BEEKEEPING AT TUSKEGEE UNIV.

JAN 2022

Catch The Buzz™

Bee Culture

The Magazine Of American Beekeeping

www.BeeCulture.com

2022 Almond Pollination Outlook

Build a Modified Dadant Hive Body

A Closer Look – Wintering Honey Bees

ROOT

$4.99

THE WAIT IS OVER!

The 42nd edition of the *ABC and XYZ of Bee Culture* is now available!

Item #X5-42

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

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

Get your copy today at https:www.store.beeculture.com/books/ or mail your check or money order to Bee Culture, 623 West Liberty Street, Medina OH 44256.

Blue Sky bee supply®

It's not too early to plan ahead for Spring!

PARADISE POLYSTYRENE 10 FRAME DOUBLE DEEP HIVE KIT

$93.95

Includes screened bottom board, entrance reducer with shutters, 2 unassembled deeps, clear mylar inner cover, ventilated top cover. (frames & foundation not incl)

NOT styrofoam! High-density polystyrene has an R-value of approx. 8

- Warmer in winter, cooler in summer; less fluctuations in temps
- Quicker brood build-up in spring
- No wrapping etc
- Light weight
- Compatible with existing 10-frame wood supers!

INSTRUCTION SHEETS AVAILABLE

PARADISE POLYSTYRENE 3/6 FRAME NUC KIT

$49.99

Includes screened bottom board with 2 entrances on opposing corners, 2 entrances reducers, deep nuc body (unassembled), and cover. (frames & foundation not incl)

When operating as a 6 frame colony, one entrance can be closed completely. When used with the optional corrugated divider board, each 3 frame nuc can have its' own entrance on opposing corners.

6 FRAME CORRUGATED DIVIDING BOARD

$7.10

Honey Bottling

Caps

PRINTED METAL CAPS

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

Plastic

a PLASTIC PANEL BEARS

2 oz Panel Bears
$70.21 / 160 Ct. Case
WITH Caps
6 oz Panel Bears
$211.20 / 660 Ct. Case
No Caps
12 oz Panel Bears
$119.54 / 365 Ct. Case
No Caps
16 oz Panel Bears
$91.95 / 200 Ct. Case
No Caps

b DECO EMBOSSED JUGS

5 LB - $90.67 / 72 Ct. Case
3 LB - $118.87 / 126 Ct. Case *No Caps*

c CLASSIC PLASTIC JARS

32 oz - $73.77 / 110 Ct. Case
No Caps
16 oz - $94.19 / 225 Ct. Case
No Caps

d SQUARE PLASTIC

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

Glass

e GLASS 3 OZ. MINI MASON

$19.95 / 36 Ct. Case
Lids now available in Gold, Black or White

f GLASS 12 OZ. HEX EMBOSSED CYLINDER

$12.95 / 12 Ct. Case
Gold Metal Lids Included

g 12 OZ & 3 OZ GLASS SKEP JARS

12 oz Skep Jars $18.85 / 12 Ct.
3 oz Skep Jars $15.95 / 24 Ct.
Gold Metal Lids Included

h MUTH JARS

4 oz - $32.49 / 36 Ct. Case
8 oz - $14.95 / 12 Ct. Case
16 oz - $19.95 / 12ct. Case
Includes Corks

i CLASSIC GLASS JARS

8oz - $19.10 / 24 Ct. Case
16 oz - $9.75 / 12 Ct. Case
32 oz - $13.95 / 12 Ct. Case

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

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

TREAT DURING THE SPRING SEASON FOR

45% HIGHER HONEY YIELDS*

*By treating for nosema, studies show 45% higher honey yields

FUMIDIL-B

NOSEMA PREVENTATIVE & TREATMENT

- Only known U.S. registered treatment for Nosema
- Promotes healthy bee packages for thriving colonies
- Helps control infection rate in winterized colonies

25 g $34.95

500 g Bottle $214.95

Case of 12 $189.99 ea.

MANN LAKE EXCLUSIVE

Stronger & Healthier Hives

HIGHEST PROTEIN CONTENT AVAILABLE

ULTRA BEE

- Increased brood production
- Promotes healthier and stronger bees
- Beneficial vitamins, minerals, and fats
- No animal byproducts

40 LB $103.95

BULK 2100 LB $2,829.75

THOUSANDS of products

EXCLUSIVE online sales

MANN LAKE
MANNLAKELTD.COM

800-880-7694

SIX RETAIL locations

CUSTOMER SERVICE for all your needs


MADE IN THE
USA
DADANT & SONS, INC.
HAMILTON, IL 62341
Dadant
Online dadant.com
Toll-Free 888.922.1293

Bee Culture

January Features . . .

800.289.7668
Executive Publisher – John Root
Associate Publisher, Senior Editor – Jerry Hayes, Jerry@BeeCulture.com, Ext. 3214
Layout & Design – Emma Wadel, Emma@BeeCulture.com, Ext. 3215
Advertising – Jean Newcombe, JNewcombe@BeeCulture.com, Ext. 3216

Contributors
Clarence Collison • James E. Tew • Kim Lehman • Jay Evans
Connie Krochmal • Jessica Lawrence • Ross Conrad • 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), January 2022, Volume 150, Issue 1, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Subscriptions, Book Orders – 800.289.7668, Ext. 3220 • www.BeeCulture.com • info@BeeCulture.com

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

Two different Winter beeyards – one north, one south.

Pierco®

EST. 1977

Genuine Pierco
Manufactured in-house

FREE SHIPPING

* See website for details

We Offer DOUBLE & TRIPLE WAX

Frames - Plastic

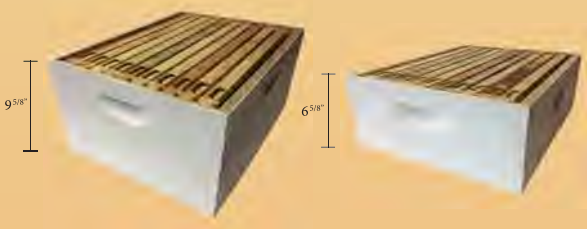
- Super Strong and Durable
- Safe - FDA food grade plastic
- Easy to use - No Assembly Required

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

Check us out at: **www.Pierco.com**

FOR ALL YOUR BEEKEEPING NEEDS

HOBBYISTS / SIDELINERS / COMMERCIAL BEEKEEPERS

AgriSea
Bee Nutrition

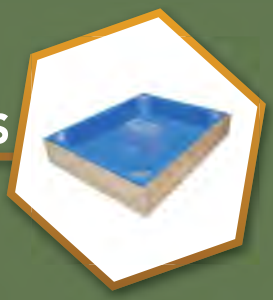
- Seaweed Nutrition
- Reduction of Nosema Spores
- Certified Organic
- No Chemicals/GMO free
- Key Nutrition to Build Hives
  - Add to Syrup or Patty mix

Pierco – **EXCLUSIVE** supplier of AgriSea

MITE CONTROL

BEEKEEPING KITS

TOP FEEDERS



★ IMPROVED ★
PROTECTIVE WEAR

IN-HIVE FEEDERS

Call or Visit us at:

Factory/Store Address: 680 Main St. | Riverside, CA | 92501
Get Connected | (800) 233-2662 Made in the USA

Since 1863 Dadant & Sons has produced quality beekeeping supplies. Manufactured in the U.S. at the Dadant Metal Plant, our line of American made extractors, tanks, and smokers are built to a quality matched by none. At Dadant, we believe that ***"it pays to furnish good goods."***

Dadant

www.dadant.com

EST · 1869

ROOT

AMERICAN MADE CANDLES

DISCOVER AN OHIO ORIGINAL

It all started with a swarm of bees.

Over 150 years ago, Amos Ives Root was inspired to start a beekeeping business when a swarm of bees landed on the window of his jewelry store. That simple event created a company that has become synonymous with beekeeping, honey, pure beeswax, and the highest quality candles.

A Root candle is clean burning, long lasting, elegantly designed, and luxurious. It is a candle burning experience unlike any other.

623 West Liberty Street
Medina, Ohio 44256
330-723-4359
rootcandles.com

SAVE 20%

on your total purchase at RootCandles.com!
Now through Jan 31st, 2022.

USE PROMO CODE: CatchTheBuzz2022

BEE FRIENDLY • BEE FRIENDLY • BEE FRIENDLY

We love bees...
Root is actively involved in advancing the knowledge and science of beekeeping.

We proudly call out our "Bee Friendly" products and services.

Create a sanctuary at home with our most luxurious candle collection yet!

Classics by Root Candles consists of six exquisite and captivating fragrances that will envelop your home in pure luxury.

Bee Culture's Best . . .

Page 51

In Every Month –


COLORADO
BEE VAC
Betterbee®
MADE IN USA
WORLD'S LEADING HIVE RELOCATION VACUUM
1.75 HP VACUUM WITH ADJUSTABLE SUCTION
EVENLY DISTRIBUTED VACUUM PRESSURE
HOLDS UP TO 10 POUNDS OF BEES
HAND ASSEMBLED IN NEW YORK
CALL US: 800-632-3379 | SHOP ONLINE: betterbee.com


Betterbee®
distributor for
LYSON
POLYSTYRENE HIVES & NUCS
2-88 FRAME HONEY EXTRACTORS
WAX & HONEY PROCESSING EQUIPMENT
SMOKERS & OTHER BEEKEEPING TOOLS
EASY-TO-USE SILICONE CANDLE MOLDS
CALL US: 800-632-3379 | SHOP ONLINE: betterbee.com
LYSON DEALER INQUIRIES WELCOME!

Obituary

Dr. Roger Allen Hoopingarner of Holt, Michigan died Saturday, November 6th after a two-week battle with breakthrough Covid-19 virus – just days before his scheduled booster shot.

Professor Emeritus at the MSU Department of Entomology, Roger was a world-renowned expert in Apiculture (the study of honeybees). He taught, served as Michigan Cooperative Extension Specialist, and researched the biology and management of the honey bee, including seminal work in pollination of orchard crops. He was an author, co-author, or cited in hundreds of research articles and books, and an international speaker on all things honey bee.

Roger became interested in honey bees as a teenage Boy Scout in Detroit. These insects so interested him that he chose to major in Entomology at Michigan State College. While at MSC he met and courted his future wife, Barbara (neé Kuhl), who was a Home Economics Education major. She was his helpmate and love for 43 years until her death in 1999.

After graduating in the first class of Michigan State University in 1955, Roger went on to graduate school at the University of Wisconsin, Madison where he earned both M.S. and Ph.D. degrees. After a year as a post-doctoral fellow, he returned to MSU as a faculty member in the Department of Entomology until his retirement after 38 years.

Roger was active in the worldwide beekeeping community throughout his life – always willing to help, answer any questions, teach seminars and lend a hand to amateur and professional beekeeper alike.

He was an active an d committed volunteer throughout the community, including with the University Lutheran Church, Boy Scouts of America, Eaton Rapids Historical Society, the Buenos Aires National Wildlife Refuge, and many beekeeping associations throughout the country.

On December 29, 2015 he married lifelong friend, Marian Stoll. They were married at University Lutheran Church, which has been the heart of their faith and cornerstone of their marriage and where their families have celebrated since the 1960's. Together they have enjoyed traveling, attending MSU sporting events, theater and spending time with their joyful extended family full of love and laughter.

Roger is survived by his wife, Marian Lois (neé Stout) Stoll, sister Marilyn DeRoche, and brothers Kenneth (Donna), Douglas (Suzanne), and Donald (Dorothy) Hoopingarner.

He is also survived by children Lynn Marie Hoopingarner of West Hollywood, California, Harper West of Rochester Hills, Michigan, and Dale (Laura) Hoopingarner of Milford, Massachusetts, and their children Kelsey Collins of Windsor Locks, Connecticut, and Jenna (Pat) Terrio of Canton, Massachusetts.

He was preceded in death by his step-daughter Sarah Ortwine, and is survived by his step-children Martha (Todd) Albertson, John (Patricia) Stoll, Matthew (Kristy) Stoll, Mary (Greg) Gluck and twelve grandchildren.

Roger was a much beloved father, brother, uncle, cousin, colleague, mentor and friend and will be remembered for his kindness, generosity, humor, passion for science, the environment, knowledge and learning, and so much more. He will be much missed by his extended family and dear friends all over the world.

A service for immediate family will be held at ULC this Fall followed by a Celebration of Life in the Spring of 2022.

In lieu of flowers, those wishing to honor Roger's memory may do so through contributions to: Roger Hoopingarner Endowed Professorship in Apiculture/Entomology at Michigan State University. Checks payable to: "Michigan State University" Memo: "Roger Hoopingarner Endowed Professorship" Mail to: University Advancement 535 Chestnut Rd. Rm. 300 East Lansing, MI 48824

University Lutheran Church Memorial Garden. Checks payable to: "University Lutheran Church" Memo: "Memorial Garden" Mail to: 1020 S. Harrison East Lansing, MI 48823

Michigan Beekeepers Association: **www.MichiganBees.org**

Brother Adam
The Switch to Modified Dadant sized Woodenware

Beekeeping has been around a long time, so we do have celebrities in our world of Honey Bees. Aristotle wrote about honey bees, A.I. Root, Charles Dadant, Edmund Hillary, Brigham Young, Charles Mraz, Eva Crane and many more were inspirational beekeepers.

When I discovered honey bees and beekeeping "long, long ago on a planet far, far away" one of the names that was always mentioned was Bro. Adam. The short story is that Bro. Adam started learning about honey bees and beekeeping in 1915 at Buckfast Abbey, Devon, England. For those of you who may have heard of Bro. Adam's decades long honey bee breeding genetic improvements with the result of the Buckfast Queen this is the person.

Bro. Adam's birth name was Karl Kehrle. Here is a little bit of his Bio.

Because of health problems Karl was sent by his mother at age 11 from Germany to *Buckfast Abbey*, where he joined the Benedictine order of monks (becoming Brother Adam) and in 1915 started his *beekeeping* activity. Two years before, a parasite, *Acarapis woodi,* (the Tracheal mite which we still have today) had started to extend over the UK. Called the Isle of Wight disease, devastating all the dark native bees. In 1916 it reached the Abbey, killing 30 of the 46 bee colonies.

Bro. Adam was allowed to travel to *Turkey* to find resistant bees for *selective breeding* back at the Abbey. In 1917 he created the first Buckfast *strain*, a very productive bee resistant to the Tracheal mite parasite. In September 1919 Bro Adam was put in charge of the Abbey's apiary, after the retirement of his mentor (boss) Brother Columban. In 1925 and after some early studies on breeding honey bees he created his famous breeding station in *Dartmoor*, an isolated cold, treeless,windy location a few miles from Buckfast Abbey to try obtain selected Drone and Virgin Queen matings. From 1950 and for more than a decade Bro. Adam continued his gradual improvement of the Buckfast bee by analyzing and crossing bees from places all over *Europe,* the *Near East* and North Africa.

In 1964 he was elected member of the Board of the Bee Research Association, which later became the *International Bee Research Association*. He continued his improvement of the Buckfast bee. During the 1970s he received several awards, including appointment as an Officer of the *Order of the British Empire* and the *German Bundesverdienstkreuz.*

On 2 October 1987 he was appointed *Honorary Doctor* by the Faculty of Agriculture of the *Swedish University of Agricultural Sciences* while in search of a bee on the *Kilimanjaro* mountains in *Tanzania* and *Kenya*. This deeply moved him, and he saw this as the official recognition of the scientific nature of his research. Two years later he was appointed Honorary Doctor by *Exeter University* in England.

On 2 February 1992, aged 93, he resigned his post as beekeeper at the Abbey and was permitted to spend some months in his home town Mittelbiberach, Germany with his niece, Maria Kehrle. From 1993 onwards, he lived a retired life back at Buckfast Abbey, and became the oldest monk of the English Benedictine Congregation. In 1995, at age 97, he moved to a nearby nursing home where he died on 1 September 1996.

Everything I knew about Brother Adam I learned in my early days in beekeeping as he was still alive and active at Buckfast Abbey. I was

cleaning out some clutter in my office at *Bee Culture* and discovered a small paper back 86-page book titled *Bee-Keeping At Buckfast Abbey* by Brother Adam, printed in 1975 in England. I was excited. I read it and then I read it again. So many good things I had learned over the years but didn't know where they came from. They came from Bro. Adam.

The intent of this article and the future ones is that Bro. Adam changed the size and style of his honey hive boxes from the British Standard to the large Modified Dadant Hive. Over this coming season I am going to try out a custom made, by Ed Simon, Modified Dadant hive to compare and contrast hive sizes.

But first I want to share some insights from Bro. Adam in his book "Bee-Keeping at Buckfast Abbey" about honey bees, beekeepers and how he decided to transition to a different hive.

Principles of Management - Page 8

"There was a time, not so many years ago, when great value was placed on certain particular methods of management, based on complete disregard of the truly marvelous organization and wisely balanced interactions regulating the activities of a colony of honey bees. However, experience has shown that all such intrusions and lack of elementary considerations not only usually fail to achieve the intended results but in fact prove positively harmful to

From The Editor –

the well being of a colony. Indeed, were it not for the most extraordinary ability of the honey bee to overcome and adjust itself to the most flagrant, wanton interference of many well-meaning custodians (beekeepers), success in the keeping of bees would prove even far more of a hazard than is actually the case. There is doubtless some truth in the assumption that in many instances a colony will produce a surplus (honey) in spite of the beekeeper"

The Hive - Page 13

"I now pass to make a few observations on the hive we are using and some indications of the reasons which prompted us to adopt this particular type, as for almost 50 years we used British Standard equipment before the changeover to the Modified Dadant hive in 1930.

Needless to say, the type of hive used has a bearing on the results obtained in honey production. On the other hand, we must not lose sight of the fact that a modern hive is in many respects merely a tool in the hands of the beekeeper. Bees are by nature extraordinarily undemanding and accommodating, a hollow tree, a cavity in a rock or wall having formed her normal habitation from time immemorial.

Perfection in a modern hive is not found in a complicated design nor in a multitude of gadgets, but on the contrary in an extreme simplicity of every detail. The more conveniently and more rapidly, and with the least effort the seasonal manipulations can be carried out, the more perfect the hive from the strictly practical point of view. It is indeed surprising how one can produce honey with best success by the use of the simplest of makeshift hives and equipment. There is however one really vital consideration, namely, the capacity of the brood chamber."

"It is now widely accepted that the more prolific Italian bee demanded a very much larger breeding space than afforded by a single ten frame British Standard brood chamber. The needed capacity of breeding space, whether it should be provided in one large unit or two smaller ones, was less easy to decide. The majority of the more progressive beekeepers favoured the Langstroth hive. But a single Langstroth brood chamber though considerably larger than the British Standard, was still too small for a prolific queen. We did not wish to use two Langstroth brood chambers as is common practice in America, and wherever this hive has been adopted. Indeed, I saw no real advantage when thus used between the Langstroth and the British Standard. Twenty combs had to be examined in either case. Moreover, as experience has amply demonstrated, the space between the two brood chambers tends to act as a barrier to the queen with the result that, though the breeding space is there, the actual area of brood rarely if ever exceeds that when no such barrier obstructs the movements of queens. Our final choice, therefore, fell on a brood chamber holding twelve Modified Dadant frames. A brood chamber of this size is square and measures 19⅞ inches x 19⅞ inches x 11⅞ inches in depth. The supers are of identical size but only 6 inches deep...."

"It will be readily appreciated that a changeover of this kind would not have been justified without tentative tests carried out over a period of years. The most convincing arguments and conclusions concerning all practical aspects of beekeeping require substantiation by concrete results. In order to secure positive comparisons of the kind needed we transferred in the summer of 1924, half the number of colonies in each out apiary into 12 frame Modified Dadant hives. The other 20 hives in each apiary remained on British Standard combs and on two brood chambers. The summer of 1924 was a poor one, but we managed to carry out the changeover without undue difficulty. The following summer proved outstandingly good. The comparative results achieved between the colonies on British Standard combs and those in Modified Dadant hives were indeed startling. The colonies in the Modified Dadant hive fulfilled our most optimistic expectations, not only in regard to every practical consideration, but foremost in a very substantial difference in the amount of surplus produced. On the Moor (heather) the yields were approximately double that of the colonies in the smaller British Standard hives, a result confirmed in the succeeding years. These comparative tests, involving 120 colonies of which half were on British Standard combs and the others on Modified Dadant combs, situated in three different localities, were maintained over a period of five years. At the expiry of this period the overwhelming advantages of the large hive were from every point of view beyond dispute. The final changeover of all our colonies to twelve frame Modified Dadant hives was made in 1930."

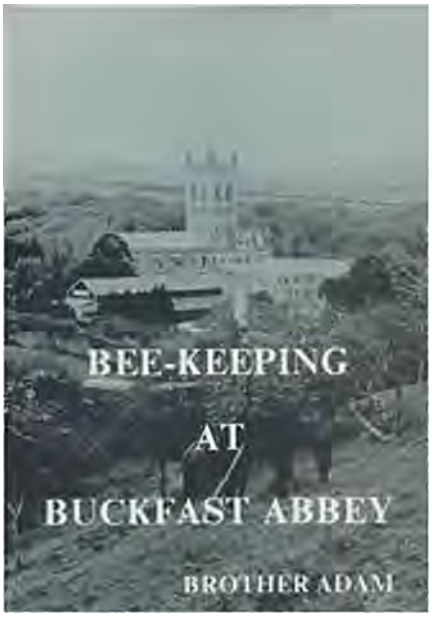
The Aim of Beekeeping - Page 18

"In order to place beekeeping at Buckfast in true perspective, I have to point out that South Devon (England) is no bee paradise. Our rainfall averages no less than 65 in. and is one of the highest in the British Isles. The imperative need of exceptional strong colonies such as can take full advantage of the honey flow whenever it arises is a prime necessity. With haphazard methods one cannot hope to secure remunerative crops in this area. Only the most intensive form of beekeeping will, in such environmental conditions prove profitable.

While therefore, our beekeeping is of necessity carried out on intensive lines it is nevertheless, based on the simplest and most elementary ways of management. Methods of questionable value and every step not really necessary are eliminated. It is indeed truly astonishing what few means we can employ that have a positive influence on the well-being and prosperity of a colony and in turn on the economic results. When all is said and done our efforts and endeavors are restricted to a kindly ministration serving the needs of a colony. When bees were still kept in 'skeps' the term "bee master " was in common use—with some justification, for a time the life and death of a colony, was at the end of the season, determined by him. But we really never have had or ever will have a mastery over the honey bee. She is wild by nature and will at times have her own way and will unfailingly and un

erringly follow her instincts. It is up to us to understand her ways and adjust ourselves to her truly marvelous nature, not attempting the impossible of "mastering" her. But rather doing all we can to serve her needs."

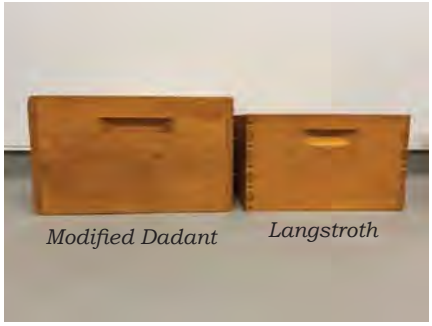
I wish I had read *Beekeeping at Buckfast Abbey* years ago. He is honest, truthful and insightful of his journey with honey bees at Buckfast Abbey. I would suggest you google up where you can buy this short 86 page book and set aside an hour to read it. It will make a difference in your honey bee, beekeeping outlook.



So now if you have gotten this far here is my plan.

Ed Simon, Master Craftsman, has laid out and cut out, hive bodies, supers, frames, tops, bottom, queen excluders for the Modified Dadant Hive. We are going to follow along with Eds instruction to build all of these LARGER than Langstroth hive components over the next couple months.

And I am going to do a very non-scientific typical backyard 'trial' on comparing my Langstroth two brood chamber colonies to the Modified Dadant that Ed Simon, 'Master Woodworker' made for me.



BUILD A MODIFIED DADANT HIVE BODY

Ed **Simon**

I just started reading *Beekeeping at Buckfast Abbey*, by Bro. Adam.... of course. One thing that got my attention was his support of what he calls the Modified Dadant (MD) hive, with his dimensions of 19⅞" x 19⅞" x 11⅞". In application not two 'deeps' of this size for a colony but simply one for his climate. He [Bro. Adam] admits that for migratory beekeeping this size is perhaps too large but for most other beekeeping applications it is superior. Supers are 'square' same dimension but hold a 6¼ frame.

That is how Jerry Hayes started his email to me last summer.

The kicker was at the end of the email when Hayes asked me to build a hive to match these dimensions as close as possible.

The result is a design and implementation that can be built using currently available dimension lumber.

Design Decision:

Modifications were negotiated to the design that would allow for the use of available material with a minimum amount of labor and for the reuse of existing beekeeping equipment. These were:

Hive Body

- To make building the Modified Dadant (MD) hive easier and cheaper, the width and height dimensions are changed slightly from the original. This was done to make use of current precut frame parts and currently sized dimensioned lumber.
- To keep with the original twelve frame Dadant hive, the width is changed to 19". This width maintains the currently accepted bee space at each side of the hive body at ½".
- The height of the brood hive body is reduced to 11¼" to make use of the standard 1" x 12" lumber available at your local home improvement store or lumber yard. This reduces the labor, cost and expertise needed to join two pieces of wood.
- A standard medium hive body height (6⅝") will be used for the honey supers. The width and length will match the MD hive body dimensions.
- Easy to cut DADO Blade handles will be used on all four sides of all boxes.
- Gargoyles[1] are added to the top corners of all hive bodies to ease the placement of a hive tool.

Parts

1) ¾" x 11¼" x 19⅞" – Side (4)
2) ¾" x 11¼" x 17½" – End (4)
3) ¾" x 6⅝" x 19⅞" – Super Side (4)
4) ¾" x 6⅝" x 17½" – Super End (4)

Construction

This is a terse description that assumes that you are comfortable reading construction drawings and

[1]Bee Culture 2021 Dec. "Gargoyles are Useful and Free"

A Gargoyle

that you have experience constructing Langstroth style hive bodies. If there is any ambiguity in the description, please reference the accompanying drawing "Modified Dadant Hive Body". Please read the complete instructions and resolve any questions before starting the construction process.

Build MD hive bodies

Step 1: Cut the MD brood box and honey supers sides and ends.

Using the diagrams provided cut all the hive bodies sides and ends (parts 1, 2, 3, 4) to length and width.

Step 2: Add the handholds.

Using the diagrams provides cut the handholds to the hive bodies sides and ends.

Note: A DADO Blade handhold was used for these hive bodies. Use whatever style handholds you are comfortable with.

Note: Depending on the choice of a top, the distance to the top of the handhold may need to be changed. The top of the handhold needs to be below any extension (lip or cleat) on your style of top.

Note: A 1½" to 2" drop to the top of a handle will probably work for most hive top designs.

Hint: Make it easy on your fingers. Double cut the DADO handholds so the height is at least 1½" high. Depending on the size of your hands a larger cut may even be needed.

Step 3: Cut the frame rests in the hive body ends.

Using the diagrams provided cut the ⅜" x ⅝" frame rest on the ends (parts 2, 4).

Warning: Be careful. Mark the ends as ends. The length measurements for the sides and ends are close. Once a frame rest is cut it is impossible to uncut it.

Step 4: Add gargoyles to the side top corners.

Using a belt sander to remove the top corners from the sides (parts 1, 3) of the boxes.

Important: Only add the gargoyles to the top of the sides and on the handle side. I repeat **ONLY** the handle sides top corners.

Step 5: Assemble the boxes.

Use a high-quality external glue, and staples, screws or nails to join the corners. The hive bodies must have square corners. When assembling the boxes measure the distance to opposite corners. The measurements should be the same.

Check Point In addition to being square, use a frame top bar to insure it fits in the box and it can be easily removed and replaced.

Step 6: Paint the boxes.

Get some recycled free exterior latex paint from your local recycling center and paint two coats on the hive body.

Many additional instructions and steps are needed to build a complete Modified Dadant Hive. They will follow in subsequent months.

Two of these modified Dadant (MD) hives are scheduled to be used by Jerry Hayes during 2022.

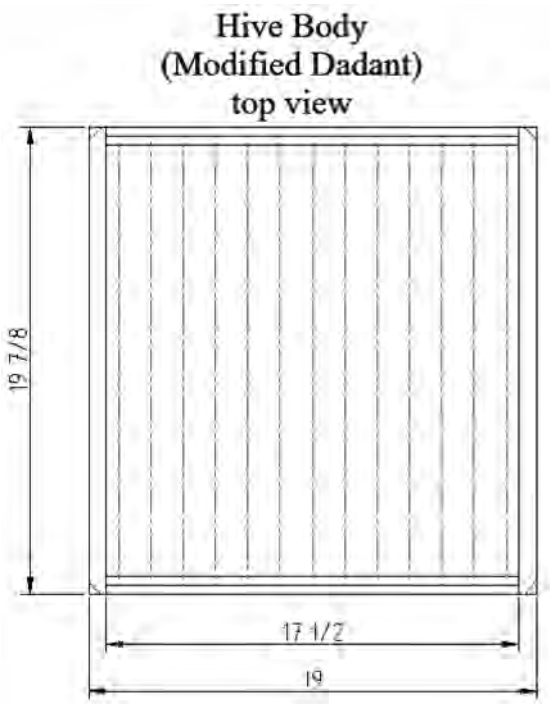
Good Luck!

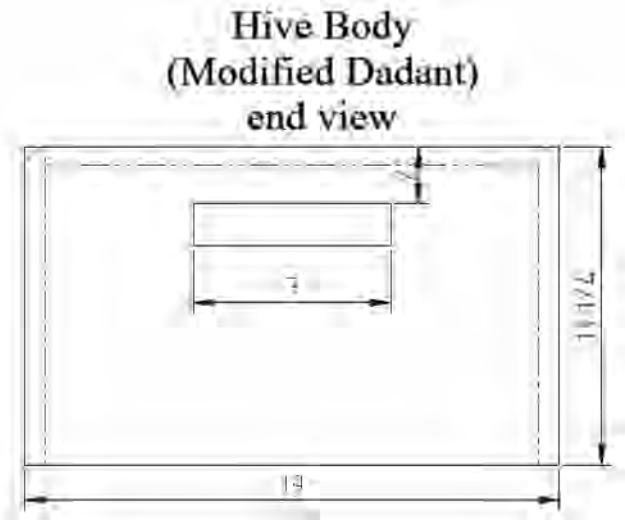
Get a copy of Ed Simon's new book *Build Bee Equipment* with detailed drawings, construction hints and how-to-use instructions for over forty beekeeping tools and equipment from **www.LULU.com**. Under the LULU sales section, search for "Beekeeping". Ed can be contacted through **SimonEdwin41@gmail.com**.

Drawings – Modified Dadant Hive Body for use with standard lumber dimensions.

MD Hive Body (Brood)

- 19⅞ x 19" x 11¼" over all dimensions (holds 12 Langstroth frames)
- ½" Standard bee space on the outside of the side frames.





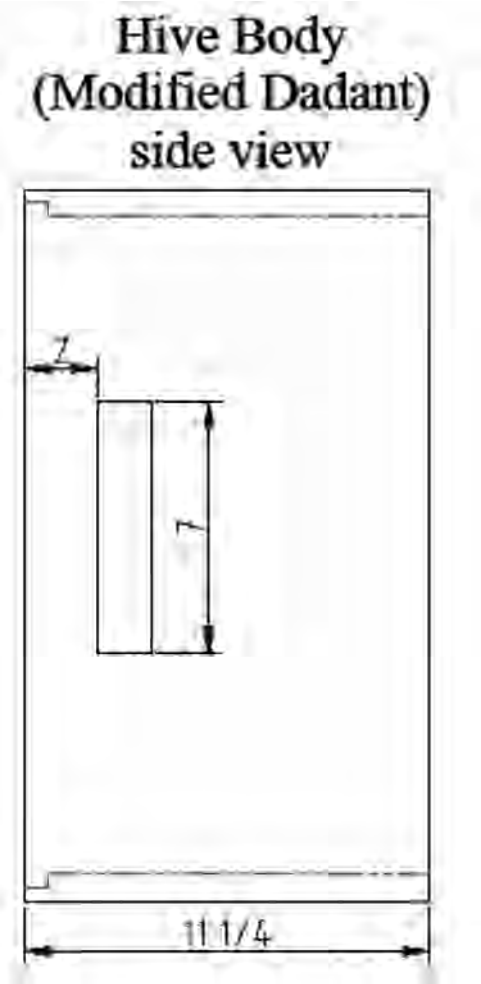
- Standard bee space on the top and bottom of the frames.
- Dado Blade Handles – ½" to ⅝" deep, 7" wide, 1½" high – The top of the handle is 2" below the top edge.
- Gargles on all top corners (Triangle cuts for easy hive tool insertion.)
- Stapled and glued corners

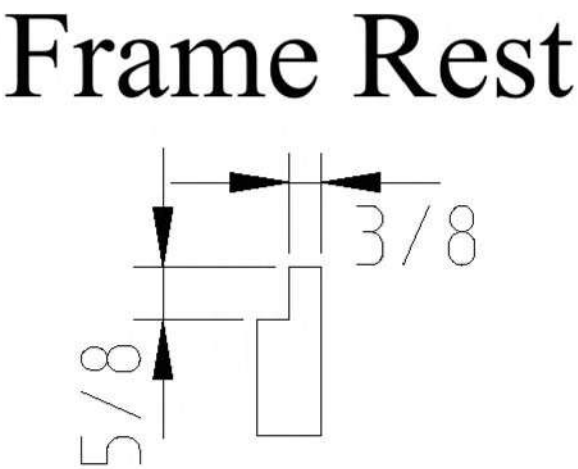
MD Hive Body (Honey Super)

- 19⅞" x 19" x 6⅝" over all dimensions (12 Langstroth frame contents)
- The associated honey super for the MD Hive body has a height of 6⅝" so the standard medium frames and foundation can be used.
- Sized to hold 12 commercial Langstroth medium frames.

Note: There are no independent drawings for the honey super. The only difference between the brood box and the honey supes it the height.

Note: The side view drawing does not show the Gargoyle top corner cuts for drawing clarity.






Northern California Quality Queens
530-520-8558
-Cordovan
-Carniolan
-Italian
Produced in Orland, California
The Queen Bee Capital of North America
Z's Bees
Zitlaw Family Beekeeping


Hobbyist? Sideliner? Commercial?
We're here for your success!
Quality Hive Woodenware
Precision Manufacturing from USA Pine
Any quantity at great prices
Beekeeping Necessities
Protective Gear ▪ Foundation ▪ Tools ▪ Harvesting
Dealerships Welcome
Health Products
Feed ▪ Feeders ▪ Medications
...plus much more!
Quality ▪ Integrity ▪ Service
BEELINE APIARIES & WOODENWARE
Rochester, Washington:
360-280-5274 beelineofwa@norcell.us
Pueblo, Colorado:
719-250-4005 sales@beelineofcolorado.com
Mendon, Michigan:
269-496-7001 beeline@abcmailbox.net
Order online or request a free 2021 catalog!
www.beelinewoodenware.com

NEXT MONTH

Region 1
- Check food stores, tilt hive up
- Is electric fence still working?
- Clean off bottom board if break in the weather
- Feed if needed
- Order package bees and queens
- Top ventilation
- Is hive wrap still on?
- ID deadouts
- Sleep in
- Treat for mites when no brood
- Are mouse guards in place?

Region 2
- Check hive weight
- Work in the shop repairing equipment
- OA drizzle if no brood present
- Inspect hive on warm days
- Feed if necessary
- Check, check, check
- Read more *Bee Culture* and bee books
- Have a better plan for 2022
- Upper ventilation
- Be sure stored comb is safe

Region 3
- Mite check!!!
- Feed
- ID weak hives
- Clean and repair supers
- Feed, sample for mites, treat if necessary
- Find better locations
- Queen right?
- Check for swarm cells

Region 4
- Check hive weight. Feed if needed
- Do you have enough equipment for Spring splits?
- Treat for *Varroa* during broodless period
- Repair and build equipment
- Check and feed, feed and check
- Clean out dead outs
- On warm day, remove lid and take a look
- OA drizzle in broodless time
- Feed
- Possible pollen sub patties

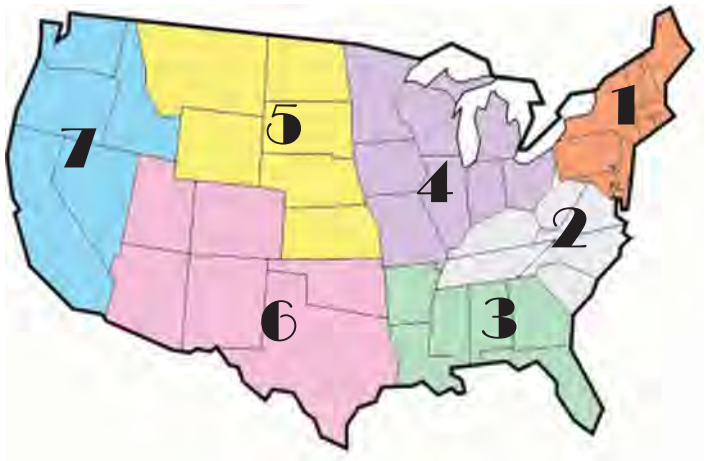
Region 5
- Check hive weight
- Feed if needed
- Continue to fix equipment
- Order more bees. These are dead
- Splits being made in Texas
- *Varroa* treatment when broodless
- Feed regardless
- Is equipment repair done?

Region 6
- Clean out dead hives
- Feed
- Review notes from 2021. Plan for 2022
- Order queens
- Feed again
- Too late for mite control in AZ
- Order new equipment
- Inspect colonies
- Clean bottom boards

Region 7
- Which ones are dead?
- Feed live colonies
- Equalize colonies
- Check food stores
- OA drizzle if broodless
- Move deadouts inside and clean them, get ready for splits
- Clean and paint and repair
- Read *Bee Culture* issues I didn't have time to read

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 **Emma@BeeCulture.com** and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.



JANUARY – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**	**Last Month**	**Last Year**
55 Gal. Drum, Light	2.17	2.28	2.23	10.05	2.43	2.27	2.63	1.82-17.50	3.23	3.23	2.29	2.20
55 Gal. Drum, Ambr	2.16	2.20	1.85	7.47	2.50	2.14	1.95	1.10-17.50	3.17	3.17	2.33	2.12
60# Light (retail)	235.00	204.25	192.50	199.00	165.00	186.92	221.67	160.00-300.00	212.15	3.54	205.10	207.21
60# Amber (retail)	229.38	196.25	185.00	188.00	213.07	177.42	219.13	150.00-285.00	208.63	3.48	204.68	209.81
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	104.74	111.00	100.75	87.00	117.10	96.00	116.54	66.20-194.90	102.53	8.54	99.90	92.31
1# 24/case	158.03	188.40	116.48	122.63	169.00	83.40	144.00	48.00-300.00	143.50	5.98	146.69	140.38
2# 12/case	145.74	264.00	113.76	111.83	111.84	153.90	132.00	78.00-264.00	136.79	5.70	127.87	125.67
12.oz. Plas. 24/cs	118.27	133.20	102.61	106.88	96.72	106.80	102.67	72.00-192.00	111.98	6.22	110.11	103.44
5# 6/case	156.40	229.05	355.95	121.40	113.16	192.85	192.85	90.00-355.95	162.73	5.42	146.37	147.90
Quarts 12/case	191.69	192.00	155.00	179.00	170.44	146.10	246.00	119.40-360.00	186.81	5.19	167.72	162.94
Pints 12/case	73.48	98.00	93.33	100.50	111.50	96.00	96.00	60.00-139.00	96.12	5.34	98.45	99.86
RETAIL SHELF PRICES												
1/2#	5.97	6.04	5.30	5.75	3.89	3.84	5.70	2.68-9.00	5.57	11.14	5.58	5.51
12 oz. Plastic	7.05	7.39	7.20	7.05	5.38	4.88	7.80	4.19-12.00	7.03	9.38	6.65	6.62
1# Glass/Plastic	9.31	10.00	9.93	8.22	8.17	10.00	9.00	5.00-17.00	9.22	9.22	8.63	8.48
2# Glass/Plastic	15.71	17.22	15.91	14.39	11.68	6.89	15.50	6.00-30.00	15.23	7.62	14.77	14.59
Pint	10.85	11.33	16.75	12.29	9.97	9.76	10.30	4.00-25.00	11.69	7.79	11.15	11.29
Quart	21.84	20.43	20.67	19.90	17.65	15.33	22.53	8.00-42.00	20.31	6.77	19.16	18.56
5# Glass/Plastic	32.97	39.33	30.23	28.57	30.69	17.89	33.95	12.48-60.00	31.66	6.33	32.24	31.85
1# Cream	10.89	9.25	8.00	10.83	9.64	11.15	16.00	5.89-18.00	10.35	10.35	10.79	10.92
1# Cut Comb	15.16	13.20	14.20	15.22	9.00	15.60	15.60	8.00-25.00	14.70	14.70	14.31	13.99
Ross Round	12.35	7.31	11.61	13.25	11.61	7.95	13.75	7.00-17.00	11.22	14.95	12.04	11.73
Wholesale Wax (Lt)	8.75	6.37	6.75	7.02	6.00	4.33	8.67	3.68-15.00	7.42	-	7.45	6.91
Wholesale Wax (Dk)	7.46	5.67	10.00	7.50	6.00	4.05	6.00	3.00-13.00	6.58	-	6.31	5.06
Pollination Fee/Col.	87.22	68.75	102.50	128.75	111.02	111.02	100.00	30.00-225.00	94.55	-	93.23	93.57

Across the board imports are cheaper than U.S. prices....but which ones are adulterated, and which are just cheap because.... labor is cheaper, the government in that country subsidizes the beekeeper, because the U.S. is the only market those beekeepers can sell to or reach, because even that low price is a good price for those beekeepers, because U.S. packers won't pay more? You can speculate that the $.81/lb honey from Vietnam may be adulterated, but that's all you can do.... And, when you look at imports to date, and U.S. exports to date, and then U.S. production for all of 2020....you get a pretty good picture....

U.S. honey packers and producers exported, as of October 1, 2021, 7.05 million pounds of honey

U.S. honey packers imported, as of October 1, 2021, 428.5 million pounds of honey

In 2020, the latest we have data for, U.S. beekeepers produced 147.5 million pounds of honey

Prices paid to importers for bulk honey, duty paid, containers included, cents per pound, ex-dock or point of entry unless otherwise stated.

ARGENTINA Mixed Flowers White $1.74 - $2.10 Mixed Flowers Extra Light $1.77 - $2.27 Mixed Flowers Light Amber $1.79 - $2.27

BRAZIL Mixed Flower Light Amber $1.83 ORGANIC Extra Light $1.77 ORGANIC Light Amber $1.75 - $2.52 ORGANIC Amber $1.75 - $2.25

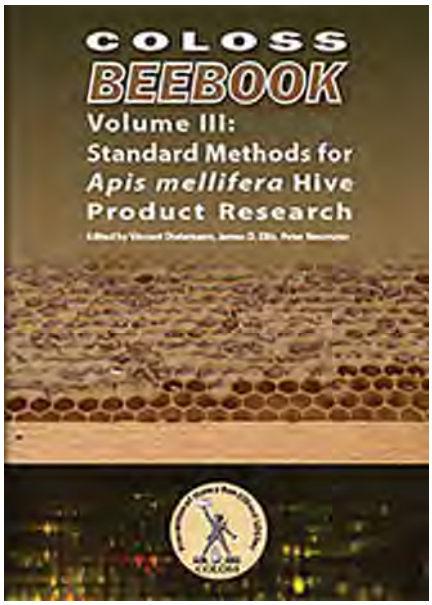
INDIA Mixed Flower White $1.04 - $1.17 Mixed Flower Extra Light $.97 - $1.61 Mixed Flower Light Amber $1.05 - $1.72 Mustard White $.96 - $1.19 Mustard Extra Light $1.05 - $1.19 Mustard Light Amber $.96 - $1.19 Mustard Amber $1.19

MEXICO Orange White $2.28 Orange Extra Light $2.24

URUGUAY Mixed Flower Light Amber/Amber $1.77

VIETNAM Mixed Flower Light Amber $.81 - $1.68 Mixed Flower Amber $1.22 - $1.49

Bundle Up with These Books –



COLOSS BEEBOOK Volume III: Standard Methods for Apis mellifera *Hive Product Research.* Edited by Vincent Dietemann, Peter Neumann, Norman L. Carreck, James D. Ellis. Published by IBRA, Monmouth, UK and Northern Bee Books, Mythoimroyd, Hebden Bridge, UK. ISBN 978-1-913811-05-1. 8.25"x11.5", 464 pgs., color and black and white, soft cover. $80 + UK postage if purchased from IBRA or Northern Bee Books (NBB) with foreign post, and the same price from Amazon (no shipping costs from Amazon).

COLOSS is a group of scientists and researchers who are standardizing how research for honey bees is being carried out. When you think about it, this makes very good sense because, simply, any scientist anywhere can now compare, essentially, apples to apples, or, perhaps more appropriately, honey bee science results to honey bee science results. COLOSS comes from Prevention of Honey Bee COlony LOSSes.

Volume 1, which came out in 2013 studies and defines standard methods for research covering such sub-categories as anatomy and dissection, behavioral studies, subspecies and ecotypes, artificial insemination, pollination and statistics. Only available from IBRA or NBB.

Volume 2 covered studies of pests and pathogens of honey bees. It standardized how surveys are conducted looking at colony losses, and then defined how diseases, small hive beetles, mites of all kinds, viruses and all the other pests and pathogens honey bees have to deal with should be examined, categorized and reported. Only available from IBRA and NBB.

Volume 3, released in October 2021, is now available. This third volume examines techniques and methods to use when studying and reporting on hive product research.

Each chapter is set up the same way. The product is described, and then produced in such a way that each time the product is identical, or not, to the last time it was produced. It is then harvested, and preserved. And then, it is taken apart and each tiny part studied, using techniques and analyses described in the book. For instance, for Royal Jelly, there are 17 pages on production, harvesting and preserving the product. Then, there are 40 some pages looking at how to do all manner of research studies on the product. It's a long list and here are just a few….protein and sugar content, characterisation of proteins and peptides, antibody purification, staining, labeling, and on and on.

The value of this information to researchers is easy to see. Everybody does it the same way, so results can be compared and measured and used by everybody. It draws these techniques from just over six pages of references. Everything about royal jelly you ever wanted to know is here. Everything. It is a scientists go-to book for certain.

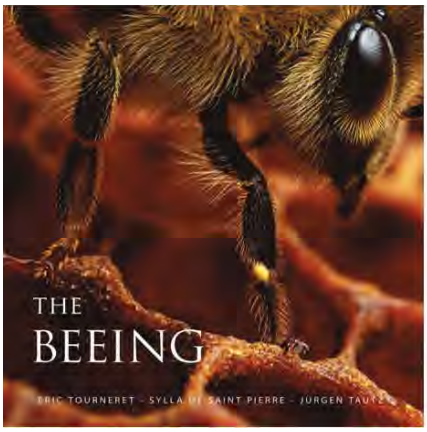
The editors have reviewed all six pages of references, and have pretty much said, by including them here, this is what others have done, how they did it, and how you should now do it because now we'll all be doing these complicated research studies the same way.

The subjects covered are done thoroughly and in depth. The first section of each product studied is basically how to produce, process, store and use each of the products. I've mentioned royal jelly (67 pgs), but there's also beeswax (108 pgs), propolis (49 pgs), brood as food (28 pgs), honey (62 pgs), venom (31 pgs), and pollen (109 pgs). Figure the first third or so of each chapter is the simple collection, processing, storing and using each of these. Now that would be a beekeepers book to keep, for sure.

Each chapter has scores of charts, graphs, diagrams and such for displaying research results. And, each has good photos and drawings for collecting and preparing each, with lots of color photos and drawings. Pollen especially has excellent pollen photos for color, drawings for size comparisons and shape and more. From a beekeeper's perspective, this is as far as I want to go when collecting pollen for my bees, or for sale. The rest of the information in the chapter is excellent for research, however, and standardization is important.

If you produce, harvest, process, store or sell any of these products, this book will pay for itself your first season. Especially if you are producing a product that needs to meet the high standards we all expect. Processing and storage is also important for consistency in sales. Seriously consider having this book on your shelf, even if you'll only ever use half of it.

Kim Flottum



The Beeing: Life Inside a Honeybee Colony by Eric Tourneret, Sylla de Saint Pierre, and Jurgen Tautz. Published by Deep Snow Press, Ithaca, NY. ISBN 978-0-9842873-9-0. Originally published in French in 2017, translated to English October 30, 2021, by Mark Pettus, and edited by David Liedlich and Leo Sharashkin. Hard cover, 262 pages. Large format (11-3/4" x 12-1/4"), glossy color throughout. $49.95.

Eric Tourneret and Sylla de Saint Pierre are also the authors of *Honey From the Earth: Beekeeping and Honey Hunting on Six Continents,* published only a few years ago. To produce that first book, they spent FIFTEEN YEARS traveling the world to capture the breathtaking diversity of bees and beekeeping traditions on six continents. Epic scenes of scaling cliffs to reach honeycombs of the giant bees in Nepal ... and the truckloads of hives of industrial beekeepers in America. Artisanal straw-basket hives in Romania ... and the unique honeypot ants of the Australian desert. Honey traditions in the heart of the African jungle ... and moving bees by boat in Argentina. Our familiar honey bees ... and the most exotic stingless bees of the tropics. This is a most stunning collection of bee photography, complete with insightful commentary from a dozen leading bee experts, including Dr. Tom Seeley, Dr. Jurgen Tautz, and Kirk Webster. Shot in 23 countries.

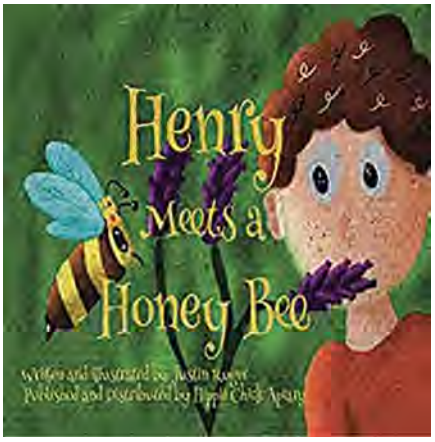
Now, with additional input from Jurgen Tautz, Eric and Sylla have produced yet another beautiful and stunning collection of photos, accompanied with expert biology and physiology commentary for these photos. *The Beeing* covers all aspects of bees' lives: physiology, colony organization, foraging strategies, nest architecture, bee intelligence, reproduction, and much more. Discover the most up-to-date knowledge on the functioning of the colony, insights into beekeeping practices, and the challenges bees face today - all written in an easy-to-understand non-technical language.

Chapters include a close look at the queen, what makes a queen and mating; the hive as a super organism and the stages of life; bees and flowers and nectar and pollen; foragers and seeing flowers the way bees see flowers; bees and humans and pesticides and breeding and honeys; nest architecture and a place to dance; bee math and propolis. Finally, Intelligence and communication looking at memory and languages and dancing and scents; and finishing with swarming and super and half sisters and genes and temperature's assault on character.

I've already noted the spectacular photography, with many, many two page spreads, some showing only two bees filling both pages, with others showing a 20 acre apiary, with hives spread everywhere.

Quite simply, there is no other book like this. It's been called the most useful coffee table book ever produced. It is actually one of the most useful books on bees ever produced.

Kim Flottum



Henry Meets a Honey Bee. Written and illustrated by Justin Ruger. Published and distributed by Hippie Chick Apiary. ISBN 9780578995045. 30 pages, soft cover, color throughout. $15.00

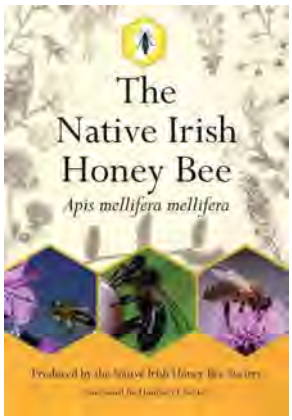
Henry Meets a Honey Bee is a children's book that uses bright colors, age appropriate art, and fictional characters to educate children on the importance and life of honey bees, one of nature's favorite pollinators.

Come join Henry as he takes a walk, enjoying nature, and stumbles upon the adventure of a lifetime. Henry meets Honey, the queen bee of a local hive, and learns all about honey bees from an unique point of view. Watch how knowledge transforms fear to admiration for one of nature's favorite pollinators.

I suppose if you are going to learn about bees from a bee, a Queen is about as good as it gets. And when she turns Henry into a honey bee, the learning is even better. Henry learns of pollination, visits a hive, learns of the different kinds of bees that live in that hive, the role of the queen in the hive, how workers are cleaners, nurses, builders, coolers, guards and foragers. And he even meets a beekeeper.

This is an easy to read, well designed children's book that shows the world of bees from the bees themselves.

Kim Flottum



The Native Irish Honey Bee, Apis mellifera mellifera. By the Native Irish Honey Bee Society. This book can be purchased online at: **https://nihbs.org/shop/**

During the last period of European glaciation, the honey bees in Europe diversified into three subspecies that survived in three refuges in southern Europe: *A. m. mellifera* in the Iberian peninsula, *A. m. ligustica* in the Apennine peninsula, and *A. m. carnica* in the Balkan peninsula. When this period of glaciation ended, about 12,000 years ago, the subspecies *A. m. mellifer*a expanded its range far to the north. Its colonies spread to northwest Europe (the British Isles and Scandinavia), to north central Europe (north of the Alps), and even to north central parts of Asia. They also adapted to each of these regions. This produced the Irish black bee, the Dutch black bee, the Alps black, the Nordic black bee, the Welsh black bee, and still more. Each of these forms of *A. m. mellifera* is an ecotype, i.e., a population of honey bees which possess genetically-based traits that contribute to their ability to survive and reproduce in their particular location. Broadly speaking, the workers of *A. m. mellifera* differ from those of *A. m. ligustica* (Italian bees) and *A. m. carnica* (Carniolan bees), in being larger bodied, longer haired, more capable of flying at low temperatures (5°C/41°F), more avid collectors of propolis, and better able to survive long winters as small colonies that are frugal with their honey stores.

These days, the largest population of *A. m. mellifera* is found in Ireland, and the book *The Native Irish*

Honey Bee provides us with a marvelous synthesis of recent work on the biology and the keeping of this bee. It is also a remarkable book in that it was written and produced entirely by members of the Native Irish Honey Bee Society (NIHBS). Some are biologists, some are beekeepers, and many are both. All have love for and pride in their native honey bees, and all have shared their knowledge in the cause of conserving these bees. The Irish, by the way, have a long tradition of writing about their bees. The oldest Irish legal manuscript dates to before 1350 AD, and is called *Bechbretha* (Bee Judgments). It covers legal decisions dating back to 700 AD regarding such matters as the rights of the neighbors of a beekeeper to receive a share of the honey crop because his/her bees trespass on their properties. Evidently, this was a sticky matter, and it needed a legal resolution.

The book's chapters are grouped into five sections. The first—The Native Irish Honey Bee—delves into the basic question of defining the native Irish honey bee. It is argued, quite cogently, that it is a genetically distinct population of *A. m. mellifera* that is adapted to living in the mild, but damp, oceanic climate of Ireland. It is not known whether this bee was introduced by Celtic-speaking people who came to Ireland in prehistoric times, or it reached Ireland even earlier, when sea levels were lower and present-day Ireland and England were part of the European mainland. One thing that is known is that the native Irish honey bee is the largest and most important surviving population of *A. m. mellifera*. One chapter in this first section describes the genetic analysis of 412 bees sampled from 80 sites across 24 counties (of 32 total) in Ireland, and it reports that 97.8% of the sampled bees were found to be pure *A. m. mellifera*. Evidently, the rate of importation of queens of non-native subspecies (e.g., Italians and Carniolans) has been low, or the colonies headed by native queens have survived and reproduced better than those headed by imported queens, or both. This genetic analysis also revealed numerous *unique* alleles of the bees' mitochondrial genes. This discovery tells us the Irish population of honey bees has evolved independently since the closure of Ireland's land bridge with Britain, thousands of years ago.

The book's second section—Conservation—examines strategies for the conservation of *A. m. mellifera* in Ireland. The first chapter explains that this is a thorny matter, because the legal status of honey bees in Ireland is somewhere between that of domesticated animals and wildlife; neither status is quite right for honey bees. One conservation approach being used already to support the native Irish honey bee is to establish voluntary conservation areas reserved for these bees. For example, members of the Galtee Bee Breeding Group are keeping and breeding only native honey bees in the Galtee and Vee Valley areas. Subsequent chapters include one by Micheál C. Mac Giolla Coda, titled "Rewilding the Irish Honey Bee" in which he describes how beekeeping was in the past, and how already there is evidence from a "Free-Living Bee Survey" that there are colonies surviving on their own. The chapter "Wild *Apis mellifera mellifera* in Ireland", by Professor Grace McCormack, discusses an on-going study of the genetics of wild colonies in Ireland, and reports that the workers sampled from these colonies have a probability of 0.99 of coming from a lineage of *A. m mellifera* queens. This is a clear sign that, in Ireland, the native Irish honey bees have greater fitness than those from elsewhere in Europe. This section of the book ends with a thoughtful chapter "Bees and the Environment, by Willie O'Byrne. He discusses changes in the farming and the floral landscape in Ireland, and offers many suggestions for farming, urban beekeeping, afforestation, and hedgerow management that will improve the lives of both honey bees and wild (non-*Apis*) bees.

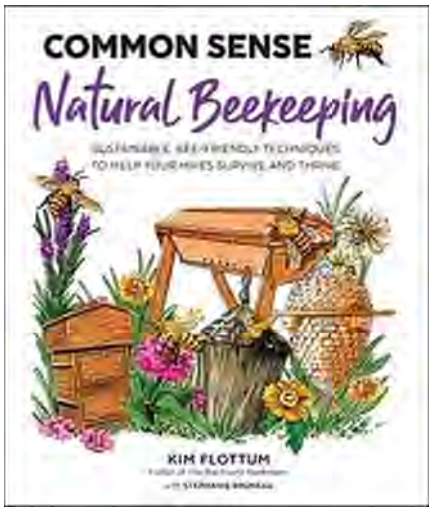
The third section focuses on queen rearing. It includes six chapters that show how easy it is to improve your bees for winter hardiness, disease resistance, and honey production. The first two chapters, by Aoife Nic Giolla Coda and Jonathan Getty cover the biology of queens and drones, and the logistics of setting up a queen-rearing group. Next comes Michael Maunsell's chapter on how to improve your bees. Front and center, he makes the point of "Take the bees that are native to your own area and work with these." Even in Ireland, a relatively small island, there are great differences in climate and vegetation, and beekeepers there want bees that are suited to where they live. Maunsell notes, too, that colonies that are heavier propolisers "are generally healthier or better able to handle disease." The next six chapters, by Tom Prendergast, Colm ÓNéill, Jane Sellers (three), and Irene Power, describe each author's tools and methods for rearing queens and getting them properly mated. Some are traditional (collecting swarm cells and using 5-frame mating nucs) and others are modern (Jenter kits and Apidea mating nucs). All have been tested by the authors' experiences in Ireland over several decades.

The fourth section— Four Corners—is very special, for it comprises personal accounts of some of the Irish beekeepers who have long championed the native Irish honey bee. For example, Gerry Coyne, of Connemara on the west coast, describes beautifully his early years in the 1960s of working with the native bees—"kind creatures that were docile and content carrying out their work"—using no veils, or just ones improvised from lace curtains. Likewise, John Summerville, a beekeeper with 40 years of experience in Galway, writes "we need to protect and nurture our own black native bee as she serves us well with her calm nature and ability to forage in typical Irish weather." There is also the inspiring piece by Michéal Mac Giolla Coda that describes the origins of the Galtee Bee Breeding Group. He also explains how the protection (from non *Amm* drones) of the group's mating apiary was inspired by the prehistoric fortress on Inis Mór, one of the Aran Islands off Ireland's west coast. These three contributions, plus the others found in this section, show much that is special about the beekeepers, as well as the bees, in Ireland.

The fifth section—The Past, The Present & The Future—contains five chapters. The first, by Jim Ryan, does a fine job of reviewing the history of beekeeping in Ireland over the past 1300 years with emphasis on the period from the 1850s (following the Great Famine) to the present. Photos of beekeepers and their hives, from the 1880s to the 1920s are a special treat. The second chapter, by Eoghan Mac Giolla Coda, provides a clear and precise description of what it is like to be a commercial beekeeper in Ireland. I found his tables on such things as the monthly mean maximum tem-

perature, the monthly mean rainfall, and his annual honey production per hive very helpful in getting a clear picture of the conditions of beekeeping in Ireland. Beekeepers will also appreciate his careful descriptions of the hives he uses, and of how he deals with the challenges of swarming, propolisation, and disease susceptibility. The third chapter, by Redmond Williams, "Preparing for the Season Ahead," is well named, for he describes his system for doing just this. He cites the old saying "There is no point in sharpening your sword when the drum beats for battle." The fourth chapter, by Tanguy de Toulgoët, provides a ten-point ("Ten Commandments") program for managing colonies in Warré hives to help increase the population of wild colonies of *Apis mellifera mellifera* in Ireland. I like his program, and hope that it will be followed by those who are interested more in being a bee watcher (akin to a bird watcher) than in being a beekeeper. The closing chapter, by Mary Montaut, poses two questions about the future of bees: "Can our beloved bees outlast the harm which human activity is undoubtedly doing to the earth? And if so, how can beekeepers help them?" I have asked myself these two questions, and I hope that bee biologists, beekeepers, and other concerned people will muster the collective intelligence that we will need to answer these questions with "Yes!" and "Here's how." After reading this book, I am confident that the natural "laboratory" of Ireland, and its resilient native Irish honey bee, will play an important role in helping us find ways to protect the future of bees.

Thomas D. Seeley



Common Sense Natural Beekeeping Paperback, 128 pages • $24.99 US, $32.99 CAN • ISBN: 9781631599552 • Quarry Books. You can preview the book here: **https://bit.ly/3yFh0A2**

The newest book by Kim Flottum, *Common Sense Natural Beekeeping,* co-authored with Stéphanie Bruneau, needed to be written. It very succinctly covers sustainable beekeeping using "limited chemical or human intervention." It will be perfect for individuals who wish to Save the bees but not treat nor manage their bee colonies like conventional livestock.

New beekeepers quickly learn, and established beekeepers are well aware, that honey bees face numerous stressors. Wide adoption of chemical treatments as necessary for varroa mite control have become standard. Rather than spending our time continually at war with varroa mites, using a "battery of chemical treatments" *Common Sense Natural Beekeeping* covers the "middle ground between micromanagement and no management….it allows the bees, the environment and the beekeeper to thrive." in the words of the authors.

The authors believe we should approach yearly colony losses differently and adopt "an acceptable alternative." Contending that natural colonies are "thriving" without our intervention, we need to learn how better to manage our backyard bees. Their approach is to return to a more natural handling and housing of bees. We need to first learn then to partner and participate in colony care rather than seek to dominate our bees. It is a stewardship of cooperation from respect, not from control.

The book is extremely well illustrated – 35 pages are photos alone. The cover is outstanding and really captures the essence of the book. Amber Day is credited with its design. There are two pages of background reading and research and a useful index. The last section includes final recommendations "Bee like a Bee would Bee" - a neat summary of the *Common Sense* philosophy of the book.

The first pages describe the authors philosophy of bee care. It provides back ground on the life of bees in the wild. The work of Dr. Tom Seeley, who has extensively researched bees in bee trees, is summarized. His studies form the framework that "helps us make modifications to create healthier and more habitable hive systems."

There are three sections of information. For the first section **Home Sweet Home**, different bee hive designs are covered. Chapter 2, over one-third of text, describes and lists pros and cons of eight different hive designs. Real-life practitioners are included of adapters for each hive. For the Langstroth hive, cons (9) outnumber the pros (2) but eight "adaptations" are listed for how individuals might "improve the bee approval rating." The pros outnumber cons for Warré, Top Bar, Layens and skep (modified as a sun) hives. Log hives, the Custos and Eco Tree hive are also discussed. There is a companion chapter on Hive siting entitled "Real estate decisions."

A second section discusses three major bee stressors - bee mites, swarming and "what's for lunch" (bee nutrition). Natural beekeeping for varroa management includes stock selection, best hive, proper nutrition and more intensive management. Each of these is light on text, more of the philosophy compared to practice. Swarming coverage includes prevention and control. Keeping bees in smaller hives and swarming is described as "natural selection to create strong and healthy colonies [that] decrease the hive's problems with varroa mites." The final chapter discusses the importance of a varied diet for proper bee health.

A third section includes a two page case study discussion of five individuals that are using *Common Sense Natural Beekeeping*. It nicely illustrates how the philosophy of gentler, sustainable beekeeping might be achieved via use of a different hive and chemical-free management of honey bees. These help illustrate how by observing the way bees live in the wild, beekeepers learn to make management decisions including hive design that incorporate the bees innate intelligence and behavior for sustainable alternatives for natural hive management.

Dewey Caron

FOUND IN TRANSLATION

More Signs of the Resistance

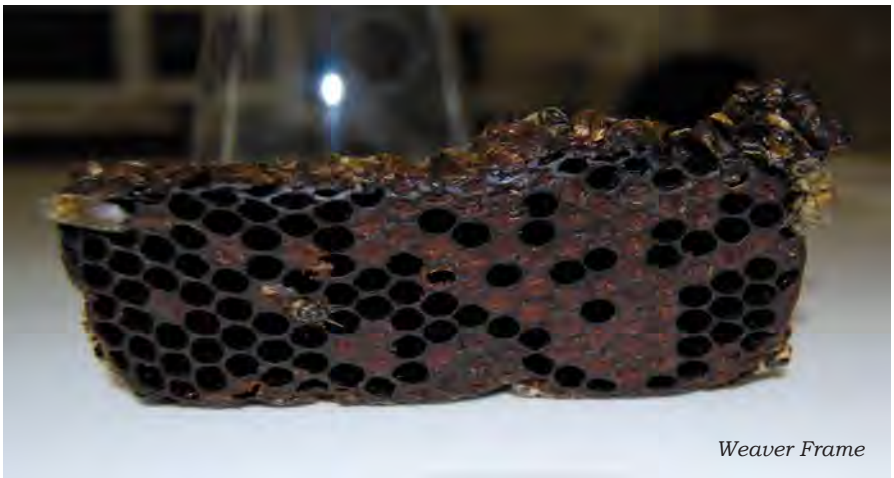
Jay **Evans**, USDA Beltsville Bee Lab

I always like to start the New Year with hopeful signs for bees and beekeepers and am feeling optimistic right now that breeding efforts to control the disease impacts of parasitic mites are starting to have wide success. Controlling mite impacts on honey bees depends on several lines of attack, from effective breeding schemes for hygienic or mite-repelling bees to a battery of chemical and management controls. While nothing is permanent since the mites generally fight back, mite levels in wisely managed colonies are not much higher than they were in past decades. Still, the remaining mites seem to have a greater impact on colony health even when at low levels. This has shifted the blame to bee stress and disease as great hazards for bee losses. We know that *Varroa* mites move viruses around in bees, and that these same viruses are important for bee health. Why do the viruses moved by mites seem to cause more harm currently, and how can we deflect this viral curse?

Three recent studies suggest that bees are developing their own viral cures, either by actively decreasing virus loads or somehow learning to tolerate the viruses they carry in abundance. Barbara Locke and colleagues in Sweden and other European countries have been on the hunt for bees that live well with *Varroa* for many years. They recognized that bee survival in the face of these mites can reflect either direct attacks on mite fitness or tolerance for higher mite loads. For the latter, the sense is that survivor stocks deal with viruses moved by mites even while losing ground against the mites themselves. In a recent paper, Locke and teams from Sweden, Norway, the Netherlands, and France dug deep into the viral populations of bees known to be mite-resistant in each of those countries (Locke, B.; Thaduri, S.; Stephan, J.G.; Low, M.; Blacquière, T.; Dahle, B.; Le Conte, Y.; Neumann, P.; de Miranda, J.R. "Adapted tolerance to virus infections in four geographically distinct *Varroa destructor*-resistant honeybee populations." *Scientific Reports* 2021, *11*, **doi:10.1038/s41598-021-91686-2.**).

In the study, bees from all four survivor lineages tended to have slightly lower virus levels when fed equal virus amounts as larvae, when compared to a non-selected control population. Still, these results were largely non-significant, i.e., viruses (Deformed wing virus and Acute bee paralysis virus, both linked with mites) flourished in these survivor lineages. In fact, the most striking result from this study was not that survivor bees were better defended against viruses, but that they just went on with their lives even when heavily infected. All survivor lineages did better than standard bee populations when infected with viruses. This points to a tolerance effect by survivor bees, for both mites AND viruses. Perhaps these bees can keep viruses from invading vital body parts while not quashing infection entirely. Longterm survivor stock presumably holds a number of cards that are in play to limit the impacts of mites. This virus tolerance is perhaps a last line of defense when behavioral, colony-level, or physiological defenses are not quite enough.

Bees that are tough in the face of bee viruses are almost certainly a thing in the U.S. as well. This past month, I was lucky enough to be part of a published paper describing virus-fighting abilities of a mite-tolerant breeding line from Texas (Weaver, D.B.; Cantarel, B.L.; Elsik, C.G.; Boncristiani, D.L.; Evans, J.D. "Multi-tiered analyses of honey bees that resist or succumb to parasitic mites and viruses." *BMC Genomics* 2021, *22*, **doi:10.1186/s12864-021-08032-z**). This study began a decade ago, when queen breeder Danny Weaver, and his late father Binford Weaver, sent a few dozen



Weaver Frame

Collecting injected bees.

colony samples from their beekeeping lines. These lines are never treated for mites so are analoguous to the four European survivor stocks in that way. The Weaver samples were divided into 'susceptible' and 'resistant' lines based on field traits, and all were fairly loaded with mites. They wanted to know what distinguished the survivors from the sufferers. What caught our interest was that the resistant bees had lower levels of both the mite-friendly Deformed wing virus and viruses that are not transmitted by mites....hinting at a more general trait of viral resistance.

We next pitted some of our local mite-susceptible stock against these Texas survivors. We found lower viruses overall in the Texas bees but also a much lower bump in virus levels when individual bees were parasitized as pupae by mites. Next up was an experimental infection of relatively clean (mite-free) pupal bees with Deformed wing virus, the main "plus-one" of parasitizing *Varroa* mites. We injected a virus dose or a control solution (salt water) into pupae from a range of breeder queens. Infected bees were followed for several days then sacrificed to measure virus levels as well as the suite of bee genes turned on in response to virus infection. Again, progeny from some queens kept virus levels in check while others gave in to high virus growth. We did not measure longterm bee health in our study but did subject infected and control bees to a battery of genetic tests to determine how they had reacted to virus exposure. Bees from resistant queens did seem to mount a better immune reponse when given a full virus dose. They also just seemed to drag their feet on activating genes indicative of the stress of viral infection, perhaps slowing virus growth as a consequence. In a humbling twist, some bees even from resistant stocks were highly vulnerable to these (admittedly strong) virus doses, suggesting that more can be done to push even mite-tolerant lines towards a stronger response against viruses.

New tools are being developed to help screen breeding stock for virus resistance and Michael Simone-Finstrom has used such tools as a main focus of his work in the USDA-ARS Honey Bee Breeding, Genetics, and Physiology Research Laboratory in Baton Rouge, Louisiana. In a paper led by postdoctoral researcher Hannah Penn (Penn, H.J.; Simone-Finstrom, M.; Lang, S.; Chen, J.; Healy, K. "Host Genotype and Tissue Type Determine DWV Infection Intensity." *Frontiers in Insect Science* 2021, 1, **doi:10.3389/finsc.2021.756690**), these researchers injected young bees with various viral cocktails and then measured viral outcomes.

This study involved many of the key commercial bee lineages in the U.S.; 'Carniolan', 'Italian' and the mite-selected 'Pol-Line', "Russian', and 'Saskatraz' lines. Surprisingly, there was no significant difference across stocks on the whole when bees were injected with Deformed wing virus. However, simply poking bees with control injections (salt water again) did lead to higher virus levels in some of the tested stocks versus others, suggesting that latent viruses were more risky in these stocks (you'll have to read the paper to see how your favorites did).

This study also gives great insights into differences between the two predominant strains of Deformed wing virus in terms of how they differ in their infection means and possible impacts on bees. The two strains, 'A' and 'B' differ in the bee body parts they thrive in, and in how they interact with particular bee stocks. DWV Strain 'B', a recent and now widespread lineage in the U.S. also called *Varroa destructor* virus-1 (e.g., **https://www.nature.com/articles/s41598-017-17802-3**), was also both more aggressive during infection and more likely to emerge from latent infections in bees simply given the salt water injections. This is a bit ominous, and suggests that selection for breeding traits against viruses might have to account for an increasing diversity of viruses.

Viruses in both bees and humans are invisible and don't always present symptoms that beekeepers, researchers, and doctors can detect. These studies took advantage of genetic viral signals and careful experiments to show that bees from different backgrounds have some of their own defenses in hand to deal with virus exposure. This is reason to be optimistic and it will be exciting to see how breeding programs that target the impacts of viruses on bees proceed.

"In order to survive cold northern winters, honey bees crowd tightly together in a winter cluster. Present models of winter cluster thermoregulation consider the insulation by the tightly packed mantle bees as the decisive factor for survival at low temperatures, mostly ignoring the possibility of endothermic heat production. Stabentheiner et al. (2003) provided direct evidence of endothermic heat production by 'shivering' thermogenesis. The abundance of endothermic bees is highest in the core and decreases towards the surface. This shows that core bees play an active role in thermal control of winter clusters. They concluded that regulation of both the insulation by the mantle bees and endothermic heat production by the inner bees is necessary to achieve thermal stability in a winter cluster."

"The temperature at the center, the periphery and the entrance of a honey bee colony was continuously determined during the summer season and the broodless time in winter. During the summer season the temperature in the brood nest averages 35.5°C (95.9°F) with brief excursions up to 37.0°C (98.6°F) and down to 33.8°C (98.8°F). Increasing environmental temperatures resulted in linear increases in the temperature of the hive entrance, its periphery, and its center. The temperature in the center of an overwintering cluster is maintained at an average value of 21.3°C (70.3°F) (min. 12.0°C (53.6°F), max. 33.5°C (92.3°F). With rising ambient temperatures, the central temperature of a winter cluster drops whereas the peripheral temperature increases slightly. With decreasing external temperatures, the peripheral temperature is lowered by a small amount while the cluster's center temperature is raised.

Linear relationships are observed between the central and the ambient temperature and between the central temperature and the temperature difference of the peripheral and the ambient temperatures. The slopes point to two minimum threshold values for the central (15°C, 59.0°F) and the peripheral temperature (5°C, 41.0°F) which should not be transgressed in an overwintering cluster. Microcalorimetric determinations of the heat production were performed on the three castes of the honey bee: workers, drones and queens of different ages. Among these groups single adult workers showed the highest heat production rates (209 $mW \cdot g^{-1}$) (mW=milliwatt) with only neglectable fluctuations in heat production rate. Juvenile workers exhibited a mean heat production rate of 142 $mW \cdot g^{-1}$. The rate of heat production of adult workers is strongly dependent upon the number of bees together in a group. With more than 10 individuals, weight-specific heat dissipation remains constant with increasing group sizes at a level approximately 1/17 that of an isolated bee.

Differences are seen between the rates of virgin (117 $mW \cdot g^{-1}$) and laying (102 $mW \cdot g^{-1}$) queens. Laying queens showed less thermal fluctuations than virgin queens. High fluctuations in heat production rates were observed for drones. In both drone groups (fertile, juvenile) phases of high and extremely low activity succeed one another. The heat production of juvenile drones was 68 $mW \cdot g^{-1}$, that of fertile drones 184 $mW \cdot g^{-1}$ due to stronger locomotory activities (Fahrenholz et al. 1989)."

"Sumpter and Broomhead (2000) developed a model to investigate the movement of individuals in thermoregulating honey bee clusters. Thermoregulation in over-wintering clusters is thought to be the result of individual

A Closer Look

Wintering Honey Bees

Clarence **Collison**

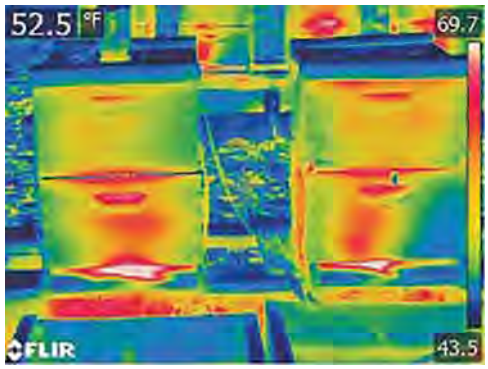
In order to survive cold nothern Winters, honey bees crowd tightly together in a Winter cluster.

bees attempting to regulate their own body temperatures. At ambient temperatures above 0°C (32°F), a clustering bee will move relative to its neighbors so as to put its local temperature within some ideal range. Computer simulation of this model demonstrates qualitative behavior which agrees with that of real honey bee clusters. In particular, they observed the formation of both disc- and ring-like cluster shapes. The simulation also suggests that at lower ambient temperatures, clusters do not always have a stable shape but can oscillate between insulating rings of different sizes and densities.

The computer model they developed is based on the following assumptions about the behavior of individual bees: 1. Each bee bases her behavior exclusively on her local temperature. 2. Bees have a preferred range of temperatures. Inside this range a bee moves randomly. When she is outside this range she will move in the appropriate direction along the temperature gradient. 3. Below a lower threshold temperature a bee will go into a "chill coma" and will be unable to move. 4. A bee's heat production is based

on her metabolic rate which is an increasing function of temperature. Bees in a coma generate no heat."

"A thermal imaging method was used to monitor thermal processes in the inter-comb bee clusters and temperature of different body parts during the wintering period. The temperature of different body parts was found to depend on the localization of bees in the nest and the external temperature. The dependence of the thermoregulatory activity of bees on the external temperature fluctuations decreased during wintering. The trends of distribution of thermal fields in clusters of wintering bees were revealed (Eskov and Toboev 2011)."



Infrared heat of colony.

"Winter cluster volume and surface area were measured over a range of ambient temperatures (T_a) in 3 honey bee colonies representative of small, medium and large populations from 29 November 1984 to 21 March 1985 (Severson and Erickson 1990). Changes in these parameters were correlated with changes in T_a and the observed response to T_a was independent of population size. They observed decreases of about 55% in cluster volume and 40% in cluster surface area as the T_a decreased from 4°C (39.2°F) to -23°C (-9.4°F)."

"Experiments conducted over three winters have revealed a metabolism controlling function of bee-induced hypoxia in the winter cluster. Permanent low oxygen levels around 15% were found in its core. This hypoxia was actively controlled, probably via indirect mechanisms. Varying ambient oxygen levels demonstrated a causal relationship between lowered oxygen and reduced metabolic rate (MR). Under deeper ambient hypoxia the bees switched to ultra-low metabolic rate (ULMR), optional-occasional at 15% oxygen, obligatory at 7.5% oxygen. This dormancy status resembled deep diapause in insects. It stayed reversible after at least several days and was terminated under normal oxygen at 15°C (59°F). Reduced MR via core-hypoxia is essential in water conserving thermoregulation of the winter cluster. It allows bees to reconcile warm wintering in alert state—for defense of stores—with energy saving and longevity (Van Nerum and Buelens 1997)."

"During the broodless period in winter, the pollen content of the gastrointestinal tract, the degree of pollen digestion and the proteolytic activity in the midgut were investigated in bees from the margin and from the center of winter clusters of two colonies in Austria. In addition, the movement of bees within the winter cluster was examined. There was no difference in pollen content and proteolytic activity between bees from the center or margin of the cluster, nor did the two groups show a preference for staying at the center or on the margin of the winter cluster. Compared to 8-9-day-old bees in summer, the amount of pollen in the midguts was smaller by a factor of 100-1000, but the degree of pollen digestion in the midgut and the rectum was significantly greater; the proteolytic activity in the midgut was approximately a quarter. The more efficient utilization in spite of lower proteolytic activity might be due to pollen staying longer in the midgut. Foragers in summer also consume only minimal amounts of pollen but have a smaller degree of utilization than winter bees. The reduced pollen consumption rate, and efficient utilization in spite of lower proteolytic activity are useful adaptations to the reduced availability of pollen and reduced protein metabolism which bees experience during the winter (Crailsheim et al. 1993)."

"Microbial symbionts inhabiting the honey bee gut (i.e., gut microbiota) are essential for food digestion, immunity and gut protection of their host. The taxonomic composition of the gut microbiota is dynamic throughout the honey bee life cycle and the foraging season. However, it remains unclear how drastic changes occurring in winter, such as food shortage and cold weather, impact gut microbiota dynamics. Bleau et al. (2020) characterized the gut microbiota of the honey bee during the overwintering period in a northern temperate climate in Canada. The microbiota of nine colonies was characterized by metataxonomy of 16S rDNA between September 2017 and June 2018. Overall, the results showed that microbiota taxonomic composition experienced major compositional shifts in fall and spring. From September to November, Enterobacteriaceae decreased, while Neisseriaceae increased. From April to June, Orbaceae increased, whereas Rhizobiaceae nearly disappeared. Bacterial diversity of the gut microbiota decreased drastically before and after overwintering, but it remained stable during winter. They concluded that the gut microbiota is likely to be impacted by the important meteorological and dietary changes that take place before and after the overwintering period."

"In winter, honey bees thermoregulate their hives to survive cold temperatures and maintain their physiological activity, without becoming completely dormant. During this time, nurses and foragers are not distinguishable. In late winter or early spring, as the brood rearing re-initiates, the division of labor resumes among the workers born in the fall. To understand the overall physiological changes of honey bee workers from late winter (end of over-wintering) to early spring (beginning of brood rearing), Lee and Kim (2017) collected honey bees in January and February and compared their protein expression profiles. Among the 50 and 85 proteins showing greater than two-fold differences in expression levels in the head and abdomen, respectively, 20 proteins with relatively large differences in expression level between the months were selected and identified. Most proteins were more abundantly expressed in January than February and were mainly involved in nutrient storage, energy metabolism, and biosynthesis pathways in both the head and abdomen. This finding suggested that overwintering bees require large energy storage and metabolize stored nutrition to generate high cellular energy for thermoregulation of their hive without diapause and/or to prepare for the initiation of brood rearing in January."

"Thermoregulation is crucial for colony survival in temperate regions, but possible interference by parasites is currently unknown. The small hive beetle (*Aethina tumida*) and the ectoparasitic mite *Varroa destructor* are honey bee parasites that overwinter in host colonies. The

efficiency of thermoregulation might thus be affected in infested host winter clusters, due to altered worker activity. Schäfer et al. (2011) showed for the first time that parasites can alter honey bee thermoregulation. Moreover, the data suggested that only combined infestations with *V. destructor* and *A. tumida* resulted in higher thermal maxima in the winter clusters, whereas infestations with one parasite alone had no significant effect compared with the controls. Due to the ubiquitous mite *V. destructor* combined infestations with parasites or combined infections with pathogens are almost inevitable. Therefore, their data indicated that an altered thermoregulation due to multiple infestations might be another widespread factor contributing to winter losses of colonies."

"Extreme winter losses of honey bee colonies are a major threat to beekeeping but the combinations of factors underlying colony loss remain debatable. Desai and Currie (2016) monitored colonies in two environments (colonies wintered indoors or outdoors) and characterized the effects of two parasitic mites, seven viruses, and Nosema on colony mortality and population loss over winter. Samples were collected from two locations within hives in fall, mid-winter, and spring of 2009/2010. Although fall parasite and pathogen loads were similar in outdoor and indoor-wintered colonies, the outdoor-wintered colonies had greater relative reductions in bee population score over winter. Seasonal patterns in deformed wing virus (DWV), black queen cell virus (BQCV), and Nosema level also differed with the wintering environment. DWV and Nosema levels decreased over winter for indoor-wintered colonies but BQCV did not. Both BQCV and Nosema concentration increased over winter in outdoor-wintered colonies. The mean abundance of Varroa decreased and concentration of Sacbrood virus (SBV), Kashmir bee virus (KBV), and Chronic bee paralysis (CBPV) increased over-winter but seasonal patterns were not affected by wintering method. For most viruses, either entrance or brood area samples were reasonable predictors of colony virus load but there were significant season*sample location interactions for Nosema and BQCV, indicating that care must be taken when selecting samples from a single location. For Nosema spp., the fall entrance samples were better predictors of future infestation levels than were fall brood area samples. For indoor-wintered colonies, Israeli acute paralysis virus IAPV concentration was negatively correlated with spring population size. For outdoor-wintered hives, spring Varroa abundance and DWV concentration were positively correlated with bee loss and negatively correlated with spring population size. Multivariate analyses for fall collected samples indicated higher DWV was associated with colony death as did high SBV for spring-collected samples.

References

Bleau, N., S. Bouslama, P. Giovenazzo and N. Derome 2020. *Dynamics of the honeybee* (Apis mellifera) *gut microbiota throughout the overwintering period in Canada.* Microorganisms 8:1146; doi:10.3390/microorganisms8081146

Crailsheim, K., N. Hrassnigg, R. Gmeinbauer, M.J. Szolderits, L.H.W. Schneider and U. Brosch 1993. *Pollen utilization in non-breeding honeybees in winter.* J. Insect Physiol. 39: 369-373.

Desai, S.D. and R.W. Currie 2016. *Effects of wintering environment and parasite-pathogen interactions on honey bee colony loss in north temperate regions.* PLoS ONE 11(7): e0159615. doi:10.1371/journal.pone.0159615

Eskov, E.K. and V.A. Toboev 2011. *Seasonal dynamics of thermal processes in aggregations of wintering honey bees* (Apis mellifera, *Hymenoptera, Apidae).* Entomol. Rev. 91: 354-359.

Fahrenholz, L., I. Lamprecht and B. Schricker 1989. *Thermal investigations of a honey bee colony: thermoregulation of the hive during the summer and winter and heat production of members of different bee castes.* J. Comp. Physiol. B. 82.4159: 551-560.

Lee, S.H. and Y.H. Kim 2017. *Comparative proteome analysis of honey bee workers between overwintering and brood-rearing seasons.* J. Asia-Pacific Entomol. 20: 984-995.

Schäfer, M.O., W. Ritter, J.S. Pettis and P. Neumann 2011. *Concurrent parasitism alters thermoregulation in honey bee (Hymenoptera: Apidae) winter clusters.* Ann. Entomol. Soc. Am. 104: 476-482.

Severson, D.W. and E.H. Erickson Jr. 1990. *Quantification of cluster size and low ambient temperature relationships in the honey bee.* Apidologie 21: 135-142.

Stabentheiner, A., H. Pressl, T. Papst, N. Hrassnigg and K. Crailsheim 2003. *Endothermic heat production in honeybee winter clusters.* J. Exp. Biol. 206: 353-358.

Sumpter, D.J.T. and D.S. Broomhead 2000. *Shape and dynamics of thermoregulating honey bee clusters.* J. Theor. Biol. 204: 1-14.

Van Nerum, K. and H. Buelens 1997. *Hypoxia-controlled winter metabolism in honeybees* (Apis mellifera). Com. Biochem. Physiol. A 117: 445-455.

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

Apiary Inspectors of America

Apiary Inspection District of Columbia

Brooke **Decker**

The apiary program in the District of Columbia is relatively new, there were no regulations for beekeeping in the District until 2012. Until then there was an obscure law that stated that you could keep bees as long as they didn't leave the hive.

Thanks in part to the beekeepers of the District the new law was passed in 2012. The apiary program consists of one full time employee and one part-time intern. The District is home to over 500 honey bee colonies and 125 beekeepers. Unlike other jurisdictions the District is 100% urban with honey bee colonies being kept in a variety of creative spaces, from the White House garden to the top of the Kennedy Center, the balconies of row houses and a 19th century cemetery, a Franciscan monastery and numerous community gardens. The District is home to a vibrant beekeeping community. The District is home to over 700,000 residents in 68 square miles, more residents than some states, that is over 10,000 people per square mile. Because of these close quarters, beekeepers are required to register their colonies and follow density and distance requirements. With the close proximity to Maryland and Virginia, the District is happy to have a good working relationship with their apiary programs.

The infamous wagon.

On the roof of the Kennedy Center with all the monuments and mall in the background.

Our rooftop apiary. An 11th floor greenroof.

Bee Vectoring with the Protectabee™

Erica **Shelley**[1,2] & Tasmin **Brown**[1] & Aparna **Karthikeyan**[1] & Nicole **Gauvreau**[2] & Peter **Kevan**[1]

[1]University of Guelph, Guelph, Ontario, Canada
[2]Best for Bees Ltd., Kitchener, Ontario, Canada

They say that necessity is the mother of invention. In the pursuit of developing new technology that would enable bees to carry potentially beneficial fungal powders into their hives, we created an entirely new product that addresses several problems in modern beekeeping.

The original goal of the joint research project between Best for Bees and Dr. Peter Kevan's team at the University of Guelph was to demonstrate that bees could carry powders into a beehive. Apivectoring, also known as bee vectoring, was pioneered by Dr. Kevan and associates 20 years ago. Pest and disease-fighting fungal powders coat honey bees or bumblebees as they exit the hive. The bees then deliver the fungus to the targeted crops' flowers during regular pollination visits. Bee vectoring is now being implemented successfully to combat pests and diseases of several types of crops.

Honey bees also struggle with many pests and diseases of their own, including *Varroa* mites, foulbrood diseases, and small hive beetle. Dr. Kevan recognized the potential of bee vectoring to combat threats within the hive. The process of moving powders into the colony, which his team coined inspensing (Fig. 1) (while outspensing refers to vectoring to crops), is complicated as bees are very efficient at cleaning out foreign materials. Creating a system that would outsmart the bees and effectively move powders within the hive proved challenging.

At the beginning of 2020, Dr. Kevan enlisted the services of a private research company, Best for Bees, to oversee research and development of the "inspenser." Initial trials with a ramp-based prototype used in prior studies were less than satisfactory.

Since the two-year funded project depended on a successful device, Dr. Erica Shelley, founder and CEO of Best for Bees, recognized that an entirely new system was required. Borrowing from old-time bee escape boards using cones to direct bees away from honey supers, she realized that incorporating a separate entrance and exit at the front of the hive could be devised. However, the bees could easily bypass the powder by walking above it inside the device. After engineering many prototypes, she discovered a design that solved the problem and christened it the **Protectabee**.

The research team then set out to determine if the Protectabee would permit the bees to spread the powder throughout the hive efficiently. Bee transport of the powder was tracked via microscopic fluorescent beads in a carrier powder. In six hours or less, the bees emptied the powder from the drawer (Fig. 2, next page). Using microscopy and UV light, the researchers determined that a minimum of 80% of the comb contained fluorescent powder (Fig. 3a, next page).

With proof of concept and a functioning device, the researchers set their sites onto vectoring antibiotics and fungi.

Antibiotics are used prophylactically to ward off American and European foulbrood before possible infection. Ontario's recommended spring application is to sprinkle the antibiotic/powdered sugar combination on top of the brood frames three times, two weeks apart, at least four weeks before the main honey flow. This timing can be tricky for beekeepers who live in cold or wet climates,

Figure 1
Bee vectoring (inspensing) illustration with the Protectabee outlines a bee returning from forage, walking through powder, and spreading powder throughout the hive.
Illusration by Cara Ward

Figure 2
Before: 45ml of carrier powder + fungi (B. bassiana) *added to drawer. After: 6 hours after adding the drawer to a beehive. Rice is used as a desiccant to keep powder dry.*

not to mention labor-intensive.

As one of the wettest summers on record in Ontario, applying antibiotics inside the hives was a constant struggle. However, an advantage of the Protectabee is that the drawer can be pre-loaded before arriving at the apiary and simply slid into the device's front without being impacted by adverse weather.

The research team determined that the Protectabee delivers dosages of antibiotics that correspond to concentrations of conventional applications (Fig. 3b). These findings are exciting as the Protectabee offers an entirely new and easy way to administer antibiotics efficiently into a hive.

The biggest threat to bees in many parts of the world is the *Varroa destructor* mite. The mite feeds on young larvae, transmitting diseases that weaken the hive. Overtreatment has led to widespread resistance to conventional miticides. Developing an easy and effective mite control is one of the bigger goals of the Protectabee project. Possible candidates for mite control include fungi that act as parasites of insects. *Beauveria bassiana* and *Metarhizium brunneum* are two soil fungi that can infect *Varroa* mites.

Botanigard, a commercially available biological insecticide approved for bee vectoring in greenhouses in Canada, uses *B. bassiana* to protect strawberries against thrips, a problematic insect. Could the Protectabee effectively distribute Botanigard throughout a beehive, and would it decrease *Varroa* mites? Indeed, the fungus was successfully disseminated to about 50% of larvae using a single application of Botanigard with the Protectabee. Unfortunately, although mite drop increased immediately after application, Botanigard did not reduce *Varroa* mites long term when applied as a single dose (Fig. 4). These findings are not surprising as the warm and humid environment inside a beehive is not optimal for *B. bassiana* growth.

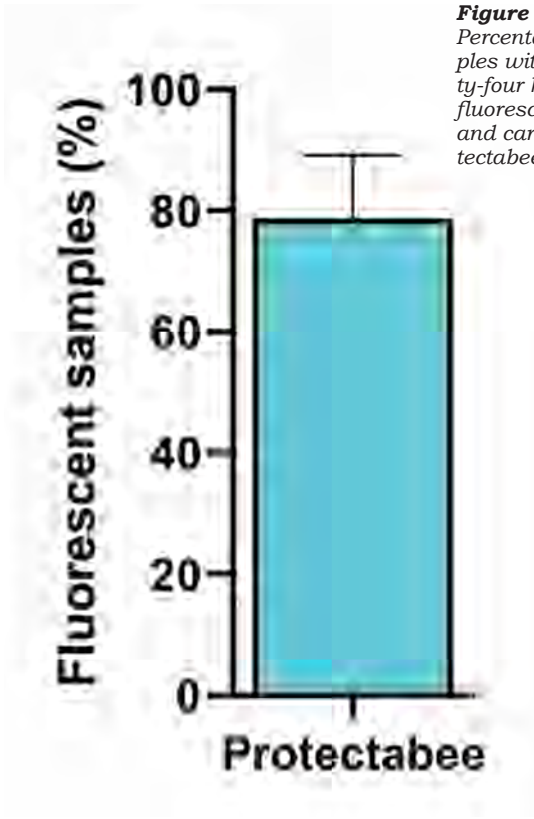


Figure 3a (left)
Percentage of comb samples with fluoresence twenty-four hours after adding fluorescent microbeads and carrier powder to Protectabee drawer.

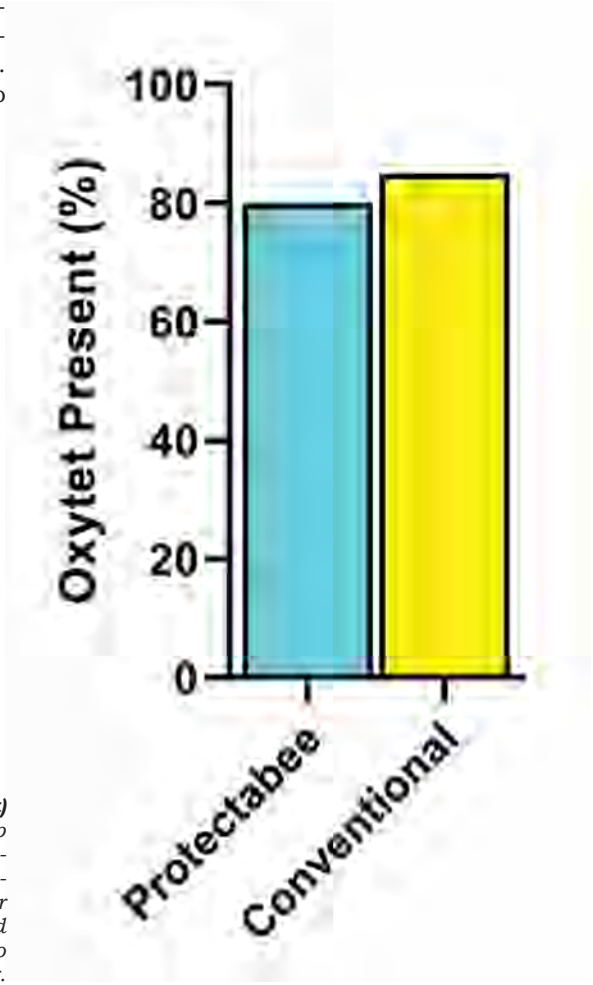


Figure 3b (right)
Percentage of comb samples with oxytetracycline twenty-four hours after adding Oxytet and carrier powder to Protectabee drawer.

Identifying a method for successfully introducing fungi into beehives using bee vectoring holds promise for the future. Researchers at Washington State University recently identified a variant of *Metarhizium* that effectively controls *Varroa* mites and is better suited for environmental conditions inside a hive (1). Once the *Metarhizium* strain has received approval, the fungi could combat mites employing the Protectabee and carrier powder as a delivery system. This combination could be an easy and effective method to improve honey bee health.

Bee vectoring offers an innovative method to introduce health-improving powders into beehives with the additional benefits of reduced labor and heavy lifting, the ability to apply treatments in adverse weather conditions, and decreased hive disruption.

To learn more about Protectabee and ongoing research, visit our website at **bestforbees.com**. The Protectabee will be launching on **Indiegogo** in **February 2022**.

References

1. Han, J.O., Naeger, N.L., Hopkins, B.K. *et al. Directed evolution of* Metarhizium *fungus improves its biocontrol efficacy against* Varroa *mites in honey bee colonies. Sci Rep* 11, 10582 (2021). **https://doi.org/10.1038/s41598-021-89811-2**

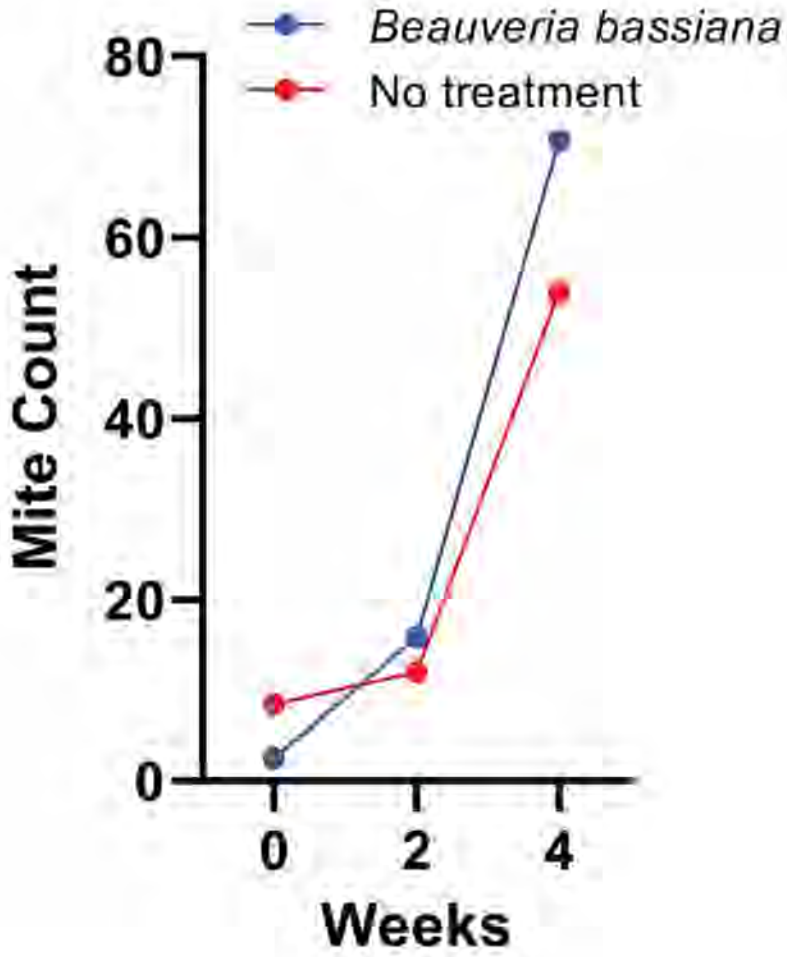


Figure 4
Average mite counts were determined before treatment using an alcohol wash (zero weeks) and at two weeks and four weeks post-treatment of Botanigard (B. bassiana) *or no treatment (control).*

Technology Tips For Beekeepers

Malcolm T. Sanford

SNIFFING OUT AMERICAN FOULBROOD: VOLATILE BIOMARKERS FOR NON-INVASIVE DIAGNOSIS

Cooperative Research Centre for Honey Bee Products (CRC-HBP), Australia; Honey Bee Health Research Group at School of Molecular Sciences, University of Western Australia; jessica.moran@research.uwa.edu.au

Abstract American foulbrood (AFB) is the costliest honey bee disease in Australia. Caused by the bacterium, Paenibacillus larvae, AFB kills honey bee larvae and converts the cadaver to a foul-smelling, spore-laden, glue-like mass. Early detection and intervention are critical to prevent the disease from spreading to nearby hives and apiaries. Although various diagnostic methods have been developed, AFB remains a significant problem for beekeepers. Diagnosis is often slow, generally requiring beekeepers to open hives and visually identify AFB symptoms. In this project, we investigated the volatile compounds associated with AFB's notoriously foul smel to determine if specific compounds could be used as a method for quick and non-invasive diagnosis. We used gas chromatography-mass spectrometry (GC-MS) to identify numerous compounds that are significantly elevated in - or exclusive to - AFB-diseased brood compared to healthy brood. We further investigated the specificity of the compounds for AFB compared to brood that had died of temperature shock or other brood diseases. These biomarker compounds can be used to diagnose AFB-diseased brood with an accuracy of over 97%. In a follow-up field experiment, we demonstrated that these volatile biomarkers could be detected non-invasively in beehive air. We are now developing sensor surfaces for the biomarkers to create a portable, electronic, diagnostic "beehive breathalyzer" device. This work aims to develop a practical and cost-effective tool that will de-risk high-density beekeeping through improved biosecurity.

Acknowledgements Contributing authors of this work are Jessica Moran, Tiffane Bates, Maike Bollen, Gavin Flematti, Julia Grassl; This research is supported by a CRC for Honey Bee Products Ph.D. Scholarship and UWA Alexander Juett Fellowship Ph.D. Top-Up Scholarship in Agriculture, with assistance from the Western Australian Department of Primary Industries and Regional Development and the Metabolomics Australia, Centre for Microscopy, Characterization, and Analysis, University of Western Australia . 14 Minutes https://tinyurl.com/mdnmzysj

O'KEEFE ELECTRONICS WIFI HIVE SCALE

Patrick O'Keefe Jr.; O'Keefe Electronics; USA; info@wifihivescale.com

Abstract Bees need our help more than ever. Today's electronic technology can provide the beekeeper with insights into the colony's behavior to give the needed guidance. This information is useful in managing the hive as well as preventing catastrophic events. The WIFI Hive Scale provides profound knowledge about the condition of the colony. The beekeeper can determine the strength of the hive the first day the scale is installed. The information can be used to monitor nectar runs, know when to add supers, when to feed, know when to harvest the honey, and help with decisions such as how much to leave for winter feeding. This presentation focuses on the catastrophic events that are encountered in the hive. Clear trends in the data provide information to prevent swarms, stop robbing, identify dearth conditions and act, pinpoint queen loss, and determine early warning signs of disease. Actual graphical data examples of catastrophic events from live colonies are illustrated and discussed where the WiFi Hive Scale has been deployed. This presentation shows how these events can be preempted and mitigated. The WiFi Hive Scale was designed to provide many years of operation in the difficult and challenging physical environment that hives find themselves in with rain, sleet, intense cold and heat, salt spray, and even hurricanes. 17 Minutes https://tinyurl.com/3nm3upmu

EXTRACTING INFORMATION FROM CONTINUOUS DATA; Carl Hayden Bee Research Center, USDA-ARS; ARS William.meikle@usda.gov

https://beekeep.info/vita_details/

Abstract: Using sensors to monitor bee colony health, like monitoring the environment or even human health, is becoming feasible for most researchers. Monitoring bee colony temperature has been done for a long time. Our approach to extracting information from continuous temperature data has been to detrend the data by subtracting the 24-hour running average from the raw data and then modeling the residuals using sine curves. 10 minutes https://tinyurl.com/y4wejbzb

BEE VET

Not as fun as a Volkswagen

Dr. Tracy **Farone**

Happy January! For many beekeepers this means your hives are tucked in for the winter and you are enjoying a time to catch up on the season that has passed and get ready for the new.

Winter is also a time where we see breaks in lifecycles of many parasites that can play to our advantage. Many parasites diminish in number and/or reproductive activity or hibernate during the Winter months. This does not mean that they are gone, however. If given the opportunity parasites of all types, will hunker down in/on our warm and cozy bodies, home, or hives to make it through the winter and produce the next generation.

Most parasites, including fleas, ticks, *Varroa* mites, and various intestinal worms are endemic in most of the world. We cannot stop them but strive to control them. No matter the type of parasite or animal it infects, several factors are always at play in the host-parasite-environment relationship. Nutrition, general health of the host animal, genetics, medical preventative or treatment interventions, and climate/shelter/other environmental stressors all play a role in maximizing or minimizing a parasite's effects on our animals.

Nope- this is not another article on *Varroa* mites. By reader request, I will review a parasite that is often listed as a secondary "pest", but they can still cause significant issues within a hive and may be an indication of the even greater issue of a weakened hive…*Aethina tumida*, the small hive beetle.

History

Aethina tumida is a newer pest to the US, arriving as early as 1996, about a decade after we first observed that Varroa had arrived on our shores. In Europe, it is considered a notifiable pest. Small hive beetles are native to South Africa, but despite efforts to control spread, hive beetle infestations are now found throughout the US, Canada, Mexico, Australia, and parts of Europe, Asia, South America, and Central America.

Adult small hive beetles are small (about half a centimeter), brown to black, oval-shaped beetles with club shaped antenna. Female beetles lay their eggs in the hive. Their eggs are smaller than honey bee eggs, so they are hard to individually see, but the eggs may be laid in cells or in multi-clusters around the hive.

The larvae are creamy white to light yellow in color and can be over one centimeter long. Larvae feed on all things within comb; honey, pollen, and brood, and can be quite destructive. Pollen patties may also attract female hive beetles for egg laying and therefore may become infested with larvae. Adults and larvae can defecate through the hive, ruining honey by fermentation.

The pupae must mature in soil, typically in front or near an infested hive. After pupation, the adults emerge, are sexually mature within a week, and may reinfest the nearby hive/s or travel up to five miles to find a new host. The lifecycle from egg to adult is *typically* four to six weeks. Adult beetles may live up to six months and females can lay up to 1000 eggs in her lifetime. Warm and humid conditions favor hive beetle reproduction.

Aethina tumida are "timid" in their behavior in that they use hiding as a survival behavior. Adults move very quickly and can be elusive to both the bees and the beekeepers. In some hives, bees have been observed "herding" beetles into an area or propolis "jail" to control them by confining them.

While parasitic to the honey bee, *A. tumida* have been found to infest bumblebee colonies, and to feed on tropical fruits. Small hive beetles have been reported to be a possible vector for *Paenibacillus larvae* (American Foulbrood) and some honey bee viruses, like deformed wing virus (DWV) and Sacbrood virus.

Diagnosis/Clinical signs

Diagnosis can be straight forward with visualization of adults, larvae and/or eggs. Soil in front of hives can be examined for pupal tunneling. However, several non-pathogenic beetle species, other than *A. tumida*, can be found in hives. So, it is vital that beetle samples are properly identified. Visual identification can be aided with laboratory microscopic exam and PCR is available for confirmative diagnosis.

Damage to the hive's comb may be evident on inspection and a foul odor due to fermenting honey may be present. Slime trails may be evident from larval wanderings. In-hive beetle traps can be used for monitoring as well as control (see Traps below).

Hive beetle infestation should also be on the differential diagnosis list for hives that abscond.

Prevention/Treatment/Control Chemicals

Many who comment in the literature are not big fans of using insecticidal products around bees to control hive beetles. I will say that I am in that camp. However, to be complete, there are several products on the market that have been used in the control of hive beetles. I will briefly mention them here.

Coumaphos is an organophosphate that has been used in veterinary medicine starting in the late 1950's for the treatment of various parasites in a variety of animals. While attending veterinary school in the mid 1990's, I mostly learned about organophosphates as toxins. Coumaphos persists in the envi-

Hive beetle larvae in pollen patty

Hive beetles.

ronment, has shown resistance in the treatment of target parasites, and many of the long-term effects of chronic human exposure remain unknown (CDC). Hives are treated with coumaphos strips placed **directly** into the hive.

There are several ground drenches used (i.e., not placed in the hive but on the ground in front of the hive), which contain a Permethrin. Permethrins have lethal and repellant effects on various external parasites and pests of many animals and humans and are commonly used medically today. It can be helpful as a medication, when used under the proper guidance, but it can persist in the environment. It is particularly toxic to cats and aquatic life. Do not use it around bodies of water, if you like to fish. Like other insecticides, it is toxic to honey bees, if they come into contact with it.

Traps & DE

I would be happier if beekeepers utilized less toxic methods, for both us and the bees, to help monitor and control hive beetles. There are several beetle traps and beetle towels with or without the use of oil that are placed in the hive on the market. Homemade traps can be made from dry, disposable, dusting mop pads. These traps and towels can help trap adult beetles so they can be removed from the hive and may I suggest, placed in a hive to measure the presence or amount of hive beetles in a hive. Remember you will have to check your traps periodically for them to be the most informative and effective. Anecdotally, I have heard varying reviews from beekeepers regarding their experience with various trapping methods utilized in hive beetle control.

Diatomaceous earth (DE) makes me recall my old lifeguarding and swimming pool "work" days. DE is commonly used in filtration systems of swimming pools. Diatomaceous earth originates from the remnant shells of little pre-historic sea creatures called diatoms. Evidence of DE's effectiveness in controlling hive beetles is anecdotal, but the theory is that the crystal-like shells of diatoms cut and dehydrate any hive beetle larvae that try to pupate in front of a hive. Therefore, this organic substance can be placed outside, in front of hives, to make the ground less hospitable for pupating hive beetle larvae without the fear of environmental toxicity. Check your local swimming pool store for prices. Warning: DE can become very clumpy and stick to your boots when it gets wet.

General management/IPM

There are several management techniques that can also be employed to reduce hive beetle infestations.

1. This is often stated but cannot be overlooked here- *keep strong colonies*. Strong colonies will always have an advantage over parasite infection and hive collapse. Colonies collapsing due to hive beetles may have had underlying issues in functional hive immunity. Assure varroa control and good nutrition.

2. This may seem obvious but physically remove and kill any hive beetles you see during hive inspections. Death by hive tool. Do not spend all day doing this but any beetle you can take out can be helpful. Be aware they are quick little buggers.

3. This may not be practical for all beekeepers, but it is a method I have employed with success. Do not keep your hives directly on the ground/dirt. Placing a weed barrier and then gravel over the ground will create a barrier for grass, weeds, and hive beetle reproduction. I suspect hives on rooftops may enjoy a similar benefit.

4. While it's true that hive beetles can "fly in" to your hive from miles away, biosecurity principals should still be employed to reduce parasitic pressures. Swarms, while they may have other issues, are less likely to introduce hive beetles to a new yard. Trade and movement of package bees, nucs, colonies, various hive products and even tropical fruits can present risks of further beetle spread. If you are purchasing nucs or hives, ask the supplier if you can inspect the hive/nuc, prior to purchase. If the answer is "no" that may provide you with enough information to make an informed choice. Nucs originating from the South are more likely to carry hive beetles, since the winter is mild in those areas and their reproduction is not curtailed (Sammataro). Producing your own new stock from splits is often the best way to avoid biosecurity breeches.

5. Freezing frames will kill any hive beetle eggs (as well have other parasites like wax moths). If possible, store un-used comb over the winter in a freezer.

6. Hive beetles do not prosper or reproduce if humidity falls below 50%. Controlling humidity within hives can reduce their success. Top entrances and screened bottom boards may be helpful under the correct environmental conditions.

7. In honey houses, extract honey from supers quickly to avoid attracting hive beetles.

What's on the horizon?

The Large Hive Beetle, consisting of two main species that infest honey bee colonies, *Oplostomus fuligineus* and *Oplostomus haroldi,* are currently found in southern Africa. This pest is *not currently* in the US, but it is just another parasite to be on our watch list.

References:

CDC website. **https://www.cdc.gov/biomonitoring/Coumaphos_BiomonitoringSummary.html**. Accessed 10/26/2021.

Kane, Terry Ryan and Faux, Cynthia M., eds. Honey Bee Medicine for the Veterinary Practitioner. Wiley Blackwell. 2021. pp.310-12.

Vidal-Naquet, Nicholas. Honeybee Veterinary Medicine: *Apis mellifera L.* 5m Publishing. 2018. pp.176-81.

Sammataro, Diana and Avitabile, Alphonse. The Beekeeper's Handbook, 4th Ed. Comstock Publishing Associates. 2011. pp.223-6.

Gravel in beeyard.

2022 Almond Pollination Outlook

Economic Outlook and Other Considerations

Brittney **Goodrich** & Marieke **Fenton** & Jerrod **Penn**

In this article, we summarize some considerations for the 2022 almond pollination season, including results from a 2021 survey of commercial beekeepers regarding their almond pollination agreements.

Almond Industry Update

Almond prices rebounded this summer due to a lower than anticipated almond crop for the 2021-2022 marketing year, following roughly a year of low almond prices. Nonpareil inshell prices hovered around $3/lb in August 2021 according to Merlo Farming Group, 74% higher than August 2020. Prices of other varieties have increased more moderately, with shelled Monterey and Carmel both at $2.09/lb, 45% above their August 2020 prices. Relatively low competition from other exporting countries, coupled with steady growth in almond demand have kept almond prices strong despite monumental growth in production over the last two decades (Bruno, Goodrich, and Sexton, 2021).

Despite the recent increase in almond prices, the outlook for almond growers is not all positive. Consecutive years of drought in California have limited surface water availability, and the drier than average outlook for the upcoming winter shows little promise of improving water availability (National Interagency Fire Center, 2021). In addition to surface water scarcity, the first groundwater sustainability plans required by California's Sustainable Groundwater Management Act (SGMA) were approved for implementation in June 2021. The goal of SGMA is to lower groundwater extraction levels which have reached unsustainable rates in many areas. Because plans are just beginning to be implemented and have up to 20 years to reach sustainable extraction rates, it is unclear how exactly SGMA will impact the almond industry and California agriculture in general. However, restricting water extraction will likely increase the cost of water as well as decrease the amount of acreage in production, especially in areas that rely heavily on groundwater sources for almond production.

The Almond Board of California and Land IQ estimate the removal of around 48,000 acres of almonds by September 2021, approximately 3.6% of the 1.3 million bearing acres in 2021. This is up slightly from 2020, with an estimated 39,000 acres removed. Aging orchards are the likely candidates for removal, and we have heard speculation from a few industry sources that some orchards will be removed after harvest due to water scarcity concerns. Land IQ estimates 13% of almond orchards are over 21 years old, compared to 20% of young orchards that will begin bearing in one to three years. Between June 2019 and May 2020, nurseries reported 66,000 acres of sales, with over half being for new orchards and the remainder replacing aging orchards. These numbers suggest that almond acreage is still expanding, though likely at lower rates than previous years due to the recent low prices and uncertain water availability.

Colony Demand

Figure 1 plots the estimated demand for colonies based on bearing almond acreage each year from 2015 to 2022, as well as the total colony shipments into California for almond pollination and the total number of colonies in the U.S. on January 1. Estimated demand is calculated using two colonies per acre for traditional varieties and one colony per acre for self-fertile varieties (Shasta and Independence). A consistent gap between estimated demand and colony shipments is filled by colonies that remain in California year-round. For the 2021 almond bloom, roughly 1.3 million almond acres (3.3% in self-fertile varieties) required an estimated 2.6 million honey bee colonies for pollination (Figure 1). According to apiary shipment data provided by the California Department of Food and Agriculture, other states shipped 2.1 million honey bee colonies into California for the 2021 bloom, up 16% from 2020.

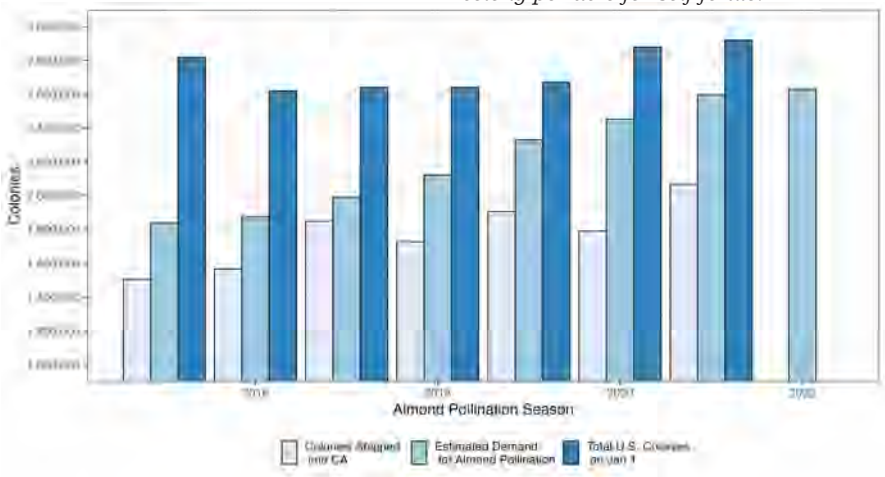
As seen in Figure 1, the estimated demand for colonies in 2022 is 2.63 million colonies, slightly above that of 2021. It seems the recent increase in self-fertile variety plantings have started leveling off the estimated demand for colonies. However, the colonies that will be required for almond pollination in

Figure 1

Total U.S. colonies on January 1, estimated demand for colonies, and shipments of colonies into California, 2015-2022

Sources: 2015-2020 Almond Acreage Reports, USDA NASS and CFDA; Apiary Shipments through California Border Protection Stations, CFDA Plant Health and Pres Prevention Services; Honey Bee Colonies Reports, USDA NASS

Note: Estimated demand is two colonies per acre for traditional varieities and one colony per acre for self-fertile.



Week	No drought	Abnormally dry or worse	Moderate drought or worse	Severe drought or worse	Extreme drought or worse	Exceptional drought
July 27, 2021	15%	85%	76%	59%	32%	6%
July 31, 2012	9%	91%	72%	59%	30%	1%

Table 1
Comparison of percentage area under drought conditions in the Northern Plains Climate Hub, Weeks in July 2012 and 2021
States: Montana, Wyoming, Colorado, Nebraska, South Dakota, and North Dakota
Source: ***https://droughtmonitor.unl.edu/***

2022 still represents 90% of the 2.92 million colonies in the U.S. on January 1, 2021, so at least in the short run, it's unlikely this leveling off of demand will put downward pressure on pollination fees. Additionally, an article published in *Nature* found the Independence variety showed an increase in yield by 20% from allowing bee visitation (Sáez et al. 2020). This study eliminates any claims that these self-fertile varieties do not require honey bee colonies for commercial production. Growers of self-fertile varieties who do not currently place honey bees in their orchards are likely "borrowing" pollination services from neighboring orchards. In the future, growers with traditional orchard varieties surrounded by many self-fertile orchards with few (or no) colonies per acre may have to compensate by placing more colonies per acre.

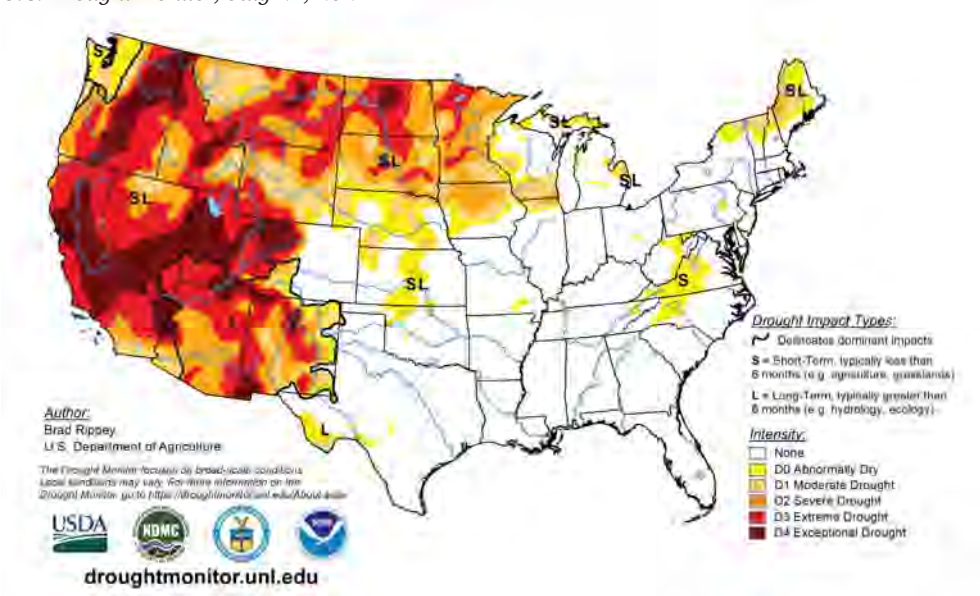
Weather Impacts on Colony Supply

Much of the western U.S. and major honey producing states in the northern plains have been under severe drought conditions throughout the summer. Figure 2 shows the U.S. drought monitor for the week of July 27, 2021. As of the week of October 12, 2021, 35% of the U.S. is still in a severe drought or worse. Consequently, many commercial beekeepers have seen decreased honey production, increased costs of feeding, and poor colony nutrition, all likely to negatively impact the supply and strength of colonies for almond pollination.

To get an idea of potential impacts of this drought, we looked back to 2012 when a similar drought took place. In October 2012, approximately 40% of the U.S. was in a severe drought or worse, slightly more area affected than our current situation. Table 1 provides a comparison for the Northern Plains Climate Hub states (Montana, Wyoming, Colorado, Nebraska, South Dakota, and North Dakota) where most commercially managed honey bee colonies are located for honey production in the summer. This shows a similar percentage of this area was impacted by drought-like conditions, but in terms of the worst drought categories, Extreme and Exceptional, the 2021 drought has affected more of this area than the 2012 drought.

According to national honey yields from USDA, the 2012 honey crop was the lowest production in over 30 years. Figure 3 (next page) shows winter mortality rates and colony strength delivered at almond pollination for years 2010-2021. Following the 2012 drought, winter mortality rates were 31% according to Bee Informed Partnership (BIP), 38% higher than the previous winter. Average colony strength delivered for 2013 almond pollination dipped 20% lower than the previous year. 2022 almond pollination could see similar impacts on colony availability and strength from the 2021 drought.

Figure 2
U.S. Drought Monitor, July 27, 2021



2021 Almond Pollination Survey Results

In February-April 2021, we conducted an online survey of over 90 commercial beekeepers that participated in the 2021 almond pollination market to better understand their almond pollination decisions. The sample represented over 19% of hives demanded for 2021 almond bloom. The following sections summarize some key findings of interest. Some participants chose not to answer certain questions, so sample sizes vary and will be indicated in figures, tables, and text.

Almond Pollination Fees

We asked survey respondents to report the fees associated with their largest almond pollination agreement in 2021. Reported fees ranged from $130/colony to $225/colony. Fees vary due to a number of factors, a primary determinant being the colony strength requirement in the agreement. Table 2 (next page) shows the average, minimum and maximum pollination fee by colony strength requirement. Figure 4 (next page) shows box plots with the average pollination fee received sep-

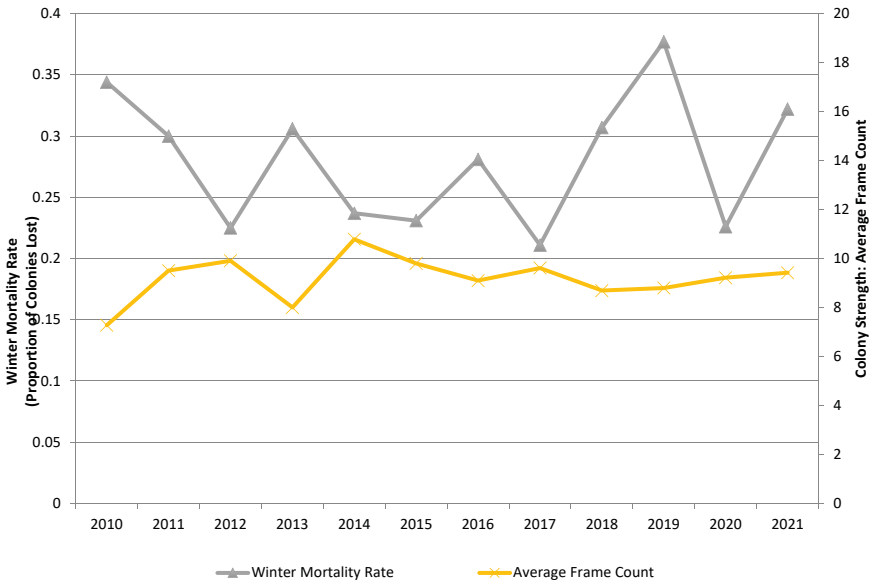


Figure 3 (above)
Almond pollination colony strength and winter mortality rates, 2010-2021

Sources: The Pollination Connection, BIP Winter Loss Surveys

Table 2 (below)
Average 2021 almond pollination fees by average colony strength requirement (N=95)

Average Colony Strength Requirement	Percentage of Responses	Average Pollination Fee	Average Premium/ Discount compared to 8-frame	Minimum	Maximum
<6-frame	11%	$192.00	-0.03%	$175	$205
6-7 frame	28%	$184.81	-3.77%	$130	$200
8-frame	46%	$192.05		$160	$225
>8-frame	15%	$211.43	10.09%	$200	$225
Total		$192.84		$130	$225

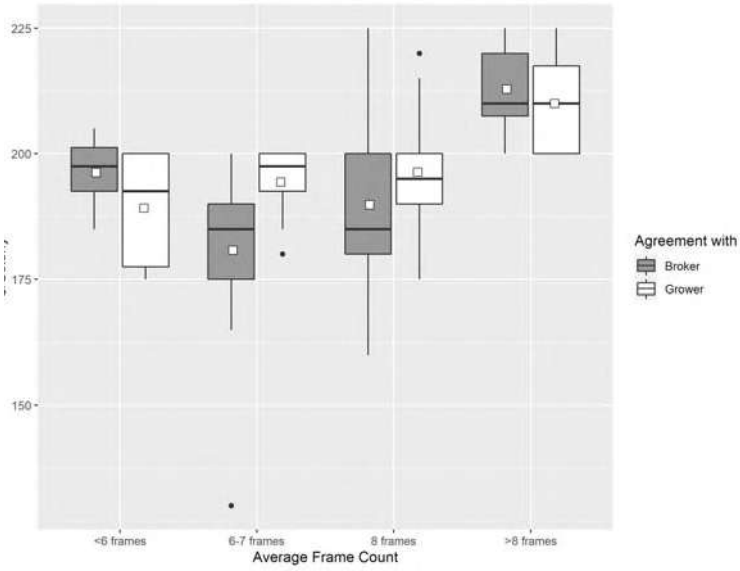


Figure 4
Box plots of almond pollination fees by colony strength category and whether the agreement is with a pollination broker or grower, 2021

Note: Box plots represent the distribution of fees within each group where groups are separated by colony strength categroy and whether the beekeepers contracted through a broker or directly with the grower. The lower and upper sides of each rectangle are the 25th and 75th percentiles of each group's fee distribution. The horizontal line in each rectangle represents the group median, white squares represent the group average and circles represent outliers in each group.

arated by frame count category and whether the beekeeper had contracted directly with the grower or through another beekeeper or broker.

Most pollination agreements (46% of those reported) required eight active frames, for an average fee of $192 in 2021 (Table 2, next page). Across all frame count categories, the average fee was $193 per colony. Agreements with higher colony strength requirements received a 10% premium compared to eight frame agreements, while six to seven frame agreements saw approximately a 4% discount. Low strength agreements (less than six frames) on average received about the same fees as eight frame agreements, however this could be due to the small number of these agreements reported.

The average fee received by beekeepers who contracted through a broker (or beekeeper-broker) was $193 versus contracting directly through a grower at $202 per colony (Figure 4). This suggests brokerage fees on average were around $9 per colony.

27% of beekeepers said at least one of their pollination agreements were incentive-based contracts that pay per-frame based on the results of a third-party inspection (See Goodrich and Goodhue (2016) for a sample incentive-based contract). For the beekeepers whose largest contract was an incentive-based contract, on average they received $191/colony for a seven frame average and $210/colony for an 11-frame average. On average, this constitutes a $5 premium per-frame over the base fee.

Pesticide Exposure and Agreement Specifics

We asked beekeepers if their colonies had experienced either sublethal or lethal pesticide exposure during the 2020 or 2021 almond pollination seasons. Of the 77 beekeepers who answered this question, 19% and 56% had experienced lethal and sublethal exposure, respectively, in the last two almond pollination seasons. This suggests that pesticide exposure is relatively common and is a cost beekeepers should factor in when making pollination decisions.

We also asked about language

The grower agrees to. . .	Percentage of Responses (N=82)
No pesticide details in agreement	46%
Apply pesticides only during inactive foraging times (e.g. evening, night)	33%
Minimum notification time before applying pesticides (e.g. 48, 72 hours)	29%
Not apply specific chemicals	18%
Pay extra fees if colonies must move due to pesticide application	12%
Pay damages for colony loss due to pesticide exposure	11%
Not tank-mix multiple pesticides	11%

Table 3
Percentage of beekeepers with agreements containing pesticide exposure details

Note: Participants could select more than one, so the percentages add to over 100%

related to pesticide exposure in pollination contracts. 54% of beekeepers said that at least one of their pollination agreements contained details to prevent pesticide exposure or to receive compensation if it occurs. Table 3 (next page) below shows the percentage of beekeepers whose agreements contained language about pesticide exposure by the specific feature. The most common detail included was that the grower would not apply pesticides when bees were active (33%). 11-12% of beekeepers stated they had agreements in which they would be reimbursed if colonies had to be moved or were damaged due to pesticide applications.

Advance Payment

Beekeepers were asked if any of their growers/brokers pay some portion of the pollination fee before colonies are placed for almond bloom. Nearly half of respondents (44%) had at least one contract that pays part of the pollination fee in advance. Table 4 shows the percentage of respondents in each advanced payment category. 21% of beekeepers received advanced payments of 30% or less of the total pollination fee. 19% of participants received over 40% of the total pollination fee in advance.

Colony Theft and Agreement Specifics

21% of beekeepers (16 of 77) reported that they had colonies stolen during the 2020 or 2021 pollination seasons. Thus, it seems colony theft is a relatively common issue for beekeepers who participate in almond pollination. 10 of 91 beekeepers (11%) reported that language is included in their pollination agreements that would allow them to be compensated by the grower if colonies were stolen.

Contracting Timeline and Reserve Colonies

Beekeepers reported when they settled the price and quantity for their largest agreement for the 2021 almond bloom. Over half of beekeepers (56 of 90) settled their largest agreement in December 2020-February 2021. One-third settled in September-November 2020, and 9% settled before September 2020.

The majority of beekeepers do not rent out all of their colonies in advance of almond bloom. Having a reserve of colonies that are not contracted can help mitigate risks from high colony mortality or poor colony health. Figure 5 shows responses to the percentage of colonies beekeepers contract "in advance" of almond bloom, which was subject to each beekeeper's interpretation. Roughly 10% of respondents said they do not contract any colonies in advance of almond bloom, and roughly 13% of respondents said they contract all of their colonies in advance of almond bloom. 56% of beekeepers said they have reserves of 5-25% of colonies that are not rented out in advance of almond bloom. The most frequent answer was 90% of colonies were rented in advance with 22% of the observations.

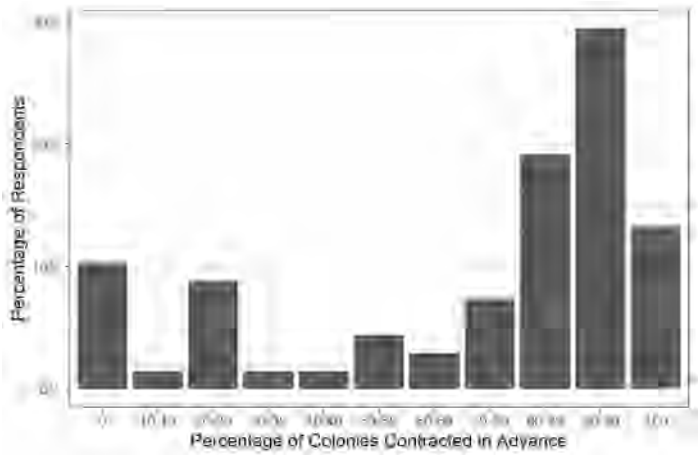


Figure 5
Percentage of beekeepers by the percentage of colonies contracted in advance for almond pollination (N=68)

Concluding thoughts

This summer's drought may make preparing for almond pollination especially stressful for many beekeepers. Years with large winter losses and poor colony strength show the benefits of having a sufficient reserve of colonies that are not contracted in advance for almond pollination. In a year with widespread colony health issues, beekeepers will still likely be able to rent out those reserve colonies (even without meeting an eight frame requirement) once bloom nears and colony health and

Percentage of Pollination Fee Paid in Advance	Percentage of Responses (N=91)
None	56%
1-10%	18%
11-20%	1%
21-30%	2%
31-40%	0%
41-50%	10%
50% or more	9%
No response	4%

Table 4
Percentage f beekeepers by percentage of almond pollination fee received in advance of colony placement.

numbers are realized.

Almond pollination agreements seem to be ever-increasing in importance to profitability for commercial beekeepers. While seeking out the highest possible pollination fee may seem like the best way to increase profits, there are economic tradeoffs to consider. We find that losing colonies to theft and pesticides is fairly common, but few beekeepers have protections in their pollination agreements against such risks. Implementing some of these beneficial terms into pollination agreements allows beekeepers to share these risks with their almond grower, but it may come at a cost in terms of a lower pollination fee. The long-term benefits for colony health and peace of mind may be worth the tradeoff off for some beekeepers.

References:

Bruno, Ellen M., Brittney Goodrich, and Richard J. Sexton. 2021. *The Outlook for California's Almond Market.* ARE Update 24(6): 9–11. University of California Giannini Foundation of Agricultural Economics. **https://giannini.ucop.edu/filer/file/1629132450/20132/**

Goodrich, Brittney and Rachael 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. **https://giannini.ucop.edu/filer/file/1461278500/17280/**

National Interagency Fire Center, *Northern Operations Monthly/Seasonal Outlook,* October 4, 2021. **https://gacc.nifc.gov/oncc/predictive/outlooks/Outlook_NOps.pdf**

Sáez, A., Aizen, M. A., Medici, S., Viel, M., Villalobos, E., & Negri, P. 2020. *Bees increase crop yield in an alleged pollinator-independent almond variety.* Scientific reports, 10(1), 1-7. **https://www.nature.com/articles/s41598-020-59995-0**

Authors

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

Marieke Fenton, PhD Candidate, Dept. of Agricultural & Resource Economics, University of California, Davis

Jerrod Penn, Assistant Professor, Dept. of Agricultural Economics & Agribusiness, Louisiana State University

Painted Hive Body Competition

Lisa **Bright**

The Painted Hive Body Competition and Auction is the brainchild of one Nansemond Beekeepers Association member, Jajala Schweiger. It began 8 years ago, as a labor of love, with funds from her own pocket. It has since grown into a program that is a Hallmark of our club. It has been showcased at EAS 2018 and EAS 2019. Our most recent auction took place in October 2021 at the Virginia State Beekeepers Association conference in Smithfield, Virginia.

This is an art competition to showcase hive bodies that are painted, judged, and then auctioned off to support honey bee research. It is a program that reaches out to all parts of the community; Beekeepers, school children, businesses, and artists alike. It gives our club many opportunities to talk about bees with all members of the community. We try to raise interest in our future beekeepers, and increase everyone's awareness as far as the plight of the honey bees and all pollinators.

Everyone is invited to the initial building and priming party. Then the boxes are doled out to those that wish to paint them. There are several categories including youth, high school, adult amateur, and professional. Their ages range from 3 years old to 70+. Some years we even have full hives donated from the larger bee supply companies, and that can also be a separate category.

There are several months for the artists to complete their work, then the boxes are turned in at the venues that have been prearranged. Our venues include art supply businesses, nurseries, art museums, and wineries. While the boxes are being displayed at these venues there is an auction book where people can start bidding on the boxes. The art portion of the competition ends when the boxes are judged by people we've selected from our community. In the past we have had such illustrious judges as our local delegate Emily Brewer, the Mayor of Smithfield, Carter Williams, members of our local tourist bureau, various presidents of the Virginia State Beekeepers Association, and members of our local newspapers.

There is an entry fee to paint the boxes if you are an adult, professional, or paint a full hive. The money collected from these entry fees are then used as the prize money allotted to the winners of the art competition. Once the auction portion of our program ends, expenses are tallied and any profits left over are used as Grant funds to be used for honey bee research. There is an application on our club website for anyone interested in applying for these research grants. The Painted Hive Body committee reviews all applicants and submits their recommendations to the club. The club then votes on a recipient. The only additional requirement is that the grant recipient inform the Nansemond Beekeepers Association within 6 months of how their research is going, and how the funds are being used. Past Grant winners include Dr. Horth of Old Dominion University, Samuel Ramsey, and Zachary Lamas, who graciously spoke to our club about his research.

We are beginning our 9th Annual Painted Hive Body Competition this year with the hopes of being invited to EAS 2022 in Ithaca, NY. Every box that is painted is done with loving intent, and signifies another individual determined to help our honey bees and native pollinators.

Lisa Bright, Secretary Nansemond Beekeepers Association

BEE CONSERVATION IS NOT 'Child's Play'

Paolo **Fontana** & Laura **Bortolotti** & Giacomo **Ciriello**

There are concerns among conservationists in Italy about the sale of solitary bee species, under the purported aim of supporting pollination and to raise awareness about these bees, mistakenly defined as 'at risk of extinction'. The marketing campaign aims to educate the public about the plight of the bees and threats to pollinators. These issues affect honey bees, and therefore beekeepers, but even more so all other bee species. The so-called *bee decline* is a complex phenomenon and therefore bee conservation is not 'child's play'.

The plight of bees

The causes of the decline in bee numbers are linked to many factors including changes in land use, and unusual seasonal weather patterns. Honey bees in Europe are affected by many health problems especially the parasite *Varroa destructor* and the viruses which are transmitted by this mite. Another issue is the pollution of local honey bee populations (subspecies and ecotypes) with imported genetics and the loss of genetic diversity associated with intensive queen breeding. The safeguarding of local honey bee genetics has only recently emerged as an important theme which in Italy has been dealt with in depth through the San Michele all'Adige Declaration (2018).

Recently a narrative has taken hold in the media pitting 'wild bees' against 'domesticated bees'. Honey bees are thus blamed for out-competing other bee species, especially when there is a high concentration of beehives in a particular area, as often happens with migratory beekeeping. The alarm raised by the spread of honey bees as a cause for the decline in 'wild' bees and pollinators, while not entirely warranted, highlights growing public attention on the plight of pollinators. Many are however unaware that honey bees are not the only bees that are bred and managed by people. Even among the so-called 'wild bees' several species are increasingly subject to intensive breeding and management.

A bumblebee and a solitary bee on the same flower. There are over 1,000 species of bees in Italy.
©Paolo Fontana

Evidence of poisoning at the hive entrance. One of the gravest problems for bees is the use of pesticides.
©Mateo Marighi

Wild bees and breeding

The notion that honey bees are 'bad' because they are bred and other bees are 'good' because they are wild, crumbles readily if we consider that, in Italy and the rest of Europe, honey bees are part of our ecosystems and that many colonies live free from any human intervention. Little does it matter whether free-living colonies derive from managed colonies, because managed colonies in turn derive from those that lived freely in nature. This is true also for the 'other' bees. Some would say that bumblebees and other bee species are no longer 'wild' once they are managed and bred. This position however is not supported by a scientific vision.

Today beekeeping is practised by many people for reasons that have nothing to do with production and livelihoods, but rather with experiencing nature and transmitting traditional knowledge. On the other hand, the breeding of bumblebees and solitary bees has been almost exclusively for economic purposes - that is to guarantee adequate pollination services to specific commercial cultivars. It may court sympathies to enrol these cute and furry creatures, buzzing from flower to flower, in a bid to transmit a love of nature. But it takes only a few 'how' and 'where' questions to paint a less reassuring picture.

Breeding bumblebees

Around one million bumblebee colonies are sold every year for pollination. These colonies are bred intensively, starting with the queens held in captivity. To ensure a minimum of genetic variation, it is necessary to periodically capture queens from the wild. These are caught towards the end of summer, picking queens that are ready to hibernate, or caught toward the end of winter and beginning of spring, when new queens are emerging from hibernation and starting to build their new colony. Generally, spring captures are considered more damaging, as this is a removal of individuals that are key to the survival of that species in that habitat. Sophisticated techniques to rear colonies of bumblebees have developed over many years and are not in the public domain. Sometimes worker honey bees are used to help bumblebees establish colonies faster.

The bumblebee species that is most widely bred in Europe is *Bom-*

An apiary in the mountains. Competition between honey bees and other species depends largely on hive density in the area. ©Paolo Fontana

bus terrestris - indigenous to Europe and western-central Asia. Following the development of its commercial use, this species has been introduced to continents where it was not present, such as parts of South America, eastern Asia and Australasia, causing severe issues of genetic pollution and competition with local species. The introduction of *Bombus terrestris* in South America at the end of the 20th century led to the near extinction of *Bombus dahlbomii*, as well as issues linked to the inter-species spread of disease. In many other countries where it has been introduced since the 1990s including Argentina, Chile, Japan, Korea, New Zealand and Tasmania, *Bombus terrestris* spread at such a rate to be considered an invasive species. More recently, some countries including Australia, Japan and the USA, have forbidden the importation of these species for commercial purposes and incentivised the breeding of endemic species.

In addition to its diffusion outside its natural range, the commercialization of Bombus terrestris colonies does not take into account the fact that this species is present in Europe and in neighboring countries with as many as 9 subspecies. The problem of subspecies derives from the fact that they are interfering with each other. Therefore, the displacement of one subspecies within the range of another, unequivocally causes genetic pollution as occurs in *Apis mellifera*, in *Bombus terrestris* and in any other species.

There are many reasons to call into question the environmental sustainability of the use of bumblebees for pollination. Even though they have become essential for the economic sustainability of many farming businesses, it is necessary to regulate the commerce of these species adequately to reduce risks for biodiversity. The challenge then is to identify solutions that are sustainable both from an environmental and from an economic point of view. Favouring indigenous pollinators must entail protecting indigenous flora and biodiversity more broadly, making farms welcoming and healthy places for pollinators.

Rearing bumblebees for pollination started in the 1980s. ©Laura Bortolotti

Management of mason bees

Mason bees are solitary bees that nest in small cavities. In the past few years, several companies have emerged in Europe specialising in the management of these bees to offer commercial pollination services. How are these bees used? It starts with the capture of individuals in their natural habitat, siting *bee hotels* with straws or cavities of specific sizes depending on the species one seeks to capture. The nests with the bees are then taken to a production centre, where they are opened and the cocoons extracted, following a process of selection that eliminates those with parasites (as if parasites were not themselves serving an ecological function). Finally, the cocoons are frozen so that they can be made available, by modulating the temperature of conservation, on a specified date to match pollination requirements. The cocoons are thus sent to their destination ready to hatch according to farming requirements rather than to their natural lifecycle. When the mason bees have finished pollinating, their nests are retired back to the production centre, and are sorted and restocked for a new cycle.

A queen of Bombus terrestris *flying towards a* Prunus sp *blossom. ©Laura Bortolotti*

The species used in Europe are *Osmia cornuta* and *Osmia bicornis*, for which different subspecies have been described. As they are captured in the wild, and selected, handled and shipped as cocoons, there is a risk

that different species and subspecies to the ones identified are sent to where they are not endemic. In Italy, we know there are exotic species, such as *Megachile sculpturalis* from the Far East that compete with local species, especially for nesting sites and the large-scale trade in solitary bees can only increase the occurrence of the introduction of alien species.

Stingless bees

Looking beyond Italy, in tropical and subtropical areas of the world there are many species of stingless bees (*Meliponini* sp, social bees) that are kept for the production of honey, as well as for pollination of special cultivations, such as the vanilla orchid. The circa 500 *Meliponini* sp are severely threatened by the various environmental issues causing a decline of pollinators everywhere, but also by the introduction of honey bees in their habitats. This issue is especially acute in the Americas following the spread of 'Africanized' honey bees. In the case of stingless bees, we are witnessing a growing movement of particularly productive species outside of their endemic ranges, without much thought to competition with local species or to the spread of pests and diseases. This is the case for example with the Mexican species *Melipona beecheii*, which is exported to regions in the Caribbean and South America.

Entrance of a managed nest of Tetragonisca angustula, *Costa Rica ©Paolo Fontana*

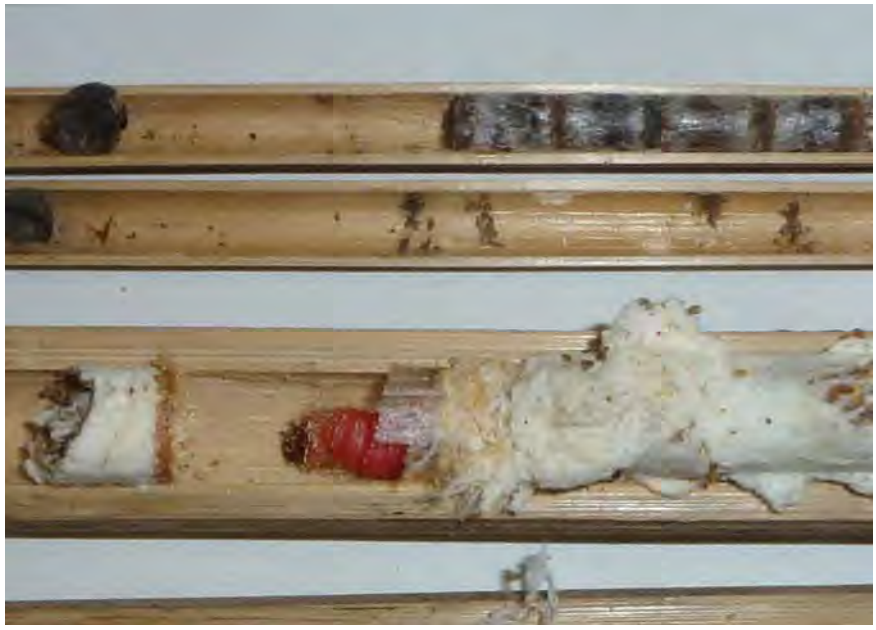
Subspecies of Bombus terrestris *in Europe and the Mediterranean. Image from* Rasmont et al *(2008)*

Conservation of bees and sustainability

As noted at the start, we are seeing how in addition to breeding and moving bees for productive reasons, there are now initiatives doing so with educational goals, supposedly to enhance biodiversity and contrast the decline of pollinators. Unfortunately, despite good intentions, this proposal is not in the slightest sustainable from an ecological point of view: it fosters miseducation, as it reduces these marvellous beings to a mere object, a toy and a slogan. A different matter altogether is the setting up a of *bee hotel*, planting local flora, stopping the use of pesticides, and choosing to buy organic food, sustainably produced.

How can this mindless sale of mason bees be happening despite environmental and animal welfare legislation? From a legal standpoint, there are indeed laws that explicitly prohibit the transfer of wild animals outside of their endemic range. However, these laws are usually made to hold exclusively for vertebrate species. There is no good reason why they should not hold for bees, butterflies, crickets etc. Consider also, for example, the release of butterflies at

Inside a bee hotel: A mason bee nest (top) and a carder bee nest (bottom) parasite by checkered beetles (pink larva). Bee parasites have also an ecological function. ©Paolo Fontana



weddings and other events. Does the fact they are reared by people strip them of their status as 'wild' (and therefore of legal protection)? There is a need for knowledge, clarity and dedication on these themes. Superficiality is one of the great evils of our times. Today more than ever information is at our finger-tips, yet we fail to focus on the heart of the matter. Bees, with their great ecological role, with their variety of species and habits, but also with their fragility, are once again a key to understanding our reality and a measure to evaluate what is truly sustainable.

This article was first published in Bees for Development Journal Issue #140, September 2021. The extended, Italian language of this article was first published in L'Apicoltore Italiano N.4 May-June 2021.

Authors and Translators

Paolo Fontana, *Fondazione Edmund Mach and World Biodiversity Association*

Laura Bortolotti, *CREA-Centro di Ricerca Agricoltura e Ambiente*

Translation by Giacomo Ciriello, *Bees for Development*

Megachile sculpturalis *approaching a bee hotel. This is an alien species in Italy.*
©Paolo Fontana

Osmia cornuta *male and female mating and a male flying*
©Laura Bortolotti

Above
Planting and sowing some wildflowers helps bees and biodiversity..
©Paolo Fontana

Below
Bee hotel in a garden in Verona.
©Paolo Fontana

THE HISTORY OF BEEKEEPING AT TUSKEGEE UNIVERSITY

Asmera **Smith**

Becoming an apiarist can make a meaningful imprint on the world. It allows you to be conscious of the umbilical cord connecting human beings and nature, as we see in the history of beekeeping in Tuskegee, Alabama.

Beekeeping in Tuskegee also served as a necessary skill that assisted in anchoring Black identity, community, and environmental connectedness.

Since the inception of Tuskegee University, its first president Booker T. Washington emphasized the importance of molding the model citizen with discipline and practical learning through the lens of agriculture. All students enrolled at Tuskegee were once required to learn beekeeping per the curriculum.

Despite agriculture being the focus of the curriculum and designated lifeblood, at the time of its creation, there was an agricultural stagnation that plagued the town of Tuskegee and half of the United States. The South still had a dependency on "King Cotton". Tuskegee University, at that time, Tuskegee Normal and Industrial Institute, was even housed on an old cotton plantation. The majority of students were either sharecroppers or former sharecroppers.

The boll weevil, the pest responsible for ravaging the majority of the cotton production, was running rampant throughout southern states. In addition to cotton sales being significantly less than their white counterparts, Black people were desperately trying to combat other multiple unfair systemic obstacles.

When Dr. George Washington Carver came to Tuskegee, he restructured and reframed a lot of modalities. Carver knew the lack of understanding of nature and ecological relationships caused poor farm management and a lack of holistic wellness.

Ever connected to the spiritual, Carver would talk about how nature whispers to him, and God speaks through all of its creations. Having that innate connectivity, he held great respect for all creatures. In a 1930 letter, Carver wrote, "The singing birds, the buzzing bees, the opening flower, and the budding trees all have their marvelous creation story to tell each searcher for the truth…I love to think of nature as unlimited broadcasting stations, through which God speaks to us every day, every hour, and every moment of our lives if we will only tune in and remain so…"

Similar to Dr. Booker T. Washington, Dr. Carver highly encouraged beekeeping. So much so, he attempted to convert the majority of cotton farmers into beekeepers. The high increase of beekeepers paired with his emphasis on synergy inside the ecosystem gave a unique edge and allowed higher optimization of bee productivity. He encouraged and improved practices such as resting the soil periodically, intentional crop selection, crop rotation, and plant diversity. These practices played an enormous part in the success rate of not only soil health but also beekeeping.

There is empirical data that explains the positive correlation between soil health and the increase of honey and solitary bee populations!

Tuskegee pivoted, seeing crop increases, and increased honey production, generating substantial economic savings.

This success was also made possible through community efforts. Through the creation of the Jesup wagon, Carver and his Master's level student, at the time, Thomas Monroe Campbell, brought lessons to farms. They traveled a total of 800 miles visiting 100 farms in 1907 alone. The Jesup Wagon became the inception of the model for the Federal Farm Extension Programs. However, due to anti-Black racism embroiled in the passing of the 1914 Smith-Lever Cooperation Extension Act, The Department of Agriculture did not award Tuskegee with pioneering the program and even took money away due to a created technicality. Though experiencing this extreme racial injustice, Thomas Monroe Campbell was successfully hired as the first Extension Agent in the United States. He headed the first Cooperative Extension Program in the nation as a Field Agent for The United States Department of Agriculture.

The Jesup Wagon (Tuskegee University Archives)

This innovation and community collaboration occurred time and time again within Tuskegee. To this day, Tuskegee University still operates the longest-running farming conference in the nation, held annually in February. Originally called the "People's Conference", the Farmer's Conference began in Tuskegee on February 23, 1892. In its 130th year, the conference continues on Booker T. Washington's mission and practice of using agriculture as a vehicle for self-actualization.

By improving community initiative, education, and trade, the formation of communities became more preva-

lent, as seen with George Ruffin Bridgeforth. Mr. Bridgeforth was a beekeeping instructor at Tuskegee Institute from 1902-1915 and established a highly successful all-Black community of landholders in Limestone County in 1910. Limestone County is a part of Huntsville, Alabama, present-day. Bridgeforth was one of the largest Black landowners at the time.

Black people began having the autonomy to develop wealthy towns, own land, and trade and buy from one another. This possibility was powerful in reinvigorating the self-esteem and the integrity of the Black identity.

Black women, specifically, were able to cultivate their autonomy within this period using beekeeping as one of the tools. Mrs. Maragret Murray Washington, the wife of Booker T., played an active role in creating space for Black women. When she came to Tuskegee, she founded her club, The Beekeeping Ladies, an all-women-led beekeeping organization. This club was nationally recognized and was even mentioned by the successful master beekeeper, entrepreneur, and writer A. I. Root in *Gleanings in Bee Culture* in 1874.

Beekeeping Instructor, Dr. Bridgeforth teaching the Beekeeping Ladies. (The Tuskegee Archives)

The spread of the farming gospel also improved community race relations. The white populace in the South was economically struggling alongside the Black population of Tuskegee and benefited from the teachings of Dr. Carver. Moreover, by learning together, trading farming techniques, and interacting with one another, these events facilitated a unique opportunity for healing and collaboration. As scholar Linda O. Hines writes, "Even Southerners who ardently supported white supremacy hailed Carver as one of Dixie's leading citizens". This collaboration also helped strengthen relationships that were peaceful and healthy amongst Black and white people.

There existed a small but powerful population that believed in advocating and amplifying Black voices, as seen by A.I. Root. Although built in the pretense of superiority and yields real results of kick-starting generational wealth (read: for some), racism's true end demolishes everyone. One risks their moral compass, lives in a state of false reality and purpose, and robs themselves of impactful encounters with diverse people when subscribing to racist ideologies. Heather C. McGhee, author of "The Sum of Us: What Racism Costs Everyone, and How We Can Prosper Together." mentions even the economical losses that racism yields for white people and communities as well. The key to rebuilding our world lay in the power of mutual respect, love, and honoring our similarities along with our differences.

The spirit of innovation, love of community, and love for the environment carried over through multiple generations. Dr. Booker T. Whatley, a former instructor of Tuskegee Institute (in 1974-1981), continued to carry the torch Dr. Carver and Dr. Booker T. Washington ignited. Dr. Whatley is one of the pioneers of restorative agriculture, responsible for creating the concept of Community Supported Agriculture (CSA) farm systems and U-pick farms. He also wrote "How to Make 100,000 Dollars On A 25-acre Farm", a book used and relevant today. One of the main components that made his model possible was having 60 colonies of bees.

Dr. Whatley frequently taught the community and students alike, hosting open labs similar to Dr. Carver and Dr. Washington.

From left to right: Mr. Bernard Pace, Mentor of Tuskegee Bee Club; Jade Daniels, Vice President; a 2018 member of Tuskegee Bee Club; Dr. Harold Higgins, Mentor; Asmera Smith, President; and Halle, Mentor.

Mr. Bernard Pace, a current apiarist in Tuskegee, was under Dr. Whatley's mentorship and worked with him frequently. Upon the inception of the Tuskegee University Bee Club in 2017, Pace mentored students in Tuskegee (the author included), sharing his stories and knowledge.

Dr. Carver and Dr. Booker T. Washington continue inspiring present-day apiarists and community leaders. Dr. Darren Spencer of Harlem Comes to Cotton, Ms. Gbadamosi of Shady Grove Farms, Candace Clark, the founder of The Tuskegee Bee Club, Dr. Harold Higgins, a key board member of The Tuskegee Bee Company, and many others who continue the legacy.

Mentors such as these are greatly needed, as Earth-conscious resurgence is what we desperately need now.

We can see the impact of the lack of respect for Earth, with phenomena such as colony collapse disorder, which affects a large population of honey bee hives worldwide. Solitary bees are also being affected, even certain species becoming endangered.

When looking at solutions, we must keep respect for our planet at the forefront. For example, when combatting varroa mites, the natural inclination is to use chemical control. However, this treatment has detrimental effects on the bees themselves, as well as the soil. The chemicals

used can leach into groundwater, soil composites and affect the total ecosystem, including humans. Different techniques exist to eradicate these pests. Integrative Pest Management, even using essential oils, powdered sugar, and other methods that are more Earth-conscious.

Olden practices are resurging once more, such as organic farming principles, or as Sir Albert Howard, a famous English botanist, names the act "Nature's Farming".

We must heed how deeply our actions impact the world. Our choices not only affect our economic fabric, societal fabric for future generations, but for all life itself. We are all responsible for the survival of the planet and its inhabitants. The history of Tuskegee and its beekeeping history show how integral our impact can be.

Sources:

Tuskegee Institute's Founding - Tuskegee Institute National Historic Site (U.S. National Park Service). (2020). National Parks Service. **https://www.nps.gov/tuin/learn/historyculture/tuskegee-institute-s-founding.htm**

Skrabec, Q. R., Jr. (2013). *The Green Vision of Henry Ford and George Washington Carver*. Macmillan Publishers. pg. 44 & pg. 46

Hawkins, B. (2021, March 2). *Peanut-sized faith: George Washington Carver leaves legacy of faith in the Creator*. Pathway. **https://mbcpathway.com/2021/02/26/peanut-sized-faith-george-washington-carver/**

Skrabec, Q. R., Jr. (2013). *The Green Vision of Henry Ford and George Washington Carver*. Macmillan Publishers. pg. 50

Ceulemans, T., Hulsmans, E., Vanden Ende, W., & Honnay, O. (2017). Nutrient enrichment is associated with altered nectar and pollen chemical composition in Succisa pratensis Moench and increased larval mortality of its pollinator Bombus terrestris L. *PloS one*, *12*(4), e0175160. **https://doi.org/10.1371/journal.pone.0175160 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390989/**

Leepson, D. (2020, December 13). *How Soil Health Affects Bees*. LeaseHoney. **https://leasehoney.com/2020/11/24/how-soil-health-affects-bees/**

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. (n.d.). *Dr. George Washington Carver*. MIT.Edu. **https://lemelson.mit.edu/resources/george-carver**

Skrabec, Q. R., Jr. (2013). *The Green Vision of Henry Ford and George Washington Carver*. Macmillan Publishers. pg.48

Skrabec, Q. R., Jr. (2013). *The Green Vision of Henry Ford and George Washington Carver*. Macmillan Publishers. pg. 69

Abigail Harper and Eric Walcott, Michigan State University Extension. (2019, February 15). *Black History Month Spotlight: T.M. Campbell -- America's first Extension agent*. **https://www.canr.msu.edu/news/thomas-monroe-campbell-first-extension-agent-black-history-month**

Tuskegee University Archives. (n.d.). *Thomas Monroe Campbell*. **https://web.archive.org/web/20070927193142/http://www.tuskegee**. edu/Global/story.asp?S=1144384

Jesup Agricultural Wagon. (n.d.). Encyclopedia of Alabama. **http://encyclopediaofalabama.org/article/m-5685**

Tuskegee University. (n.d.). *Farmers Conference | Tuskegee University*. **https://www.tuskegee.edu/programs-courses/colleges-schools/caens/conferences-workshops/farmers-conference**

Carden, N. A. (1990). *A Study of Southern Black Landownership, 1865–1940: The Bridgeforth Family of Limestone County, Alabama*. TRACE: Tennessee Research and Creative Exchange. **https://trace.tennessee.edu/utk_gradthes/2388/**

Horn, T. (2006). *Bees in America: How the Honey Bee Shaped a Nation*. University Press of Kentucky. Pg.150

Libretexts. (2021, January 3). *Appendix B- Historical References*. Biology LibreTexts. **https://bio.libretexts.org/Bookshelves/Ecology/Radicalize_the_Hive_(Roell)/zz%3A_Back_Matter/04%3A_Appendix_B-_Historical_References**

Hines, L. O. (1977). White Mythology and Black Duality: George W. Carver's Response to Racism and The Radical Left. *The Journal of Negro History*, *62*(2), 134–146. **https://doi.org/10.2307/2717174**

Vittek, S. (2021, May 20). *You Can Thank Black Horticulturist Booker T. Whatley for Your CSA*. Smithsonian Magazine. **https://www.smithsonianmag.com/innovation/you-can-thank-black-horticulturist-booker-t-whatley-your-csa-180977771/**

Anstreicher, K. (2020, July 14). *Glynwood : Connect : News & Notes*. Glynwood. **https://www.glynwood.org/connect/news.html/article/2020/07/14/the-untold-history-of-csa**

The Small Farm Plan By Booker T. Whatley | MOTHER EARTH NEWS. (1982). Mother Earth News. **https://www.motherearthnews.com/homesteading-and-livestock/small-farm-plan-zmaz82mjzkin**

Seeber, Barbara H. "The producer." *Science '84*, vol. 5, July-Aug. 1984, pp. 40+. *Gale Academic OneFile*, link.gale.com/apps/doc/A3333872/AONE?u=anon~faa08cae&sid=googleScholar&xid=04e7158f.

Center for Biological Diversity. (2021, September 28). *American Bumblebee Takes Step Toward Endangered Species Act Protection*. **https://biologicaldiversity.org/w/news/press-releases/american-bumblebee-takes-step-toward-endangered-species-act-protection-2021-09-28/**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7726572/

Bahreini, R., Nasr, M., Docherty, C., de Herdt, O., Muirhead, S., & Feindel, D. (2020). Evaluation of potential miticide toxicity to Varroa destructor and honey bees, Apis mellifera, under laboratory conditions. *Scientific reports*, *10*(1), 21529. **https://doi.org/10.1038/s41598-020-78561-2**

Sabahi, Q., Gashout, H., Kelly, P. G., & Guzman-Novoa, E. (2017). Continuous release of oregano oil effectively and safely controls Varroa destructor infestations in honey bee colonies in a northern climate. *Experimental & applied acarology*, *72*(3), 263–275. **https://doi.org/10.1007/s10493-017-0157-3 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5547185/**

Jack, C. J., & Ellis, J. D. (2021). Integrated Pest Management Control of Varroa destructor (Acari: Varroidae), the Most Damaging Pest of (Apis mellifera L. (Hymenoptera: Apidae)) Colonies. *Journal of insect science (Online)*, *21*(5), 6. **https://doi.org/10.1093/jisesa/ieab058 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8449538/**

R. (2019, July 31). *Powdered Sugar Dusting - Sweet and Safe, but Does it Really Work? Part 2*. Scientific Beekeeping. **https://scientificbeekeeping.com/powdered-sugar-dusting-sweet-and-safe-but-does-it-really-work-part-2/**

Addison, K. (n.d.). *The work of Sir Albert Howard*. A Journey to Forever. **http://journeytoforever.org/farm_library/howard.html**

Asmera Smith is a novice beekeeper and a nature enthusiast. She graduated with her Bachelor's in Food Science at Tuskegee University, in May of 2020. She was the first President of Tuskegee Bee Club in 2018 and continues her apiary adventures by volunteering and interning at different farms throughout Tuskegee and Notasulga.

Have you checked your mailing label? It tells you how many issues you have left! Please double check, and if you have 3 or less, we recommend renewing so you don't miss an issue!

You are free to think thoughts of worry or joy, and whatever you choose will attract the same kind back to you.

Worry attracts worry. Joy attracts joy.

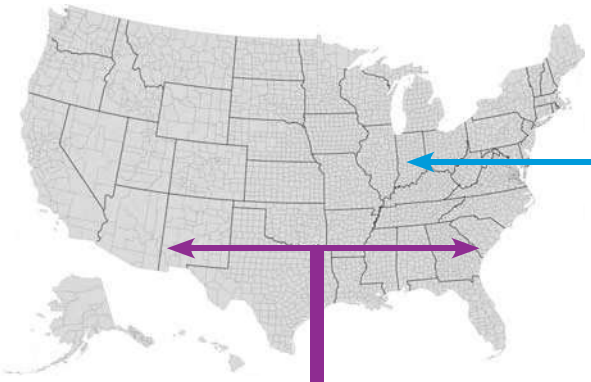
Rhonda Byrne

Beekeeping Critical Thoughts – *For Winter*

Earl **Hoffman**

- December 21st at 10:59 AM EST is Winter Solstice the beginning of Winter
- Which means we will receive less than seven hours of day light
- Hopefully you followed the Axiom "Take you losses in the Fall"
- The creation of Winter Bees happened during late Summer and Early Fall
- The hives that did not successfully create pounds of Winter bees will expire during the Month of December, No Winter bees, No heater bees!
- During this time, the Queen will stop laying eggs and the hive and combs will go broodless. It is a time of transition.
- My suggestion is to monitor the number of hives that are still alive and active each month, even during the Winter period.
- When there is fresh fallen snow, look for hives that are strong enough to carry out the dead. If you see lots of dead bees on top of the fresh snow, this is a great sign that the hive is strong and active. Feed these bees if possible.
- Only feed dry sugar bricks or soft fondant candy using a feeder shim on top.
- Make sure that during a January thaw period, that the bees have an upper entrance, for cleansing flights. Do not block the upper entrance.
- If you do detect a dead out hive in your bee yard, determine if there is a full honey super on top of the hive. If so, consider moving the full super of honey, from the dead hive and give this honey super to a hive that is active and full of bees.
- It's okay to be Robin Hood in Winter, steal from the dead rich and give to the poor.

Winter looks different for each and every one of us. Some are deep in snow trenches and others are finally getting outside.



WE GET OUT OF IT WHAT WE PUT INTO IT

Maybe More in this Case

PART 1

Diane
Wellons

Cesar Martinez, Greg Carey and Walt Williams at 2021 Charles Co Fair

I can almost hear my fathers' exasperated words in my head, "young lady, you won't get anything out of it if you don't even participate." Or "how do you know you won't like it? You've never done it before." The problem for me has always been that I'm shy, painfully, desperately, hiding in the back of the room kind of shy. It was a hard way to grow up in a family with six kids. But grow up I did, and for the most part I grew out of a lot of the shyness (thank the stars!). I look back and realize how much I missed out on because of that little personality quirk. I can honestly say I am thrilled to be more outgoing these days, which leads me back to the topic of this article-participation.

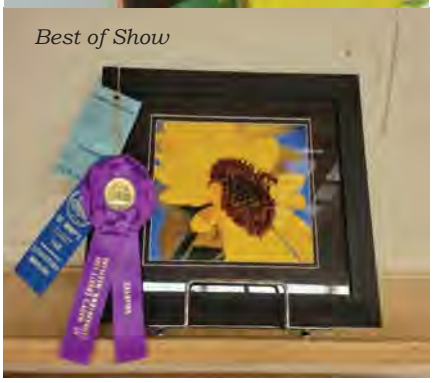
Every year in the Southern Maryland region, fair season comes in mid-September, and for three weeks in a row, the tri-counties are a-flutter with all kinds of fair-going hubbub. Folks find themselves daydreaming of cotton candy, funnel cakes, horse pulls, and if you are a beekeeper, the honey shows. It doesn't cost a thing to participate, except your time, creativity, a little elbow grease. Plus, an ability to follow "simple" directions. My mentor is a huge advocate of participation. Not just in the fairs but in our local bee club meetings and in events that highlight and showcase beekeepers in the region. I learned from the best. (Shout out here to Greg Carey whos' articles you have seen in this very magazine.)

I try to be a good student, here's what I have learned.

Fair season is fun. That's the whole truth of it. It can be a lot of work if there aren't many hands to make the workload lighter. For the most part though, it's just plain fun. We all know beekeepers love to talk about bees and everything that goes into beekeeping in general. Well, this one gig will have even the most vociferous well and truly tongue tied by the end of a busy week at the honey show. Participation can come in many forms. You can show up as a volunteer to talk to the public about all the joys and misadventures of beekeeping. If you are a shy type, this is a perfect opportunity to talk to strangers about something you love- let's face it you'll never see most of them again, and they aren't going to critique you or judge you on your knowledge- only you will. It's worth doing this one event if for nothing else but meeting the public and sharing enthusiasm about your most amazing hobby. It was hard the first year, like any new experience typically is. But by the second and third years I felt so much more comfortable talking to people and engaging them in conversation. Truth be told, the bees do most of the work. Most folks don't even notice us standing there next to the huge observation hive, all they see are the bees!

You can also make your own exhibits and show off your skills at candle making or bottling your liquid gold--delicious honey. Making home-made cosmetics or arts and crafts that showcase beekeeping as a hobby or career. There are specific rules to follow for each class you enter. Weight, size, smell, cleanliness, overall quality, presentation, or public appeal. Some judges love wax, others photographs, and others still love pollen exhibits above all things at the show. Each artisan is a craftsman. Each entry a singular work of art. You didn't know a bottle of honey could be a work-of-art, did you? Well, neither did I, until I started participating in the shows. I

Walt Williams has been the Superintendent since 2010 and he is the current Association of Southern Maryland Beekeepers Vice President.



Best of Show

Greg Carey at 2021 Calvert Co. Fair educating young ones/future beekeepers.

started off small, a couple of entries, just for kicks to see what it was all about. Honestly, I had no intention of ever entering anything after that first year. I thought I would try it, say I did it, and then walk away with knowledge and experience that would no doubt make me a better more well-rounded beekeeper/citizen and (yay) participant. Stepping outside of my comfort zone to just enter took an act of sheer will for me. But, I did it. And it was FUN! Fun enough that I wanted to do it again, and each of the last 5 years I have participated in this behind-the-scenes aspect of fair-going that I never even knew existed. Oh, by the way there's another bonus—I also got paid. Every ribbon won came with a monetary award.

You bet yer bippy I was surprised and thrilled to collect CASH from my very first fair. Well, then I figured I had some serious improving to do. My white ribbons improved to red, which improved to blue and wow my participation was not only fun, it was a tiny bit profitable too. THAT felt really good. I found something I loved in beekeeping and then I found something I was good at because I tried, and didn't give up.

Each year my exhibits get better and more creative, and I pay closer attention to the little details. I enjoy it and the fellowship and comradery of competing with others from the region. It's a fairly small community of beekeepers, we all know each other, we spend time at other events around town throughout the year. We genuinely appreciate one another as keepers and friends. We are also very competitive! We needle one another with playful jests and mockery. It's never mean spirited or hurtful, always full of laughter and kindness that only truly belonging offers. I have made some of the most wonderful friends because of my participation and I have found a whole new kind of joy for putting myself out there and "trying." Honestly, that should say succeeding, not trying. I would have called it a success even if I had never won a single ribbon. This activity driven only by a willingness to participate, has brought so much enrichment to my life, not just as a keeper of bees but as a friend, steward, educator and volunteer.

My goal in writing this article is to encourage and inspire others to step outside of that comfort zone just a little. Try something new. Heck you were crazy enough to try beekeeping in the first place, volunteering will be a piece of cake. Participate in your local honey show. Once you do, you'll really understand the value of each of the exhibits that you see at the fair. The hard work, effort, sweat and tears that went into making each of those treasures shine is exactly what keeps folks coming back each year. Not just to gawk at the bees, but the displays as well. Give it a try, participate in some small way next season. The public is genuinely thrilled to talk with real life beekeepers who are singing the praises of the mighty honey bee - one honey show exhibit at a time. Happy keeping friends.

Volunteer Cesar Martinez at 2021 Charles Co. Fair

Gerard Worell at the 2021 Calvert Co. Honey Show. He has been the superintendent (a volunteer position) for years and beekeeper since 1972. He is one of the founding members of the Association of Southern Maryland Beekeepers.

20 Celebrity Beekeepers

A Quirky Profession, Full of Characters.

Beekeeping is a quirky profession, full of characters and interesting people. The beekeeping community is also relatively small and that may be part of the reason that it seems to nurture a culture of camaraderie that transcends differences such as religion, race, ethnicity, sex, political affiliation, and economic and social status. This got me thinking about celebrities, world leaders and historical figures who are, or were, beekeepers. Some famous people from Popes to Presidents, never actually kept bees themselves, but had hired hands keep them for them. Others promoted bees such as Mohammed Ali, the former world heavy-weight boxing champion who ate lots of pollen and honey and attributed this as part of the reason he could "*float like a butterfly and sting like a bee.*" Nevertheless, there are many well-known people have actually gotten their hands inside a beehive and have been deeply involved in beekeeping. Here is a sampling:

Aristotle – (384-322 BC) The Greek philosopher and scientist kept and studied honey bees in simple hives that utilized strips of wood as top bars. A founder of clever scientific deduction, many of his bee observations were sound, others not so much, and many of these wrong explanations got passed down to later generations, until they acquired the status of authority. Such observations included the idea that bees find their young in flowers; that what we know today as the queen bee was actually a "king"; that worker bees that stung were males, and that honey is distilled from dew or falls magically from the air. Aristotle also thought that bees lived for seven years. If only our colonies would live for that long today…

Jon Bon Jovi – (1962- Present) This rock-n-roller who once dated Cher is a beekeeper, but some theorize that it's not just because he loves bees. Apparently there were certain tax exemptions and deductions for land uses that produces agricultural revenue in his home state of New Jersey that Bon Jovi reportedly wanted to take advantage of.

Christie Brinkley in 2011.

Christie Brinkley – (1954 - Present) According to the pictures she has posted on social media, famed super model Christie Brinkley is able to make a bee suit and veil look stylishly fashionable when she checks on her bees in her backyard in Bridgehampton, New York.

Leonardo DiCaprio – (1974 - Present) Introduced to beekeeping by his mother's boyfriend, it is reported that DiCaprio took up beekeeping to reduce stress when he was nominated for an Academy Award for The Revenant in 2016. He not only builds his own hives for the colonies he keeps in his garden in Los Angeles but he won the Oscar!

Henry Fonda – (1905-1982) The star of 96 films, this hobby beekeeper gave away his Hollywood honey in jars labeled "Henry's Honey". He kept his bees on his Bel Air estate, where they pollinated lemon and orange trees. Fonda started his beekeeping journey while he was a youngster growing up in Nebraska, when he earned the Eagle Scout's merit badge for beekeeping.

Peter Fonda – (1940-2019) Undoubtedly influenced by his father, Henry Fonda, Peter was named Beekeeper of the year by the Florida State Beekeeping Association for his portrayal of the lead beekeeper role in the 1997 movie *Ulee's Gold*, and for his contributions to beekeeping.

Morgan Freeman in 2018.

Morgan Freeman – (1937- Present) Morgan Freeman turned his 126-acre ranch in Mississippi to a bee haven for the colonies in his care. He finds beekeeping meditative and reports not wearing a bee suit or using any other protection while beekeeping because he wants to "resonate" and "become one" with the bees.

Flea – (1962- Present) Flea, whose real name is Micheal Peter Balzary, is the Australian-American bass player for the The Red Hot Chili Peppers's and he documented his love of bees on Instagram. This backyard beekeeper with a few colonies has affectionately termed his hives "Flea's bees".

Jennifer Garner – (1972-Present) After her daughter became interested in bees, Jennifer Garner got bees to accompany her chickens. Ms Garner is known to share her honey bee experiences on Instagram.

Hillary and Tenzing on return from the summit of Mt. Everest.

Sir Edmund Hillary – (1919-2008) On 29 May 1953, New Zealander Edmund Hillary and his guide, Tenzing Norgay, are considered to be the first people to stand on the summit of Mount Everest. But it is said that the only reason Hillary was on the expedition at all was because of his interest in beekeeping. Before the second world war, in which he served as a navigator in the Royal New Zealand Air Force, Hillary and his brother, Rex, joined their father's beekeeping business. This seasonal occupation enabled Hillary to fund his real passion of mountain climbing. Following his ascent of Everest, Sir Edmond was sure the attention around his climb would blow over, so he went back to beekeeping in 1954. Together, Hillary and his brother are reported to have eventually built up their operation to over 1,200 colonies.

Scarlett Johansson – (1984-Present) This Hollywood actress took up beekeeping when fellow Avengers star, Samuel L. Jackson gave her a beehive as a wedding gift for her and Ryan Reynolds. Contrary to rumor, he did not bring it to the wedding, but showed up a few days later with bees in his car. Jackson said, "Scarlett was always talking about how the bees were dying and the planet was going to die." Johansson now includes her own honey in her organic beauty regimen.

Angelina Jolie – (1975 - Present) The "godmother" of Women For Bees, in 2021 Angelina Jolie helped launch this five-year program sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the French cosmetic company Guerlain. Women For Bees trains women around the globe in their countries native beekeeping skills. Jolie joined the first 10 women in the program in getting trained as a beekeeper by experts at the French Observatory of Apidology, in Provence.

Robert Redford – (1936 – Present) One of Hollywood's most iconic leading men, Robert Redford keeps bees on his 10 acre property in the town of St. Helena, located in California's Napa Valley wine region. Although grapes do not need bees to become pollinated, the cover crops and surrounding plants in the Napa Valley benefit from Redford's colonies.

Martha Stewart – (1941 – Present) The busy *American Style* advocate has been a model, a stockbroker, cookbook author, publisher, media icon, and a beekeeper. When asked, she's stated that she's probably a gardener first and beekeeper second. It was her desire to have great gardens that lead her to become interested in backyard beekeeping. She's written and produced a lot of stuff on beekeeping.

Bruce Springstein – (1949 – Present) the Boss has kept bees for many years on an organic farm he maintains in his home state of New Jersey. We're still waiting for our winged friends to make it into one of his songs.

Sting performing at the Queen of England's birthday party in 2018.

Sting – (1951 - Present) Born Gordon Matthew Thomas Sumner, the English musician, singer, songwriter and actor was known for wearing black and yellow sweaters in college which led to him becoming known as Sting. A supporter of the beekeeping charity, Bees for Development, he and his wife Trudie Styler, keep bees on a 400 year old Villa "Il Palagio" in Italy.

Leo Tolstoy – (1828-1910) Although he received numerous nominations for the Nobel Prize in Literature and for the Nobel Peace Prize , the widely celebrated author, Count Lev Nikolayevich Tolstoy (Leo Tolstoy), is best known for his novel War and Peace. Tolstoy also got stung with the beekeeping bug and according to his wife Sonya's diary, beekeeping became "the centre of the world" and he was happy to talk bees with anyone who would listen. (Remind you of anyone you know?) He took advantage of his beekeeping experience by mentioning beekeeping twice in War and Peace. His wife wrote of him crouching in front of the hives with a net over his head to protect him from being stung.

Maria von Trapp – (1905-1987) From the mid-1940's to mid-1950's, shortly after her family left German-annexed Austria on the eve of the second world war in 1939, the real-life nun and governess from *The Sound of Music* was encouraged by her husband Georg to keep bees on the farm they had settled on the mountains overlooking the town of Stowe, Vermont. The farm which also served as a music camp when the family was not on tour, later became The Trapp Family Lodge. According to Johannes von Trapp, some of the honey they produced went to the family and the rest to guests at the Lodge. In 2018, employees at the Lodge bought several hives, and the Stowe hills were alive once again with the sound of buzzing bees.

Viktor Yushchenko – (1954-Present) The former President of Ukraine was nicknamed, "Pasechnik" or "beekeeper" in Russian. Enjoying beekeeping since his childhood days, Yushchenko is now retired and lives on his country estate with his beehives.

Steve Vai – (1960-Present) This three-time Grammy Award winning guitarist, singer, song-writer and composer played in Frank Zappa's band. These days he donates some of the honey he harvests from his bees to charity. Vai is also an honorary member of the British Beekeeping Association.

Enhance the Pre-Inspection Process

John **Miller**

Indoor beehive storage buildings designed for beehives now house nearly a million beehives. Over 400,000 of those hives are stored in Idaho alone. A new building recently opened in Laurel, Montana. New buildings opened in Idaho and North Dakota in 2021.

87% of perhaps two million hives pass through Truckee California bug station annually. That is over 4,000 loads of bees going through one lane at one bug station, with two overwhelmed Pest Exclusion agents, ledgering every single load of bees.

In 2019, a pilot project to pre-inspect beehives in the originating state was introduced. The idea is to expedite passage through Truckee. The idea is to minimize the traveling publics exposure to loads of beehives stacked up, sometimes 12 trucks deep. The idea is to alleviate the two overwhelmed inspectors from donning hat, veil, and flashlight - lifting nets, peering into loads [sometimes well after dark or prior to dawn] attempting to detect fire ants, hive beetles and weeds and field debris. Both pre-inspected and uninspected loads wait their turn to present paper work, to be legered. The idea of pre-inspection is to address these bug station clusters when a swarm of bee hauling semis arrive…and swarms of semi's bottleneck at Truckee.

This is especially important now; from January 10 to February 10 about 2,000 of those 4,000+ loads pass through the Bug Station. One unintended consequence of the current pre-inspection program is that drivers of these pre-inspected loads wait their turn with other loads of uninspected hives.

This wait-in-line bottleneck creates needless delays, a key goal of Almond Board of California, Blue Diamond Almond Growers Cooperative, the Apiary Inspectors of America, and the North Dakota Commissioner of Agriculture, and California Department of Food and Agriculture all collaborating to reach a Memorandum of Understanding on the Beehive Pre-Inspection Program. After North Dakota and California implemented the pre-inspection program, other states quickly recognized the opportunity.

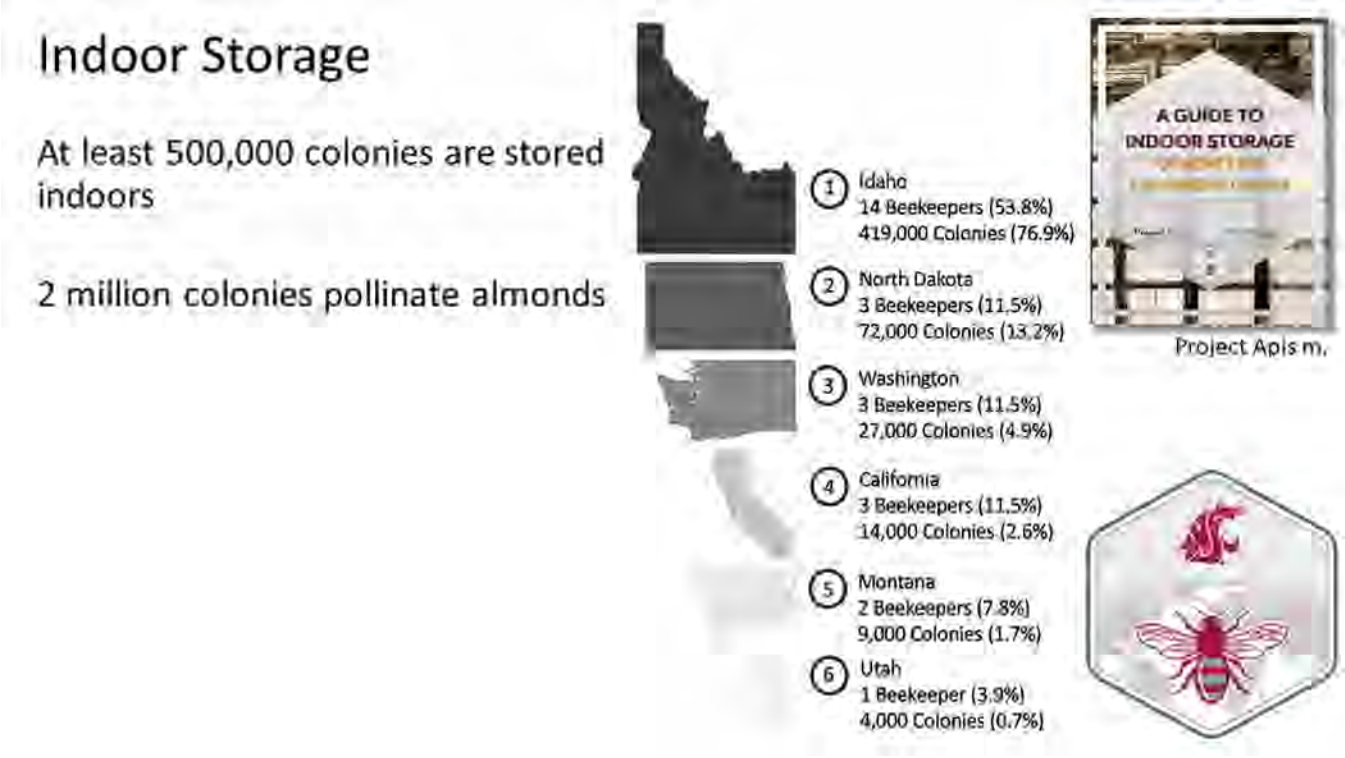
How can this process be improved?

When a load dispatches from an indoor facility, a Bill of Lading accompanies the load. Attached to that document is a certificate of facility pre-inspection. After a building is inspected, and found free of ants, beetles, weeds, and cow patties, a certificate for the number of hives in the building is issued. Each time a load dispatches from the building, the number of hives on the semi is deducted from the eligible total. After all the loads are shipped, the permit totals are reconciled with the number of hives actually shipped, to ensure the shipper complies with the terms of the pre-inspection.

This part of the process works great.

Opportunity for improvement lies in ***how*** the information is shared.

Could the Bill of Lading with the attached identifying detail be scanned and sent to the Department of Pest Exclusion – or directly to a



CDFA Plant Health and Pest Prevention Services.

Bug Station email account dedicated to pre-inspected operations? The number of indoor wintering buildings is less than 50.

Before shipping pre-inspected hives commences, a folder for each indoor building operator could house all the relevant data for that operator - In Truckee – Readily Available. As each load ships, an email alerts Truckee. The tractor number, the trailer number, the number of hives, a phone number point of contact, the destination, as much data as the participant can provide would fit in one email attachment – or fit on an Excel spreadsheet attachment.

Simpler yet, a bright yellow placard in the windshield could visually signal to the Bug Station inspector that This Load Has Been Pre-Inspected. The placard could display the operator's I.D. number so the inspector could visually match the load to the in-house spreadsheet.

Another possibility is to print QR codes [think of restaurant menu QR codes replacing those sketchy paper menus quickly passing into extinction] to match the number of pre-inspected loads. The shipper attaches a QR code to the Bill of Lading so the Bug Station Inspector scans the QR code – the information is captured, immediately – then reconciled with the shipper-authorized number of eligible, pre-inspected hives.

An important component of any pre-inspection program is compliance. For example – over 10,000 loads of certified weed-free hay pass through Truckee annually. If a load shows up in the dairy, say 300 miles down valley from Truckee – and is found to be infested with noxious weeds – a sanction occurs. If the load of hay is rejected – it can't be set on fire on site – it gets rejected. The shipper of formerly certified weed free hay looses certification – and access to the biggest dairy hay market in America.

Indoor building operators adhere to a higher standard of inspection. Indoor wintering operators should enjoy the benefit of expedited passage; and conversely, if they game the system, loose access to the program.

The pre-inspection program grew out of a need to address a serious bottleneck in a specific place for a specific purpose. The stakeholders adopted a pilot program that worked, and now enjoys Memorandum of Understanding status between the agencies, the almond growers, the truckers, and inspectors.

Above are a few possible solutions to refine the process – and get those rigs rolling.

MSU Scientist Building Pollen Database to Improve Bee Nutrition Asks Citizens to Assist

Vanessa **Beeson**

STARKVILLE, Miss.—While flowers are known to be most attractive to bees, less is known about the nutrition flowers actually provide pollinators. A Mississippi State scientist is hoping to change that and is asking for citizen scientist volunteers to help collect data.

Priyadarshini Chakrabarti Basu, assistant professor in the Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, is building a pollen database to catalogue the nutrition profiles of over 100 bee-pollinated plants. Her work, in partnership with colleagues at Oregon State University, is funded by a $500,000 grant from the U.S. Department of Agriculture's Agriculture and Food Research Initiative.

"The bee-friendly plants that are usually recommended for pollinator gardens are based on the bees' relative attraction to the plant. This database will report the nutritional quality of the plants most beneficial to bees," said Basu, who serves as co-principal investigator on the project and is a scientist in the Mississippi Agricultural and Forestry Experiment Station.

She notes that while the team has collaborators collecting pollen throughout the U.S. and Canada, the researchers also are asking citizen scientists to assist with collection.

An online training session will be held with volunteers this winter. Citizen scientists interested in volunteering to collect pollen for the project can contact Basu at **pb1090@msstate.edu** or by calling 662-325-6711. Ramesh Sagili, associate professor of apiculture at Oregon State, serves as principal investigator on the grant and also can be reached at **ramesh.sagili@oregonstate.edu** or by calling 541-737-5460. All volunteers who sign up will be provided pollen collection kits. A brief introduction to pollen collection can be found at **https://oregonstate.box.com/s/4zxia14r04xaw69rvnnigm9d48qshf97.**

Basu said the almond harvest in California's Central Valley is a good example of why bee nutrition is so important. Each year, over the course of a few weeks in January and February, 30 billion bees are shipped to the Golden State to pollinate enough flowers to create 700 billion almonds.

"When the migratory beehives are transported to almond groves in California each year, the bees are still overwintering. They're forced out of the hibernating phase into the brood-rearing phase, which can be stressful. For this reason, they need to be well fed when they arrive at the almond orchards," she said.

Basu was inspired to start the database, in part, to help solve the challenge of providing supplemental forage as the bees travel to pollinate almonds.

"The idea is to have other nutritious forages blooming before and after the almonds bloom. This helps the bees stay healthy and strong because they have access to nutritious pollen and nectar when they arrive and before they are prepped to move to the next crop," she said.

On the research side, Basu also sees a need for the database.

"I am focused on improving bee health through nutrition. One of my focus areas is phytosterols, a naturally occurring micronutrient found in pollen that is similar to cholesterol in humans. When I started working in this area, I realized I didn't know the phytosterol spectrum available in different plant pollens and as I dug deeper, I saw that many of the other nutrients that bees need for a healthy diet, including amino acids, lipids, vitamins and minerals, aren't quantified for the plants the bee pollinators frequent."

Basu said the database will be a single destination for free access to learn which plants have various nutritional resources in their pollens.

"By knowing what blooms when and where, and what their nutritional compositions are, we can establish sustainable foraging for bees so that there is always something blooming, and we can select for optimal nutrition throughout the year," she said.

Sagili said the proposed research will greatly advance knowledge on bee nutrition, an emerging area of study that Sagili deems essential to overall bee health.

"Just like humans, nutrition is the first line of defense for bees. When nutrition is optimal, the immune system is stronger, and the individual can handle more stressors. In the end, a more comprehensive knowledge of the nutritional status of the plants bees frequent will help bee conservation groups, land managers, beekeepers, crop producers and the general public better manage for pollinators," he said.

For more on the entomology program in the Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology in MSU's College of Agriculture and Life Sciences, visit **www.biochemistry.msstate.edu/insects.php**. For more information on the Mississippi Agricultural and Forestry Experiment Station, visit **www.mafes.msstate.edu**.

MSU is Mississippi's leading university available online at **www.msstate.edu**.

A honey bee collects pollen from Japanese privet. (Photo by David Ammon)

Bee Culture Booklist 2022

The Magazine Of American Beekeeping

FIRST TIME BEEKEEPING

Kim Flottum **$20.00**

SKU: X230

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

WORK I KNEW I MUST

Tammy Horn Potter **$20.00**

SKU: X228

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

QUEENSPOTTING

Hilary Kearney **$21.95**

SKU: X226

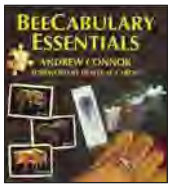
At the heart of every bee hive is a queen bee. In *QueenSpotting*, experienced beekeeper and professional "swarm catcher" Hilary Kearney challenges readers to "spot the queen" with 48 fold-out visual puzzles — vivid up-close photos of the queen hidden among her many subjects.

NATURAL BEEKEEPING

Ross Conrad **$35.00**

SKU: X220

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



BEECABULARY ESSENTIALS

Andrew Connor **$36.00**

SKU: X225

If you are curious or confused about honey bees or starting a bee hive, this book has all the special terminology about bees and beekeeping. Here is the answer to your need for short and concise definitions of the vocabulary of beekeeping.

BEEKEEPER'S LAB

Kim Lehman **$25.00**

SKU: X222

Beekeeping's popularity as a hobby continues to skyrocket. *Beekeeper's Lab* gives you 52 bee-inspired labs to do all year long, and are accessible enough to share with the family.

IN BUSINESS WITH BEES

Kim Flottum **$26.00**

SKU: X223

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

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

SKU: X1 **$10.00**

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

A CLOSER LOOK - BASIC HONEY BEE BIOLOGY

Clarance H. Collison **$10.00**

SKU: X219

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

SWARM ESSENTIALS

Stephen J. Repasky **$25.00**

SKU: X213

Swarming is perhaps the most powerful instinct beekeepers encounter while working with bees. Swarm Essentials outlines the ramifications of swarming behavior, the benefits of swarming, proven swarm management techniques, and how to recover and even prosper from a swarming event.

BEE-SENTIALS - A FIELD GUIDE

Lawrence John Connor **$15.00**

SKU: X210

A basic beekeeping book you have been looking for with some 'meat on it's bones' for continued study by any beekeeper. This a book focused on compassionate animal husbandry. There is a strong 'natural' focus for beekeepers who want to avoid or minimize pesticides and reduce stress on the bees.

GREAT MASTERS OF BEEKEEPING

Ron Brown **$36.00**

SKU: X204

It'll appeal to beekeeping historians, journalists, biologists and book collectors as well as all beekeepers with an investigative mind who will find many answers to their queries in these pages.

GOOD GARDEN BUGS

Mary M. Gardiner, Ph.D. **$25.00**

SKU: X199

Good Garden Bugs is an easy-to-follow reference to beneficial insects that provide pest control, allowing your garden to grow full and bountiful.

BEESWAX ALCHEMY

Petra Ahnert **$25.00**

SKU: X197

Beeswax Alchemy is your first step towards using excess beeswax to make beautiful, useful gifts for friends, family, and even yourself. It offers a basic introduction to the art of extracting and purifying beeswax, as well as countless ideas for what to make with it.

THE BEEKEEPER'S PROBLEM SOLVER

James E. Tew **$20.00**

SKU: X198

Getting the basics right is essential, and this demands a solid appreciation of important areas such as hive management, breed choice, and health requirements.

ABC AND XYZ OF BEE CULTURE

SKU: X5-42 **$64.95**

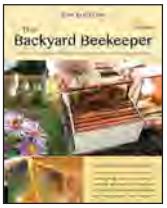
42nd Edition of ABC & XYZ of Bee Culture Since 1877 Leading the Way to Successful Beekeeping. Over 800 pages packed with information. Hundreds of color photos and illustrations . A mix of reference, the how and why things are done and a history of how beekeeping got where it is today! A MUST for every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

1926 HONEY PLANTS OF NORTH AMERICA

John H. Lovell **$10.00**

SKU: X74P

A reprint of the original Honey Plants book, published by A.I. Root. Nearly 1,000 plants, 408 pages, paperback. Measure 6" x 9". Black and white.



THE BACKYARD BEEKEEPER

Kim Flottum **$25.00**

SKU: X141

The Backyard Beekeeper, now in its 4th edition, makes the time-honored and complex tradition of beekeeping an enjoyable and accessible backyard pastime that will appeal to urban and rural beekeepers of all skill levels.

BEEKEEPING FOR DUMMIES

Howland Blackiston **$25.00**

SKU: X98

In this easy-to-follow guide, Howland Blackiston, one of the nation's most respected authorities on the subject, takes the mystery (and the sting) out of beekeeping.

INCREASE ESSENTIALS

Lawrence John Connor **$25.00**

SKU: X163

This book explains why and how beekeepers can use increase nuclei to solve problems in the beeyard and use them to winter colonies and provide a reliable source of fresh bees, locally acclimatized queens, replacement hives and colonies for operational growth or sale.

THE NEW STARTING RIGHT WITH BEES

Kim Flottum & Kathy Summers

SKU: X219 **$9.99**

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

WHAT DO YOU KNOW?

Clarance H. Collison **$20.00**

SKU: X2

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

BEE SEX ESSENTIALS

Lawrence John Connor **$20.00**

SKU: X165

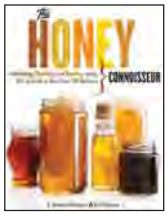
This is another book in the Essential Series by Larry Connor regarding the management of honey bee production. It covers drones, queens, the mating process, colony genetics & more.

QUEEN REARING ESSENTIALS

Lawrence John Connor **$22.00**

SKU: X177

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

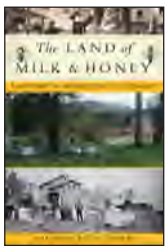


THE HONEY CONNOISSEUR

C. Marina Marchese & Kim Flottum

SKU: X181 **$30.00**

The Honey Connoisseur teaches consumers everything they need to know about how to taste, select, and use a diverse selection of honeys. The authors introduce the concept of terroir and the notion that soil, weather, and other natural phenomena can affect the taste of honey.



THE LAND OF MILK & HONEY

Bill Mares & Ross Conrad **$30.00**

SKU: X229

This book is a must read for anyone interested in how bees and beekeeping got to where they are today in Vermont and the US. The Land of Milk and Honey provides a powerful testament of the state's oversized leadership to protect our nation's pollinators and challenges other states to write their own beekeeping histories.

Beekeeping Terminology

T	Q	D	J	Z	C	U	Q	U	M	O	E	V	I	H	T	O	H	H	X
S	U	S	N	H	M	W	U	O	E	W	H	S	P	E	E	D	A	M	E
A	N	L	A	O	T	M	E	U	D	A	O	H	B	E	N	F	B	Y	E
F	U	A	X	N	R	E	E	Z	L	X	N	Q	E	V	B	W	S	Q	B
K	S	R	E	E	A	A	N	U	S	G	E	S	E	I	E	I	C	K	N
C	O	E	P	Y	T	V	L	P	G	N	Y	E	K	H	E	I	O	W	E
U	C	F	R	S	C	I	E	I	E	I	S	V	E	E	S	H	N	F	E
B	I	I	O	U	E	Q	S	P	N	M	U	O	E	E	U	I	D	S	U
Y	A	L	P	O	N	U	S	I	O	R	P	L	P	B	I	V	I	U	Q
D	L	L	O	E	G	E	R	N	R	A	E	G	E	B	T	E	N	P	I
R	N	E	L	L	N	E	E	G	D	W	R	M	R	B	B	T	G	E	A
O	E	M	I	C	I	N	Z	S	A	S	S	N	L	M	N	O	G	R	D
T	L	S	S	U	T	C	E	E	B	R	E	K	R	O	W	O	E	S	O
C	L	I	C	N	S	A	S	K	E	P	Z	X	L	L	G	L	W	E	O
A	O	P	O	T	H	G	I	L	F	G	N	I	T	A	M	Q	O	D	R
R	P	A	M	I	S	E	R	P	C	F	O	N	D	A	N	T	O	U	B
T	U	C	B	R	E	T	S	U	L	C	Q	Z	D	A	P	I	A	R	Y
X	N	A	I	L	A	T	I	U	B	M	R	D	I	S	E	A	S	E	S
E	S	G	G	E	S	M	G	V	J	P	A	Y	A	V	R	A	L	U	D
S	P	M	S	C	T	X	S	T	G	C	Q	R	E	K	O	M	S	D	G

WORD LIST:

ABSCONDING	DEEPS	HOT HIVE	QUEEN CAGE
APIARY	DISEASES	ITALIAN	QUEENLESS
APIS MELLIFERA	DRONE	LARVA	SKEP
BEEHIVE	EGGS	MATING FLIGHT	SMOKER
BEEKEEPER	EXTRACTOR	NECTAR	SOCIAL
BEE SUIT	FONDANT	NUCLEOUS	STING
BROOD	GLOVES	PIPING	SUPERSEDURE
BUCKFAST	HIVE TOOL	POLLEN	SWARMING
CLUSTER	HONEY	PROPOLIS	WAX
COMB	HONEY SUPERS	QUEEN BEE	WORKER BEE

answers on page 94

Winter Cleaning of Beekeeping Equipment for the Hobbyist from the World Wide Web

A Social Media Survey

Elizabeth **Irving**

Beekeepers and scientists agree on the importance of maintaining healthy and disease-free equipment, and everyone has opinions on how best to do it. As a third year beekeeper in rural Massachusetts, I have attended meetings, read actual books, watched hours of zoom webinars, listened to reputable podcasts, subscribed to America's Beekeeping Magazine and read most of the internet. The same bits of advice on equipment maintenance kept appearing. For the benefit of other new beekeepers, I have gathered this advice given by experienced sources into the 10 basic steps most frequently mentioned.

1. Make sure you are too busy during the warm months of the beekeeping season to clean anything properly. Tell everyone how busy you are.
2. Offer relationship advice, and complain happily about how your beloved family won't let you store or clean your sticky, stinky, bulky equipment in the same rooms where they live, cook and sleep.
3. Fuss about how many different types of equipment you've collected over the years and the impossibility of it being mutually compatible.
4. Make extensive suggestions about the best beverages to accompany the critical cleaning of apiary equipment. Offer recipes if necessary.
5. Exchange book reviews and back issues of *Bee Culture* with other beekeepers and brag about all the reading you are going to do during the cold months when you are not cleaning your equipment. Actual reading is optional.
6. Remind people that you are old and the boxes of kit get heavier each year.
7. Have an intern, a mentee or a younger relative helping? Tell stories about them to other beekeepers while they are in earshot. Tell the stories about the young person in a way that sounds as though you are complaining about them, but actually brag about how wonderful they are. Young people these days are really on their game.
8. Test everything for varroa. Test the bees, the grandkids, test your gloves for varroa. Sugar shake your holiday cookies.
9. Tell people that you clean your equipment "in the usual way." Do NOT under any circumstances reveal what this is, or how you do it. Nod solemnly, and swear that it is the secret to having healthy bees.
10. Write to your trusted editor of The Magazine of American Beekeeping

Readers: How can a new beekeeper get accurate information?

Send your suggestions / direction to *accurate*, vetted info to jerry@beeculture.com and we'll share it with *Bee Culture* readers in the next issue.

GARGOYLES ARE USEFUL *and Free!!*

Ed **Simon**

Years ago, when I started building my own woodenware, I made a very unscientific survey. The question I asked was "What is the most common problem when working with colonies of bees?"

A few of the most common answers were:

1. Unable to find the queen
2. Propolis sticking to everything
3. Hive bodies rotting out – usually at the corners
4. Stings hurt

I was unable to do anything about problems one, two and four but I thought I might be able to help with the hive body rotting problem. At least it was related to woodenware. After watching a couple of the more experienced beekeepers examine a hive, it became apparent that problem number two - propolis -was also related to problem number three – wood rot. Being unable to get the hive bodies separated, a hive tool was usually inserted at a corner and forced between the hive bodies. Sometimes this worked but many times it required more force and the wood on the corner was torn or chipped. Since the hive bodies were usually reassembled in the same order the propolis built up and it required additional effort each time the hive was opened. Then I realized that the combination of damaging the corner wood with a hive tool and the subsequent rainwater remaining in the corner accelerated the rotting of the wood.

The solution was an established architectural invention called a gargoyle. The Wikipedia definition of an architectural gargoyle is:

A gargoyle is a carved stone grotesque, usually made of granite, with a spout designed to convey water from a roof and away from the side of buildings thereby preventing rainwater from running down masonry walls and eroding the mortar between.

Therefore, let me introduce the Hive Body Gargoyle. It is a very simplified version of a gargoyle and is guaranteed to be free (just a little labor). Additionally, it will not scare young children when they see it.

It is the triangular shaped notch that is removed from the top corners of a hive body. It is very simply made with a belt sander. Four corners can be formed in less than five seconds when you are building or reconditioning a hive body. This little notch provides two very important functions:

You can now get an initial purchase for your hive tool without chewing up the corner and when water runs down the corner of a hive it is less likely to remain in the corner because of the slope and the width of the cut.

For a trial run, add the notches to a couple of your hive bodies and see if they make your life – well at least the hive inspection part – easier.

Ed's second book *Build Beekeeping Equipment* is now available at **www.lulu.com**. Take the "Bookstore" option and search for "beekeeping". The book will appear in the list. Ed can be contacted through **SimonEdwin41@gmail.com**.

A Sage Decision

Alyssum **Flowers**

Russian sage 'Blue mist'
Source: ***https://garden.org/plants/group/perovskia***

When planning for next year's gardens and landscape, make sure to include some Russian sage, *Perovskia atriplicifolia* (changed to *Salvia yangii).* Although the Latin words are a mouthful, most gardeners are well aware of the tall, bushy plant with silver-gray slender leaves and blue flowers that continues to bloom until hard frosts occur. This hardy perennial is a magnet for pollinators including honey bees, native solitary bees, swallowtail butterflies, monarchs, skippers, moths, syrphid flies, colorful beetles and even hummingbirds.

Russian sage was named Perennial Plant of the Year in 1995 due to its versatility in the landscape and rugged tolerance of different soil conditions. Native to Central Asia, it is found at elevations up to 8000 feet in the mountains of Tibet and is a mint, not a sage (*Salvia spp.*). Unlike other mints, is not likely to take over an area in its range of Zone 4-9 in the United States. Russian sage was named by a Russian botanist honoring B.A. Perovskia and because of the lovely sage-like scent of the leaves when handled.

Growing 3-4 feet tall and equally wide, Russian sage mixes well with other plants. It complements rose bushes, coneflowers, and compact shrubs, due to its upright, carefree growth habit and columns of purple-blue tubular flowers attached to the stems at the end of each branch. It grows best in full sun with well drained soil, but it tolerates dry clay and poor soil once it has become established. It is mostly pest and disease free, but make sure that the plants do not sit in water very long, to avoid root rot.

Cultivars include Blue Mist, with pale blue flowers, 'Blue Spire', with deeply lobed leaves and purple flowers, 'Blue Jean Baby' with electric blue flowers, 'Denim 'n Lace' a dark blue version, and Little Spire, a compact version that only reaches 2 feet tall. The Chicago Botanical Gardens performed an evaluation of cultivars in 2020. The link to the document is below. A. I. Root planted one which has been growing well and is already attracting a "crowd" of visitors (insects and 'others').

Many local garden centers still have Russian sage at a discounted price. Plant them now or purchase in the spring. You can root cuttings from soft new stems once the plants are established. It is recommended to cut the Russian sage to 1-2 feet tall in the spring to encourage new growth. No matter which cultivars are planted, you will be delighted by the constant show of color and activity. It is a "must" for every landscape!

'Blue spire'
Source: ***https://www.highcountrygardens.com/perennial-plants/perovskia/perovskia-atriplicifolia-blue-spies***

Two bees and a grasshopper visit A.I. Root gardens.

References

https://hort.extension.wisc.edu/articles/russian-sage-perovskia-atriplicifolia/

https://plants.ces.ncsu.edu/plants/salvia-yangii/

https://www.chicagobotanic.org/sites/default/files/pdf/plantevaluation/no46_perovskia.pdf

Two bees and a grasshopper visit A.I. Root

Above:
'Blue Jean Baby'
Source: ***https://www.waltersgradens.com/variety.php?ID=PERBJ***

Right:
'Denim 'n Lace'
Source: ***https://www.bluestoneperennials.com/PEDL.html***

NEWLY REVISED AND BETTER THAN EVER!

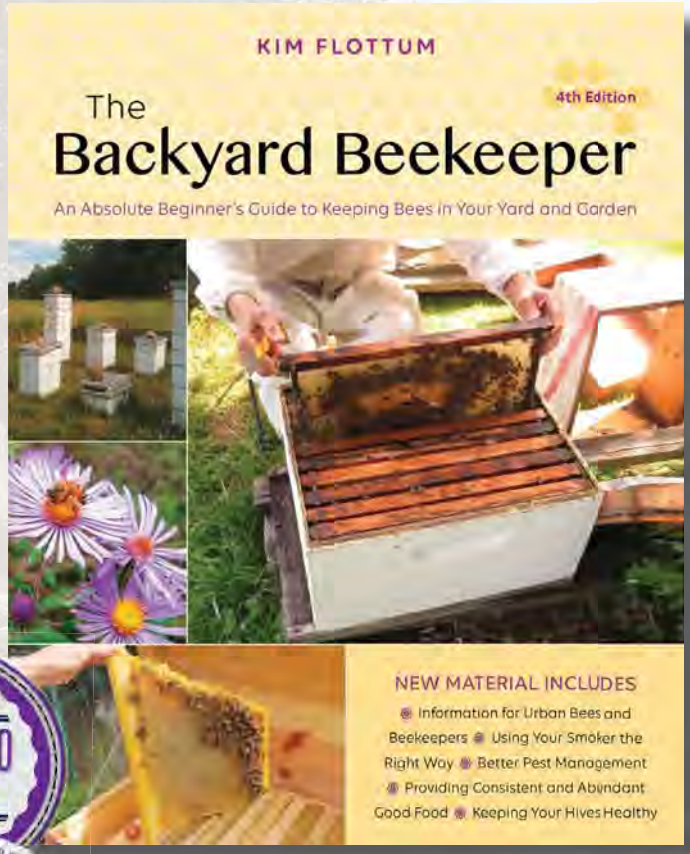
THE BACKYARD BEEKEEPER, NOW IN ITS 4TH EDITION, MAKES THE TIME-HONORED AND COMPLEX TRADITION OF BEEKEEPING AN ENJOYABLE AND ACCESSIBLE BACKYARD PASTIME THAT WILL APPEAL TO URBAN AND RURAL BEEKEEPERS OF ALL SKILL LEVELS.

MORE THAN A GUIDE TO BEEKEEPING, THIS HANDBOOK FEATURES EXPERT ADVICE FOR:

- SETTING UP AND CARING FOR YOUR OWN COLONIES
- THE BEST LOCATION TO PLACE YOUR NEW BEE COLONIES FOR THEIR SAFETY AND YOURS
- THE MOST PRACTICAL AND NONTOXIC WAYS TO CARE FOR YOUR BEES
- SWARM CONTROL
- USING TOP BAR HIVES
- HARVESTING THE PRODUCTS OF A BEEHIVE AND COLLECTING AND USING HONEY
- BEE PROBLEMS AND TREATMENTS

WHAT'S NEW?

- INFORMATION FOR URBAN BEES AND BEEKEEPERS
- USING YOUR SMOKER THE RIGHT WAY
- BETTER PEST MANAGEMENT
- PROVIDING CONSISTENT AND ABUNDANT GOOD FOOD
- KEEPING YOUR HIVES HEALTHY
- 25 RULES FOR MODERN BEEKEEPING



Only $25.00 beeculture.com

WITH THIS COMPLETE RESOURCE AND THE EXPERT ADVICE OF BEE CULTURE EDITOR KIM FLOTTUM, YOUR BEES WILL BE HEALTHY, HAPPY, AND MORE PRODUCTIVE.

WWW.BEECULTURE.COM

How many times have you looked at your hives, and wished you knew more about what was going on inside?

For migratory beekeepers, the travel their hives undergo during pollination adds another layer of complexity to this question. Many are left wondering not only where their hives have been, but also how different locations impact the health of their hives.

The desire to understand this simple relationship, hive location versus mortality, is the driving force behind BeeTrack, the record-keeping smartphone app developed by Nectar Technologies.

Nectar was started with the desire to give bees a voice through collecting hive data. Initially the team developed in-hive sensors with the idea that by listening to what's going on inside the hive, beekeepers could take more informed actions, make better decisions, and better cope with the challenges they were facing.

After a series of papers came out and painted a grim picture for pollinator health[1,2], the Nectar team knew they wanted to develop a more impactful solution. Land degradation and reduced forage ability, likely due to monoculture and chemical spraying, were seen as primary culprits for rising honey bee mortality. We started to wonder, like many other commercial beekeepers, if we could tie hive mortality to land management.

We continued listening to commercial migratory beekeepers and researchers. After suffering significant mortality rates for a few years in a row, one of the biggest beekeepers in the world told us he wanted to know where his hives had been. There was no way to know if and where the hives had been exposed to sub-lethal doses of pesticides during one of the many pollination stops. The effects of that exposure likely only resulted in observably significant mortality rates months later, by which time the hives could have been moved to multiple places.

Since the Nectar team already had experience in the field implementing precision beekeeping technology, and through creating our own apiary Ferme Nectar (ferme means farm in French as Nectar is based in Montreal, Quebec), we knew the solution had to be low-tech and low-touch. The user would need to be able to collect data reliably and easily under the beating sun, with gloves covered in propolis, and bees in full flight. We wanted the technology to be accessible and usable by everyone. This led to the creation of the smartphone app, which is available in both English and Spanish.

The entire BeeTrack system is made up of the smartphone app, the manager's portal where you can visualize your data, and durable QR/NFC tags for your hives. The tags are stapled onto the front of the boxes. Nothing needs to be placed inside the hive so you don't need to worry about propolis. The app uses GPS to locate your phone in the yard where you're inspecting the hives. The manager's portal is where you can see all the data you've been collecting, and it's designed to mimic the traditional whiteboards familiar to many commercial beekeepers.

While BeeTrack was conceived with the desire of tracking location versus mortality, we quickly realized it could help us with another problem we had been trying to solve - tying any management practice to its outcome.

Using BeeTrack you can log inspections for your entire yard. With just a few clicks, that one input of data also lives in the individual history of each hive in the yard. It's easy to create specialized reports for problematic hives, and you can track hive health, feeding and disease-treatment practices, and more! BeeTrack is customizable, so you can continue to use the practices and terms your operation is already comfortable with. You can also choose to input as little or as much data as you want.

BeeTrack allows the beekeepers to collect their own data, and understand the effect of any location or practice on any outcome to make better decisions. With every season of logging practices and locations, you can see trends in location vs mortality, queenline genetics, honey production, and more - depending on the data you're interested in collecting. Currently we have beekeepers interested in using BeeTrack to validate their low-touch beekeeping practices (where migratory operations aim to move their hives as little as possible), assess queenline genetics, monitor honey quality, and more. BeeTrack is also being used in research and academic settings. Project Apis m. researchers are using BeeTrack to evaluate best management practices regarding nutrition, varroa, nosema, equipment management, colony management, and more.

In developing BeeTrack, meeting and being in the field with migratory beekeepers has been the single most important way to learn. There's no

[1] https://www.futurity.org/bees-pollinators-extinction-1112572-2/

[2] https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

What's Going

substitute for getting stung by bees, blinded by the sun, and having your entire phone covered in propolis. This field experience helps us to empathize with the beekeeper when it comes to daily micro-decisions, so that the tool is genuinely designed to fit the real world challenges of beekeeping!

While BeeTrack has been developed with the needs of commercial beekeepers in mind, backyard beekeepers will also be interested in the honey bee health research advancements that will come from the data. BeeTrack is currently being used in Project Apis m. - funded research *involving 15,000 hives. The aim is to develop practical and regionally-specific best management practices for all beekeepers. In the future, BeeTrack could be used by researchers to work together with many beekeepers across a substantial geographical area. This colossal data set could give insights on changing colony health over a large region with implications for every beekeeper.*

Users of the app are already able to conduct their own research after collecting data for just one season. One operation diligently tracked their queenline performance throughout 2021, across ten different queen types and almost 1000 hives. By also logging their deadout data, they determined that more than 40% of their deadouts occurred in hives with one specific queenline. They're now considering not buying that queenline next year and are looking into alternatives. We're looking forward to sharing more insights with Bee Culture *readers as they develop!*

When it comes down to it, BeeTrack is an agricultural production tool. It can record many of the practices in a beekeeper's day-to-day routine, and works throughout the season from pollination to honey-pulling, to holding yards and over-wintering facilities. It shows the impact of beekeeping practices, however it is not the one-size-fits-all solution to all of the problems pollinators face.

Given the complexity of the challenges facing honey bees, we know that it will take more than one company or one technology to improve the state of affairs. Nectar instead believes that it can support its mission to secure the pollinated food supply by partnering with beekeepers, researchers, growers, and other stakeholders, to together design a system that leads to better outcomes for all - bees included. For example, as we head into winter, the fall deadout data typically starts to compile. We're looking forward to working with our client beekeepers to evaluate the effects of different locations on their bees.

BeeTrack is still developing, and its design is continuously being refined to increase the ease of use for the beekeeper. At Nectar, defining a problem and trying to fix it is our core approach. The design process means spending the time to map out the solution to the stated problems of migratory beekeepers. It also means a willingness to shift that approach if it doesn't line up with the real-life needs of the end user. It can be easy to get carried away with ideas, innovations, and solutions to the problems pollinators face, but it's important to always return to actively listening to the needs of the target user - migratory beekeepers.

Interested in learning more about BeeTrack and how it can fit into your operation? Pricing is a subscription model based on the number of hives. Visit **www.nectar.buzz/en/request-a-demo** or send us an email at **info@nectar.buzz**. We'd love to hear from you!

nectar

on Inside?

Hannah **Thomas**

QUEEN ACCEPTANCE

BY THE BEES, NOT THE KEEPER

Diane **Wellons**

ABSTRACT: Determining the wants of the honey bee based on the choices they make versus the choices we make as beekeepers. What if the stranger mated queen is not the best choice for re-queening based on what the bees decide not on what is easy to get/ship/produce commercially? We sell mated queens, but the process is most unnatural and counter to what feral or captive bees would do to replace a queen.

Many new beekeepers have problems with new package colonies staying queen right. Often after package install a new colony will be found staging supersedure of the queen that arrived with them. We are curious to know why some colonies accept a queen readily and without question they seem to invite her in and make a spot for her at the table without even asking for credentials. She might not even be a good laying queen, but they decide to take her in and accept her readily as their own. Other colonies refuse the mated queen multiples of times until they have almost doomed themselves.

Curiosity had us wondering if there is a way to test if queenless colonies have a preference in queen choices. Mated, virgin or grafted cell? If offered, which would they accept most often? Every colony is different, every breed has their own temperament, but on average, is there a clear winner in this question? Is it the mated queen? That is how we sell and ship queens commercially, mated and stranger to the colony they get installed, but is this what the bees prefer or what is easiest for the keeper?

METHOD: We tested this hypothesis by removing laying proven queens from 10 colonies, then leaving their source colony queenless for 24 hours. We then installed those caged mated queens into a different colony than the one they came from using the marshmallow capped cage for slow release to determine if after a 45-day time frame the colony would accept or remove this "new" mated proven queen. If they removed or attempted to remove her within 45 days, the test was considered a "failure." Conditions of the hives were matched as closely as possible. Ten frame deeps with one super well nourished, fed if necessary.

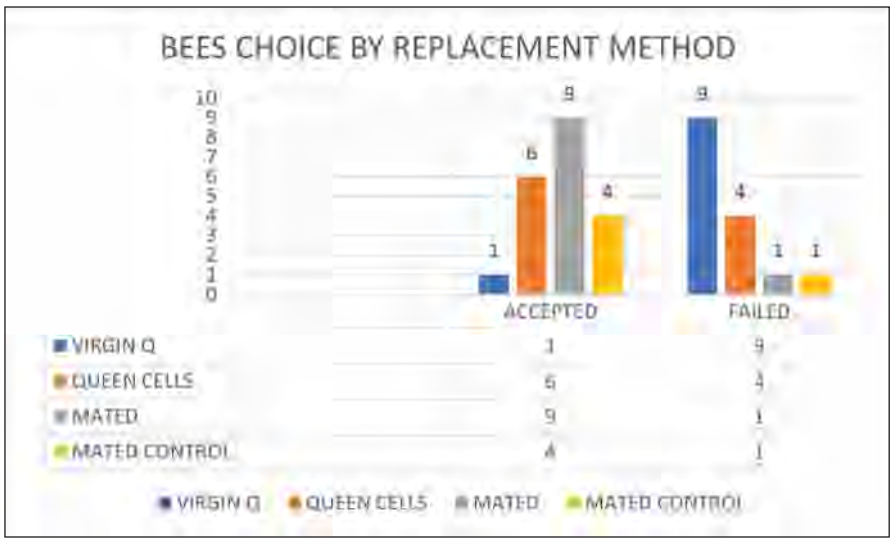
We also installed mated queens from a local breeder into five colonies in another apiary 17 miles away from the test apiary. These colonies were left without queens for 24 hrs. Same rules applied to all colonies of mated moved queens, cells and virgins. We used these queens as our control since most often queens are purchased from breeders and shipped out to beekeepers around the region as the most common form of requeening. *Of note* only five queens were used for control due to cost of these new queens.*

The second group was given 10 virgin queens fresh out of the cell. All were raised in a well-nourished standard deep five frame colony with a minimum of five frames of brood. The cells were removed from the queen builder and placed into solo cups with eight to 10 worker attendants and allowed to emerge into the cup under cellophane with air holes, water and honey feed. These Virgin queens were introduced into colonies in cages with marshmallow caps that took two to three days each to be released. Same adoption rules applied as above.

The third group was given queen cells pulled from the same queen builder as the virgin queens, all grafted from the same source queen. These 14-day old cells were introduced to 10 colonies that were deliberately made queenless for 24 hours prior to installation, with the same rules applying as listed above. Any attempt to remove, destroy or replace the cell or new queen within 45 days was considered a failure.

RESULTS and BENEFITS: The purpose of this experiment was to gain understanding of bee preferences regarding queen adoption and acceptance by a colony. We aim to prove that beekeepers have more options for requeening by using grafted queen cells or newly emerged virgins from a sister colony or another beekeeper in close proximity versus having to purchase a mated queen who may be superseded shortly after installation. Most colonies in the requeening process make multiples of cells which could be sold, traded and potentially accepted more readily with reduction in cost (on average a new queen runs about $35.00 in most locales in the US) and reduction of timeline for the process as shipped queens require some delay in sourcing and potential injury during the shipping process.

We wrote to and asked Professor Marla Spivak for her input and estimation of how this experiment should be run and her predictions on the conclusions. We set up the experiment much as she recommended. All of the bees were located in one apiary except the control colonies. They were not necessarily the same "source of bees" as she recommended since we planned to use full sized colonies for some of these tests versus nucs, but



we did use queen cells and newly hatched virgin queens from the same queen grafts. We did incorporate ten nucs into the experiment as well. The bulk of the experiment occurred on one farm. A control group located away from the apiary. She noted that in her experiments/experience more often than not a virgin queen moved to a new colony would fail or be replaced and that the mated queens would be more readily accepted.

The results we found were quite surprising. Contrary to our original thinking, the virgin queen group did the worst for overall acceptance by colonies in our apiary. (See chart to left.)

The Virgin queen group way underperformed what we had originally anticipated they would. Given that most openly mated queens start out in this state-fresh out of the cell. They walk around the hive giving off their own pheromones and then head out on mating flights once ready to fly. It obviously does matter to the bees where this virgin came from, as most were replaced in short order. It is possible that there was some complication during the grafting process but cells from those same grafts took better than half of the time. We can only assume it is due to the queens being unmated virgins from another mother not their own or as my mentor pointed out, it could also have been from a lack of return from mating flights. Unfortunately, there is not a deliberate way for us to test or account for this number. Another theory we did not have time to test was the nature of her release. Since these virgin queens were caged, they did not get to walk the hive and release pheromones to the colony directly after hatching as they were caged. I hypothesize this method could have reduced acceptance due to lack of pheromone released to the whole colony/hive. I plan to test this theory in the spring. For this experiment, virgin queens were not a suitable replacement for queen loss, as Professor Spivak noted was her experience.

The Queen Cells in the second group had moderate acceptance of the cells and replaced just under half of the queens over the 45-day time frame. At 60% overall acceptance which seems about average for this area and time of the year. The bulk of our experiment time was accomplished after the spring nectar flow and through the dearth of summer when resources were scarce so there may be some variability in success rates if these tests were conducted at the beginning of the year during the spring nectar flow when the bees seem to be more concerned with foraging and considerably less concerned with the movement of queens/cells/etc. within the hive.

Next, we tested mated queens and their acceptance rates. Mated queens are mostly widely available through commercial sellers and local associations whose members produce queens for some recompense. The cost is steep but this seems to be the bees overwhelmingly preferred choice for re-queening should the need arise.

Of the 10 colonies that we re-queened using mated queens from the same apiary that had simply been pulled and shifted to another colony, nine of the "mated" queens remain at present. Fully functioning and thriving. Winter preparations have begun in earnest as the fall nectar flow in Maryland has come on.

My first attempt at Queen grafting.

We expected our control group to do well as this is how we have seen, sold and commercially managed re-queening for some time. (See chart) Of the five queens from the breeder placed in the apiary 17 miles from our home location, four remain viable, one queen from this group was labeled as "failed," but only because the colony swarmed which we considered technical replacement of the original queen.

Full disclosure, the temperatures in Southern Maryland, and much of the eastern seaboard in fact through the months of July and August 2021 were just incredible. Heat in excess of 95 degrees and humidity above 90% during the bulk of our experiment's run time caused some problems with our production colonies as well as our experimental hives. Nucs made using the Pro nuc box (which we absolutely love) had a significantly harder time regulating temperatures with only three frames of bees- which is our standard queen mating nuc size. We had five colonies and queens perish on day one of our experiment when they were placed in the sun over the

One of the Virgin Cell hatching cups we used to allow open hatching with a few sister attendants in the cup taking care of the cells.

Relatively good acceptance rate 22 of 30.

afternoon until we could get them installed into their source experiment colony. It was a bit disheartening to place queen cells on frames in the morning and come back in the afternoon to find the bees all dead in the bottom of the box as this was something we had not experienced before. The next day, we moved cells the same way, but placed the nucs in the shade of the trees. We had our typical success using the shade to help keep everyone cool. We did have discussions with others who have used the pro nuc box as we did for mating nucs and they seemed to think it was more than likely robbing. We disproved this hypothesis quickly as several of the nuc boxes had full frames of untouched honey and no torn wax capping on the bottom of the box. This left us concerned that our data would be a bit skewed but the process after installation was typical on day two with the shaded bees so we called the five colonies lost to unforeseen act of Mother Nature and beekeeper error (lack of paying full attention to the temperature for the day that led to the bees' demise.)

Overall, this was an enlightening experiment which proved without a doubt that the way queens are openly mated and sold as such to be released in cages or by direct means is indeed the bees' preferred method of sorting out a new queen in a pinch. Of course, we prefer to let colonies re-queen themselves as much as possible but often times that is simply not an option. Most who find themselves in a situation where their hive is queenless and needing to purchase a queen do so more often at the end of the season or after going an extended period without inspecting the colony with no hope of recovering except by means of purchasing a mated laying queen. Remarkably, the bees prefer this method for the fastest most reliable means of reestablishing themselves for viability. We are supposing that most beekeepers also prefer this method because it is the fastest, least labor-intensive way to get a colony back on track. From queenless to queen right in about three days. Cost for the new mate queens is negligible at around $35.00 US on average and with a 90% success rate, this method assures most beekeepers they will have a colony for the future.

It's not enough to have lived. We should be determined to live for something.

Winston S. Churchill

Minding Your Bees And Cues

Well, Buzz a While

Becky **Masterman &** Bridget **Mendel**

There are no two individuals with more divergent taste in music than yours trulies. For our Bee Lab bee work, we share a blue Chevy Colorado pickup, and that poor little truck radio toggles between heavy metal (Becky) classical (Bridget) heavy metal (Becky) R&B (Bridget) and heavy metal (Becky) until it's dizzy and broken.

We both love music though, so we thought we'd make a honey bee playlist for your winter days and nights. Songs were chosen because they mention bees or they have an interesting relationship to them, but it's somewhat curated since there are *a lot* of bee songs out there. We also omitted songs with R rated lyrics, though we did not agree on this decision. Please reach out to the editor for additional song recommendations. Which songs would you have included?

For best results while reading this article, please visit Spotify and search for the 'bees&cues buzz a while' playlist. Press play and read on.

Scan to go directly to the 'Bees&Cues' Buzz a While Playlist!

Taj Mahal's Queen Bee

Bridget: This is the crown jewel of honey bee songs. It's a classic and should be played at all bee conferences and events. Beekeeper and Eastern Missouri Beekeepers Association President, Bob Sears, is inspirational in this regard.

Becky: I completely agree with Bridget. The genre is blues and the song's soulful refrain is why we keep bees.

Slim Harpo's I'm a King Bee

Bridget: I'm pretty into Mr. Harpo's sense of honey bee biology. King bees are welcome in my hives. Side note, my very favorite recording of this song is Muddy Water's version...

Becky: In beekeeping, there are many correct answers to a single question. It is the same with this song as there are many great ways to cover it. My favorites from the over 50 versions of I'm a King Bee is one performed by Aerosmith's Joe Perry and Steven Tyler and another by the Rolling Stones. For you Deadhead beekeepers, there is a 1969 Grateful Dead cover. Even Pink Floyd recorded a version of this song.

Metallica's Iced Honey

Bridget: Wait, Lou Reed is in Metallica? Iced honey sounds like it should be a cocktail. I'm going to request it next time I'm at a bar.

Becky: While the Lou Reed-Metallica collaboration is a sensitive subject for some Metallica fans, if you like Metallica and are a beekeeper, this song deserves your attention. If the song's title doesn't sway you, maybe this fact will: Metallica's front man, James Hetfield, is a beekeeper. Although I have no data to support it, my bees appear to like it when I play Metallica (my bees prefer Master of Puppets to Lulu) during apiary management.

June 18, 2017 Metallica concert at Soldier Field. James Hetfield, beekeeper and band front man not singing Iced Honey, which has only been played live five times in concert (setlist.fm). ***Photo credit: Tom Masterman***

Wilco's Muzzle of Bees

Bridget: I'm just assuming this song is about a bee beard experience gone wrong. Possibly bees got up their unstitched sleeves and made this band sad.

Becky: I agree.

Dessa's Beekeeper

Bridget: Dessa's a local Twin Cities musician that I don't really listen to. I do love the lyrics of this song, and wonder if it is based on any of our Twin Cities beekeeper friends in particular.

Becky: It is a lovely song. Just like beekeeping, it makes you think.

Zee Avi's Honey Bee

Bridget: This song is absolutely adorable.

Becky: From her 2009 debut album titled Zee Avi, this song is a must-have in your bee music library.

Blake Shelton's Honey Bee

Becky: At the risk of alienating the dear reader, I admit that I do not have a country music station programmed on my truck radio. With that said, Honey Bee is a strong addition to any bee themed playlist and we would be remiss to miss it.

Bridget: I like that this song mentions an invasive plant.

Van Morrison's Tupelo Honey

Becky: A classic. I think this song is a serious contender as a wedding song.

Bridget: It is a classic. I would recommend the Nicki Minaj song that got censored by my co-writer for any bee loving wedding planners out there.

Gloria Gaynor's Honeybee

Becky: Disco great, Gloria Gaynor, delivers a danceable or workshop-ready tune in 'Honeybee'. Get ready to tap your feet while building boxes or just set your hammer down and dance like it is 1973.

Bridget: This is definitely a great anthem for extraction room

August 7, 2015
Canton Football Hall of Fame performance by Aerosmith. Joe Perry and Steven Tyler, two of the many artists to cover 'I'm a King Bee' are front and center.
Photo credit: Rebecca Masterman

cleaning day. Which is coming up at the Bee Lab. Disco is definitely essential for getting bee poop off walls and keeping up the pace with mopping sticky floors.

Barenaked Ladies' Daydreamin'

Becky: Daydreamin' makes you appreciate that as a beekeeper, you are living the dream of many who express a desire to keep bees. This song should remind us that we are lucky to have made it happen.

Bridget: According to this playlist, a lot of people daydream about being actual bees or actual honeys. Quick Q, Becky: would you rather be a worker bee that lives for four weeks, or a jar of honey that lives forever because it's crystalized and no one can get it out of the jar? Or would you rather be a king bee?

Becky: At the risk of offending our dear readers once more, I must admit that I am not a big fan of honey, so that choice can be ruled out immediately. I am in it for the bees and am quite good at multitasking, so worker bee it is.

References

I'm a King Bee covers
https://secondhandsongs.com/performance/9988/versions

Music lyrics
http://www.songlyrics.com/

Acknowledgement

The authors would like to thank Dr. Marla Spivak for helpful edits and suggestions.

Authors

Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. Photos of Becky (left) and Bridget (right) looking for their respective hives. If you would like to contact the authors and share your favorite bee song or other thoughts, please send an email to **mindingyourbeesandcues@gmail.com**

Tip of the Month – Replacement Feeder Caps

I like using quart entrance sugar syrup feeder jars on new nucs that I have just started. The feeder jars decrease the nuc entrance size and provide a quick way to see if external nectar flows are available and adequate for all my hives depending on how fast the syrup is used by the bees. After a few years of use my quart jar feeder caps tend to get rusty and corroded regardeless how hard I try to keep them clean. I am sure the bees don't mind as long as they can get to the syrup but I like to keep things as clean as possible and potential nuc buyers looking at rusty feeder jar lids, easily seen through the clear syrup, may have second thoughts about a purchase. I thought if there were a way to replace them with plastic caps the cleaning and rust issues would dissappear.

I purchased a box of plastic quart jar storage caps and used a small hobby square and compass to mark out where I would place holes in the plastic storage cap. You could just place holes randomly, but my math teaching background dictated I use a more precise geometric pattern. I then used a pin vise with a sewing needle to place holes at interesction points of the penciled pattern. The plastic caps are soft enough that with just a little pressure the pin vice sewing needle pushes through easily. I made sixteen holes in the same pattern as the original metal caps.

Before placing the holed caps on their jars into their plastic holders I also found it necessary to cut one or two of the ribs out of the plastic cap holder. The metal caps are just a bit thinner than the plastic lids. I found if this step is skipped the plastic capped jars keep sliding up out of the plastic holder. A one edged hobby razor blade can be bent to the same curvature as the holder inside curve and pushed straight down the side cutting out the rib. So with just the cost of a few plastic storage lids, a pin vice and sewing needle your feeder caps can always look as good as new. Happy beekeeping.

Richard Wahl, Richmond, MI

Left to right: Feeder jar with new cap above a rusted metal cap, Plastic jar holder showing where to cut out a rib above a hobby square and new cap, Pin vice with sewing needle to poke holes above a marked cap (layout marks are not visible) and compass above a completed cap (again holes are not visible in the picture)

Bee Culture wants you to share your good ideas with our readers. Be precise and include a photo or sketch if possible, but that may not be necessary. If we use your idea you get a free one-year subscription.

A Case for Embracing Smaller Population Beehives

PART 2

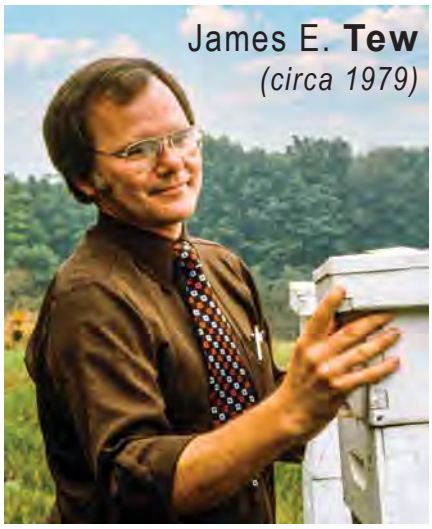
Beekeeping techniques for the faint-hearted Beekeeper

My bees are ageless. I am not (Part 2).

After one ages and accumulates ever-increasing instances of life's events, when a decision-making situation is posed, confusion – not clarity – can commonly result. Consider this for a moment. Hypothetically, a younger individual has, maybe, five of beekeeping life's experiences or, as a considerably older individual, that same person has had twenty-eight of beekeeping life's experiences. Which number of life's experiences will require more consideration to form an opinion when a given situation arises?

Let me give this confusing thread a specific bee theme. *"Is it better to keep a bee colony in a single deep or in two deeps – or even more?"* As a young beekeeper, many years ago, I was taught classic, traditional beekeeping. I still respect and cling to my concept of traditional beekeeping. My answer to this simple question would be -- t*wo deeps for an established colony. Otherwise, expect swarming. It's an* easy question with a clear answer.

But as time passed, and I read, heard, and learned more, I began to understand that – originally – bee hives were much smaller boxes; sometimes smaller that a single deep. The recommendation of two deeps came later as both queens and management techniques improved. But wait! There's more...



My idea of a perfect colony

Who decided what the dimensions of a deep was to be? Indeed, why are Langstroth hive measurements what they are? For instance, why is the rim on a standard telescoping cover the depth that it is? *(Just so you know, the measurement varies slightly between manufacturers.)*

Apparently, *(and without a needed literature citation to insert at this point)* early equipment manufacturers determined measurements based on lumber-use efficiency. Maybe if the manufacturer took a pine board, that was 1"x12" and ripped it down to 1"x 9⅝", then the 2⅜" waste pine strip could be used as the telescoping edge of the outer cover[1]. Keep the wood waste pile as small as possible.

Throughout this entire dimensional evolution of hive sizes – to my knowledge – the bees were never directly consulted. Allow me to reword all of this – hive sizes were primarily determined based on production efficiency more so than bee biology. Okay, if no one conferred with the bees, and I'm conferring now, what size cavity would the bees want? Well, it's complicated. *(Of course, it is. I'm old. Nothing is simple.)*

For more of this story, I refer the dedicated reader to Seeley's work, *The Lives of Bees, The Untold Story of the Honey Bee in the Wild*[2], page 116, Section *Cavity Volumes*. A summation of some of the findings by Seeley and other researchers is that *"…. honey bees of different geographic races have different lower limits for an acceptably sized nest cavity, and that bees of races native to colder regions…. require bigger cavities, probably to hold larger stores of honey."*

Okay, now what? Does this information mean that, all those years ago, when I was keeping bees in South Alabama, that I could have used a hive body even smaller than a standard deep? Alternatively, does that mean that a standard Langstroth deep might not have enough winter honey storage capacity for my bees that I now have in Northeast Ohio?

In retrospect, I suspect that the equipment producer of yore, simply did the best that could be done with the limited information that was available at the time. Plus, I suspect they did not consider the bees' needs any more than necessary. Wisely, hive boxes were produced in different depths. That way, the beekeeper could choose the size box best suited for their conditions. Seemingly, based on the work cited above, the bees themselves, do not even agree on the dimensions of a perfect hive domicile size.

Over time, our beekeeping decisions and guesses have become standardized – not because of what was best for the bees, but rather because this is what has always worked before. Plus, my beekeeper friends are using it and people like Jim Tew are writing about it.

Do you remember?

Do you even remember why I started this painful discussion? I posed a rhetorical question, *"Is it better to keep a bee colony in a single deep or in two deeps – or even more?"* I said that as a young beekeeper, classically trained, I would

[1]A note to my woodworking friends, I realize that the nominal dimensions of undressed lumber would not have these clear measurements such as the ones I used. I used whole numbers for clarity in my example.

[2]Seeley, Thomas D. 2019. The Lives of Bees – The Untold Story of the Honey Bee in the Wild. 353 pp. Princeton University Press (See pp 116-119)

have quickly said that two deeps were required. But as a much older, experienced beekeeper, I would have hesitated – pondered – pontificated, and finally said, *"Probably, two*". You see, having much more information, experience, and data, puts pressure on me to make a more educated guess as opposed to my quick, youthful answer. I cannot truthfully say that one decision-making process is better than the other, but I can say that as an older beekeeper, I tend to be sluggish and cautious when making beekeeping decisions. I can't help it.

So, one deep – maybe two in some instances

So, my wishy-washy plan for my apiary is to keep some colonies in one deep, while I may keep others in two deeps. I do not want any more, big three and four deep brood bodies for bee hives. I've already begun to implement the changes. So, my intent next spring/summer is to not allow brood nest space beyond the two deeps. For me, the aged beekeeper, if possible, even smaller would be better.

Beautiful colony presents big challenges.

The reason I have anguished in what is now this second article is that I am moving from the standard beekeeping practices that I have employed all my bee life to a different model. All of the previous years, *bigger hives are better hives* has been my mantra. Now, at my ever-increasing age, I cannot maintain huge populations of bees in 3-4 deep brood nest boxes with 2-3 supers atop them. For me, smaller more manageable hives seems to be the way to go.

Single-deep beekeepers - can you help me?

For those of you who have kept bees in single or maybe double deeps, can you help me with the following concept? Many years ago, when I was a beekeeper infant, I conducted a research project in which I maintained bee colonies in expanded Styrofoam® hive boxes. This was well before such bee equipment was commercially available, ergo I had to buy bulk foam and cut it to size on my table saw. At this point, it would be very easy to wander from my subject.

Prototype polystyrene pollination unit.

Beekeeping conditions in the early 1980s were much different than today. So, I kept bees in expanded polystyrene boxes, about the volume of a Langstroth deep, that I stick-built. Yep, they were odd-looking contraptions filled with bees.

These lightweight single-deep polystyrene boxes were only intended for a single season use. The thing that I quickly encountered was that the insulated sides of the JTew-made box was insulated enough that the bees would readily put brood on the outside frames – right up against the outside wall. This rarely, rarely happens with bees in standard wooden Langstroth boxes. Subsequently, larger than anticipated populations of bees developed in these insulated boxes. That's good – right? Yes, it is if large pollinating forager populations was the goal, but you must know that swarming was an immediate issue when using these novel hive boxes.

A remarkable selection of plastic foam boxes is presently readily available from beekeeping equipment purveyors. With my long experience using polystyrene boxes, I am inclined to use them as my single deep units in my changing apiary design. It would appear that I can certainly expect swarming to be an issue with this size hive box. Does anyone reading here have experience in keeping a colony in a single plastic foam hive body?

Swarming and queen biology – a bonded relationship

Swarming biology cannot be successful without successful queen biology. However, queen production biology can be implemented within the colony without swarming having to occur. One of the routine ways to keep swarming reduced in managed colonies is to never allow the brood nest to become crowded. So historically, I kept adding brood space, which helped reduce swarming, but that added space allowed the colony to grow to large populations not commonly seen in nature. If I plan to keep the colony brood nest smaller by cutting the brood nest space back, I can expect swarming rates to increase.

Question - If swarming is to be expected, why would I invest in high-dollar queens? *Answer* - Essentially because there are no readily available low-dollar queens. I sense that beekeepers who keep bees in smaller colonies will need to modify traditional swarming and queen management procedures. Managing smaller colonies will require me to tolerate more lost swarms and become more intimate with the queens heading the colonies. *(Truthfully, as I try to compose these written thoughts, I am forced to accept the reality that beekeepers do not have conclusive ways to restrict swarming, and queen management has always been a convoluted process that is tiresome to routinely implement.)*

So, just let them swarm?

In previous conversations with other beekeepers who are also on this smaller colony management path, the comment has been frequently made, *"Just let them swarm!"* Even more support for swarm tolerance is that swarming will impede varroa populations and will result in frequent queen replacement. If one is eager about this Laissez-faire approach to beekeeping, it can also be said that our escaped swarms repopulate the feral honey bee population.

Well, I suppose all those reasons are valid, but who among us, while sipping our hot morning coffee, can watch a swarm issue without becoming ballistic? I can tell you, for sure, that I will not be able to do it. At this point, my preliminary plan is to worry about this issue when it is truly an issue. I think I already know what I will do.

My neighbors...

As is so often the case, in my close neighborhood, I cannot have

swarms willy-nilly issuing that I simply ignore. There is nothing else that I can write at this point. If I allow my colonies to crowd their brood nest, they will swarm and, in many cases, those swarms will not be on my property. I must ask you to let me get back to you on this point later next spring. I'm still pondering this aspect of smaller colony beekeeping.

Small colony queens

I must immediately write that there is no such animal as a small colony queen. If all goes as planned, in nature, the small colony builds up and swarms. It's an endless process. The colony population stays small because frequent swarming truncates it. Enter, the enterprising beekeeper who (ideally) manages the brood nest area – even to the extent of destroying developing queen cells. Queens in these colonies are allowed to become *Large Colony Queens* – but by beekeeper intervention.

Honestly...

As I try to write my thoughts, my mind races and some of the *"Life's Experiences"* I alluded to in my opening comments come to my mind very clearly. While I was still a graduate student at the University of Maryland, and with responsibility for teaching a class, I had a young beekeeper come to the lab asking for instructions on ***"absolutely"*** controlling swarming from his single colony. He had unagreeable neighbors who had minced few words when discussing his neighboring bee project. He simply could not have a swarm on their property. I have revisited this life's episode many times. A solid recommendation is still unavailable.

I suggested that he periodically give about half of the colony's brood nest to another beekeeper. I suggested that he periodically cage the queen to restrict her brood nest area. I suggested that he find another location for his single colony. I don't know what management pathway he took, but here I am asking the same swarm control questions of myself. I will not be implementing any of the suggestions that I made to that beekeeper over forty years ago. Too much work.

Challenging before I even begin...

Deciding to downsize my typical colony size has already been entertaining and challenging – and I only just started. I sense that this transitional learning curve is not going to be a passing phase. While I may be better able to manage colon[illegible]e and mite populations, I will clearly have a smaller honey crop and, most likely, much more swarming. I'm already asking myself if this is all worth it. Sure, it is. It's beekeeping.

Dr. James E. Tew
Emeritus Faculty, Entomology
The Ohio State University and
One Tew Bee, LLC

tewbee2@gmail.com
http://www.onetew.com

Cold Day Honey Recipe –

Shana **Archibald**

Korean Short Ribs, with Honey

MAIN
3-3.5 lbs of short ribs
3 cups of diced potatoes
2 cups of diced carrots
Green onions (optional), thinly sliced
Toasted sesame seeds (optional)

SAUCE
1 red apple, cored & chopped (I used a honey crisp)
1/2 onion, chopped
1/2 cup beef stock
1/2 cup soy sauce, regular (kikkoman)
1/4 cup brown sugar
2 tbsp honey
1 tbsp minced garlic
1 tsp sesame oil
5 whole black peppercorns (optional)

THICKENER
2 tbsp corn starch (or potato starch)
2 tbsp water

Rinse the bone-in short ribs under cold water, mainly around the bone area to remove any bone fragments. (If you have some time, you can soak in cold water for 10 minutes while changing water a few times.) Gently pat down the ribs with some paper towels. Or you can leave the bones IN, for added flavor. Totally up to you!

Pre-heat a large skillet over medium high heat and place the ribs. Brown all sides for about one minute. Transfer them into the slow cooker crockpot as they finish.

Blend the sauce ingredients in a mixer or food processor until smooth. Pour over the meat. Add the potatoes and carrots. Close the lid and cook for eight hours on low heat. (You could cook for five hours on high heat if you're short on time, but I find that it results in less flavorful and less tender meat.)

30 minutes prior to the end of the cooking time, make the starch thickener by combining the water with the starch flour. Whisk well and pour it into the slower cooker. Turn the heat to high and simmer for the remaining time.

You can serve over rice or, as is. Garnish with green onions and/or toasted sesame seeds. Enjoy!

CALENDAR

♦INDIANA♦

Indiana Bee School XX will be held February 26, 2022 at Horizon Convention Center in Muncie, Indiana. Cost is $50 for members and $60 for non-members. Our Beginning Classes cost $55 for members and $65 for non-members. All registrations include lunches.

We have three guest speaker this year for an oustanding diverse agenda. Our guest speakers will be Geoffrey Williams, Brock Harpur, and Joan Gunter.

Our breakout sessions include "Using Technology in Beekeeping," "Beekeeping as a Supplemental Cash Crop," and "Races of Honeybees-Characteristics and Traits."

We hold a silent, live auction and raffle with over 30 vendors.

For more information about speakers, topics, vendors, hotels, and to see the registration links, visit **https://indianabeekeeper.com/events/indiana_bee_school_xx**.

The Heartland Apicultural Society (HAS) has made plans to host its 2022 conference in June in Evansville, Indiana.

Watch **www.heartlandbees.org** for details.

♦MISSOURI♦

Missouri State Beekeepers Association will hold its 2022 Spring Conference on March 11-12 at the Truman State University Student Union building, 901 S Franklin St, Kirksville, MO 63501.

Speakers include Zac Lamas, Marla Spivak, and Carl Korschgen.

Afternoon breakout classes on Friday and Saturday include two segments on Queen Production by Queen Breeder Cory Stevens, EAS Master Beekeeper; Microscopy Discoveries in Beekeeping, and more.

There will be a vendor hall during the entire conference with state and national beekeeping supply vendors.

Keep updated on conference details, registration, and hotel accomodations at **www.mostatebeekeepers.org**.

♦NEVADA♦

American Beekeeping Federation will be held January 5-8, 2022 at South Point Hotel in Las Vegas.

Speakers include Jamie Ellis, David Tarpy and Judy Wu Smart.

For more information visit **www.abfnet.org**.

♦OHIO♦

Greater Cleveland Beekeepers Association is holding Beginning Beekeeping classes on Wednesdays in February 2022 (2-2, 2-9, 2-16, 2-23). Classes run from 6:30-9pm. It will be held at Cuyahoga County Fairgrounds, Building 25.

Registration now open. It is $50 which includes four class sessions and a one year family membership to GCBA.

For more information and to sign up visit **greaterclevelandbeekeepers.com**.

♦TENNESSEE♦

Hive Life Beekeeping Conference 2022 will be held January 7-8, 2022 at Sevierville Convention Center, Sevierville, TN.

Keynote speakers: Bob Binnie, Ian Steppler, Kamon Reynolds, Kent Williams, Rick Sutton, and Greg Rogers. Other special guests include: Randy McCaffrey - "628 Dirt Roost," Frederick Dunn, Jeff Horchoff - "Mr Ed," and more. Honey Show and over 24 vendors! $180/pp including lunch each day.

For more information see **http://tinyurl.com/hivelife**.

♦WYOMING♦

The Wyoming Bee College beekeeping pre-conference workshops and conference will be held at Laramie County Community College in Cheyenne, WY, on March 11-13, 2022.

The pre-conference on Friday is offering three different workshops and the main conference offers everything from beginning beekeeping through journeymen and advanced beekeeping.

For more information, please isit: **http://www.wyomingbeecollege.org**.

Beekeeping Terminology

T	Q	D	J	Z	C	U	Q	U	M	O	E	V	I	H	T	O	H	H	X
S	U	S	N	H	M	W	U	O	E	W	H	S	P	E	E	D	A	M	E
A	N	L	A	O	T	M	E	U	D	A	O	H	B	E	N	F	B	Y	E
F	U	A	X	N	R	E	E	Z	L	X	N	Q	E	V	B	W	S	Q	B
K	S	R	E	E	A	A	N	U	S	G	E	S	E	I	E	I	C	K	N
C	O	E	P	Y	T	V	L	P	G	N	Y	E	K	H	E	I	O	W	E
U	C	F	R	S	C	I	E	I	E	I	S	V	E	E	S	H	N	F	E
B	I	I	O	U	E	Q	S	P	N	M	U	O	E	E	U	I	D	S	U
Y	A	L	P	O	N	U	S	I	O	R	P	L	P	B	I	V	I	U	Q
D	L	L	O	E	G	E	R	N	R	A	E	G	E	B	T	E	N	P	I
R	N	E	L	L	N	E	E	G	D	W	R	M	R	B	B	T	G	E	A
O	E	M	I	C	I	N	Z	S	A	S	S	N	L	M	N	O	G	R	D
T	L	S	S	U	T	C	E	E	B	R	E	K	R	O	W	O	E	S	O
C	L	I	C	N	S	A	S	K	E	P	Z	X	L	L	G	L	W	E	O
A	O	P	O	T	H	G	I	L	F	G	N	I	T	A	M	Q	O	D	R
R	P	A	M	I	S	E	R	P	C	F	O	N	D	A	N	T	O	U	B
T	U	C	B	R	E	T	S	U	L	C	Q	Z	D	A	P	I	A	R	Y
X	N	A	I	L	A	T	I	U	B	M	R	D	I	S	E	A	S	E	S
E	S	G	G	E	S	M	G	V	J	P	A	Y	A	V	R	A	L	U	D
S	P	M	S	C	T	X	S	T	G	C	Q	R	E	K	O	M	S	D	G

WORD LIST:

~~ABSCONDING~~	~~DEEPS~~	~~HOT HIVE~~	~~QUEEN CAGE~~
~~APIARY~~	~~DISEASES~~	~~ITALIAN~~	~~QUEENLESS~~
~~APIS MELLIFERA~~	~~DRONE~~	~~LARVA~~	~~SKEP~~
~~BEEHIVE~~	~~EGGS~~	~~MATING FLIGHT~~	~~SMOKER~~
~~BEEKEEPER~~	~~EXTRACTOR~~	~~NECTAR~~	~~SOCIAL~~
~~BEE SUIT~~	~~FONDANT~~	~~NUCLEOUS~~	~~STING~~
~~BROOD~~	~~GLOVES~~	~~PIPING~~	~~SUPERSEDURE~~
~~BUCKFAST~~	~~HIVE TOOL~~	~~POLLEN~~	~~SWARMING~~
~~CLUSTER~~	~~HONEY~~	~~PROPOLIS~~	~~WAX~~
~~COMB~~	~~HONEY SUPERS~~	~~QUEEN BEE~~	~~WORKER BEE~~

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 Emma at Emma@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**
- **Instagram.com/beeculturemag**

***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**

When my back went out the other day, like it occasionally does, I decided a hot soak might be good medicine. But when we arrived at the local mineral springs, that gal Marilyn and I were informed that, due to Covid, admittance was by reservation only.

Marilyn wasn't having any of it. "Look at this poor old guy!" she exclaimed, pointing to her pathetic wreck of a sweetheart, hunched over and listing to starboard. "Look at him! He can barely walk. He needs a soak in your miracle waters!" The young woman behind the counter looked stunned. But clearly she had a heart, because she "oversold" us two tickets and, because the hour was late, only charged us for one.

As for Marilyn, that free spirit never met a rule that didn't need to be tested, a rope that didn't need to be ducked under, a gate that didn't need to be crashed. She's brazen, she's pushy, she's lucky. And she got us in.

About the time my back got all better, my left ear plugged up with wax, and I went nearly deaf. This was annoying in some ways but soothing in others. We live close by I-70, and the traffic roar abated nicely. But I had a hard time carrying on a conversation.

Wax can also be an effective intentional impediment to hearing. As Homer recounts in *The Odyssey*, on his return voyage from the Trojan War, Ulysses and his men sailed past the Isle of the Sirens, treacherous nymphs lovely beyond the power of men to resist. The sirens lured ships onto the rocks – and to their sailors' doom -- with their enchanting music. There the sirens devoured them and fashioned musical instruments from their bones.

Intrigued by the prospect of a close encounter with such mesmerizing yet deadly creatures, Ulysses instructed his crew to stop up their own ears with beeswax, so as to avoid temptation. But, wanting to hear the music himself – this divine music that drove men to madness -- he had his men lash him tight to the mast, instructing them in advance to ignore his orders and his pleas when he inevitably fell under the sirens' seductive spell. And in this way Ulysses and his men sailed close by the Isle of the Sirens.

It's October as I write. I'm supposed to be wrapping things up for winter with my little darlings, but this last gasp of autumn beekeeping can be a flurry of activity. There's always the colony that's inexplicably overrun with mites, or too light on food stores to survive the winter. I keep filling shopping carts with sugar to make syrup to feed any hives not packed tight with honey.

For this column last month I interviewed fellow Colorado beekeeper Tom Theobald of Niwot, who knew more about two-queen honey bee colonies – and about pesticides -- than anyone you're likely to ever meet. What I did not report was that he had terminal brain cancer.

Two days ago, on November 10, Tom departed Earth, his family and faithful friend Miles by his side. Miles told me, "I was holdin' his hand, and it was still warm, but then it went limp, and he was gone."

Tom's legacy is and forever will be his opposition to pollinator-killing pesticides. He was known throughout the beekeeping and scientific world for his knowledge of -- and his warnings about -- what he considered the most insidious of all insecticides – the systemic neonicontinoids. "We're poisoning the Earth!" he'd thunder. Never subtle, he preached his message like John the Baptist come out of the wilderness. You were wise to get out of his way.

An ancient, white-bearded, gravelly-voiced mountain of a man, earthy, learned, often angry, he could out-talk the smartest and the best. He came straight at you. He knew he was right. Compromise was simply out of the question. And yet there was beneath all this a quiet dignity and the sweetest, gentlest soul. He made enemies along his lonely road – You bet he did! – and he was mocked and vilified by some he once called friends. But time and again he turned aside spite with brotherly love. Never once did I hear him utter an unkind word about a fellow beekeeper. He reserved his judgment for the chemical profiteers at Bayer and Syngenta.

He kept his mental acuity to the end. He told Miles, "If I didn't know I had cancer, I'd feel just fine." He occupied his final days podcasting the weekly columns he wrote for 27 years in *The Fence Post*, a farm newspaper. You can listen to these down-home masterpieces at notesfromthebeeyard.buzz.

Some months ago, Tom told me he didn't fear death but rather embraced it. It was for him, as Miles explained to me later, the final, most glorious, adventure. At hospice the day before he passed, Miles asked him, "Is there anything I can do for you?"

Tom Theobald smiled faintly, winked, and whispered, "Dig a hole!"

Dig a hole! And he *winked*, I tell you! That we should all show such pluck when our time draws nigh!

He went painlessly and quickly. Praise all the saints! Now Godspeed, old friend. You made your mark. We'll likely not meet anyone quite like you, ever again.

Ed **Colby**

Dig a Hole!