Eastern Missouri Beekeepers will hold their annual workshops and banquet in St. Louis, February 8-9, 2019 at Moritz in Fenton. Tuition for the workshop is $85/person by January 20. After January 21 is is $95/person.

Speakers include Kim Flottum, Andony Melathopoulos, Stephen Pernal, Becky Masterman and Ana Heck. There are courses for beginners and advanced. Lunch and refreshments are included as well as course materials, handouts, a reference book and catalogs.

For information and to register visit **www.easternmobeekeepers.com**. Or contact **info@easternmobeekeepers.com** or 314.669.1828.

♦NEW JERSEY

Bee-ginner's Beekeeping: The Basics of Apiculture, May 2-4; **Review of Basic Beekeeping**, February 16. Both held at Rutgers Eco Complex, Bordentown.

For more information visit **http://www.cpe.rutgers.edu/courses/current/ae0404ca.html**.

♦NEW YORK♦

Southern Adirondack Beekeepers Association will hold their annual one-day seminar March 30.

Speakers are Michael Bush and Kim Skyrm.

For more information visit **http://adirondackbees.org/**.

♦NORTH CAROLINA♦

Organic/Sustainable Beekeeping Seminar, March 30 at Campbell University, Bules Creek.

Speakers are Kim Flottum and Kirsten Traynor.

For more information visit **ttps://tinyurl.com/campbell-event**.

♦OKLAHOMA♦

The Northeast Oklahoma Beekeepers Association will hold The Big Bee Buzz March 29-30 at Venue 68 in Tulsa.

Speakers include Dennis vanEngelsdorp, Jerry Hayes, Ed Levi and Katharina Davitt. The price is $40/pre-register and $50/at the door.

For more information visit **neoba.org**.

♦PENNSYLVANIA♦

Introduction to Beekeeping February 2-3 and March 23-24 at Temple University, Ambler, 11:00 a.m. to 3:30 p.m. The class is taught by Vincent Aloyo.

For information or to register vivit **http://vincemasterbeekeeper.com/course/**.

♦TENNESSEE♦

Honey Convention March 21-23 at Fountainhead College of Technology, 3203 Tazewell Pike, Knoxville.

For more information and to register visit **www.honeyconvention.com**.

♦TEXAS♦

Austin Area Beekeepers Association will hold their seminar February 2 at the Austin Marriott North, 2600 La Frontera Blvd., Round Rock. The cost is $70.

All experience levels are welcome. Over 35 presentations will be offered.

For more information email **ance@beekeepinghelp.com**. Register at https://aabaseminar2019.eventbrite.com

♦WYOMING♦

Wyoming Bee College will be held March 23-24, with a preconference workshop offered March 22. The cost of the conference is $85, workshop $125 or both for $195.

For more information visit **https://visitcheyenne.regfox.com/bee-college-2019**.

♦WISCONSIN♦

Beekeeping and More February 16 at Fond du Lac Tribal and Community College. Fee is $20 for association members and $25/non-members.

For information contact Courtney Kowalczak **courtneyk@fdltcc.edu** or 218.879.0862.

Display Advertisers

If you are having an annual meeting or teaching a beginning beekeeping class, we are happy to send you magazines to give to your attendees and students. BUT – we need to receive your request four weeks before your event so that we have time to process your request. Please email Amanda at Amanda@BeeCulture.com with the number of magazines needed, a complete mailing address and a contact person.

Check Us Out At

- **www.BeeCulture.com**
- **www.Facebook.com/Bee Culture Magazine**
- **Twitter.com/beeculture**

***Sign up for the FREE News Service* – CATCH THE BUZZ – at BeeCulture.com, and read hundreds of recent BUZZ posts at BeeCulture.com/category/catch-the-buzz**

Quick Trip To Boulder

Ed **Colby**

My gal Marilyn thinks we should all do our part to reduce global warming by using public transportation. So when I announce that I'm driving over the Continental Divide to Boulder for a Colorado State Beekeepers Association (CSBA) board meeting, she says, "Why not take the bus? You could come back on the Amtrak."

Boulder is a mere three-hour drive from Colby Farm, but Marilyn's idea intrigues me, especially since our five vehicles are all beaters.

So I catch the 7:25 a.m. "Bustang" out of Glenwood Springs, get off in Golden to visit Marilyn's niece, then hop the new light rail to downtown Denver. From Union Station, the "Flatirons Flyer" bus takes me to Boulder where Neil and Tina pick me up. We arrive ten minutes early for the 5 p.m. board meeting at Kristina's house.

I confess that CSBA board meetings are not exactly models of efficiency. We sometimes wander from the agenda. I tell jokes that make Tina wince. We've been known to whip a dead horse. Three hours and fifteen minutes into the meeting, I say, "Guys, we gotta wrap this up." We've covered our agenda. I'm pleased with the evening's accomplishments. I think we all are.

I crash on the rollaway in Kristina's basement. When I awaken at 4 a.m., I'm pretty sure I'm not going back to sleep, so just as quiet as a little mouse I slip out the front door, walk down Table Mesa Drive and catch an early bus back to Denver. As I step into cavernous Union Station, I stop in front of the flower shop to admire the image of a pink, two-foot wide, spread-winged honey bee.

The Amtrak is running late. My bright-eyed breakfast server buoys my spirits. When I emerge into the metropolitan bustle, the world looks fresh and new, a better place.

What's all this about partisan politics and a nation divided? As I watch an older gentleman hold the door for four strangers, the pettiness and meanness of humanity melts away. Every woman appears to me angelic, every man a noble-hearted brother. Am I in Heaven?

Outside on the street, a crane lifts a beam onto a building under construction. Above me I can see the operator's hands on the controls as he eases his burden into place. He has an American flag in his side window.

I stop in front of the 25-foot-wide, four-story Hitchings Building on Market St. Its dizzying courses of half-high bricks, stone lentils, ornately carved woodwork, arched windows, and concrete gingerbread hearken to the grandeur of the late Victorian era. Today it's a pot shop.

A young man in a tan suit and Bogart slouch hat strides jauntily down the sidewalk and disappears into a law office. I stop to talk to an old woman about her dog. Back at Union Station, everyone is staring at their mobile devices.

In line to board the train, I stand behind a woman of a certain age. Her son asks if she can get on the train by herself. She nods in silence. He kisses her cheek, tells her that he loves her, and walks away. She turns sidelong to watch him go. I feel an ineffable sadness at the frailty of the human condition.

We strike up a conversation. Her friend will pick her up in Granby. She lived in Montana once, on Finley Point, on Flathead Lake's south shore. She worked a summer job in a sweet cherry orchard. She misses the place. "Only five people lived on the point when I was there."

"Why did you ever leave?" I ask.

"I had a husband," she mutters. "He wanted the bright lights. I never did."

She smiles when I say, "We don't necessarily marry the right person."

She wants to sit downstairs, but an unsympathetic conductor tells her that her ticket is only good upstairs. We sit across the aisle from each other. Once we're underway, I tell her, "Sit wherever you want. What are they going to do?" She thanks me for the advice and heads downstairs.

In the observation car, a man asks me why the bees are dying. I do my best to explain.

I want to read my *Bee Culture*, but how can you ride over the Rocky Mountains on a train and not look out the window? You might miss something. In Gore Canyon I watch a bald eagle enjoy a gory lunch on the ice.

Downstairs in the observation car young people drink beer and talk about sports and music. A woman sings the "Peanut butter jelly with a baseball bat" song and dances around the car, as the others cheer her on. I ask the singer if Marilyn and I could hire her to go on trips with us to entertain us and make us feel young again. I ask if they are friends traveling together. No, they say, they never met until this trip. They want to know why the bees are dying.

When I get off in Glenwood, Marilyn picks me up in her school bus that she's shuttling across town. I tell her not to get fired on my account. But she's a rebel. She never listens.

I'm almost home. It's 3 p.m., just 30 hours since I left town. I could have made this trip the easy way, alone in my car. I'd have been home hours ago. But for a hundred reasons, I'm glad I didn't.

Blue Sky bee supply®

Tool Box
3 handle designs to choose from.

Contents not included.

Lega Smokers

Polystyrene Hive Kit

$59.95

Single Deep Polystyrene Hive Kit
Includes: 1 screened bottom board, 1 entrance reducer with shutters, 1 deep hive body (unassembled), 1 reversable cover. Available in 8 & 10 Frame.

Polystyrene 6 Fr Nuc Kit

$46.99

Kit includes
1 screened bottom board,
2 entrance reducers,
1 deep frame body (unassembled),
1 reversible cover. Frames and foundation **NOT INCLUDED.**

NEW Protective Suits & Jackets

Blue Sky Bee Supply Deluxe Cotton Jacket

BeeKool Pro Ventilated Suit

Honey Bottling

CLASSIC PLASTICS
8 oz - $19.99/50 ct. Case
16 oz - $23.99/50 ct. Case
32 oz - $39.99/50 ct. Case
No Caps

DECO EMBOSSED JUGS
5 LB- $78.35/72 ct. Case
3 LB - $99.95/126 ct. Case
No Caps

GLASS MUTH JARS
4 oz - $28.49/36 ct. Case
8 oz - $12.95/12 ct. Case
16 oz - $16.95/12 ct. Case
includes corks

PLASTIC PANEL BEARS
2 oz Panel Bears $229.95/800 ct. Case No Caps
6 oz Panel Bears $181.45/660 ct. Case No Caps
8 oz Panel Bears $144.95/525 ct. Case No Caps
12 oz Panel Bears $114.95/400 ct. Case No Caps
16 oz Panel Bears $94.69/240 ct. Case No Caps
24 oz Panel Bears $89.50/195 ct. Case No Caps

CLASSIC GLASS JARS
8oz - $14.50/24 ct. Case
16 oz - $8.45/12 ct. Case
32 oz - $12.95/12 ct. Case

GLASS SKEP JARS
12 oz glass jars
$10.45/12 ct.
includes Gold Metal lids

FOR BEES. FOR HONEY. FOR EVERYONE | (877) 529-9BEE | www.blueskybeesupply.com

NEED BEES?

Look no further than Mann Lake for quality bee packages and queens to start the season off right. Our bee supplier consistently produces strong and healthy bees year after year to ensure you're getting productive packages with gentle queens.

- QUALITY
- PRODUCTIVE
- STRONG
- HEALTHY

OHB

FOUNDING MEMBER BEE INFORMED

NC State Queen & Disease Clinic
APICULTURE PROGRAM

Packages & individual queens will be available for pick-up at our fully stocked locations in:

HACKENSACK, MN
WILKES-BARRE, PA

MANN LAKE
WE KNOW BEES

800-880-7694
www.mannlakeltd.com

Hackensack, MN • Wilkes-Barre, PA • Woodland, CA • Marshall, TX

*Free shipping applies to most orders over $100 sent standard ground service within the lower 48 states. Prices effective 12/1/18 thru 12/31/18 and are subject to change without notice.