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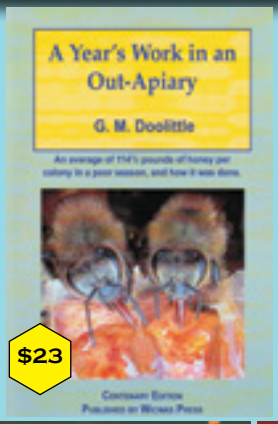

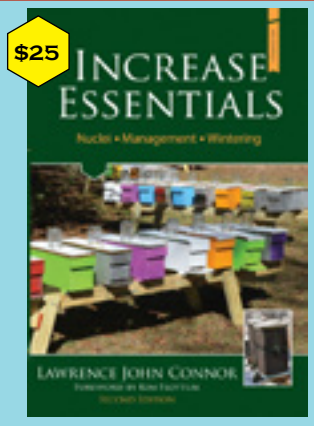

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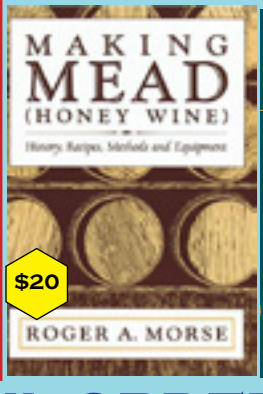

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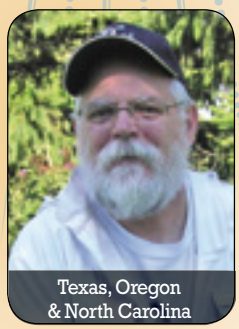
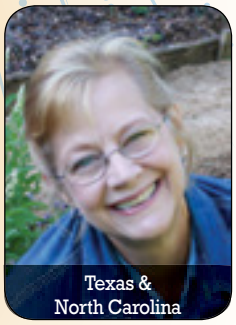


KIM FLOTTUM
Editor of *Bee Culture Magazine*, Beekeeper



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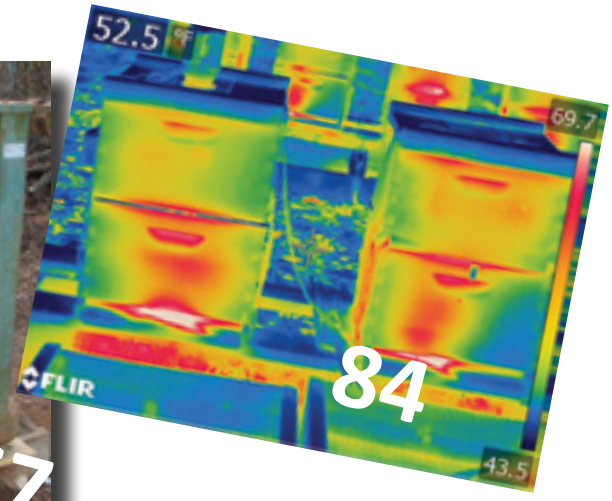

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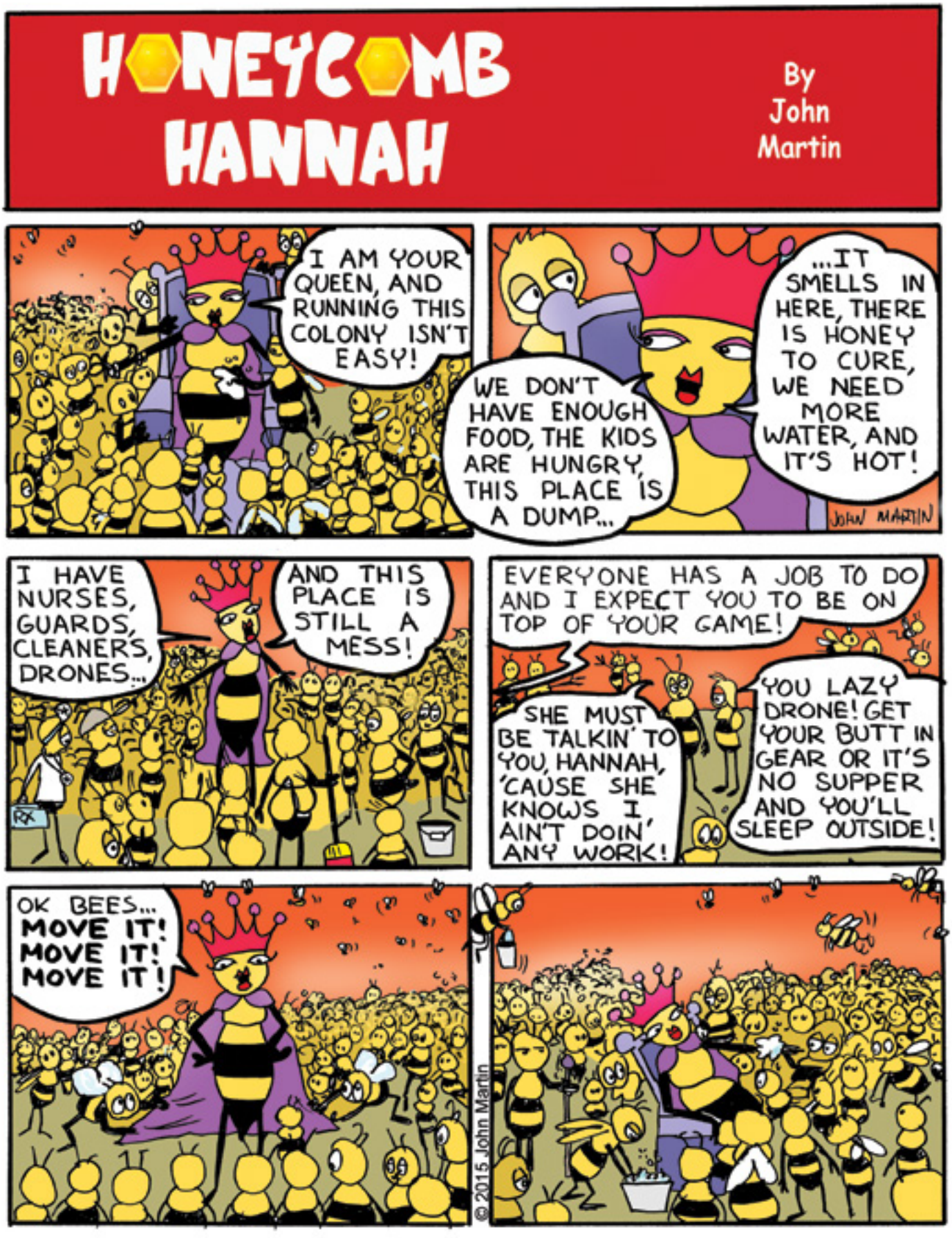
HONEYCOMB HANNAH
By John Martin
I AM YOUR QUEEN, AND RUNNING THIS COLONY ISN'T EASY!
WE DON'T HAVE ENOUGH FOOD, THE KIDS ARE HUNGRY, THIS PLACE IS A DUMP...
...IT SMELLS IN HERE, THERE IS HONEY TO CURE, WE NEED MORE WATER, AND IT'S HOT!
JOHN MARTIN
I HAVE NURSES, GUARDS, CLEANERS, DRONES...
AND THIS PLACE IS STILL A MESS!
EVERYONE HAS A JOB TO DO AND I EXPECT YOU TO BE ON TOP OF YOUR GAME!
SHE MUST BE TALKIN' TO YOU, HANNAH, 'CAUSE SHE KNOWS I AIN'T DOIN' ANY WORK!
YOU LAZY DRONE! GET YOUR BUTT IN GEAR OR IT'S NO SUPPER AND YOU'LL SLEEP OUTSIDE!
OK BEES... MOVE IT! MOVE IT! MOVE IT!
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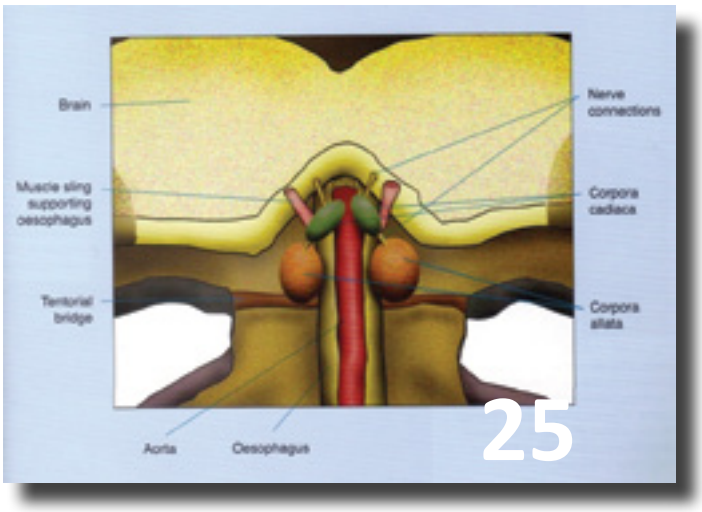
Bee Culture's Best . . .



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Nectar To Honey To Wax Ratios

I was at the Four Pillars of Beekeeping. Thanks so much for putting together a great line-up of speakers.

Food was great too. I look forward to next year's performance.

I was wondering if you know of any studies that provide a ratio of how much Nectar is takes to produce 1lb of honey and how much nectar to produce 1lb of beeswax?

I see numbers all the time like 4lbs of nectar/1lb honey and 8lbs of nectar/1lb of wax but there is never anything to substantiate the numbers. While on the surface it seems logical that wax requires more energy to produce than honey, but is there any science to back this up?

Dave Newman
East Aurora, NY

Tiny Transmitters

I read with much interest the article in *BC*, November 2015 about bees with tiny transmitters, Pg. 93.

It instantly occurred to me that this technology could be used to locate queens in a hive.

What a great idea, I told myself, and nearly broke an arm patting myself on the back. Wouldn't it be fabulous to lift the lid of hive that housed a queen carrying a chip on her thorax and locate her in a matter of minutes. We would however, need a 'probe' to home in on her whereabouts. This would be such a time saver for all beekeeping kind.

So many times I've wasted time going through frames searching for an elusive queen. There are days of complete failure when I've had to give up and admit failure. One for the queen and zip for the beekeeper. I recently had to repeat the process of removing brood frames three times on different days trying to locate a queen that I'd only gotten a glimpse of prior to this when I saw her scooting across a solid bottom board.

I do not use solid bottom boards myself and was in the process of changing out a box with a solid bottom board of a recently acquired hive from a fellow beekeeper. He does not believe in screened bottom boards. It's a miracle all of his hives don't self destruct from massive infestations of *Varroa*. I wanted to mark that queen; but was unable to until the 3rd attempt. Of course I found her on the first frame I pulled and set aside, in a yard box, when I went to return them. I keep an empty deep box in each beeyard just for this purpose of marking queens. I place frames in the box in the order they were in the hive.

I try to keep all my queens marked. This year's color is blue. Also I would like to start clipping the queen's wing. Right wing in the even years and left in odd. It's a skill I've not had time to master. Many times I have told new beekeepers to practice marking drones to get an idea of how they would mark a queen. This way you are a lot less likely to injure a queen when you give it a try. There is a queen marking device that makes doing this chore a breeze. The big thing you've got to master is picking her up by her wings. This definitely can not be done while wearing gloves. If you're scared to death of being stung, like a beekeeper I know who won't go near his hives without full bee suit, hat, veil and gloves you might as well forget this chore.

Practice makes perfect by using drones until your confidence is improved. Queen marking pens can be purchased from bee supply companies. Check their catalogs first or ask for 'paint pens' at WalMart. The colors for five years ending in are: 0 or 5 Blue, 1 or 6 White, 2 or 7 Yellow, 3 or 8 Red, 4 or 9 Green.

I used to mark queens with paper 'white out'. This I found out is way too soft a substance when it dries and bees would often chew it off! Why? Well we've been producing hygienic queens and bees for over a decade now and guess what?

The workers are attempting to clean their queens. Many times I even find partially chewed marks using paint pens.

Good luck finding queens and marking them.

Wil Montgomery
Etowah County, AL

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Medina, OH 44256
mailbox@beeculture.com

Varroa Resistance

It is a rainy day in Georgia and *Bee Culture* just arrived in our mail box.

I just finished reading the article by Roger Hoopingarner in the November issue of *Bee Culture.*

Dr Hoopingarner sites as examples of *Varroa* resistance, the Minnesota Hygienic bee and the VSH bee. Each possesses a single trait of resistance. *Varroa* resistance of the Minnesota Hygienic bee is minimal. You could not likely alter mite treatment plans based on this minimal resistance. This trait is effective against brood disease and is likely already present in many southern produced queens.

The VSH bee is not a stock but a one trait also. To incorporate this trait into a beekeepers stock is difficult and regular mite treatments probably would continue.

Who is being misled? I believe it to be the struggling beekeeper who listens, tries and then continues with his chemical treatments that he has figured out for himself.

Then there is the favorite topic of scientists at gatherings of beekeepers.

They are implying, if not saying that the answer is genetic diversity.

What is their definition of genetic diversity?

The message that the beekeeper is receiving is:

Mix as many bee stocks as possible into your bee operation and you will have the benefit of all of this wonderful diversity.

Again, what do we mean by "Genetic Diversity"?

I recently read an article in a

European beekeeping publication that stated:

The intermingling of other races of bees in native honey bee populations is destroying the genetic diversity of the local bees.

Maybe the definition of genetic diversity for them is something like:

Possessing the diversity of genes that best equips the population of bees to survive and prosper in their environment.

Seems logical to me that there is only so much room for genes on chromosomes and by mixing races we get both bad and good genes. Of course, I am not a genetics expert but a breeding program that favors desirable genetic diversity might result in a better bee for the bee keeper.

Breeding programs in animals and plants have resulted in animals and plants with multiple desirable traits. Breeding honey bees with multiple desirable traits should work also and in fact is resulting in better bee stocks.

Carl Webb
Georgia

Editor's Note: *Carl Webb is a Russian Queen Breeder and founding member of the Russian Queen Breeder's Association.*

Missing Bees

Two years ago I had an experience like Jim Furr and "Missing Bees" in Novembers issue.

It was a new hive, Buckfast bees from Weaver apiaries started in May. The hive went gangbusters all Summer long. Early in September lots of bees and activity but the tilt test made me believe it was losing weight.

I came home from work one day in mid-September and noticed many bees and yellow jackets attacking the hive. Where were the guards? The bees didn't seem to mind. I grabbed a flyswatter and squashed many of them. The next day fewer bees but more Yellowjackets so I opened the hive.

It was empty. No bees, brood, honey or even comb.

I could only surmise that the bees had absconded a week or two earlier and the activity I had observed was not a robust hive but the prior tenants coming back or robbers taking back all of their honey and the wax and depositing it into their new home.

Not sure why the left but hope they are doing well.

Craig Stitt

Practical Information

I just finished the October issue and was very pleased with both the Jennifer Berry and Larry Connor articles. That's not taking from the other writers, but I found these articles to be most useful for any beekeeper, but especially the new beekeeper.

I have and will continue to recommend your magazine to beekeepers for this type of information. It's the basics that keep us on track which can't be emphasized enough.

Greg Carey

All In A Row

What on earth is Leo thinking? He must have been asleep or missed the class of Beekeeping for Beginners that suggests and explains why we no longer paint all hives white and place them close together in rows. Leo's interesting article is in the November 2015 issue of *Bee Culture.*

It does make for a nice well arranged beeyard. This obviously impresses the visitors to his yard. But this situation makes for what we call 'drifting' of workers when they return from foraging with loads of nectar or pollen. This is especially true if there is a strong breeze flowing from one end of the row toward the opposite end.

Even the commercial boys and girls know it is advantageous to have boxes painted in different colors to help reduce this drifting problem. Of course if you have a weak hive at the end of the row it may be an advantage for that colony to increase its population without having to requeen. But I suspect this situation would be a rare one indeed. Theoretically a hive at the wrong end of the row could become over-populated and we all know what that causes – swarming.

Getting cheap paint is not too big of a problem if you let your local paint store know you will buy paint at a discount when a color

is returned from the customer not being satisfied with it. They should be happy to get something for it and not need to throw it away.

Leo tells us that a 'long hive' can be painted with bees in it! Some 40 years ago when I got my first hive it was painted white and since it was up on a garage with a flat roof I thought it a good idea to paint it green so neighbors would not notice it.

Of course the best time to perform this task would be at night when all the bees are home sleeping in their bee beds. This was one of many, disasters in my beekeeping career poor judgement. I started out painting the back first and this went well. It wasn't until I started down one side and got near the entrance did the bees suddenly disapprove and 'flow' out the entrance to inflict multiple stings on my body. Sometimes lessons from the 'scool of hard knocks' are the ones best remembered and not repeated.

I did like Leo's approach to housing bees in 'long boxes.' Being a nut for gadgets I may give his system a try. I enjoy woodworking and have a modest shop with some essential tools like a table saw and mitre saw as well as a router. This looks like a good cold Winter project.

One thing I learned from Dr. Marla Spivak who spoke at the Young Harris Institute of Beekeeping, UGA this past May, is that we have been making a major mistake using smooth milled wood to construct beehives. Since propolis is antibiotic, antifungal, antimicrobial, and an antibacterial substance we should be using rough sawn, sawed if you prefer, wood especially on the insides of our boxes.

Bees hate rough or sharp surfaces and coat them with

copius amounts of propolis. I have even heard that honey bees have survived in their present state for some 30 million years because of their use of propolis. Due to the fact that bees live in such close proximity they can easily pass harmful microbes and viruses to one another.

Now I just have to figure out how to rough up the insides of all my beehives which number in the dozens. As an aside we should be painting flowers, vines, trees and grasses on the front of our hives to help bees orient to their own hive. Isn't this what bees see when they are out foraging? OK so that's not practical. You could take your white boxes to a 5th grade teacher and see if she would make an art project, out of this, with her students. I guarantee you will get some very interesting and artistic results. You will probably need to spray them with a clear coat of polyurethane to preserve the art work. You only need the front of the hive decorated and coated thusly.

Wil Montgomery
Etowah County, AL

Neonics And CCD

In response to last months review of a review warrants a much further discussion. As a recap, Randy Oliver offered a review of Dr Lu's work on neonics and the link to CCD. Jim Doan took exception to some of Randy's points. I would like to take a few minutes of your time, and really consider the reality and the facts. Unlike Randy, I have no reason to be careful with my words, and unlike Jim, I have no legal stake in the issue. But I do have my bees and my livlihood involved. For brevity, I am not going to cite specific papers. Unfortunately much like the debate on sodium in your body, you can find research that says anything you want it to. I will leave it to interested readers to dig deeper on their own.

Let us start with a real review of Dr. Lu's work. To put it bluntly it is horrible. You could make the argument its only flaw is the title, it should have been "holy batman how much of this do I need to kill these bees?" Let me get to the real reasons though. First off Dr. Lu's assumption is that Neonics tainted HFCS fed to bees caused the CCD. Two problems with that, the first, not all CCD bees got artificial feed.

And the bigger issue? *No* neonics residue has ever been found in HFCS, read that again. None, zero, nada. Now you would think that if you were going to do a bunch of research on a theory, you would at least *check* to see if the theory had any merit. Believe me a lot of HFCS was tested. So here we are using a test which the basic premise is totally a non issue as the club to ban a pesticide. Anyone see an issue with that? Frankly after studying the report, I realized my intelligence had been insulted.

Then move to the methodology. No need for field realistic dosage data. Let's start with 10 times that and we confine them so the only source is contaminated food. Definably not what happened in the field. When that fails to kill them we up the dosage, more than once in order to ensure they do die. The final numbers it took were nothing short of astounding. Even at that point I am not convinced what killed the hives, it sure looks like poor nutrition may have been involved also.

One of the points of the debate is soil contamination, Jim points to some test which found longer degradation times than normal. True, no doubt. Some soil types slow that rate, but not where we farm typically. Randy points out quite well the *normal* life of neonics are really good. Short soil life, no bio accumulation, and the residual levels in water are a non issue. Jim is correct. If you dig you can find exceptions, and if you dig you can find gold nuggets also. Generally though you want to stick to the day job it pays better, nuggets can be hard to locate.

I would like to get to the real meat of this debate though that's where the truth lies. Both these guys are beating around the bushes, Randy is trying to be politically correct and Jim is mining for nuggets.

Neonicotinoids were developed as a environmentalist dream. In some brainstorming session a while back someone said" hey, wouldn't it be cool if we had a pesticide that only killed bugs that eat the plants" some brilliant mind went to work

on it and systemics were developed. Another simple goal was short life. And "TADA" Neonicotinoids came about. They are in fact the next generation of pesticide. Very targeted and effective, with a much better environmental footprint than the previous pesticides.

Therein lays the key. We know neonics kill bees, they are a pesticide. What is missing in all the conversations is the baseline of exposure paths and options. We now have a pesticide applied to the seed, that stops bugs from feeding on immature plants, and from almost all the data, shown to be a non issue by the time the plant matures and sets flowers. We have easily a decade of real field data in the Midwest and Canadian prairies, showing where we really are. In that decade I have seen the level of Japanese beetles drop, and the number of solitary bees seems to have risen in my area. Literally thousands of tons of honey from the prairies has been made and tested hives have been checked over and over.

The other elephant in the room is the options. What seems to elude most people in the debate is the baseline of farmer applied sprays. Pyrethroids and Atrazine, sprayed typically three times during the growing season, on everything in the field. Dandelions, milkweeds and all, everything covered with a pesticide? Not a good scene. That's stopped. The tonnage of pesticide has dropped significantly. So when you see that chart showing the increase of Neonics since 2000, DEMAND to see the one showing the decrease in the other pesticides.

Let's talk residual and cumulative issues, look at some of the data that shows what Atrazine does to frogs and how they bio accumulate in water, compare that to Neonicotinoids, then we have a intelligent debate. Just last Summer we read reports of

Iowa using snowplows to remove Mayflies from the bridges. Seems to me Neonics in water may not be an issue when you have to call the snowplow for bugs in June

Not enough?

"Scientists now say that the Lu study, published in an obscure pay for play journal, proved only that feeding bees poisonous levels of an insecticide can and will kill them. University of Illinois Department of Entomology Chair **May Berenbaum**, who headed up the National Academy of Sciences 2007 National Research Council study on the Status of Pollinators in North America, has **called** Lu's research "effectively worthless" to serious researchers."

This is from an article in the Huffington post, not exactly a pesticide friendly forum **www.huffingtonpost.com/jon-entine/neonics-not-key-driver-of_b_6928578.html.**

I live here. When you look at that map showing the super high levels of use, you are looking at my home and beeyards. Not a beeyard in upstate NY. I can once again raise bees next to farm fields. Little worries about spray drift anymore. Overall a huge improvement, of course we still have some challenges with planter dust, and foliar applications. The key to remember is where we were, and where we are now. The new class of pesticide is a huge improvement and deserves to be appreciated and improved more, not battled in court and ludicrous links to CCD touted.

We need to keep our eyes open and looking at problems, but chasing red herrings is going to

hurt us not help.

I did ask Randy if he minded if I replied, he asked me not to defend him. My answer is simple, he doesn't need defending. We read his work here monthly, where he tirelessly attempts to make us better beekeepers; the amount we have learned from him speaks for itself.

Charles Linder

Questions and Answers

Label Contest

I was just updating my honey bottle labels and thought, "I bet this one ranks right up there with the best." So, how about a contest where 'keeps could submit their label, and a panel of judges pick the best ones? Points awarded for design, photography on the label by the beekeeper, legibility, durability of the label, etc...

Since most of us that do our own labels likely have all the gear we need, maybe paid admission to a beekeeping event near the winner's home, or gift certificates for some supplier, or maybe subscriptions.

William Powers
Waxhaw, NC

Good Idea!

Not only will we find the best labels, but beekeepers who haven't had the pleasure of designing their own labels yet will get to see all the great labels out there. Send a pdf or jpg or your label to us at ***info@BeeCulture.com*** *by* ***Valentine's Day*** *and we'll show the entries in the April issue.*

William Powers
Waxhaw, NC

More On Warming Honey

I use old freezers to do the job. I also use them for my solar wax melters. Set one end on legs and build a bed inside the freezer. Put insulation between the bottom and the bed. Cover with window glass. Set southwest to the sun and all my frames and cappings get melted down.

Remove the door to the freezer. I have used these for almost 40 years.

At one time I ran around 1,400 colonies in Kansas and Louisiana. I spent seven years at the USDA Baton Rouge Honey Bee Lab.

Gary Reynolds
Concordia, KS

New For The New Year –

A couple of Kid's books first off . . .

What's The Buzz? Keeping Bees In Flight. By Merrie-Ellen Wilcox. Published by Orca Book Publishers. Victoria, BC, Canada. ISBN – 978-1-4598-0962-8. 8" x 9.5", 48 pgs., hard cover, color. $19.95.

This is for middle school age kids, and it does a good job of what it wants to do. It wants to introduce kids this age to bees, not only honey bees, but mostly honey bees, and beekeeping, and especially the world they live in. Chapter 1 looks at bees in general, all kinds of bees, while chapter 2 discusses pollination and how bees make that work. Chapter 3 looks at our honey bee and life in the hive, while the final chapter talks about the issues affecting honey bees and bees in general. Each chapter has good information, and offers two different kinds of call out boxes. The first are the Bee Facts: short snippets on background to the chapter…for instance: Many bees are called generalists, because they can easily collect pollen and nectar from lots of different kinds of plants. But some bees are specialists, because they can only get their food from specific types of flowers.

A second type of call out, called All Abuzz, tend toward the author talking about her beekeeping experiences and how they relate to the information in the chapter. So, readers get good science, good beekeeping, and good information in general. – *Kim Flottum*

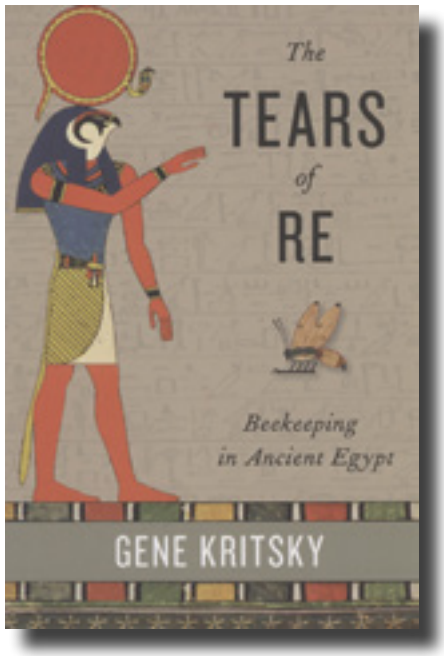
The Boy Who Lost His Bumble, by Trudi Esberger. Published by Child's Play, Auburn, ME. ISBN – 978-1-84643-662-8. 9.75" x 9.75" 32 pages. Hard cover, color. $16.99.

Written for three to six-year-olds. The 'boy' is fascinated by the outdoors, the garden, but especially bumble bees. The story follow a season, in a few short pages, from when there are lots of bees, to one day – none. Winter comes, and no bees. Other activities don't dull his love of bees, and finally, Spring, and the bumble bees return. The art is attractive and captivating, but it's the short story at the end that gives this book value. In two short pages the seasons are explained – Winter, Spring and the fullness of Summer and Fall. And all within the bumble bee world. – *Kim Flottum*

For both kids and adults . . .

The Tears of Re. Beekeeping in Ancient Egypt, by Gene Kritsky. Published by Oxford University Press. ISBN - 9780199361380 6" x 9.5", 160 pgs. Hard cover, color section in center, extensive B&W throughout. $29.95.

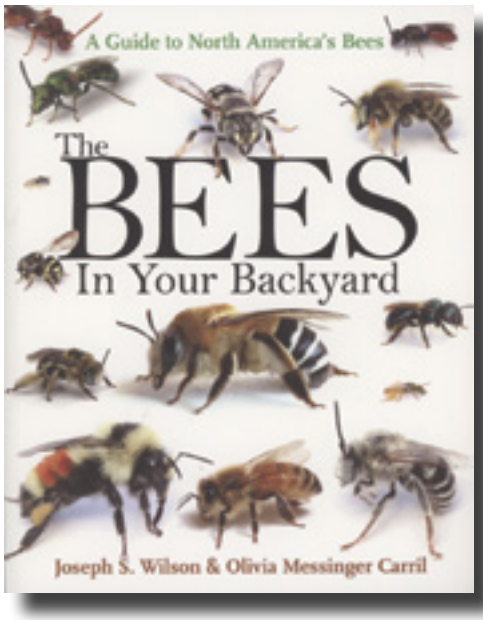
I've been fortunate to know Gene since before I started here, and I've had the pleasure to review now a couple of the dozen or so books on various entomological topics he's written over the years. The first we covered here was *The Quest for the Perfect Hive: A History of Innovation in Bee Culture* back in 2010. Currently he is the Chair of Biology at



Mount St. Joseph University in Cincinnati. He was a Fullbright Scholar to Egypt in the early 80's and has published several papers on the history of beekeeping in that region.

What I know of Egyptian history would fill half of the first page of Gene's book, so all I read here was for me both new and fascinating. Old, Middle and New Kingdoms and the chronology of each of these and the several dynasties that followed each had a part in shaping the art and science of beekeeping then. And deciphering the hieroglyphs of bees, looking at the beekeeping equipment and management used, plus honey harvesting, cooking with honey and the use of beeswax in art and decoration are discussed, And the same organizational skills that built the pyramids organized the apiaries and beekeepers for honey production for food, medicines and trade are examined, along with the gods, the men and the bees– it's all here.

This is beyond doubt the most comprehensive study of honey bees and beekeeping in this most ancient civilization. – *Kim Flottum*



The Bees In Your Backyard. A Guide to North America's Bees. By Joseph Wilson and Olivia Messinger Carril. Published by Princeton University Press. ISBN – 978-0-691-16077-1. 6.5" X 9.5". 260 pages. Soft cover. Color. $29.95.

If you have a pollinator garden, you have pollinators and many, if not most are bees. Not just honey bees, but all kinds of bees. This book helps identify the bees that you see. It has more than 900 photos of all of the kinds of bees you'll find, plus the biology of all of the bees included, and how to provide both food and habitat for them. Each family is a chapter, and has ID tips, plus key features in anatomy to make sure you have the right bee. Maps of distribution are included, along with sized images so you know how big, or small each one is. When they are active is included, along with differences between male and female. Each chapter also includes some bit on biology specific to the family, genus or species of bee being studied, and for many the diet they favor. This is probably the best reference on all of the bees in your backyard you'll find, and the price is right.

Kim Flottum

Honeybee Veterinary Medicine: Apis mellifera L. By Nicolas Vidal-Naquet. Published by 5m Publishing, UK. ISBN – 978-1-91945-504-3. 7" x 9.5".260 pages. Hard cover. $95.00.

This is a very expensive book. It is worth the money. The work was commissioned by The World Organization For Animal Health, an intergovernmental organization responsible for improving animal health worldwide. It is recognized as a reference organization by the World Trade Organization (WTO) and in 2014 had a total of 180 Member Countries with permanent relations with 45 other international and regional organisations and Regional and sub-regional Offices on every continent. In 2011 - 2015 they made global bee health a priority, and Nicolas Vidal-Naquet, a DMV in Beekeeping from the French Veterinary School of Nantes and Alfort has produced this book as a result of the studies and research conducted during this time. One can get a degree in France as a DMV in Honey Bee Pathology, a position not available in the US.

Chapters cover, in exceptional detail, honey bee biology, environmental problems including pesticides, viruses, bacterial diseases, parasites, fungi, colony pests, and sanitary beekeeping practices. The last chapter is 15 pages in how to manage colony health with examinations, sampling and data collection. The table of contents is 12

pages long, enabling one to find any topic instantly. There are 4 appendices, the first covering the average values and typical features of the biology of colonies…for instance, how much should a drone weigh when it emerges, or how many bees should be reared during a season or the head diameter of a first instar worker larva. The second is a list of notifiable diseases (we don't do this in the US). Three is instructions on sampling techniques and the final is how to perform a sanitary audit…12 pages of boxes to check as you accomplish each task. Each chapter finishes with a comprehensive list of references. Expensive, but worthy of the cost. – *Kim Flottum*

More Than Honey. The Survival of Bees and the Future of Our World. Markus Imhoff & Claus-Peter Lickfeld. Published by Greystonebooks. ISBN – 978-1-77164-099-2. 6.5" X 8.5". Soft cover. Some color. $19.95.

This book is a follow-up of the documentary of the same name that came out a few years ago. We reviewed the documentary, summarizing that the first half hour or so, represented here by the first chapter, made the film worth seeing. The rest of the film, don't bother. After the first chapter of this book, don't bother. But the first is worth the time.

That first chapter is about big migratory pollination business in this country, specifically the Miller operation out of North Dakota and

California. The authors mostly get it right because John made them get it right. The title of the chapter is Bees: A Big Business, and they explain it quite well. It is big business, and with that comes the dangers of being big. John is aware of this, as are the successful big beekeepers in this business. There are dangers and costs and there's lots of money involved.

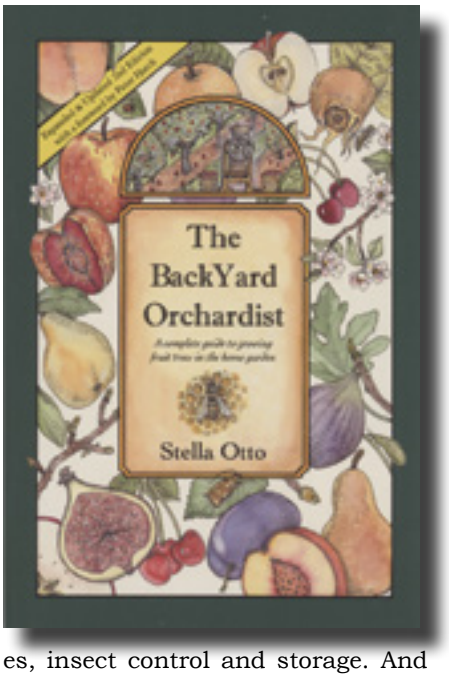
The rest – biology, science, breeding, humans as bees – there's enough out of date, or just plain wrong information to give anyone pause as to the accuracy. Borrow this book if you can. If not, read the first chapter and lend it to someone else. – *Kim Flottum*

The Backyard Orchardist. 2nd Edition. Stella Otto. Distributed by Chelsea Green. ISBN – 978-0-9634520-4-7. 6" X 9". 320 Pages. Soft cover. $24.95.

The first edition lasted 20 years, so you know it was good. This edition is even better. If you haven't yet started growing your edible landscape, or even if you've been at for a time you'll find lots and lots of helpful information here.

23 chapters, charts, call outs all highlight the information. Planning for the best site, selecting varieties suited for where you live, disease resistance, pruning, pest control with the bees in mind, irrigation, and harvesting tips for best flavor and preservation.

Apples, pears, Asian pears, Quince, Medlar (don't know what a medlar is?), sweet cherries, tart cherries, apricots, apriums and pluots, plums, peaches and nectarines…for each of these growth habits, flowering and pollination, thinning, rootstocks, varieties and harvesting. Plus, container gardening, nutrition, pests and diseases, insect control and storage. And more and more. If you grow, or want to grow – start here. – *Kim Flottum*



California Bees and Blooms: A Guide for Gardeners and Naturalists, Gordon Frankie, Robin Thorpe and Rollin Coville, Barbara Ertter. Published by Heyday Press, Berkeley, CA. ISBN 978-1-59714-294-6, 6"x9", 296 pages. Soft cover. Color $28.00.

Bees play a profound role in shaping the world we live in, but many species remain strangers to us, say University of California scientists who co-authored the newly published book, *California Bees and Blooms: A Guide for Gardeners and Naturalists*.

Of the 20,000 bee species identified worldwide, some 4000 are found in the United States, and 1600 in California.

The book, the first of its kind, profiles some of the most common bee genera found in California gardens; their preferred plants, both native and non-native; and how to attract them.

In addition to the well-known honey bees and bumble bees, the authors spotlight such bees as mining, leafcutting, carpenter, sweat, digger, masked, longhorned, mason and polyester bees.

The honey bee, which provides pollination services valued at $217 billion globally and $20 million in the United States alone, is the most recognizable of the bees, but many are unaware of its non-native status. European colonists brought the honey bee to America in 1622.

California Bees and Bloom, published by the nonprofit Heyday Books in collaboration with the California Native Plant Society, is the work of urban entomologist Gordon Frankie. a professor and research entomologist at UC Berkeley; native pollinator specialist Robbin Thorp, emeritus professor of entomology at UC Davis; insect photographer and entomologist Rollin Coville, who holds a doctorate in entomology from UC Berkeley; and botanist/curator Barbara Ertter of UC Berkeley.

"This book is about urban California's bees: what they are, how and where they live, their relationships with ornamental flowers, and how to attract them to urban gardens," they wrote. "It was written in the urgency of knowing that bees are critical to the health of our natural, ornamental and agricultural landscapes and that populations of some, perhaps many are in rapid decline."

The authors want people to read the book and act on the bees' behalf, to appreciate them, and to provide food and nesting areas.

"While the book is specific to California, larger insights can be gathered about the role of native bees in developed landscapes (such as agriculture), and native bee conservation," said Frankie, who researched bees in urban gardens in California for 13 years.

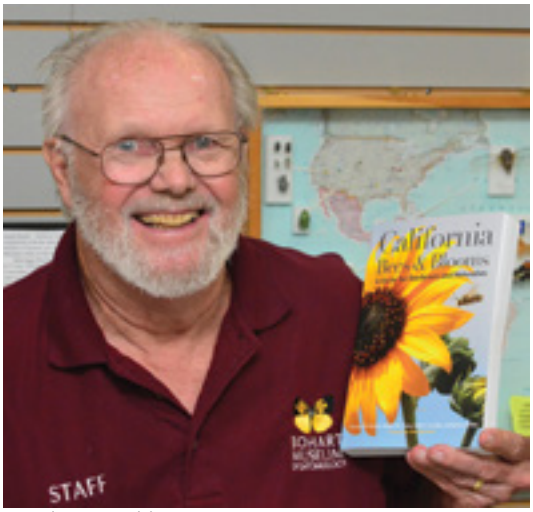
The book traces the first fossilized bee to Burma's Hukawng Valley, where it was lodged in amber approximately 100 million years ago.

The book destroys such myths as:

1. All bees make honey. Fact: Most native bees make no honey at all.

2. Bees die after they sting. Fact: Only the honey bees die; native solitary bees do not.

3. Male bees don't pollinate flowers. Fact: Males engage in pol-



Gordon Frankie.

lination, but are not as efficient as most females.

4. Honey bees displace native bees on flowers. Fact: There is no evidence of that. In fact, "Recent research does indicate that interaction between honey bees and native bees results in an increase in the activity and efficiency of honey bees with regard to visiting (and pollinating) crops."

"Nature has programmed bees to build nests and supply their young with nutritious pollen and nectar, and their unique methods for collecting these resources are fascinating to observe. Their lives are dictated by season, weather and access to preferred flower types and nesting habitat."

Co-author Gordon Frankie's specialty is behavioral ecology of solitary bees in wildland, agricultural and urban environments of California and Costa Rica. He teaches conservation and environmental issues. He is involved in how people relate to bees and their plants and how to raise human awareness about bee-plant relationships.

Co-author Robbin Thorp, who retired in 1994 after 30 years of teaching, research and mentoring graduate students, continues to conduct research on pollination biology and ecology, systematics, biodiversity and conservation of bees, especially bumble bees. He is one of the instructors at the The Bee Course, affiliated with the American Museum of Natural History and held annually at the Southwestern Research Station, Portal, AZ. The course is geared for conservation biologists, pollination ecologists and other biologists who seek greater knowledge of the systematics and biology of bees.

"The book is profusely illustrated with photos and drawings of bees and flowers, especially notable are the magnificent close up images of bees by co-author Rollin Coville," Thorp said.

California Bees and Blooms lists 53 of urban California's best bee attractors identified through the Urban California Native Bee Survey. Among them: aster, bluebeard, catmint, California lilac or Ceanothus, cosmos, California sunflower, red buckwheat, California poppy, blanket flower, oregano, rosemary, lavender, gum plant, and salvia (sage). With each plant, they provide a description; origin and natural habitat, range and use in California; flowering season; resource for bees (such as pollen and nectar), most frequent bee visitors, bee ecology and behavior and gardening tips.

The book offers tips on how readers can "think like a bee." It devotes one chapter to "Beyond Bee Gardening: Taking Action on Behalf of Native Bees." In addition, the book provides quotes on bees and/or bee gardens from Extension apiculturist Eric Mussen (retired) of UC Davis: Ellen Zagory, horticulture director of the UC Davis Arboretum; and Kate Frey of Hopland, a designer of sustainable, insect-friendly gardens throughout California and in some parts of the world.

For more data on the book, the authors, and purchase information, access the publisher's website at **https://heydaybooks.com/book/california-bees-and-blooms/**

Kathy Keatley Garvey

Enough of books . . .

The Ultimate Gripper Multi-Tool. Produced by BeeSmart Designs, the good folks who bring you hive stands, hive tops, feeders, uncapping devices and more. The Ultimate Gripper has several design innovations compared to conventional grippers. First, it's made of lightweight high strength glass filled technopolymer that offers just a little flex for easy use, and it has a frame-lifting hook and a larger blade to separate frames, plus hooks on each gripper edge to keep frames from slipping off. And, it can only open so far, and can't pinch you hand when closed. Available at most suppliers for around $10.00.

Kim Flottum

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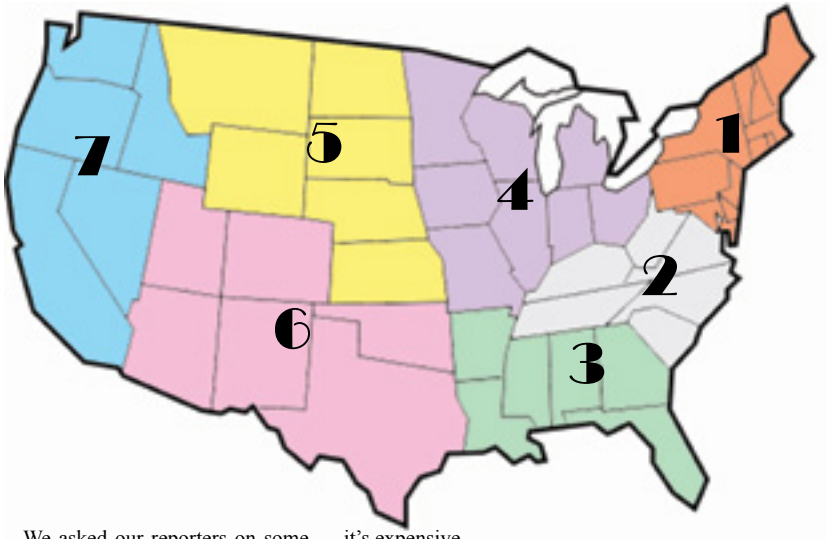
JANUARY – REGIONAL HONEY PRICE REPORT



We asked our reporters on some management questions this month regarding treating for pests and diseases and feeding. The chart shows what per cent of them do, or don't do what. We'd like to note a few of these findings.

Overall, 54% of our reporters treat for one or more of these maladies. The highest of course is for Varroa, with just over 80% doing something for this beast. It's not quite an even split on treating for Nosema, and that problem is difficult to define, and time treatments for. With out good data, spores/bee, good decisions are difficult to make, and then, it seems, sometimes treatments do more harm than good. And it's expensive.

Feeding when necessary is always called for, and over 80% feed at least sugar syrup when needed. It's good to see that more protein is being used with 65% feeding it when needed. Overall, only 45% of our reporters feed something, sometimes.

IPM techniques are used, but not as frequently as we would have predicted. 60% are using organic acids for *Varroa*, but only 33% use essential oils. Still, that comes to 99% are treating with something other than the hard chemicals. Overall, 47% are treating with some IPM technique, which isn't a bad thing at all.

Do you medicate for	**yes**	**no**
Nosema	43%	57%
AFB	36%	64%
Varroa	81%	19%
Do you feed	**yes**	**no**
Sugar syrup	84%	16%
HFCS	28%	72%
Fondant	24%	76%
Feeding Stim	24%	76%
Pollen sub	65%	35%
Pollen	20%	80%
IPM use	**yes**	**no**
Organic acids	60%	40%
Essential oils	33%	67%
Beetle traps	52%	48%
Drone comb	40%	60%

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.00	2.08	2.19	2.55	1.85	2.03	2.26	1.80-2.95	2.14	2.14	2.18	2.24
55 Gal. Drum, Ambr	1.80	2.02	2.02	2.52	2.17	2.00	2.17	1.65-2.85	2.09	2.09	2.16	2.15
60# Light (retail)	212.00	174.60	175.83	191.00	171.00	174.00	242.50	136.00-285.00	189.23	3.15	205.33	199.96
60# Amber (retail)	217.50	171.00	180.00	184.20	198.62	155.67	242.50	130.00-285.00	189.73	3.16	198.45	198.83
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	86.64	73.95	82.25	64.00	51.84	88.50	81.91	48.00-118.80	80.43	6.70	83.20	80.25
1# 24/case	126.45	106.30	119.77	100.50	127.16	95.25	150.00	45.00-216.00	117.20	4.88	119.87	116.53
2# 12/case	116.52	91.67	107.23	89.36	97.44	89.25	112.02	70.00-168.00	105.03	4.38	107.71	103.48
12.oz. Plas. 24/cs	101.37	81.83	93.97	86.13	74.40	96.60	102.00	36.00-153.60	92.92	5.16	95.99	93.77
5# 6/case	142.65	103.75	113.86	109.80	102.30	97.50	128.04	64.75-204.00	121.70	4.06	118.72	118.02
Quarts 12/case	207.15	123.07	128.03	127.80	145.82	147.60	132.00	105.00-275.00	138.59	3.85	139.10	134.84
Pints 12/case	111.99	83.92	76.86	96.67	111.00	73.20	96.00	54.00-144.00	89.15	4.95	88.44	85.08
RETAIL SHELF PRICES												
1/2#	4.93	4.19	3.77	3.27	3.68	4.25	5.00	2.00-7.75	4.30	8.59	4.36	4.16
12 oz. Plastic	6.09	4.70	4.92	4.63	5.02	6.19	6.60	3.00-8.99	5.35	7.13	5.40	5.45
1# Glass/Plastic	7.22	6.46	6.68	5.98	6.09	6.37	13.00	3.00-15.00	7.01	7.01	7.06	6.91
2# Glass/Plastic	12.97	9.73	11.42	10.95	10.23	9.83	11.05	2.00-19.00	11.59	5.80	11.70	11.60
Pint	12.49	8.29	8.34	11.33	9.38	9.37	12.22	4.50-17.00	9.67	6.45	9.68	9.51
Quart	19.99	14.82	14.08	17.50	16.53	14.11	20.07	8.50-38.00	16.14	5.38	16.10	15.24
5# Glass/Plastic	26.80	22.95	32.74	24.37	23.89	21.08	26.91	15.00-41.00	25.81	5.16	25.52	24.68
1# Cream	8.89	7.50	6.00	6.33	7.57	6.50	8.17	4.59-12.50	7.80	7.80	8.22	8.61
1# Cut Comb	9.38	9.00	8.20	11.68	10.00	4.50	12.00	4.50-16.00	9.40	9.40	10.35	9.47
Ross Round	9.02	6.67	8.68	8.50	8.68	10.50	8.68	6.00-12.00	8.36	11.15	8.46	8.25
Wholesale Wax (Lt)	7.52	4.78	4.59	5.15	6.00	5.75	5.00	3.00-12.00	5.75	-	5.75	5.81
Wholesale Wax (Dk)	6.65	4.47	3.69	4.95	5.55	2.75	5.55	2.00-10.00	5.09	-	5.20	5.03
Pollination Fee/Col.	99.29	63.00	60.00	74.75	80.00	92.00	50.00	30.00-145.00	76.29	-	80.39	81.78

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INNER COVER

Well, welcome 2016. Growing up, that figure would have been so far in the future and brought with it robots waiting on us at home, flying cars, food in a pill, thought police…but here it is, and, darn it, not one of those fantasies is a reality yet. Moreover, I'm probably not going to get to see any of them before I shuffle off this mortal coil. What we do have though is DNA editing with crisper/Cas9, a changing climate and a growing population to feed, honey bees and chickens in downtown New York City and Washington DC, and gasoline at less than $2.00 a gallon. No robots I guess, but lots of things I didn't dream of way back then. I hope your new year is everything you want it to be.

•

What do you think of that T-shirt? Toni Downs brought it a bit ago when she was here on a visit. A while ago I related an incident at the security station at the airport when the lady checking my boarding pass noticed my Medina County Beekeepers shirt. She detained me to ask some questions about starting out with bees, how were the bees doing and did I actually have bees? Her curiosity caused a backup in the line, and murmurs from some wanting to get to their gates, and what the heck was going on, anyway? But a whole bunch ended up listening to her questions and my answers. And there were a couple of questions from them, too. Eventually, her husband reached out and is probably going to get his bees this spring. That all came about because of the logo on my shirt.

Well, unless you have been a beekeeper for a bit, that T-shirt probably isn't going to get much attention from folks who want to start keeping bees. Or anyone, for that matter. Who knows *Varroa* except someone who knows bees? And, mostly, T-shirts are personal billboards that most folks don't pay much attention to because everybody has one that tends toward the outrageous, or a particular political stand, maybe membership in some organization, or one of those that say something about my folks visited some exotic place and all I got was this lousy T-shirt. They tend toward making a point, or making a statement or bragging, or supporting something, and most folks could care less. Unless, that is, it's something they support, someplace they've been, or some band they enjoy listening too. If they don't recognize it, they just look right through you.

But beekeepers will notice that shirt. How do I know? I walked the length of two terminals at Chicago O'Hare airport recently. I have no idea how many people I walked past on my way. Certainly hundreds, probably thousands. But a whole slew of them made it a point to actually stop and make a comment, or a fist bump, or at least give a thumbs up when they saw the shirt. I quit counting after I hit 20. Some asked where they could get one because it spoke to them and they wanted to share. Of course when you have a captive audience, like I did once I got on the plane, it might get someone's attention who isn't a beekeeper. Actually the guy across the aisle asked if they were really that big. But if you want to meet a beekeeper when you have no clue where you are or who are all these people – wear this shirt. Plus, you'll meet some interesting folks who aren't beekeepers, yet. You can get this shirt at **http://www.cafepress.com/mf/58798158/varroa-sucks_tshirt?productId=567206034**.

•

Speaking of planes, I urge you to read Jessica's Bigger Picture article this month. It's all about travel. And while I'm not on the road as much as she and her husband seem to be, I do the airport, plane, airport, another plane, another airport, rented car, hotel, airport, plane thing more often than a lot of people. I'm not complaining about having to travel. It's a perk of this job, no doubt about it. But I think I've seen everything she mentions, and more, in my travels. So I'll let you in on a little secret about the reclining seats in airplanes she mentions. I, too, detest when the passenger in front of me slams their seat back as far as they can without warning. And Jessica is correct, so much for getting any work done on the tray table. That's usually a pretty productive time for me, either reading or writing something like this. But what I've found is that if you don't want that reclined seat to stay there, take that cold air thingy above you, turn it up as far as it will go and aim it at the top of your violators head. In a short time that cool breeze will become so irritating they move, usually by raising their seat. If they turn around and ask to turn it off…make them a deal. Sure, you say, just as soon as you get your head out of my lap. It usually works but you didn't hear it here.

•

You've heard of manuka honey. It has seemingly miraculous medicinal properties, and more are being discovered daily. Manuka honey comes from the manuka shrub,

Meeting Beekeepers. Stealing Honey.

which grows in New Zealand and parts of Australia. It mostly grows on the drier, steeper, erosion susceptible parts of the islands on land not otherwise used for much. Not surprisingly, because of its value - somewhere in the neighborhood of $400 a pound - beekeepers are vigorously seeking locations where the manuka shrub is already growing, and are expanding their operations when they find those locations. And there's the problem.

The world wants more manuka honey. And New Zealand beekeepers and honey sellers want more manuka honey. So, how to get more? One plan is to have farmers who already own land with these manuka shrubs to team up with beekeepers and co-produce this honey. So far they are only using one colony for every 2 acres or so, which isn't very dense. So, they would jointly plant more and more of these shrubs and plant different varieties so the bloom time would be extended from something like four or five weeks to a couple of months or so. So more shrubs would need more bees would make more honey. Then, they'd share in the profits made from this crop. The farmer has the land, the beekeeper has the bees and they jointly invest in what is needed to expand. Part of the expansion would be more plants, removing shrubs to make room for more plants, more hives and maybe more basic equipment. That seems like a reasonable approach to this unique situation.

Another scheme that's beginning to be noticed is that this once inexpensive land now has far more value than before and the price has increased, making it unavailable for local farmers to expand and get into a program like this. Beekeepers are working together to do this themselves, without having to split the resulting wealth with a farmer who owns the land. And what the wisest of them are doing is purchasing lands in different locations so they can move as the bloom ends in one place and begins in another, extending the available bloom time even more. They invest more than those beekeepers who work with farmers, but potentially they make more because they've eliminated the middleman. There is a risk with this, for both approaches certainly, of crop failure due to drought or too much cold or heat or just plain lousy weather. But even with that, this, too, seems like another reasonable approach to this unique situation.

Of course it isn't working. You knew that, right?

For one thing, theft of hives has bumped up. One beekeeper had 14 hives stolen full of honey, valued at $19,000. 14 hives, $19,000. Really. Another had 50 hives stolen. They didn't give their value. Not enough zeros on the keyboard I think, or they didn't want to encourage more of the same. Beekeepers are now installing cameras in their beeyards and gps units in their beehives. I can imagine the thieves will find ways to avoid those deterrents, and beekeepers will up the ante even move to keep their honey safe.

Another way to avoid spending money and getting more honey is to ask why go to all the trouble of investing and owning and sharing when I can put my hives on the property line of either of these groups and simply let my bees take their manuka honey, without lifting a finger to help, and without investing a 10 cent coin? Farmers, and the beekeepers they work with don't own the airspace above the land, and bees are bees and where they go isn't trespassing, right? And what's happening is just that. Beekeepers are moving right next door to manuka plantations and, in the words of some, stealing the honey, and the money, that others had invested to make. There are some regional authorities that are pretty upset, not to mention the beekeepers and farmers, and want – somebody to do something to stop this, now!

At $400.00 a pound you can imagine this is going to come to a head pretty soon. This unethical behavior has roiled the whole country. Sound somewhat familiar? Stealing honey that is?

It happens in this country all of the time, well, in some places all of the time, and, recently, with lousy weather, lost forage and intense agriculture, in more and more places. California beekeepers, and beekeepers that spend a lot of time in California had an exodus this year because of the drought and the near total lack of forage almost everywhere there. They went to – North Dakota, South Dakota, and Florida among other places. Thousands and thousands of hives that haven't been to those places before.

North Dakota beekeepers, landowners and others were overwhelmed I'm told, by beekeepers who simply unloaded truckloads of bees…wherever they found enough land to put them. Some made arrangements with land owners, some without asking the land owner at all. Beeyards sprung up like mushrooms overnight. There were so many hives in that state one beekeeper told me that it was almost impossible to go outside and breath without sucking in a bee, or three. And there was confrontation – between landowners and trespassing beekeepers, between homeowners and too-near trespassing beekeepers, and between plan ahead beekeepers and didn't plan beekeepers.

Much the same happened in Florida, I'm told. Only there isn't enough to eat there, so feeding was an ongoing pasttime much of the time. And with feeding that much that often comes robbing and more robbing. But the encroachment on other beekeeper's locations was even more aggressive they tell me, and pretty much everybody was having a hard time keeping bees going.

I suspect this isn't going to change. The number of hives that have no place to go is increasing during the not-pollinating seasons it seems. Agriculture has taken a lot of land out of honey production…either by simply turning it into corn or soybeans, or by not daring to be too close because of the pesticides. So what this means is that those who happen to be in a relatively safe place can expect to be overrun by those who aren't in a safe place. So your honey crop will be reduced in all likelihood, and if you are raising queens, forget about it – your gene pool will be so screwed up you won't have any idea what those queens will be like. Of course there will be an abundance of drones for your queens to choose from – drones from who knows where. And when those colonies from faraway come and visit, with them come an abundance of all of the great and small creatures that bees are prone to. Disease, parasites, predators, virus, fungi, and who knows what else. So be sure and share what you have.

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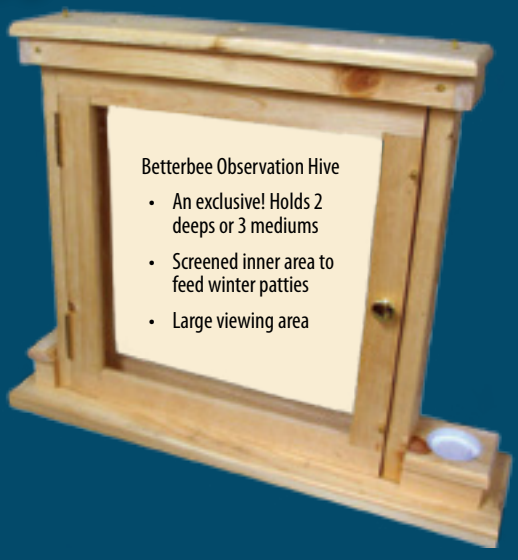

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It's Summers Time –

Ducks, Chickens And Winter

As I write this we are approaching mid-December and so far here in our part of Northeast Ohio we have not had much Winter. And believe me, I am not complaining. We are predicted to hit 60° later this week. We've had a dusting of snow one time, but that has been it.

We have had frost enough to freeze the duck's outside water. And she has voiced her irritation quite loudly. She runs out of the coop in the morning and jumps in the pool and stands on top of the water chattering and looking at us as if to say, "Can you do something about this?" And of course, Kim does. He gives her fresh water every morning in the little tiny pool, and then she is happy.

For about two weeks now we've had issues with the ducks getting out of the pen. It first happened when Kim was in Oregon visiting his daughter. I came home to get them in before going back into town to a meeting. All the chickens were in and the female duck kept running in and out of the coop. I didn't see him anywhere. So I went outside to look and there he was in the corner just sitting there. Because it was dusk it took me a minute to tell that he was actually on the outside of the pen. So I approached him slowly and he got a little frantic, but then was quite happy that I was retrieving him and putting him back with her. This whole time she was so distressed. She was walking in circles and chattering the whole time. Once I got him back in the coop with everyone else she settled right down.

However the last week or so it has been her getting out. The first time it happened I think Kim startled her when he was going out to close the door for the night. She ran out of the coop before he could get the door closed and then I couldn't find her or hear her. I kept calling and whistling. Most of the time they will respond when I do this, but she wasn't making a sound. So back in the house to get Kim and my barn shoes and the flashlights. We looked and called and were just about to give up. This time the male duck was frantic. Then I walked past Kim's potting bench and heard a faint rustling underneath. Well, if your potting benches are like ours you know how much stuff is tucked underneath. So I couldn't even see her at first, but there she was buried under all of the stuff. We had to dig her out, scared to death and get her back to safety. Since then she has gotten out two or three more times. The funny thing is they don't leave, they just stay right outside the pen frantic to get back in. I guess the next step is to clip their wings.

We still have one chicken that keeps escaping and the same thing – she doesn't run away. They just hang out on the other side of the fence. There are houses close by that let their chickens be completely free-range. But we have a lot of predators and with us gone all day I just don't want to come home one day and have half of the flock gone. We hear the coyotes almost every night and now that it's dark we hear them earlier and earlier and closer than before – in fact a little too close.

The younger chickens have kicked it into gear with the egg laying and lately we're getting on average 10 a day which is pretty good considering eight of the ladies are heading for four years old and have really tapered off. I haven't seen any duck eggs yet. If she's laying she's doing a good job of hiding them somewhere.

That is Sophie in the photo. Sophie has lived with us for eight years now, along with her sister Chloe. She is a presence in and around the chickens. She'll sit outside their pen for what seems like hours and just watch them and they watch her. They all seem to be very entertained by each other. When the chickens get out or when we let them out into the yard she stays right there. Birds and cats are quite comfortable with each other. It doesn't seem like it should be that way, but at our house it is. I don't know if Sophie is any kind of deterent to predators but she keeps a watchful eye. You can't really tell in the photo but Sophie is a big girl. She weighs in at close to 20 pounds and has a bit of an attitude.

We've wrapped all of the hives and now it's time to just hope and pray for the best. We're going into Winter with six hives. Hopefully they'll make it. We're already seeing package prices for next Spring at $125 from our local dealers. Ouch! It gets more expensive every year. Like everything else, I guess.

I hope the New Year brings peace and quiet to all of our homes. Here's to a mild, short Winter.

If we can make it out of northeast Ohio in January Kim and I will be travelling to Florida for the American Beekeeping Federation Conference. Maybe we'll see some of you there. Let's see Florida in January – sounds like a good idea to me!

Happy New Year!

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A Closer Look

ENDOCRINE GLANDS & HORMONES

Clarence **Collison**

Although typically produced in very small quantities, hormones may cause profound changes in their target cells.

Endocrine glands produce hormones that work internally in the honey bee to control bodily functions. Hormones only affect the individual that produces them. They are often regarded as chemical messengers. Although typically produced in very small quantities, hormones may cause profound changes in their target cells. Their effect may be stimulatory or inhibitory. In some cases, a single hormone may have multiple targets and different effects in each target.

Larval honey bees have three important endocrine glands that are involved in their growth and development. The prothoracic gland is a very small leaf-like structure situated between the first two of the three thoracic segments. This gland produces a substance called ecdysone that controls molting in the larva and pupa; this gland is not present in the adult bee.

The other two endocrine glands are the corpora cardiaca and corpora allata that are connected by nerve fibers to each other and to brain neurosecretory cells. The function of the corpora cardiaca is not completely clear but the corpora allata produces a substance called juvenile hormone (JH). This hormone controls development in the larva and pupa. In the adult, JH is responsible for workers changing from one role to another as they age. The corpora allata glands are two globular organs found on the sides of the esophagus, behind the brain in both larvae and adults. Each corpus cardiacum however, is a loose body of cells attached to the wall of the aorta (heart) (Figure 1). The brain regulates corpora allata activity via neural and neuroendocrine signals. The corpora allata of queen larvae are considerably larger than those of worker larvae.

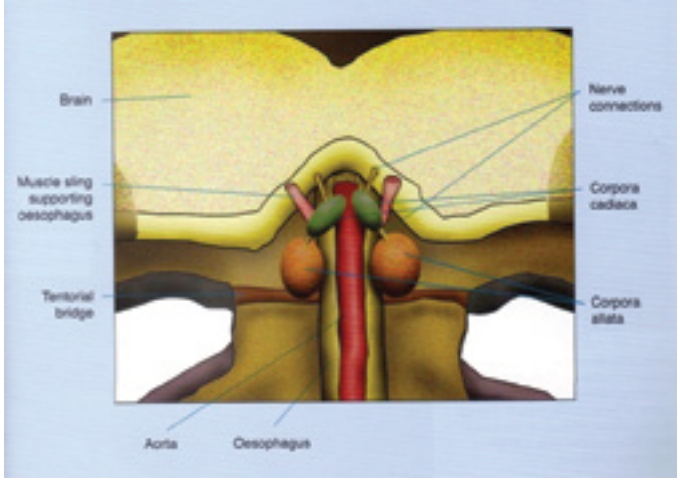

***Figure 1**. Diagram showing a slice through the head, seen from behind. In the small space behind the brain and in front of the connection to the neck are the main neurosecretory glands: corpora allata and corpora cardiaca. Stell (2012).*

Molting or ecdysis is the process during which the insect casts off its exoskeleton and grows a new larger one to accommodate its increase in size brought about by feeding in the periods between molts. Ecdysis is therefore confined to the larval and pupal stages and does not occur during the adult stage where there is no growth (Morse and Hooper 1985). Developing bees undergo six molts during which the outer skeleton is shed; five of these take place during the larval stage and the last occurs when the bee emerges as an adult. The first four larval molts occur approximately once a day for workers and queens and allow the larva to grow rapidly by shedding the exoskeleton when it has become too small (Winston 1987).

Neurosecretory cells in the brain release brain hormone in response to both internal and external stimuli. Molting is initiated when brain hormone is passed down the nervous connections to the corpus cardiaca, where it is released into the hemolymph (blood) of the bee. This brain hormone causes the prothoracic gland of the larva to produce ecdysone (molting hormone), which initiates the changes in the epidermis and the whole process of molting. This hormone travels in the blood and ends up at the epidermal cells of the exoskeleton. Ecdysone is the message to begin process of molting (Caron and Connor 2013).

The first change to occur in the exoskeleton is the division of the cells of the epidermis, the cells become

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"Molting is initiated when brain hormone is passed down the nervous connections to the corpus cardiaca, where it is released into the hemolymph (blood) of the bee."

increasingly closer packed as they multiply in number. The non-living exoskeleton, the cuticle, is freed from the epidermis by molting fluid, secreted by the epidermis, filling the space between the two layers. The molting fluid is at this time inactive. The epidermis secretes a new epicuticle which protects it from the action of the molting fluid which now becomes active. The active molting fluid contains enzymes, both proteinases and a chitinase, which digests the old endocuticle (the innermost layer of the cuticle), the products of the digestion being absorbed by the epidermis and used in the secretion of the new exoskeleton.

At the same time as parts of the old cuticle are being digested, the new cuticle is being secreted by the epidermis. The two processes continue until only the old epicuticle and exocuticle (the very hard tanned parts) remain, and the new cuticle has reached its full depth (Morse and Hooper 1985). Juvenile hormone also travels in the blood to the epidermal cells of the exoskeleton. It suppresses the expression of adult characteristics (Caron and Connor 2013).

Juvenile hormone and ecdysone together control growth and development. Whether the larva molts to a larger larva or proceeds to the pupal stage depends on the balance between ecdysone and juvenile hormone. Prior to the molt to pupa, juvenile hormone production ceases so the level in the hemolymph goes down and the next molt produces the adult stage from the pupa. Juvenile hormone production returns during the adult stage when it serves additional functions such as regulating egg development and worker duties as well as queen aging (Caron and Connor 2013).

Understanding regulatory mechanisms that underlie the fluctuations in the hemolymph juvenile hormone titers is a major issue in understanding honey bee sociality. Such regulation can occur in two different ways in the corpora allata, via modulation of enzyme levels and enzyme activity in the biosynthetic steps of the juvenile hormone molecule, and via degradation and clearance of secreted JH in the hemolymph.

Juvenile hormone-precursor manipulation and pharmacological inhibition experiments have shown that the final steps in JH synthesis are critically regulated in the corpora allata (Rachinsky et al. 2000), with their activity being modulated by biogenic amines (Rachinsky and Feldlaufer 2000) and also by the insulin-signaling pathway (Corona et al. 2007).

Corpora allata activity of queen and worker larvae of the honey bee in late larval development was studied in vitro by a radiochemical assay (Rachinsky and Hartfelder 1990). During larval development, the juvenile hormone titer reaches a peak in the third to fourth larval instar, then drops to low levels at the beginning of the fifth instar in both worker and queen castes. This peak in the early larval stages is particularly pronounced in queens (Rembold 1987; Rachinsky et al. 1990) demonstrating that modulation of juvenile hormone release is of prime importance in regulation of the caste-specific juvenile hormone titer. This queen-specific maximum juvenile hormone titer is an important factor for caste-specific organ differentiation, especially the larval ovaries (Schmidt-Capella and Hartfelder 1998). After a small peak that initiates vitellogenin synthesis and egg formation in the late pharate adult stage of queens (Barchuk et al. 2002), the juvenile hormone titer stays at low levels throughout a queen's adult life cycle. In both female castes, hormone release is strictly correlated with juvenile hormone synthesis. The conversion of the precursor methyl farnesoate to juvenile hormone may be regulated caste-specifically, since only in queens but not in workers, a linear correlation between intraglandular contents of juvenile hormone and methyl farnesoate was found.

"Understanding regulatory mechanisms that underlie the fluctuations in the hemolymph juvenile hormone titers is a major issue in understanding honey bee socialty."

In adult workers, the corpora allata show growth periods, increasing in size particularly during the first days after emergence. Under queenright conditions nearly constant growth was measured within the house bees. In queenless workers the initial gland growth is attained much faster, although the corpora allata volume diminished about a week after emergence (Kaatz et al. 1992). Additional studies investigating volume changes of juvenile hormone-producing corpora allata suggest that queen pheromone may affect the endocrine system of the receiver (Gast 1967).

Juvenile hormone synthesis in adult worker honey bees was measured by an *in vitro* corpora allata bioassay. Adult queenless workers exhibit higher rates of juvenile hormone biosynthesis than queenright workers (Kaatz et al. 1992). Hormone synthesis was not correlated with the volume of the glands. Extract of queen mandibular glands, applied to a dummy, reduces juvenile hormone biosynthesis in caged queenless workers to the level of queenright workers. The same result was obtained with synthetic (E)-9-oxo-2-decenoic acid, the principal component of the queen mandibular gland secretion. This pheromonal primer effect may function as a key regulating element in maintaining eusocial colony homeostasis. The presence of brood does not affect the hormone production of the corpora allata.

A correlation between the volume of the corpora allata and oocyte (egg) formation suggests that oocyte maturation is dependent on the presence of a hormone of the corpora allata (Gast 1967). Besides the hormone of the corpora allata at least one other factor is necessary for oocyte maturation. It is probably contained in the neurosecretory material produced in the neurosecretory cells of the brain. The growth of the nuclei of the neurosecretory cells of the brain is

"During larval development, the juvenile hormone titer reaches a peak in the third to fourth larval instar, then drops to low levels at the beginning of the fifth instar in both worker and queen castes."

inhibited by the presence of a queen, but it is doubtful whether this is due to the action of queen pheromone (Gast 1967).

Effects of biogenic amines on the corpora allata of worker larvae were studied in late larval development (Rachinsky 1994). Under *in vitro* conditions, octopamine and serotonin caused a dose-dependent stimulation of juvenile hormone release and increased intraglandular contents of juvenile hormone and its precursor methyl farnesoate in prepupal glands.

Juvenile hormone has taken on the role of producing multiple effects on setting the physiological conditions for age-specific tasks in adult workers. In young workers, the hemolymph JH levels are low and these bees carry out tasks within the broodnest, primarily feeding the brood with secretions from their well-developed hypopharyngeal glands (Winston 1987). As the bees grow older, they switch to more hazardous tasks outside of the hive, foraging for nectar, pollen and water, their JH titers are typically increased (Huang et al. 1991).

Measurements of both juvenile hormone and ecdysteroid hemolymph titers were made from the same individuals to explore the possibility that there is also an interaction between these hormones in the regulation of adult honey bee behavior and physiology. Queens, egg-laying workers, and workers engaged in brood care (nurses) had low titers of juvenile hormone whereas foragers had significantly higher titers. In contrast, ecdysteroid titers were undetectably low in both nurses and foragers, higher in laying workers, and higher still in laying queens. Measurements of juvenile hormone titers are consistent with previous findings demonstrating that this hormone regulates worker age polyethism (division of labor) but does not play a typical role in reproduction, as in other insects. Comparison of juvenile hormone and edcysteroid titers suggests that ecdysteroids are not involved in the regulation of age polyethism but may play a role in the regulation of reproduction in honey bees (Robinson et al. 1991). BC

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Bee Culture
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Get Ready For Bee Culture's Next Event

A CASE FOR HONEY

Four medium sized Producer Packers and a medium and large Packer will be in Medina in October to share what they know, and to give you insights into what you need to know, and need to do to be successful in this business. Selling strictly retail, strictly wholesale, strictly bulk – they all need attention, as does buying wholesale and buying bulk. What equipment will you need, what volume will you need and where will you get that much honey? How many employees will you have to have? What about permits, zoning, insurance, labeling…it all comes under the microscope when you open the doors for business. Find out here.

And who can help? What businesses are in business to offer your business help with all of this? Are there any, some, none. If there are, what's the cost? What's the value? Find out here.

And what about The National Honey Board. If you're small you don't have to make that contribution, but even so, can they help? What can they do? Why would they help? Find out here.

We mentioned insurance? How much, for what? What are the risks? What can go wrong and how can you prevent it? Find out here.

And what does the government think about all this? What is honey? What food safety regulations affect you now that the new rules are in place? Can the FDA give you help, or just get in the way? Find out here.

A Case For Honey. October 22 and 23, 2016 at Bee Culture's Conference Center, 640 West Liberty Street, Medina, Ohio.

Watch these pages for travel and hotel information.

Registration is $150 per person. We will begin taking reservations March 1, 2016. There is a limit on how many we can take so consider registering early.

Watch these pages and www.BeeCulture.com for updated program and registration information.

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THE MASON JAR

Karin **McKenna**

From America's most challenging eras, including the Great Depression and World War II, to the rise of farmers markets, hipster barware, and Pinterest, the Mason jar has maintained its popularity through the ups and downs of three consecutive centuries.

Invented by tinsmith John Landis Mason of Philadelphia in 1858, the Mason jar ended a quest for safe food storage. With the introduction of Mason's simple jar design, boiled fruits and vegetables could be sealed and stored safely for meals months after harvest. This was a substantial improvement over the pickled, salted, and dried-food methods that had existed for millennia.

Upon introduction, home kitchens and family meals were changed forever. Suddenly, the canning process was within reach of anyone who had access to Mason jars. Not only was the process simpler and safer, but contents were visible as well.

The many different brands of Mason jars are a result of Mr. Mason's patent expiring just a decade or so after his breakthrough. A rush of hundreds of jar makers swooped in and the inventor died with nothing to his otherwise famous name in 1902.

Florida-based Jarden Home Brands owns multiple Mason jar lines, including the best-selling Ball jars. Even with the billions sold in their 130 years in production, sales have doubled since 2001 and risen 25% just in the past couple of years. Renewed emphasis on where our food comes from and how it is grown, and the popularity of farmers markets and home gardens, all lead to the need for fresh food storage and the continued popularity of the Mason jar.

But not all of the jars are being used for canning. Certainly they are a common sight when it comes to bees and honey. Head to a flea market for pastel-hued chalk-painted jars to use as vases or pretty storage containers, or a local restaurant where you'll find Mason jar light fixtures hanging above you as you sip your cocktail from one.

I hadn't even consciously noticed my own Mason jar habit until I looked around my house for something to shoot for this story. I have sea glass, pebbles, and sand from all over the world in jars on my fireplace mantel, in bookcases, and my grandmother's button collection in a jar in my office. In the kitchen I have tea bags in one jar and flowers in one of the aforementioned painted jars from the flea market. They're simple, clean, and functional – seemingly perfect vessels for pretty much anything. BC

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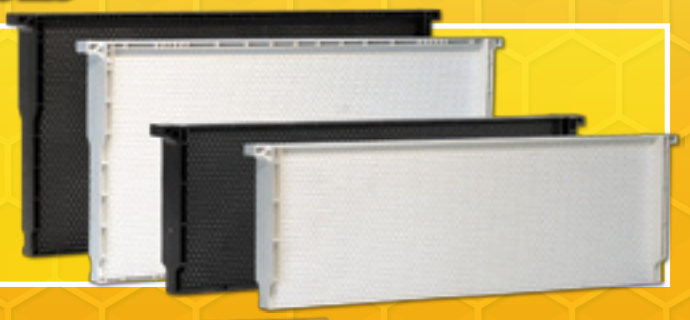

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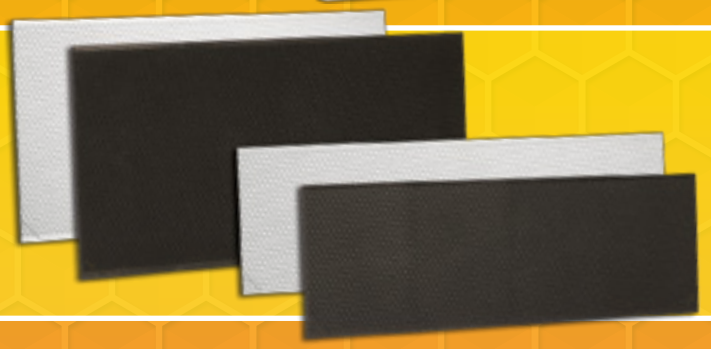

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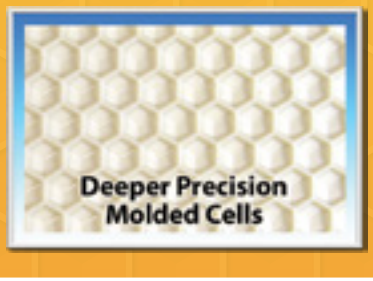

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The Pollinator Stewardship Council

DEVELOPMENTAL STAGES OF NONPROFIT BEE CLUBS

Is Becoming A Nonprofit A Good Idea For Our Club?

Michele **Colopy**

Beekeeping Clubs and Associations have developmental stages, just like our honey bees. Growth can go smoothly, be stifled, ignored, and suppressed. As with any group dynamic, nonprofits are subject to the individual personal agendas of the founders, or Board members of any nonprofit. Due to inquiries from beekeeping groups and individual beekeepers the Pollinator Stewardship Council is working with local and state bee groups helping them answer the question "to be or not to be a nonprofit bee club or association." The October 30, 2015 issue of our *Pollinator News* listed the pros and cons of becoming a nonprofit.

Pros for you and your club/ association:

- Club/association can apply for grant funding for projects
- Liability of club activities protects the Board members when Directors and Officers insurance is purchased
- Allows you to hold fundraisers, etc. with less tax responsibilities.
- A state beekeeping association can act as the main nonprofit for its member clubs (see group exemptions), saving the many small clubs in a state the paperwork of being a nonprofit by themselves.

Cons to you and your club/ association:

- Grant funded projects require attention to the grant contract, compiling reports, and managing the grant funds
- Directors and Officers liability insurance can be an annual cost of $1500+
- Not a registered nonprofit, and funds raised may have tax responsibilities.

Responsibilities of you and your club/association:

- The Treasurer and President are responsible for filing the necessary annual reports to maintain nonprofit status.
- Policies and procedures need to be developed to manage the grant funds, and grant funded projects.
- Grant funded projects and their accompanying application, reports, and accounting records can be public record (depending on the funding source), and the grant contract language.

Nonprofit organizations are living entities. All Board members must set-aside their personal agendas to give life to the mission of the nonprofit. The mission of the nonprofit is the raison d'etre of the nonprofit, and all actions, programs, and services of the nonprofit are driven by the mission. The mission defines "why" the nonprofit exists. Key to supporting the mission is understanding the developmental stages of nonprofit organizations. No small business, no nonprofit begins as a fully staffed, fully funded, fully supplied entity in its first year. Nonprofits have typical growth stages, based on levels of involvement of volunteers, professional staff, fundraising, and program development. It is the "duty of care" of board members to be able to "adjust to meet and support the organization's needs as they change."[1] "Nonprofit boards typically go through four stages of development."[2] A variety of terms are used, but readily understood developmental stages are:

1. The Coveralls Stage (foundation building)
2. The Shirtsleeves Stage (working board)
3. The Blue Suit Stage (managerial)
4. The Black Tie Stage (governing)

This chart from the Enterprise Foundation's Community Development Library provides a visual analysis of the varying growth stages of nonprofits.

Understanding of the growth

	Coveralls	Shirtsleeve	Blue Suit	Black Tie
Important Director Attributes	Lots of time, willingness to work	Willingness to work, planning skills	Planning skills	Policy skills
Board's Focus	Organization's structure and operations	Operations	Governance	Governance
Board's Planning	Day to day	Day to day	Long range	Strategic
Board Composition	Founders	Founders and recruits	Founders and recruits	Recruits and maybe founders
Committee Structure	Works as a whole, possibly with working committees	Work as a whole with one or two committees	Working committees	Oversight and policy-making committees
Board's Fund-Raising Activity	Events	Events, grant seeking	Grant seeking, individual solicitations (Staff does events.)	Individual and institutional solicitations (Staff does events and grant seeking.)
Staff's Role	No staff	Focus on operations	Focus on operations, assist board in defining roles	Focus on operations, serve on the board

of a nonprofit is also important in determining whether to become a nonprofit. Some founders of nonprofits, simply want the organization to end when they retire, so growth is limited based on the personal goals of the founder. When a bee club is begun it is because like-minded beekeepers have come together for common interests and purpose. When thinking of the future of a nonprofit, it is important to consider long-range strategic planning as it relates to the growth stages of the organization. At the Coveralls Stage and Shirtsleeve Stage long-range planning is key to legitimize the leader's ideas, to *share* leadership, and in raising funds for the nonprofit. The Blue Suit and Black Tie Stages must strategically plan to resolve "growth, directional issues, and internal challenges;"[3] as well as, most importantly, to measure success in and by the nonprofit.

The Coveralls Stage is when the nonprofit begins, and the board creates a viable nonprofit. By Laws are created, incorporation documents are filed, tax exempt status is filed, bank accounts set-up, and information management systems created. The Board runs the day-to-day operations of the organization. These founding board members raise money to support the organization. By now the Board is exhausted, and desires to transition to the Shirtsleeves Stage. The Board may still be running the day-to-day operations, but seeks an Executive Director to take on the management of the nonprofit. The Board establishes clear lines of authority through a job description for the Executive Director. Any other staff positions hired prior to an Executive Director will stifle the growth of a nonprofit. Boards will often get stuck in their Coveralls Stage, not willing to give up authority, due to lack of strategic planning and vision, and simply hire a staff person to act as "glorified secretary," who will be hampered by having no clear authority or strategic plan to drive the mission forward.

If the Board, often founders of the nonprofit, has accomplished their long-range planning, they will transition to the Blue Suit Stage, hiring professional staff to administer and implement the programs of the nonprofit. At this stage "the budget is growing, and the staff needs the board to think about the future and help raise money."[4] However, often the board is not ready to "exchange their "doer" hats for their "overseer" hats."[5] This is where it is important for Board and staff roles to be clearly defined. It is the role of the Board *and* staff to raise funds for the nonprofit.

Once the board has finally let go of the day-to-day activities of the nonprofit, then the professional staff can finally attend to the operations of the organization. Now the board must "think and plan more broadly and strategically." [6] This is the Black Tie Stage of nonprofit development wherein the board has:

- clarified board and staff roles and responsibilities
- has hired competent management and provided the resources for staff and operations
- provides the governance for the nonprofit – policy-making, strategic planning and evaluation.
- shares the fundraising with the staff, and "understands their respective roles and responsibilities."[7]

When a nonprofit organization gets stuck at one stage for years, even decades, the organization may not be growing, and will be unable to meet the challenges of its mission, membership, or industry. All-volunteer nonprofits at the local level are typical. State Associations, Regional Associations, and certainly national associations will struggle to maintain themselves as all-volunteer for too long. Board roles become defined by personalities. By Laws written once are never reviewed, updated, revised, or clarified, and cannot support new technology, new demographics, new economies, etc.

Similar to the growth of a hive, nonprofit beekeeping organizations must have leaders who understand the mission of the nonprofit, work with others to ensure success of the mission, strive for growth, plan for a dearth, welcome new life into the organization, and sometimes cope with a growing mission or the organization "swarms" in order to meet new needs.

For questions about becoming a nonprofit contact the Pollinator Stewardship Council at 832.727.9492 or **info@pollinatorstewardship.org** or contact your State Nonprofit Council. BC

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[1]"Enterprise Foundation's Community Development Library," The Enterprise Foundation, Inc., pg. 13
[2]Ibid.
[3]Ibid, pg. 28
[4]Ibid, pg. 15
[5]Ibid.
[6]Ibid, pg. 16
[7]Ibid. pg.16

Michele Colopy is the Program Director for the Pollinator Stewardship Council. She holds a Master's degree in Arts Administration/Nonprofit Management from The University of Akron, and has created, revitalized and held leadership roles in nonprofit organizations for 20 years.

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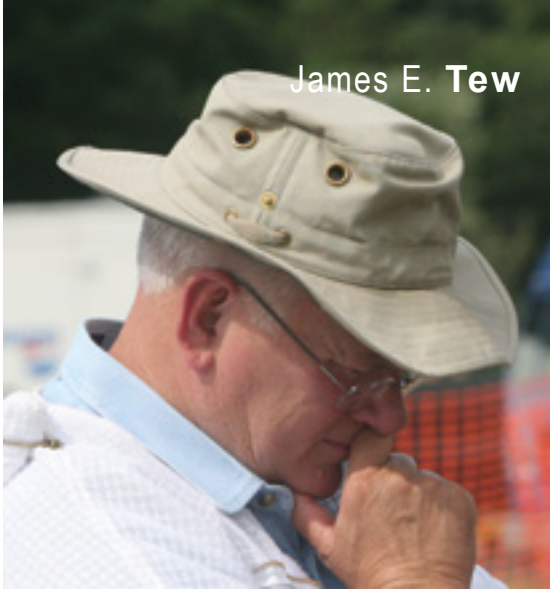

Tanging a swarm? Maybe or maybe not.
Double screens for Winter nuc survival. Are you sure?
Drumming bees. Was it ever effective?
Queen excluders – always an entertaining discussion.

Apparently, as I use my computer and as both the machine and I age, we acquire orphaned (junk) files in our respective storage systems. At one time, I suppose these files were necessary for the computer to operate efficiently. Then there were required software updates. Maybe I removed some programs, but over time, increasing numbers of orphaned files were stranded on my hard drive. Useless, space-occupying dead files accumulated, taking up space and waiting for an electronic call that would never come. The results – my aging computer ran slower – and slower.

As beekeepers, are we like that aging computer? When I refer to him, I speak of my very first beekeeping professor with pure reverence. Many professors have a cadre of graduate students who are forever beholden to them. My first beekeeping professor did not mentor grad students, but he taught thousands of undergrads. Seemingly every one of them adored the man as an instructor and as a person.

In 1973, I distinctly remember him telling our bee class participants that drones are colony laggards and contribute nothing to the functionality of the colony. At every opportunity, drones were to be eliminated. In his defense, the bee world was wildly different at the time. Other than organophosphate insecticides, nothing else was yet a problem – no mites, no small hive beetles, no killer bees. Flowering weeds were common, and there were abundant honey bees – everywhere.

From the beekeeper's perspective, at that time, drones were not profoundly critical to the specific colony in question. But if anyone had ever asked a healthy colony if it wanted drones, an entirely different answer would have been presented. This is an example of bad information being given by an excellent instructor. This is also an old obsolete memory file that I have stored away. I will never again use this advice, but the memory file just sits there – waiting for the day to come when it is once again thought to be good management to kill all drones in our colonies.

Years ago, I was at a bee meeting in the upper Mid-West. While discussing American foulbrood, the speaker confidently explained that the reason AFB had always been such a common problem for beekeepers is that wind easily spreads the disease – even miles and miles away from the diseased hive site. This was why, when the bee disease was encountered, beekeepers with American foulbrood needed to immediately implement a scorched earth policy (actually, that part is correct.). But otherwise, these comments are seriously wrong. Wind plays very little, if any, role in AFB dissemination.

This speaker is still a respected beekeeper in his bee community, as he should be. The rest of his information was rock solid. I was the traveling presenter – the outsider – far from home and departing the next day. What would you have had me do? *(Later, I told one of the meeting organizers that some of the AFB spore dissemination information should be reviewed, and then I left town.)* No doubt, some of the participants today are still storing those mental files that truly need to be erased.

Spotting some of these embedded errors can be difficult. When repeated, most of these *misinformation events* easily roll from the tongue and sound factual. And then they get restated thousands of times becoming accepted facts that are not factual.

Tanging a swarm – factual misinformation

This topic will get me some email messages. The thought is that once a swarm departs the hive, clanging pieces of metal together will cause the swarm to land. At meetings, I am told by occasional beekeepers that doing that very procedure brought a swarm right to the ground. Consider this. It would be impolite – even evil – for me to take that pleasant memory from the beekeeper. There is no science to explain why this happens, and the question that is begged is how many swarms were tanged that **did not** come down?

Losing a swarm is disappointing. I have personal experience with that pain. I can also say that tanging is as good as anything one can do when a swarm is escaping. Playing a loud radio, spraying water with a hose, or tossing stones through the swarm will probably have the same random effect. The good news is that other than amusing the neighbors, no harm is done when swarms are tanged.

Double screens for winter nuc survival – *usually* factual misinformation

A common procedure is putting a smaller colony above a double screen. It is thought to make Winter life easier for the smaller colony. Indeed, in some instances, it could very well do that. But there seems to be so many variables as to make the success of the procedure random.

How large is the bottom colony? What is the cluster size of the smaller upper colony? How far is the bottom colony from the upper colony? How severe is the Winter season? Does the warmer, moisture-laden air cause a problem in the upper unit?

Bottom line – wintering small colonies, for the future,

A double screen made by Ohio beekeeper, D. Wilson.

will be a challenging process. Since this top wintering procedure has been practiced for years without amazing general results, it seems that this is not the silver bullet answer for wintering small colonies. For sure, double screens have other uses such as making spring splits or producing queens, but I am not convinced that top wintering is one of its better uses.

Drumming bees – shows all the signs of factual misinformation

Though not practiced much now, drumming instructions persist in both new and old literature. When transferring bees from one box to another – for whatever reason – the drumming procedure is thought to cause the bees to abandon their stores, brood, and former nest cavity in lieu of a new or different box offered to them.

It is a simple procedure: Flip the box to be abandoned so the combs are reversed (comb bottoms are upward). Position it near the new box. Tap, drum, bump, bang or thump on the side of the inverted box with something – hands, hive tool, stone – for an undetermined length of time with an undetermined vigor. If all goes well, the bees will inexplicably begin to abandon hive and home.

Search the web. There are videos and testimonials documenting the success of this procedure, but as is often the case, if this procedure is a sound one, why is it not used for other common bee reasons? Why is it not a staple of bee management? Removing bees from supers? Driving bees up or out for package shaking or split making? Driving bees from the wall of a house?

Interestingly, the electronic bee media has hybridized the procedures of tanging and drumming. What should this blended procedure be named – "*trumming*?" In this variant procedure, drumming – usually on a wooden surface – will cause a swarm to land. This information *is wrong* in so many ways.

It is important to know that bees do not sense airborne vibrations. Now the arguments come. Maybe they feel the vibrations with their body. Then how do they exclude the noise of my neighbor's lawn mower or the garbage truck passing, or the tractor in the soybean field behind my beeyard? All Summer long, a water tower was constructed a few miles from my home. There were frequently rhythmic metallic sounds coming from the site. I could not tell that my bees left the colony. Why would not any rhythmic sounds in the environment cause bees to leave their hive? Again, no harm seems to be done to the colony. Drum away.

Queen excluders – the eternal argument

You either hate them or you love them? Only very briefly is an undecided beekeeper in the middle. Misinformation and hyperbole flow from both camps. *"I use them to keep the grass down out in front of the hive." "I have always used them and never found them to be a problem." "These things are nothing more than honey excluders!" "They cause swarming." They clog with burr combs."* My favorite description is this one – *"Though I don't like them, and do not use them, here is a description of the pros and cons of excluders."* That is certainly an unbiased source for acquiring neutral information.

An older publication presented quite a few years ago indicated that without an upper entrance, queen excluders did reduce honey crops[1]. In fact, simply using web based searches, finding opponents with confirmed opinions to queen excluder use is common. But actual objective research findings are rare.

So, I here offer my *unbiased,* emotionally based opinion. I have these devices in my storage building right now. Depending on my future schedule, I might use them or I might not. They can be useful when finding a queen that has simply refused to show herself, and they have specialty uses in queen production or comb honey production. These devices clearly have novel uses and ***do*** seem to function to keep the queen from honey supers. If maximal honey production is the goal, I could see how they might hamper foragers from squeezing through them. If maximum management efficiency is the goal, I can understand why they might be used.

All the reasons to use or not to use these grids are readily available on the web. I refer you to search there. If they fit your need, use them. If they are not helpful, don't use them; but I cannot categorically support the disdain that some have for them.

For the Beginner

Right now, lots of behaviors are ongoing in your wintering beehive; but you, the beekeeper, have nearly no involvement. There is very little you can do during hard winter to help your bees. For the previous three-fourths of the year, your colony has been preparing for this restrictive period.

[1]http://www.beesource.com/point-of-view/jerry-hayes/queen-excluder-or-honey-excluder/

If this is your first Winter with packages bees, it will be a bit more touch and go than with established hives. But, if your bees had a good season, stores were accumulated, and your queen was on the job all season, there is a good chance that all will end well.

The job description for bees is to: forage, maintain a healthy brood nest, reproduce their species (swarm), hoard food stores for Winter or other foodless periods, and, finally, defend all of this. Surviving Winter is one of the major things on the bees' "to-do" list.

It is not uncommon for bees to perish during Winter months. This happens even in wild honey bee colonies. Indeed, even in very warm climates, all bee colonies do not survive indefinitely. If you lose the battle this Winter, I hope you realize that it is, in many ways, just the nature of bee things.

Odds and Ends

Using excluders to trap drones

Hers is a couple of untested uses for queen excluders that may or may not be useful. It is well documented that drone brood above a queen excluder can unintentionally confine mature drones. They finally die while trying to escape, and workers worry themselves trying to remove the dead drones. As was stated in the cited research paper, an upper escape entrance helps.

But what if you specifically wanted to capture drones? Maybe drones are needed for instrumental insemination work or for research studies on drone behavior. A novel use of the captured drones would be to make an educational moment for kids and adults. They could actually handle live bees, and then release them. A problem in one instance may become a solution in another.

I think this variation for a drone trap would work. After the drones are free flying – ideally from the bottom entrance – bore a hole or holes a few inches above the brood body bottom edge. Put a queen excluder between the bottom board rim and the bottom brood body with newly bored holes near the edge. The drones, trying to depart, will be trapped by the queen excluder, but will ultimately find the bored holes. Off they will go, but upon their return, they will enter the familiar lower entrance. Returning workers will have to deal with this excluding grid but most will get through it while the drones are trapped beneath the excluder and the bottom board.

A zinc excluder and a used, abused standard queen excluder.

This contraption will only work for a few days before some drones begin to return to the colony through the bored holes.

Punched zinc excluders, shown in the photo were extensively used by past bee researchers for improvising queen and drone traps. For innumerable lab studies, these pliable malleable excluders could be cut to any size with snips allowing an unlimited number of trap or cage designs. To my knowledge, they are no longer manufactured today. If I am wrong, I would like to know.

An insulated hive top makeover

I improvised a variation of an insulated hive top that I saw described on the Internet. Rather than using typical screen wire, I screwed a queen excluder to the bottom of an empty super. I filled this super with wood shavings, leaving a short section of PVC pipe in the center for ventilation. A couple of bounces dislodged some of the smaller shavings that fell through the excluder. The bees may pull down even more of these wood shavings as Winter passes – I will let you know. I would hope that the shavings in the super will absorb moisture and the excluder will allow bees access to the insulated area. This is one of those ideas that looks okay on paper, but probably has problems that have not yet made themselves plain. Stand by.

We can only do our best

I am not a good one to tell anyone else how to astutely evaluate his or her beekeeping information sources.

Modified super before shavings are added.

Cedar shavings on queen excluder grid.

As I have become an ever increasing, cranky old man, statements like, *"well, it works for me"* – especially in written or video material, alerts me. In our present social media driven world, we are all self-assigned experts. *(I know, I know, I too, am in that category.)* Verifiable facts are valuable data points, but they rarely tell the whole story or offer a complete plan. Still, I search for them constantly. For instance, *"Beekeepers must control Varroa!"* That's a fact, but control these mites with what scheme or chemical? That question becomes primarily an opinion that is permeated with smaller facts. Each of us must develop our opinions based on as many facts (please do not confuse *facts* with *opinions* of others) as we can reasonably amass. We will never win outright when developing plans for bees. We will always hit and miss. We can only do our best. BC

Photos are presented at:
https://onetewbee.smugmug.com/December-2015-Bee-Culture/n-ZTFCCt/i-dsW6qL5
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BUILD A MIGRATORY PALLET

Ed **Simon**

Build a Migratory Pallet

Last year we tested moving some of our bees to Texas. We moved six hives with great results. Not only did the hives come back with a large population, they also had good brood patterns and were healthy.

This year we decided to move most of our bees south. Working with a well established commercial beekeeper, Corey Belke of Homestead Apiaries in Dennison, MN, we contracted for taking our hived south. A long time friend, Fred Kapoff of Sekapp Orchards in Rochester, decided to join us in this adventure. By working together we tried to eliminate each problem as it arose. Needlless to say there were obsticles that had to be overcome. The first problem was the need of pallets for shipping.

The main requirements for the pallet was durability – It had to last for many years of rough use.

It also had to be relatively easy to make and inexpensive (cheap).

Using an old migratory pallet as a pattern, I built 15 pallets for our combined sixty hives. The following design and construction fulfilled all of these requirements. At a cost of around $20.00 each, was more than reasonable since I expect the life of a pallet to be from 15 to 20 years.

Parts (Thickness x Width x Length) – migratory pallet

1. 2" x 4" x 48" – ground standoff supports (3) – pressure treated
2. ½" x 21½" x 33" – hive bottom boards (2) – CDX plywood
3. ¾" x ¾" x 33" – bottom board back rim (2)
4. ¾" x ¾" x 20" – bottom board side rim (4)
5. ¾" x 2" x 18¼" – bottom board center rim (2)
6. ¾" x 1½" x 9" – bottom board front rim (2)
7. 1" x 4" x 33" – standoff stabilizers (2) - pressure treated
8. Hive clips (4) – Mann Lake # HD-649 – "W" or HD-648 – "U"
9. Construction adhesive – one tube

Construction

Because of the size of the pallet, a relatively large workspace is needed. As parts are added to the pallet it becomes increasingly heavy and unwieldy. But once they are complete they are meant to be moved by a skid loader or forklift.

Forewarned: The hive clips (parts #8) are available in 2 designs. The "**U**" design forces you to have your hive body sides touching each other. Consequently the migratory tops are touching. The "**W**" design provides for a space between the hive bodies and allows you to manipulate the hives a little easier. The decision is yours.

Step 1: Cut the three standoffs (parts #1). These are made from pressure treated wood that when stood on edge, provide the space under the hive bottom boards for the forklift slip its lifting tines into.

Step 2: Cut two of the bottom boards (part #2) from ½" cdx plywood. Paint one side of the bottom boards at this time. The painted side will become the bottom (underside) of the bottom board. Two thick coats of paint help ensure a long life for the pallet.

Hint: Some home improvement stores will cut wood for you at no extra cost. I can no longer manipulate a 4' x 8' sheet of plywood, so it comes in handy to have the sheets cut to manageable sizes.

Hint: Free paint is usually available at the local recycling center. It is available in individual cans or in

five gallon pails. A pail is usually marked as to the type of paint.

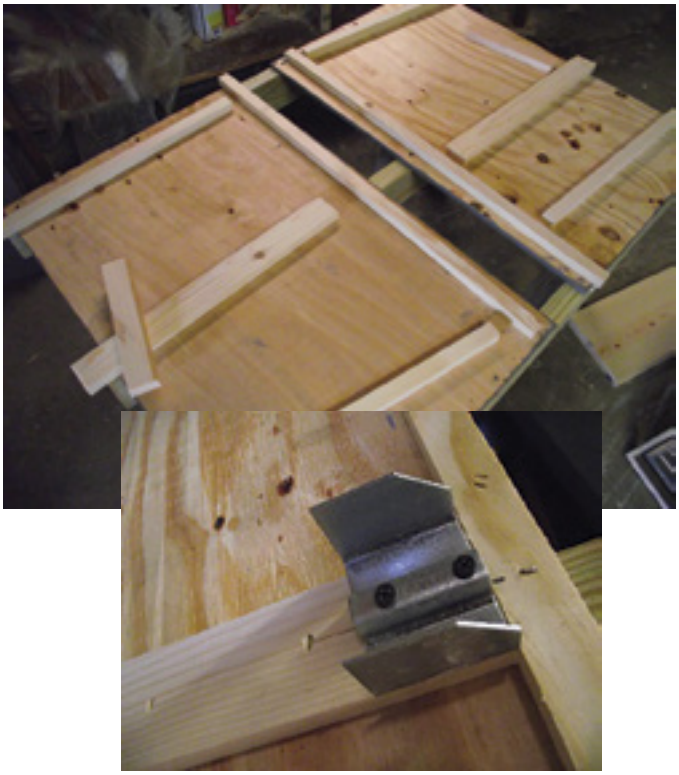
Step 3: Lay the standoff supports cut in step #1 on a flat surface. Place them on edge and mark a ¾" line from each end of each board. This is the setback to the front of the bottom boards. By allowing ¾" of the supports to extend in front of the bottom boards you provide a little protection from overzealous forklift operators.

Hint: You are probably going to build multiple pallets. If so, consider making a jig to hold the standoffs in position. I used the bed of an old trailer and screwed positioning cleats to hold the standoffs on alignment while I added the bottom boards.

Step 4: Place the bottom boards painted side down on the standoffs, two standoffs on the outside edges and one in the middle. When positioned and everything looks square, remove the bottom boards and lay a bead of construction adhesive (part #8) on the standoffs. Replace the bottom boards and put a screw in the outside corners of the bottom boards. Remember to keep the ¾" setback from the edge of the standoffs. After making sure the pallet is square, finish screwing the bottom boards down.

Step 5: Turn the pallet over and using construction adhesive and screws add the standoff stiffeners (parts #7) to the bottom of the pallet. In addition to stabilizing the standoffs they provide the support when a pallet is stacked on top of another set of hives. These stiffeners are set 5" back from the front of the standoffs and provide extra stability to the pallet.

Step 6: Turn the pallet right side up and add the rims (parts #3 thru #6) to the bottom board. Use wood glue and screws, nails or staples that are long enough to penetrate the rim, bottom board and still extend into the standoffs.

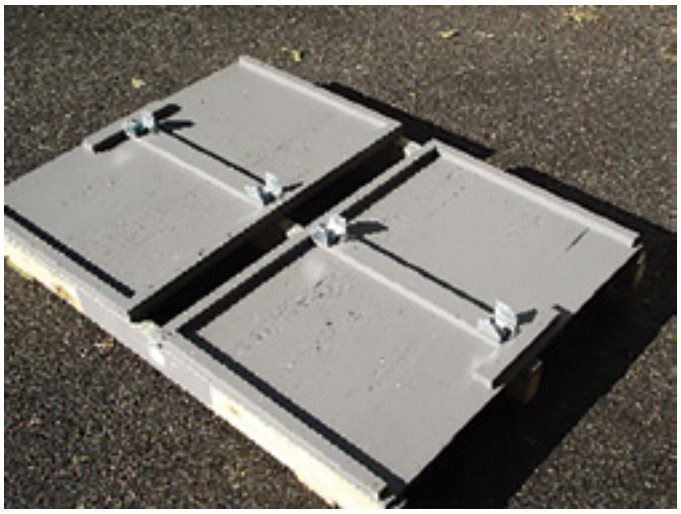


Step 7: Test fit the hive clips (parts #7) at this time. Make sure the hive bodies fit correctly and are able to be tilted for inspection. Set the clips aside for later installation.

Note: The beveled edges of the hive clips face the front and back. This provides for easier positioning of the hive body and allows you to tilt the hive body to look at the underside of the frames.

Step 8: Now is the time for two more liberal coats of paint to the top of the bottom boards. Be sure to coat the edges of the bottom board. Moisture getting in here will separate the plywood laminates.

Step 9: Add the hive clips (parts #7) at this time. They are positioned on the center rim just inside the back and front rims. Before screwing them down, make sure a pair of hive bodies will be able to fit in them and align correctly with the front and back bottom rim.



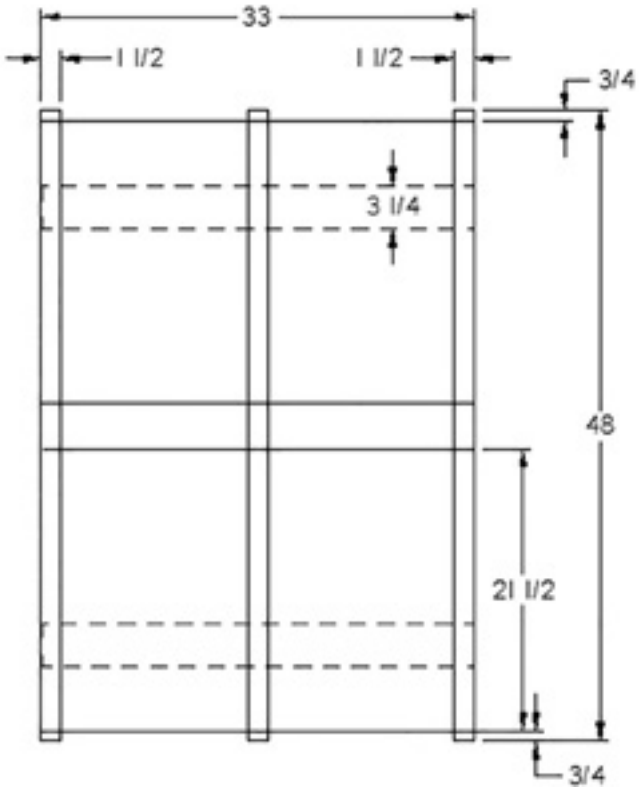
Step 10: Paint your identifier on the pallet where it is clearly visible. If you are small like we are and consigning your hives to a company for wintering, they usually require that all your equipment be identified.

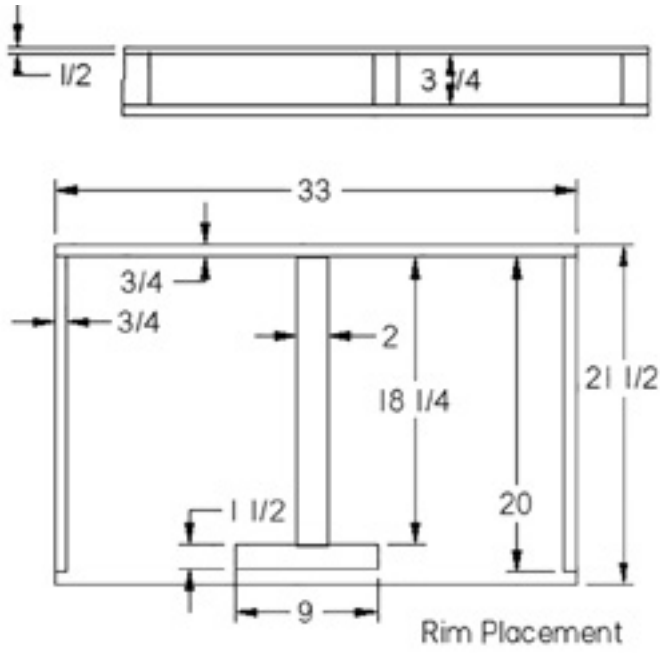
Conclusion

A well-constructed pallet should last a long time. Even if you do not have the equipment to handle a pallet of hives. The company that transports your hives probably does. Then it becomes your responsibility to get your hives onto the pallet for shipment and when they return, get them back onto a standard bottom board.

Note: Transportation pictures were provided by John Shonyo. BC

Get a copy of Ed Simon's book *Bee Equipment Essentials* with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from **www.wicwas.com**. Ed can be contacted through **Ed@TheBeeShed.com**. Now available are all of Ed's "Bee Culture" magazine articles. They can be accessed through The Bee Shed website at **http://www.thebeeshed.com/publications.html**.





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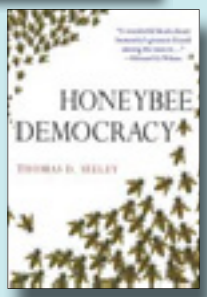

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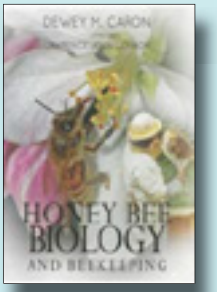

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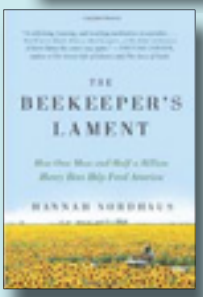

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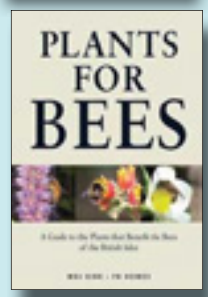

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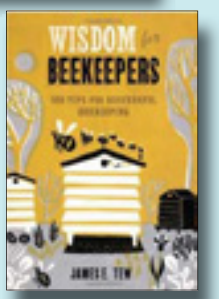

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An Interview With Dan Conlon At Warm Colors Apiary

Larry **Connor**

This is an interview with Western-Massachusetts commercial beekeeper Dan Conlon, who works with his wife Bonita to run Warm Colors Apiary. Dan has a background in running a private boys school in Massachusetts. At 50 he decided to leave education and work full time with honey bees. Here is his story.

How did you get started with bees?

A farmer named Hugh Bell introduced me to beekeeping. He kept several dozen colonies for the honey and for pollination. I would work for him Summers helping hay, with harvesting, and other chores. I was 14 and learned a great deal from Mr. Bell. His honey bees were an instant attraction for me, and we spent many hours working in the hives. Over three years I learned to make Spring splits, raise queens (from cells, no grafting), and produce honey. One of my favorite activities was "bee lining" on Sunday afternoons. Three or four of us would capture bees, and release them one by one and follow them until we located a bee tree. Later we would cut the tree and place the log in the apiary. As I remember this was how we found bees. I do not think we ever had to buy bees to keep the farm apiary stocked. He gave me my first beehive and first copy of the *ABC-XYZ of Beekeeping*. When I think back Hugh Bell was probably a very good beekeeper and teacher. I still quote his advice and over the years continue to find his bee lessons still work.

How did you make the decision to become a full-time beekeeper?

I have kept bees most of my adult life. Sometimes a few, or 50 or 100. Any income generated from honey sales or pollination helped me support my hobby. I would think about the possibility of keeping bees for a living, but it felt financially risky and I had a family to support. When I turned 50, I decided to reinvent myself as a beekeeper. This was to a large extent due to having acquired the business skills, and personal finances to finally start a commercial apiary. It could be said that it took 40 years to take the plunge, follow my dream, and take the financial risks. Today I have no regrets at making the move to a career in beekeeping. The work can be challenging, has disappointments, but those moments when the bees produce and your hard work returns a paycheck you feel the satisfaction of being responsible for your success. Good or bad, you own the work.

Describe your current beekeeping business.

Warm Colors Apiary started as a honey producing business. We invested heavy in equipment and bees the first three or four years, building our apiaries to seven or eight hundred colonies. We do not live in an area known for high honey production, but we do have very good conditions for raising bees and queens. Over 16 seasons produced an average of 60-70 pounds of honey per production colony. We have both fixed (year-round) beeyards and we move hundreds of colonies each season to specific nectar sources to maximize production.

We offer pollination services to apple, and blueberry growers in May. June and July we pollinate vine crops: squash, cucumber, and vegetables. Growers pay us a fee for the hives and we service individual fields, not profitable for the bigger mechanized beekeepers. Spring fruit pollination requires that the bees be in and out of the orchards to avoid the potential risk from spraying. The Summer pollination sites provide access to bee forage and also provide some of the better honey producing locations. We are able to produce some buckwheat, raspberry, basswood, and other varieties of honey by moving bees to the plants. These locations may not be adequate

for keeping bees all year, but do offer a crop if timed properly and strong colonies are used to harvest the nectar.

We also sell bee equipment and supplies. Selling woodenware was an accidental side business that was not originally part of our business plan. There was a local supplier, well established, who quit the business. With no source for woodenware local beekeepers came to us and started to buy a few frames, or a box and covers. I kept an inventory for my use, and after a while, every time I went to setup new equipment it was gone – sold to beekeepers. Bonita & I finally accepted we were in the bee supply business and started doubling our orders – some for Warm Colors Apiary and some for the backyard beekeeper. We sell equipment three days a week at our home apiary.

The bee supply business includes package bee sales, queen sales and nucs. Selling bees requires providing instruction and advice. We offer classes and workshops to help new beekeepers get started and experienced beekeepers to learn advanced skills.

What is the division of your current activities?

Seven or eight months are focused on working with the bees. Nuc production, queen rearing, honey production, and pollination take about 60% of our time, honey bottling and delivery another 20%, and at least 5% marketing products. The remaining time includes recordkeeping, retail sales in our shop, and attending agricultural or beekeeping meetings.

What are the most profitable parts of your business?

Honey is the most profitable product. Total production is not consistent from year to year so forecasting a profit is unreliable. In a high yield year honey represents two-thirds of our total income. We did have a year that cost us more to keep our apiary going than we took in from honey. Production was so poor nearly all our hives required heavy Fall feeding to survive Winter. We spent more money buying sugar to feed than our honey sales could recoup.

Equipment sales has the lowest profit margin, as there is only a small discount from the manufacturers and on top of that you must add the cost of shipping. Equipment sales need to be high volume to produce measurable income. Equipment requires storage, ties up cash as inventory, and you compete with the same companies who you represent as a distributor.

What are the least profitable times that you are reluctant to let go of and why?

Many aspects of beekeeping that are enjoyable do not produce any income. I enjoy talking about bees and beekeeping, but I only occasionally get compensation and it rarely covers my expenses. Taking time to answer questions or helping other beekeepers, volunteering to serve as an officer in local, state and national bee associations is not about making a profit. There are obligations, if not a requirement, that those with experience mentor those willing to learn. I had this mentoring many times in my life and continue to learn from those beekeepers I have met in associations.

Queen breeding is another place that is difficult to make profitable. Warm Colors Apiary produces queens to make increase and re-queening hives. Some are sold to beekeepers. We are members of the Russian Honey bee Breeders Association selecting from specific lines of queens to improve mite tolerance and other desirable traits. It requires feeder colonies to setup mating nucs, drone source colonies, and considerable equipment to maintain a queen-rearing program. Selling queens at $30-35.00 does not reflect the actual investment in resources, or the labor it takes to produce, evaluate, and care for a queen. Raising an excellent queen is not about the money, but the satisfaction of watching her build a large colony of healthy workers, that produce a big honey crop.

If you were to start over, knowing what you know now, what would you do differently?

I became a full-time beekeeper in 2000. Mites were wiping out apiaries, and bankrupting successful beekeeping families. It was probably not the best time to go into this business. I can look back now and say I am so glad that did not keep me from trying. I lost bees, and struggled to find better solutions to the mites, and how to keep my bees productive. This was a motivator for me to learn as much as I could about mites, who were the people doing the best research, and learning to do my own evaluation of treatments. Having a stronger background in science would have served me well, as I read many scientific publications a bit over my head to understand.

In many ways I was well prepared to start a small business. My background was as a manager and administrator at a private school. A part of my responsibilities included forecasting budgets, labor costs, and working with students and faculty. Much of this could be applied to running a small business and marketing products. I was a competent beekeeper, and had been managing a hundred hives for honey and pollination. With this said, I would have spent more time planning on paper before declaring I was in the bee business.

I would have benefited by working with an established commercial beekeeper. One hard lesson anyone managing several hundred colonies learns is that you must be efficient with your time, and as good as you were when managing a dozen hives, little carries over to a commercial apiary. It is easy to be distracted from the management tasks by other more

enjoyable activities. When you work bees for honey or pollination, or raise queens, procrastination is the enemy. Bees, mites, disease, and colonies needing supers do not wait for the beekeeper. An ignored problem in beekeeping only gets worse, and the longer it continues the less likely the beekeeper can be successful in turning things around.

More attention to the purchasing of equipment would have saved me money after buying new, instead of used, or extracting equipment that was insufficient for our needs. Again working and consulting with experienced commercial beekeepers would have been helpful in planning my equipment priorities.

I started Warm Colors Apiary in isolation, as an unknown to many beekeepers. I did not belong to any bee associations, nor did I seek out advice from other beekeepers. This was a mistake. Today I would suggest anyone entering into beekeeping as a business should join associations, make friends with successful beekeepers, and find ways to stay informed about the bee business, and news about honey bee health and best management practices. Beekeepers need to see each other as collaborators not competitors. Bee discoveries may start in the backyard, but are proven and refined when nationally tested.

What are your key sources of information about bees and beekeeping?

Information about bees comes from other beekeepers, reading material, and from the bees whenever I open a hive.

I like books for most of my information. Books provide more detail, I can read them more than once, and I can look up specific topics. My personal beekeeping library has more than three hundred titles. I am a subscriber and regular reader of *Bee Culture Magazine* and the *American Bee Journal*.

I pick up many ideas whenever I attend bee meetings. I have been active with the Eastern Apicultural Society, Massachusetts Bee Associations and my Franklin County Bee Association.

Do you use the Internet in your beekeeping? If so, how is it useful? Has it been harmful at all?

I use it to sell our products, stay in touch with customers and other beekeepers. I also order for my business and from vendors. Purchasing and selling is a convenient tool.

I use the Internet to research bee topics. This can be an excellent way to find research publications and often older studies on bees. This is as much an exercise in filtering out the self-declared experts, from researchers & expert beekeepers who pass the peer-review and scrutiny for their scientific work and demonstrated beekeeping skills. This can be harmful to a new beekeeper, as I have found many examples of bad practices that are recommended on-line.

What book are you reading right now (bees and not beekeeping)?

I have read all the "Essentials" books, which I have and as you know I consider them the best series of bee books available.

Currently I am reading "*Bringing Nature Home*" by Douglas Tallamy, and "*Two Million Blossoms*" by Kirsten Traynor. These are in preparation for a workshop I am presenting for a January NOFA conference (Northeast Organic Farmers Association) on Honey.

How is your business set up? (LLC, Corporation, proprietorship)?

Warm Colors Apiary is a sole proprietorship. This is the simplest accepted form of business for tax purposes. I have looked into LLCs as a possibility, but our legal exposure and financial situation does not gain anything from this change. As an agricultural business there is less required recordkeeping, and the option of combining all income, and take more deductions. This may not be the best choice in another state, or another beekeeper's financial profile.

What is your plan to transfer your business to a younger person?

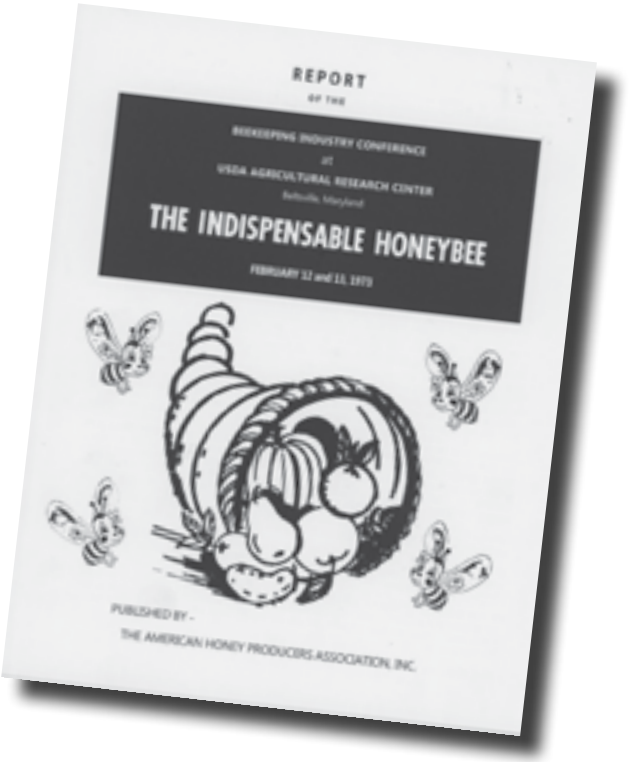
This is a difficult question. I have several young beekeepers who work for me and would like to eventually become full-time beekeepers. Raising capital to purchase, even if I finance the purchase, and earn a living would require growing the business beyond its current size. Essentially the apiary would need to generate enough income to support additional employees, plus pay down the purchase of the business. My replacement would require additional capital to finance growth. Having built the business without acquiring debt, and self-financing my expansion and struggling through the first three years before showing a profit, it is difficult for me to see how Warm Colors will continue. This is not unique to beekeeping, but is a major challenge for small farms throughout the U.S. The solution may be investment and financial incentives and assistance from Government and USDA programs.

What 'feeds you' keeping bees?

Making a living with my bees brings wholeness to my life. After 50+ years of beekeeping I am still curious, excited, and hungry to learn more about the honey bee. Beekeeping is problem solving and I enjoy the process of discovering solutions to a problem and gaining the understanding that comes from new knowledge. Working bees is engaging with nature, testing and honing my perceptions of weather, plants and the conditions that change behavior in bees. I enjoy the culture of beekeeping and enjoy the company of beekeepers. Beekeepers are a diverse group, representing all kinds of backgrounds, occupations and lifestyles, all brought together because of a special appreciation and relationship with the honey bee. BC

Dan Conlon is a scheduled speaker at 'A Case For Honey' held in Medina, Ohio in October 2016.

The Indispensable Honey Bee



Waiting For 'Someone' In 1973

G. **Splevin**

In the Nov. 2015 *Bee Culture* magazine I wrote of the 1973 report, "The Indispensable Honey Bee." This report is a compilation of presentations from a 1973 American Honey Producers Association conference in Beltsville, Maryland. I was keeping bees in 1973, and when I saw a reprint of "The Indispensable Honey Bee" I was intrigued to review the past and learn what has changed in 41 years. At age 81 I still attend the Eastern Apiculture Society Conferences, my state beekeeping conference, and participate in my local beekeeping club. I am continuing to learn, but I wonder if the beekeeping industry is learning.

Compared to the 1973 report regarding the issues with honey bees today: no learning has occurred. The beekeepers in this 1973 report presented grave concerns for honey bees due to pesticides and loss of habitat starting in 1968. It took five years for a national conference to bring the issue to the national discourse.

What happened in those intervening years – 41 years? As the report from 1973 clarifies not much has changed in 41 years. The bee industry has continued to state they are on their last legs, and the industry is weak. While many of the commercial beekeepers from 1973 are still commercial beekeepers, or their sons have taken on the business, their sons are now aging, and their sons are highly skeptical of the long-term viability of the industry.

What has been accomplished in 41 years, and what has not, and why not? Why are the issues from 1973 the same issues beekeepers experience today? While the bee industry has exclaimed the bees are disappearing and so are beekeepers: neither has come true in 1973 or today. Agriculture has expanded, and still beekeepers breed enough bees to pollinate the crops. Granted, as a business model suffering the loss of your "employees" (working honey bees) 30-60% losses each season is not sustainable: still beekeepers have done it.

Some though have sold their businesses. The majority of beekeepers have suffered in silence, blaming themselves, yet knowing it is pesticide exposure along with *Varroa*, disease, and no forage, or pesticide contaminated forage killing their bees. Even if these crop pollinating beekeepers have a contract with a grower protecting their

Richard Adee

Berna Johnson

bees while pollinating, none of the beekeepers will utilize the legal contract when its guidelines are breached, and bees are killed.

From 1973 to today beekeepers are not believed: that their bees are dying, that beekeepers are suffering financially, and that their signature (and the farmer's) on a contract meant to protect their bees has no value. Therefore, beekeepers are not taken seriously, their industry is not viewed as a united industry, and when a contract is broken, and there are no ramifications, the contract has no value, therefore bees (and the beekeeper) have no value.

This is the world *beekeepers* have helped to create for themselves. The effect of the *Varroa destructor* mite and systemic pesticides are new contributing factors since 1973. These two factors have greatly changed the landscape for bees and beekeeping, but it was two things added to a list of already detrimental effects upon bees that has *not* changed since the 1973 report.

Richard L. Adee, then Vice President of American Honey Producers Association, stated in his report at this conference:

"The decline of beekeeping in the U.S. can be attributed to three specific problems – poor honey prices, pesticides, and limited bee pasture. The order in which the problems are rated will depend on where the beekeeper lives in the U.S. In some areas, it may just be one problem affecting the beekeeper and in other areas it might be a combination of all three."[1]

"To meet the challenges of beekeeping today, many beekeepers have turned to migrating with their bee colonies. This means that the beekeeper moves his bees South in the Fall and back again in the Spring. By doing this, the beekeeper can cut down on the amount of honey stores needed to Winter a colony and he also can replace colonies lost the past season due to queen failure, pesticides, etc. Some beekeepers also harvest two crops of honey from their bees. One in the South and another one in the north."[2]

The President of New Mexico Beekeepers Association, Berna Johnston, spoke of the loss of the "various kinds of flowers which make up what we call bee pasture."[3] *He acknowledged the growth of the U.S. from 1873 to 1973 as having caused some of the loss due to urbanization and highway development. "But much pasture has been lost needlessly through short-sightedness and selfishness." . . . "The changing methods of farming have contributed greatly to the loss of bee pasture."*[4] *The business model of beekeeping slowly changed from earned income from honey sales to earned income from crop pollination. But at what cost to both earned revenue streams for beekeepers?*

"If the future pollinating requirements of this country are to be met, the beekeeping industry must continue to have access to the latest advances in technology, science, and economics."[5] wrote Richard L. Adee in his report. That was true in 1973, and is still true today. Beekeepers need funding for the "technology, science, and economic" research, analysis, and product development for bees, honey, beekeeping management, and more. This funding needs to be supported at the local, state, and federal levels. However, once beekeepers have the technology and the research, they need to implement the technology appropriately. There are no short-cuts. Short-cuts, and cost-cutting just kills bees. From 1973 to today beekeepers continue to cut costs and short-cut their beekeeping management, and wonder why their bees are dwindling and dying.

Beekeeping leaders in 1973 were asking "someone" to do something, "someone" to improve the world in which their bees live, and the work of beekeepers. In 1973 and today, beekeepers have yet to realize that "someone," is them. The "someone" needs to be all of them, united for the common cause of their honey bees and beekeeping.

Beekeeping leaders at the local, state, and national level need to be leaders, and work to protect our bees. In 1973 and today beekeeping leaders talk of "protecting honey bees and the ecosystem" for our grandchildren. Those beekeepers' grandchildren are now working bees, and nothing has changed.

The beekeepers in 1973 waited for "someone" to do something, and here we are still stuck in 1973: pesticides, loss of habitat, migrating with bees, the price of honey, the high cost of managing bees through all of these issues makes beekeeping difficult.

I am 81. I am old and yet, I am still learning. When will the bee industry leadership begin learning? When will beekeeping leadership work to protect our bees now, not wait for another generation of "grandchildren?" When will the beekeeping leaders become "someone" and advocate for beekeeping, beekeepers, honey, and honey bees? Beekeeping leaders need to come together on the issues affecting our bees. These are the same issues from 1973: forage, pesticides, pests, and bee diseases. Beekeepers need to unite under the common cause of improving honey bee health.

Diversity is wonderful, and reflective of any industry, but diversity of the health issues affecting bees should be a part of every bee club and association: forage, pests, pesticides, and diseases. These four issues have been the focus since 1973 (earlier than that, but I am referencing the 1973 report, so that year is used for comparison). These four issues reflect the greater good for our bees. This must be the focus of all beekeepers. Nothing else! The health of honey bees as they are impacted by forage, pesticides, pests, and bee diseases must be the uniting force bringing beekeepers together.

Nothing has changed for our bees since 1973. Beekeepers must be the "someone" making the change: no one else will do it for us.

The next issue will feature the USDA, and researchers' contributions at the 1973 conference. Stay tuned for further discussion on beekeeping in 1973 and 2015 from this "curious guy." Read the actual report, *The Indispensable Honey Bee*, Feb. 12-13, 1973, available through *Bee Culture* magazine. BC

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[1]Report of the Beekeeping Industry Conference at USDA Agricultural Research Center, Beltsville, Maryland, "The Indispensable Honeybee," February 12 and 13, 1973, published by the American Honey Producers Association, Inc., page 118

[2]Ibid, page 120

[3]Ibid, page 53

[4]Ibid., page 53

[5]Ibid, page 121

Frames Used In Beehives

Jim **Thompson**

copy of Langstroth Frame

Any one starting beekeeping today may not realize the discovery, manufacture, assembly, and use of the frames in a beehive. If you captured a swarm of bees and put them in a plain box that the bees accepted as their home, you would soon find the box filled with honeycomb that twists and turns in many directions and that the box will not be easily opened without destroying some of the comb. This leaves you scratching your head as you may have noticed that in early times bees were kept in clay pots, skeps, and log gums. What is not mentioned is how the early beekeepers got the bees to accept these containers as their home. One of the most important items that the early beekeeper did was to wedge one or more sticks across the inside top of the container, giving the bees a place to hang and the sticks would serve as guides for the comb.

Some of the very early box hives didn't have frames but had a provision for sticks or top bars across the top of the box. A problem was soon noted that the bees would form comb that would be attached to the sides of the box and thus it was difficult to remove honeycomb.

Reverend Langstroth discovered between frames and between frame and the walls of hive that if the bees were given a space of ¼ to ⅜" the bees would not generally fill that space in with brace comb. Thus the movable frame was invented. The first frames had a convex "V" on the underside of the top bar. This "V" served as the guide for bees to use in forming their combs. There was also a vertical "V" edge on the inside of the Langstroth frame ends. In the center of a few Langstroth frames, you would have noticed that there was a square column that would also provide the "V" edge to correspond with the sides. However the center of the square column was cut out to provide "bee space" for the bees to travel from comb to comb. Most beekeepers will call this a communications gap and it could aid in some movement of the bees while they were in their Winter cluster. This idea of a communication gap was again used on the shallow frames in the 1920s as the center frames in a hive could have four end bars. Hives during this period of time would over Winter by using a deep super and a shallow super.

In later years the communication gap was accomplished by holes being put in the lower corners of Duragilt foundation which is a plastic sheet foundation covered with wax. Some plastic sheets of foundation are made with the lower corners of the foundation perforated so the corners could be broken off, providing horizontal travel from comb to comb.

A later adaptation of this "V" shaped top bar in a hive can be seen today in the Top Bar Hives. If the sides of a hive are sloped, it has been found that the bees do not generally attach the comb to the side walls of the hive. A variation of the top bar hive can be made by cutting a 55 gallon steel drum in half top to bottom and putting "top bars" across the opening, with the top and bottom closed. This kind of hive was developed to be used in countries where wood is scarce. Of course one would have to make some provisions to keep it from rolling or tipping over.

The "V" edge was soon replaced by the insertion of a thin wood strip which would be the guide for the development of comb. Later beekeepers would use a strip of foundation instead of the wood and they would call it, starter strips or starter foundation.

The starter foundation was usually waxed in when the top bar was grooved. Some of the illustrations for this article consist of photographs of the actual equipment and since they have been used, there may be damage caused by wax moths and other damage from rough handling and the passage of time. Other illustrations may consist of advertisements from catalogs or line drawings.

The next development in frames was to have staples driven into the sides of the top bar or upper part of the end bars to keep the frames from touching. Along with the use of the staple spacing, a jig was developed to help determine the length of the exposed staple.

Since the Langstroth frames were all uniform in their width, the frames would be spaced apart so bees could have vertical movement.

In 1912 a metal spacer was

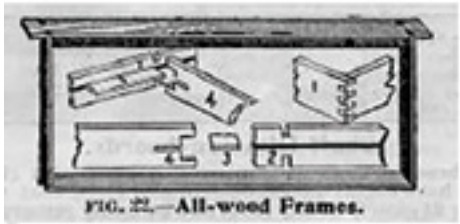


FIG. 22.—All-wood Frames.

Insertable wood starter strip
1895 - Root Catalog

Frame with wood starter strip

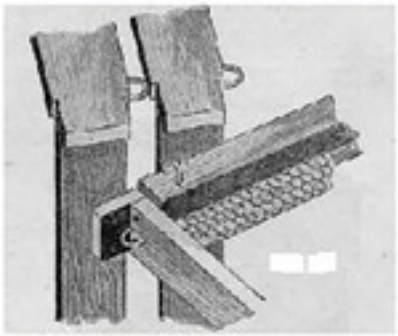
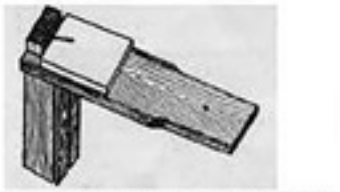
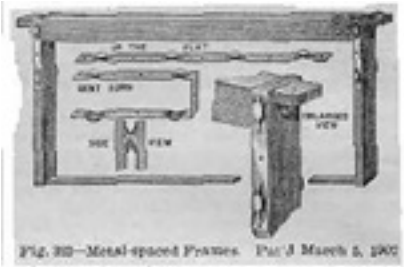


Figure from 1900 Root Catalog



END-SPACING STAPLE GAUGE

1921 Root Catalog



Information from 1912 Root Catalog

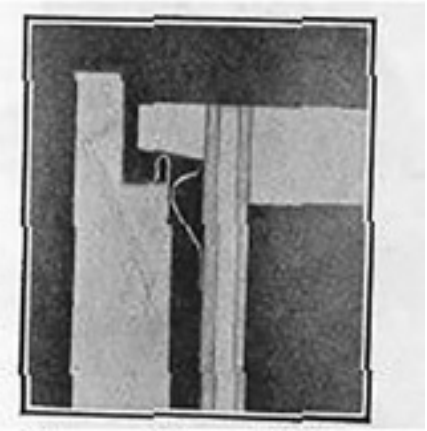


Figure from 1936 Root Catalog

available in the Root Catalog. This spacer would fasten to the end bar edge and wrap over the frame and attach to the other edge. Then the desired width between frames would be attained and additional strength in holding the frame together was achieved. Later frame spacing devices became available that could be built into the hive or were hand held devices used by the beekeeper.

Then came the idea of a "spring" or slanted wire that was inserted below the ear of the frame that would help hold the frame firmly in the hive and center the frame in the super. This improvement worked well when the frames were new but soon the frames would became encased with propolis, and wouldn't move well or would be destroyed by the beekeeper when the frames were being cleaned. The width of the frame was now determined to be approximately 1½" wide and there were eight and 10 frame supers that looked like a beekeeper could almost fit in another frame if just a little amount of wood was shaved off the side of each end bar. The result was that the frame could be added when everything was new and all frames had been shaved, but the bee space had been altered. After some use, it was even more difficult to move frames or add "new" frames to the hive as the frames may have not been altered the same amount. This practice in shaving frames was a step backward in frame development.

However, reducing the number of frames in a hive was found beneficial in the production of honey. A common practice is to use eight or nine combs in a 10 frame super so the bees will draw the cells out further for easier and straighter uncapping. This technique is used in the frames that are being used in honey supers but not in the brood supers. If you space the frames out with just foundation, you run the risk of having combs being built with cross comb between the frames or an extra comb being built parallel in between the frames. Thus frames that are being spaced wider apart should be of developed comb prior to spacing to prevent burr comb problems.

To help a beekeeper remove frames from a hive, a follower board or division board was used. The follower board is a board that takes up the space of either a half frame to a frame in width and usually placed next to the side wall of the hive. When you work the hive, you remove the follower board and that gives you space to move the frames laterally in the hive. Some beekeepers used a follower board on each side of the hive and so they could move frames from either direction. The extra space also helps to assure that you do not roll bees or the queen when frames are moved around.

It is important to have the hive level so the frames hang perpendicular to avoid combs that are drawn out on one side and indented on the other side of the frame. To help with this problem, the Danzenbaker hive was developed. The Danzenbaker's frames had a pin in the end bar that would support the frame in the super. This pin was handy to keep the frames vertical, if the beekeeper just happened to place the hive on a slope, the frames would only "rock" sidewise. The supers were much heavier than the other supers due to the extra wood that was on the end of the supers to support the frames and after use the top portions of the supers would be filled with brace comb and propolis due to the violation of bee space.

As I mentioned there were frames used in the 1920s that used four end bars. The "extra" two bars were placed in the middle of the frame with a ⅜" communication gap in between. The frames worked well for over wintering bees but created difficulties when one was trying to install foundation as you would have to cut it to the correct length for each side. If these frames were used in a honey super, the center end bars prevented a clean cut when you were uncapping. In the automatic uncappers the center "end bars" would be cut flush with the comb by the uncapper. People raising queens would use an idea similar to these frames by cutting the frames in half to be used in the queen mating nucs. In the "off" season, a metal clip

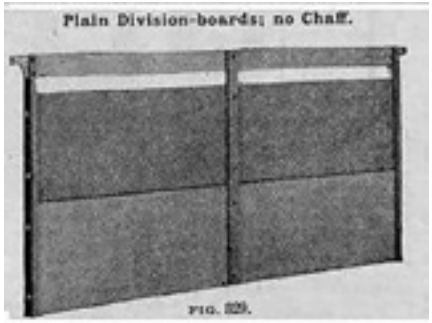
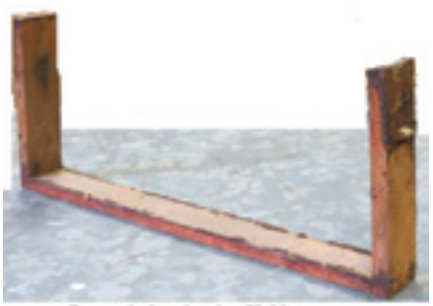
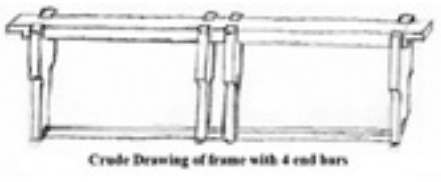


Illustration from 1900 Root Catalog



Danzenbaker Section Holder



Crude Drawing of frame with 4 end bars

Plastic Economy Station frame

could hold the two halves together so the frame could be pulled out in a regular super.

Other changes in the frames were to have different types of bottom bars. The first type was the one piece solid bottom bar. The solid bottom bar was followed by the two piece bottom bar and the slotted bottom bar. Your initial reaction to these differences may be that these differences are minor, but when you couple them with the differences of the top bar used, there are many different sizes and thicknesses of foundation that could be selected. Many beekeepers would purchase deep foundation and cut it to the height that they desired.

The frame top bars usually are available as grooved or wedge type. Today's grooved top bar is usually meant to be used with plastic foundation which can be bent to spring into the groove. Another way to use the plastic foundation sheet is to assemble the frame around the sheet.

The wedge type frame has a wedge that is meant to be removed, the remaining wood flash on the wedge is cleaned up, and the wedge reinstalled by nailing or stapling over the bent part of the vertical wires in the inserted foundation or creating pressure against the foundation to hold it in the frame.

There are "top loading" frames on the market. One type of top loader frame is for comb foundation where you spread the top bar and insert

Top loading frame with thin top bar, for comb honey

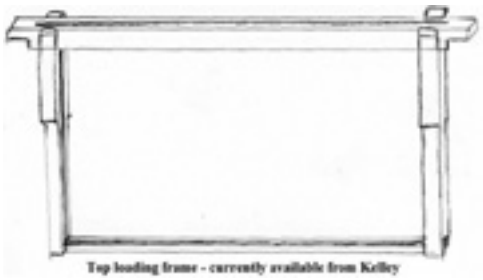
the foundation from below the top bar and staple or nail the top bar shut. The other type is to slide the foundation into the frame from the top and it is held in place by the thick grooved end bars and grooved bottom bar. Plastic foundation works best in this type of frame.

We live in the age of plastic and composition frames. One of these is a frame that uses a wood top and bottom bar and plastic end bars that snap into place and are secured with a nail.

Other plastic type frames include those for the round sections, half comb cassettes, and bee-o-hex frames. These frames snap together and hold parts that are essential for harvesting the sections. These frames may also have provisions for holding foundation and rings while providing a bee fence between combs. The original round section frames were made out of wood and held rings that were cut out of glass bottles.

There are some plastic frames that will snap together to hold the foundation in place. The most common type of this frame has intermediate columns of plastic to help keep the foundation straight.

At one time there was a Styrofoam frame that would hold thin surplus foundation. The idea for this frame was to develop section comb honey in the shape of a hexagon and to cut the sections apart with a hot wire when the sections were ready to harvest. These frames worked well if there was a honey flow, but during a dearth the



Top loading frame - currently available from Kelley

bees would chew up the frames.

There are entire frames that are made of plastic that include foundation. Some of these frames are available in different sized cells, coated with beeswax, or plain plastic. Other plastic frames have differences in the depth of the cell. The style that has about 1/8" deep cell encourages the bees to develop worker cells. The fully drawn plastic foundation was developed to save the bee's time and wax, but also to save the beekeeper time in extracting honey. The idea was to have a high speed extractor spin off the cappings and extract the honey without uncapping. These frames are available for the 6-5/8", but at one time were offered in the full depth size.

There was another medium depth frame that were made of plastic and divided into three parts that one could used for cut comb honey production.

During World War II, beeswax was scarce as it was being used in the war effort and thus there were frames that had drawn aluminum cells. If the bees used these frames the finished result looked beautiful, but the heat transfer during the Winter was detrimental for the bees.

The way I assemble a wedge top wood frame is to remove the wedge from the top bar. Then I apply water

Combination Wood and Plastic Frame

Plastic snap together frame

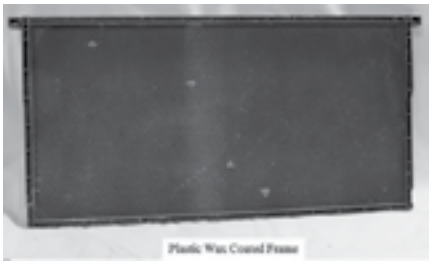
Styrofoam Section Frame - in a display case behind other beekeeping items.

resistant glue to all joints of the frame. If the frame has six rounded end bar sides for spacing, I put the round part in my right hand and press it up into the top bar joint. I do the same for the other end and the result will be that the rounded sides will be opposite. I then turn the frame upside down and attach the bottom bar using two nails at each joint. I nail the top bar down to the end pieces and nail the bottom bar/bars into the end bars. My final two nails on each frame will be through the end bar into the top bar opposite to where the wedge was removed. This last nail is the most important nail in the whole frame as it will resist the separation of the end bar from the top bar when prying up of the frame. Several hundred pounds of torque are applied to the top bar when it is firmly stuck to the rabbet with propolis. That extra nail prevents the top bar from separating from the end bar. If a mistake is made in the assembly of the end bars as to the rounded side verses the flat side, it will not be a huge problem as the frames will still fit in the super. Consistency in the method of assembly is the important item. Frames with two flat end bars have been used for years with no adverse effects.

You may call me old fashioned, but it seems to me that bees tend to prefer wood and wax over the plastic. However there will be the day where we all will be forced to use plastic and if you have some good drawn comb, you can work the plastic in to your operation easier.

The beekeepers that have switched to using totally plastic frames like it, because there is no more assembly of frames and the frames are cheaper to use if you consider the amount of time that you use in frame assembly.

However it may require some cutting out of comb as there will be times that the bees will want to build comb from one frame to the next. Other suggestions in using plastic foundation may include spraying the frame with sugar water prior to installation in the hive. Some beekeepers will brush on a new coating of warm beeswax, but the best hint is to use ALL plastic frames or frames with plastic foundation in the super so that the bees won't have a choice in choosing which frame to work. BC



Plastic Wax Coated Frame

Plastic Frame for cut comb sections

Frame with Aluminum Foundation

Climate Change

A bee problem we can potentially solve – Part 1

Ross **Conrad**

Much has been said about most of the major challenges facing honey bees these days. I like to refer to these as the five "Ps" (Pathogens, Pests, Poor Nutrition, Progeny and Pesticides). The one major challenge facing bees that is too often overlooked however is climate change. Specifically, climate change induced anthropomorphically through the burning of fossil fuels. Thankfully, the evidence indicates that the farming practices of ecological agriculture can be harnessed to reverse the damage being caused by greenhouse gas (GHG) emissions.

The vast majority of scientists agree that the dramatic increase in atmospheric carbon-dioxide from around 280 parts per million (ppm) at the start of the industrial revolution to over 400 ppm of CO_2 currently is caused by human activity, and a growing body of evidence indicates that this is playing a significant role in the numerous weather extremes and weather-related changes being observed globally.

For honey bees this includes the increased occurrences and severity of droughts. Not only do bees require some water in order to survive, but flowering plants are unable to grow when there is no moisture in the ground. On the other end of the spectrum is the increased risk of flooding which has the potential to not only destroy necessary pollinator forage, but may have the capacity to destroy the tree or structure housing a colony, and can easily sweep the typical beehive off its hive stand and send it downstream drowning the inhabitants.

The overall increase in the average global temperature is not just melting around 97 percent of the glaciers on the planet, but is causing noticeable shifts in the seasons and can cause plants to bloom at unusual times, severely impacting forage availability at critical times of year.

Because this situation has never occurred previously in our recorded history, we really don't have a clear idea of what to expect as a result of our having increased the carbon dioxide levels in our atmosphere by at least 40 percent. Our climate which had been remarkably stable for all of human history has now become unpredictable. Here in Vermont's Champlain Valley for example, Winters are getting milder, temperature-wise, with lows only getting down to 10-15°F below zero instead of the 20-25°F below zero that had been common place in the past. Some Winters are consistently cold and snow covered, while others are relatively mild with little snow cover all Winter long. This unpredictability makes it difficult to prepare hives for Winter. Is the Winter going to be a long cold one, requiring hives to have more than the typical amount of honey in order to survive (and thus requiring supplemental feeding in the Spring), or is the Winter going to be relatively mild, with colonies requiring just as much if not more honey than during a severe Winter since the bees will be more active in the warmer weather and will utilize their food stores at a faster pace than normal?

With all due respect to the Farmer's Almanac, I have changed my beekeeping practice to wintering hives with the equivalent of a full deep super of honey *above* the brood nest of every hive as insurance against starvation in either scenario. This is about twice as much honey as had been customary to leave on hives twenty years ago, but it typically relieves me of having to provide any type of supplemental feeding no matter what the winter weather is like.

How can we deal with greenhouse gas emissions, the resulting weather extremes and weather unpredictability that accompany them? It appears that we must transition to renewable energy sources (solar, wind, hydro, geothermal and biomass) and stop burning fossil fuels as soon as possible. This also means that we will likely need to cut back on our energy usage, particularly the vast amount of energy we simply waste as a result of inefficiency or laziness. Reducing our energy demand will make it easier to meet our energy needs with renewables alone. However, we also need to do something about all that additional carbon dioxide that is already in the air. While a number of geoengineering solutions have been proposed, there is only one practical solution that has already been proven to work without creating equally unbearable side effects and additional problems: the use of plants to sequester carbon in the soil.

A spoonful of healthy soil contains more micro-organisms (bacteria, fungi, nematodes, protozoa, algae, etc.), than there are humans on the planet and these organisms have a huge appetite for carbon (Hoorman, 2010). As a result, they quickly use up all the available carbon in the soil and to get more they work with

What is the Winter weather going to be like this year? Global climate change is making the weather increasingly difficult to predict, which in turn is making the job of safely seeing your bees through the Winter months more challenging.

Well made compost and especially humus is full of biological activity (and worms), as well as carbon in the form of organic matter. Plants grown in such soil tend to resist diseases, droughts and floods and are able to remove carbon dioxide from the atmosphere and sequester the carbon in the ground.

plants who sequester carbon in the soil through photosynthesis. The chlorophyll molecules in plants allow them to use the energy from sunlight to break apart water molecules into water and hydrogen. Plants release the oxygen into the atmosphere and temporarily store the hydrogen. In the second stage of photosynthesis, the hydrogen is combined with carbon dioxide to create carbohydrates such as the simple sugar glucose.

Not all of the carbohydrates manufactured by plants are consumed by the plant or inserted into the nectar they use to attract pollinators. When they produce carbohydrates through photosynthesis, plants will emit a significant amount of these carbon containing compounds into the soil. Micro-organisms in the soil quickly consume these root exudates and want the plant to produce more. In order to encourage the plant to produce more the micro-organisms work on behalf of the plant so that the plant will grow strong and healthy and exude a lot of carbon containing materials from its roots.

For example: fungi will transport water and nutrients to the roots of the plant; and bacteria will fix nitrogen, synthesis hormones, and even produce antibiotics or fungicides for the plant. Over the course of a year, an acre of wheat can take 8,900 pounds of carbon in the form of carbon dioxide in the atmosphere, combine it with water and make about 22,000 pounds of simple sugars. Estimates are that world-wide, 15 percent of all the carbon dioxide in the atmosphere is transformed by the process of photosynthesis each year (SAPS, 2015).

Of course we need to sequester carbon in a way that ensures soil micro-organisms won't simply consume it all and release it as carbon dioxide back into the atmosphere once again. We know this is possible since the organic matter found in soils, such as throughout America's fertile mid-west, were historically much higher than they generally are today with levels of 6-10 percent common, and documented levels of organic matter as high as 20 percent (LaSalle 2008).

What has prevented soil organisms from decomposing all the soil organic matter in the past? This is not fully understood, but we do know that the one form of carbon in soil that appears to remain stable for centuries is humus. Humus refers to the part of soil organic matter that is rather shapeless and formless without the "cellular structure characteristic of plants, micro-organisms or animals" (Whitehead, 1963). According to Wikipedia, "It is difficult to define humus precisely; it is a highly complex substance, which is still not fully understood. Humus should be differentiated from decomposing organic matter. The latter is rough-looking material and remains of the original plant are still visible. Fully humified organic matter, on the other hand, has a uniform dark, spongy, jelly-like appearance, and is amorphous. It may remain like this for millennia or more. It has no determinate shape, structure or character. However, humified organic matter, when examined under the microscope may reveal tiny plant, animal or microbial remains that have been mechanically, but not chemically, degraded. This suggests a fuzzy boundary between humus and organic matter. In most literature, humus is considered an integral part of soil organic matter."

Until soil scientists learn more about humus and how it is formed we can only guess at how it is created. The evidence so far indicates that building soil organic matter and carbon levels that will create an abundance of soil micro-organisms that will help plants to thrive and sequesters carbon in the ground, requires more than simply adding organic matter to the soil. We now know that to build up the percentage of carbon in the soil over the long term (humus) there are certain agricultural practices that have proven themselves successful. Next month we will review these agricultural practices and explore what it will take to restore balance to our planet's atmosphere, our struggling ecosystems, and give our honey bees a leg up.

Special thanks to the MA Chapter of the Northeast Organic Farming Association and Jack Kittredge for the white paper: *Soil Carbon Restoration: Can Biology do the Job?*, which formed the basis for this article series. **http://www.nofamass.org/content/soil-carbon-restoration-can-biology-do-job** BC

Ross Conrad is author of Natural Beekeeping: Revised and Expanded 2nd Edition.

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Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in Georgia writes:

Enjoy your column in Bee Culture very much. Got a problem. South GA-and probably lots of other places-was hit hard this year with small hive beetles. For various reasons, including being away from home for a period of time, I wasn't able to get into my two hives for six weeks, and the little devils had a field day..

When I got back home, both hives had absconded, no bees left in the hives, and both were full of beetles and their worms. Honey residue had dripped throughout each box, out between boxes and all over the outsides. It's taken me about a full week to scrape the fouled wax, etc. off the frames and foundation, all of which are plastic. I've been scrubbing the frames with water mixed with dish detergent and it works reasonably well, except it's very slow.

A beekeeper friend suggested I clean everything with a bleach and water solution of 50-50 and then rinse off each frame eight to 10 times to remove the smell, otherwise the bees would probably reject the hive as a place to live. Another friend who has a pressure washing business said the bleach would leave a residue which would be next to impossible to remove. He suggested peroxide, which he uses in his business because it leaves very little residue, but is very effective-although quite expensive in the amount I might need.

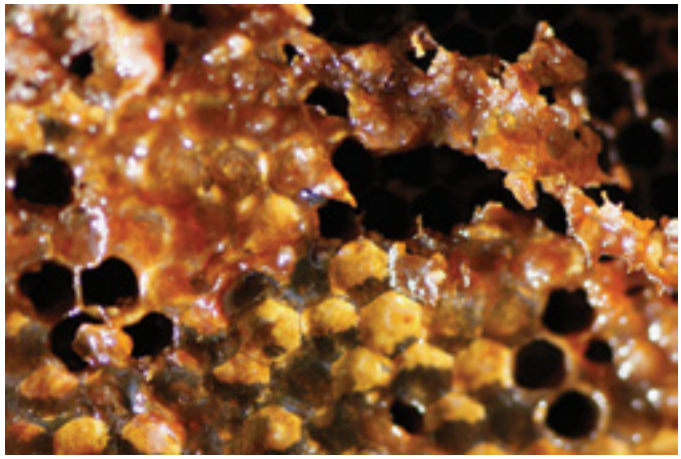
I'd appreciate your thoughts on this ugly situation. It's been a lousy year! Thanks for any suggestions you might send me.

Phil replies:

I commiserate with you. You describe very well the aftermath of a severe small hive beetle (SHB) infestation or, to be more precise, an out of control explosion of SHB larvae. In a healthy hive with a strong population, honey bees can control the beetles pretty well. They do this by restricting adult beetles to areas of the hive, such as the inner cover or empty comb, where they are cut off from the pollen and other food sources they need in order to reproduce. By this means a populous hive can tolerate a large number of beetles. It is their larvae and not the beetles themselves which cause all the damage. I often see dozens of adult beetles (mostly on the inner cover) when I open my hives, without seeing any of the carnage your two hives experienced.

On the other hand, a weakened or underpopulated hive simply does not have enough bees to herd and contain beetles while also tending to the queen and brood, foraging, ventilating and guarding the hive, and performing all the other tasks which are part of the life of a colony. I am certain that some circumstance occurred, while you were unable to attend to them, to reduce the strength of your hives and allow the beetle larvae to get out of hand - perhaps the loss of the queen, or the consequences of a varroa mite problem. The explosion of SHB larvae results in badly damaged comb and, as you describe, fermented, ruined honey. The fermentation is caused by a yeast carried by both adult beetles and larvae. The final stage is the absconding of any remaining bees, leaving the beetles and larvae in sole possession to wreak the destruction that you found. Leaving you with the cleanup.

Which brings me to your question about how to deal with the mess and make your equipment usable again. I personally do not re-use frames (most of mine are wood), preferring to buy new ones instead of taking the time to clean up the old. However, a good scrubbing and scraping off of the damaged wax is all they need. A chemical such as peroxide or bleach is not necessary; a mild detergent works fine. Just scrub them up and let them dry. You might find it helpful to melt some beeswax and use a paintbrush to apply a thin coat to the plastic foundation. Plastic foundation, as I am sure you know, comes with a film of wax which your scrubbing and scraping has most likely removed. Replacing it will help encourage new bees to draw out the comb next spring. If you are lucky enough to have caught some of the comb before it was badly damaged, you can clean it by gently



Damaged comb. photo by Mary K. Parnell

agitating the frames in a bucket of soapy water, rinsing with a gentle spray from a water hose, and allowing them to dry. Not in direct sunlight of course; you do not want to melt the wax. Cocoon residues in the comb would be an indication that wax moths as well as SHB have been exploiting your weakened hives. The same guidelines for clean-up would apply.

I'm sorry you've had such a lousy time. Remember the slogan of the Brooklyn Dodgers of the '40s and '50's when season after season began with promise only to end in disappointing post season losses to the Yankees: "Wait 'till next year."

A note to *Bee Culture* readers: I have written in more detail about the problems caused by SHB in columns of February 2014 and June 2013. Let me know if you would like a copy of these Q&A's. If you are interested in more information on small hive beetles, I think one of the best written resources is from Mississippi State University. You can get it online at: **https://www.extension.org/sites/default/files/SHB-Mgt-in-MS_2012_Sheridan-Fulton-Zawislak%20%281%29.pdf**.

A beekeeper in Kentucky writes:

Hi, Phil. While observing a hive last Friday (late afternoon) I noted two things:

1) The bees were acting oppositional rather than cooperative, and it seemed they were pushing drones out of the hive.

2) I observed a worker carry out a large grayish larva that I think was a wax moth larva.

I am concerned about the wax moth possibility and what to do....

Phil replies:

In response to your first observation, forcing drones out of the hive is a normal behavior for this time of year. The ruthless efficiency of the hive requires the elimination of those members that do not contribute to the colony's well-being. This includes adults damaged by disease or parasites, such as those with deformed wing virus. It also includes diseased brood, the removal of which we refer to as hygienic behavior – a trait which queen breeders select for because it helps control *Varroa* and brood diseases such as foulbrood and chalkbrood. In times of dearth, bees sometimes even remove healthy brood in order to reduce the drain on meager food resources. (*Bee Culture* readers: I discussed hygienic behavior in a November 2013 "Ask Phil" column. You can email me to get a copy.)

Drone pupa. photo by Mary K. Parnell

The only role of drones in a hive is to be available for mating with virgin queens. It follows that the need for drones coincides with periods of queen production. Colonies produce the first drones in the Spring several weeks before building the first queen cells in order to have an abundance of them by the time queens are ready to mate. The drones' job remains important throughout the Summer until queen rearing tapers off (around September in most of the U.S.) At that point, they become superfluous – consuming resources while contributing nothing. The workers force them out to starve. No need to waste good food on those guys. Hives that are stressed by a shortage of food reserves may eliminate drones from a hive at any season, much as they remove healthy brood under the same circumstances: to reduce the need to feed unproductive members of the colony. However, considering the time of year (late September when I received this question), you are most likely seeing normal, seasonal, drone expulsion.

As to the larva you saw being carried out, you are going to have to open the hive to find out what's going on inside. Its presence may indicate a weakened hive with a serious parasite problem, or it may merely be a case of a worker doing a routine housekeeping chore. Wax moths will multiply by what I call clandestine reproduction: a small number of moths in corners of the hive, doing little damage to the comb and not producing larvae in large numbers. A healthy colony can keep them in check, but can't eliminate them completely. The beekeeper might never notice them unless something else causes the colony to weaken and the infestation gets out of hand. The larva you saw might have been one of a few produced by a stray moth which snuck into the hive. It is also possible that it belonged to a small hive beetle (SHB) instead of a wax moth. The larvae of these two pests can be difficult to tell apart unless you compare them side by side. My earlier comments pertain to both of these pests, but it is even more common to see an occasional SHB larva in a healthy colony. While a healthy colony can usually remove adult wax moths before they have a chance to reproduce, adult SHB are more difficult to expel and are more likely to be permanent squatters inside our hives.

Observations made at the hive's entrance can give you clues about what is occurring inside, but for answers, you're going to have to open it up. The first thing to look for is the number of frames covered by bees. A strong hive at this time of year should have bees on most of the frames. Look to see if you have eggs, larvae (honey bee larvae that is), and/or pupae. A queenless hive will have a dwindling population making it vulnerable to wax moths and small hive beetles as well as a host of other problems. In addition, take note of the number of frames of stored honey. There should be several. If the hive has a good population, developing bees, and food reserves, and if you do not see additional wax moth or small hive beetle larvae, don't worry about the one you saw being carried out. Your hive should be fine.

A beekeeper in Nevada writes:

New (18 months) at this fascinating hobby of bee keeping. Q: I have a hive (my only one) that may not survive the winter here in Reno, Nevada. Maybe under 1000 bees left. Don't know the reason, but was wondering if this late in the season, it is worth the gamble to re-queen, and if so, where can I obtain a new queen?

Phil replies:

Considering the time of year (late October when I received your question) and the number of bees in your hive, to purchase a queen would be a waste of money and a good queen. Even if the season were not so advanced – say late July or August – it would be a dubious strategy. If your estimate is accurate, there simply aren't enough bees in the colony for it to build up to strength before Winter. New beekeepers tend to expend a lot of effort on lost causes, understandably since they have already invested time and money and don't want to end up with nothing but an empty hive to show for it. As for me, I'm pretty ruthless when it comes to very weak hives. I shake the bees out on the ground in my apiary and store the equipment, including the drawn comb, to use another day.

IF the hive had more bees, and you thought it possible to save it, you would have to consider whether you could get the re-queened hive through the winter. When we discuss the necessary conditions for winter survival, we talk about three things:

- Health of the colony. The most common factor affecting health is the level of *Varroa mite infestation. Mites shorten the lifespan of bees, so a high mite count could result in the bees' dying before spring.*
- Food stores. The amount required can be as much as 100 pounds of honey in the far northern U.S., about 50 pounds in Kentucky, and probably less in your area.
- Strength of the colony. This is the criterion which relates directly to your question, though for the colony numbers to have diminished to the extent that you describe, some other factor must be present. Conventional wisdom is that a colony needs a deep hive body full of bees, or roughly about 20,000, going into winter. This number is an estimate which assumes ten frames of bees with about 2,000 bees on each frame.

The thousand bees in your hive means that you are way short. If you had a second, stronger hive, I might recommend moving several frames of brood from it to the weaker hive and requeening, or better yet, combining the two hives. Unfortunately, that obviously is not an option for you. I'm glad to hear you describe beekeeping as a fascinating hobby. I hope you maintain your enthusiasm when you try again next year.

Your question brings up another issue that I face time and again when communicating with beekeepers concerning problems in their hives. Though your description of a hive containing "maybe under a thousand bees" worked fine to help me visualize your situation, most descriptions of hive populations are too vague and subjective to be helpful. When we refer to strong hives, we mean ones with enough bees to make honey, rear brood, and carry on all the functions of a colony – in other words *a lot of bees.* But what seems like a lot of bees to an overwhelmed new beekeeper may look altogether insufficient to me. How can we quantify what constitutes a strong hive? We obviously cannot count the bees. We could use the rule of thumb I referred to above and multiply the number of frames covered with bees by 2,000, but that's just a guestimate, and I don't think it necessary to come up with an actual number. I prefer just to count the number of frames (typically deeps) in a brood box which are literally covered with bees. A box with the equivalent of nine or ten full frames is a full box. A hive all of whose brood boxes are full is a full hive. This provides us with a quick and sufficiently accurate method of quantifying the strength of a colony. I find referring to the number of full frames in a hive to be useful, not only in communicating with other beekeepers, but also in evaluating my own hives. When I inspect hives in the early Spring, I take note of and record the number of frames covered with bees. Later, during follow-up inspections, I expect to see that number increased. If it is not, that's an indication that there may be a problem, perhaps food, queen, disease, or mite related, and a signal that I need to do a more thorough inspection. BC

THE HOWS, WAYS AND WHYS OF

Weighing Hives

Lonnie **Funderburg**

My interest in honey bees began in the Fall of 1989 with a visit to my office by a client who was contemplating retirement. He told me that he wanted to set up some bee hives. As an experienced woodworker, I thought the construction of the boxes would be fun, and I volunteered to construct his bee hives. Over the next six months, I assembled six deep supers, 18 shallow supers, and the associated 200 odd frames in the evenings. At the appropriate time in the Spring of 1990, I installed a three-pound package in each of his six hives. I was disappointed to let them go; I was hooked; I had to get bees of my own. Thus began my beekeeping experience.

Scroll forward 10 years, on my first trip to Ukraine in June of 2000, I had the opportunity to visit some beekeepers that lived out in the country some distance from Feodosiya. I was staying in the town of Prymors'kyi, which is right on the Black Sea. One day, we rode out away from the city for about an hour. As a passenger, I was not paying attention to the direction we headed. Wherever we were, there were lots of fields. We stopped to talk to another beekeeper who wanted to show us his hives. We walked up to the rear end of a large trailer, climbed the steps, and proceeded to the front where he had a small enclosure about the size of a walk-in closet. Inside were a bed, an extractor, and a small workbench with tools. The beekeeper could stay overnight at this trailer and extract honey and repair woodenware, if necessary. Because no one had said anything about donning protective gear, I assumed that all these boxes were empty supers that he had stored on the trailer. One stack of supers was on a platform scale. When we exited the trailer, I realized that all those stacks of supers were actually hives. There was a hive sitting

Aldon **Maleckas**

The Winter of 2013-2014 left me with three surviving hives out of 10. Three died from starvation; three died from lack of a cleansing flight and/or starvation; and one queen must have become lonely because I found her balled and dying next to a neighboring hive. I decided I needed a method to determine how much honey my hives needed to survive the Winter. I wanted something simple and light. I had some left over cherry boards that I drilled holes in and attached with a removable pin. Holes were determined by the height of the hive, the height of the base the hive sits on, the distance from the hive I wanted to position the vertical stick, and how much pressure I wanted to use to find the hive weight. In addition, for weighing hives, the bottom hook is turned 180 degrees to hook under the hive.

I purchased and attached a Taylor scale that reads up to 70 pounds. I tested the whole system on a fixed object to see if it would handle a seventy pounds of pressure; did not want to upset the ladies.

I put my hives on two concrete blocks (only one hive is positioned on a pallet) so that I can establish two weight bearing points; one at the front of the hive and one at the back of the hive. The front face and rear face of the hive are the same distance from the concrete block base. The front of the concrete block base and the rear of the concrete block base establish my two bearing points.

With the weight at two different points and if the item you are weighing has the weight evenly distributed, each point has the same weight on it. I know this is not exact science, but I felt it was more accurate than picking up one end of the hive and with practice it is almost as fast.

I pick up the rear of the hive and record my

on the platform scale. The hive on the platform scale enabled the beekeeper to monitor the nectar flow. At the time, this hive on scales did not impress me. I thought I knew when my bees were bringing in nectar.

Scroll forward to May 2008. One of the speakers at Young Harris Beekeeping Institute was Dr. Wayne Esaias from Maryland. Dr. Esaias gave a presentation about his scale hive. "Scale hive" is how he referred to his hive on a platform scale. The amusing narrative about his son's accepting the offer of a hive of bees from his Scoutmaster, who was moving out of state and did not wish to take his hive of bees with him, then asking if it was OK with his dad reminded me of the challenges of being a parent. The hive that Dr. Esaias acquired came with a platform scale. I recall his saying that his son acquired this hive in 1991. Consequently, Dr. Esaias had a bee hive on a scale that enabled him to monitor the weight of the hive. He had accumulated data on the daily weight change of his hive for 17 years.

In July 2008, Dr. Esaias was a speaker at the Heartland Apicultural Society meeting at Marshall University in Huntington, West Virginia. Again, I attended his presentation about his scale hive. At this presentation, Dr. Esaias elaborated on the scale hive that he had brought to HAS with additional information about how to acquire platform scales, what color to paint the scales, how to protect the scale from the weather, and maintaining the daily record of change in hive weight. Of most importance, Dr. Esaias stated, "If the platform jiggles, they probably are OK." Later on, I realized what he meant. My interest in obtaining a scale hive increased.

Upon my return home, I made an unsuccessful attempt to bid on a Fairbanks-Morse scale online. Don't let me discourage you from attempting to purchase your scale online. I am sure my experience was singular. Mine was the only bid until less than an hour to go; then someone outbid me. That's OK. But the next day I received an offer by e-mail from the seller. I did not respond. After my unsuccessful online experience, I placed an ad in the *Alabama Farmers and Consumers Bulletin*. The day the paper came out, I got a call from a gentleman with a Fairbanks-Morse scale for sale. Also, he lived only about thirty minutes from me. The scale had a capacity of 1,000 pounds. A scale with a capacity of 500 pounds would have been slightly more desirable. It has to do with the precision with which the scale can measure. A 1,000 pound scale measures to the nearest ½ pound. A 500 pound scale measures to the nearest ¼ pound. All the steel parts had some rust; the sheet metal platform was rusted through in places. However, as Dr. Esaias had said, "If it jiggles, they probably are OK." Well, mine jiggled. The steel wheels did not roll; I had no plans to move my scale, anyway. Also, there was a device at the end of the balance arm that was rusted in place. I soon discerned that this lever and cam mechanism prevented the balance beam from banging around while a load was placed on or removed from the platform. Over the next three weeks, I squirted the rusty part with penetrating oil and tapped on it with a small hammer. Eventually, the rust turned loose, and the lever moved as designed. I never really attempted to get the wheels to roll. The fine tuning mechanism that

measurement. Multiplying this measurement by two will give me the weight of the hive. I took an abandoned hive (two deeps with drawn comb, one bottom board, one inner cover, and one outer cover) and put it on a scale. It weighed 60 pounds. With the weighing system as configured, I felt that a weight of 70 pounds on the scale would mean a total hive weight of 140 pounds. One hundred forty less 60, the weight of the equipment, would mean there's 80 pounds of bees and honey in the hive. I used 10 pounds as the weight of the bees. Eighty less 10 would mean 70 pounds of honey. Most beekeepers in my area would like 80 to 90 pounds of honey. Next year I will

would zero the scale was totally beyond movement. During that Winter, I weighed stuff just because I had this platform scale.

I acquired my Fairbanks-Morse scale in September 2008. It would be Spring 2009 before I put a hive on them. During the Winter, I very carefully balanced the counterweight by drilling holes in it until the scale was level with zero weight. This is not terribly important since the information to be recorded is the daily change in the weight of the hive. The accurate total weight of the hive is of secondary importance. If I did need to weigh something accurately, I could always put a known weight, such as five pounds, on the scale and determine the amount to correct the actual weight. I haven't needed to do that in six years.

The next Spring, fellow beekeeper, Wil Montgomery, and I constructed a special hive stand for the scale. There were already two colonies on a hive stand at the spot where I intended to place my scale hive. We placed some concrete blocks that were set level. It is important that the scale be placed on a level surface. We then set the colonies back in place with one colony on the scale.

On March 7, 2009 I began my daily recording of the weight of my scale hive. It has added a new dimension to my beekeeping. It is almost as if I knew nothing before, and now I know something. In the spring, as I monitor the daily change in the weight of the hive, I eagerly await the day that the weight stops declining. On that day, I can add a super with confidence knowing that something out there is producing excess nectar.

During that first season in 2009, I recorded daily gains of one or two pounds, maybe three or four pounds. In my location in north-eastern Alabama, around my house, there is usually no intense nectar flow from a single floral source. In some years, we get a privet bloom. The daily weight increase in April, May, and June is fairly steady and consistent, usually. Then one day, to my shock and delight, I read a 14-pound increase in 24 hours. This must be a mistake. How

purchase a scale with more capacity.

Photo shows how I hook the scale to the bottom of the hive. I will be setting all my hives on two concrete blocks so that I do not need to change the position of the sticks. I watch the positioning of the vertical stick so that the scale does not push on the top cover. I kept the metal connecting the hive to the scale short because I had to kneel to hook the bottom of the hive, it was at a good height for reading while kneeling, and I kept my recording materials on the ground.

I pull/push (depends on the weight and whether kneeling or standing) down on the stick attached to the scale while watching the scale and the bottom board of the hive. My sister, Janet, was recording my measurements while her husband, Bob, took the pictures.

When the bottom board of the hive starts to rise from the concrete block base, I record the reading and multiply it by two to determine the actual weight.

This is the method I used to weigh a whole hive. Incidentally, I use 12 pounds for a medium super with drawn comb.

I use the scale to weigh supers to determine the rate of honey production and to determine when I should put on another super. The metal connecting the scale to the super is about the right height for reading when checking a super while standing. The hook fits nicely in the handholds. BC

could I have read the scale wrong? In 2009, HAS was held at Oberlin College in Oberlin, OH. Wil Montgomery and I attended. HAS is usually on Thursday, Friday, and Saturday. On Friday, I ate lunch in the school cafeteria with a few hundred beekeepers. I sat at a round table with seven other beekeepers. Somehow, I cleverly worked it into the conversation that I had recorded a 14-pound increase in my scale hive on a day in May. I was expecting them to doubt the accuracy of my scale. To my surprise, their response was, "That's not unusual. We have 30-pound days!" It turns out that several of these beekeepers were from Canada. There, they have 20 hours of daylight in the Summer. Their bees may bring in twice as much as my colony in one day. Obviously, they are also better beekeepers than I. The lesson, always consider the location of the colonies whenever you are discussing your bees with another beekeeper.

Back to the fairly steady and consistent daily weight gain. How often have you heard or possibly said this yourself, "My bees did not swarm this year." This remark always amuses me. I suppose it is simply my nature or maybe my career choice. I am skeptical, among other personality traits. My immediate reaction, and sometimes, improperly, my verbal response is, "How do you *know* they did not swarm?" I envision this beekeeper camped out in his apiary 24/seven watching each colony for a swarm to sally forth. I don't think so! Anyway, I can only speak concerning my scale hive. If my scale hive swarms, on one day, there is a four to six pound decline in weight. If you read Huw Evans article in the December 2014 issue of *Bee Culture*, he highlights **Swarm!** in Figure 7. So, if my scale hive swarms, I will know, regardless of whether or not I am there to observe the egress.

I looked into Arnia Remote Hive Monitoring at **http://www.arnia.co.uk/how-it-works/**. They emailed their price list to me. Very sophisticated is all I can say. Their system puts my scale hive back in the dark ages. However, I gave four quarts of honey for my platform scale. When I win the lottery, I will definitely invest in something like the Arnia Remote Hive Monitoring System. The keyword is *remote*. I have to walk out to my backyard apiary every night to read my platform scale. All you wealthy beekeepers (is that an oxymoron?) should read Huw Evans' article and consider some sort of monitoring system.

If you already have or are successful in obtaining a platform scale, and you are willing to keep a record of the daily weight of a hive and the change in weight due to all the manipulations you perform, e.g. adding or removing supers or a queen excluder, Dr. Wayne Esaias would appreciate your reporting the data to his scale hive project. Even if you do not participate in his project, your scale hive will add a new dimension to your beekeeping. Honey bees are already fascinating. Accurately monitoring the weight of one of their hives will only add to your fascination. BC

Letters from a Beekeeper's Wife

Home, January 1, 1917

Dear Sis;

The Christmas box that came the day before Christmas from your house could not have been more enjoyed. Billie has been out on his skates every day since, and the girls are delighted with their muffs. They have always wanted furs but we thought we couldn't afford them. Now that they have muffs we are going to take the money out of our private I.P.T.A. fud and get them neck pieces to match.

Have I ever told you about the I.P.T.A. fund? It stands for "It Pays To Advertise" – and it certainly does. We never realized how much it pays until our road became part of the Jefferson Highway. A year ago last Autumn, just after the concrete road was laid, we found that we had considerable fall honey which was very good but it was what the buyers call "off color." Rob conceived the idea one day as we sat watching autos whiz past that we might be able to sell our honey to passersby. That is an undeveloped trade, so if we can sell to them it means just that much more honey disposed of.

He talked about it all winter off and on, but, man-like, never did anything until spring. One day he painted a big sign, "HONEY FOR SALE," and nailed it to a post at the gate at the east end of the lot. It wasn't a sign painter's job, and maybe that convinces the city folds that we have "bee honey." Mother was here at the time and maybe she told you how scandalized she was by that sign! I don't see just why she thought it so much worse to sell honey at our door than to send it away to be sold, but in her mind it "lowered" us in the social scale to have the sign up. I don't take much stock in social scales. They are never balanced, are they? So I was just as eager as Rob to see what would happen. I had a little honey in a quart Mason jars – not the green ones, of course – all ready and had previously ordered some plain labels. I don't believe it was more than an hour after that sign went up before an auto stopped and a man came up to the door. To be sure, he didn't buy-he wanted comb honey- but he was interested and even went to look at the hives. The next day another auto stopped at the sign – a Ford this time – and those people took a quart of honey. Its queer, but we seem to sell more to Fords, perhaps because they can stop more easily. We but the 65 cents in a Mason jar and Mother assured us that we'd never have any more to put in from that source, but we felt elated. If only one person a day was halted by the sign and bought one quart of honey we would be getting twenty cents a pound for that much honey instead of seven or eight. There's a big difference between wholesale and retail prices.

Well, do you know that scarcely a day passed after that but some one stopped to buy? And as the warm weather came on, bringing tourists by the score, we could scarcely keep up with the demand. That's why I have so little canning done for this winter. We actually had to buy more honey to sell to our auto trade, which makes Rob sore when he remembers that most of our crop last year was sold at wholesale. We noticed that machines coming by from the east stopped frequently but that those going the other way got too far past before they could slow down, and we usually lost their trade, so Rob put another sign at the west end of the lot to "catch them coming and going." It's tremendously interesting to watch the machines come flying by – then come to a halt. There's a little conversation, some hesitation, then (particularly if there are children aboard) some one is almost sure to get out and walk up the line of basswoods. Our Mason jar bank was outgrown long ago – on Labor Day we took on $35. With this weather of course traffic is at its lowest ebb, and yet I dare not have less than a half dozen jars ready on the shelf. There are so many calls for comb honey that we will buy some next summer to have on hand, Rob says he can buy that cheaper that he can produce it, but he may be that's true of the extracted too, for selling honey is more profitable than producing it.

The nicest part of all is that so many come back for more. Rob has visions of someday selling all of his own honey and more besides, from his own doorstep. Wouldn't it be fine if he could? Mother is convinced now that it pays to advertise and has even got over the feeling the "it isn't done by the best families." We have accomplished more than all the profit by widening her horizons a little.

I forgot to tell you that Rob has promised to take me to the state convention this month – the beekeepers wife convention of course. I'll tell you all about it later. I'm curious about it.

Your loving sister,
Mary

BIGGER PICTURE

Jessica **Louque**

Travel Notes

Bobby and I have had quite a lot of travel over the last few years in the bees. We have driven to some places and flew to others. Sometimes we flew to places to drive really far then fly again. We met a lot of really cool people, and we had some really great experiences. I'd say on average we see no less than 10 states a year, occasionally a different country, which means different food, new scenery, and different ties to buy my grandpa (I'm shooting for one from all 50 states). There was the other side of travel though – *other travelers*. It seems like courtesy, professionalism, and dignity when traveling have gone right out the window with reality TV. Besides Bobby being the voice of reason during travel when I get mad, I'm hoping by sharing my thoughts (rants and ravings) that perhaps some of my ideas will spread to others, making me a less angry traveler.

Flight

Back in the day (apparently before my time, based on my experiences) traveling by air was considered a privilege. People wore nicer clothes, were always punctual, and polite to other passengers. Nowadays, people are either traveling in pajamas, or something so revealing that I wish they had on pajamas so it would cover more of their body. Not everyone is on the road or in the air for business, but people forget that you will usually be treated in the same manner with which you present yourself. If you don't care what you look like, why should other people care about you either? As bee people, we are normally out for business, and our business attire is not so formal. That doesn't mean we can't present ourselves in a professional manner, with at least a nice shirt and jeans that aren't old, dirty, ratty, or stained. This particular item on my list is a personal quirk, as it doesn't specifically affect me if you look like Oscar the Grouch straight from your hometown dumpster – unless you also smell like a dumpster.

If you're going to be in tight quarters with people for extended periods of time with recirculated air, please wear deodorant, brush your teeth, and don't bring strong smelling food on the plane. Common courtesy towards others is no longer so common.

People in airports are incredibly self-absorbed, oftentimes hitting people with their bags, standing in the way of people rushing to get through, or just generally oblivious to their surroundings. Nobody wants to wait behind you while you struggle to shove your checked-bag sized carry-on into a bin meant for a backpack. Sometimes I think that some things should be common sense, but it is the long-lost cousin of the disappearing common courtesy. Clipping your nails on a plane is annoying. Cursing on a plane is rude. You might want to be a Chatty Cathy with your aisle-mates, but 99% of the time, they don't want to talk to you.

Now for the massive debate over the reclining seats, heavily doused with my opinion . . . While I realize that the plane has reclining seats for your personal use, it doesn't mean you should do it. There is nothing that invokes rage faster than the person in front of you leaning their seat back. Does that two-inch space really make you feel better? Maybe, but now I definitely can't use my tray table.

While I will personally blame you for reclining the seat, we should all focus our anger on the airlines that are trying to cram everyone on a plane like sardines. Sometimes my knees are already shoved into the back of the seat, and the reclining isn't going anywhere because there's nowhere else for my knees. Some of you will disagree with this and say you have a right to your seat because it's there, but this goes back to the common courtesy. So many people only care about themselves that they don't care if something they want upsets or inconveniences someone else. At least if you're going to do it, politely ask the person behind you if they mind. If they do, then take it gracefully and respect their wishes.

It's amazing what can go wrong when you travel, and it's also amazing how helpful staff can be if they find you to be polite. Flight attendants are doing a job that I personally would never want to do (because I would be fired quickly in a customer-service situation). Travelers are so rude sometimes to these people, forgetting that if something happens, these ladies (and sometimes gentlemen) are your ticket to a less awful situation and may even be able to rectify it for

The states we visited in 2015 for something relating to bees.

a few people. Sometimes, you can just look at the staff in an airport and know that they've had a rough day. Smile at them, ask how they are, maybe give them some candy, or at least treat them like they are a real person and not a plane accouterment.

Some of you reading this are thinking to yourselves that these things don't apply to you. To you, I say thanks, and maybe we can be on the same flight sometime. Maybe you could wear a beekeeper emblem or something so other people can see you and decide that beekeepers must be awesome and really nice, courteous people. Remember, when you're traveling, it's an opportunity to be an ambassador not only for the bees, but for all the other traveling beekeepers as well.

A pheasant in South Dakota.

The highways and byways

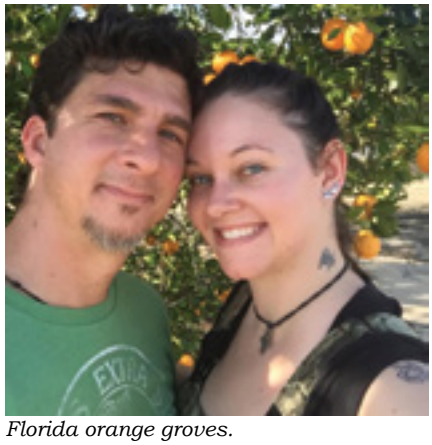
We've had a lot of rain in North Carolina lately, and it has brought out the worst in the drivers on the roads that are out at the same time as me. It is technically illegal in our state to drive with windshield wipers on and not your headlights. I think almost everyone in a sky/road/fog colored car thinks this is optional. What people forget is that you might be able to see without headlights, but they are for other people to be able to see you. I don't think that most people are looking for an accident, but if your wipers are on, it means there are bad road conditions and bad visibility already. Don't make it worse.

Turn signals are on a car for a reason. The people in the car with you hopefully know who you are, but they can't read your mind. The other people on the road definitely can't read your mind, so they don't know that you're hungry and you've decided to turn into that McDonald's on the left. If I'm behind you with a trailer of bees, or just bees in the back of the truck, and I have to slam on my brakes because I didn't know you are stopping, I'm going to curse you with the fleas of a thousand camels and hope that some of my disgruntled bees find their way into your car. On the other side, I see people with trailers or loads all the time that act like it's a personal affront if someone tries to pass them. It's safer for everyone just to slow down and let people by when they have the chance. Why speed up just to have someone angry tailgating you for the next five miles? Granted, not many people are going to be on your bumper once they realize you're carrying bees. It's not an easy job to drive with a loaded trailer, and everybody on the road should be aware of that.

Isn't it the most annoying thing ever (at the moment when it happens, of course) when you're trying to pass someone in a four-lane road and both lanes on your side are full of people going exactly the same speed? The left lane is for people to pass, not to hang out. Again with the trailer, it's not like you're trying to be an inconvenience to anyone on the road, but occasionally you're going to need to pass someone and then you get stuck in the left lane behind someone going one mile under the speed limit but everybody blames the guy with the trailer.

I know some of you are going to think that I am just an angry passenger, and I definitely can be. Why can't everyone just be nice to everyone else and treat not only others, but themselves, with respect? It will be so exciting to have that day traveling where everyone says "please" and "thank you" and lines up quickly at the gate without cutting other people off and have a nice, efficient flight. While everyone is on the path for making their New Year's Resolutions, maybe some of these can be incorporated? A lot of you guys will be going down to Florida for NABC and will experience a good portion of these actions on your way. I think we could all stand to be a little nicer to each other, and treat other people with respect and consideration and be able to receive that in return. After all, we want people to think that beekeepers are as sweet as their products, right? BC

Sunflowers in South Dakota.



Florida orange groves.

Visiting WI – gotta get some cheese curds!

Knowledge Speaks

•

Wisdom Listens

Politicians Should Dress Like Race Car Drivers. At Least We'd Know Their Corporate Sponsors.

Smartweeds And Knotweeds As Bee Plants

Connie **Krochmal**

Members Of The Buckwheat Family Can Be Annual, Perennial Or Shrubby

The various smartweeds and knotweeds are found throughout the world. The plants are sometimes known as heart's ease. Worldwide, there are over 200 species.

About 39 species are found in the U.S. with around half of those occurring in the Great Plains. They're major bee plants in the West, Southwest, Plains, and the Southeast. One main difference between the smartweeds and knotweeds is the location of the flowers. On the latter, they arise in the leaf axils while those of the former appear in terminal clusters.

Certain species are better honey plants than others. The honey can vary considerably, according to the location, weather, soil, and plant species.

General Description

Members of the buckwheat family, these can be annual, perennial, or shrubby. They usually grow from a tap root. Certain species are adapted to aquatic situations. Some of the introduced ones have naturalized and become quite invasive.

Japanese knotweed.

The various species vary greatly in growth habit, appearance, and size. Some are quite tall – over 10 feet. These can be erect, climbing, scrambling, or trailing.

The Latin genus name refers to the swollen nodes on the jointed, slightly angled stems. Knotweed is named for the sheath that encircles the nodes on the stems. The plants are called smartweed because they have a sharp, peppery flavor and their plant juice makes one's eyes run.

The leaves are at least an inch in length although in a few cases they're much larger. The shape varies widely from linear to lanceolate or elliptic.

The blossoms typically open from July or so to October, depending on the species. The small, showy, bracted blooms are brightly colored. They open on jointed short pedicels in clusters, spikes, or racemes. The colorful part of the blossom is the perianth, which is often pink or red. The white calyx can have a pink, white, or yellow border.

Habitats

For the most part, these are generally found in bottomlands, low woods, moist spots, and fields. They're also suited to ditches, meadows, coastal areas, dunes, swamps, marshes, clearings, low ground, railroad yards, waste places, thickets, prairies, and disturbed sites. Some are suited to wet spots, while others prefer dry, rocky, or gravelly soils.

Recommended Smartweeds and Knotweed Species for Bees

Of the many species of smartweeds and knotweeds that are found in America, the following are known to be good bee plants.

Bolander's knotweed (*Polygonum bolanderi)*

Native only to California, this species occurs in some areas of the state, including Mt. Hood. It can be found most frequently in Napa Valley, the northern Sierra Nevada and a number of other northern locations. It is most common in the lower foothills but can occur to slightly over 5000 feet elevation.

Its preferred habitats are rocky, open areas, especially stony outcroppings. The species favors sandy loams, but is suited to very poor soils. Bolander's knotweed is intolerant of salt.

Often low growing, this plant can sometimes be shrubby. The tangled, slender, tough, wiry stems can reach about 1½ feet in length. Bolander's knotweed features slender, alternate foliage.

The pink or white blossoms with deeply colored veins open from the upper leaf axils. These emerge from July to October. Although the plant is less common than some knotweeds, it is considered a reliable bee plant.

Bolander's knotweed typically produces a small honey crop even in poor years. There is generally an average of 20 pounds per colony. The amber colored honey is mostly left on the hives for the bees.

Common Knotweed (*Polygonum lapathifolium)*

This species features numerous common names, including smartweed and pale smartweed. Found in all of the lower 48 states in damp places and gardens, this annual was introduced from Europe.

Reaching six feet in height, this has dotted stems with yellow glands. The foliage features clear glands.

Variable in shape, the alternate leaves can be eight inches in length.

The very variable plant is similar to lady's thumb except for the flower color. This one features flowers that vary from light rose or dull pink to whitish-green. Opening during late Summer and Fall, these appear on nodding spikes.

This species can produce a small honey surplus. One particular variety (*Polygonum lapathifolium var. incarnatum)* is known to be a source of honey in some regions.

Giant Knotweed (*Polygonum sachalinense)*

This fast growing, robust, spreading perennial was introduced from Sachalin Island, which was once part of Japan. The plant has naturalized in some states, including Alaska, Washington, Montana, Oregon, California, Idaho, Louisiana, Minnesota, Wisconsin, Illinois, Michigan, Ohio, Kentucky, Tennessee, New England, and from Pennsylvania to North Carolina.

Giant knotweed is quite similar to common knotweed except this species is much taller and rather coarse looking. The angular stems are marked with lengthwise lines. The foliage grows to ten inches in length and is almost as wide. The leaves have a heart shaped base.

The greenish blossoms open from July through September, depending on location, in crowded short clusters from the leaf axils. Bees are particularly fond of the flowers although the plants generally aren't known for yielding large honey surpluses.

The tips and young shoots are eaten cooked and raw in Japan. This is sometimes made into a rhubarb-like, tart tasting sauce. The seeds or fruits are also eaten.

Japanese knotweed (*Polygonum cuspidatum)*

Japanese knotweed is also known as Japanese bamboo, Japanese fleeceflower, and bamboo. Introduced from Japan and China, this fast growing, invasive perennial has naturalized in some areas. It is found in all states except Hawaii, Texas, Arizona, New Mexico, Nevada, Wyoming, North Dakota, Alabama, and Florida.

Usually shrubby, Japanese knotweed is a vigorous plant that forms dense colonies. It spreads mostly by rhizomes, which can be over 40 feet in length. Sometimes, the offshoots spread as well. Several varieties of the plant can be found.

Smartweed.

Reaching 10 feet in height, this plant features erect, stout, smooth, hollow, jointed, grayish, mottled stems that resemble bamboo. During the Spring, the young shoots can be cooked as a vegetable.

The Latin species name refers to the abruptly pointed foliage. Generally alternate, the leaves, which grow to six inches in length and feature scalloped edges, can vary in shape. Often they're heart shaped at the base.

This species is quite floriferous and is covered with small flowers, up to ½-inch in length. The whitish green blossoms, which lack petals, feature five sepals and a winged calyx. These open from May to October or so.

More numerous on the upper part of the plant, they open terminally in six-inch-long terminal clusters or in racemes from the leaf axils. Opening on separate plants, the female blossoms droop, while the males are erect.

Well liked by bees, the blossoms provide bee forage when little else is available. The amber honey has a pleasing flavor.

Lady's Thumb (*Polygonum persicaria)*

This is sometimes called heart's ease, spotted knotweed, and spotted lady's thumb. Introduced from Europe, this has naturalized in all states except Hawaii, particularly in damp or disturbed sites. It commonly occurs in all regions. There are several varieties of this annual. The plant spreads by seed.

Reaching three feet in height, this has forked or branched, erect, reddish stems that are swollen at the base. Sometimes, they're hairy, especially along the fringed sheaths.

Resembling those of peach trees, the sticky, slightly rough leaves are easily identified by a dark blotch, which was once described as resembling a lady's thumb print, in the center of the leaf. Up to six inches in length, the foliage can be oval or lanceolate. The tender, young leaves and stems are eaten raw or cooked.

Lady's thumb blooms from June through frost. The blossoms emerge on terminal flower panicles that contain a number of crowded flower spikes, up to two inches long, which are usually interrupted on the lower portion. The blossoms are only ¼ inch or so in length.

The flowers are typically pink but sometimes come in various other shades, including white, green, or purple. Lacking petals, these contain four to six colorful sepals. The calyx is generally pink but can also be purple, green, or white.

One of the best species for bees, this is a very good honey plant. It typically yields 100 to 200 pounds or more of honey per colony. Initially, the aroma can be slightly unpleasant, but it mellows with time.

Tending to granulate easily, this can be white, pink, or various shades of amber. In the comb, it is very white. The flavor is influenced by the weather and soil conditions. The honey quality can vary somewhat. Higher quality ones, which are usually labeled as heart's ease, have a mild, pleasing taste. The others, known as smartweed honey, are usually darker colored and stronger flavored.

Longroot smartweed (*Polygonum amphibium)*

This variable perennial is found in many areas of the country. It occurs in both aquatic and terrestrial habitats.

The terrestrial forms are typically found along shores, swamps, prairies, meadows, ditches, and harbors.

Its stems can be hairy. This features long, slender, lanceolate leaves. The foliage can be rough on both surfaces and quite hairy. The pinkish blossoms open from June through September on terminal spikes.

One particular variety (*Polygonum amphibium var. emersum)* is called pinkweed, water smartweed, heart's ease, and tannin plant. It is known to be an excellent bee plant.

Pennsylvania smartweed (*Polygonum pensylvanicum)*

Sometimes called pinkweed, this species is found in all states except Hawaii, Utah, Idaho, and Washington. It occurs most frequently in moist and wet soils.

Spreading by seed, this annual reaches five feet in height. The branched, erect or ascending, jointed, sticky, reddish stems, often hairy, are swollen at the nodes. Sheaths surround the lower part of the stems.

Either alternate or opposite, the thick, shiny leaves, six inches in length, can be hairy. They can vary in shape.

Opening from May through October, the abundant flowers, ¼ inch in length, open on crowded racemes or spikes, about 2½ inches long. The blossoms are usually pink or rose, but are sometimes white. Lacking petals, these feature showy sepals and a pink calyx. The female flowers can open on separate flower spikes. Pennsylvania smartweed produces lots of pollen.

Native Americans used Pennsylvania smartweed for medicinal purposes.

Silver fleece vine (*Polygonum aubertii)*

Also called silver lace vine, this bee plant is closely related to the smartweeds and knotweeds. The fast growing, slightly woody, twining, deciduous plant has stems that can grow up to 20 feet annually. Hardy to zone 4, this Asian introduction has escaped from cultivation in some areas and is typically found along fences and walls.

The very tiny, pale green foliage is often heart-shaped. This very floriferous plant is covered with scented flowers that open in dense clusters for several weeks during late Summer. Bees favor the flowers, which are sources of nectar and pollen although the plants aren't known to yield honey.

Water smartweed.

Water Smartweed (*Polygonym punctatum)*

Sometimes called dotted smartweed, this species is found in all of the lower 48 states except Nevada and Utah. It grows in swamps, low ground, wet places, moist meadows, and along shores.

An annual or perennial, this arises from tough rootstocks. It can be slightly over three feet in height. Water smartweed can assume a loosely spreading growth habit.

The firm, dark green, lance-oblong to broadly lanceolate foliage is over an inch wide and nearly 5½ inches long. The leaves are covered with dotted glands, which can be clear or colored.

Water smartweed blooms from July through October. The blossoms open on spikes that contain a number of panicles. The calyx, which is dotted with glands, is usually white with green but is occasionally rose.

This species is an especially good bee plant, particularly in the East. In California, it has been known to yield a lower quality honey that is darker in color.

A number of water smartweed varieties occur in some areas. Some are branched and grow to less than a foot in height. One particular variety (*Polygonum punctatum var. punctatum)* is an excellent honey plant. It is known as dotted smartweed. BC

Power Point Presentations

Ann **Harman**

Once upon a time there were colored photo slides and simple slide projectors, used by scientists, beekeepers and ordinary people. The scientists could make illegible slides of graphs and tables of information. Beekeepers took fuzzy pictures of fuzzy bees. Ordinary people bored their friends and neighbors with vacation photos. The slides and slide projectors worked just fine if you overlooked the occasional upsidedown slide and the projector bulb that burned out midway through the presentation.

Fast forward to today (actually since 1990 when Power Point first appeared) and scientists are now making illegible slides of graphs and tables of information. Beekeepers are flooding their audiences with endless fuzzy information about fuzzy bees. Ordinary people are boring friends and neighbors with cell phone photos of their vacation so Power Points are not for them.

The Internet is filled with tutorials, ready-to-use formats, everything anyone wants to make a good Power Point (PP). Even books on composing PP are available. Yet all this information seems to be overlooked by anyone asked to give a presentation. Yes, some good PP have been shown but the vast majority are poor for a variety of reasons. Let's find out about the basics of making a good Power Point.

Unlike many of the old fashioned slides, Power Point puts words on the screen for all to see. The audience is going to read those – no, make that – attempt to read the words. More about that later. However **you** are not going to read your Points out loud. There is nothing more boring than having the speaker read what is on the screen. Most of the audience has just read it.

First of all, you need to consider the audience. With scientists talking to scientists the graphs, charts and scientific terms are the language of science, understandable to that audience. However many of those presentations fail in preparation. Scientists talking to beekeepers need to modify their language of science. Beekeepers talking to beekeepers have and use their own language. But beekeepers talking to non-beekeepers also need to modify their beekeeping language. Unfamiliar words are visible on the screen. If the audience is pondering the unfamiliar terms while you, the speaker, are talking, you've lost your audience.

Now we are going to consider something that many do not realize. As you sit in front of your computer or laptop screen while composing your PP, the light is coming from the back, shining through essentially from the back of your slide to your eyes. You pack up your laptop and arrive at the venue, plug all the cables in, turn on the projector and voila! Your PP is projected onto a screen. (We'll cover using walls as screens later.) Now the light is from the front, bouncing off the screen to your eyes.

Does the backlight vs. frontlight make a difference? Oh wow! It certainly does. You just composed a slide with a black background with a red line and red words. On your computer this slide positively glows! The audience will be impressed! Well, no. They can hardly read the red line and red words on a black background on the frontlit screen. I once sat through a presentation (from a bee scientist actually) that had yellow lettering on a white background. From my seat in the fourth row the screen appeared white with peculiar very pale areas here and there. I am sure when being composed on the computer the yellow appeared a glowing liquid gold on a white background, very visible when backlit

Very pale backgrounds, such as very pale blue or green or yellow, become much more pale when frontlit from projection. The very pale blue disappears into a vague greyish color as do the green and yellow. There is absolutely nothing wrong with black letters. They are visible! Isn't that what you wish to achieve?

Perhaps now we need to consider the venue. Some large facilities, well-designed for presentations may have rear-projection (backlit) screens. But do not depend on them. Just prepare for frontlit screens and your PP will appear legible. Consider the size of the room. You may be speaking in a small church meeting room where the screen will be only 20 feet from the back row of seats. Or you are in a hotel meeting room where the back rows are more than 50 or 100 feet from the screen. No matter the distance, your slides must be legible.

What about the church meeting hall with its sort-of-beige walls and no screen? Be prepared for that. Your photos of bees and plants will look a bit muddy. That can't be helped. If you know in advance you can make a copy of your beautiful light green background slides and change to a white background and use black letters. Don't fuss if it is not as elegant as you had hoped; you were asked to present information.

Computers and the projectors have become more compatible. Not

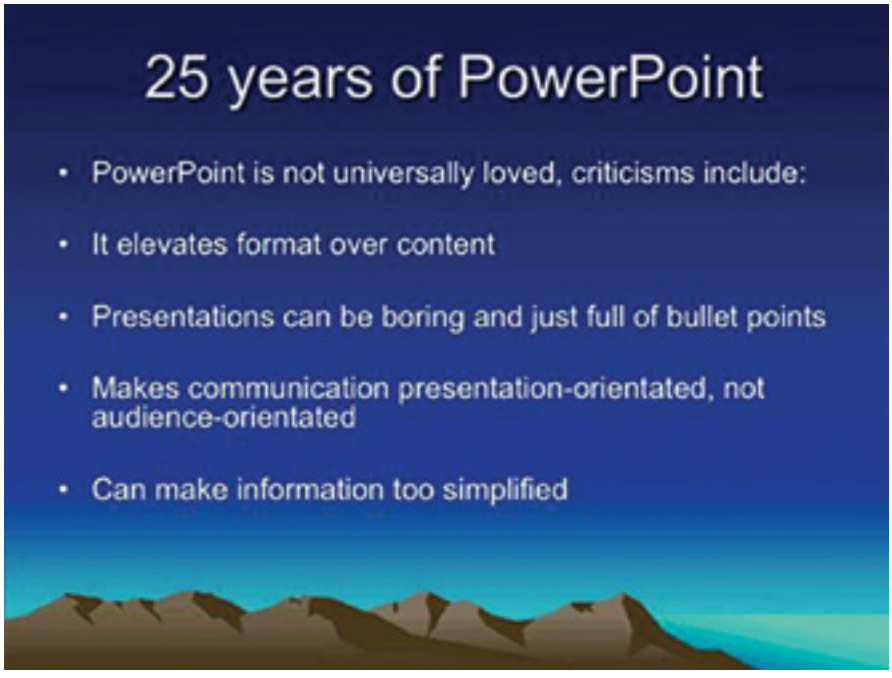
too long ago any given laptop or its flash drive (thumb drive, stick) just would not 'speak' to any given projector. Although the cables were connected nothing happened. The audience was entertained by a growing number of helpful people offering different laptops and much advice. Perhaps something worked, perhaps not. Still today there is the niggling thought 'what if....'

Quite nice projectors are available today at very affordable prices. If you give a number of PP you might wish to buy a projector. You can then see, on a wall of your home, what your finished Power Point will look like. If you see a slide that needs fixing you can do that before your audience sees it. I highly recommend purchasing a projector. Then find a small, wheeled, cheap suitcase and carry everything with you for your presentation. Please add a long extension cord or two. The wall socket can be quite far from where you will be standing. Now you have the assurance that everything will work smoothly and properly.

What if you do not have a projector? Arrive at the meeting place early, in enough time to set everything up and try out a few slides. What if you are flying to the meeting? In either of these situations you can put your PP on a stick and send it to the program organizer and request that it be tried on the equipment you will be using. If everything works, you're all set. If the PP is not compatible then you have time to fix the problem before the meeting. Take a stick with you anyway just in case they misplace the one you sent. Yes, all that is worth the bother.

Now it's time to compose a good Power Point. You have a huge choice of backgrounds, most of them fussy and distracting. Some are even not particularly compatible with frontlighting. Consider anything from just plain white to a plain pale color, compatible with your topic. Choose a font, one that is plain, easy to read from a distance. Remember your audience is not sitting in front of your computer but is 'miles away' – 20 to 100 feet or more. Good fonts are Arial, Calibri, Helvetica, Lucida. Look at them in normal and in bold. Now choose a font color. Yes, you can have black. It can be seen at a distance. You can try combinations such as a medium yellow font on a dark blue background. Font size? Big. Yes, you have plenty of room for Big on a slide. Just remember two things: backlit/frontlit and distance to audience.

The initial slide is the title of your presentation. This slide can have a 'decoration.' That can be a photo, drawing, something compatible with your subject. All the rest of the slides will have a title giving a brief statement of the topic you will be discussing. Put the title in all capital letters. Then in the body of the slide use upper and lower case, as appropriate. The title font size will generally be larger than the font size in the body of the slide.



To construct the body of the Power Point slide it is important to consider part of that name – Point. Your slides will be showing a Point or Points that you will be discussing. These Points will be only one or a very few words. Why? The audience is focusing on the slide to read it. Your Point is simply your topic for the next few minutes. The few words are to remind you what to say, to keep you on track to stay within the allotted time for your presentation. The title of the slide must relate to the text on the slide. Otherwise you have lost your audience. They will be wondering why the slide title and text are not related.

The text of the slide, one to a few words per line, should be limited to three lines – three thoughts – three Points that you are discussing. They should be nicely spaced, font size Big (perhaps 36 pt) and each can have a sub-Point or not. The text can have bullets or not. If you need more than three lines make another slide. Well, four line would be acceptable but not more!

Now, the title and these three Points need Animation. (That's a PP term for how the words, the lines, the Point will enter onto, act and exit from the slide.) Unfortunately your choice of actions is from a long list, most of which are a bit silly. The Animation is going to put your Points on the screen individually, yes, one at a time, **not all at once.** When something appears on the screen the audience is attracted to that and will read it. Put everything on the slide at once and you've lost your audience. You are talking about the first Point. They are reading all the Points.

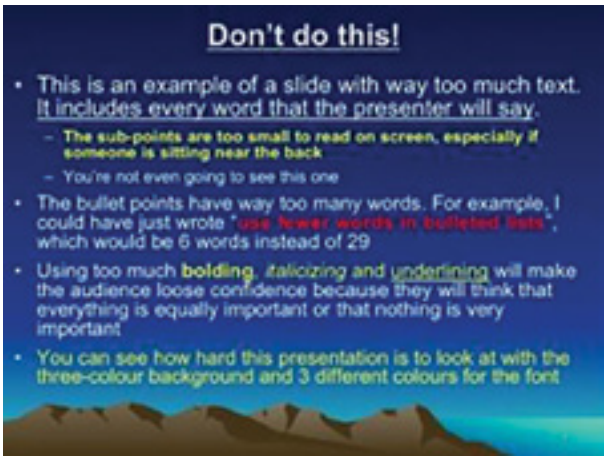
Keep the Animation sensible. 'Appear' does just that, quietly. However, you might choose an occasional different one. That does give a bit of variety to the presentation. Yes, there can be occasions when a dramatic entry or exit fits what you are talking about. A bit of experimentation is worth the time.

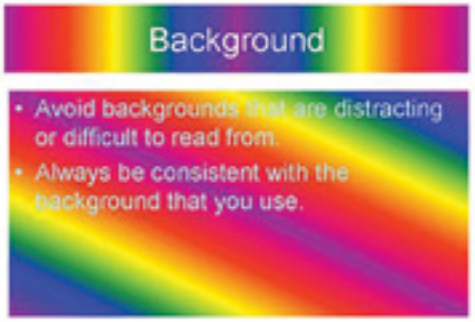
Let's consider photos and drawings. Is the original photo in focus? If not, keep in mind that enlargement on the screen will emphasize the fuzziness. Is the photo of a tiny darkish bee crawling into a hole in the side of very large dark tree bark? The person in the fifth row sees a large dark blob. Is a diagram drawn

with spidery fine lines to illustrate some place or action? Those spidery lines lose visibility with increasing distance to the screen. If you do not own a projector to see problems then arrive early at the meeting. Go to the back row and have someone else just click through your slides. You will learn a lot.

Now to consider ClipArt! The world is full of ClipArt – some free, others for sale. Photos, cartoons, realistic items, stylized items, colorful, bland, big, little. And more! Yes, use ClipArt when and where appropriate. A bit of humor from a cartoon, where appropriate. Something that illustrates your Point, certainly. Don't overdo. If you use something from another source than the commercial ClipArt, respect copyrights and trademarks! Ask permission to use something that is useful to your PP. You can use your own photos and drawings. Just make certain they will be visible to the audience. You can be easily fooled when sitting in front of your laptop.

You can also add a video or music to your PP. Please practice using these tools a number of times before the meeting. At home you sat in front of your computer and fiddled around, finally getting the video to work. Your audience does not need your fiddling and muttering for several minutes. By the time your spectacular video finally appears the audience has forgotten why it pertains to the slide. Also keep in mind the distance to the audience. A tiny bee interacting with another tiny bee may be seen as a tiny jiggling blob from 75 feet away.





What about graphs – you know, those drawings with an 'x' axis and a 'y' axis and lines going across and up and down. Scientists speak in graphs. Others do not. If you absolutely need a graph keep it simple, very, very simple. Limit the number of lines to one or two. Quickly explain any ups or downs or staying flat. Bar charts are easier and quicker to understand provided the number of bars clustered together is limited to two or three. The audience can easily see that a tall bar means 'more' and a short bar means 'less.' Too many bars clustered together take too much time to sort out. Keep the bar charts simple and they can add information to your presentation.

Slides that acknowledge or thank a number of people or institutions can definitely have all that information on one slide with no Animation. These frequently are either at the beginning, after the title slide, or end of the Power Point before your final slide.

The final slide can ask for questions or simply say 'thank you.' It can also contain something else, such as a relevant photo or item from ClipArt.

Now you have finished your Power Point. Almost. You know the time allotted for your presentation. Get your laptop set on the initial slide. Note the time. Now stand up and present your PP out loud to your dog or cat (they tend to sleep through it). Note the time you finish. If too short or too long, and any glitches, now is the time to fix it.

Off you go to the meeting. Good luck! Your audience will appreciate your information. BC

Ann Harman gives talks all over the world, and keeps her bees in Flint Hill, Virginia.

INFRARED

THE NEXT GENERATION IN COLONY MANAGEMENT

Jerry **Bromenshenk**

Inspecting the Hive

Have you ever wished that you could check your bees without having to suit up, get the smoker going, and dismantle each hive for inspection? How about in the winter, when it's too cold to inspect bees without chilling the cluster? Or maybe, you want to remove a bee colony from a wall or ceiling, but don't know where it is or how big it is?

Television shows and movies portray spying on people behind walls. That's a microwave technology, expensive, not readily available, and not yet adapted to looking at beehives. Infrared imaging, on the other hand, has been used to image bee colonies, although it is not true through the wall imaging.

Objects, including living organisms, emit energy as electromagnetic radiation (heat) and light. The full range of wavelengths, extending from gamma rays to long radio waves, is referred to as the electromagnetic spectrum. Colors that we see are only a very small part of the light spectrum. We can't see the IR light from a television remote, and we feel infrared radiation from heat lamps and electric heaters. IR or thermal cameras image the surface heat emitted and reflected by objects.

First developed and used by the military in Korea, thermal cameras were used to find things like a tank covered by a camouflage net. The net makes the weapon invisible to most people, unless you are color blind like my father. Since his visual perception of the world was different, this masking failed to fool him; although he couldn't see cherries on a tree except when the round shape was highlighted against the sky.

In the same way that heat from a tank can be easily imaged by an IR camera, the heat of the cluster of bees in a beehive that is radiated from the outside surface of a beehive can be imaged by an IR camera. It's not truly through the wall imaging, but if the cluster is reasonably strong, it's heat signature can be readily seen and sized. Properly used, an IR camera will almost always detect a strong cluster, but it may miss a weak or small cluster, particularly if the cluster inside the hive is far from the hive surface at which the camera is aimed. Also, frames full of honey retain heat, so a full frame or two on the outside of the cluster may mask the cluster from that vantage point.

A colony cluster has a distinctive shape and heat gradient, with the hottest part in the center core. A

queenless colony usually yields a diffuse heat pattern, since the bees aren't clustering tightly, if there is little or no brood. Side views can be misleading, especially if there are full frames of honey next to the wall of the box. The best imaging position is from directly in front or behind a hive and down from the top, if there aren't honey supers above the brood nest. Since honey retains heat and reflected sunlight masks emitted heat from inside the hive, the best time of day to use an IR camera is early morning, when night time ambient air temperatures are lowest and clustering tightest.

Why IR and Why Now?

We started testing IR cameras for hive inspections for the U.S. army about a decade ago. Our objective was to allow a soldier to quickly determine whether colonies used for surveillance and search purposes were adequately strong and healthy. The first camera that we used was a custom-built, research grade instrument, built by our colleagues at Montana State University at a cost of tens of thousands of dollars.

In 2011, we published our findings and tips for use. At the time, the only thing about IR cameras that was readily available to most beekeepers was the article itself. Some contractors were using hand-held IR cameras for energy audits, a few plumbers and electricians were using them, and law and fire departments had begun to purchase and use them. But the price was just too high to be cost effective for beekeepers.

I purchased my first, low-cost, thermal camera for about $4,000. Then in 2013 the IR camera market rapidly shifted from military applications to other sales, with a 23% non-military sales increase projected by 2018. By October 2014, entry level cameras were being sold at retail prices of $1,000 or less, and in 2015, the price barriers dropped to $400-700, with at least one camera currently available for $150. At the same time, off-the-shelf availability, ruggedness, image quality, and camera options increased dramatically. Prices have dropped precipitously and overall camera features and quality have dramatically increased; much like we've seen with laptop computers.

Pitfalls

First, and most importantly, buying an IR camera does not automatically make you a thermographer. You need to learn how to use the camera, and never forget, it only measures heat at the surface of the beehive. Factors like distance from the hive, wind, rain, snow affect accuracy. Also, the material composition, wood versus plastic or foam, the thickness of the hive wall, and the color of the hive will alter camera temperature readings. Higher end cameras provide adjustments to compensate; lower end point and shoot cameras normally don't.

Second, if you buy your camera from a reputable IR camera distributor for companies such as FLIR or Fluke, their technical staff should know their product line well, but do not expect them to know anything about applying this technology to bees and beehives.

Also, be careful of "new to the market" visible thermometers. If it's surprisingly low cost and is referred to as a dual-spot, imaging, or visual thermometer, it probably will not work for your purposes. Many of these entry level visual thermometers only measure temperatures on two or more points, then generate a picture that approximates the temperature gradient on the surface. Prices for these visual thermometers range from about $130-400; but this technology is not going to do the job you need.

Selecting a Camera

Over the next few months, I intend to review cameras from simple point and shoot to full featured auto-focus cameras with interchangeable lenses. I'll also provide

detailed instructions for use. If you must have a camera right now, I recommend renting. You can rent by the day or week from online sources, some contractor equipment suppliers, and in some locations, even box stores like Home Depot. Before you buy or rent, I highly recommend that you contact me for guidance at **beeresearch@aol.com**.

In choosing a camera appropriate for your use, the major considerations are thermal resolution and sensitivity. Digital thermal cameras tend to have low resolution compared to visible digital color cameras. Low end thermal cameras have about 4,800 pixels. Each of these pixels should provide a calibrated temperature data point. For imaging beehives, 4,800 data points may be a bit marginal. The next step up are cameras with 19,200 - 19,600 pixels. Better cameras have 76,800 pixels – that's a lot of temperature data points in an image, maybe more than you need. The more pixels the finer the thermal detail and the easier it is for a human eye to detect subtle changes like evidenced by a queenless colony. Top-end, hand-held, IR cameras bump up the resolution to more than 700,000 pixels; at a hefty price. As per sensitivity, virtually all cameras other than the least expensive should be adequate for imaging beehives. The combination of higher resolutions and sensitivities will improve accuracy at greater distances. Low resolution cameras are only accurate when close, within a few feet of the colony being imaged.

If you really want to buy an entry level IR camera, there are four low cost options: 1) the original FLIR ONE that snaps onto the back of an i5 iPhone (and only the i5 models), 2) the newer FLIR ONE camera dongles that plug into the Lightning and microUSB port of a iOS or android phone or tablet, 3) the competing IR plug-in camera from SEEK, and 4) the FLIR C2 point-n-shoot camera. The first three options keep overall costs low by using the digital camera in a phone or tablet to increase detail, but these phone-based IR add-ons rapidly consume batteries (I get less than an hour), and the small plug-in camera dongle is likely to be quickly lost or broken. The current bargain is the first generation FLIR ONE for $150 while online supplies last, but it only fits the i5 series iPhone. The snap on camera makes for a sleek camera combination.

I'm impressed by the FLIR C2. This pocket-sized, entry level, point-n-shoot camera is ruggedized, with a hole for a lanyard in one corner. Thread a strong cord through it, put the cord around your neck, and the camera in your shirt pocket. This is a dedicated camera aimed at construction workers who need to spot things in the infrared but don't necessarily have thousands of dollars to spend. At $699, it is more expensive than the $250-300 second generation FLIR ONE or SEEK XR which also require a camera or tablet. The C2 has its own built-in visible camera. SEEK has just released a similar camera

that looks like a small GPS, but I haven't had a chance to test it.

Finally, if you must have a camera immediately, purchase a visible/IR camera combination; now standard across the entire FLIR line and also available in some other brands. Aim a thermal (IR) camera at a sheet of paper, you'll only see a blank heat image. Add a visible camera to the IR camera, and you'll be able to read printing superimposed on the heat image. That's useful for reading hive identification labels. Dual visible/IR cameras usually allow you to overlay visible and thermal pictures to outline things, and store both images as separate pictures, one visible, and one IR for reference.

In following articles, I'll cover what IR cameras can be used for, more on how to use them, and review specific cameras by cost and brand, covering and comparing what can be a bewildering choice of features. BC

Shaw, J.A.; Nugent, P.W.; Johnson, J.; Bromenshenk, J.J.; Henderson, C.B.; Debnam, S. *Long-wave infrared imaging for non-invasive beehive population assessment.* Opt. Express 2011. *19*, 399-408.

Yole Development. *The faster shift toward commercial applications is due to military budget cuts and growing commercial markets. Uncooled infrared imaging technology and market trends report.* September, 2013.

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GLEANINGS

JANUARY 2016 • ALL THE NEWS THAT FITS

OBITUARY

Charles D. Michener, 1918-2015, University of Kansas Professor Emeritus of Entomology and of Systematics and Ecology. He was considered the world's foremost authority on the natural history, classification, and evolution of the world's 20,000 species of bees.

He was born in Pasadena, California. His parents were serious amateur ornithologists. He helped his parents capture, band, and release 45,000 birds in the course of their studies.

He attended Berkeley beginning in 1936, completing his PhD in 1941. In 1944 his dissertation was published as a monograph by the American Museum of Natural History. This work, "Comparative External Morphology, Phylogeny, and a Classification of the Bees," began what a colleague termed "the Michener era" in bee studies.

His fascination was not with honey bees, but with with the many thousands of other species of bees worldwide that do not live in large colonies or make honey, but which are essential pollinators for both the natural environment and crops. Mich accepted a position at the American Museum of Natural History in New York City as curator of butterflies and moths.

At KU he was able to return full-time to the study of bees and settled into a routine of teaching, research, and publishing. Overseas trips to collect examples of the world's bee-fauna. included Brazil, Australia, South Africa, Uganda, Mexico, Costa Rica, Panama, Peru, French Guyana, New Guinea, Fiji, China, and Thailand, as well as the U.S. and Canada.

In 1974, he published *The Social Behavior of the Bees*, which summarized everything then known regarding the development of sociality in bees.

In 2000 he published *Bees of the World*. A thousand pages long, it contains accounts of 16,000 species. Mich published an expanded second edition in 2007, when he was 89. He gave names to 618 previously unknown species and has had 92 species named by others in his honor.

NATIVE BEES EXPOSED TO PESTICIDES

According to the first-ever study of pesticide residues on field-caught bees, native bees are exposed to neonicotinoid insecticides and other pesticides. This report was conducted by the U.S. Geological Survey and published in the journal Science of the Total Environment.

This research focused on native bees, because there is limited information on their exposure to pesticides. In fact, little is known about how toxic these pesticides are to native bee species at the levels detected in the environment. This study did not look at pesticide exposure to honey bees.

"We found that the presence and proximity of nearby agricultural fields was an important factor resulting in the exposure of native bees to pesticides," said USGS scientist Michelle Hladik, report's lead author. "Pesticides were detected in the bees caught in grasslands with no known direct pesticide applications."

Although conservation efforts have been shown by other investigators to benefit pollinators, this study raises questions about the potential for unintended pesticide exposures where various land uses overlap or are in proximity to one another.

The research consisted of collecting native bees from cultivated agricultural fields and grasslands in northeastern CO, processing the composite bee samples to test for 122 different pesticides, as well as 14 chemicals formed by the breakdown of pesticides. Scientists tested for the presence of pesticides both in and on the bees.

The most common pesticide detected was the neonicotinoid insecticide thiamethoxam, which was found in 46 percent of the composite bee samples. Thiamethoxam is used as a seed coating on a variety of different crops. Pesticides were not found in all bee samples, with 15 of the 54 total samples testing negative for the 122 chemicals examined.

Although this study did not investigate the effects of pesticide exposures to native bees, previous toxicological studies have shown that the chemicals do not have to kill the bees to have an adverse effect at the levels of exposure documented here. Neonicotinoids can cause a reduction in population densities and reproductive success, and impair the bees' ability to forage. Follow-up research is being designed to further investigate adverse effects at these exposure levels.

There are about 4,000 native species of bees in the U.S. They pollinate native plants like cherries, blueberries and cranberries, and were here long before European honey bees were brought in by settlers. many native bees are quite efficient crop pollinators, a role that may become more crucially important if honey bees continue to decline.

This paper is a preliminary, field-based reconnaissance study that provides critical information necessary to design more focused research on exposure, uptake and accumulation of pesticides relative to land-use, agricultural practices and pollinator conservation efforts on the landscape. Another USGS study published in August discovered neonicotinoids in in a little more than half of both urban and agricultural streams sampled across the U.S. and Puerto Rico.

"This foundational study is needed to prioritize and design new environmental exposure experiments on the potential for adverse impacts to terrestrial organisms," said Mike Focazio, program coordinator for the USGS Toxic Substances Hydrology Program. "This and other USGS research is helping support the overall goals of the White House Strategy to Promote the Health of Honey Bees and Other Pollinators by helping us understand whether these pesticides, particularly at low levels, pose a risk for pollinators."

Research can be found with the USGS Toxic Substance Hydrology Program webpage or the USGS Pesticide Fate Research project in CA.

BETTERBEE PURCHASES HUMBLE ABODES

In September, the three Betterbee owners and two employees partnered to purchase woodenware company Humble Abodes in Windsor, Maine. Humble Abodes produces quality Eastern White Pine woodenware including frames, boxes, nuc boxes and other select hive components.

Humble Abodes is capable of supplying large quantities of unassembled woodenware to those in need of large or pallet quantities. If you are interested in pricing information call Humble Abodes at 1-877-423-3269; Select, Commercial and Budget grades are available.

Betterbee is excited to introduce a consistent supply of woodenware throughout the year, and to introduce a 3/4" line of equipment. We look forward to working with the existing sta in Windsor, updating the facility, and providing our customers with the woodenware they need.

GRAND OPENING OF EVA: VÉTO-PHARMA HONEY BEE VALUATION CENTER

Surrounded by its partners, Véto-pharma celebrated the inauguration of eva (Espace de Valorisation de l'Abeille or Honey Bee Valuation Center) in Chaillac, conveniently located in the center of France.

Eva's goals are to add value to beekeeping and to the local economy. The 360 square meter building is outfitted with a multitude of tools to promote beekeeping and honey bees.

Véto-pharma has been committed for several years to projects and supportive actions for sustaining beekeepers facing a variety of problems and risks that threaten beekeeping activities and colony survival. The most recent of these projects – Eva – is placed near our pharmaceutical industrial plant where some of our products are produced with the goal of developing and enhancing local beekeeping.

In 2014 an Apiculture Research Center including a testing apiary of 150 colonies and a laboratory supported by a researcher/beekeeper was built.

Eva is a collective honey extraction plant, and an educational space to promote beekeeper trade and enhance beekeeping activity.

The honey extraction plant space provides local beekeepers with reliable tools, in compliance with the best practices of extraction, to improve the quality of honey and the professionalization of beekeeping activity in this region where beekeeping is not well developed. The eva provides two lines for honey extraction: A small line dedicated to small apiaries (1 to 50 hives), and a second semi-automatic dedicated to larger apiaries (up to 300 hives).

The educational space has a living hive, and printed educational materials and videos. Events and activities about beekeeping, honey bee, hive products and beekeeping conferences and technical training will be organized.

Veto-pharma hopes to contribute even more to the valuation of honey bees and beekeeping, and to support the beekeeping industry for tomorrow.

The words of Véto-pharma's president, Raphaèle Massard: "Our objective in the coming months is to fill the Eva with life and to become a beekeeping reference in this area of France. This center is dedicated 100% to beekeeping and complements our 150 colony testing apiary, the project at the heart of our research and development plan to offer new solutions to honey bee health issues."

ANOTHER MANUKA?

A new gold rush is underway in Australia with beekeepers looking for a competitor for New Zealand's lucrative Manuka honey.

The beekeepers are to send researchers samples of their honey collected from local forests of a similar species to the trees to that produce their neighbor's Manuka honey.

Manuka honey is produced by bees whose hives are placed near flowering wild Manuka bushes that grow mostly on New Zealand's North Island. Until 1981, when a scientist found powerful anti-microbial properties, it was classed as a low-grade honey and used in cattle feed.

Now its price has gone through the roof because of the global demand for its antibiotic qualities in treating wounds and other infections.

The Australians figure their chances of finding a competitor are high.

While New Zealand has two species of Leptospermum, earning the industry an estimated NZ$75 million a year, Australia has 83 different species of these types of trees.

The research now underway aims to find which ones will provide honey with the best antibacterial and healing properties.

The project is led by Prof. Liz Harry of the University of Technology Sydney, with assistance from the University of Sydney and the University of the Sunshine Coast.

It is funded by the Rural Industries Research and Development Corp., Capilano Honey Ltd of Australia and Comvita Ltd. Of New Zealand.

Program spokesman Ben Hooper says there has been a huge response to a call for beekeepers to send in Leptospermum honey samples for testing.

"Initial findings from the North Coast and Northern Rivers regions of New South Wales have confirmed Australian honey is just as potent as the manuka from New Zealand, which is an incredible boon for the industry in areas where the trees grow," Hooper says.

"The next step is to identify more sources of these types of honey, which is why researchers will be travelling the country with beekeepers over coming months to collect nectar, plant and honey samples."

Hooper says the research is important because antibiotic resistance is a global health problem, and the industry pipeline for new antibiotics is running dry.

"All honey is antibacterial to a certain extent, but there are special properties in the manuka-type honeys that take them to the next level," he says.

"Honey is steadily emerging in clinics as an alternative treatment for various wound infections, as it has potent antibacterial and healing properties.

"Critically, unlike antibiotics, bacteria cannot develop resistance to medicinal honey. This makes it an essential weapon against major infections like golden staph, E. coli and other superbugs that are becoming untreatable with modern antibiotics." – *Alan Harman*

BIG SUGAR 1, BIG CORN 1, PEOPLE 0

At the end of November the billion dollar sweetener war came to an end. Sugar processers and makers of high fructose corn syrup announced a secret out of court agreement. When the announcement came, they were in the middle of a court battle over is sugar, sugar, or is HFCS different than sugar. Apparently, not.

Sugar processors had sought $1.5 billion in a false advertising claim against corn refiners and agribusinesses giants Archer Daniels Midland and Cargil and others after they tried to rebrand their product – HFCS – as simply corn sugar. Their efforts were rejected by the FDA in 2012 when they found sugar was solid, and HFCS was, well, syrup.

But are they similar? Sugar is sucrose, which is half fructose and half glucose. HFCS is typically 555 fructose and 45% glucose.

The corn people countersued for $530 million, saying they suffered because the sugar industry made false and misleading claims that included a comment that HFCS was as addictive as crack cocaine with junk science associating HFCS with diabetes and obesity. This has been going on for four years.

But the joint statement during the trial seemed to heal all wounds, and attorneys on both sides refused to comment. Neither, it seemed wanted this to go to a jury.

A jury finding, either way, could have provided a model for lawyers looking to take on foods with genetically modified or non-organic ingredients

FLOWERS SPREAD PESTS

Flowers can pose a grave danger to bees by providing a platform of parasites to visiting bees, University of California, Riverside researchers say.

The researchers found four common honey bee and bumblebee parasites dispersed via flowers – *Nosema apis*, which causes a honey bee disease, *Nosema ceranae*, which causes an emergent disease in honey bees and bumblebees, *Crithidia bombi*, responsible for a bumblebee disease and *Apicystis bombi*, mostly found in bumblebees.

These parasites are known to cause, lethargy, dysentery, colony collapse, and queen death in heavily infected bees.

"Flowers are hotspots for parasite spread between and within pollinator populations," says Peter Graystock, a postdoctoral researcher in the university's Department of Entomology.

"Both the flower and bee species play a role in how likely parasite dispersal will occur."

The study, published online in the Proceedings of the Royal Society B, is the first to show that not only can bees disperse parasites around the environment but also that flowers are platforms for a host of pollinator parasites subsequently dispersed onto visiting bees.

"By showing that visits from parasite-carrying bees can turn flowers into parasite platforms, we can say that it is likely that heavily visited flowers may become more 'dirty' with bee parasites," Graystock says.

"Planting more flowers would provide bees with more options, and parasite spread may thus be reduced."

Bees are frequently transported across state and international territories and quarantine and parasite screening usually cover only the screening of host-specific diseases.

But bumblebees can transport honey bee parasites, the research team now has shown, and proposes that increased screening protocols be employed to protect pollinator diversity.

"With some 20,000 bee species, it is a surprise that only recently has research in pollinator health considered the interactions between bee species," Graystock says.

"Our finding may also affect the national and international trade of flowers unless sterilization of parasites on these flowers can be guaranteed. Otherwise flower movements may also be moving pollinator parasites to new territories."

He says commercially imported bumblebees have been found to contain a cocktail of parasites that are harmful to both bumblebees and honey bees.

"We know these commercially imported bumblebees, when given the opportunity, will forage on the same flowers as wild bees and honeybees," he says.

Graystock and his colleagues allowed one species of bee – honey bees or bumblebees – from hives containing parasites to forage on flowers for three hours.

The bees were then removed and a second group of flowers were added to the foraging arena along with colonies of a second bee species, not used before. The new bees then foraged upon both the new and previously foraged flowers for three hours.

All flowers were then sampled to see if parasites had dispersed onto them. Parasites found in the original patch confirmed parasite dispersal by the original hosts. Parasites found in the new group of flowers confirmed the non-target bee was able to disperse the parasites.

Graystock now is looking at how flowers may also be hubs for transmitting not just parasites but also potentially beneficial microbes. He is looking, too, at the role different flowers play on bee survival and development.

Alan Harman

*A bumblebee (*Bombus melanopygus*) in flight towards a pansy flower.* (UC Davis photo by Kathy Keatley Garvey)

CROP DIVERSITY GOOD FOR FARMERS AND BEEKEEPERS

U.S. farmers are growing fewer types of crops than they were 34 years ago and this could have implications for how they fare as changes to the climate evolve.

This is the result of a large-scale study by KS State University, ND State University and the U.S.D.A. which also found that less crop diversity may also be impacting the general ecosystem.

Lead researcher Jonathan Aguilar, a K-State water resources engineer, says the team studied data from 1978 through 2012 across the country's contiguous states and found that at the national level, crop diversity declined over the period.

Croplands comprise about 408 million acres (165 million hectares) or 22% of the total land base in the lower 48 states, so changes in crop species diversity could have a substantial impact, not only on agroecosystem function, but also the function of surrounding natural and urban areas.

Because croplands are typically replanted annually, theoretically crop species diversity can change fairly rapidly. There is the potential for swift positive change, unlike in natural ecosystems, the researchers say in a report in the journal Plos One.

"At the very simplistic level," Aguilar says, "crop diversity is a measure of how many crops in an area could possibly work together to resist, address and adjust to potential widespread crop failures, including natural problems such as pests and diseases, weed pressures, droughts and flood events.

"This could also be viewed as a way to spread potential risks to a producer. Just like in the natural landscape, areas with high diversity tend to be more resilient to external pressures than are areas with low diversity. In other words, diversity provides stability in an area to assure food sustainability."

Although the study showed that crop diversity declined nationally, it wasn't uniform in all regions or in all states.

"There seem to be more dynamics going on in some regions or states," Aguilar says, noting that not all of the factors affecting those regional trends are clear.

For instance, the Heartland Resource Region, which comprises IL, IA, IN and parts of OH, MO, MN, SD, NE and KY and is home to 22% U.S. farms and represents the highest value, 23%, of U.S. production, had the lowest crop diversity.

In contrast to all of the other regions, the Mississippi Portal Region, which includes parts of Louisiana, Mississippi, Kentucky and Arkansas, had significantly higher crop diversity in 2012 than in 1978.

The region called the Fruitful Rim (parts of WA, OR, ID, CA, AZ, TX, FL, GA and SC) and the Northern Crescent (states along the northeast border from part of MN east through WI, MI through to ME and south to NJ and PA) had the most crop diversity.

The data used was specific enough that the researchers were able to quantify crop diversity and trends down to the county level.

"A significant trend of more counties shifting to lower rather than higher crop diversity was detected," the team writes. "The clustering and shifting demonstrates a trend toward crop diversity loss and attendant homogenization of agricultural production systems, which could have far-reaching consequences for provision of ecosystem services associated with agricultural systems as well as food system sustainability.>'

"Biodiversity is important to the ecosystem function," the researchers write. "Biodiversity in agricultural systems is linked to critical ecological processes such as nutrient and water cycling, pest and disease regulation, and degradation of toxic compounds such as pesticides.

"Diverse agroecosystems are more resilient to variable weather resulting from climate change and often hold the greatest potential for such benefits as natural pest control."

The researchers say that during the 20th century, increases in the value of human labor, changes in agricultural policies and the development of agricultural technologies led to increased specialization and scale of production.

Economic and social factors helped drive the adoption of less-diverse cropping systems.

"An important consequence of increased crop homogeneity is the potential for yield instability with anticipated increased unpredictability in weather patterns linked to

Continued on Next Page

HOW DNA AND A SUPERCOMPUTER CAN HELP SUSTAIN HONEY BEE POPULATIONS

New multi-locus metabarcoding approach for pollen analysis uncovers what plants bee species rely on

To uncover what plants honey bees rely on, researchers from The Ohio State University are using the latest DNA sequencing technology and a supercomputer. They spent months collecting pollen from beehives and have developed a multi-locus metabarcoding approach to identify which plants, and what proportions of each, are present in pollen samples.

A single beehive can collect pollen from dozens of different plant species, and this pollen is useful evidence of the hive's foraging behavior and nutrition preferences.

"Knowing the degree to which certain plants are being foraged upon allows us to infer things like the potential for pesticide exposure in a given landscape, the preference of certain plant species over others, and the degree to which certain plant species contribute to the honey bee diet," says graduate student Rodney Richardson. "One of the major interests of our lab is researching honey bee foraging preferences so we can enhance landscapes to sustain robust honey bee populations."

For Richardson and his colleagues, metabarcoding is key to this research. It is a DNA analysis method that enables researchers to identify biological specimens.

Metabarcoding works by comparing short genetic sequence "markers" from unidentified biological specimens to libraries of known reference sequences. It can be used to detect biological contaminants in food and water, characterize animal diets from dung samples, and even test air samples for bacteria and fungal spores. In the case of pollen, it could save researchers countless hours of identifying and counting individual pollen grains under a microscope.

Richardson and his colleagues devised the new metabarcoding method using three specific locations in the genome, or loci, as markers. They found that using multiple loci simultaneously produced the best metabarcoding results for pollen. The entire procedure, including DNA extraction, sequencing, and marker analysis, is described in the November issue of >Applications in Plant Sciences.

To develop the new method, the researchers needed a machine powerful enough to process millions of DNA sequences. For this work, the team turned to the Ohio Supercomputer Center.

"As a researcher, you feel like a kid in a candy store," Richardson says. "You can analyze huge datasets in an instant and experiment with the fast-evolving world of open source bioinformatics software as well as the vast amount of publicly available data from previous studies."

In previous metabarcoding experiments, the researchers worked solely with a marker found in the nuclear genome called ITS2. ITS2 successfully identified plant species present in pollen samples, but it could not produce quantitative measurements of the proportions of each.

While searching for something better, they decided to test two markers from the plastid genome. Pollen was previously thought to rarely contain plastids, but recent studies showed promise for plastid-based barcoding of pollen. Richardson and his colleagues found that the combined data from the two plastid markers, rbcL and matK, successfully correlated with microscopic measurements of pollen abundance.

The new multi-locus metabarcoding method involves all three markers and could serve as a valuable tool for research on the native bee species that comprise local bee communities.

"With a tool like this, we could more easily assess what plants various bee species are relying on, helping to boost their populations as well as the economic and ecological services they provide to our agricultural and natural landscapes." Richardson says, "While the honey bee is seen as our most economically important pollinator, it's only one of several hundred bee species in Ohio, the vast majority of which are greatly understudied in terms of their foraging ecology."

Rodney T. Richardson, Chia-Hua Lin, Juan O. Quijia, Natalia S. Riusech, Karen Goodell, and Reed M. Johnson. 2015. Rank-based characterization of pollen assemblages collected by honey bees using a multi-locus metabarcoding approach. Applications in Plant Sciences 3(11): 1500043. doi:10.3732/apps.1500043.

DRONES & BEER

Drone bees took on a whole new meaning in a Taiwanese brewery.

Taiwan Beer used drones in the shape of giant bees to help deliver its new Honey Beer to office workers.

Taipei office workers who signed up to the drone delivery service received a free supply of the sweet, mead-like brew. Some 15,000 signed up in just 10 days.

The bees hovered outside windows at off ices to announcing the arrival of a van carrying the beer.

The promotion was the brainchild of marketing agency Wunderman Taiwan.

"The liquor market in Taiwan is quite mature and new products are easily overlooked," says Jeff Wen, Wunderman Taiwan vice president of accounts. "Our client had also launched fruit-flavored beer before, and was worried that the new Honey Beer would get lost in the mix. The challenge we faced here was having to draw consumers' attention and create social buzz before the product was even released."

The agency's aim was not only to get people talking about the beer, but also to get them to drink it.

With the buzz created by the drones and other marketing ploys, including blind taste tests, the promotion drew more than 106,000 people visited the brewer's website.

The beer even went out of stock three days before its official launch, but, most importantly for the agency and the brewer, sales of Honey Beer were four times better than all previous Taiwan Beer launches.

Alan Harman

Bee drones announce the arrival of Honey Beer.

Continued From Page 91

climate change. Diverse cropping systems tend to increase farmers' chances of encountering favorable conditions while decreasing the probability of widespread crop failures," the team wrote, citing a study based on long-term data collected in Ontario, Canada.

A simple example would be if a farmer planted part of his acreage to sorghum and the rest to corn. If the growing season was unusually dry and the farmer didn't irrigate, the sorghum would likely fare better, because it's more drought tolerant than corn.

In that example, the farmer has come out better by having diverse crop species than if he had planted all of his acreage to corn, in which case he may have had low or non-existent yields.

In addition to quantifying the changes in crop diversity, Aguilar said, the scientists hoped to spur further studies and research with regard to changing agricultural condition and status.

"The factors that affect crop diversity in North Dakota do not necessarily apply to what is happening here in Kansas," Aguilar says.

"This study also has relevance to other agronomic and environmental issues," he said, adding that the research has already generated inquiries from scientists who are studying weed resistance to herbicides, honey bee "friendliness" of the landscape and agricultural community resilience to pressures such as climate change. – *Alan Harman*

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CALENDAR

♦ARIZONA♦

9th Annual Chemical Free Organic Beekeepers Conference will be held February 26-28 in Oracle.

The cost is $200 and includes two nights lodging, six meals and the meeting.

For information contact Dee Lusby, **deealusby1@aol.com**.

♦ALABAMA♦

The Alabama Cooperative Extension System's 21st Annual Beekeeping Symposium will be held February 6 at the Clanton Conference and Performing Arts Center, 1850 Lay Dam Road, Clanton.

Featured speakers are Marion Ellis and Jennifer Berry. A beginning workshop will be available. Lunch is provided with pre-registration.

For more details and to register visit **https://mellbase.uce.auburn.edu/wconnect**, or contact Paul Mask, 334.844.4450.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2016 Speaker Schedule – January 26: Allision Gillespie, author Hives in the City; February 23: Jonathan Snow, Barnard, TBD; March 29: Dr.John Boyce M.D., Yale, Honey as Medicine; April 26: Roberta Gantz, NYS TBD; May 24: James Wilkes, Hive Tracks – using technology for record keeping;
June 28: Dinner & Silent Auction Meeting; September 27: Brenna Traver, Penn State, Honey Bee Pathogens; October 27: Anne Frey, TBD; November 17: Jennifer Tsuruda, Clemson TBD.

Each month we have timely weekend hands on inspection workshops, bee school, mentor program and more. For dates and locations and more information please visit **www.backyardbeekeepers.com**.

♦GEORGIA♦

Tara Beekeepers Association meet every third Monday at the Georgia Power Building, 752 Main Street, Forest Park at 7:00 p.m.

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

♦ILLINOIS♦

Will County Beekeepers will present an all-day conference – Bee Prepared. Healthy Bees Make Happy Beekeepers – for the beginner and the expert. April 2 at Joliet Junior College, Weitendorf Ag Ed Center, 17840 W. Laraway Road, Joliet.

For more information visit **http://willbees.org/beeprepared**.

♦MICHIGAN♦

The MI Beekeepers Association will hold their Annual Spring Meeting March 11-12 at the Kellogg Hotel and Conference Center at MI State University in East Lansing.

The keynote speaker will be Gary Reuter. Breakouts will be offered for beginners and a microscope session with Zachary Huang.

The cost is $30/one day or $50/both days. Register at **www.michiganbees.org** or pay at the door. Room are available at the hotel for $102/night through February 4 using code 1603MIBEEE when reserving.

The Holland Area Beekeepers' Association (HABA) will hold its annual beginning beekeeping school February 6.

The cost is $40.

Visit **http://hollandbees.org** for details.

♦MISSOURI♦

Eastern MO Beekeepers will host their 9th Annual Workshop February 6 at Maritz in Fenton.

Speakers include James Duever, Mark Dykes, David Westervelt and more. The cost is $85/person or $95 after January 18. Lunch is included.

For more information **info@easternmobeekeepers.com** or 314.669.1828.

♦MONTANA♦

Master Beekeeping Certificate endorsed by MT State Beekeepers Association; The American Honey Producers Association and Project Apis m.

For more information visit **www.UMT.EDU/BEE**.

♦NEW YORK♦

Geneva Bee Conference will be held March 19 at the Scandling Center in the Vandervort Room at Hobart and William Smith Colleges, 300 Pulteney Street, Geneva.

Speakers include Mike Palmer and Tom Seeley. There will be four breakout sessions and an evening social.

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

♦OHIO♦

Medina County Beekeepers Association meets the third Monday of the month at the Root Candle Company in Medina, OH. The meeting starts at 7:00 p.m. January 18 the speaker is Jim Tew.

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

Medina County Beekeepers will hold their annual Spring Beekeeping Classes starting in February, at Root Candle, 623 West Liberty Street, Medina.

The instructor is Kim Flottum. Classes will be held on Monday evenings. Watch for details.

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

♦PENNSYLVANIA♦

The Western PA Beekeeping Seminar will be February 19-20, 2016 at Doubletree by Hilton, Mars, PA.

Speakers include Jeff Harris, Diana Sammataro and Christine Grosinger.

For information contact Lyn Szymkiewicz at **lynszym@comcast.net** or 412.855.0710.

♦TEXAS♦

Austin Area Beekeepers Association will hold its 5th annual Beekeeping Seminar January 16 at the J.J. Pickle Research Campus, 10100 Burnet Road, Austin.

Pre-registration is $40. Speakers include Juliana Rangel-Posada, Mark Dykes, Mark Hedley and more.

For more info and to register for this event go to **http://aabaseminar2016.eventbrite.com**.

♦WISCONSIN♦

Beekeeping Classes, Madison – Beginners Classes will repeat through the Spring. Second Step Class is in March. The fee is $50 and covers handouts, coffee, and more. Individual hands-on mentoring available, $20/two hours in the apiary.

Classes are held at the Dane Co. Extension Building.

For more information and registration contact Jeanne Hansen 608.244.5094 or **jeannielabeannie@yahoo.com**.

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

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When I picked up the phone, the voice on the other end simply said, "Wassup?!"

"Maybe you should tell me," I said. This was my truck driver, en route to pick up a pollen shipment bound for California. "I'll be there in about an hour, maybe," he said.

I wondered where he was. "What direction are you coming from?" I inquired.

"Direction?" he said. "I don't know about no direction."

"No, I mean are you coming from the East or the West?" I queried.

"All's I know is my next town is called Meeker," he said.

"Ah, you're coming from the Northwest," I observed. "Call me when you get to Rifle," and I'll load up my pickup and meet you at the McDonald's in New Castle."

I ship pollen when my two garage chest freezers fill up. I always meet the truck at McDonald's. Easy to find, easy to get to, big-truck parking. But why would my buyer send an empty freezer tractor trailer to pick up fifteen 50-pound boxes of pollen? Because they wanted it bad, that's why. It just seemed like overkill to me. Must cost a fortune. I wished I had a camera when we loaded that pathetic pile of little boxes into the maw of a cavernous truck.

The 20-something driver was a dark, good-natured guy. He talked some serious slang. I pegged him immediately. "What part of East L.A. you from?" I asked.

"East L.A.?" he laughed, "What, you think I'm Mexican?"

Now he had me on my heels. "Maybe," I ventured.

"I live in Texas, but before that I came from India," he said.

He seemed pretty culturally adapted to this country, or maybe they say "Wassup?" in India, too. He apparently does pretty well in the States. He owned that truck. You have to admire some of these immigrants. They hustle.

Afterwards, I told my environmentalist sidekick Marilyn about the big truck and its tiny load. "That's a sin," she said.

"Next time we'll get a photo." I said.

In October I had another load ready. A third party dispatcher scheduled pickups and deliveries for independent truckers. My contact person was a pleasant enough woman who nonetheless had a hard time comprehending that I'm not a company with a fax machine, a warehouse, forklifts and an office assistant, or that I don't own a cell phone. When she made out the delivery's bill of lading, she asked the name of my company.

"It's just me," I said. "I don't really have a company name."

She paused. "Well, I'm going to put down 'Ed Colby, Inc.,' she said.

"I'm not incorporated," I said. "Just put 'Ed Colby.' She didn't say anything, and when she sent me the bill of lading, it listed the shipper as "McDonald's," because, well, McDonald's is a company, I guess. When I called back to correct this error, she said, "Well, that was where you shipped from, right?"

There was no point arguing. I gave up and went along. I try not to sweat the petty stuff. There is a certain just-fill-in-all-the-blanks bureaucratic mentality. It doesn't matter what you put in the blanks. The information can be wrong. That's O.K. Just so they're all filled in.

On delivery day, when I picked up the phone, again, the voice on the other end said, "Wassup?!" I guess this is what truckers all say when they call you, because this was a different trucker. His English was only rudimentary, but he had directions to McDonald's.

This time I brought along Marilyn and her camera. When we spotted a slender gentleman in a bright blue turban outside McDonald's, I felt confident I had my man. His name was Amrit. The outside of his truck cab read "Amrit Trucking Company". When I asked what country he came from, he replied, "India."

"Are you a Sikh?" I asked. "Yes," he said. He said he's been in the U.S. for seven years. I took an instant liking to the man. He radiated a kind of goodness, or was it merely innocence?

After we loaded the truck, he muttered something. Marilyn asked him to repeat himself, but I still didn't get it. Marilyn said, "He wants to know if he should turn on the refrigeration."

"Please, zero to 10 below would be perfect," I said. He merely nodded.

This time there were only 12 boxes. I asked him if he had more pick ups to make on his trip to California. "No," he said, "This is my load."

He was in a hurry to leave. I shook his hand. It's odd how a stranger can pull on you. Someone you can barely understand! I wanted to bring him home to Marilyn's cooking. At the very least, I wanted tell him, "Welcome to America!" Of course I never did. But I should have.

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