JUN 2006

Bee Culture

WWW.BEECULTURE.COM

A honey bee on a banana blossom in Hawaii. (photo taken by Rico Leffanta)

800.289.7668 • www.BeeCulture.com

Publisher – John Root

Editor – Kim Flottum, Ext. 3214, Kim@BeeCulture.com

Production Coordinator – Kathy Summers, Ext. 3215, Kathy@BeeCulture.com

Circulation & Advertising – Dawn Feagan, Ext. 3220, Dawn@BeeCulture.com

Publication Assistant – Sharon Garceau, Ext. 3255, Sharon@BeeCulture.com

Contributors

Clarence Collison • James E. Tew • Ann Harman
Malcolm T. Sanford • Steve Sheppard
Larry Connor • Connie Krochmal

Subscription Information

U.S., one year, $23.50; two years, $44. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), June 2006, Volume 134, Issue 6, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Contact Information

V800.289.7668 • V330.725.6677 • F330.725.5624 • www.BeeCulture.com • email: info@BeeCulture.com

Advertising

For information on advertising contact Dawn Feagan at 800.289.7668, Ext. 3220

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

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

JUNE 2006 VOLUME 134 NUMBER 6

FEATURES

DEPARTMENTS & COLUMNS

Comments
Suggestions
Criticisms
Kudos, and
anything else

Enjoyed Jacketology

I really enjoyed Charles Simon's article on Yellow Jackets in the March issue of *Bee Culture*. It was very well written, easy to read, and full of great information. I am not a professional, but instead a highly allergic victim. I do a lot of hunting, and I'm usually the individual who sets out on the path that has the yellow jacket nest. Your article taught me a lot, and may help to save my life in the future. I picked up several good pointers from your article, so now I know how to better retreat. I can honestly say that you know more about yellow jackets than any professional I have received information from in the past.

Thank you for the article.

Charles Stanley
Euless, TX

Katrina Update

I just finished reading the March *Bee Culture*. Since you published my letter, we have received another $1,500. I am in the process of trying to find some other beekeepers who need assistance. A sideline beekeeper, Kemp Bush of Laurel, MS has received $500 of this. He lost 100 hives in south LA from Rita and Katrina. If I can find no other beekeepers who need or want assistance I will dispense the additional $1,000 to the previous four who have in no means been compensated for near all their losses.

Harry Fulton
Bureau of Plant Industry/MDAC
harry@mdac.state.ms.us

April 2006 Cover

I keep receiving glowing comments about the *Bee Culture* cover showing the multi-colored pollen in cells. Numerous people have requested copies, from an internist to the director of a neuroscience program. I guess my image is causing quite a stir. I thought I should explain the origins of the image.

The image of the brilliant pollen was taken in one of 12 colonies we have headed by daughters from feral queens. We purchased the queens late last summer from Old Sol Apiaries in Oregon. He raises the queens from his line of survival stock that has incorporated feral bees found in his area in addition to SMR and Russian stock. We have several other hives in our apiary with queens from commercial queen breeders, and none of those hives gathered the same diverse array of pollen. The Old Sol queens seemed to seek out a larger variety of pollen and mixed it so beautifully in their cells, creating swirls of color that remind me of an artist's palette.

We have been very pleased so far with the Old Sol queens. We wintered them in a story and a half (one deep and one medium) of five frame nuc boxes. They all came through the winter extremely well and built out quickly in March. We recently transferred them into ten frame equipment.

Although we used no *Varroa* treatments on these hives, they had no mites in the drone brood we uncapped during the transfer.

So far we have been very happy with the queens and so thought we would share this information. You can read more about Old Sol's queen breeding program at www.oldsolenterprises.com.

Information on the prints of the cover. We can make original photographic prints of the April cover shot in the following sizes – 8x10 ($20), 12x18 ($30) and 16x20 ($50), plus shipping. I can be reached via the email address below. However, I will be leaving for Germany on my scholarship as of late May. Unfortunately, I cannot easily fill orders from Germany, but I intend to return briefly for a few weeks around Thanksgiving. If people would like to order the prints as holiday gifts and I have their orders and payments in by October, I can have prints made up and shipped out at the end of November/early December, just in time for the holiday season.

Kirsten Traynor
kirsten@mdbee.com

Editor, 623 W. Liberty St.,
Medina, OH 44256
KIM@BEECULTURE.COM

The Arno Family

It was that time of year again, building frames. Living in the suburbs of Chicago, it is rare to meet beekeepers, especially any that have as many generations still involved as in our family. Working full time for Natalie and going to school for Elizabeth doesn't leave us a lot of time, but every weekend we are visiting our small family farm in Sterling, IL. On the farm, Elizabeth and I continue to learn everything we can about animals, gardens, and most importantly, beekeeping, all from dad/grandpa and grandpa/great grandpa.

Ranging in age from 86 to 14, we are four generations still working and loving our hobby.

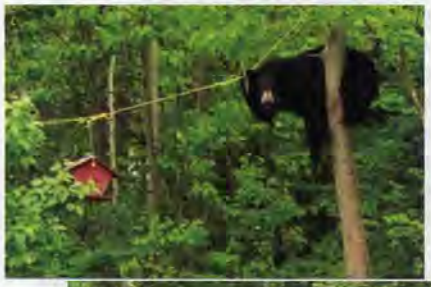
Natalie Saylor
Chicago, IL

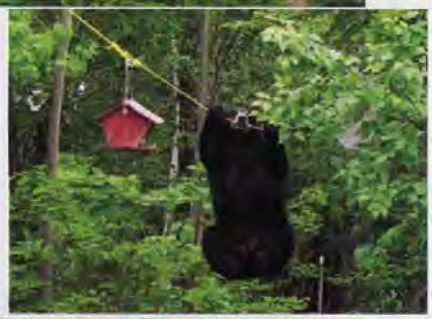
The Arno Family – Elizabeth, Natalie, George and Bob.

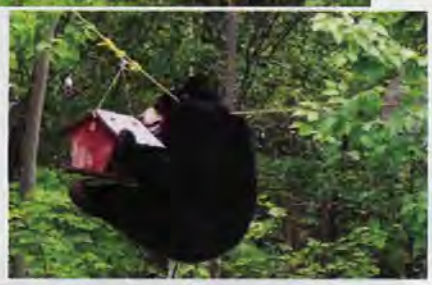
The Bird Feeder!

Ever worry about *squirrels* getting into the bird feeder? Well look at this. Good grief, what is that line made of!!!

Doug McRory
Ontario Provincial Apiarist







Queen Grafting

Dear Dr. Connor,

I enjoyed your article in the March issue of *Bee Culture* on the grafting method of cell production. You gave me some pretty good ideas, a couple of questions if I may ask:

Q-The cell cups are placed on a base made of what? And how do you mount them? And why do you use this type of mount instead of using one that goes in a hole or pushes into a saw slot of a frame bar?

A-The base is usually made of wood. Kelley makes a nice one that can take the small cells or the flat-based cells. They are mounted onto the grafting bar with hot beeswax. As far as the ones with the saw slot, I see no problem with them, and they would be faster to prepare.

Q-You also talked about artificial insemination. How long does an AI queen last? In the north where temps are too unpredictable for queens to properly mate early in the year, (referring to April), with drones for a successful mated queen, could a person raise the queens and artificially inseminate them? Being weather dependent do you think this would be a good method for raising early queens?

A-Instrumentlly inseminated queens will last as long as a naturally mated queen when all the insemination procedures are working correctly. The key is to give the queens a full amount of semen, usually from eight or more drones. While you could produce queens early in the season – say in April in New England or Utah, your problem will be the drones. Right now I suspect the only adult drones in most colonies in my area are the ones included in package bees installed in the past few days. A few colonies have started drone production, and if they are starting to emerge right now, that colony is probably very powerful and getting ready to swarm. None will be ready to mate for another week or two at the earliest, and the main push for drones will not take place until early May. That fact aside, the headaches of instrumental insemination should be left to professionals, and let the 'average joe and jane' beekeepers rely on overwintering queens from the previous season in nuc colonies. That is the growing trend in this area.

Q-I've been able to raise the queens but not get them properly mated, they are normally superceded quite quickly.

A-I've written a great deal about the problems of drones and getting good mating. Early supersedure implies to me that there is something wrong with the queen production/ queen mating system. Wait until swarm season to produce queens and drones for successful mating. A delay of a few weeks can make a tremendous difference. If you have problems at that time of year, when the colonies are primed for queen cell production, then I would start looking for some other explanation for your problems.

Q-You show a photo of a five frame nuc divided so the nuc holds four frames and 1 divider board? Or are you using a ten frame box with a divider board and five frames on each side of the divider board?

A-There are two common systems using 10-frame boxes. One uses a thin divider with five frames on both sides. The other uses a Brother Adam-inispired feeder that divides the two colonies so each nucleus has one end of the feeder to itself. Because of the bulk of the feeder, this will only hold 4 frames. Since I figure the feeder equals a frame of honey, it is an equal trade off. But if you don't have frames of honey, use the feeder design.

Q-When using a divider board do the queens try to get to each other? And when the queen is piping does this confuse the bees on the other side of the divider boards?

A-I don't know the biology of the communications between the two units, and I'd like to see some basic research on this subject. The reason to use the double nuc is to share the warmth during buildup. If you overwinter nucs, the two colonies form a joint cluster in the center of the box, even though the bees and queens cannot contact each other. Inspections I made in early April showed that, and the double nucs were successful at about 75%, while full sized colonies nearly all died. I am impressed with the potential for these double nucs in the future of northern beekeeping.

Q-I appreciated your article and I'm looking forward to more articles like this. I hope to hear from you soon.

A-Thanks. I'm sending a copy of this to Kim Flottum. Perhaps he will share some of this with the readers of BC. I enjoy hearing from readers who pose thoughtful questions like yours.

Lee Knight
Lehi, UT

INNER COVER

College Kids; and, Plastic, Again

I had the distinct pleasure of addressing a group of college kids recently. I hardly ever get to talk to folks in that age group, and it was definitely an illuminating experience. I was invited by, of all people, a dorm supervisor in charge of routinely providing educational experiences for kids living in dorms. It's a program to offer experiences and opportunities to kids at Kent State that they probably wouldn't have otherwise. Kent is a fairly small town, and if you don't have a car to get out of town, there's not a lot to do.

So, the supervisor had recently been interviewed by the Campus newspaper about his beekeeping experiences, and the questions he got about bees and beekeeping from students, and the attention the article got from faculty and staff, inspired him to bring in a speaker with a bit more experience than he had. He invited me anyway.

All he wanted, he said, was a short talk on beginning beekeeping and leave a lot of time for questions and answers. And some bees. And some equipment to show and tell. And some honey to taste.

For a whole lot of reasons the traveling road show observation hive didn't work that evening, so we put some workers and some drones in a couple of jars, brought a hive and frames and drawn comb, pollen, honey, candles, bee suits, plastic and beeswax foundation, hive tools and more and set up shop in one of the dorm lounge areas. In the back on a table we put the honey, and from somewhere biscuits showed up, and about 15 minutes late, 20 or 30 students ambled in. Over the course of the hour plus time I was there, several more came in, late, but interested.

I gave the typical spiel about pollination, numbers of beekeepers, honey from flowers, honey bee management through the season, imported honey, beekeeping equipment....and in between, answered a multitude of questions.

One student, an organic chemistry major, wanted to know how the enzyme invertase worked to make two, six carbon sugars in honey from the 12 carbon sugar in nectar. Another wanted to know if her black friend would have any more trouble keeping bees than me, a white person. Yet another wanted to know where bees went to the bathroom, while others asked lots of questions about honey colors and flavors.

There were several questions on the size and the scope of the beekeeping industry in the U. S., and the world, and likelihood of success if one were to become a commercial beekeeper was discussed. What technologies were used in the business...and gps, budget management, mechanization, and immigrant labor were all brought up, and, certainly, how many bees were in a hive...at the beginning of the season when a package was installed, at the height of the season and peak population, and how many over wintered.

Every one of the questions was well thought out, and I could see the wheels turning when these fresh minds were presented with a situation they had not before encountered. They left well entertained, certainly more knowledgeable and appreciative of agriculture in general, and beekeeping and honey bees in particular, and, though still novices, a bit of a connoisseur in the world of honey flavors and colors. The half hour talk turned into an hour and a half, nobody left, and people kept coming in the whole time. Several even came up and thanked me for the information. It was me who should have been thanking them for taking the time to learn and appreciate. Too few do.

•

Some time ago I discussed on these pages the value of using preassembled frames with plastic foundation. Every time I do that I get clobbered by the traditionalists that yell that if you can't put together frames, especially using that critical tenth nail, then you aren't a beekeeper worth talking to. I disagreed then, and I disagree now. Though some may enjoy the time and effort it takes to assemble hundreds of frames, and put in the required wires, and insert the wax foundation and get it embedded, I don't. It's not a fun activity. At all. And I don't ever have the time to do all that, anyway.

But, the next argument goes....bees don't like that plastic stuff. And I shoot right back that they like it just fine if you use it correctly. And there is a way to use it correctly. Here's how. When using plastic foundation, the first and cardinal rule is put it on a colony during a honey flow, and don't give them a choice in what they have. Don't mix wax and plastic in the same super, for goodness sake, and don't put a wax super above a plastic super. And make sure there is a honey flow on...if not, feed, feed, feed sugar or corn syrup. To build comb bees need carbohydrate...honey or sugar, or they won't build.

They also respond better if there is some beeswax on the plastic sheet. Enough beeswax to see and enough beeswax to feel. I don't know how the manufactures can put on a layer of beeswax as thin as they do. It's measured in molecules, I think. Actually, the amount the manufacturers use approaches criminal, I think. Rather than "Beeswax coated" in their catalogs they should say, "We walked by a box of beeswax when we were making this stuff". The reasoning of course is cost. It would cost more if they used more, they say. Well, people would buy more plastic foundation if it worked better, and it would work better if there was more wax on it. So if there was more demand, there would be more made and the cost would go down and people would buy even more, right? Am I missing something here? I must be.

OK. So they won't put on more wax. You have to do it yourself. How? Lots of ways, actually, but the best I've heard is to melt some up, get a drip pan, hold your frame at about a 45 degree angle and use a sponge paint brush, as wide as you can find. Dip it in the hot wax, paint it on. One, or two (depending on the size of the frame) swipes per side and you're done. But this certainly defeats the purpose of buying already assembled frames, doesn't it?

Suppliers, why not add more wax? Charge more for the wax? In fact, why not sell several styles of frames...no wax at all; some wax, and lots of wax. Don't skimp on the wax. The bees will like it better, it will work better, beekeepers will like plastic foundation better, and you'll sell more. What could be better?

And those commercial folks who don't care? They don't care if there's wax because they only use it when there's a honey flow on. It's the rest of us that care. Use more wax. Please.

June...summer time and the beekeeping is busy. Keep your hive tool sharp, your smoker lit, and make sure your bees have room.

Kim Flottum

For Your Reading Pleasure

Asian Honey Bees – Biology, Conservation, and Human Interactions, by Benjamin P. Oldroyd and Siriwat Wongsiri, Harvard University Press, Hard Cover, 340 pages, ISBN 0-674-02195-9, $59.95.

Benjamin Oldroyd, well known for his work on the genetics and evolution of worker sterility, has teamed with Siriwat Wongsiri, a pioneer of the study of bees in Thailand, to provide a comparative work synthesizing the rapidly expanding Asian honey bee literature. After introducing the species, the authors review evolution and speciation, division of labor, communication, and nest defense. They underscore the pressures colonies face from pathogens, parasites, and predators – including man – and detail the long and amazing history of the honey hunt. This book provides a cornerstone for future investigations on these species, insights into the evolution across species, and a direction for conservation efforts to protect these keystone species of Asia's tropical forests.

Kim Flottum

Fatal Harvest, Island Press, ISBN: 1-55963-941-5, Soft Cover, 12" x 13", over 250 color photos. $45. This book also comes in a text only version, $16.95 and a hard cover version, $75.

Fatal Harvest takes an unprecedented look at our current ecologically destructive agricultural system and offers a compelling vision for an organic and environmentally safer way of producing the food we eat. The *Fatal Harvest* reader brings together in an affordable paperback edition the essays included in *Fatal Harvest*, offering a concise overview of the failings of industrial agriculture and approaches to creating a more healthful and sustainable food system.

The large format *The Fatal Harvest: The Tragedy of Industrial Agriculture*, which includes more than 250 profound and startling photographs, is available in hardcover and paperback.

Bee by Claire Preston (Reaktion Books Ltd., 2006) is the kind of book I was looking for when I started beekeeping, a general overview of bees as they have appeared in history, art, and society. Preston presents the true, the absurd and everything in between about honey bees by tracing their reality, mythology, and folklore.

The first page of *Bee* begins "una apis, nulla apis-one bee is no bee". Anyone who has worked with bees knows the truth of this proverb which translates to "a singular bee cannot exist and function." Ms. Preston shows us immediately she has a sense of humor and understands the fundamental biology of the insect she is writing about by telling her readers her book is inaptly named (note: this book is one of a series on animals and all are titled in the singular, i.e. *Crow*, *Dog*, *Cockroach*, *Bear*, etc.). She then proceeds to deftly weave the history, biology, poetry, and culture of *apis melifera* together into an amusing, though short, discourse.

Throughout history bees have been both worshiped for their industry and apparent selflessness, and more recently feared for their potential to "mindless, monstrously violent" behavior. Preston makes an astute observation when she reminds us while bees were one of the first domesticated "animals", they have never truly been domesticated.

The history of beekeeping is covered from the honey-hunters of Spain 6,000 years ago to the Hittites and Greeks, and up through modern beekeeping. After a brief and accurate biology lesson on bees (one photo caption does mistakenly state the queen "is marked by a dot on her head" though the red dot clearly lies on her thorax.) Preston goes on to describe how man has used the perceived order and virtues of the hive as morals which man should adopt. Preston uses the writings of the Greek poets Hesiod and Vergil, the Napolionic French Republic, even Marxist revolutionaries to illustrate how people have manipulated bees and their behavior to fit nearly any and every tradition and political moment.

There is a fascinating chapter on the aesthetic bee where Ms. Preston shows the influence bees have had on religion, art, and our economies. Samuel Hartlib estimated in the mid seventeenth century that England's GNP from honey and wax was £300,000. From the Alhambra Palace in Granada to Gaudi's hive inspired cupola at the Palacio Güell in Barcelona, the beehive hairdos of the 1960s, RimskyGorsakov's *Flight of the Bumble-Bee*, even the U.S. Navy's fighting "SeaBees", man has borrowed the amazing building ability of honey bees as well as co-opted their various behaviors and physiognomy for his own end.

In my experience most beekeepers do not anthromophize their bees, yet large segments of the general populace do. This wild insect which has existed since the time of the dinosaurs is turned into a cute, cuddly insect with human-like characteristics. Romper Room, a children's TV show from the 60s & 70s, is one example. They exhorted children to be good, like a "Do-Bee" instead of bad and grouchy like a "Don't Bee." Since the 1950s Hollywood has had a proverbial field day with bees, usually portraying them as anything and everything except what they actually are. Bees have been depicted as gigantic bees in the movie *Mysterious Island*, capable of capturing and incapacitating men; then there are the killer bees who leave no marks when they sting in *The Swarm*; as well as the eco-warrior bees who invade the U.S. in *The Bees* to try to "save the environment and redress the unjust exploitation of their species."

Preston concludes that the longer one keeps bees, the more there is to learn from them. She describes the fictional character Sherlock Holmes who retired to tend bees, as well as the real life Sir Edmund Hillary who did the same (though she fails to mention that Sir Edmund actually grew up in a beekeeping family and worked their apiary in order to bulk up for his future career of mountain climbing).

I recommend, between supering for the nectar flow, moving bees for pollination or harvesting honey, sitting down to enjoy Preston's new book *Bee*.

Cynthia Allen

JUNE – REGIONAL HONEY PRICE REPORT

7th Annual Store Survey

The average number of rows of honey on grocery store shelves, across all regions this year remained essentially unchanged at 13.3, and is off just one row from the seven year average of 14.5. But it is down a hair.

There has been some consolidation of packer businesses recently and small, regional packers are either getting bigger and better and leaner and meaner, or they are beginning to disappear.

The average number of brands of honey taking up those 13+ rows this year is 5.6, down from last year's seven year high of 6.2, but much higher than the seven year average of 4.8 brands.

Local honey in grocery stores remains essentially unchanged at 2.5 brands/store and just a tad above the seven year average of 2.3.

It's the national brands that changed this year, down a full row/store, on average, to only 2.2. It's hard to compete with good local and cheaper store brands, that's for sure. But even store brands haven't changed at 1.7/store. The money is on store brands expanding though, so watch those.

All brands with foreign honey on the label – this is getting to be a joke, and no one seems to care. Unlabeled origin is the rule, rather than pride in quality – too bad more isn't being done to enforce those rules. Maybe there really is less.

Shelf space assignments have changed a little, but no much. The biggest drop was for the 12 oz sizes – from nearly 29% to 20%, a screeching halt to its rapid climb in securing more and more space. Still, 20% of all honey space for, mostly, bears is pretty commanding. If we could get them off the top shelf they'd do better.

The biggest gains were in pints, quarts, and half pounders, but still, they're not much. Cremed honey made some gains, and comb honey, too. They're still niche players though.

One pounders were down. Not much, but enough to catch attention. In fact, there seems a blip in the trend toward smaller, easier to use containers, toward larger, almost always glass containers. Interesting.

The trend in speciality containers dropped, too, but we didn't ask what those containers were.

Percent of Shelf Space

	2003	2004	2005	2006
6 oz.	2%	2.6%	3.0%	3.0%
1/2# gl/pl	8.3	8.3	6.9	10.0
12 oz. pl.	20.4	23.3	28.7	20.3
1#	19.9	18.7	19.0	17.7
2#	12.2	11.5	10.8	10.0
Pint	6.3	4.2	5.0	6.0
Quart	5.6	3.3	4.1	7.0
5#	4.0	5.7	3.1	4.9
Cremed	9.1	7.5	6.6	8.8
Comb	2.2	4.6	1.6	2.6
Other	7.6	7.6	10.4	8.5
	97.6	**97.3**	**99.2**	**100**

(Not 100% due to rounding.)

This month reporters visited local grocery stores to survey honey space. On average, there were:

	#Rows	#Brands	#Local Brands	#National Brands	#Store Brands	# With Foreign Honey
2006	13.3	5.6	2.5	2.2	1.7	1.7
2005	13.6	6.2	2.6	3.1	1.7	2.6
2004	18.4	4.2	1.9	-	1.4	1.8
2003	13.0	3.0	1.4	-	1.0	0.8
2002	15.6	4.6	2.3	-	1.0	3.5
2001	12.7	4.6	1.7	-	1.5	6.9
2000	13.5	5.2	3.8	-	3.1	5.5

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last	Last
Extracted honey sold bulk to Packers or Processors													**Range**	**Avg.**	**Month**	**Yr.**
Wholesale Bulk																
55 gal. Light	0.93	0.95	1.01	1.15	1.03	1.00	0.85	0.93	0.93	0.85	0.95	1.05	0.85-1.15	0.97	0.90	1.01
55 gal. Amber	1.05	0.85	1.00	1.25	0.76	0.95	0.75	1.10	0.71	1.05	0.94	1.05	0.71-1.25	0.96	0.87	0.89
60# Light (retail)	105.00	114.93	109.51	98.38	115.00	100.00	95.50	102.58	109.51	115.00	129.00	100.00	95.50-129.00	107.87	105.84	111.29
60# Amber (retail)	105.00	107.87	106.94	96.94	102.00	105.00	90.00	102.50	100.00	106.94	125.00	100.00	90.00-125.00	104.01	101.70	102.99
Wholesale - Case Lots																
1/2# 24's	41.32	52.78	43.66	38.70	49.25	43.66	40.32	43.66	43.66	35.76	41.15	43.66	35.76-52.78	43.13	42.19	41.55
1# 24's	54.96	68.23	66.14	56.94	77.50	56.00	63.09	62.40	63.00	77.76	72.50	67.20	54.96-77.76	65.48	63.02	61.10
2# 12's	54.84	69.90	58.27	52.37	63.96	58.27	55.58	66.00	46.75	57.84	39.95	58.80	39.95-69.90	56.88	54.75	55.02
12 oz. Plas. 24's	57.12	62.10	51.13	49.48	66.69	60.00	48.96	57.15	41.50	47.64	66.00	52.80	41.50-66.69	55.05	52.98	54.23
5# 6's	61.68	72.98	62.88	57.13	62.88	72.00	60.36	54.15	62.88	56.43	58.00	62.88	54.15-72.98	62.02	60.07	59.60
Quarts 12's	67.00	100.35	85.50	75.67	83.64	77.67	81.13	76.00	83.00	109.15	81.70	72.00	67.00-109.15	82.73	85.58	82.92
Pints 12's	48.00	49.95	60.85	53.00	49.20	47.67	59.70	44.00	48.75	49.50	50.00	48.00	44.00-60.85	50.72	49.57	49.68
Retail Honey Prices																
1/2#	2.33	2.59	2.50	2.54	2.40	2.50	2.35	1.99	1.99	2.60	2.52	2.50	1.99-2.60	2.40	2.50	2.44
12 oz. Plastic	3.25	3.21	3.19	3.13	3.25	3.25	2.92	3.19	2.90	3.08	3.32	3.15	2.90-3.32	3.15	3.26	3.15
1 lb. Glass	3.60	3.70	3.90	4.22	3.65	3.75	3.50	3.90	3.30	4.20	4.18	4.00	3.30-4.22	3.82	3.91	3.79
2 lb. Glass	7.00	6.82	5.94	6.08	6.60	5.94	5.53	8.25	5.44	6.29	5.84	7.00	5.44-8.25	6.39	6.52	6.44
Pint	6.75	6.88	5.38	5.70	5.30	4.80	5.70	4.93	5.25	4.76	4.74	6.00	4.74-6.88	5.51	5.25	5.53
Quart	10.50	8.55	9.59	8.25	8.20	8.00	9.33	8.46	8.63	10.18	8.39	9.00	8.00-10.50	8.92	8.90	9.20
5 lb. Glass	13.00	14.20	13.40	13.49	13.40	14.00	14.49	15.99	16.95	13.36	11.65	13.40	11.65-16.95	13.94	12.95	13.51
1# Cream	4.38	5.33	5.24	4.51	3.79	4.00	5.13	4.54	2.99	4.91	4.65	4.75	2.99-5.33	4.52	4.69	4.84
1# Comb	4.50	4.91	5.16	5.20	4.10	4.50	4.85	4.50	5.16	5.50	6.50	6.00	4.10-6.50	5.07	5.19	5.66
Ross Round	4.90	3.90	4.93	5.63	5.15	3.10	5.31	5.11	4.95	5.63	6.88	5.00	3.10-6.88	5.04	5.10	4.79
Wax (Light)	1.92	2.28	2.52	1.72	1.85	2.00	2.03	2.50	1.92	2.52	2.30	2.00	1.72-2.52	2.13	2.12	2.36
Wax (Dark)	1.82	2.07	2.46	1.75	4.46	1.00	2.50	2.00	1.46	2.46	1.70	1.00	1.00-4.46	2.06	1.73	1.89
Poll. Fee/Col.	51.00	66.33	70.60	39.33	45.00	50.00	49.57	60.00	100.00	70.60	85.00	45.00	39.33-100.00	61.04	56.50	47.28

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"The addition of honey bees had no significant impact on the solitary bee species for any of the measured variables related to reproductive success."

From an original homeland that encompassed Africa, Europe and parts of Asia, the honey bee *Apis mellifera* was distributed nearly worldwide by well-intentioned beekeepers. In the case of North America, introduced honey bees from Europe were providing honey to the colonists of Virginia by the early 1600's. Following many of these introductions, feral populations of honey bees became established in various countries and subsequent generations of beekeepers took the presence of wild honey bee population for granted. In the United States, disagreement later arose over whether the honey bee had been introduced from the Old World or was instead native to the Americas (Belknap 1792, Barton 1793). More recently, there has been concern that the movement of honey bees into areas from which they were historically absent may have had a detrimental effect on native pollinators, especially solitary bees, through competition for resources. In North America, given that honey bees have been present for almost 400 years and that humans have made substantial changes to the habitat and ecological setting of native bees, it has been difficult to conduct direct research on the question of competitive impacts. However, a recent paper from a group of Australian researchers provides new information on the potential effect of introduced *Apis mellifera* on reproductive success of a native bee (Paini et al, 2005).

The authors initially inform us that honey bees have been present in Australia for 180 years and now exist, in part, as a feral population. Previous studies generally attempted to measure the overlap in resource utilization or flower visitation between honey bees and native bees as an indirect measure of the potential for competition. However, in the study reported here, the authors conducted a "Before-After Control-Impact" experiment. To do this, the authors evaluated the reproductive success of a native solitary bee (without a scientific name at the time, but referred to as *Megachile* sp.323) in locations from Western Australia with and without the addition of honey bees. In each of the experimental sites, two hives of honey bees were added to simulate the effect of a feral population and in the control sites, no honey bees were added. Sites were located a minimum of 1.5 km apart. Reproductive success of the solitary bees at each site was measured by collecting occupied trap nests placed within the study areas and counting the number of progeny and other reproductive parameters. Trap nests are drilled sections of wood that provide a potential nesting site for solitary bee females. The researchers also measured "resource overlap" by identifying the pollens used by the different bee species at each location.

The authors found that the addition of two colonies of honey bees to a site resulted in a significantly higher density of honey bees compared to control sites where honey bees were not placed. The analysis of resource overlap showed that one particular plant used by *Megachile* sp. 323 as a source for both pollen and nectar was also used by honey bees as a source for nectar, but only for the early period of assessment. Thus, they report that the level of resource overlap between the two species was high for a short time during the experiment. However, the authors point out that resource overlap "only determines the potential for competition and does not measure competition directly." In contrast, the reproductive success of the solitary bee species was quite similar at both experimental sites (with added honey bees) and control sites. In fact, the addition of honey bees had no significant impact on the solitary bee species for any of the measured variables related to reproductive success, including the overall production of male and female progeny, the number of progeny per nest, sex ratio and percentage of nests with dead progeny. Paini and colleagues concluded that over a short time period at least, a feral population of honey bees did not negatively affect the native solitary bee *Megachile* sp 323. The authors cautioned that, while the sensitivity of their approach was adequate, the short term nature of their experiment "may not truly reflect the result of the long term presence of honey bees." They suggest that future studies consider methods to evalu-

ate the potential impact of feral honey bees on native solitary bees over a longer time period. While the larger question of how introduced honey bees impact native pollinators cannot be answered by a study of a single native solitary bee species in a single country, the analytical methods employed by Paini et al. should be widely applicable to further investigation of the issue.

Dr. W. Steve Sheppard, Thurber Chair, Department of Entomology, WA State University, Pullman, WA 99164-6382, shepp@mail.wsu.edu; www.apis.wsu.edu.

Belknap, J. 1792. *On the question, whether the honey-bee is native of America?* In: A Discourse, Intended to Commemorate the Discovery of America by Christopher Columbus. Pp 117-124. Belknap and Hall, Boston.

Barton, B.S. 1793. *An inquiry into the question, whether the Apis mellifera, or true honey-bee, is native of America.* Transactions of the American Philosophical Society, 3:241-261.

Paini, D.R., Williams, M.R. and Roberts, J.D. 2005. *No short-term impact of honey bees on the reproductive success of an Australian native bee.* Apidologie, 36: 613-621.

Malcolm T Sanford

At Last, A Standard of Identity for Honey

"The adoption of a honey identity will go a long way in helping the beekeeping industry bring the marketing of its principal sweet up to modern standards with associated protection and control."

Considering the amount of time humans have been involved with honey it may seem ludicrous to some that no standard definition exists. In retrospect, however, there are a good many reasons for this situation.

A standard product means that practically any sample of a pool of that product is representative and has the same characteristics as the rest of those in the pool. In fact, a whole arena of one of the activities that drives much of the modern economy exhibits this phenomenon, the commodities futures market. Take soybeans, which are traded in hundreds of thousands of bushels on a daily basis. The trade presupposes that a contract (5,000 bushels) of soybeans is pretty much the same whether produced in Brazil, the United States or elsewhere. The same is true of other commodities such as frozen orange juice concentrate and silver bullion.

There is no honey futures market because the product is too variable to support one. It's difficult to compare tupelo honey produced in the Southeastern United States with clover extracted from the Midwestern section of the country. Thus, a contract of honey might include either one or none of these sweets, and the characteristics and price would be different.

A general definition of honey has been in use for a long time: "A sweet viscous material produced by bees from the nectar of flowers, composed largely of a mixture of dextrose (glucose or grape sugar) and levulose (fructose or fruit sugar) dissolved in about 17 percent water; contains small amounts of sucrose, mineral matter, vitamins, proteins, and enzymes."[1] A variation of this also is found in nature, called honeydew honey or simply honeydew: "An excreted material from insects in the order Homoptera (aphids) which feed on plant sap; since it contains almost 90% sugar, it is collected by bees and stored as honeydew honey."[2]

Because of its inherent value, there have always been attempts to water honey down or add materials that are less expensive and achieve an increased overall price by selling what is purportedly a "pure" product. This "economic adulteration" of honey has been going on a long time and a quick glance through the history books shows some of the creative and some times not very benign substances that have been added to honey. Most of these, including cane and glucose syrup, were fairly easy to detect, however, the rise of high fructose corn syrup meant that a substance extremely close in structure could be added with little chance of detection. This adulteration took on epidemic proportions in the 1980s when it was discovered that some products labeled as pure honey had up to 80 percent corn syrup. When one can sell corn syrup costing $.14 a pound in a container of honey costing $.50 a pound, it doesn't take much figuring to see the incentive for adulterating the product.

Fortunately, wholesale addition of high fructose corn syrup has been somewhat curtailed, but certainly economic adulteration continues to this day. However, new problems have emerged to challenge honey marketers. One of the most significant is contamination by products used in the beekeeping industry to treat pests and diseases of bees. Recently, Chinese honey was eliminated from the world market because it was found to contain a powerful antibiotic, chloramphenicol. Argentinian honey was subsequently banned from much of its market when nitrofuran antibiotics were detected.

In the United States, another situation has surfaced that concerns many beekeepers and packers. This is mislabeling or misbranding products, where the label implies a product contains a good amount of honey, when in fact the amount present is miniscule, or even absent. Among the prime culprits are breakfast cereals, but others too have been identified and constitute what one wag has published as "The Wall of Shame."[2]

The current situation can no longer be tolerated by honey marketers and so a resolute group met December 2-4, 2005 in San Antonio, Texas. Sponsored by the National Honey Board, this "Honey Industry Roundtable," which included the U.S. largest beekeeping associations, honey cooperatives, and packers and dealers, promulgated several resolutions, among which was: "To support legislative action on a 'honey standard.' Co-opting parts of the CODEX standard as a U.S. standard was discussed as a possible alternative to the traditional 'standard of identity'."[3]

The Food and Drug Administration was the agency asked to develop a standard of identity for honey. In this vein it is instructive to read the history of the development of the "Pure Food and Drug Act of 1906," modified in 1938 and later years. It turns out to be exhibited in "the peanut butter and jelly sandwich, which both assembled and contained the basic ingredients of the United States' food standards program in the twentieth century. Scrutiny of the jelly

standard illustrates the use of food standards to insure value to consumers. The bread standards illustrate the short lived use of food standards of identity to control the safety of ingredients as well as their ongoing use to enhance the nutritive value of standardized foods. And the peanut butter hearings demonstrate the wisdom of abandoning earlier strict standards in favor of a more dynamic food standards agenda. The peanut butter and jelly sandwich, itself a staple in American life, will enter the 21st century as a living history lesson on the importance of regulating, but not over-regulating a wide variety of foodstuffs in a dynamic marketplace."[4]

Given the above history, the FDA has discouraged adoption of new standards in recent years, saying to the American Beekeeping Federation and others that many of the standards for processed foods were aimed at reducing competition.[5] However, the petition was submitted under a different section of the law that seeks to coordinate U.S. with international standards. Thus, a variation of the Codex Alimentarius has been recommended. "The Codex Alimentarius Commission was created in 1963 by Food and Agricultural Organization of the United Nations (FAO) and World Health Organization (WHO) to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme. The main purposes of this Programme are protecting health of the consumers and ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations." [6]

The U.S. standard lists some deviations from the Codex standard, including:

1. Deleting voluntary annex to the Codex as not applicable.
2. Deleting subsections (a) and (b) from section 3.4 moisture content, no honey should exceed 23% moisture content.
3. Deleting contaminants as these are controlled by U.S. laws and regulations.
4. Deleting hygiene as these too are controlled by U.S. laws and regulations.
5. Deleting labeling and 6.2 labeling of non-retail containers.
6. Deleting methods of sampling and analysis as these could be different in the U.S.

"The FDA discouraged adoption of new standards in recent years, saying to the American Beekeeping Federation and others that many of the standards for processed foods were aimed at reducing competition."

The American Beekeeping Federation (ABF) has announced that the petition asking the U.S. Food and Drug Administration to develop a Standard of Identity for honey was filed on March 7. The petition was signed by ABF, American Honey Producers Association, Sioux Honey Association, National Honey Packers & Dealers Association, and Western States Honey Packers & Dealers Association. The full text is available from the ABF web site.[7]

Comments can be sent supporting the honey standard now, according to the ABF. It is not necessary to wait until the comment period soon to be noticed in the Federal Register. There is yet to be a dedicated email portal for comments, but your company comments can be sent electronically [or otherwise] to FDA at the address below:

Reference: Docket # 2006P-0101.
Contact:
Division of Dockets Management
Food and Drug Administration
5630 Fishers Lane, Room 1061 (HFA-305)
Rockville, MD, 20852
Email: fdadockets@oc.fda.gov
Phone: 301-827-6860
Fax: 301-827-6870
TTY/TDD Users: 1-800-735-2258

I have in my possession a letter written by Florida Commissioner of Agriculture, Charles Bronson March 31, 2006 supporting the petition. In part it states:

"Mislabeled or misbranded products bearing the word honey in the product name or front label induce customers to purchase these products under the false belief that they are either 100% honey or contain honey as their principal sweetener. The increasing presence in the market of these misbranded products threatens the image of honey as a pure, natural and healthy sweetener. Beekeepers work extremely hard to harvest the high quality product that consumers have come to expect. FDA's adoption of a Standard of Honey will not only help guard against the negative pricing impacts that come from deceptive labeling by an inferior product but will give regulators, both FDA and state agencies, the tools they need to facilitate regulatory actions on these products, particularly in cases of adulteration or fraud. The adoption of this standard will go a long way toward ensuring the viability of our domestic honey industry in years to come."

The leadership of the Florida State Beekeepers Association is now formulating a response in support of the petition. It is hoped that others in the beekeeping industry will follow suit.

According to the ABF, adoption of the proposal is expected to take a year or longer. Its progress can be tracked online at http://www.cfsan.fda.gov. Under "Dockets" enter that number (#2006P-0101) and anything filed should be accessible. You should be able to enter comments on the proposal online as well, although at the present time this feature has not been implemented.

The adoption of a honey identity will go a long way in helping the beekeeping industry bring the marketing of its principal sweet up to modern standards with associated protection and control. It's been a long time coming, but no doubt one that beekeepers in the future will say was worth the wait and effort. Now its up to the rest of us to do

our part in ensuring that the efforts of many others have not been in vain. BC

References:

1. Apiservices Web Site, www.beekeeping.com/goodies/beekeeping_glossary.htm#h, accessed April 20, 2006.
2. Fischer's Bee Quick Web Site, bee-quick.com/wall/, accessed April 20, 2006.
3. National Honey Board Web Site, www.nhb.org/buzz/roundtable2004report.html, accessed April 20, 2006.
4. Suzanne White Junod. 1999: Society for the Social History of Medicine

Spring Conference 1999 Aberdeen, Scotland "Science, Medicine and Food Policy in the Twentieth Century," www.fda.gov/oc/history/slideshow/default.htm, accessed April 20, 2006.

5. American Beekeeping Federation Web Site, abfnet.org/?p=90>, accessed April 20, 2006.
6. Codex Alimentarius Web Site, www.codexalimentarius.net/web/index_en.jsp, accessed April 20, 2006.
7. abfnet.org/images/Standard_of_Identity_Petition.pdf, accessed April 20, 2006.

PROTECTING BEEKEEPERS FROM PRODUCT LIABILITY – II

Sylvia A. Ezenwa, J.D.

The law of product liability allows a person who has been injured by a defective product (i.e., a plaintiff) to recover monetary compensation or *"damages"* for his injury by suing any company or individual (i.e., the defendant) involved in the product's manufacture, distribution, or sale.[1] Product liability lawsuits are usually decided in two stages: First, a court will determine whether the defendant was responsible or *"liable"* for the plaintiff's injury; and second, if liability is found, the court will assess the kind and amount of damages to award to the plaintiff.[2] Part 1 of this article showed how liability is determined; specifically, the assertions or *"claims"* commonly raised by plaintiffs in product liability lawsuits. Part 2 reveals some defenses commonly used by defendants to refute plaintiffs' claims; the kinds of damages that may be awarded to plaintiffs when those defenses fail; and how beekeepers can minimize their risk of product liability.

About the "plaintiffs" and "defendants"

Within the beekeeping industry, *"plaintiffs"* in product liability lawsuits are typically users or consumers of hive products, specifically, those who have suffered injuries or illnesses as a result of burning defective candles or eating contaminated honey. Meanwhile, *"defendants"* include sideline or commercial beekeepers who raise bees for profit, and who manufacture, produce, process, distribute, and sell hive products.[3] Honey packers, candle manufacturers, natural food stores, and other individuals and companies that manufacture, distribute, or sell hive products can also be defendants.

Common defenses to product liability claims

Plaintiffs usually assert one or more of the following claims in product liability lawsuits: (1) strict product liability (i.e., a product defect caused the plaintiff's injury); (2) negligence (i.e., the defendant's failure to use reasonable care in manufacturing the product, or to provide warnings about potential dangers of the product, caused the plaintiff's injury); and (3) breach of warranty (i.e., the non-conformity of a feature of the product to the seller's promises or warranties caused the plaintiff's injury).[4] Two defenses commonly used by defendants to refute plaintiffs' claims are contributory negligence and assumption of risk.

(1) Contributory Negligence

Using the defense of *"contributory negligence,"* the defendant can argue that the plaintiff should be barred from recovering any damages, because the plaintiff's own negligent or careless conduct while using the defective product contributed (along with the defendant's negligence) in causing his injury. However, in many States, the defense of contributory negligence has been replaced with *"comparative negligence,"* which means that the plaintiff's own negligence cannot totally bar him from recovering damages, but the damages he does receive will be reduced in proportion to his own negligence.[5] For example, suppose a sideline beekeeper sells several jars of honey to a woman at a local farmers' market where he is a regular merchant. During the sale, he notices that she is pushing a child in a stroller, so he warns her not to feed the honey to the child. He explains that according to some sources, spores of the bacterium *Clostridium botulinum* can cause infant botulism when ingested by children less than one year old; and that most infants who develop infant botulism have been fed honey, which is the only identified food source of the bacterium.[6] Several months later, the beekeeper is surprised to learn that the woman has filed a product liability lawsuit against him. She claims that the child inadvertently consumed some of the honey, contracted infant botulism, and was briefly hospitalized. She is now seeking to recover the $100,000 she spent in medical costs. At trial, the court determines that: (i) the beekeeper is 50% liable for the child's illness because he produced the contaminated honey; and (ii) the woman is 50% liable for the child's illness because she failed to heed the beekeeper's warnings. As a result, when assessing damages, the court will reduce the amount of damages awarded to the woman by 50%, which means that, although she is entitled to receive $100,000 in compensation for the child's medical costs, she will only receive $50,000.

(2) Assumption of Risk

Using the defense of *"assumption of risk,"* the defendant can argue that the plaintiff should be barred from recovering any damages because the plaintiff: (i) knew that a product was dangerous; (ii) appreciated the nature or extent of the danger; and (iii) voluntarily exposed himself to the danger.[7] For example, a patient may be barred from recovering any damages for an illness caused by undergoing a holistic cancer treatment based solely on the consumption of bee pollen, if the patient was warned of all the potential dangers of the treatment, but chose to undergo it anyway.

How damages are assessed

If a defendant is found liable for a plaintiff's injuries, the court may choose to award damages to the plaintiff. In product liability lawsuits, there are two kinds of damages that may be assessed against defendants: actual and punitive damages; and the defen-

dant may also incur other defense or litigation-related costs.

(1) Actual Damages

"Actual damages" consist of the money awarded to a plaintiff to compensate him for the actual or real expenditures he made, or pecuniary losses he suffered, during the course of his injury.[8] For example, suppose a consumer is injured by a glass candle container that explodes after the candle has been burning for several hours. At trial, the consumer may be awarded actual damages that include "medical costs (past, present, and projected, after insurance), lost productivity (e.g., actual salary losses and projected lost future earnings), other dollar losses (e.g., burial expenses, travel costs to obtain medical care), and general losses that are difficult to monetize (e.g., pain and suffering, loss of consortium (i.e., a spouse's help and affection), disability, psychological and emotional distress)."[9]

(2) Punitive Damages

In addition to actual damages, a plaintiff may also be awarded *"punitive damages"* if the court finds that the defendant either: (i) intentionally caused the product defect; or (ii) inadvertently caused the defect by being grossly negligent or reckless during the manufacturing, distribution, or retail process.[10] Because punitive damages are intended to punish a defendant's reprehensible behavior and deter similar wrongdoers, they are not based on the actual damages suffered by the plaintiff, but on the defendant's ability to pay.[11] For example, a consumer injured by an exploding glass candle container may be awarded punitive damages (in addition to actual damages) if the commercial beekeeper that manufactured the candle used a glass container that he knew could not withstand high temperatures. The amount of punitive damages awarded to the consumer would likely depend on the size and profitability of the beekeeper's operation – the larger and more profitable the operation, the greater the beekeeper's ability to pay, and hence, the larger the award.

(3) Other Defense Costs

In addition to actual and punitive damages, a defendant may also incur other monetary losses that adversely affect its business interests, including: "direct and indirect costs of a product recall (including lost product and replacement of product), lost profits, lost sales (i.e., affected products and other product in the same product line or similar product category), loss of customers, reduced market share, loss of business reputation, and legal expenses."[12] Also, the intentional violation of any State or Federal product safety, labeling, or other applicable laws may subject the defendant to additional civil or criminal penalties, such as statutorily-mandated fines and/or terms of imprisonment.[13]

How to minimize the risk of product liability

Product liability is usually imposed when a product is sold in a defective condition, making it unreasonably dangerous to the user or consumer. A product may be considered *"unreasonably dangerous"* if it has a defect in design, manufacturing, or marketing.[14] For example, there are currently national industry standards for candles, including a Cautionary Labeling Standard, Heat Strength of Glass Containers Standard, and Fire-Safety Design Standard.[15] A candle that fails to meet the specifications for either the heat strength of glass containers or fire-safety design has a *design defect*. A candle that lacks a "warning label that cautions consumers to always keep a burning candle within sight; never place a candle on or near anything that can catch fire; and to keep candles out of the reach of children and pets,"[16] has a *marketing defect*. And honey contaminated with *Clostridium botulinum* has a *manufacturing defect*. All these – failure to meet design specifications, lack of a warning label, and bacterial contamination – are considered defects because they make the candle or honey unreasonably dangerous.

Therefore, to minimize the risk of product liability, beekeepers who manufacture candles or produce honey must try to reduce the likelihood of such defects occurring during the design, manufacturing, or marketing process; and that requires the development and implementation of quality assurance standards.

Checklist for Quality Assurance Standards

Quality assurance standards are necessary for every sideline or commercial beekeeping operation, regardless of its size or scope; and any set of standards developed to assure the quality of hive products should cover the following areas:

- product design (including compliance with candle and/or honey industry and government specifications)
- product performance (including post-production testing)
- product safety (including post-production inspections; *tracking procedures*, such as serial or lot numbers, to help identify and locate products after distribution and sale; and *recall procedures* to recover defective products already in the hands of distributors, retailers, or consumers)
- product marketing (including review of product literature, such as advertisements and labels, to ensure adequate and proper instructions for product use, and warnings of potential dangers)
- product packaging (including the functionality and ease-of-use of glass or plastic honey bottles and jars, and glass candle containers)
- express warranties (including verification of truthfulness of statements made by salespersons, on labels, and in advertisements, concerning product quality, character, safety, and performance)
- monitoring of customer complaints (including the specific product involved, the alleged defect, and the eventual resolution – either refund or replacement)
- monitoring of compliance with product safety, labeling, and other applicable laws
- documentation and recordkeeping (including maintenance of paper and electronic records of all design specifications; results of performance testing and safety inspections; copies of all product literature; and correspondence with government regulatory agencies)

Remember, the goal of quality assurance standards is, first, to prevent defects from ever occurring; and second, if they do occur, to detect and correct them before they can cause injury to a consumer. To achieve those goals – regardless of whether a beekeeping operation has two employees or 10 – it is best that such standards be: (i) written; (ii) comprehensive; (iii) user-friendly and readily accessible to all company employees (e.g., by compilation in a handbook or manual); and (iv) administered by an individual (i.e., a quality assurance administrator) who is fully capable of monitoring and ensuring the company's compliance with internal quality standards, as well as State and Federal laws.[17] BC

References

1. Early, Ludwick & Sweeney, *Defenses in Products Liability Lawsuits*, available at http://www.els-esqs.com/ProductsLiabilityNewsletter.jsp (last accessed Feb. 21, 2006).
2. Jean C. Buzby et al., Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 799, *Product Liability and Microbial Foodborne Illness*, app. at 39 (April 2001), available at http://www.ers.usda.gov/publications/aer799/ (last accessed Feb. 22, 2006).
3. *See* Buzby et al., *supra* note 2, app. at 34.
4. *See generally* Buzby et al., *supra* note 2, app. at 36-39.
5. *See* Black's Law Dictionary 1033, 282 (6th ed. 1990).
6. Nutriwatch, *Fact Sheet on From Health Canada: Honey and Infant Botulism* (June 14, 1999), available at http://www.nutriwatch.org/06FST/honey.html (last accessed March 5, 2006).
7. *See* Black's Law Dictionary 123 (6th ed. 1990).
8. *See* Black's Law Dictionary 390 (6th ed. 1990).
9. Buzby et al., *supra* note 2, app. at 40.
10. *See* Buzby et al., *supra* note 2, app. at 40.
11. *See* Black's Law Dictionary 390 (6th ed. 1990); Buzby et al., *supra* note 2, app. at 40.
12. Buzby et al., *supra* note 2, app. at 40.
13. *See* Buzby et al., *supra* note 2, app. at 40.
14. *Caterpillar, Inc. v. Shears*, 911 S.W.2d 379, 381-382 (Tex. 1995).
15. National Candle Association, *Industry Standards*, available at http://www.candles.org/industry.html (last accessed March 4, 2006).
16. *Id.*
17. *See generally* Early, Ludwick & Sweeney, *Quality Control*, available at http://www.els-esqs.com/ProductsLiabilityNewsletter.jsp (last accessed Feb. 21, 2006).

BIOGRAPHY: Sylvia A. Ezenwa is a lawyer, author, and freelance writer based in Superior, Colorado. She is licensed to practice law in the State of Texas.

DISCLAIMER: The information in this article is not intended to constitute legal advice. Please consult an attorney regarding your specific situation.

The African Honey Bee III

The African Honey Bee Has Arrived – So Where Do We Go From Here?

Gloria DeGrandi-Hoffman, Mona Chambers, Stan Schneider, David Tarpy, Deborah Smith

In the first two parts of this series, we discussed the history of African honey bees (AHB) in the New World and the biological and behavioral bases for their successful establishment. In this third and final part of the series, we address the practical aspects of the AHB migration into the U.S. We begin with a brief overview of the history of AHB in the U.S. and then discuss some behavioral features that might indicate that a colony is in the early stages of Africanization. We then review the current methods of determining whether or not a sample of bees is AHB. We also discuss the potential future range of AHB and how they might spread throughout the U.S., as well as address public perceptions of AHB, beekeepers and white boxes, and the role of the media. Finally, we provide some advice on what to do if you suspect that a colony is Africanized, including some guidelines concerning what beekeepers can do to prevent or reverse Africanization.

Stan Schneider received his PhD in Animal Behavior from the University of California at Davis and is now at the University of North Carolina at Charlotte. His main areas of research are honey bee communication and the biology and behavior of the African honey bee.

Gloria DeGrandi-Hoffman received her PhD from Michigan State and is now Research Leader at the USDA Bee Lab in Tucson. Studies include pollination, African honey bee genetics and biology.

Deborah Smith received her PhD in Neurobiology and Behavior from Cornell University and post-doctoral training in molecular biology at the Laboratory for Molecular Systematics at the University of Michigan. She is now at the University of Kansas, studying mitochondrial DNA analysis, honey bee biogeography and honey bee population biology.

David Tarpy received his PhD in Entomology from the University of California at Davis and is now the Extension Apiculturist in the Department of Entomology at North Carolina State University. His research interests address the biology and behavior of honey bee queens – using techniques including field manipulations, behavioral observation, instrumental insemination, and molecular genetics.

Mona Chambers is a Research Technician at the Carl Hayden Bee Research Center in Tucson, Arizona, and Coordinator of the Honey Bee Morphometrics Laboratory. She received her Bachelors degree from the University of Arizona.

The AHB in the U.S.

The African honey bee was first detected in the U.S. in 1990 in south Texas (Fig. 1). For the next three years, their population was confined to southern Texas. In 1993, however, the AHB was detected in Arizona when a dog was severely stung by honey bees. Over the following year, feral honey bees were sampled in the southern region of Arizona, and AHB were found across the state. In 1995, AHB were detected for the first time in New Mexico and southern California. AHB then spread northward in Arizona and New Mexico and, by 1998, they were detected in Nevada. The bees continued their migration northward in every state where they became established. By 2004, the bees had migrated through Texas and were detected in the southern most counties of Oklahoma.

For reasons that are yet unclear, the spread of AHB eastward out of Texas stalled in the Houston region for several years. One explanation for why the population did not expand east was that areas with more than 55 inches of yearly rainfall could not support AHB populations. The reasoning for this was that the higher humidity might enable *Varroa* mites to have greater survival rates in colonies so that most feral AHB would succumb to *Varroa* infestations. The propensity of AHB colonies to increase brood production in response to rainfall also was given as a possible explanation for the failure of AHB to expand eastward. Since Winter rains in east Texas are not followed by blooms on flowering plants, it was assumed that the AHB colonies would starve.

Despite their temporary inability to spread east of Texas, by 2005 the AHB expanded eastward from Houston. Most recently, the AHB has become established in Florida, western Louisiana, and in the southwest region of Arkansas. It remains unclear how Florida became populated, but it seems likely that the bees entered on cargo ships through commercial shipping ports.

How do I know if my bees are Africanized? Behavioral Attributes

Extreme nest defense has been the calling card of AHB; a stinging incident usually is the first indication that AHB are present. In such cases, an inordinate number of bees – usually from a colony in a structure like a shed or garage rather than a managed hive – sting an unsuspecting person or pet that inadvertently disturbed their nest. Stinging incidents from confirmed AHB colonies tell us several things about the local feral honey bee population. First, the colony is probably not the only AHB nest in the

Figure 2. Comparison of European (left) and African bees (right) on a brood frame. Notice how the European bees cover the brood, while the African bees leave it exposed.

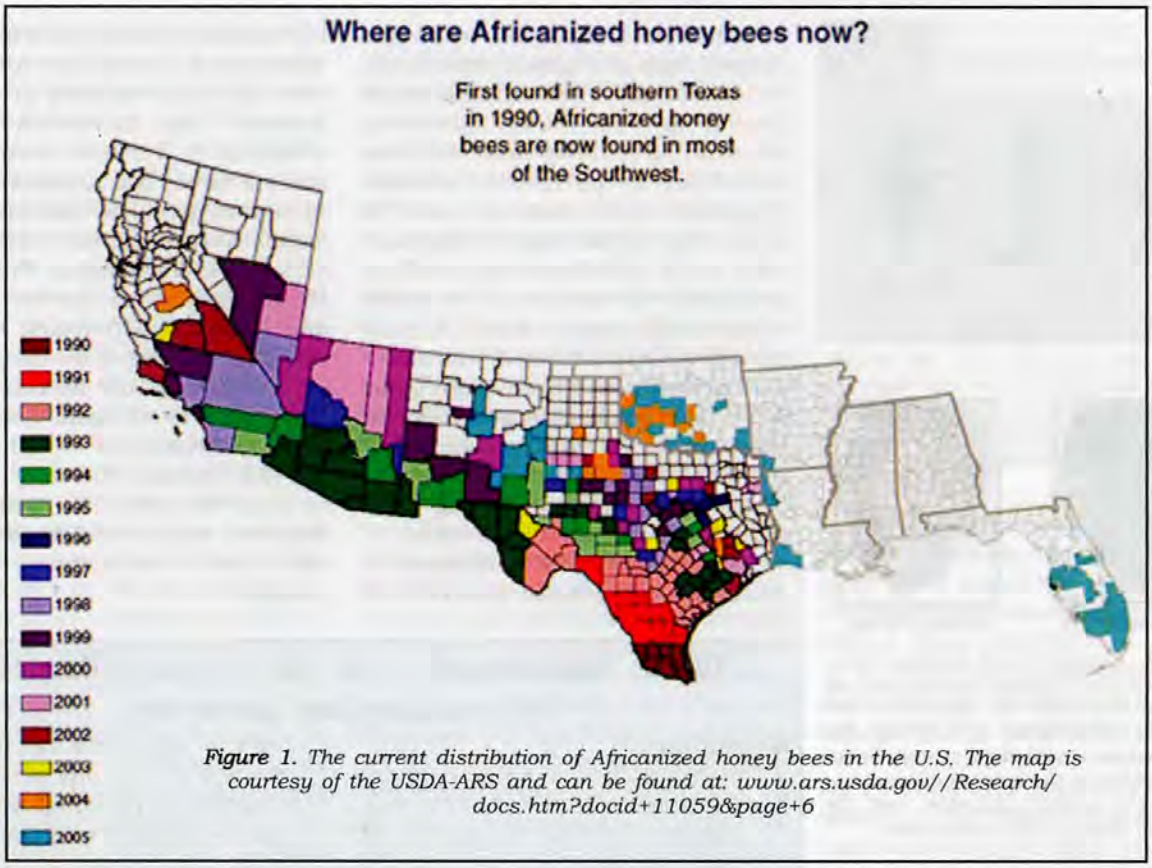


Figure 1. The current distribution of Africanized honey bees in the U.S. The map is courtesy of the USDA-ARS and can be found at: www.ars.usda.gov//Research/docs.htm?docid+11059&page+6

area. The drones that mated with the queen likely derived from other AHB colonies. The stinging incident also indicates that colonies of AHB in the area are numerous and successful enough to rear drones. Finally, there are sufficient numbers of AHB colonies so that queens are mating with enough drones that workers are expressing nest defense characteristics that are unlike those of EHB colonies.

While the general public might notice that a colony is Africanized only when a severe stinging incident occurs, beekeepers might notice more subtle changes in colony behaviors that could indicate lower levels of Africanization. First, AHB workers may persistently fly into the helmet or mesh of the bee veil when a colony is first opened. Second, AHB workers will move to the corners of the comb and expose the brood when a frame is removed from a hive (unlike EHB, which usually remain on the frames and cover the brood) (Fig. 2). Populous AHB colonies will also form clumps of bees on the sides of frames and attach to surfaces against which the frame is set. Third, AHB colonies often construct a single queen cell on a honey frame, particularly in populous colonies. Finally, beekeepers might also see workers with shiny black abdomens that look like small virgin queens (Fig. 3). Dr. Gloria DeGrandi-Hoffman of the USDA Carl Hayden Bee Research Center in Tucson has recently demonstrated that these shiny black bees are "intermorphs" that have characteristics of both workers and queens. How and why intermorphs are reared in colonies remains unclear, but they are signs that AHB colonies are in the area.

Perhaps one of the most extraordinary behavior exhibited by African bees is invading and usurping colonies of EHB (see Part 2: **The Displacement of European Honey Bees by African Bees in the New World**). While the behaviors described above are characteristic of Africanized bees (i.e., those arising from European matriline queens mated with African drones), nest usurpation behavior appears to be associated with "pure" African bees (i.e., African matriline queens mated with African drones). Researchers have yet to collect a swarm that invaded an EHB colony that does not have African mitochondrial DNA, which means the workers in the swarm were produced by an African queen (see Part 1: **The African Honey Bee: A Case Study of a Biological Invasion**). Usurpation swarms can look like a clump of bees hanging out at the entrance of a colony that is over crowded especially during the warmest part of the day. However, upon closer examination, bees might be seen fighting and dead bees might be found at the colony entrance or on the ground around the hive. The definitive characteristic of a usurpation swarm is that one or more queens are found in the center of the swarm (Fig. 4). Usurpation swarms can present serious problems to managed colonies: if queens are not marked, and the swarm is misdiagnosed as simply an overcrowded colony, an EHB colony will be invaded and will immediately become converted to an African colony.

Methods of Identification

Despite behavioral differences, the only way to be certain if bees are Africanized is to have them analyzed by an objective test. There are two general categories of tests to determine Africanization: morphometrics and DNA analysis. We have previously reviewed the


Intermediate Morph


European Worker

Figure 3. *Examples of worker bees, intermorphs from African colonies and an African queen; note the differences between the abdomens of a European worker and an intermediate morph. Notice the differences in the amount of branched hairs on the worker abdomen, and the absence of them on the intermorph.*

various DNA analyses that are currently available to distinguish AHB from EHB (see Part 1: **The African Honey Bee: A Case Study of a Biological Invasion**). Here, we briefly describe the morphometric analyses that are commonly used to detect AHB.

Any analysis that differentiates groups of bees based upon their morphology is called morphometrics. Morphometric analysis uses a system of measuring morphological characteristics to determine honey bee type by a statistical technique called discriminant analysis. The technique determines whether bees are EHB or AHB based on body measurements. While they are difficult to distinguish with the naked eye, AHB workers are, on average, smaller than EHB workers. By carefully and accurately measuring different body parts, researchers can determine the likelihood that a particular sample of bees are AHB or EHB (see box on next page).

The benefit of morphometric analyses is that they are relatively inexpensive and can be accomplished fairly rapidly (particularly by using a protocol called FABIS that measures only the wings). A limitation of morphometrics, however, is that it does not provide information on whether Africanized traits are derived from the queen (matriline), the drones she mated with (patriline), or both. Knowing whether a colony has African matrilines or patrilines provides insights into the state of the AHB population in the area. If the bees have EHB matrilines and African patrilines, the invasion is probably in the early stages, but if African matrilines are detected, the invasion probably has been ongoing for some time. While DNA analyses can provide this valuable genetic information, they can be relatively expensive and time-consuming compared with morphometric tests.

Many states now perform morphometric or genetic analyses of bee samples. In addition, the USDA Africanized Honey Bee Identification Laboratory housed in the Carl Hayden Bee Research Center (CHBRC) in Tucson, Arizona will analyze honey bee samples for state apiary inspectors, maritime port authorities, and other USDA agencies such as Animal Plant and Health Inspection Service (APHIS) and Plant Protection and Quarantine (PPQ). Samples for morphometric analysis should be collected by placing 30 to 50 adult honey bees in a small container or vial containing just enough 70% ethyl alcohol to cover the bees. The name of the collector, collection date, and location need to be included with the sample.

What beekeepers can do to minimize the Africanization process

Be vigilant

1. Mark all queens; **no** exceptions.
2. Regularly check hives for unusual external clumping of bees, as these may be parasitic AHB swarms.
3. **Requeen** any colony that is unacceptably defensive or contains an unmarked queen; use only queens from a known EHB source.
4. Inspect hives for behavioral signs of AHB, particularly after they are transported in and out of known AHB areas.
5. Send suspect samples to authorities for morphometric or genetic testing; place 30 to 50 adult bees in a small container, fill with enough 70% ethyl alcohol to cover the bees, and label with contact information, collection date, and location.
6. In an Africanized area, attempt to make all potential AHB nesting sites "bee tight"; avoid storing empty beehives outdoors.

Be responsive

1. Keep AHB incidents in an appropriate context during media interviews. **DO NOT** include box hives in filming about stinging incidents, as this promotes a negative perception of **all** honey bees. **DO** include managed hives in filming about the benefits of beekeeping.
2. **Avoid speculation** and answer only those questions to which you know the answer. Parts 1 & 2 of this series of articles were designed to provide the background information necessary for explaining the AHB to the media and public.
3. **Don't sensationalize** defensive behavior by using terms like "aggressive" or "vicious."
4. Make clear the relative risk of the AHB; the number of deaths each year from stinging incidents are far fewer than dog attacks, food allergies, even lightening strikes.

Be proactive

1. Emphasize that beekeepers are on the front lines of defense—**beekeepers are part of the solution**, not the problem.
2. Be a good neighbor and inform anyone who may be in close proximity to your hives; educating them about the benefits of honey bees and the relative risks of AHB should lessen their fears.
3. Establish and maintain lines of communication between local beekeepers, first responders, and local officials.
4. Make people aware of the distinction between yellow jackets and bees, as many people mistake wasps for honey bees. Increased public awareness of the different types of stinging insects will reduce the number of erroneous AHB reports.

Morphometric analyses to detect AHB

African and European honey bees can be distinguished by measurement of individual cells in colonies that build their own comb as this varies according to honey bee type. The USDA Honey Bee Breeding, Genetics and Physiology Lab in Baton Rouge reported that the distance spanned by 10 European cells tends to be about 0.4 cm larger than the same measurement of African cells. Cell size affects the size of the adult bee. Because of their smaller cell size, AHB workers tend to be slightly smaller than EHB. The discriminant analysis program compares the sample of workers collected from a suspect colony with a database of honey bees known to have originated in Africa or Europe, and from feral honey bees tested in South America, Mexico, and the United States.

The single characteristic that best discriminates between Africanized and European bees is the length of the bee's front wing. The discriminant analysis program compares a sample of workers collected from a suspect colony with a database of honey bees known to have originated in Africa or Europe, and from feral honey bees tested in South America, Mexico, and the United States. Based upon the length of the front wing, a rapid morphometric analysis system was developed to quickly screen European and Africanized bees. The analysis is called FABIS (Fast African Bee Identification System). A FABIS identification is based upon the average length of 10 wings. The average forewing length of an Africanized bee is 8.87 mm, whereas the average for a European bee is 9.20 mm. The FABIS program estimates the average wing length of the sample and generates a probability that the colony is EHB or AHB.

There are limitations to the FABIS protocol, though, that in many instances necessitate a full morphometric analysis. The average lengths of forewings are not hard and fast numbers; there is variation around the averages. Within a colony, the 10 bees sampled might represent different patrilines, each with slightly different wing lengths. In the early stages of Africanization, a colony might include only a small number of African patrilines with smaller wing lengths, and a larger number of European patrilines. Depending on which 10 bees are selected for examination, the colony might be scored as African, European, or hybrid. FABIS analysis might also generate a false "non-European" identification if some patrilines are from feral European colonies, which often have wing lengths smaller than 9.2 mm. Identification using FABIS works best if a colony is either completely EHB or AHB. Mixture of EHB and AHB patrilines, as occurs early in the Africanization process, reduces the accuracy of the test.

If the FABIS test generates a non-European identification, then the full morphometrics identification is performed. There are two major components of the full morphometrics identification system: preparation of the specimen and computer analysis. The sample is prepared by dissecting and mounting the fore-wing, hind wing, hind leg, and third metasomal sternite from each bee (ten honey bees per sample colony). Using the USDA-ID computer program, 37 points are digitized and analyzed by discriminant analysis. Measurements include angles between wing veins and linear measurements of wings, leg segments, and sterna. A simple count of total hamuli (the hooks on the wings that couple them during flight) is also recorded. The computer program generates probabilities that the type of bee that was sampled is: *European*, *African*, and *European Feral*. The program also distinguishes intermediary stages of hybridization with results such as *Africanized with the introgression of European genes*, and *European with the introgression of Africanized genes*. These categories are important in areas where the AHB is becoming established. Continued sampling of colonies in the area will reveal whether the AHB population is displacing the EHB (more samples are identified as Africanized) or if the hybridization process is in the early stages (introgression continues to be detected in the samples).

Figure 4. *An African honey bee ururpation swarm actively invading a European honey bee colony. The arrow is pointing to a ball of African bees that are surrounding and protecting the queen.*

How far will Africanized Honey Bees spread in the U.S.?

There are two ways that the AHB may spread. First, they may migrate through the natural processes of swarming and absconding (see Part 2: **The Displacement of European Honey Bees by African Bees in the New World**). Second, they may spread inadvertently by human transport of AHB colonies. The movement of managed beehives across long distances is one such example. If a colony from a non-Africanized area is moved into an Africanized area, and if the colony replaces its queen while in the AHB region, then the new queen will mate with African drones and the colony will become Africanized. Returning the hive back to the non-Africanized area may thus introduce the AHB genotype into that area.

Perhaps even more important than the movement of beehives, the movement of any cargo from an Africanized area also can transport AHB. Many of the goods we commonly find at retail outlets come from areas with established African bee populations, such as South and Central America and Mexico. The Carl Hayden Bee Research Center in Tucson has obtained bee samples for morphometric identification that were collected from the hulls of ships, engine compartments of trucks, and pipes carried on trains. Even if beekeepers refrained from bringing colonies that were in an Africanized area back to their home state, the spread of African bees would not be prevented as long as cargo from countries with AHB is being imported.

If AHB enter a new geographic area either by swarming or inadvertent transport, conditions must be such that the colony can become established and thrive to a point where it can make drones. If this occurs, mating with EHB queens will be possible and the Africanization of EHB colonies will begin. The geographic range where this might occur in the U.S. is not known. Indeed, the manner in which the AHB has spread in the U.S. has repeatedly taken us by surprise. It was initially predicted that the AHB would spread rapidly and evenly throughout all of the southern regions of the U.S. Yet, for the first 10-12 years of the invasion, the African bee was confined almost entirely to the southwestern states and California. This led to predictions that high rainfall and humidity would prevent the AHB from becoming permanently established in the southeast (see map). Yet the AHB has recently been reported from Louisiana and Florida. The discovery of an AHB population in Florida is particularly troubling for beekeepers in Georgia, South Carolina, and North Carolina. After the small hive beetle was first reported in Florida, it was discovered in these states within only 1-2 years, probably due to the rapid spread of infected colonies through human activity. It remains to be seen if the AHB will also spread this quickly from Florida into surrounding states.

A common assumption is that

Figure 5. European queen introduced in an Africanized colony behind a push-in cage. The arrow is pointing to the marked queen.

the AHB cannot survive a prolonged Winter, which will slow or prevent its movement into northern states. However, we now know that feral AHB populations are established in areas above 5000 ft in Arizona and New Mexico and can survive through the Winter. Thus, at this point we do not know the extent to which the AHB will spread in the U.S. or how quickly the invasion process will proceed. Furthermore, we cannot predict in which regions the AHB will become permanently established or be a "seasonal visitor," in which colonies may migrate in during Spring and Summer but die out during the Winter. The ultimate distribution of the African bee in the U.S. will depend on a combination of its inherent ability to spread and survive in new areas and human assisted movements that might transport the bee past barriers that otherwise would halt its progression.

What should beekeepers do to minimize Africanization?

The first step in minimizing Africanization is for beekeepers to be vigilant. Queens in colonies that are transported into or reside in Africanized areas should be marked and their hives should be inspected on a regular basis (see Box 2). Any hive that contains an unmarked queen should be requeened with a new queen of known European descent. The new queen should be introduced behind a push-in cage over emerging brood (Fig. 5). AHB workers often kill EHB queens introduced in shipping cages. The push-in cage should be moved every two to three days, and this should be repeated at least three times before releasing the queen. After the queen is released, the colony should be examined every 10-14 days for six weeks to ensure that the introduced queen has been accepted, and to destroy any supersedure queen cells that the workers may construct.

Another important way that beekeepers can minimize the impact of the AHB is to respond to reports of AHB in an appropriate and timely manner. In many areas of the U.S. where AHB have already become established, the initial detection occurred from a stinging incident. It is likely that the same will happen in newly established areas. These events are sure to make the local TV news and grace the front pages of local newspapers. Such incidents are indeed serious, but they can be easily sensationalized. If they are, the public may become fearful of all bees and the beekeeper might be perceived as part of the problem. To mitigate the damage from sensationalized news reports, beekeepers and beekeeping organizations need to have sound and coherent information concerning the AHB. They must also adopt strategies to work effectively with the media. After a stinging incident, a reporter might want to interview a local beekeeper. If this occurs, avoid conducting interviews with managed beehives in the background, because the image conveys to the public that all managed colonies contain AHB. Instead, the background for news stories about AHB should have a structure, such as a carport or shed, where an AHB colony is or can become established. Also, avoid having reporters film bees on frames, as a large number of bees may be taken out of context when the story appears. Instead, emphasize the importance of honey bees to U.S. agriculture, the benefits of local honey and pollination, and the relative risks of bee stings.

Finally, beekeepers can help by being proactive. The main message that beekeepers need to communicate to the public is that managed colonies are part of the solution and not part of the problem. Because beekeepers manage the genetics of their colonies, they are ensuring that genes associated with reduced nest defense behavior remain in the honey bee population. Thus, managed colonies are the genetic buffer between the public and the feral AHB population. By projecting the AHB issue in an accurate and rational manner, beekeepers will be able to adjust to the changing landscape of beekeeping in the country and address the AHB in the coming years.

General Conclusions

In closing, the goal of this series of three articles was to provide beekeepers with the background information and management tactics necessary for coping with the AHB, and for handling the media and public attention it invariably generates. The African honey bee is now a permanent resident throughout the southwestern states and California, and seems destined to become part of the landscape in the southeastern states as well. As has occurred throughout Latin America, the AHB is likely to displace feral EHB colonies and have a substantial impact on the management of European colonies throughout the southern tier of the U.S. The ultimate distribution of this highly invasive honey bee cannot be predicted at present, and only time will tell the economic and public welfare impacts that it will have in our country. The only certainty is that the AHB is now a feature of U.S. beekeeping. But, just as we have learned to cope with introduced mites and beetles, we will also learn to cope with this latest challenge to beekeeping – and perhaps in the long run we will realize benefits from doing so. Studies in Mexico and Central and South America have suggested that under some conditions the AHB is a highly efficient pollinator, and might be more resistant to *Varroa* mites than the EHB. Whether these benefits will be realized in the U.S. remains to be seen. Nevertheless, by being prepared and managing our colonies effectively, we can ensure the continuation of a viable beekeeping industry in the U.S. that controls, and perhaps some day incorporates, this new arrival. BC

PROPOLIS

The Ignored Hive Product

James E. Tew

Yes, I know better

I've tried this in past articles and it doesn't work well. My problem is that it will be some number of weeks before you get a chance to read this. The way I feel now is not necessarily how either of us will feel then. Even so, I intend to try yet again. Read on.

It's early evening on an early Spring day. It's warmish and as the day fades, a warm rain is falling on Spring flowers. I will be moving bees into apples tomorrow night. They're already in peaches. With their springtime noise, birds are staking and defending their territory. My wife is away on a business trip. I am classically, *Home Alone*. It is under these relaxing conditions that I want to write about a common topic that is commonly ignored – Propolis. Wait! Don't touch that dial! I admit that when I was assigned the propolis topic to present at the March, 2006, Spring Workshop at Wooster, Ohio, I, too, was not particularly excited. *(I've often wondered, "If you are bored when you write an article or develop a presentation, will you bore the people who read or listen?")*

Where most of us are with regards to propolis (Bee Glue)

When I began working on the topic, concerning propolis, I had the opinions and experiences of many established beekeepers, but this stuff is just not high on the interest lists of most beekeepers. It's the goop we scratch off our hands while in church or sitting in a physician's waiting room. It's the sticky stuff we get on our pants and makes a mess of our bee gloves. It's the natural glue that sticks hive parts and frames together causing us endless hours of grief. It gums up the entrance and sticks in lost lumps on the landing board. Though good, it is smelly stuff – sometimes stringy and other times rock hard. It's collectible – but then what? An occasional advertisement in a bee magazine is about the only path for selling what seems to be a necessary evil of beekeeping – kinda like beekeepers and their surrounding having to smell like smoke all the time. Some things are just a normal part of beekeeping. In general, bee glue is a very common hive commodity that is surprisingly mysterious. Propolis – we see it all the time, but most of us know very little about it.

Propolis – the product

Propolis *(bee glue) is a resinous sticky gum collected from various plants that has been manipulated by honey bees*[1]. Immediately, I was stymied. Apparently, propolis only exists in bee nests. Foraging bees do not collect propolis, but rather they gather sticky gums or resins. From these raw materials they formulate the product, propolis. More about the recipe later. The term means something loosely akin to, *"before the city."* As some of you have seen many times, the occasional hive will nearly close the entrance of a colony with propolis. The Caucasian race of honey bees is notorious for excessive propolis use.

Propolis – the components

In general, propolis is made up of: Plant resins, salivary enzymes, wax and foreign materials. Foreign materials would be things like wax moth scales, bee body parts or hive litter. Plant resins make up the largest part of propolis. I am not qualified to do technical justice to the chemical components of propolis. The specific chemical configuration of a propolis sample is highly dependant on the geographical region. Flavonoid pigments, of which more than two-hundred are known, are critical in determining the characteristics of the propolis sample in question. Beyond flavonoids, general component percentages are: 50% resin & balsam, 30% wax, 10% essential oils, 5% pollen, 5% organic debris *(referred to as foreign materials above).*

Propolis collectors:

- Are specialized
- Are more than 15 days old
- Have atrophied wax glands
- Work warm months
- Add saliva & wax
- Need help unloading

Apparently, propolis collectors are specialized foragers and not just unemployed nectar and pollen collectors. They are generally older bees as would be expected of foragers, but unexpectedly, their wax glands are shrunken and atrophied. Propolis is gathered throughout the warmer months, but especially during Spring and Autumn. Though they generally need help unloading, they are apparently the individuals that add wax and saliva to the gum mix to form propolis. *(I can't say that these resin foragers are the* ***only*** *ones to make the product.)*

Propolis collectors are the rugby players of the hive. The unloading process can be nearly a brawl with the resin-loaded bee being dragged about the hive by house bees trying to help with the unloading process. Occasionally, the sticky gum resin can't be removed – especially if the day is late and the resin has cooled on the pollen basket[2] of the collector. If this is the case, the resin-locked bee will be required to sit in the next day's sunlight to warm the

[1] Other species of bees gather resins and make a propolis-like product. In this article, my comments are directed to honey bees only.

[2] This review caused me to look at the term, *pollen basket*, in a different light. If some foragers use the basket to gather plant gums and other use it gather pollen, why is it only called the *pollen basket*? Would it not more logically be called a *collection basket* or maybe just the *basket*? Maybe the technical term, the *corbicula*, should be universally used. I mean that if I were propolis, I would resent being tacked onto the pollen basket's reputation. But that's just me.

hardened resin – then, back inside the hive to be dragged about all over again. The natural caulking compound is generally moved to needed locations by housé bees. I had thought that the propolis load was positioned by the resin collector.

The propolis load

This product is hard work to gather, formulate, and position. It makes nectar and pollen foraging look like the easy job. The average load is about 3/10,000 oz. The average colony will require about 1.8 oz – 5.3 oz per season. Caucasian bees can manufacturer as much as 35 oz per season. As discussed above, the plant gums are transported in the pollen basket from the field to the hive.

Resin Collection Procedure

- Find plant resin and tear a stringy piece off
- Legs manipulate the string and move it to the basket
- Repeated several times to acquire load
- Short hovering flight to manipulate load
- Return for more thread-like collections
- Laborious and time-consuming

I don't know how the resin collectors become adept at their craft. I do know that desperate foragers (or novice not yet proficient) will gather strange things like caulking or even road tar. Obviously, the basic components of bee glue vary according to region. Upon finding suitable plant resins, the forager will struggle to tear a string from the plant and using all the legs necessary, move the glob to the basket. The load is formed and packed just as a pollen load would be formed. Several of these gum threads may be required to comprise a load. In all my beekeeping life, I have only seen two resin collectors and they were both on Pines in South Georgia. Essentially, resin foragers seem to be using whatever is available. They have no choice.

A Partial List of Common Resin Sources.

- Poplar *(Populus spp.)* and hybrids
- *Birch (Betula spp.)*
- *Conifers (Pinus spp.)*
- *Horse Chestnuts (Aesculus hippocastanu)*
- *Cherry, Peach, Plum (Prunus spp.)*
- *Willow (Salix spp.)*
- *Alder (Alnus spp.)*
- *Oak (Quercus spp.)*
- *Hazel trees (Corylus spp.)*

The poplar and its many hybrids are generally thought to be the primary source for gums used to make bee glue.

Hive uses

There are two broad hive uses for bee glue – mechanical and biological functions.

Mechanical uses

- Thin layers on walls and surfaces
- Slippery varnish (Pest removal)
- Fill cavities less than 3/16"
- Repair combs
- Strengthen combs
- Enforce entrance
- Encapsulation

Through the years, all interior hive surfaces are coated in a thin film of propolis. Is this intentional or just an artifact of all those little bee feet tracking through propolis and unintentionally coating hive surfaces? I don't know. Apparently, this natural varnish makes surfaces slippery so pests can be more easily removed. *(If this is true, then why is the surface not slippery to bees also?)* Literally, when discussing the concept of bee space, I have said – hundreds of times – that propolis is used to fill any cavity that is less than 3/16". Anything greater than 3/8", bees will put wax comb. Anything 3/16"-3/8", bees will leave open – ergo bee space. Filling these voids with propolis or comb supposedly eliminates hiding places for various pests. *(If this is true, it doesn't seem to have much effect on the wax moth that can readily chew right through wood.)* Propolis is a repair product and will be used to both strengthen and restore damaged comb. Over time, snow-white comb becomes dark black – due in large part to propolis coatings.

A propolis collector on a Pine.

A propolis-loaded bee.

Another common use is the natural reduction or even complete closing of some entrances as the bees deem necessary. Is the fact that some colonies do this readily while others make no effort to reduce entrances a factor of genetics or resin availability – or both? As have you, in the same yard, I have seen some colonies using copious amounts of propolis while the neighboring colony has done nothing.

Finally, the use of propolis to

encapsulate anything they can't move from the hive is legendary. A dead mouse or lizard is the usual obstruction that is mummified, but I have seen oak leaves and mouse litter coated in heavy layers of propolis.

Biological uses

- Restricts putrefaction
- Brood protection
- Entrance repellant
- Entrance disguise
- Inhibits seed germination

Some of the biological uses border on the mechanical uses. By entombing a dead mouse in propolis, the bees are mechanically and biologically controlling putrefaction. By using propolis at the hive entrance, bees are both repelling other insects, such as ants, and hiding the entrance – to some degree. *(Mocking birds and yellowjackets don't seem all that confused.)* I suppose it could be said that this product helps but does not eliminate hive invaders. Interestingly, propolis inhibits the germination of seeds brought into the hive by mice or by plants growing near (or into) the hive. I wonder if propolis plays any part in bee collected pollen not being viable after being stored. I know that honey and bee saliva are the primary reasons for inactivating fresh pollen, but I still wonder if propolis is not being given its due.

Beekeeper collected propolis

Saving hive scrapings and the occasional large lumps found at hive entrances have been the historic way to collect propolis. Plastic grids, looking much like queen excluders, are presently available from bee supply companies that encourage bees to fill with propolis. The grid, filled with soft, pliable propolis is put into a freezer for a couple of days. Upon removal from the freezer, the propolis literally shatters from the grid. Propolis collected in this way is clean, colorful, and fresh. It smells earthy and gamey. I like the odor. Simple boards with saw kerfs cut into them will also instigate propolis-filling activity.

I have neither advice nor admonition to give to beekeepers that would encourage them to collect propolis. It is an interesting product, but unless there are personal reasons for propolis collection or a commercial outlet is available, I'm not sure what to do with quantities of collected propolis. *(I suspect I will hear from some of you on that point.)*

Beekeeper-collected propolis.

Propolis and you

I have no doubt that some of you have read to this point awaiting information and comment on the healthful attributes of propolis. You are going to be disappointed. The popular literature is literally filled with (primarily) anecdotal accounts of the goodness of propolis, but there are some scientifically-supported reports. Propolis has been shown to: have antibiotic qualities, have antiviral qualities, have antifungal qualities, and "boost the immune system." It is dearly difficult to separate fact from advertisement with claims being made that nearly every disease known to human-kind can be positively affected by propolis consumption. The claims can only be described as spectacular. The fundamental problem is that propolis is not all the same. No doubt some varieties from a particular location are good medicine components, but not from other areas. The research cost to determine what and where would be significant.

What I can say

Propolis, in general, is clearly biologically active. Since colonies are unable to immediately bring in meaningful quantities of the product, that would imply that bees are benefited from the presence of propolis, but do not absolutely require, the product. I suspect that some human ailments also profit from the use of propolis products. Extensive literature review, beyond the scope of this article, would be required to show which maladies would benefit and what propolis mixture would be necessary.

Additionally, research currently underway may show propolis to have miticidal activity and ideally, would be effective in controlling predaceous bee mites. I'm out of space for this article and cannot sate my curiosity here, but I have been wondering if propolis significantly inhibits hive body decay. My question – do hives housing an active colony last longer than empty equipment having no propolis protection? Maybe some other time in some other article.

The mystery continues

While I solved no mysteries in this article, my respect for propolis – the product – has increased significantly. Would it be too dramatic to say that propolis has the potential for being a promising hive product that we have always simply discarded? Wouldn't that be funny? BC

Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684, Tew.1@osu.edu; http://www2.oardc.ohio-state.edu/agnic/bee/ ; http://beelab.osu.edu/

Drone Saturation

For Small Scale Operations

Larry Connor

Drone Holding Colonies (DHCs) are special colonies that are made up much like a cell finisher used in queen production, but instead of finishing queens, you will use it to finish and hold drones. Here's How.

What is drone saturation?

The idea behind drone saturation is based on several bits of knowledge of bee mating biology.

First, we've known for a long time that a virgin queen mates with more than one drone. Recently, Dr. David Tarpy of North Carolina State University wrote that the average queen mates with 13 drones (13.2 is the mean), with the range from one drone to 45. Think about it – 45 drones, that is a lot of drones for one virgin queen. She must have been quite the drone killer. But even at 13, the numbers add up if you are mating dozens or hundreds of virgins at the same time.

Second, we know that drones and virgin queens from the same colony have different behaviors in selecting the mating area they fly to (the Drone Congregation Area or DCA). Virgins seem to fly out further than the drones, probably in response to some evolutionary instinct to prevent inbreeding. This creates a real headache for the beekeeper wanting to control mating in his or her queen rearing operation. Unless the beekeeper has access to an isolated area, creates artificial isolation, or uses instrumental insemination, there is a very high probability queens will mate with some undesirable drones (what I call *non-target drones* in the rest of this discussion).

Third, if a virgin queen mates with 13 drones, that means that there must be many more unsuccessful drones produced to provide the best of the successful sexual partners. If only a small percentage of all the drones are successful in mating (as suggested in the literature), it means that the beekeeper must provide a *huge* number of drones for every queen so that she is fully mated. It serves no purpose or benefit for virgin queens to mate with weak drones, poor fliers, drones with development problems (poor pollen nutrition, exposure to coumophos, diseased conditions in the hive, etc.), and old drones (known to carry diseases to queens).

Flooding an area with drones of diverse genetics

There are two aspects of the drone flooding activity. First, you must produce a large number of target (desirable and compatible) drones to mate with the virgins you will produce. Second, you must somehow get rid of or restrict non-target drones (those of unknown characteristics, incompatible genes, or ***African origin***).

To increase disease resistance, the beekeeper should take steps to increase the genetic diversity of the drones being produced for mating. The use of a single drone source works *against* the natural instinct of the virgin to mate with a mixture of drones that are not genetic brothers. This is a huge change in thinking for a lot of people, like myself, coming from the background of producing a drone line for the Starline and Midnite hybrids. In the past our goal was to saturate the mating area (not mating yard) with drones of *one* desirable type. These were closely related drones, coming from the same drone mother breeder. Now, David Tarpy and Tom Seeley's observations are clear – that in nature, mating to closely related drones **is not desirable**.

Diversity is to be celebrated in the beehive when it comes to the variation of the queen's mating partners. To achieve this level of variation will require the use of multiple, unrelated drone sources, but all of target lines.

With *Varroa destructor* well established in North America, and with the African bee working it's way through the southern parts of the country, many beekeepers are looking for ways to provide a local, acclimatized stock of honey bees that will provide healthy, vigorous colonies that have mite tolerance/resistance, and mated in such a manner as to eliminate ***any*** intrusion by African bees. Colony vigor is a key aspect of these programs, and essential for successful queen production.

This article has evolved from talks I gave at the Southern Adirondack Beekeepers Association annual seminar in March (Albany), and at the Maine State Beekeepers Association (Augusta) in April.

Flooding with target drones

If you are a sideline beekeeper with 40 colonies, you are in luck, because I am going to pick that colony number as a model for our discussion about queen production in a mating area that you have managed for drone saturation. Traditionally, beekeepers have attempted to obtain saturation by moving in an adequate number of colonies to guarantee target drones. In our model, this would mean that you will need to move in all your colonies, all 40 of them, into the queen mating area you have worked to develop. If you have selected a somewhat isolated area where there are few surrounding colonies, or if you found a secure, large location owned by a single landowner, or if you have just been lucky and fallen into a good mating area, there is an excellent chance that this area *is not* ideal for nectar production. So you are trading good mating success for all the queens you plan to produce for a large chunk of the honey crop.

Well, that just doesn't make much sense. Moving bees is hard work (with 40 colonies I doubt you have mechanized the colony moving process). It will cost you labor, fuel costs and lost queens to move those bees, plus you have written off part, maybe all of your honey crop. Fortunately, there is a way to avoid most of these problems.

Drone Holding Colonies (DHC's) are special colonies that are made up much like a cell *finisher* used in queen production, but instead of finishing queens, you will use it to finish and hold drones. You can remove frames of drone brood (at the sealing stage or later) and put the frame into a special hive body. Between these you will insert frames of worker brood. All the adhering bees go along for this, checking for the queen as you go through each colony. You will build a nine or 10 frame colony in this manner, and use it to mature drones in the brood stage, sexually finish the drones so they are optimally ready to mate, and hold them during mating attempts. And, instead of moving all your 40 colonies into the mating area, you will move just the DHC's, cutting your labor and fuel costs while keeping the rest of your colonies in their honey production locations. What could be better?

Isolated mating area in Louisiana used by the USDA-ARS laboratory in Baton Rouge to mate Russian lines of queens. Under these conditions, there are no other drones available, and the mating takes place if not interrupted by dragonflies, hurricanes and other problems. The tower used to take this photo was destroyed by last year's hurricanes. (Photo provided by USDA/ARS Baton Rouge Bee Laboratory)

A typical DHC or drone holder colony is made up of four frames of drone brood from target drone producing colonies, three or four frames of worker brood, adhering bees (no laying queen), and frames of pollen and honey. I suggest you attempt to harvest one frame of drone brood from each target drone-producing colony, which will be all 40 colonies if we do this right. To this we will add one *caged* virgin queen – healthy and vigorous but caged so she cannot fly. This queen is the essential part of the DHC or drone holder colony. Her presence tells the bees, biologically anyway, that they are undergoing queen replacement, since there is no queen laying in the combs. Further, she is producing pheromones and will suppress the development of laying workers and queen cell production. The latter is not absolute, so you will need to check the DHC in seven to 10 days to make sure that no queen cells are produced. If a queen is produced and starts to lay brood, the drones will be neglected and rejected by the worker bees; the numbers of drones will drop from thousands found in a healthy DHC colony to a few hundred found in a colony with a laying queen.

The DHC should be fed sugar syrup (I use a top feeder so drones are not lost in a division board feeder) as well as pollen supplement *at all times*. I also recommend the sugar syrup be medicated to protect the colony against *Nosema apis*. If you are concerned about *Varroa* levels, you may want to treat with Apistan, but do so with caution.

Between the time you make up the DHC and the time the drones are ready to fly in your mating area, move the colonies to within one quarter to one half mile of the mating yard where the queens are being produced. This is a recommendation Dr. G.H. Cale, Jr., made to all the Starline and Midnite hybrid producers; he knew from experience that this gave better queen mating than obtained if all the drone producing colonies were located within sight of the mating nucs. He actually tested this idea in the 1950s using the Cordovan genetic marker, a recessive trait. It works.

If you know there are other colonies in your mating area of two to five miles, make every attempt to either requeen the colonies with desirable target drone stock, or screen the entrances so that drones are unable to fly. Note, that if you put a piece of queen excluder on the entrance of a strong colony filled with drones, you can kill the colony during the afternoon mating flight as the drones struggle to get through the excluder and stop off the normal air flow and suffocate the colony. Queen and drone traps fun-

There are several advantages to this system. None of the queen introduction or queen rearing needs to be done in the early to mid Spring. Don't even think about starting until after the fruit bloom is over – for either year!

nel drones away from the entrance. Or, use a full queen excluder over the entire bottom of the hive, so both ventilation and worker bee movement are minimally disturbed.

A Two year plan

Year one: In this 40-colony operation we will install queens from five lines of bees. These may be daughters of survivor stock from your own apiary or some other apiary in the area. Or they may be daughters of queens you have purchased from breeders and carry desirable traits you want in your operation. These may include Russian, SMR/VSH, Minnesota hygienic, New World Carniolian, or other stocks you have studied and want to introduce into your apiary. I selected the number of lines arbitrarily, but it offers an affordable method of getting drone mothers from diverse genetic lines working for your drone diversity plan. I suggest you install eight queens from all five stocks, giving you young, vigorous queens from the different stocks. During this first season, I strongly recommend you eliminate any undesirable traits you observe: chalk brood, foulbrood, defensive behavior, and poor hygienic behavior. In the latter, use the liquid nitrogen test to evaluate dead brood removal by colonies at 24 and/or 48 hours after the treatment. This will give you a valid index of the level of hygienic activity in each colony. Eliminate and replace non-hygienic bees, and keep an eye on the best for possible breeding use.

Year Two: In the Spring of the second year you will evaluate your colonies again, eliminating those that do not give you traits you want. Some level of winter loss (5-10%) is desirable, since you want Winter hearty stock to survive. From the surviving colonies, select the three best and keep them aside as grafting mothers for queen cell production. You may pick the ones you feel you like the best based on your beekeeping experience, or you may develop a complex selection index on your laptop to record and weigh all the observations you have made. Pick three and a few backups.

Drone flight in a bee flyway at the University of Nebraska at the June, 2005 Master Beekeeper Workshop organized by Dr. Marion Ellis. The cage contained queen lure (pheromone) on a cotton tab in the cage. Virgin queens fly further than drones for mating, requiring drone colonies to be placed 1/4 to 1/2 mile away from the mating yard to create a successful mating area.

You will now prepare to set up drone holding colonies. If all 40 colonies are in production (you have filled in any poor performers from a few nuclei you keep at all times). For as long as you want to mate queens (something you decide), every two weeks you will make up and move 40 frames of drone brood from

target drones source colonies and put them into DHC's. Locate these colonies into the mating area.

If the average colony gives you a drone brood frame with a patch of brood yielding about 2000 drones (1,000 on each side), (there's about 4,000 on each side of a drone-comb frame) this will provide you with 80,000 drones at the time of mating. These are not ordinary drones, but ones from colonies you have worked to select and tested for an entire season. While I still cannot tell you how many drones you need for each queen you produce (if only it were that easy!), these 80,000 drones will provide 500 drones for *each one* of 160 queens you attempt to mate, or *80 drones* for each of a 1,000 queens. (Remember you need a minimum of 13 drones/queen.) Using the first example, if you mate 160 queens every two weeks in your mating area, you will have generated well-mated queens. Repeating this labor over two to six cycles (depending on your season and personal schedule) a 40 colony operator could be producing and marketing hundreds of locally acclimatized queens for local beekeepers, and at $15 per queen, this could add up to a tidy sum.

There are several advantages to this system. None of the queen introduction or queen rearing needs to be done in the early to mid spring. Don't even think about starting until after the fruit bloom is over – for either year! This will give you time to build colonies, equalize and boost them, even use them for fruit tree pollination, and get prepared for the drone and queen producing effort. If you sell 50 queens a week for 10 weeks, that is, well, you have already done the math by now.

Drone comb (green) in a target colony for drone production. This frame could be left in this colony or moved to a DHC for mating.

Once the drones in a DHC colony are depleted, the colony is not lost. Install a newly mated queen (remove the caged virgin – she is too old to mate now, poor thing), and treat the colony as an increase colony. Or split the bees into groups for winter nuclei. Add frames of brood to balance the colony's age demographics. If you make up drone holding colonies all Summer, you may have doubled your total colony count. You can do some math here too.

DHC's may be made up in one region of the country or state and moved to another, creating early season mating conditions; or mating during a dearth by heavily feeding all participating colonies. The DHC's may be trucked to mating areas in remote locations with much less trouble than large numbers of full-sized production colonies. BC

Larry Connor says his new book, Increase Essentials, is nearly done, and will be available soon after you read this. He doesn't mind if you contact him at ebeebooks@aol.com to reserve a copy.

Summer Mite CONTROL

Varroa population buildup might be compared to a runaway locomotive barreling down the mountainside; it's going to continue picking up speed (increasing their numbers) until disaster strikes.

Roy Hendrickson

There are a variety of external factors that can influence or increase *Varroa* population dynamics. They include individual colony susceptibility, outside invasion pressure, ineffective controls, and beekeeper oversight or neglect. Whatever the circumstance, *Varroa* population buildup might be compared to a runaway locomotive barreling down the mountainside; it's going to continue picking up speed (increasing their number) until disaster strikes. It's the responsibility of the beekeeper to intervene and break the mite reproductive cycle, to create a treatment window before the aforementioned disaster can occur.

Under ideal conditions *Varroa* mite populations double approximately every three weeks. Using this example, a colony with a population of only a 100 mites on April 15th would on July 29th, have a population of roughly 3,200 mites. The generally accepted threshold or point at which colony damage begins to occur is about 3,000 mites. Once that damage threshold is reached, colony viability starts to decline. If left to grow unchecked the rapidly increasing *Varroa* population will send the colony spiraling into an irreversible decline. To be effective treatment must begin *before* that point of no return is reached. The solution to this dilemma is to remove the early honey crop as soon as possible, preferably by the end of July. Only then can the actual degree of mite depredation be ascertained, and, if necessary, treatment applied.

SAMPLING METHODS

Once the crop is off, samples should be taken to determine the mite population density and the time frame in which any treatment must be applied. Unnecessary treatment with Apistan®, CheckMite®, or one of the IPM products is not only a waste of time and money, but increases the chances of mite resistance to that chemical. *Varroa* populations can and often do vary tremendously from colony to colony within the same yard. Sampling prior to the application of any controls is essential to any mite management program.

There are three commonly used methods of sampling for *Varroa*: 1) sticky boards via the use of a screened bottom board; 2) the sugar roll which uses powdered sugar to dislodge the mites; and 3) the original ether roll. Sticky boards work fine if the colonies are all close to home. If not, a lot of valuable time will be wasted traveling to and from the outyards. Sampling potential breeder colonies is the one exception. Here the extra time and effort required with sticky boards is well justified. Sugar rolls have received a lot of favorable press, but I've never been able to duplicate the reported results. Trying to count mites covered with powdered sugar can test anyone's patience, particularly a harried beekeeper. In my opinion the ether roll is the most practical and efficient testing method currently in use. While not perfect, ether rolls are quick and easy, and once you master the technique, fairly accurate.

The standard ether roll recommendation is to collect 300 bees in a quart mason jar, spray in some starter fluid, and shake the jar for a couple of minutes. You then remove the lid, pour out the bees and count the mites on the inside of the jar. Based on personal experience, I think it's unrealistic to expect an accurate mite count using that many bees. The main problem, from my experience, is that by shaking the jar for so long the dead bees are continually re-acquiring the dislodged mites adhering to the jar wall. It's also a very time consuming process, and by the end of the day your arm is ready to fall off.

A much quicker and far more accurate ether roll can be accomplished by cutting the above procedure in half. Replace the quart jar with a wide mouth pint mason jar, and reduce the number of bees to 150. (To acquire the 150 bees you'll need a quarter-cup measuring cup and a collection pan. Telescoping outer covers will work, but a small Rubbermaid tub with rounded corners works best. Simply remove a frame of brood, *without the queen*, and shake the bees into the tub. Bounce the bees into one corner of the tub and scoop up a quarter cup. Gently wiggle the cup to level the bees then dump them into the jar. One quarter cup of bees equates to between 145-160 bees.) The real trick is in the amount of ether used. A quick squirt is all that's required. You barely want to get the bees wet. If you can see obvious signs of moisture most of the mites will stick to the bees and the count will be useless. The second trick is to hold the jar on its side parallel to the ground and shake it with an up and down motion. Shake for 10 to 15 seconds, then turn the jar upside down and let the bees fall into the jar lid. Carefully unscrew the lid so as to retain the bees and count the mites on the inside of the jar. Remove the visible mites from the jar, then dump the bees back in and repeat the process. Combine the two counts and treat as necessary. This technique takes practice to master, but in time it will become second nature, and the repeat roll will be unnecessary. Standard treatment recommendations based on mite counts using 300 bees

are still valid. Simply divide the mite number in half and treat accordingly. The threshold I use, mid-Summer, is I will treat a colony that produces five (5) mites from an ether roll. That's not many, but it's enough.

IPM CONTROLS

There is a growing list of mite control products coming online. It seems as though a new product is being introduced every couple of months. The problem is that beekeeper familiarity and acceptance lags way behind any new product introduction. This results in the same old status quo; Apistan® and CheckMite® remain the primary mite control treatments. It's no wonder colony losses continue to pile up as mite resistance slowly erodes product effectiveness. It's time beekeepers wake up to the fact that mite control is a continually evolving process. Old methods, treatments and timing should be replaced by new, safer, less contaminating products, and better timed applications. Not only will residues be minimized or eliminated, but the end market commodities of honey, pollen, and beeswax products will retain their natural wholesome appeal.

The following is a quick review of the most recently introduced IPM products. I urge you to give one or more of them a try. There is a definite learning curve with each of these products involving both timing and application technique. Don't wait until your current treatments regiment fails to investigate and make the necessary changes.

Sucrocide

Sucrocide is a sugar ester; it kills *Varroa* by coating the mite and suffocating it, an effect similar to an orchard oil spray. Sucrocide has no effect on tracheal mites. Application is achieved by spraying the water diluted solution directly onto the adult bees. Depending on the number of colonies to be treated either a hand sprayer or a garden type pump sprayer can be used. Each frame has to be lifted up and sprayed. The product has to come into contact with the *Varroa* mites to be effective. Complete wetting of the adult bee population is required for maximum control. Three treatments at seven to 10 day intervals are necessary to kill the mites emerging form the brood cells. Application can occur anytime the ambient air temperature is above 55°. This product might be the treatment of choice for small colonies such as Spring or Summer splits where there are a limited number of frames to be sprayed. To treat large numbers of colonies refer to the *July, 2005, American Bee Journal.*

Mite Away II

The active ingredient here is formic acid which produces a corrosive vapor that kills *Varroa* by breaking down the mite's cellular structure. Formic acid vaporizes when exposed to air thereby acting as a fumigant. To apply this product correctly, read and follow all the label instructions. There are specific temperature ranges applicable for the proper application, again follow all label instructions.

This is a very corrosive product and appropriate handling precautions are required. Carefully read and follow all the label instructions. In actual use formic acid kills not only *Varroa*, but tracheal mites as well. If used properly, Mite Away II gives an average 90% *Varroa* control and 100% tracheal mite control. Unlike the other IPM products, Mite Away II requires only one application; there is no need to re-treat at weekly intervals.

Api Life Var

This was the first thymol based product to reach the U.S. market. The major active ingredient is a pharmaceutical grade crystalline thymol. Fumigation is the means of dispersal. When exposed to air, the thymol crystals vaporize to form a heavier-than-air gas. This product should be used when the average daily temperature is between 65°F and 95°F. Three treatments at seven to 10 day intervals are required for maximum control. When properly applied control rates approaching 95% can be expected. Again, follow all label instructions regarding the timing of the treatments and the suggested wait time prior to honey super installation. Unfortunately this product currently has a section 18 emergency registration and may not be available in all states. Hopefully, this will change by early Summer with the approval of a section three general use registration.

Apiguard

This thymol product is formulated as a slow release gel and is packaged in an individual 50g tray with a peel off cover or in a 6.6 lb. bulk package. Apiguard gives off a foreign odor which the bees try to remove. Distribution of the gel depends on the house cleaning bees transporting it around the hive during the removal process. Apiguard kills *Varroa* by disrupting the mite's cell membranes. It also has some action against tracheal mites and chalkbrood. Apiguard can be used anytime temperatures are between 59°F and 100°F, the warmer the better. Two treatments at two week intervals are required for maximum control. The second treatment should be left on for up to four weeks, or as long as any gel remains. When used according to the

To acquire the 150 bees you'll need a quarter-cup measuring cup and a collection pan. Telescoping outer covers will work, but a small Rubbermaid tub with rounded corners works best. Simply remove a frame of brood, *without the queen*, and shake the bees into the tub. Bounce the bees into one corner of the tub and scoop up a quarter cup. Gently wiggle the cup to level the bees then dump them into the jar. One quarter cup of bees equates to between 145-160 bees.

label instructions Apiguard gives a *Varroa* control rate of between 85 and 95%, with an average kill rate of 93%.

Oxalic Acid

Oxalic acid has not yet been approved for use in the U.S. It has however been approved in Canada and Europe. Registration in the U.S. is currently in progress. Application is achieved by using a veterinary syringe to trickle 50 cc of the dilute oxalic solution between the frames of the active broodnest. The bees come in contact with the mix and spread it through direct body contact. Current recommendations are to use this product at the end of the season when brood rearing is at a minimum, or has ceased entirely. Mixing and application instructions are available online at www.honeybeeworld.com – click on *Varroa* formic acid, then oxalic acid trickling.

Mechanical Control

Mechanical control is another option worthy of consideration in the battle against *Varroa*. Mechanical control being defined as short term *Varroa* control without the use of any mite control regimen other than selected stock and colony manipulation. Stock selection can play a significant role in the management and control of *Varroa*. *Varroa* reproduces in the capped brood. If the amount of brood can be controlled or managed after the main honey flow, the *Varroa* reproductive cycle can be disrupted. Instead of using a prolific Italian stock you might want to consider a more conservative Carniolan or Russian line. Reducing the size of the broodnest prior to the main honey flow can also have a negative effect on *Varroa* reproduction. This management strategy also reduces the populations of welfare bees that do not contribute anything towards the honey crop.

The makeup of Summer splits also has a negative effect on *Varroa* populations. Nothing of significance changes with the parent colony, but the split ends up with a much smaller *Varroa* population. The *Varroa* buildup process has to start all over. The necessity of queen introduction further disrupts mite reproduction. As Fall approaches and brood rearing continues to decline, *Varroa* cannot maintain its rate of increase. Put another way, splits made in mid July in northern climes only have time to rear three cycles of brood before cold weather halts the proceedings. Mite populations don't have enough time to build up to the point where colony injury ensues. In practice, Summer splits in this area rarely require any mite treatment prior to the onset of Winter.

Local beekeeper and good friend Mark provides another example of mechanical *Varroa* control. Mark runs most of his colonies in a single brood chamber year round. While this type of management has some limitations, it bodes well when it comes to *Varroa* control. Mark was kind enough to check his yard records regarding mite control treatments and their dates of application. It should be noted that Mark routinely samples for *Varroa* using the ether roll method described above. No treatment is applied unless the ether roll indicates there is a problem. (Treatment is initiated when the 150 bee ether roll shows a mite load five or more.) Mark treated everything in October of 2005 with CheckMite® once the majority of the samples reached the treatment threshold. According to his records, the previous treatment was with Apistan® and it was applied in early May of 2003. Again everything was treated at that time. That's two and a half years without any treatment. No special stock, Russian, SMR, or hygienic bees are in use. Yet the *Varroa* counts have remained very low for an extended period of time.

There are no commercial operations in this area. The two or three sideline beekeepers operating in the same area as Mark are all responsible individuals. They all have a healthy respect for *Varroa* and routinely sample and treat as necessary. As a result outside invasion pressure, a common source of *Varroa* infesta-

tion probably isn't much of a factor. But that alone can't explain the low mite counts. Something else is at work. Obviously the small broodnest comes into play, but how? As Mark would say, "The small broodnest reduces the size of the *Varroa* incubator, hence the mite's reproductive capacity." I think Mark is partially right, but it can't be that simple. If it were, *Varroa* would be but a footnote on the pages of beekeeping history. Perhaps some enterprising young grad student could help supply an answer to this question.

IN SUMMARY

To achieve proper *Varroa* control you need to create a window of opportunity in which to apply the necessary controls. This is accomplished by removing the Spring honey crop as soon as possible. Once the crop has been removed sample each colony, or take a representative yard sample and treat accordingly. Instead of routinely treating with Apistan® or CheckMite®, consider using one of the IPM products. Take advantage of whatever time is left before the old standbys fail, to familiarize yourself with these new treatments. Last of all, you might want to consider experimenting with some form of mechanical *Varroa* control. Not only will you lessen your dependency on chemical controls, but you may also improve some of your beekeeping skills in the process. BC

Summer splits in this area rarely require any mite treatment prior to the onset of Winter.

I would like to thank the following individuals for taking the time to educate me on the pros and cons of the IPM mite control products mentioned above: Terry Avise of Dadant's home office in Hamilton, Illinois; Jerry Latner, manager of the Dadant branch in High Springs, Florida; Steve Forrest of Brushy Mountain Bee Farm in Moravia Falls, North Carolina and David VanderDussen of NOD Apiary Products, Stirling Ontario Canada. I would like to thank good friend Mark Rinderman of Marks Apiaries in Painesville, Ohio. Mark has spent a lot of time tracking Varroa populations and keeping the less attentive among us well informed.

Roy Hendrickson is a successful sideline beekeeper, and a frequent contributor to these pages.

WHY QUEEN EXCLUDERS LIMIT HONEY PRODUCTION

And it has absolutely nothing to do with the space between the wires.

Walt **Wright**

In an earlier article, the design deficiencies of the queen excluder were presented in general terms. That article stopped short of saying that those design problems were responsible for decreased honey production. However, the statement was made that the QE *does* decrease honey production - with no further discussion of why. You knew, in advance, that eventually there was more to say on the subject.

The real reason for reduced production has to do with excluder effects on colony population. More specifically, the excluder encourages brood nest reduction that limits the population. For this discussion, try to see the excluder for what it is – a screen separating the brood chamber(s) from space needing filling. Unlike the folding screen used by models to change cloths behind, the visual barrier is unintentional, but it does reduce the colony's perception of the space above.

The colony decisions governing priorities, motivation, and focus on activities are made in the brood nest. That seems unlikely to those of us who consider the brood nest workers to be comprised of mostly junior bees. But senior bees travel through the brood nest and typically the brood nest is located near the entry. Is that to keep in touch with field conditions? You do not have to believe any of the above to take advantage of the following discussion.

Figure 1 breaks the Spring season into the four major over-wintered colony development periods. The periods are centered at reproductive swarm cut off timing for your area. Although most beekeepers are aware that colonies lose interest in swarming at some point in the Spring season, there is only a fuzzy notion of when that is on their calendar. Observation of colony activities puts that timing at a strong three weeks *prior* to the "main flow" appearance of new wax, and early in the period of swarm issue for your area. The details of observations leading to that conclusion were provided here in the April '03, issue. Note that, to my knowledge, no academic organization or individual has considered those observations worthy of validation, or disproving.

The weeks of the timeline are "long" weeks. I see some of the periods as associated with worker brood cycles. When cell turn-around time is added to the 21-day (three weeks) development time of workers, a brood cycle is a couple days more. Several lines on the chart are three divisions long. Those periods are not absolute for all colonies, but are representative of most. Genetic variation, colony over-wintered strength, available flying weather, and field forage availability all introduce some scatter outside those norms.

One thing that all colonies in a given out-yard agree on is when to invoke repro cut off. Different races and mongrel crossbreeds read the seasonal timing with remarkable consistency. Repro cut off may be a week early this year, and a week late next year, but all colonies in a given location agree on the timing within a few days. It is not known what cues the colonies use for this judgment, but the consistency of timing, in any given season, suggests that the cues should be identifiable in future studies.

It has come to my attention in recent months that all walks of life are not necessarily oriented to absorbing data from charts and graphs. What is obvious to this engineer may be gobbledegook to someone else. And beekeepers come from all walks of life. To help you interpret the information on Figure 1, I will try to walk you through the information a step at a time. **It is important that you understand that repro cut off is the change in colony motivation from producing a reproductive swarm to protection of survival of the existing colony**. When season advancement progresses beyond a point where a reproductive swarm has a good chance at establishment in a new location, the colony abruptly changes focus. That new focus is oriented to gearing up to store wintering rations. Reproduction ambition is cancelled for

Tip Of The Month

The queen excluder can be removed for the main flow. At new wax of the main flow, brood nest reduction of third and more year colonies has been in process for at least three weeks. Second year colonies may have just started. Colonies that entertained swarm ambition have been reducing brood volume even longer. If you have not deprived them of rearing a comfortable number of drones in the basic brood chamber, there will be no brood in the supers.

that season, in favor of existing colony survival. Line 1 of the chart, "Colony Objective", shows the objective change at repro cut off.

Brood nest volume and growth or reduction in size reflects that change in motivation. A colony motivated by swarm ambition increases its brood nest size to acquire the population needed to support a division by a reproductive swarm. Brood nest expansion continues to the maximum safe volume. The safe volume is determined by the amount of honey reserve that must be maintained to offset hard times in field forage or flying weather. Having reached maximum *safe* brood volume and potentially maximum *safe* population, they start swarm preparation. The first activity of swarm preparation is to *reduce* brood volume to a level that can be maintained by the parent colony left behind. When the colony is reduced in population by swarm

We will come back to the concepts above, as appropriate, as we discuss application of the queen excluder for the development phases of Figure 1. Line 3 of the chart, "Colony Operation", reflects colony activities for the four phases of operations. Starting at the left side of the chart, phase A is the early build-up. This period begins in mid-winter and stretches through early field forage availability. While that is only two brood cycles at my location, at northerly locations, it can be four months or more. Regardless of the calendar length of this period, it is the time that the colony, strong enough, builds brood volume to the max limit – stopping short of the safety reserve of honey. Assuming that an excluder is installed at the top of the wintering honey, it would have no more effect than the hive cover.

There is dramatic change in effect in phase B, the

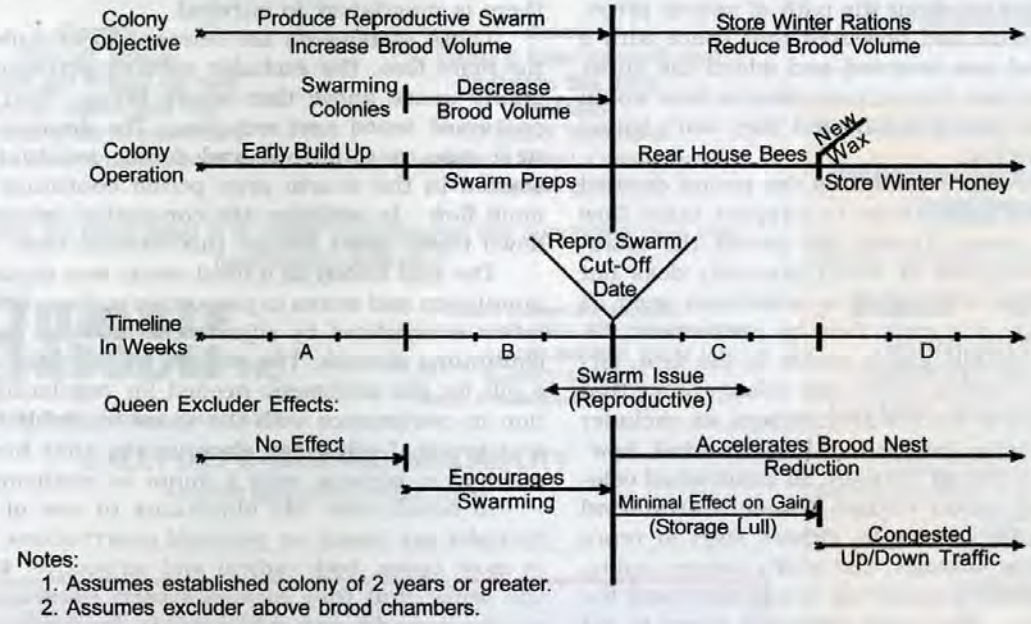


Figure 1. Effects of Queen Excluder for Colony Spring Development Phases (chart by Roy A. Kesmodel)

departure, the parent colony needs a reduced brood volume. This brood nest reduction is a prerequisite for swarm commit, but is seen in the literature as nectar "congestion." Line 2 of the chart, "Swarming Colonies", shows the timing of brood nest reduction associated with swarm preps.

The brood nest reduction described above is relevant to over-wintered colonies strong enough to entertain swarm ambition and may start six to seven weeks prior to the "main flow." All colonies, excepting those struggling for survival and *second year colonies*, get serious about brood nest reduction at repro cut off. They must reduce brood to limit consumption of the stores being collected on the main flow. Excessive brood and nurse bees would be a burden on stores being collected. Nectar processors, wax makers, and foragers support the objectives of that season period. An over-run of new bees generated during the main flow would be counter-productive to the season objectives.

swarm prep period. The colony wants to reduce the brood volume from the top with nectar. In the natural scheme of colony operations, reducing the brood volume from the top is important. This puts the honey overhead of the brood nest to grow into the following Winter. Not relevant to this discussion, but that's why hive body reversal is successful in swarm prevention. When the box with brood to the top is raised, the colony has to start over on brood nest reduction, giving a two to three week reprieve on swarm commit. Swarm prevention by hive body reversal does not reduce population crowding, but puts the nectar below the brood. That's a no-no for wintering.

Where were we?

Queen excluder effects during swarm preparation! Let's assume that you intend to take advantage of the "early flow." You add an excluder and a super of drawn comb when the colony appears to be crowded. The colony is already prepared to ignore space above their band of

It is important that you understand that repro cut off is the change in colony motivation from producing a reproductive swarm to protection of survival of the existing colony.

reserve honey (an un-natural circumstance in the tree hollow). Then the excluder also helps obscure the overhead space. What you have done is almost insure that the colony marches on down the path of swarm preps. You gave them space and obscured that space with a visual screen. Had you reversed and added the super of drawn comb without the excluder surplus bees would have occupied the empty comb, and they can't ignore empty comb underfoot.

Phase C, after repro cut off, is the period devoted to development of house bees to support main flow storing of Winter honey. During this period, the established colony (two years or more) generally does not add much nectar at the top. It is sometimes seen as the "dearth" before the main flow by beekeepers. Although there is typically ample nectar in the field, foraging is limited to feeding brood and colony. Since that activity is primarily in the brood chambers, an excluder has little effect during that period. Keep in mind, however, that at repro cut off virtually all *established* colonies are reducing brood volume. Those that started during swarm preps, continue. Others start at repro cut off. Second year colonies, last year's swarm, splits, or packages will often expand the brood nest until the start of main flow. Obscuring overhead space is not helping slow the process. By the start of main flow, all colonies with an excluder will have substantially reduced brood volume.

Phase D, is the open-ended "main flow." It lasts as long as surplus nectar is available in the field. But that statement is misleading. The bees didn't hire in to gather honey for you. They are motivated by survival requirements. When they have stored sufficient honey for wintering, complacency sets in, and brood nest reduction accelerates. Overhead storage of honey trails off earlier than nectar availability in the field.

Another characteristic of the colony is that they want to fill their residence cavity with stores for Winter. Empty space at the top doesn't fit their natural survival format. It doesn't happen in the tree hollow. This article is about use of the queen excluder and a discussion of top or bottom supering is outside the scope. A couple statements will avoid that subject: If the extra work of bottom supering is worth it, do that. The colony has better perception of empty space immediately above the brood nest, and wintering honey there is mandatory to survival.

Those statements are relevant to excluder use in the main flow. The excluder reduces perception of the empty space above that needs filling. That leads to continued brood nest reduction. The damage to brood nest size, population, and honey production that started in the swarm prep period continues into the main flow. In addition, the congestion created in up/down traffic slows forager turn-around time.

The wild colony in a fixed cavity size must regulate population and stores in proportion to that cavity. Population is regulated by adjustment in brood volume – a continuing process. The colony, wild or managed, has a gift for the arithmetic needed for regulating population in consonance with the space available for stores and brood. I often say (facetiously) that honey bees majored in physics, with a minor in mathematics.

In conclusion: My objections to use of a queen excluder are based on personal observations that are, in most cases, both radical and subjective. Radical in the sense that they have not been examined by the academic world, and subjective in the sense that they are unproven deductions based on observation. Subjective, loosely translated, equates to opinion.

You can prove these characteristics for yourself. Assuming you Winter in a double deep and practice hive body reversal for swarm prevention, try the following approach: Reverse during the swarm prep period, as usual, and reverse again in the range of repro cut off (three weeks prior to main flow). Notice the weight differential between the two boxes. The upper box with the nectar of brood nest reduction will normally be significantly heavier. Nectar/honey weighs more than brood of any age. At the beginning of the main flow, check the brood chambers again. You will likely find that the upper chamber is again filling with nectar, reducing the work force for later into the flow. When that upper chamber is filled and capped, the colony has survival "in the bag" and motivation to do more is relaxed.

In my area, with standard management, the bees have shut down for the season by the time sweet clover blooms. BC

Walt Wright is a retired engineer and a hobby beekeeper in Tennessee. He is a frequent contributor to these pages.

Honey Plants

Connie Krochmal

Abelias As Bee Plants

Abelias have long been a favorite shrub in warmer regions of the country. These densely leaved plants belong to the Honeysuckle family. Native to Asia and Mexico, there are about 30 species worldwide. Of those, a limited number are generally found in cultivation.

These plants were named for Dr. Clark Abel (1780-1826), a renowned British author, naturalist, and physician.

They provide bees with nectar and pollen for months at a time in areas where winters are relatively mild.

General Description

Depending on the species and winter conditions, these fountain-shaped shrubs can be deciduous, semi-evergreen, or evergreen. They have fine-textured foliage and gracefully arching branches. The ultimate size of these plants varies from one kind to another.

The toothed, oval to egg-shaped leaves grow from ½ to 1½ inches long. They are oppositely arranged. Nearly stalkless, these range in color from light to dark green. The foliage is often shiny. During the fall, this can become brightly colored.

Especially floriferous, abelias bloom reliably. The sweetly scented blossoms cover the stems. These come in various colors. They can be funnel, bell, or trumpet-shaped. Emerging on the new growth, the flowers usually open in small clusters. These can appear both terminally and from the leaf axils. Though the flowering period can vary somewhat, most abelias bloom any time from mid or late Spring until the killing frosts of Fall.

The calyx lobes are retained long after the flowers have faded. The small, dry, leathery fruits contain one seed.

Growing Conditions

Very carefree, abelias adapt well to all soil types, including poor ones. However, the best growth occurs in rich, well-drained, moisture-retentive soils. They thrive in acidic conditions up to a pH level of around 6.5 or so. Abelias prefer full sun, but grow well enough in light shade. They won't bloom as freely in heavy shade.

Hardiness

Winter hardiness can differ slightly according to the kind being grown. Fragrant abelia, which is exceptionally hardy, thrives in zone five. Generally, most other abelias are recommended for zones six through ten. During very harsh winters in zone six, their stems sometimes suffer considerable damage. Yet, the plants will resume growing once Spring arrives.

Problems

Aphids, which are often accompanied by ants, can occur on the new growth of abelias. These are easily controlled with sprays of water from a hose. Occasionally, the plants have been affected by fungal diseases, such as mildews, leaf spots, and root rots.

Beekeepers who are gardening in deer-prone areas will be delighted to know that abelias are rarely bothered by deer.

Spacing of Abelia Plants

In the bee garden, the proper spacing distance between abelia plants depends upon their mature size. Larger kinds should be planted about 10 feet apart, while five or six feet is sufficient for smaller cultivars.

Care

On the whole, these shrubs aren't very demanding. Though they

Edward Goucher Abelia

will survive droughts, abelias won't bloom as abundantly if they receive no supplemental waterings during dry periods.

In zone six and sometimes in zone seven, you will need to prune the ends of the branches if winter weather results in dieback. Do this during the early Spring before the new growth begins.

There is no need to shear abelia hedges. Instead, clip the tips of the tallest branches individually to promote a flush of new leaves and flowers. Cutting some of the oldest stems to the ground each year will promote better flowering.

Propagation

Abelias are propagated mostly by softwood or semi-hardwood cuttings, or leaf cuttings. But, layering can also be done. Seeds, which should be planted as soon as they ripen, are another option.

Status as a Bee Plant

With their extended blooming season, these shrubs are valuable nectar and pollen sources for honeybees. However, bees will rarely find a sufficient number of blossoms available to produce pure abelia honey.

Choosing Abelias

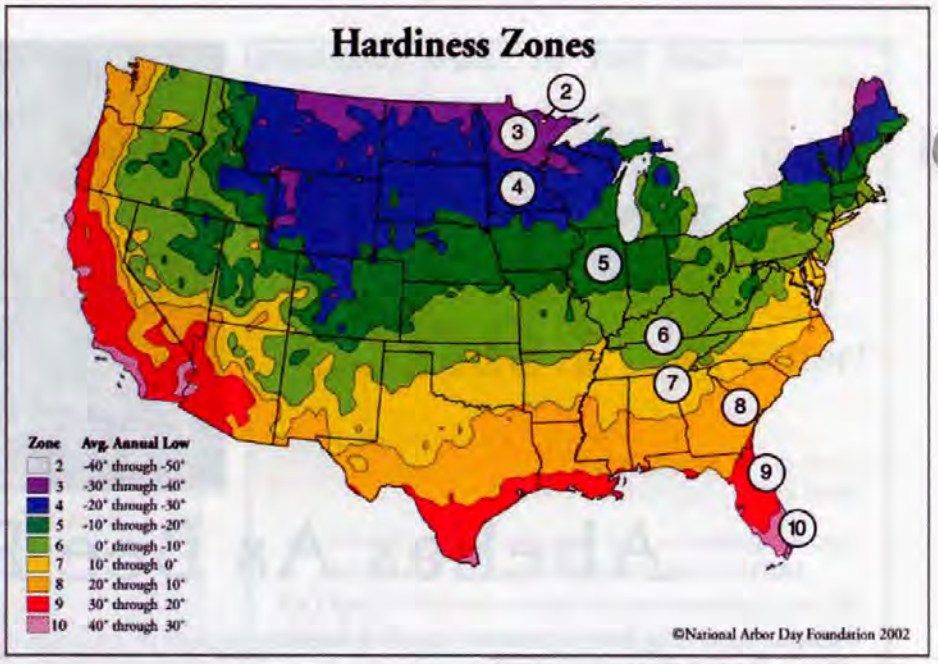
There are so many cultivars and kinds of abelias that it can be confusing to choose ones for your bee garden. It becomes easier if you focus on hardiness and mature size. First, select the hardiest ones for your area. Next, determine how much garden space is available. Compact types are best for beekeepers with limited space.

Medium to taller kinds of abelias are suitable for informal hedges, screens, and borders. Low growing ones make excellent ground covers, especially for banks.

Of the species and cultivars that are available, the following are the most suitable for American bee gardens.

Chinese abelia (*Abelia chinensis*)

This was discovered in 1816 by Dr. Abel. As the name indicates, it is native to China. A compact, spreading plant, Chinese abelia can retain its leaves throughout the year. This species doesn't seem as popular as the others. Recommended for zones six through nine, it has a swift growth rate.



A loose, rounded plant, Chinese abelia is four to six feet tall and up to seven feet across. Reddish hairs clothe the young stems. The shiny, dark green foliage, ¾ to 1½ inches long, is oval. This can be hairy on the upper surface.

Flowering abundantly, this shrub blooms from late Spring until frost. The small white blossoms have flecks of pink. Particularly fragrant, these open in round, crowded panicles.

Edward Goucher abelia (*Abelia* 'Edward Goucher')

A hybrid of glossy abelia and long-flowered abelia, this is not as hardy as most abelias. It does best in zones seven through 10. This plant originated in 1911 in the U.S. Edward Goucher abelia has a moderate growth rate.

Deciduous to evergreen, this dense, spreading plant features pendulous branches. Edward Goucher abelia reaches four to six feet in height with an equal spread.

Some experts consider this to be inferior to glossy abelia. It is compact and rather lacy looking with more reddish coloring. This has slightly larger, darker colored flowers than glossy abelia.

Its young twigs are covered with down. With a rough, bumpy texture, the gray-green foliage has red highlights. Around one to 1½ inches long and half as wide, the egg-shaped leaves are bronze when they first unfurl. These turn purple during the fall. Hairs can be seen on the underside of the foliage.

Edward Goucher abelia tends to bloom very heavily from Summer until frost. The blossoms range from funnel to trumpet-shaped. They are purplish-pink with an orange throat. Opening in small clusters, these reach an inch in length. The sepals are usually two-lobed.

Fragrant abelia (*Abelia mosanensis*)

Also called Mangsan abelia, this is native to Korea. It is deciduous to semi-evergreen with a medium texture. This species grows fairly quickly. Among the hardiest of the abelias, it thrives in zones five through nine.

Fragrant abelia grows from four to six feet in height with a matching spread. The shiny, bright green foliage becomes a vivid reddish-orange in the Autumn.

While the outer surface of the tubular blossoms is pink, the interior is white. Such a color combination creates a two-toned effect. From late Spring through mid-fall, masses of blooms hang from the stems.

Differing only slightly from the species plant, cultivars include Bridal Bouquet and Monia.

Edward Goucher Abelia

Glossy abelia (*Abelia x grandiflora*)

The best loved and most popular of all the abelias, this small, fast growing, semi-evergreen to evergreen shrub is considered a superior plant for bee gardens.

Glossy abelia is most suited to zones six through 10. When the temperature reaches zero degrees Fahrenheit, this dies to the ground. However, new stems quickly arise from the roots once Spring arrives.

Tolerant of heat and drought, glossy abelia originated in Italy some time during the latter half of the 1800s. This shrub is suited to sun and partial shade. If the soil is too alkaline, it can develop chlorosis. Normally, this is a vigorous plant with an excellent growth rate, but less so in dry soils.

A densely leaved shrub, this is somewhat upright when young. As glossy abelia matures, it assumes an arching shape. When the new stems first emerge, they're covered with tiny red hairs. The older stems become brown as they age. Often, the bark tends to peel.

In areas with mild Winters, glossy abelia can grow to five or six feet in height with an equal width. In zones six and seven, the ultimate height can be less due to Winter dieback.

The glossy, oval leaves are one to 1½ inches long and about half as wide. Often with red tinges, these turn bronze-purple during the Winter.

The bugle or tube-shaped blossoms reach up to an inch in length. Exquisitely fragrant, these open in clusters, mostly at the ends of the shoots. They appear from May into the Fall months. These are white with touches of pink. Two to five in number, the individual lobes of the calyx can be fused together. The colorful sepals, which change from green to purplish-rose, remain in place for months.

Because glossy abelia is such a popular plant, there are numerous cultivars available. Among the best are the following.

Confetti is a compact, variegated form that is less vigorous than most abelias. About 2½ feet in height, it displays cream along the margins of the foliage. This changes to red during the Winter months. Confetti has white blossoms.

Francis Mason is also compact – about three to four feet in height and about as wide. With crowded branches, this plant has yellow variegation on the foliage. The young leaves are coppery. Highly scented, the white blossoms with pink blotches open from Summer through the Autumn.

Prostrata grows from 1½ to two feet in height. However, it can spread to five feet in width. This cultivar is often used as a ground cover for banks.

With a swift growth rate, Sherwood abelia is a compact, refined evergreen. It has a spreading, mounded growth habit. About 2½ to four feet in height, this delicately textured plant can be five feet across. Its stems are smooth and red. The inch-long leaves become slightly purplish during the Summer. These turn bronze or red during the Fall and Winter.

Introduced in 2001, Sunrise is a compact, twiggy plant. Reaching about three to six feet in height with an equal spread, this cultivar has gold along the edges of the leaves. Its fall foliage is either purple or scarlet.

Long-flowered abelia (*Abelia schumannii*)

Suitable for zones seven through nine, this is not quite as hardy as some abelias, which might explain why it isn't as commonly grown as the other kinds. This was discovered in China by Ernest Wilson in 1910.

It is sometimes used for breeding new varieties.

Long-flowered abelia grows to about three or four feet in height with a matching width. This plant can be deciduous or evergreen. The blooms appear from late Spring through the Autumn. The elongated, tubular blossoms are lavender-pink with splashes of orange.

Mexican abelia (*Abelia floribunda*)

This spreading, semi-evergreen to evergreen shrub is noted for its free-flowering nature. Mexican abelia was introduced to the U.S. from Mexico in 1841. A fast growing plant, this is a tender species. If given a very protected position, this has been known to survive Winters in zone eight. However, it is most reliable in zones nine through 11. At 20 degrees Fahrenheit, Mexican abelia suffers severe damage.

Unlike most abelias, this species benefits from partial shade during the afternoon.

Normally, this medium-sized shrub typically reaches three to six feet in height. But, it can grow to ten feet tall with a 12 foot spread.

Its hairy, arching stems are covered with reddish down. The small, dark green leaves seem to glisten.

When in full bloom, Mexican abelia is by far the most striking of all the abelias. This can produce flowers throughout the year. However, the blossoms are most numerous during the Summer. These are either cherry-red or reddish-purple. They reach two inches in length. Tubular-shaped, these blooms occur singly or in irregularly shaped bunches.

In regions with mild Winters, abelias are well known for their abundant blooms throughout the growing season. They provide bees with a steady, dependable supply of nectar and pollen. BC

Connie Krochmal is an award winning garden writer and a beekeeper in Black Mountain, South Carolina.

Sauces and Salsas and Peppers - OH MY!

Ann Harman

Sauces are important ingredients for barbeque and salsas are popular any time. These sauces and salsas all contain hot peppers, an interesting addition to many foods today. Hot peppers are so popular that you can even find a magazine devoted to them.

Unfortunately some think that the addition of a hot pepper is only for the sake of hot and turn down any use of them. Actually the degree of "hot" is easily controlled both by choice of pepper and by the quantity added. Hot peppers do have individual flavors that they contribute. Go ahead and experiment with them. Just be careful in handling some of the really, really hot ones.

Chili peppers are rich in vitamin C so they are a good addition to our menus. If you have ever wondered how some people can munch on hot peppers, remember that you can become desensitized to their heat by simply eating hotter and hotter peppers. You may think that you can calm your mouth after a bite of a hot pepper with a glass of water, but water actually does not help – it only makes the situation worse. Take some sips of milk or a spoonful of ice cream. They do help. So does rice and bread.

The hottest parts of a pepper are the internal ribs and that part in the middle that supports the seeds. The overall hotness of a pepper is influenced by growing conditions – soil, rain and temperature. A scale of hotness exists for hot peppers. But instead of listing many of the peppers and their values, I am just going to list a few of the most popular ones from "coolest" to "hottest."

Your sweet bell peppers and pimento are ranked as zero – not considered hot at all. The pepperoncinis frequently found at salad bars are considered quite mild. The poblanos, anchos and mulattos are somewhat hotter. In midrange are the jalapeno and chipotle peppers. Serrano chilis are definitely hotter but not as much as cayenne. Now the cayenne pepper is really hot. And at the top of the list come the habanero and Scotch bonnet. These two are considered the hottest of the readily available chilis. I read that a British gardener has developed a pepper hotter than those. You harvest it with gloves!

While you are grilling fish and meats this summer try some of these recipes for sauces and salsas. You certainly can vary the peppers and the amount according to taste. But keep some milk handy for any guests who are not used to hot peppers.

FRESH MELON SALSA

3 cups diced melon
6 tablespoons lime juice
1/4 cup honey
1/4 cup diced red bell pepper
1-1/2 tablespoon finely chopped cilantro
1 tablespoon seeded, minced jalapeno pepper
1/2 teaspoon salt

Combine all ingredients in large bowl and mix well. Refrigerate overnight to allow flavors to blend. Serve over grilled fish or chicken. Makes 3 cups.

National Honey Board

Save this next recipe for later this Summer when fresh peaches and plums are available. Your garden can supply the mint and parsley and your bees will be happy to provide some honey.

SUMMERY PEACH SALSA

1 cup diced peach
1/2 cup diced plum
1/4 cup minced shallots
3 tablespoons orange juice
2 tablespoons minced fresh parsley
1 teaspoon grated lime rind
2 tablespoons fresh lime juice
1-1/2 tablespoons chopped, seeded jalapeno pepper
1 tablespoon minced fresh mint
1 tablespoon honey
1 teaspoon minced peeled fresh ginger

Combine all ingredients in a bowl. Cover and chill. Yield 2 cups.

Cooking Light Magazine

Look through the Mexican food section of your supermarket and you will probably find chipotle chilis in adobo sauce. You will need a can of that for the next recipe. Mangos are becoming common in grocery stores and you may well find both fresh and canned. This is a nice, quickly-made barbecue sauce.

HONEYED BAJA BARBECUE SAUCE

3/4 cup prepared barbecue sauce
1/3 cup honey (Orange Blossom is recommended)
2 tablespoons fresh lime juice
1 canned chipotle chili, minced
1 teaspoon adobo sauce (from canned chipotle chili)
1/2 cup pureed fresh mango
1 tablespoon minced fresh cilantro.

Combine the barbecue sauce, honey, lime juice, chili and adobo sauce in a small saucepan. Bring to a boil; reduce heat to low and simmer for five minutes. Remove from heat and let cool slightly. Stir in mango and cilantro. Brush over beef, chicken or pork during the last five minutes of grilling.

National Honey Board

Although this next recipe has an interesting mixture of ingredients, it is really good and can be used as a dip.

Ancho Chili Sauce

1 teaspoon olive oil
1 medium onion, diced
2 cloves garlic, peeled, cut in half
1 medium tomato, diced
2 ancho chilis, seeded (if dried, soak in warm water)
1-1/2 cups chicken stock
1/3 cup raw sweet potato, diced
1 tablespoon honey
1/2 teaspoon cumin
1 tablespoon minced fresh cilantro

Heat olive oil in medium saucepan. Add onion and garlic and sauté until browned, approximately six minutes. Add diced tomato and sauté another minute. Add chilis, chicken stock and sweet potato. Simmer 15 to 20 minutes or until potato pieces are tender. Place mixture in a blender and puree until smooth. Return blended mixture to saucepan. Add honey, cumin and cilantro. Heat thoroughly. Add additional chicken stock if sauce is too thick. If a very smooth sauce is desired, strain through a fine sieve. Delicious over fish.

Williamson Co. (TX) Area Bkprs. Assn. Cookbook

Summertime is watermelon time. Try this salsa the next time you open a good watermelon. This salsa has a nice fresh taste, quite different from a tomato-based one. You can, of course, substitute another type of chili for the Serrano.

WATERMELON SALSA

2 cups cubed watermelon, seeds removed
1/2 cup chopped green onion
2 tablespoons finely diced serrano chilis (seeds removed)
2 tablespoons honey
2 tablespoons cider vinegar

Mix diced ingredients together. Combine and stir honey with vinegar and pour over watermelon mixture. Chill slightly and serve with...everything!

Pepperfool Recipes

And finally a very quickly-made sauce for those unexpected guests to savor on hamburgers or hot dogs.

Smoking Chipotle Honey Sauce

1 canned chipotle pepper in adobo sauce, sliced
1/3 cup honey
2 tablespoons mayonnaise
2 tablespoons ketchup
1 tablespoon yellow mustard.

Mix all ingredients in a bowl.

National Honey Board

Experiment with the wonderful world of chilis. Some are red, some green and some yellow. But don't depend on the color for the degree of heat. BC

You'll find Ann Harman on her deck barbecuing with sauces, and salsas and peppers - oh my! in Flint Hill, VA.

? DO YOU KNOW ?

Managing Biology

Clarence **Collison**
Mississippi State University

To effectively manage honey bee colonies, it is important for the beekeeper to have an understanding of basic bee biology and being able to determine current colony conditions when examining the brood nest. Failure to realize when colony conditions are not optimal for colony development and survival may result in the beekeeper making inappropriate management decisions.

Please take a few minutes and answer the following questions to find out how familiar you are with basic bee biology.

Level 1 Beekeeping

1. ___ Worker honey bees may lay unfertilized eggs in the presence of a laying queen. (True or False)
2. ___ Africanized honey bee swarms are normally smaller in size and will travel further than European swarms. (True or False)
3. ___ The queen's mating sign prevents other drones from mating with the queen. (True or False)
4. ___ The piping sound produced by queens is associated with the queen's mandibles being rubbed together. (True or False)
5. ___ Under natural conditions Nasonov gland exposure by foraging bees is associated with the collection of water and not nectar or pollen. (True or False).
6. During the swarming process, Nasonov pheromone is involved in several different situations. Name three ways the pheromone is involved in swarming activities. (3 points)
7. ___ Drone and queen honey bees produce footprint pheromones that are biochemically similar to that produced by worker bees. (True or False)
8. ___ The muscles that are responsible for moving the wings are attached directly to them. (True or False)
9. ___ The cocoons of workers, drones and queens are constructed in a similar manner. (True or False)
10. ___ Footprint pheromone persists longer than the Nasonov pheromone at the hive entrance. (True or False)
11. ___ Queen, worker and drone larvae continue to feed after their cell is capped. (True or False)

Advanced Beekeeping

12. ___ Worker and drone larvae in newly capped cells usually uncurl with their posterior regions toward the cell capping. (True or False)
13. ___ In the absence of a queen both ovaries and mandibular glands of worker honey bees enlarge. (True or False)
14. ___ Some laying workers may have a higher level of queenliness than others in a colony. (True or False)
15. ___ The latency period for worker egg laying after a colony loses its queen varies with different races, with European races having a shorter latency period than African races. (True or False)
16. ___ The three major honey bee endocrine glands – the prothoracic gland, corpora cardiaca and corpora allata – are found in both adults and larvae. (True or False)
17. ___ Each bee has a tendency to express different behaviors according to their genetic profile, physiological state and external stimuli present at the time. (True or False)
18. Queen honey bees have approximately a 16 development day cycle which varies with nutrition, broodnest temperature and race. Please indicate which day of the 16 day cycle the following events occur. (Question is worth 7 points)

A. ___ Capping of brood cell
B. ___ Egg hatches
C. ___ Larva sheds its skin for the first time
D. ___ Larva stretches out on its back with its head toward the cell opening (prepupa)
E. ___ Sixth and final shedding of the skin
F. ___ Fifth molt into the pupal stage
G. ___ Larva spins a cocoon

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **True** In most social insect colonies, workers do not attempt to lay eggs in the presence of a laying queen. In the honey bee, however, a rare phenotype occurs in which workers activate their ovaries and lay large numbers of unfertilized eggs despite the presence of a fecund queen.
2. **True** Africanized honey bee swarm size is generally small- about the size of a quart jar or smaller. They move fast and travel farther than European honey bees swarms.
3. **False** The queen's mating sign is part of the drones copulatory organs lodged in the queen's vagina. It does not prevent the queen from mating with other drones.
4. **False** A queen pipes by working her wing beating apparatus without spreading her wings and vibrating her thorax. When a wing is folded its mass is brought close to its axis of rotation. The result is that the thorax vibrates about twice as fast with the wings folded as when wings spread, so the pitch of the sound produced is higher. A piping queen presses her thorax against the comb surface, producing an effect like pressing the handle of a tuning folk on to a large surface causing the sound (thoracic vibrations) to radiate more strongly.
5. **True** Foragers seldom release Nasonov pheromone on flowers, probably because flowers have a pronounced odor of their own. However, when foragers approach a water source or artificial sources of food (sugar syrup), they expose their Nasonov gland.
6. After leaving the hive, workers release Nasonov pheromone which helps the bees move in the same direction and is reinforced by queen substance.
   When the swarm cluster forms, the first workers to settle release Nasonov pheromone to attract the queen and other workers.
   Scout bees search for nest sites, which they mark with Nasonov pheromone.
   The swarm remains clustered before flying off to one of the nest sites chosen by the scouts, guided by the release of Nasonov pheromone by the scouts.
   When the swarm arrives at a new nest site, Nasonov gland exposure is again vigorous.
7. **True** Both queen and drone honey bees deposit footprint pheromones on surfaces, indistinguishable from those of workers.
8. **False** The thoracic muscles responsible for moving the wings are not directly attached to them. When the muscles contract, they distort the shape of the thorax and the wings move as a result of this. When the top of the thorax moves up and down because of indirect flight muscles, the necessary wing twisting and up and down strokes occur automatically.
9. **False** Worker and drone larvae build enclosed cocoons on the side and end walls of the cells. Queens leave the bases (i.e. the tops) of their cocoons open, because they feed there.
10. **True** Worker honey bee footprint pheromone persists for at least four hours at 23°C and longer at colder temperatures, many times longer than Nasonov pheromone. Nasonov pheromone is disseminated into the air while footprint pheromone is deposited on the substrate.
11. **True** Worker and drone larvae can eat for some time after their cells are capped. Queen larvae eat and gain weight until their cocoons are nearly completed.
12. **True** They uncurl with their posterior regions towards the cappings, later reversing their direction of movement when cocoon construction begins.
13. **True** In the queen's absence both ovaries and mandibular glands of worker honey bees enlarge in size.
14. **True** Sometimes one laying worker in a colony will develop a higher level of queenliness will be attended by a retinue of workers which feed and lick her like a queen. They have slightly swollen abdomens and seem to inhibit ovarian development and oviposition of other workers, probably because of increased production of mandibular gland substances identical to those produced by real queens.
15. **False** The latency period for European races average 23-30 days and African races only five to 10 days.
16. **False** Both the corpora allata and corpora cardiaca are found in adult and larval honey bees. The prothoracic gland, responsible for molting, is found only in the larva.
17. **True** Some kinds of activities are limited by internal physiological conditions associated with gland development. External factors also stimulate various responses.
18. A) days 7-8
    B) day 3
    C) day 4
    D) day 10
    E) day 15
    F) day 10
    G) days 8-9

There were a possible 13 points in each test level this month. Check the table below to determine how well you did. If you scored less than six points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of Points Correct	
13-11	Excellent
10-8	Good
7-6	Fair

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

GLEANINGS

JUNE, 2006 • ALL THE NEWS THAT FITS

VARROA NEWS

USDA/Almond Board Research USDA Researchers say a single *Varroa* mite can shorten the lifespan of its bee host by one-third, and two can shorten it by one-half. The bees' overwintering stage is the most vulnerable to the mites. Annual economic losses to managed bees from *Varroa* range from 25 to 80 percent, and feral bees are also impacted.

Gordon Wardell gave a progress report at the recent 33rd annual almond industry conference recently in Modesto. The Almond Board of California hosted the conference and contributes funding for the projects discussed.

Contact phase

Wardell said they wanted to take essential oil a step further in reaching the mites within the bees' systems. "We are now looking at a contact phase, which is a little more difficult. We need something that the bee larvae will pick up and carry to the mites," he said. The idea is to get the essential oil into the blood of the bees and repel the mites from feeding.

The project continues with a protein liquid diet carrying the essential oils in suspension. Wardell and others will use additional gas chromatograph studies to trace movement of the oils in the bees.

A separate project on delivering essential oils of thymol, origanum, clove, and cinnamon microencapsulated in cornstarch was discussed.

The process for microencapsulation turns food-grade cornstarch into a microcellular gel that the essential oils are then incorporated into. The product is ground to the fineness of pollen and mixed with powdered sugar.

On another front against *Varroa*, Allen C. Cohen, also a scientist at the Tucson laboratory, is a member of a group observing nutritional supplements to improve vigor in honey bees as a way to resist mites and microbial infestations they carry.

"A healthier insect is less susceptible to disease than one that is malnourished," he said.

The project has four objectives, the first being to find nutritional deficiencies in almond pollen.

A second objective is to determine the uptake of iron, calcium, and other nutrients and how they are taken up and move in bees.

The third is to chart the bees' blood chemistry to see what makes up a healthy colony.

The fourth is testing nutritional supplements in almond orchards to optimize delivery of the supplements.

Gloria DeGrandi-Hoffman, research leader at Tucson, said improved bee nutrition is key in dealing with the *Varroa* problem and they hope to use it in developing a sustainable solution.

New Compound

DeGrandi-Hoffman reported on her project, funded by both the Almond Board of California and the California Beekeepers Association, on research with microencapsulated 2-Heptanone, the compound most effective against *Varroa*. It occurs in various spices, cheese, fruits, and breads.

However, she said, "2-Heptanone evaporates quite rapidly, and that is both a good thing and a bad thing," she said. Its rapid volatilization is good because it disappears and leaves no residue to cause resistance in the mites, but the drawback is it vanishes from colonies before the month of exposure needed for effect on the mites.

Her effort was to develop a delivery system for the compound in a biodegradable form that would be placed in the colony once, instead a treated plastic strip that would have to be placed and later removed by beekeepers.

Queens Pass Virus To Young Researchers from the U.S. Department of Agriculture report what may be the first evidence of queen honey bees transmitting viruses to their offspring.

They report their findings in the January 2006 issue of the journal Applied and Environmental Microbiology.

Honey bees contribute greatly to the annual 15 billion dollar agriculture market by assisting in the pollination of a wide variety of crops. The health of honeybee colonies is continuously threatened by various pathogens, with viruses posing the greatest risk due to lack of information concerning transmission and outbreaks. In the study feces and tissue (including hemolymph, gut, ovaries, spermatheca, head, and eviscerated body) of individual queen bees were tested for viral presence. All tissue forms but one, as well as feces, were found to carry viral infections.

Once the viruses in the queen bees were identified, their offspring (including eggs, larvae and adult workers) were tested and found to carry the same viruses.

"The present study, using the sensitive RT-PCR method, demonstrated the vertical transmission of multiple viruses from mother queens to their offspring by two findings: first, the presence of viruses in queen excretion and queen tissues, particularly in the tissue of ovaries; and second, detection of the same viruses in queens' eggs and young larvae that are not normally associated with V. destructor, which is an important vector of bee viruses," say the researchers.

HOSPITAL TAKEOVER BAD MEDICINE FOR KELLEY COMPANY

Hospital takes over at Bee Hive Factory It had been coming for 20 years, but the March 27 announcement that ownership of Clarkson's Walter T. Kelley Factory moves to Twin Lakes Regional Medical Center in September was a bit of a shock. The hospital's CEO, Stephen Meredith said they would:

• Seek proposals (not bids) for a buyer for the factory's inventory and equipment, the factory name, and lease the factory with strong emphasis on keeping it in Clarkson; or

The current factory management can submit a proposal; or there could be

A buyout by employees.

The third option had not received support among the 34 employees.

"The Foundation Board," he said, "will be looking for the best proposal that keeps the factory where it is now."

He added the Hospital Foundation, acting as a holding company, can create an endowment with the remainder of the trust funds and future revenues from the Kelley Company going toward future expansion of healthcare facilities in the county.

This arrangement, he said, would let the Hospital Foundation keep the assets of the Kelley Trust.

The 110 acres surrounding the factory were not mentioned, land that Kelley, a former USDA employee, had managed in textbook ecological style.

Since the Spring of 1953, the Kelley Company has been sup-

Continued on Next Page

KELLEY ... Cont. From Pg. 57

plying bees and beekeeping accessories to the contiguous 48 states and many foreign countries, but according to records has experienced just over 20% decline in gross revenue in the last five years.

Kelley announced his decision to name the Grayson County Hospital Foundation, Inc. as the sole beneficiary of his estate after his wife, Ida, died in 1978. Kelley died in 1986. The 20-year time limit ends this year in September.

In early May, Meredith said "We're not just looking for a buyer. We're looking for somebody who is going to keep the Walter T. Kelley Company operating right where it is. The recent announcement has brought inquiries from five competitive companies, with one of them talking about making the factory in West Clarkson a distribution center for the Eastern United States."

"That's the kind of proposal we're looking for," he said. But, the proposals that were mailed to prospective companies had some honey added to the deal.

"We're offering to lease the factory buildings and site for $1 a year for the first two years, providing they keep the company at Clarkson," he said.

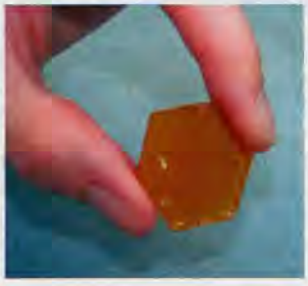
When responses to the proposals come back, those companies will have until July 14 to develop their plans for the factory and get them back to the hospital board.

"We'll review the proposals then and make a decision," he said. he promised to look most favorably at those companies who want to keep the factory open, where it is and "can back up their operating cost estimates."

Taken From The Grayson County News-Gazette

SOLID HONEY WAFERS

Next time you're considering adding a little honey to your tea, picture yourself reaching for a solid honey wafer. Amazingly, thanks to research sponsored by the National Honey Board (NHB), the ease and convenience of solid honey is now more than wishful thinking, it's reality.



Prompted by growing interest from food manufacturers in dried honey, the Honey Board initiated a product concept program on behalf of the U.S. honey industry to optimize the utility of the various forms and styles of honey. Early in the project, due to honey's hygroscopic properties, the Honey Board realized honey's sticky constraints. By removing a portion of the water content of honey (honey contains roughly 17% water), technologists solved the stickiness problem and created a new concept/product – solid honey. Launched with the tentative name "Simply Honey," the honey wafer has a single ingredient: pure honey (no additives or stabilizers). With dimensions approximating the size and thickness of a quarter, it dissolves quickly in hot liquid.

To monitor public response, the Honey Board plans to introduce "Simply Honey" as a hot beverage sweetener at food trade shows during 2006. At these events, the board will be prospecting for food manufacturers willing to implement the Honey Board's primary objective: moving the concept from ideation to the store shelves. The concept comes at no cost to the manufacturer; however, additional product development, product identity, packaging and distribution would be the manufacturer's responsibility.

While commodity boards primarily focus on generic promotion programs, the National Honey Board proactively assists the industry by identifying opportunistic honey applications and consumer-friendly honey concepts. Since joining the NHB as Marketing Director, Bruce Wolk has spearheaded industry efforts to make honey more accessible to 21st century consumers. "Our goal is to keep honey top of mind when consumers reach for a sweetener.

SWEETENER NEWS

Beyond Sugar is marketed as containing no sugar alcohols or synthetic chemicals, and claims to be able to replace all cane, beet and corn sugars in food and beverage products.

"You can do everything with Beyond that you can do with sucrose," said president and director of business development and marketing Dr Kenneth Knopf.

According to Knopf, the secret lies in the technology. Through a patent-pending process termed Beyonding, the company uses glycosides, plant derived organic compounds that contain sugars, to obtain Beyond, a disaccharide with the same molecular formula as sucrose.

"We have received enormous interest in the past six months, it's staggering for such a short period.

The cost of the product may also place it at an advantage. According to QFD, although its new sweetener is more expensive than sucrose, it is still cheaper than Tate & Lyle's sucralose product Splenda.

•

Dietary professionals and others interested in checking the amount of "added" sugars in foods can now tap a new data resource. Agricultural Research Service (ARS) nutritionists launched an online table that lets users look up the added sugars, total sugars and carbohydrates in 2,041 common foods listed.

U.S. consumers eat about 74 pounds of added sugars per year. That's about 23 teaspoons of added sugars every day – or 460 calories that supply no additional nutrients.

The data reported are "ingredients" on the package labels, and some added sugars include **honey**, molasses, fruit juice concentrate, brown sugar, corn sweetener, sucrose, lactose, glucose, high-fructose corn syrup and malt syrup.

To download the new special interest table go to: www.ars.usda.gov/Services/docs.htm?docid=12107.

OBITUARIES

BRIAN E. FERGUSON September 1, 1941-February 9, 2006 – Brian was born in Los Angeles, California, September 1, 1941, growing up in Paramount and La Sierra, California. He graduated from Ramona High School in Riverside in 1959. He served in the Air Force from 1964 to 1968, including a tour in Vietnam.

In 1979 Brian purchased the W.F. Huston operation under contract. Prominent in the California State Beekeepers Association, he served on the Board of Directors for many years. He served as Chairman of the Legislative Committee for nearly a decade.

He was awarded Young Beekeeper of the Year in 1980, Beekeeper of the Year in 1982, and Honorary Lifetime Member in 2003.

REGINALD SHUEL, University of Guelph, retired, died March 30, 2006. He received his PhD in plant physiology from The Ohio State University, and did research and taught Apiculture at Guelph for many years. His studies that are best known to the beekeeping industry centered on nectar secretion of honey plants, and the effects of soil conditions and nutrients and other environmental effects on the amount and quantity of nectar produced.

BIG, BIG TOADS

Scientists say the species *Bufo marinus* is developing a leggier, faster-moving form that is now hopping out rapidly across the Australian continent.

The toads were introduced to Australia 70 years ago to control pests, but have since wrought havoc on indigenous animals. Honey bees are on their menu, too.

They kill snakes, lizards, water birds – even crocodiles and dingos.

When harassed they secrete poison carried in two sacs behind the head which is lethal to a potential predator within minutes of being ingested.

The amphibians, which can weigh up to four and a half pounds are now found in an area covering over 386.1 thousand square miles.

They were first introduced to Queensland from South America in 1935, in an attempt to wipe out cane beetles, a pest that was destroying sugar crops in north-east Australia at the time.

Since then, the toads have been sweeping through Australia leaving a trail of dead creatures in their wake.

To investigate their worrying spread, scientists looked at cane toads invading the Northern Territory of Australia, at a site about

35 miles east of Darwin.

They caught the toads, measured them, and also attached a radio-transmitter, weighing about 5-6g, around their waist to track their movements.

"During an invasion process the individuals at the front are there because they have moved the furthest," explained Dr Ben Phillips, an author on the paper and an evolutionary biologist at the University of Sydney, Australia.

"We showed the toads that are the first to arrive at the front are the ones with the longest legs, and the last to arrive have shorter legs.

"The front toads also have much longer legs than the older populations in Queensland."

They discovered that the toads were moving incredibly quickly, covering distances about five times faster than when they arrived 70 years ago.

"They are moving around 34 miles a year on average, which is a long way to hop if you are a toad," said Dr Phillips.

MAXANT STRONGER THAN EVER

Earlier this year, this magazine reported the November 2005 passing of William T. Maxant at the find old age of 98. He claimed he owed his longevity to his lifelong passion for beekeeping and the ability to create machinery for the honey processing industry.

In February of 2006, Bill's daughter Valerie called her brother Theodore and asked him to report to the main assembly plant and take charge of Engineering and Production. Theodore brought with him from his iron works up the road, lots of modern machinery and skilled ironworkers to jump start production for this season.

Over 25 tons of old machinery was scrapped and the production facility given a good scrubbing. Water cooled tig machines were introduced and more skilled tig welders were hired. Orders for stainless steel, bearings, pulleys, castings, and other raw material were increased. Today orders are being filled on a timely basis. The goal is to produce in sufficient quantity to have large inventories of honey processing machines packed and in stock to ship at a moment's notice.

Theodore is pleased to report these goals are being reached and he's having fun. This business is so different from fabricating truckloads of structural steel for the construction industry. It's doing business with the basic value of all Americans – the farmers.

Theodore is proud of the existing staff of Maxant Industries. Rick Thibault, the general manager, has introduced new computers in the office and the web site will be vastly improved and made customer friendly. The team of people will continue the proud tradition of William T. Maxant of providing high quality stainless steel machinery and tools to the honey industry.

WORLD HONEY NEWS

England Honey Sales Sales of honey have soared in the past year while those of marmalade and jam continue to fall, according to new figures.

A generation ago honey came in just two varieties: clear and set. But shoppers are now able to choose from dozens of types, including Australian, South American, sunflower, eucalyptus and lavender.

Experts said that the new choices largely responsible for persuading an extra 490,000 households to buy honey in the past year – an increase of 4.5 per cent. Sales of marmalade and jam fell by seven and three per cent in the same period.

The overall market for honey is now worth $460.7 million and marmalade $451.6 million. Thick-cut marmalade suffered the biggest losses of the past year, with sales down 14.3 per cent.

The company that compiled the figures said that as well as being lured by the new range, shoppers could be turning to honey because they believed it was a healthy alternative to sugar-rich jam and marmalade

Nutritionists agree that people view honey as a healthy alternative to jam, but say that this perception is not supported by science.

English Packers Punished A couple who bought cheap imported honey and sold it to shopkeepers claiming it was made in Norfolk were fined £8,000 and ordered to pay £90,000 costs.

William Baker, 59, and his wife Lynn, 55, of Bury St Edmunds, Suffolk, carried out a "deliberate and dishonest scam" by using honey from countries such as Argentina and China in their product, a court heard.

They were found guilty of 12 counts of obtaining property by deception following a trial at King's Lynn Crown Court, Norfolk, in December last year. Further charges of making a false description of food were ordered to lie on file.

During the trial, the court heard that the Bakers supplied customers with 17.7 tons of the falsely named product between January 2001 and September 2003.

The jars with the label Norfolk honey, were then sold by businesses across the country.

Pakistan Pakistan has become self-sufficient in its honey requirements after production soared to 2,500 tons a year.

Official figures show the country now has 200,000 colonies and the previous nine pounds/colony annum production has jumped to 46 pounds.

European bees were introduced to Pakistan 20 years ago and there now are 150,000 colonies. The industry employs some 11,000 people.

A new report said honey obtained from European bees is more in demand than from the indigenous ones.

India With supply exceeding demand Indian honey prices have crashed, highlighting the lack of a proper pricing formula combined with unorganized retailing.

In some areas the average price paid to beekeepers in last year have dropped to $0.18/lb. from $0.61/lb. the previous two years.

The price of Litchi honey, a specialty high value honey typically sold unblended with other types of honey, averaged $0.56/lb., down from $0.76/lb..

The industry faces the problem of fragmentation of activities and a lack of coordination among the different research and development agencies. Large quantities of honey are collected in forests by unorganized groups and this honey competes with product from commercial apiarists.

"Pricing of honey is a function of the intermediaries and they decide to buy at a particular price which often is detrimental to the honey as an industry," industry expert Suresh Iyer was quoted as saying.

He has suggested greater reliance on the use cooperatives for marketing honey to eliminate market fragmentation and improve prices.

He also called for a minimum support price from the government and promotion of honey consumption in the consumer market.

Alan Harman

VIDEOS

BEGINNING BEEKEEPING VIDEO 2 hrs! All survival essentials: building hive; installing, feeding, medicating, inspecting, managing bees; harvesting, diseases & parasites; behavior. $35. Dr. Iacobucci, 172-BC Washington, Pembroke, MA 02359 www.roctronics.com/bee.htm. (TF)

SCIENCE BOOKS

PRACTICAL POLLINATION BIOLOGY, 590 pages of pollination science. 29 authors, 150 descriptions of protocol, nine chapters, X158, $62.50.

BEEKEEPING & CONSERVING BIODIVERSITY. Theory and practical information for sustainable bee breeding. 179 pages, X150, $20.

POLLEN, HIDDEN SEXUALITY. Stunning oversize, full color, hard cover. 51 floral families, 113 different families. 265 pages, X159, $60.

All avilable from Root Publishing, 800.289.7668.

PERIODICALS

RURAL HERITAGE – bi-monthly magazine in support of farming and logging with horses, mules, and oxen. Subscription includes THE EVENER Workhorse, Mule & Oxen Directory; $29 for 6 issues; sample $8.00. Rural Heritage, 281-B Dean Ridge Lane, Gainesboro, TN 38562. 931.268.0655, www.ruralheritage.com

THE SCOTTISH BEEKEEPER. Magazine of The Scottish Beekeepers' Assn. Rates from Enid Brown, Milton House, Main St., Scotlandwell, Kinross-Shire KY13 9JA, Scotland, U.K. Sample $1.

IBRA: INFORMATION AT YOUR FINGERTIPS. IBRA is *the* information service for beekeepers, extension workers and scientists. Our members support this service and enjoy the benefits of belonging to IBRA, which includes *Bee World*. We need your involvement - join IBRA - support this important information network and extend your beekeeping horizons. For more information contact: IBRA, 18 North Road, Cardiff CF1 3DY, UK. Telephone (+44) 1222 372409. Fax (+44) 1222 665522.

THE AMERICAN BEEKEEPING FEDERATION has many benefits to offer its members. Send for a membership packet of information today! Contact the American Beekeeping Federation, P.O. Box 1038, Jesup, GA 31598, ph. (912) 427-4233, fax (912) 427-8447 or email info@abfnet.org.

IRISH BEEKEEPING. Read An Beachaire (The Irish Beekeeper) Published monthly. Subscription $22.00/year, post free. Mr. Graham Hall, "Weston", 38 Elton Pk., Sandycove, Co. Dublin, Eire, email: Graham Hall@dtti.team400.ie.

THE AUSTRALASIAN BEEKEEPER. Published monthly by Pender Beegoods Pty. Ltd. Send request to: The Australasian Beekeeper, 34 Racecourse Road, RutherfordNSW 2320, Australia. Sub. $US 38 per annum, Surface Mail (in advance). Payment by Bank Draft. Sample free on request.

Bee interested. For beekeeping information read the AMER. BEE JOUR. New editorial emphasis on practical down-to-earth material, including question & answer section. For information or free copy, write to: AMERICAN BEE JOUR., Hamilton, IL 62341.

THE AUSTRALIAN BEE JOUR. Monthly, Annual subscription outside Australia, sent by airmail, $100 Australian. Write to: Victorian Apiarists' Association Inc., Annette Engstrom & Lauren Mitchell, 6 High St., Eaglehawk, Victoria 3556, Australia. Sample on request. Email: abjeditors@yahoo.com.

THE NEW ZEALAND BEEKEEPER. National Beekeeper's Association of NZ. Write for rates & indicate whether airmail or surface. NZ BEEKEEPER, P.O. Box 447, Hamilton, NZ.

SOUTH AFRICAN BEE JOURNAL. The official organization of the S.A. Federation of Bee-Farmers' Associations. Sample copies only available on receipt of a donation. P.O. Box 41 Modderfontein, 1645, South Africa.

CANADIAN BEEKEEPING The news media of the Canadian honey Industry. One year sub. (6 issues) in Canada and the U.S. $20. Foreign subscribers send $40. Send to Canadian Beekeeping, Box 678, Tottenham, ONT, Canada L0G 1W0.

BEES FOR DEVELOPMENT. Information for beekeepers in remote areas. Sponsor a subscription. $35, quarterly journal. Troy. Monmouth, NP254AB, UK. info@beesfordevelopment.org

HIVELIGHTS, published by The Canadian Honey Council. Write Suite 236, 239-5149 Country Hills Blvd. NW, Calgary, AB T3A 5K8

THE BEEKEEPERS QUARTERLY is published by Northern Bee Books, Scout Bottom Farm, Mytholmroyd, Hebden Bridge, West Yorks HX7 5JS. Write or email jeremy@recordermail.demon.co.uk for a sample copy.

MANITOBA BEEKEEPER is published quarterly by the Manitobab Beekeepers' Association. Write for a sample copy to Lois Simpson, Lot 19, Kingsway Kort, RR #1, Brandon, MB R7A 5Y1.

HONEY BEE SCIENCE is a Japanese Science and Research Journal. For information contact Japan Publication Trading Co. Ltd., P.O. Box 5030, Tokyo Internationalk, Tokyo, Japan.

MELLIFERA is published twice a year by the Development Foundation of Turkey. An annual subscription is $US 20. Write to TÜRKIYE KALKINMA VAKFI, Çetin Emeç Bulvan, 7. Cadde No: 39, Öveçler, 60460 Ankara, TURKEY.

BEECRAFT: A full color monthly beekeeping magazine for beginners and experts alike covering all aspects of beekeeping in Great Britain and Ireland. FREE COPY on request. £37 for 12 issues including airmail postage. Credit cards accepted. Contact Bee Craft Ltd., 107 Church Street, Werrington, Peterborough, PE4 6QF. Email: secretary@bee-craft.com Web: www.bee-craft.com; Tel/Fax +44 1733 771221.

BOTTOM ... Cont. From Page 64

followed by 20 minutes worth of arguing the exact definition of "hibernation".

"How about a program for next month's meeting?"

"Let's talk about setting up a bear proof fence," suggests Jesse, followed by 30 minutes of arguments about four or five wire fences, smooth, barbed or mesh, plus various booby traps designed to kill, maim, mutilate, and torture any animal that wanders within 100 feet of a beeyard.

Don, the club librarian, kept eyeing Lindsay and me the whole meeting. Don is sensitive about unreturned books. When a new person comes, Don invites them to look through the suitcase of books, magazines, video cassettes, and DVD's. The newcomer borrows one or two things and then never comes back. Every meeting Don asks something like, "Does anyone live near Walter Stuckey from Avoca? He borrowed our '72 edition of ABC and XYZ of Bee Culture back in 2003."

After the meeting he approached Lindsay. "Did you bring back the video you borrowed four months ago?"

Lindsay gasped. "Oh my gosh, I forgot! I am so horribly sorry. I don't know where it is."

"Watch out, Don," I warned. "Not only is Lindsay a hag, she's got a white belt in Cheese-Fon-Due, and she knows how to use it."

Lindsay was too upset to hear me. "Oh wait, I think Mr. Sieling came and got it. He was going to return it at the next meeting..." She looked up at me.

"No I didn't. It's probably still in your VCR player."

"I'm sure I remember you coming to get it." Lindsay looked distressed.

"I wouldn't forget something like that..." I felt her hand on my arm. "On second thought, maybe I did. I'll look around our house. It's sure to turn up somewhere."

I had a month to buy a new copy, scuff it up to look used and bring it to Don. Maybe I'll even pay the late fine. Too much tipping the earth off its axis could be bad for bees. BC

Display Advertisers

Rain beat against the windshield. Unfamiliar with the rural village, I missed a turn and drove up and down the dark streets looking for the old church. Suddenly it loomed in front of me. As I pulled into the parking lot, I thought I saw a shadowy white figure shrouded in the cold mist. She seemed to be waiting anxiously for someone. If you ever sat in the back pew of an empty church on a dark and stormy night, you already believe in ghosts. They congregate in old churches. Just before the casket is nailed shut, claustrophobic spirits sneak out and hide under the altar. With no place to go they hang out in the steeple with the bats, walk across the ceiling and bang cupboard doors in the kitchen. I've heard them.

The specter turned and stared at my car. I considered backing out and driving home. Then I remembered my phone conversation with Lindsay that morning.

"Mr. Sieling, I have several questions about the bee meeting tonight. What time does it start?"

"Seven-thirty."

"When does it end?"

"Usually around nine."

"Do I need to bring anything?"

"No."

"Mr. Sieling, you wouldn't believe my schedule today. I finish school at three. Then I have play practice – I play a hag in Narnia. After that I'll be at the Avoca Baptist Church. Could you pick me up there?"

"Sure."

"What are we doing at the meeting?"

This is where I should have shut up. "We're all bringing our bees to the meeting, kind of like a pet show. We'll be showing them off, doing tricks, and awarding trophies and ribbons."

"Sweet!" she squealed. "I'll be ready! Bye." Click.

Lindsay can't attend many meetings but the club members like to see young people involved in beekeeping. Lindsay's eleven years bring the average member age from 85 to 80 and she nearly doubles the number of women in the group.

Unfortunately her only hive died in January. There she was now, poor thing, dressed in a brand new bee suit, probably a Christmas present, her first excuse to wear it as I had told her there would be bees at the meeting. I stopped the car and got out.

"Well, what do you think?" Lindsay asked, holding out her arms and pirouetting.

"It's...terry cloth. Is it made out of towels? Where's your veil?"

Lindsay rolled her eyes. "It's my Tae Kwon Do suit. It just came today. I'm a white belt."

"What's Tae Kwon Do?"

"It's a martial art."

"Ooh, like Karate? You didn't know this, but I have a black belt in the Cave Man Carry." Cave Man Carry is actually an ancient marital art – how prehistoric men used to catch women. You bend over, jam your shoulder into the woman's waist, wrap your arms around her knees and throw her over your shoulder. All she can do is flail her feet and pound on your back with her fists as you return to your cave. That's how I caught my woman and carried her up the aisle. It's also why we delayed our honeymoon for two weeks while I recovered from a compressed disc and two bruised kidneys. "Watch this..." I said, bending down and jamming my shoulder into Lindsay's waist.

I felt a little hand grasp my forearm, then twist and pull. "Heyah!" The earth suddenly tipped off its axis and the sidewalk came up and hit the back of my head. When I opened my eyes I saw a dark gray sky. Lindsay was looking down at me.

"Oh Mr. Sieling, I'm so like, sorry! Are you okay? I am just horrified. Let me help you up."

"No, I'm fine. This is a very comfortable position. I'll just lie here and watch the sky while you change. Then we'll go to the bee meeting. Is this what they teach kids at youth meetings? Whatever happened to singing Kum-ba-ya? So you didn't really think we were bringing pet bees?"

"I've started to figure out when you're joking," she said. By the time Lindsay returned I was sitting on the sidewalk surrounded by a group of anxious Baptists.

We arrived at the meeting 15 minutes late and quietly sat in the back.

A typical Steuben County Honey Bee Association meeting goes something like this:

"Old business?"

"Anyone else have trouble with bears this Winter?" asks Harold. Fifteen minutes of discussion about bear damage ensues.

"New business?"

"Who says the bears are hibernating? Bears don't hibernate," declares Fred,

Continued on Page 62

Peter Sieling

Martial Arts