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Bee Culture

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Bee Culture
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Varroa *mites are, almost, everywhere. Read the article on controlling* Varroa *without hard chemicals on page 37, and maybe* Varroa won't *be everywhere, soon.*
photo by Serge Labesque
Glen Ellen, CA

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FEATURES

DEPARTMENTS & COLUMNS

KEEP IN TOUCH

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MAILBOX

Proud American

In response to the letter written by George Harker in the July 2005 issue of *Bee Culture*. We are proud to be American beekeepers and we too have not renewed our subscription to that "other" magazine since subscribing to *Bee Culture*. If the publishers and writers for the "other" magazine are so interested in foreign beekeeping operations, perhaps they should move their offices to one of those countries. Maybe then they would realize what a great country we have. The same is true for a lot of others we see these days. We Americans need to start standing up for our country and tell the special interest groups that run those forums that we are PROUD TO BE AMERICAN and we don't want a one-world order! There are a lot of hard working Americans in all forms of industry that have taken a back seat to foreign interests and that kind of thing needs to stop now before it's too late. We appreciate others who feel the same way we do. Wish there were more of us! Thanks Bee Culture for keeping it American!

Dan, Carolyn & Tyler Seidler
Burke, SD

P.S. Like the Editor, we also hope that Mr Harker never looks too closely at our beeyards. We run approximately 1,200 colonies and having nicely painted boxes is usually the least of our worries.

DDT and *Varroa*

I was reading Roger A. Morse's book, *A Year In The Beeyard*, when I was struck by the following paragraph from page 84, under the section on pesticides, which I read to my wife, Christie:

"This was also the beginning of the DDT era. There is no record of a single honey bee colony being killed by a normal application of DDT In fact, even several applications of DDT to a field where honey bees are foraging cause no problem. It appears for reasons that are still not clear, honey bees can break down the DDT with which they come into contact and it is not toxic to them."

My wife said immediately, "What if DDT didn't harm bees, but killed the *Varroa* mites on them?"

I'm curious. Any thoughts on this? If Morse is correct, it would be very interesting to research this. It would be simple to test it.

Anthony Keys
Saunderstown, RI

More About Glue

I had an experience with a box I had acquired in some equipment that I had purchased in an estate sale. First of all it was a full box of capped honey Winter stores left by me. Nine hives yielded 31 supers. I reloaded for further pollen collection.

A rather large deer was messing around and upset three colonies. The honey super was put together with a nailer and was not glued when it was assembled. The deer was rubbing against the hives and when the bees got after him he upset the three colonies. The end of the box came out. Gluing is important in all phases of assembling bee equipment. Especially the frames and boxes.

Robert Goodfellow
Springfield, OH

Crimson Clover

In response to Vincent Lenza in the June Mailbox – your concerns about clover, and the many species that exist – first clover is a nitrogen fixer Use it as a green manure, and most if not all clover produces nectar. Better choices are New Zealand White Clover for your Zone 5 & 6. I believe even better would be Crimson Clover. Call Johnny Select Seeds, in Albion, ME.

Maurice McDonald
Menard, IL

Mountain Beekeeping

I have been a part time beekeeper for over 30 years in Tirol, Austria. (www.tirolerhonig.at)

A couple of months ago I published my first book, Beekeeping In The Mountains, receiving an excellent response in the greater European Alpine region.

Now I am getting ready to start my next project, a picture book titled Bees – Fascinating Diversities.

The first part will include my own photographs showing the different facets of honey bees. The second part will be devoted to the international community of beekeepers. Although I am not able to financially compensate you (I personally cover the production costs), I would like to ask for your contribution to make this project an international celebration of beekeeping.

I am looking for a couple of interesting, high quality beekeeping images from your country (i.e. beekeepers in action, beehives, bees in nice landscape, bee plants .) and the copyright to use them in my book.

I also would require a short description of what is shown on each of the pictures.

Thank you in advance.

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INNER COVER

I've just returned from the Eastern Apicultural Society's annual Short Course and Conference held in early August, this year in Ohio.

There were 450 or so people attending, plus 40+ speakers and nearly as many organizing and support volunteers. All told, there were over 100 talks and presentations and demonstrations and mini-meetings over the five days. Add in 30 some vendors, a modest honey show, auctions, a BBQ and banquet, industry-recognized awards for scientists, students and beekeepers, a Master Beekeeper program, daily meals for all those people, business meetings, socials, a honey exchange, a 21 colony beeyard, dorms, a 32-page program and a 50-year anniversary celebration and you have a very full week. It is, I think, the most ambitious beekeeping meeting held each year I'm proud to be a part of this group.

The intensity, sophistication and complexity of this meeting varies from year to year, certainly, a result of the available physical facilities and the organizing state association's resources. But, it's pretty much the same every year. Until this year.

Because EAS is essentially a volunteer organization, like all the state beekeeping associations, it operates on a shoestring budget every year depending on registration and vendor contributions and support to cover the costs of facilities, speakers, and overhead. Most beekeeping associations, like most beekeeping businesses, are stretched to make ends meet.

This is not the way of other groups. For instance the Entomological Society of America (ESA, often confused with EAS) or Apimondia command their speakers to submit profiles, AV requirements, abstracts and even more, months in advance if they want to appear And speakers want to appear. It's de rigeur for your résumé, and you have to pay to give a talk at these types of professional meetings. They set the rules and the price. It's pay to play.

The rest of us, well, *we* pay to get speakers, hope they show up (and they do generally), and hope they send along some information to help us share the information (biographies, handouts, whatever) when we ask, if we ask some do, many don't there's just not enough time. I'm not complaining because I'm just as guilty just as often. It's the way it is.

So meeting planners struggle, but make it work, mostly. If you've been to one of these meetings you know what I mean.

Thus, you can end up with moderate advance input from speakers, significant hardware and software interface options, and the opportunity for infinite complexity overall. Let me explain.

Almost every speaker has visuals in PowerPoint that show the photos, graphs and statistics of their work. This information comes with them to the meeting on personal laptops, on CDs and on jump drives. Most are PC oriented, but almost as many are Apple oriented. Some bring their own computers and projectors, some just their computers, some a jump drive that usually fits somebody's computer, and some simply a CD with the program already on it.

To support all of this, a meeting planner has to be able to accommodate this variety by supplying the appropriate computers, digital projectors (you all have one, right?), the necessary cables, and backups for all of these, plus the right software and necessary skills to make them all sing together Most speakers who use this technology pretty much know how it works pretty much until it doesn't.

Add in those of us who still use slides, overhead projectors and flip charts (everyone of these was at EAS this year), plus a sound system that actually works, and, if possible, is wireless, a laser pointer and remote mouse for the PowerPoint program (both on the same hand-held device if possible), all in five or six rooms at the same time, and you have the potential for techno babble of extraordinary proportions.

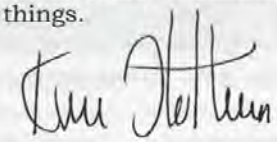
You can solve most of this with good pre-meeting prep, excellent pre-meeting communication with speakers, and a knowledgeable techie in the crowd – or, enough money to get one.

But more and more speakers are expecting these basic pieces of equipment to be provided when they arrive. Or, at least they must know to bring their own.

To have this stuff at the ready is possible if someone in the association has one – but you're probably not going to purchase a $2 4,000 projector, a lap top, and software just for this.

We're in that transition time – like the VHS vs. Beta, or 8 track vs. cassette time, and it will sort itself out eventually, probably.

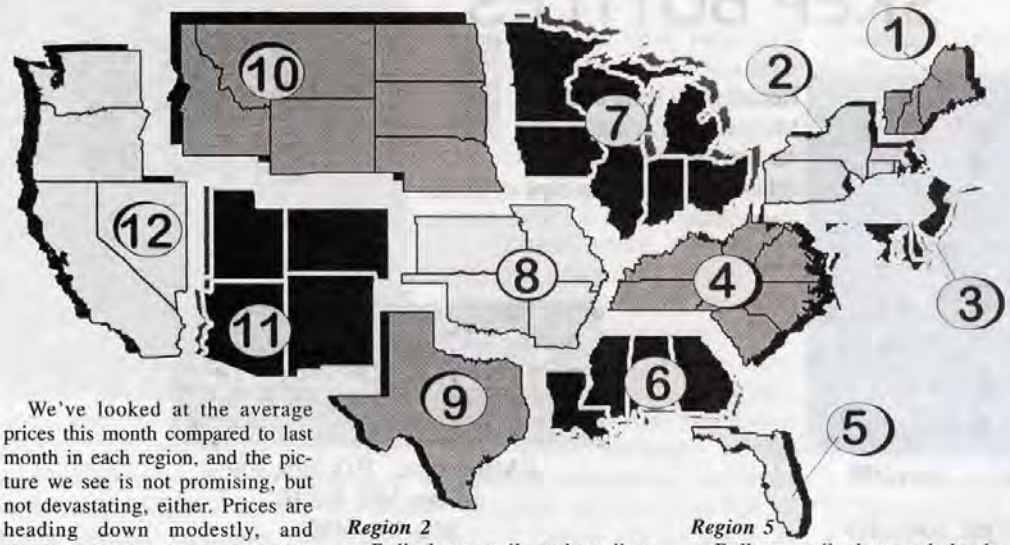
But if you're planning a meeting right now, be prepared for some confusing times (and double or triple that confusion if you have two or three things going on at the same time in different rooms). And if you are the Moderator for one of these sessions in one of those rooms, be really prepared because you will, for some time to come, encounter absolutely – all things.



All Things In Moderation

P.S. I hope you absorb the information in the article on commercial beekeeping in Norway. They seem to have figured out some things we need to know.

SEPTEMBER – REGIONAL HONEY PRICE REPORT



We've looked at the average prices this month compared to last month in each region, and the picture we see is not promising, but not devastating, either. Prices are heading down modestly, and slowly, primarily due to the influx of Chinese and Argentine honey imports. The same is true or worse in Canada we hear, and anti-dumping legislation is being considered against these countries there. The amount that remains available in China and Argentina, however, is limited, we hear, slowing the price drop.

Region 1

Prices are steady across the board this month and have remained relatively unchanged for several months. Prices are below national averages though.

Region 2

Bulk down, pails and retail up and wholesale steady. Compared to the average of last month's prices are lower than the rest of the country.

Region 3

Bulk steady, pails up, wholesale and retail steady. Compared to the national average last month this region's prices have increased across the board, which is interesting.

Region 4

Bulk prices up, pails up, wholesale up, but retail steady. Compared to last month, bulk and pails up, wholesale steady, but retail down.

Region 5

Bulk up, pails down, wholesale and retail steady. Compared to last month – bulk and pails down but wholesale and retail still steady.

Region 6

Bulk steady, pails up, and both wholesale and retail steady in the region since last month. But compared to the national average bulk down, pails up, wholesale down and retail steady.

Region 7

Bulk, pails and retail up, but wholesale down. From last month's national average, prices are the same to a bit lower across the board.

Region 8

Bulk up, pails steady, but both wholesale and retail down compared to prices here last month. Nationally, bulk and pails up, wholesale and retail steady to down a bit.

Region 9

Bulk and wholesale steady, pails down, retail up. Nationally, bulk steady, pails up, wholesale and retail steady to a bit lower.

Region 10

Bulk and retail down, pails up, wholesale steady. Compared to national prices last month, bulk down, but the rest up a bit.

Region 11

Though wholesale is just steady, prices slowly dipping across the board. Compared to last month, bulk and pails higher, but wholesale and retail only steady to lower.

Region 12

Bulk down since last month, but everything else is rising slowly. Compared to last month's national average, bulk actually up, but everything else shows slowly falling prices.

	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	0.99	0.80	1.00	1.20	0.88	0.87	0.98	1.25	0.99	0.75	1.00	1.13	0.75-1.25	0.99	0.98	1.18
55 gal. Amber	0.93	0.90	0.80	1.20	0.67	0.67	0.89	0.93	0.55	0.60	1.08	0.99	0.55-1.20	0.85	0.81	1.07
60# Light (retail)	110.00	81.90	106.46	105.00	75.50	117.50	98.57	110.00	110.00	115.00	115.00	104.00	75.50-117.50	104.08	97.48	110.46
60# Amber (retail)	85.00	96.53	102.57	98.33	71.60	100.00	92.64	90.00	110.00	102.57	105.00	92.00	71.60-110.00	95.52	101.10	109.83
Wholesale Case Lots																
1/2# 24's	47.78	67.65	66.40	38.13	59.04	32.50	39.24	66.40	66.40	35.76	30.00	66.40	30.00-67.65	51.31	41.25	36.72
1# 24's	53.71	52.92	64.44	56.53	54.34	56.00	61.96	70.80	50.42	77.76	74.90	72.60	50.42-77.76	62.20	61.78	61.14
2# 12's	58.08	55.99	57.02	52.80	60.12	50.00	57.01	55.80	45.30	57.84	37.00	61.80	37.00-61.80	54.06	56.27	53.70
12 oz. Plas. 24's	52.92	50.12	57.75	57.25	52.44	48.00	50.43	59.40	46.96	47.28	58.80	55.20	46.96-59.40	53.05	53.69	48.10
5# 6's	54.37	59.69	61.73	57.75	61.73	66.00	63.28	46.00	55.80	61.86	58.00	72.00	46.00-72.00	59.85	59.48	57.47
Quarts 12's	72.00	91.43	82.75	82.33	74.82	79.00	82.87	70.67	81.00	110.88	84.20	96.00	70.67-110.88	84.00	82.04	83.93
Pints 12's	50.00	49.95	56.36	61.50	43.60	49.00	56.22	54.00	48.00	60.00	55.00	54.00	43.60-61.50	53.14	51.30	47.01
Retail Honey Prices																
1/2#	2.33	2.26	2.50	2.97	4.89	2.95	2.84	6.00	2.37	2.57	2.20	2.50	2.20-6.00	3.03	2.45	2.40
12 oz. Plastic	3.04	2.87	3.50	3.38	3.25	3.03	2.93	2.96	3.26	3.66	3.41	3.25	2.87-3.66	3.21	3.17	3.15
1 lb. Glass	3.71	3.44	4.50	4.20	3.37	3.75	3.63	4.05	3.96	3.99	4.61	4.13	3.37-4.61	3.94	3.85	3.91
2 lb. Glass	6.65	6.31	8.00	5.98	6.63	6.99	6.25	6.02	6.42	6.06	6.10	6.75	5.98-8.00	6.51	6.54	6.34
Pint	6.13	6.88	6.03	5.89	4.87	5.81	6.02	6.40	5.13	7.02	5.00	6.00	4.87-7.02	5.93	5.56	5.21
Quart	10.38	8.55	11.14	8.13	7.91	8.88	9.29	7.34	8.75	13.41	7.75	11.14	7.34-13.41	9.39	8.75	8.58
5 lb. Glass	12.90	13.43	18.00	13.20	15.00	11.50	15.08	8.99	12.80	13.79	12.28	16.52	8.99-18.00	13.62	14.81	12.90
1# Cream	4.25	4.67	8.14	4.51	4.67	6.25	4.82	10.57	8.14	5.01	5.24	4.25	4.25-10.57	5.88	4.82	4.66
1# Comb	4.38	4.41	6.41	5.48	6.40	4.75	5.96	4.55	6.41	5.00	6.00	6.00	4.38-6.41	5.48	5.59	5.09
Ross Round	4.25	3.85	5.31	5.90	5.00	3.00	6.62	4.50	5.31	6.00	5.75	5.31	3.00-6.62	5.07	4.91	4.75
Wax (Light)	2.86	3.19	1.40	2.43	1.41	2.23	2.03	2.00	3.50	3.12	1.93	2.48	1.40-3.50	2.38	2.48	1.80
Wax (Dark)	2.29	2.86	1.20	2.25	1.33	2.23	1.57	2.13	3.00	2.79	1.70	2.25	1.20-3.00	2.13	2.23	1.20
Poll. Fee/Col.	51.67	49.75	40.00	41.00	38.33	39.00	46.57	60.00	35.00	56.62	55.00	35.00	35.00-60.00	45.66	44.44	43.59

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"Feral honey bees share the neighborhood."

The mite *Acarapis woodi* is known in the vernacular as the tracheal mite because it typically infests the tracheal system (breathing tubes) of the honey bee. However, a portion of the life of every young female mite takes place outside the tracheal system. At some point she exits the bee within which she was born and waits in readiness to move onto a young adult honey bee that will serve as the host for her own attempt to start a family. During this period, the mite may succumb to a number of dangers, including grooming behavior by the bee itself. The behavior of self-grooming (known as autogrooming) has been shown to increase in frequency when bees were placed in colonies with high mite levels compared to those placed colonies with low mite levels. Therefore, autogrooming has been suggested to be a possible mechanism that bees employ to "resist" tracheal mite infestation. A new study, published by researchers from the USDA laboratory in Baton Rouge LA, reports that autogrooming by individual honey bees is clearly associated with the presence of tracheal mites and further supports the potential that the behavior is an important resistance mechanism (Danka and Villa, 2005).

The researchers conducted a simple but elegant experiment involving the direct capture of bees that were expressing autogrooming behavior. They used an observation hive with windows that allowed them access to the comb and, when a bee was seen to begin to autogroom, they captured both the grooming bee and a nearby non-grooming worker bee. The bees were placed immediately in separate flasks filled with carbon dioxide gas. The researchers used a microscope to examine 50 such pairs of bees for the presence of mites on the outside of the thorax. Sixteen additional bees were collected from the honey storage area for dissection to determine the overall infestation level of the colony. Of the 50 bees that in the process of autogrooming, 36 of them were found to have mites in various locations on the outside of their thorax or the base of the wings. A total of nine mites were found in similar locations on the 50 non-grooming bees. This 4-fold difference in external presence of mites (72% in autogrooming bees vs. 18% in non grooming bees) was highly significant based on statistical analysis. Further, in the group of autogrooming bees, 34 of the 36 bees where mites were found had been observed to groom only one side of their body In all these cases, the mite was found on the same side that had been groomed. Overall, the colony was found to be heavily infested, with 14 of the 16 sampled bees exhibiting internal mite infestations. In their discussion, the authors point out that their study likely underestimated the relationship between autogrooming and infestation because the observed grooming behavior may have already removed the mite by the time the bee was captured or the mite may have been on another part of the body. Nonetheless, the authors conclude that their "observations add support to the view that bees attempt to remove migrating tracheal mites by autogrooming." Whether this behavior can be effective in actually reducing the internal infestation rate of bees within colonies remains to be tested.

The arrival of the Africanized honey bee into the United States through migration from Mexico took place about 15 years ago. In a recent paper published by Baum and colleagues, they describe the patterns of nest site usage in a wildlife refuge in southern Texas over an eight year period (Baum et al. 2005). The field component of the research consisted of surveys of the study area to search for or to check the occupancy of nest sites, primarily in tree cavities. The cavities were "often surveyed multiple times per year" and various parameters were recorded, including entrance height, tree type and occupancy. Worker bee samples of the colonies were collected also and evaluated in the laboratory for the presence of mitochondrial DNA markers of European or African origin. Based on the mitochondrial DNA results, the colonies were identified by the researchers as European or Africanized.

The authors found that none of the measured nest site parameters were significantly different between

the cavities that were exclusively used by European or Africanized honey bees. While both types of honey bees persisted during the course of the study, there was a decline the proportion of feral European honey bees (1993-2000). By 2000, only 15 of the 76 colonies surveyed in cavities in the refuge exhibited European mitochondrial DNA. Further, based on a statistical analysis of the pattern of colony distribution, the authors showed that Africanized honey bees appeared to affect the distribution of European colonies, at least during the last four years of the study Thus, while Africanized colonies from 1997-2000 could be found in an "aggregated" pattern, European feral colonies were no longer distributed in such as pattern (as they had been earlier), but were more randomly distributed across the refuge. They concluded that "the invasion of Africanized honey bees seem to have fragmented the existing European population, corresponding to a decrease in.....European colonies in the study area."

The overall message from this paper to those who keep bees in southern Texas and other areas of the U.S. where Africanized honey bees currently abound would seem to be mixed. While Africanized honey bees clearly became the dominant feral honey bee in the refuge and projected their influence on patterns of nest site usage, the persistence of European honey bee genetic markers suggests that there was neither an unduly rapid nor complete loss of genetic influence from the local European population (at least within the first 10 years). Therefore, in similar geographic or ecological locales, once some sort of equilibrium is reached that produces a well-adapted population, the honey bee that persists may derive traits from both European and African genetic sources. Of course, the question of equilibrium remains an open one and if Dr. Baum or colleagues continue their research at this study site in the future, it would be very interesting indeed to help evaluate the stability of the reported interaction. BC

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Danka, R.G. and Villa, J.D. 2005. *An association in honey bees between autogrooming and the presence of migrating tracheal mites.* Apidologie. 36:331-333.

Baum, K.A., Rubink, W.L., Pinto, M.A. and Coulson, R.N. 2005. *Spatial and temporal distribution and nest site characteristics of feral honey bee (Hymenoptera:Apidae) colonies in a coastal prairie landscape.* Environmental entomology. 34: 610-618.

Malcolm T Sanford

AHB In Florida?

"It seems prudent to no longer deny to the press and others that AHB is in Florida."

There continues to be more news about the "Africanized," called by some "African," honey bee now better termed by the more neutral, less sensational moniker, "AHB." A recent press release revealed that this infamous insect has now been found in southwest Arkansas in the town of Brightstar. Ed Levi, Arkansas Plant Board Inspector reported that the unwanted visitors probably came from Texas. He also said that in August 2004, a work crew in the southwest Oklahoma community of Tipton was attacked by a swarm of AHB, but there was no reason to panic.

"Honey bees in general are very defensive," he is quoted as saying. "Some are more defensive than others. "If somebody sees a colony of bees, they need to get away from it," he added. "If they get stung, they need to get away a little faster If they're getting a lot of stings, they need to run to a place of safety." But the best bet is simply avoidance. "You just need to respect the space of bees," Levi said. One might find the above advice somewhat confusing. No doubt this is the result of the kind of reporting by those who know little about honey bee behavior quoting experts in the field. It's the sort of thing we've all come to expect when it comes to the 20th century's "pop insect." Another press release by Texas A & M University reports that the state is abandoning its AHB quarantine program, that has been in place ever since the AHB crossed the border from Mexico in 1990.[1]

Now comes a release from the University of Florida's Institute of Food and Agricultural Sciences (IFAS) quoting Dr. H Glenn Hall in the Department of Entomology and Nematology as saying the AHB may eventually spread throughout the state and move into other areas of the southeastern United States.[2] "The bees, which tend to sting in large numbers, have been found and stopped at various Florida ports over the past decade, but now it looks like they're here to stay, according to Dr Hall, who said Florida's warm climate is ideal for the bees, which could be bad news for the state's $16 million honey bee industry."

"If African honey bees become established in large numbers over the next few years, they will affect the beekeeping industry and the pollination of many crops," Hall said. "Public safety, recreation and tourism may also be affected, leading to liability problems."

"Hall, a bee geneticist who developed DNA markers to identify African honey bees, said that to the untrained eye they look the same as resident European honeybees. African bees more aggressively defend their nests than European bees. African bees may swarm as many as 16 times a year while European bees swarm about three times a year, he said.

"The African bees invaded five southwestern states in the 1990s and have periodically turned up at Florida's deep-sea ports since 1987," Hall said. "Until recently, swarms entering through ports such as Jacksonville, Miami and Tampa have been successfully captured in bait hives maintained by the Florida Department of Agriculture and Consumer Services."

"However, new finds in the Tampa area suggest that African bees are spreading and becoming established in the state, and they are being found farther inland from the ports," Hall said. "We did not believe that enough bees could arrive on ships to form an established population, but they did so in Puerto Rico, and now appear to be doing the same in Florida."

In response to the press release, Jerry Hayes, Florida's Chief Apiarist, has also provided a list of talking points with the help of Dr John Capinera, Chairman of IFAS Department of Entomology and Nematology, University of Florida:[3]

"For the last decade, Florida has been surveying for the insect and established the country's first AHB detection program that is jointly operated by the Florida Department of Agriculture & Consumer Services (FDACS), Division of Plant Industries (DPI) and the U.S. Department of Agriculture (USDA). The program involves placing bait hives in ports, and educating ships' crews and dockworkers to identify and report suspicious swarms. Today, nearly 500 bait hives are in place throughout the state, primarily in port areas, along Interstate-10 and on the Florida/Alabama border. The bait hives are checked on a three-week cycle based on the reproduction habits of the AHB.

"When a suspicious swarm is found in one of our traps, or an apiary inspector identifies more defensive bees in a managed colony, samples are taken. Of the 653 samples collected since 2002 (when the first AHBs were detected in a Tampa Bay area), 59 have turned out to be positive for AHB genetics. In addition to coming in on cargo ships, they are being detected in the honey bee colonies that return to Florida after being shipped around the country at different times of the year for pollination purposes, particularly from almond orchards in California where the AHB is already established.

"Testing for AHBs in managed colonies is challenging and resource intensive. Florida alone has 200,000 managed colonies. FDACS/DPI has resources to analyze samples of approximately 10% of these colonies annually If the results of these samples show AHB genetics, current control actions include eradication or other remediation

methods such as re-queening – a process which attempts to replace AHB queens with European honey bee queens."

A meeting of Florida's Honey Bee Technical Council (June 29, 2005) reviewed the evidence of AHB in Florida. It shows an increasing number of finds last year and the first half of 2005 ranging from Tampa across the state and to the south. Most interesting was the fact that all have been confined to feral colonies, most often found in traps monitored by DPI, and none in beekeeper-managed colonies.

How long this will remain the case is uncertain. The question all this brings into focus is when authorities should declare to the general public that the state has a population of AHB. Clearly, many people including beekeepers are caught here "between a rock and a hard place." If declared too soon, then authorities run the risk of being called sensationalistic by beekeepers and others; if too late (i.e. after some sensationalized stinging incident), they are likely to be blamed for providing too little advanced warning. Given the responses of all other states with AHB populations, there is little reason to believe DPI will have the resources or will to mount any kind of eradication and/or control program. There was discussion about possibly mounting a certification program for beekeepers to provide them with a fallback position (damage control) should any become involved in law suits due to stinging incidents.

Meanwhile it seems prudent to no longer deny to the press and others that AHB is in Florida. Beekeepers and others must face up to this fact. That does not mean, however, that they should contribute to the over dramatization of the situation, which is in all too many cases the unfortunate history of reporting on this insect.

The present situation appears to make my comments in the November issue of *The Florida Beekeeper* concerning these AHB finds more relevant and subject to change: "In the face of the current situation, it is difficult to determine where Florida beekeepers might go from here. At the present time, these finds must be considered incidental. They do not indicate a population of AHB has been established in the sunshine state [Author's note: The current finds may be altering this perception]. It will take some time to ascertain whether this is so. In the meantime, the industry will have to be prepared to answer the myriad questions these and other subsequent finds may generate. As a consequence, I am republishing here an outline of remarks made by Mr Michael O'Hara, communications and education division director, Florida Fruit and Vegetable Association, on crisis communications as reported in the August 1992 *APIS* Newsletter:[4]

The following should always be kept in mind when talking to reporters:

1. **Individual Rights** – No one from the press has the right to violate your individual rights.
2. **Honesty** – Never mislead or lie to a reporter. If the situation is under litigation, say this is so; if there is a question about profits, dollars or proprietary information, you can defer/refuse answering based on not informing competitors in the marketplace.
3. **Buzz Words** – Never repeat an expression or inflammatory statement made by a reporter. As an example, if you are asked, "to what do you attribute this catastrophe?" do not repeat the word "catastrophe." It then becomes attributable to you and you alone; you will "own" it.
4. **Hostility** – Never get angry; keep cool and remember the reporter always has the last word.
5. **Off the Record** – There is no such thing; if you don't want it reported, don't say it.
6. **Estimates** – Never make numerical estimates in time or dollars. Say that the incident is under investigation and you will provide accurate information when it becomes available.
7. **Reporter Verification** – Ask for identification, the purpose of a reporter's activities, media affiliation and telephone number.
8. **Bridging** – Try to bridge the gap between a reporter's wish to be negative and providing a positive statement about your activity.
9. **Statistics** – If you are not aware of statistics provided by a reporter, say so and ask for them in writing before commenting.
10. **Deadlines** – All reporters are on deadlines, but you are not. Take all the time necessary to avoid hasty comments. The fact that a microphone is stuck in your face doesn't mean you have to say something. Dead air time is not likely to appear on television.

"It is best to have a communications plan in place and persons trained in this area. Defer all questions to one or two designated (and trained) persons to avoid giving conflicting information. An offensively oriented public relations/communications plan is the best defense against sensationalistic reporting based on negativism. Appointing and training of designated persons to speak for the group would be good activities for beekeeping associations both now and in the future.

Fortunately, there are a good many resources that beekeepers can point to as training references and can be used for reporters that are bound to call about this subject should any stinging incident arise. My good friend Tom Fasulo, the point man for information on all manner of pests in the IFAS Department of Entomology and Nematology, University of Florida, has been quick to add several publications to his Pest Alert site,[5] including both a fact sheet published in 1995 and a pointer to my previous *Apis* newsletter web site at the University, which details a history of this insect during my tenure as Florida's extension apiculturist[6].

Florida residents and officials need not feel alone in being surprised by AHB. Dr. Eric Mussen in his *From the UC Apiaries* (May/June 1998),[7] stated the following concerning readiness of officials in California, where the bee had been established for a number of years.

"The truth of the matter is that we have fallen behind. When AHBs arrived in southern California, they caught the attention of the general

public and public officials. Local and regional task forces were assembled and training sessions were held for decision-makers and emergency responders. Funds were made available for production and distribution of printed information, slide sets, videotapes and a school curriculum targeting AHBs. We did a lot of information dissemination. So, how did we get behind?

"Over the years, AHBs did not spread as fast as we anticipated. They just were discovered in the southernmost tip of Nevada and a portion of San Bernardino County, the fourth 'colonized' county in California. We have had only seven stinging incidents in California attributed to AHBs since they arrived nearly four years ago, but in the most recent incident a field worker was stung over 300 times. We were concerned that the attending physician may not have been aware of the problems with 'organ failure' (kidney failure) that can occur up to a week after such a sting patient is released from the hospital. (Three different Steering Committee agencies conveyed the message to the doctor, independently).

"The greatest problem is personnel turnover A substantial portion of the previously trained health and emergency providers have 'moved up' or 'moved out.' New replacements are ignorant of the problems encountered working around defensive colonies of honey bees."

Malcolm Sanford is a former Extension Specialist in apiculture at the University of Florida.

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MORE ON DRONE BIOLOGY

Larry Connor

Drones on honey frame. While drones are able to feed themselves, there is likely some care and feeding provided by the workers in an energy-rich colony.

Between the time I write this article and the time you receive this magazine and read it, I am scheduled to speak on the subject of "drone physiology" as part of the EAS Conference in Ohio.

I'v just finished a five week, 9,750 mile trip to 20 states, giving 17 talks, many involving some aspect of drone biology This article may repeat material presented in these talks and certainly previous *Bee Culture* articles, but that's good. Not everybody gets it yet about drones.

Google gave me 26 listings for a discussion of the word *physiology*. Does that qualify as too much information? Here is one that seems to work:

Physiology (in Greek *physis* = nature and *logos* = word) is the study of the mechanical, physical, and biochemical functions of living organisms.

Colony and individual drone physiology

As a topic, physiology is left out of many beekeeping books. A quick check of a few of the many books around my office revealed that the listing of "physiology" under "drone" in an index is a very rare event. Perhaps authors imply that physiology is included under anatomy (mechanical), morphology (physical) and metamorphosis (biochemical) functions of their work. Form and function should cover it, right?

Maybe not.

Traditional books focus on the development of the drone honey bee, his life cycle and behavior This includes the fact that drones are produced as the colony grows in the Spring and are expelled from the colony at the end of the nectar flow. This view does not work anymore. We need to know so much more that that. We need to understand the colony's *social physiology* and how it determines drone physiology:

- What triggers drone production?
- What regulates drone numbers in a colony?
- What conditions are present and mechanism(s) are used when colonies trim drone numbers?
- What regulates expulsion of older drones yet favors younger drones? (How do bees detect age in a drone?)
- What chemical(s) make(s) up drone pheromones and when and where is it (are they) produced and how does it work? (We know older open drone brood cells produce an odor very attractive to female varroa mites, biological proof that some odor is present).
- How do colonies tolerate drones from a drone layer or laying workers under conditions drones ordinarily would never be allowed in a colony? Is it the absence of worker brood pheromone or other triggers?
- What, if anything, does the queen have to do with drone production?
- What selection pressures should beekeepers keep in mind when dealing with drone production and maintenance in a colony?

Unfortunately, the answer to many of these questions is simply "we don't know." Or "we don't know enough to be certain." So consider this article a work in progress, one that I will likely revise many times as we learn more information (as I learn more information!) about the amazing process that colonies use to produce, maintain and eliminate drones.

1. The Queen's Role in Drone Production

We know that the queen bee is responsible for laying most of the eggs that become drones in a normal colony. Scientific estimates of the number of drones laid by worker bees in queen right colonies generated such a low number that the result was considered statistically zero. This changes if the queen never mates, or depletes her supply of sperm in her spermetheca. Then even a young, healthy queen will produce drones. The selection pressure here is clear her genes are being passed on to the pool of drones in the area even though she and her colony are apparently doomed.

a. Virgin queens produced very early and very late in the season, or during periods of intense nectar dearth, often fail to find drones to mate with. Drones may not be in the area because their colonies have not had conditions favoring their development. Or because of weather the virgin may not have been able to fly and mate, and after several weeks produces unfertilized eggs – drone eggs.

Workers feeding on drone larvae disturbed during a colony visit.

You can take such a queen and instrumentally inseminate her *months* after she has started to lay drone eggs, and she will produce female offspring. Apparently the sperm migration mechanism remains intact. Yet drone layers do not naturally mate once they begin laying eggs.

b. Healthy viable queens may mate with drones and run out of sperm, and become drone layers. Research has shown that virgin queens will mate with ad many as 45 drones, with a average around 13 drones. (That means that there are many queens mating with 20 drones, the number I have used in previous articles). IF drones are scarce OR the drones in an area have low sperm counts THEN there will be a reduced number of sperm in the queen's spermetheca. This has been shown to be a result of exposure to certain hive chemicals, especially coumophos, used to treat for *Varroa* mites. Also, the combs in these colonies may carry enough chemical residue to functionally reduce or end sperm production in drones. Chemically addled drones may appear healthy but be sterile, or have low sperm counts.

Nature produces a similar scenario. Early season drones used in mating areas of southern/western queen producers may experience cold weather that interferes with normal sperm development (as larvae) and sperm migration (as adults). Workers are apparently unable to detect drones with low sperm counts, and no selection occurs at this level.

A personal observation of this took place in several southern states, when a cold blast from the north affected drones in production in February. The queens that mated with these drones headed normal colonies for a full season, but became drone layers over the following Winter, and beekeepers were startled in their first seasonal inspection to find colonies filled with drones and drone brood. While the beekeepers were casting about like landed fish, afixing blame on the genetic stock of the bees, or perhaps some evil virus, a check of these queens' spermatheca's revealed hat they were nearly devoid of sperm. The cause of all of this was the weather, and how it impacted a human schedule. No genetic defect or virus was involved.

A cautionary aside. Every beekeeper should know something about the conditions of queen and drone production for the queens he/she purchases. Here is a short list of questions to ask each queen supplier·

1. What do you treat with to control *Varroa* and other pests?
2. When did you last treat?
3. Have you incorporated any mite tolerant stock into your breeding program? What and how?
4. Do you test your breeder queen colonies for hygienic behavior using liquid nitrogen?
5. What are your drone rearing conditions? How many drone mothers do you supply for every 100 mating nucs?
6. How do you manage your drone populations in your drone mother colonies?
7 What and how do you simulate drone production, maturation and maintenance?

2. The Balancing Act – Colony Regulation of Drone Numbers

Several factors have been linked to drone production in European honey bee colonies:

Increasing photo period – It has been shown that it is easier to stimulate drone production on increasing day length, artificially even in the middle of winter. In south Florida it was much more difficult to produce drones from mid October on even if the bees were in good late fall nectar flows.

Nutritional Conditions – Colonies with stored pollen and nectar and colonies with both stored food resources and incoming Spring forage will produce drones in great numbers while colonies with limited food reserves produce few or no drones. A colony with pollen in many frames in the Fall that is then fed heavily will cover that pollen with stored carbohydrate. As the brood nest expands the bees will have both pollen and carbohydrate needed for worker brood production. As young nurse bees emerge they are likely to be the workers involved in the heavy production of drone brood, although all bees producing brood food are clearly involved.

Queen Age – It is my observation that new queens and older failing queens produce the greatest number of drones. When a new queen is installed in a colony, either by supersedure or by the beekeeper, there is often an increase in drone production. There are two possible explanations for this. First, there may be some selection pressure for a queen to establish a population of her genetic offspring as soon as possible. Since supersedure and queen replacements by beekeepers are usually done in good forage conditions, this is not a stress on a colony. As queens begin to fail – something I cannot visually see in the queen or her brood – there is often a spike in drone production in the colony. This does not have anything to do with the queen being a drone layer. It seems to be an indication that the colony is reacting to reduced queen pheromone or some other trigger and they are fostering drone production. Then, after a big cycle of drones is in production, the queen disappears and a replacement queen appears.

Because we know that bees have elaborate mechanisms to prevent inbreeding between virgin

queens and drones from the same colony, the above observation has always struck me as somewhat ironic. Is this a last-ditch effort to guarantee full mating even if it means that inbreeding will take place? Or is this an expression of some selection pressure to push out a particular set of genes before the queen departs?

Measurement of sealed drone cells in square inches or number of cells in a colony will demonstrate these behaviors. If done on a 14 day interval, it will show the constant change in drone production at the same stage of development.

Brood Trimming (Cannibalism) – Bees routinely trim brood as nutritional and temperature changes occur during the season. They start with drone eggs and work up the brood cycle, and will even pull out young pupae. The bees cannibalize these drones, removing whatever fluids for proteins and other nutrients.

The regulators for these behaviors are largely unknown. How does a worker bee know to eat one larva when other workers are feeding others on the same comb? Do bees measure the quality (food value) of the royal jelly and brood food given to a bee and trim those bees receiving inadequate nutrition? This would insure that only fully functional bees are produced by the colony. A key feature to the social physiology of a hive is that all individual members be useful, productive and "functional."

In a Cornell study by Thomas Seeley and A.S. Mikheyev[1], uniform colonies were moved in June from the forage-rich areas around Ithaca, New York to a research facility in the Adirondack State Park, where bee forage is "sparse." An unfed group of colonies lost weight in the new location, and had significantly less drone brood in production. A group of colonies fed sugar syrup did a better job of maintaining both colony weight and drone comb

Flight Departures – Soon after the colonies were moved into the new location, they were observed for drone flight. The fed colonies produced significantly more drone flight (11 1 ± 2.1 departing drones per minute) than the unfed colonies (4.7 ± 2.4 drones per minute). There had been no time for new drones to emerge and mature, so these were all drones produced under Ithaca conditions. No observations were reported on the rate of movement of drones between colonies and how this may have influenced these results.

Breaks in drone production – As I inspected colonies in mid July here in Connecticut, I noticed that there were no drones in production (eggs, larvae or pupae) and relatively few drones in the colony (fewer than 100). The colonies appear to have had a very good nectar flow earlier in the Summer (while I was on my road trip) but these conditions did not appear to be present at my inspection. There were many frames of pollen stored, fresh pollen in the brood nest, and plenty of eggs. Was the queen restarting brood rearing after a bit of a break? Had the colonies swarmed and the new queen was just taking over?

Drone elimination – The above Cornell study looked at the number of dead adult and pupal drones in dead bee traps, but the results were affected by the growing difference in the numbers of surviving drones in each colony. It appears drones are not allowed back into the hive, and one can find a mass of drones at the bottom of the bottom board of a colony when drone rejection is underway. But do worker bees actually sting drones? Perhaps a few are stung in the rejection process.

A few thoughts

The Cornell study makes it clear that we are just starting to decode the social physiology of the drone honey bee and its production, maintenance and mating behavior as based on colony energy (carbohydrate) needs. This paper did not concern itself with protein needs. All this leads to even more questions, which the authors stated with eloquence:

"How exactly does a colony adjust its *production* of drones? Does the queen lay fewer unfertilized eggs when workers have less success at nectar foraging? If so, then how does the queen acquire information about the colony's success in nectar foraging? Or does the queen lay the same number of unfertilized eggs regardless of the workers's foraging success, but the workers provide less care for immature drones when the nectar foraging is poor? If so, then how do the nurse bees acquire information about the colony's success in nectar foraging? And how exactly does a colony adjust *maintenance* of drones? Do the workers simply withhold food from the drones when the nectar foraging deteriorates, or do they also attack the drones? Answers to all these questions must await further study." BC

1 T.D. Seeley and A.S. Mikheyev, 2003, Reproductive decisions by honey bee colonies: tuning investment in male production in relation to success in energy acquisition. Insectes Sociaux, 50: 1-5.

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More bees than I expected.

An Unclear Case Of American Foulbrood

James E Tew

I had a plan.

It's late Summer right now Early last spring, I found a smallish colony with clear symptoms of American foulbrood (AFB). Though it annoys the state inspection people, I frequently need AFB for testing, teaching, or for photographing. I put the colony away from other colonies in an isolated yard and made plans for a future article. Today is that "future article" day.

My plan was to give you an "on the scene" report as I worked my way through the sickly colony. Photographs would support the typical symptoms of the malady. I took a cooler of pop and water I had my laptop computer and a fully charged battery in my camera. Today would be a good bee article day.

What I found.

What I found was very different. Grass and weeds had grown to the point that I initially had trouble finding my sickly colony At 8:30 a.m., the day was already 78°F, bright, and clear *(That means it was hot from the start.)* And then there were the bees. They were matted on the front of the colony in a thick blanket of beedom. I thought this colony would be at the brink of death, but here it was – thriving. My thought at the time? *Well, it must be one of those colonies that recovered from AFB.* I get that from time to time. Clearly, I would have to have a look and clearly, this was going to be hotter work than I expected.

Fired my smoker.

I fired my smoker, cognizant of the fact that everything was hot and dry. As do some of you, I have heard stories of beekeepers starting fires with their smoker. I was extra careful. I was already sweating as I rummaged for my sticky hive tool and made my way through the weeds with the puffing smoker at the ready.

Using woodchip-fired smoke, I filled the air with smoke and bees, perfectly aware that I was really getting away from my original article-writing plan now. But the surprise? The bees were gentle and agreeable. There was only a very scant nectar flow ongoing. Bees were hanging on the front of the hive – unemployed. I was expecting them to try to kill me. *Huh* – strange, but pleasant surprise.

The outer cover and the inner cover were soundly stuck down. I was temped to say, *"I wish I had a lot of sick colonies like this,"* but I got control of myself. I should never let myself forget that this colony had AFB earlier this year Even in a colony like this, that's bad. Don't tinker around with this stuff.

Opening a stuck hive.

With burr comb and propolis, the small crowded colony was soundly stuck together When opening any hive equipment stuck together like this, diseased or not, the opening procedure is always the same. Break the seals at the joints, all the while lifting on the front of the super being removed. *"It ain't easy."* A common occurrence happened today – bottom frames are stuck to upper frames by burr comb or ladder combs, which are essentially the same things.

So with one set of fingers trying to pull the full super upward, I used my left hand, holding the hive

Looking healthy, but actually AFB ill.

The top super of my "sick" colony.

The bottom super of my "sick" colony.

tool, to search about trying to break the bottom frames loose. As usual for me, I was working alone. All I could do was grunt, groan, and strain. Finally, the top super was loosened. Using a shearing motion, I twisted the super nearly sideways and lifted it from the bottom hive body, which was actually a super, too.) Honey is always heavy. In past articles, I have written about gadgets to help me with such heavy loads, but I didn't even know where the invaluable gadgets were now. So, as I usually do, I set the full, heavy, sticky, bee-covered super on the up-turned outer cover Weeds, bees and sweat were everywhere. The colony was packed with bees and honey – not exactly what I was expecting.

What was I expecting?

What was I expecting? I was expecting the traditional AFB- infected colony. I was expecting the soured odor that accompanies advanced cases of this disease. I was expecting an extremely scattered brood pattern with dead scale and greasy, punctured cappings in abundance. I was expecting a greatly reduced adult bee population. What I was not expecting was this small hive, full of bees and honey.

Is this colony AFB sick or not?

Through the years past, I have seen healthy colonies that were not thriving as well as this colony, yet make no mistake, this colony has AFB. If you know for what you are looking, you can even suspect it from the photo I have shown above. True, the hive occupants look healthy, but the brood pattern is spotty. That could be from a lot of things, not just AFB and if I did not know this colony's history, I would not have immediately jumped to American foulbrood as a possibility. The combs looked good and well maintained, but closer inspection showed occasional dead and dying pupae as demonstrated by their less-than-pure-white color. But the big give-away was the presence of punctured cappings. So what appeared to be a crowded, wanting-to-grow colony was actually doing a pretty good job of coping with its disease.

Punctured cappings

Punctured cappings are only one of several symptoms that indicate a colony has AFB. In *Bee Culture*, 2004, I discussed American foulbrood[1] in some detail and I included sources for more information[2]. The puncturing is done by house bees as they begin the cell cleaning process. No single bee does the entire cleaning job so it takes several bees to uncap and remove the dead tissue. Obviously, bees do not have mop buckets. The only way to remove the dead material is to eat it. This is a pretty gruesome, but very necessary for hive hygiene.

Be prepared to see frequent nicely rounded holes in cappings as nurse bees cap larvae as they begin to pupate. That cylindrical hole is perfectly normal. It's the ragged holes of which you should be wary. Don't confuse them.

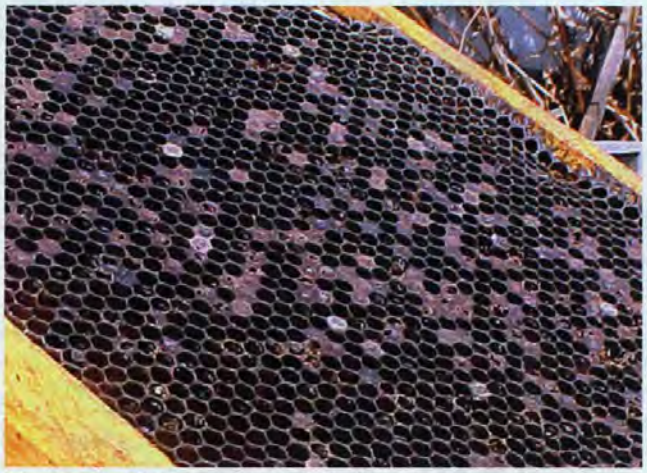
Should I admire or fear this colony?

At first blush, when I realized how mightily this colony was fighting for its health, I admired and respected it. While clearly ill, this colony continued to grow and prosper all the time harboring a serious disease. The point is well taken. At ***some*** times, ***some*** colonies can withstand ***some*** strains of AFB remarkably well. In diseased colonies long passed, I have had colonies completely recover from AFB infections. Problem is that you and I can never tell when and where such a desirable attribute will show itself. So as I compliment this specific colony for its efforts (and even consider helping with some antibiotic), I must remember that it was susceptible enough to come down with AFB in the first place. A much more admirable colony would not have allowed any expression of AFB. This

Okay, okay, I thought I had a good idea for an article, but this is many, many more bees that I was expecting and it is so very hot. Same article, but different location. I have now moved back to my lab with pictures in tow. It's cooler and I am not irritating great numbers of hot bees. Besides, I was having the usual problems trying to drink my pop through a veil. Good idea for an article but my on-the-site-location thing didn't work in this case. Maybe next time. J Tew

[1] *Tew, James E. 2004. American Foulbrood Beyond the academic discussions – real world questions and answers.* Bee Culture. *September, 2004*

[2] For basic information on American foulbrood, look at: http://www.barc.usda.gov/psi/brl/bd-amfb.htm or http://maarec.cas.psu.edu/beeaware/Dis_Info/Brood-Dis.html.



Typical American Foulbrood. This is what I was expecting.

But this is what I found.

particular fighting colony has a clear case of AFB, and yet it continues to survive and has done a pretty good job of unintentionally masking the disease – much as Terramycin® would have done.

There is a good chance that this is a "Typhoid Mary" colony. While it's able to tolerate the disease and perpetually hang on, no doubt other colonies would not be so genetically lucky. So long as robbing and drifting are not an issue and so long as I do not make splits from this unit, it will probably sit there for a long time just being a pretty good hive. Then one day something will go wrong. The resistant queen will be replaced with one not as resistant to AFB or mites and the hive will weaken to the point that robbing begins, or I retire and the bees will be sold to beekeeping friends of mine. This colony is a future source of American foulbrood.

On the other hand

As long as I am guessing, possibly the queen would pass and a new queen would take the reign having prodigy even more resistant to AFB than the previous queen. Possibly, but probably not. I don't know why. Maybe because AFB is as adaptive as resistant bees.

A strange thought.

My ramblings lead to a strange comment: *It's probably better for most beekeepers to have a colony die from AFB than for the colony to co-exist with it.* I mean no offense to anyone reading this, but some (many?) beekeepers would have missed the disease in this colony. I have a sensitive sense of smell and there was no hint of the usual AFB odor. This noble colony with a disease-fighting spirit could very well infect other colonies if left untended.

The prognosis?

Through a scheduling fluke, shortly after I left the location where this diseased colony and a few other suspicious colonies were positioned, the county bee inspector showed up for my annual inspection. I can tell you that his recommendation would be to destroy everything. The risk of bees and equipment spreading the disease would not be worth the benefits derived from saving one diseased colony. That would be his recommendation.

My opinion is not as firm. Just

An AFB punctured capping.

a few years ago, I would have gassed the bees and burned the equipment and never looked back. Now the cost of replacement packages is high. Mites are afflicting other colonies and bees are generally in short supply. The question that is begged is, *"When do you stop killing bees to save them?"*

My (new) plan

I've already moved the colony to a remote site for convalescing. My sister agency, the Ohio Department of Agriculture Apiary Inspection knows that I have this situation.

I will vacuum the bees from the diseased equipment and feed them antibiotic while confined. The disease brood comb will be destroyed. The bees will be put onto new comb and fed sugar syrup and antibiotic until new frames are produced and/or brood is produced. The primary thing I am doing is removing the bulk of the AFB spores – the diseased brood comb. Fortunately, the equipment is old and destroying it will not be painful. I have never been much of a supporter of scorching the insides of hive equipment so the stuff will just be burned.

What should you do?

Am I doing anything that you couldn't do? No. Am I recommending that the next time a colony of yours comes down with this ailment that you try this procedure? No. The point I wanted to make in this piece is that all AFB-infected colonies do not look like the typical AFB photos in the typical bee book. No doubt this is the type of colony that unintentionally destroys the remaining colonies in the yard. It is the stuff of which beekeeping disasters are made. Playing with American foulbrood is very serious play. You had better know what you are doing and it had better be legal in your state. This stuff will take your bees down.

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Varroa Fundamentals

Celia Davis

The time has come to look at the *Varroa* mite and consider its life cycle and mode of reproduction

It is time to return to basics and review our understanding of the *Varroa* mite and its life cycle. After all, it is only by understanding our enemies that we can really get to grips with them.

VARROA DESTRUCTOR

It is always useful to know where organisms fit in the great scale of things so the first thing to do is to look at the classification of *Varroa destructor*.

This simplified classification can be seen in the diagram on the next page. A number of sub-phyla are now normally recognized between Phylum and Class and some classifications do not classify Acari as an order, but what this simple scheme does show is that mites are very closely related to insects and this suggests that controlling mites in a colony of bees might be slightly difficult. (The Arachnida includes the spiders with which we are all familiar.) There are between two and five species of *Varroa* mite recognized, of which *V. destructor* is one, and this particular mite has two forms. The form which has caused such havoc throughout Continental Europe and Britain is the Korean type. So that puts the mite in some sort of context.

Adult Varroa *Mite* (USDA photo)

The mite was first found in the U.S. in the mid-80s in Florida and Wisconsin. It then started its spread throughout the country, aided by its allies, beekeepers. So, how does it live, what does it do precisely and why has it caused such devastation among honey bee colonies?

THE NATURE OF THE BEAST

As mites go, *Varroa* is quite big, as most others are invisible to the naked eye. The female mites are the only ones normally seen. Each one is dark reddish brown with a smooth, elliptically shaped 'shell' over its body and is almost 1.5 mm in diameter They are flattened front-to-back (dorso-ventrally) and always remind me of little crabs. They have four pairs of legs (as do all mites) but these are more or less hidden away under the 'shell' as the mite walks about.

Incidentally, because we usually see them dead or moribund (we hope) it is easy to forget that they are lively little things and, as well as walking, they can move very rapidly and can jump several centimeters. At the front end are the mouthparts which are adapted to pierce the outer covering of a honey bee larva, pupa or adult and suck the haemolymph (blood).

THE LIFE CYCLE

A female mite hangs about on adult bees in the hive. How long this stage lasts is variable but it is probably normally about a week. It is called the **phoretic** (migratory) stage and during this time she feeds on the bees' haemolymph which keeps her going. When the colony is broodless, all the mites are phoretic and particularly vulnerable to treatments. When there is brood in the hive, the mite is able to detect a brood cell that is about to be sealed. The method she uses is probably scent as there is a change in the substances given off from the surface of a larva as it matures. When it gets to a certain point in its development, the worker bees can smell this change and begin to cap the cell. At this point, the female mite dives into the cell and submerges herself in the brood food (worker jelly) at the bottom, extending two breathing tubes, called **peritremes,** up to the surface to enable her to breathe. Once the cell is sealed, she starts to feed on the haemolymph of the propupa. Then, about 60 hours later, she lays her first egg which is unfertilized and always develops into a male. After that she lays another, fertilized egg, every 30 hours. These all develop into females. Presumably, occasionally this system goes wrong and, like our honey bees, if the female mite fails to mate, she lays only unfertilized (male) eggs.

An egg hatches after about half a day into an immature mite called a **protonymph** (*proh*-toh-nimf). This grows and molts into a **deutonymph** (*dew*-toh-nimf) which, again grows and molts into the adult mite. This is a foreshortened life cycle, compared with other mites, which is adapted to the comparatively short time that the *Varroa* mites have to develop. Mites complete their development in between 5.5 to seven days (figures vary depending on the source). The eggs and nymphs are all cream/white in color All the nymphal stages, and their mother, feed on the pupa's haemolymph, but the young nymphs are unable to pierce the skin on their own, so mother makes a hole and all the nymphs feed from this one point. The males mate with their sisters during this time. They die when the honey bee emerges from the cell. (It is even less fun being a male *Varroa* mite than being a drone honey bee!) Using a dissecting microscope or a hand lens, it is possible to see the males if you in-

⇨

spect infested drone brood which has been cut out. You will see that they are small, with very little color and are round in shape.

The female mites, the newly mated ones and their mother, leave the cell with the hatching bee and the whole process starts again.

NOT TOTALLY SUCCESSFUL

It is a strange fact of *Varroa* life that many young mites die before they leave the cell. Why this should happen is a mystery. So, of the five eggs that a female *Varroa* mite may lay in a worker cell, the fifth just does not have time to fully mature, but the fourth and even the third and second may die before leaving the cell, leaving an average of 1.45 offspring per cell. Similar figures apply to drone cells, although the surviving numbers produced will be higher, around four, because of the longer post-capping time available for mite-production. It is easy to see why mites prefer drone brood.

Of course, although the mite population grows slowly at first, it soon accelerates and then problems arise. When *Varroa* first arrived, some people were surprised that it could cause such devastation, but the build-up is insidious. It is perhaps worth spending a little time just considering how a mite population grows. If we begin with 100 mites as a starting point, assume that each female mite in a worker cell produces, on average, 1.4 daughter mites and, in drone brood, four daughter mites, and that each female mite goes through two breeding cycles before she dies, then the numbers look like this:

100 ('starter' mites)
↓
140 + (100 mother mites) = 240
↓
336 + (140) = 476*
↓
666 + (336) = 1002

* The original 100 mites have died

This tenfold increase would take about 50 days (less than two months) allowing 12 days for each breeding cycle and seven days between them. You can carry on with the arithmetic for yourself.

100 ('starter' mites)
↓
400 + (100 mother mites) = 500
↓
2000 + (400) = 2400
↓
9600 + (2000) = 11,600

This time we are looking at a period of about 56 days because the drone pupa remains in the cell for longer, but this result is quite frightening. Of course, in a normal colony during the active season, some mites will be reared in worker cells and some in drone cells, but there is some evidence to suggest that female mites will wait until the first drone brood is available in the Spring so giving the population growth an initial spurt but, however we look at it, and taking into account all the imperfections of this simple scheme, 200 mites in May can be very bad news indeed.

THE DIRECT RESULT ON THE INDIVIDUAL BEE

The end result of the mite(s) sucking the haemolymph from a pupa is that the pupa will weigh less than an unaffected pupa. This will mean that:

- The resultant bee will weigh less;
- The life of the bee will be shortened.

If there is more than one mite in the cell, the weight reduction will increase proportionately. In drones it can result in many failing to reach sexual maturity and mate. Stunted, completely useless individuals can be produced where there are many mites in individual cells, or the pupa may die.

THE INDIRECT EFFECTS OF THE MITE

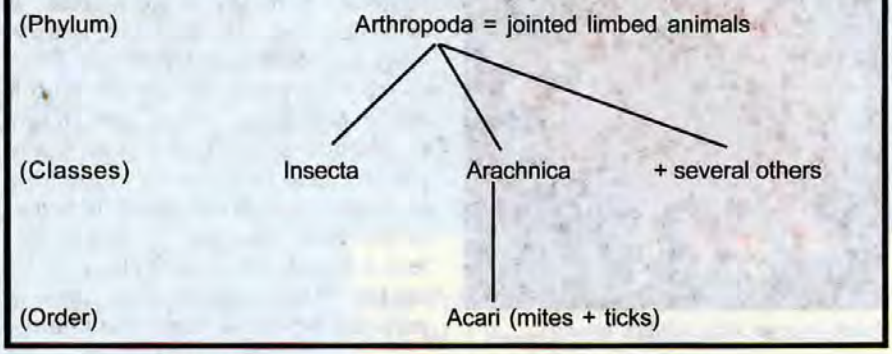
Most beekeepers had never heard of bee viruses, with the exception of sacbrood, until the arrival of *Varroa*. Then, suddenly they became very important. The reason for this is that several viruses can be present in the bee without any observable effects but, once *Varroa* has built up in a colony, this changes. The mites appear to **activate** the dormant viruses in the individual bee and then to spread them from one bee to another, so acting as **vectors.** The viruses concerned are:

- **Deformed Wing Virus** which causes infected bees to die. The signs are small, deformed wings.
- **Cloudy Wing Virus** where the wings may become opaque (but this is not always the case) When there are many infected bees in a colony, the colony will die.
- **Slow Bee Paralysis Virus** is very serious once it gets going. Brood, as well as adult bees, can become infected and the virus, typically, causes death of the colony late in the autumn. Even if treatment has been applied earlier, and most of the mites removed from the colony, the virus will still rampage through the colony and kill it. I am sure that, in the early days, this virus was responsible for stories of the ineffectiveness of the pyrethroid treatments.
- **Acute Bee Paralysis Virus** kills adults and can also be transmitted to larvae.

COLONY EFFECTS

- **Parasitic Mite Syndrome** which involves a whole collection

Classification of Varroa destructor



Varroa on larvae. (USDA photo)

of symptoms in brood and adult bees, arising from the mite and its associated viruses, may develop where mites are allowed to increase unchecked. It can be confused with other diseases such as European foulbrood.

- Colony death resulting from reduction in the length of life of the individual bees and the effects of the viruses. This is usually the end result of Parasitic Mite Syndrome, or may occur without any obvious signs.
- Higher incidence of other, apparently unrelated, bee diseases. This is due to the weakened condition of the colony.

MITES RESISTANT TO CHEMICAL TREATMENTS

The two chemical treatments Checkmite+ and Apistan, which most of us have used since *Varroa* arrived, have been brilliant. But they have lulled us into a false sense of security because resistant mites were always bound to appear in time. The experts gave us about 10 years before this was likely to be a problem and that is what has happened. Less time for the organophosphate Coumophos, in Checkmite+.

We have now entered a new phase of *Varroa* control, where simply using a treatment to knock out most of the mites, once or twice a year, is no longer an option. *Varroa* control has to be based on a thorough understanding of the biology of both our bees and the *Varroa* mites and of the interaction between them. Integrated pest management is the future. Stay tuned.

This article originally appeared in Bee Craft, *the official journal of the British Beekeepers Association. For information on BBKA or for subscription information contact them at Editor@beecraft.com.*

2005 Gold Medal winning mustard.

REED BOOTH, AND HIS KILLER BEE HONEY

William Childress

"I had been involved with bees a short time, and a bee remover awhile longer, when something happened that gave my business a boost. It happened because I recognized a simple fact: *people are easily bored.* They're always ready for something different, the more so if it's frightening or exotic. If you think fear doesn't stimulate commerce, look at TV commercials. We fear fatness, baldness, aging, illness – everything! So many drugs are advertised on TV there's no room for programming. There's nothing new about using fear of killer bees to stimulate my bee removal business. Most people would say it's a public service."

We were bouncing over the Arizona desert in Reed's two-ton truck, with its 40-foot cherry picker secured on top – unneeded on this job. Killer bees had been reported at a Bible College. The hives were under the eaves of student housing, and reachable by regular ladder.

"Although Africanized bees were known in South America since 1960, they only entered Arizona through Mexico about 1990," Booth Said. "There were scary stories about them and their danger to the public. Incidents, even deaths, were publicized, and I saw a business opportunity. I would become a killer bee remover Who wanted to risk removing Africanized bees? People were *afraid* of them"

And so, before he became an actual beekeeper, he read up on it, bought a bee suit, smoker and other necessities and began advertising as a killer bee remover. He was soon getting calls all hours of the day and night.

"I got stung on my very first removal," he said. "It felt like a white-hot fish hook. Man, it hurt! But most stingings were my fault. Either I didn't duct-tape my suit properly, or the fabric had a rip in it that I didn't see. I learned by doing, and by being done to."

The worst came first. About a month after starting his new career, a pair of bees managed to get inside his veil and sting the jugular veins on each side of his neck. Being close to the brain made the venom that much more potent.

"The pain was instantaneous," Booth said. "It nearly took my head off. I knew I was in bad trouble and immediately took Benadryl. Then I went to bed and waited to die for the next three days. It was a very, very painful time, and I learned a valuable lesson: always properly bee-proof a bee suit."

But he was raking in money hand over fist, so the occasional hazards were acceptable. And in 1997, he got a very big break.

"I had always made it a practice to call both of Bisbee's newspapers and ask if they were interested in going along to watch me remove killer bees. They were glad to as long as they could stay well back. For a small town like Bisbee, which only has 6,000 people, this is good story stuff."

"One day a Tucson television reported called from Tucson, a hundred miles away. The said she'd read one of the stories. Could she bring a crew and do an in-depth story of what it was like to be a beekeeper and killer bee remover?"

We had reached the Bible College, and Booth steered the truck towards the rear of the sprawling complex. Minutemen had made their headquarters here during the recent border unrest (Bisbee is 20 miles from Mexico.) He parked in back of the dormitory, and got out to meet his assistant, Frank Bennett, already there. Booth introduced us.

The college and its buildings were low and old, and student quarters were chiefly in a long, narrow like with overhanging eaves. The men verified that the bees had built their hives there, and returned to the truck to get ready. Before the day ended they would find *seven hives* – a record for Booth. The next day, on the oppo-

Reed Booth's Killer Bee Honey label.

site side, the found seven more.

"Bible college or not, it's a miracle nobody was stung," Booth said. Most of the honey was old, black and unusable.

"I told the reporter I'd be glad to be filmed," Booth said, peeling off his bee suit. "It was publicity for the beekeeping business overall, plus a chance to set the record straight about Africanized bees before a million Tucson television viewers. She didn't just do a report, but a good, solid program. My business got a big boost, with calls from as far away as Phoenix – 200 miles from Bisbee. I had to charge a whopping fee because of time and mileage."

Bisbee, Arizona, where Reed Booth has lived for 20 years, is a town of history, whimsy and artistry. "It's a little San Francisco," says Ilona Smerekanich, supervisor of the Bisbee Visitors Center "That's fitting, too, because a hundred years ago Bisbee was the biggest city between St. Louis and San Francisco."

A major reason Booth stayed in Bisbee is former Bisbee High School cheerleader Fabrianne Fox. They've been together five years.

"Isn't that a honey of a name?" he said.

He met Fabrianne at the Bisbee Food Co-op, and it was love at first sight. (Maybe it's time for a *Bee My Valentine* product line.)

The city of 6,000 nestles in a canyon at 5,300 feet. It has fine restaurants and is a popular winter destination. Café Roka, whose acclaimed chef is also its owner, is so popular you can't get in without a reservation. Tom Selleck, William Shatner, Dwight Yoakum and Stephen King have all dined at this four-star restaurant.

In the downtown area in 1998, Reed Booth became the hero of Bisbee – at least for a few days. For seven years he had been southwestern Arizona's only bee remover, while building up his food business based on killer bee honey.

An enormous hive of bees inhabited an old wall in Tombstone Gulch, a picturesque Bisbee canyon dedicated to beer and brothels during copper mining days.

"Everybody knew it was there and had been for probably a hundred years," said Booth, "long before killer bees took over. Then some guy decided the bees were a nuisance and sprayed them with insecticide. Killer bees drink that stuff for breakfast, so all he did was enrage a whole world of bees."

The maddened bees filled the canyon like a plague of locusts – locusts with stingers. Bisbee suddenly had an emergency in its hands that would make it, and Reed Booth, the subject of media attention from coast to coast. The furious insects spilled out of the gulch and into the nearby town square, where they began stinging people, birds, animals, even car tires.

"Some people tore off their clothes," said Booth. "A mistake, but the stings hurt so much, people tried anything to escape."

Attacked and stung, cops rolled up their windows and fled. Cars banged into each other Shops tried to keep the bees out, and found it impossible. Seventeen people were hospitalized, and many other citizens were stung in the chaotic scene that continued, off and on, for three days.

The alarm reached Booth at 10:30 a.m. "I grabbed my bee suit and motorcycled the two miles to town as fast as I could," he said. "I almost didn't beat the media. TV Channels 9 and 4 from Tucson were there soon after, and so was CNN.

According to reports, killer bees had launched a full scale attack of Bisbee. It was the kind of story viewers loved. A hundred and fifty thousand rampaging bees were stinging anyone they could find; tourists, cops, citizens, coffee shop patrons and business owners. Some bees clustered on telephone poles and stung the poles. Others came in the windows of autos. One motorist grabbed her dog and leaped from her car, receiving hundreds of stings in the process.

"She should've died," said Booth. "that much bee venom is akin to a rattlesnake bite.

"Africanized Bees are programmed to attack and keep on attacking," Booth explained. "They never retreat. It's the quantity of venom, and the shock of the

The famous "Killer Bee" t-shirt Reed designed.

intense pain, that kills large animals."

Suited up, with a cloud of bees bouncing off him, he placed a ladder against the wall and started up it with his smoker, having explained to reporters that smoke makes bees lethargic so beekeepers can handle them. He took one look at the decades of honeycomb inside, realized it was hopeless to try and move the hive, and sealed it with foam. "I don't like to kill bees," he said, "to me, they're nature's finest miracle."

He estimated that there were 150,000 bees and 1,200 pounds of honey (ruined) in the ancient wall. The incident was on hundreds of local and national channels the next day. The stories about Rood Booth, "the beekeeper that saved a town from killer bees" (as one narrator put it) kicked off a wave of publicity that Booth rode like a rodeo bull.

"Opportunity buzzed," he quipped, "and I answered."

French and German TV picked up the story and sent teams to interview Booth. He appeared on Food Network, Animal Planet, Discovery, in numerous magazines, and acted as a consultant for National Geographic's special about bees. His business thrived. His work and stress load increased. His phone rang constantly.

And one day Reed Booth had a heart attack. He was 41.

"I've always worked hard," Booth said, explaining the coronary that laid him up for three months. "I can't live any other way. But the heart attack had nothing to do with a bad heart. My heart is fine. It was my own damn fault. Temperatures inside those bee suits can reach 200 degrees in the Summer They're like saunas, but you get busy and don't notice it."

"I skipped water, and as the doctor later said, my electrolytes and potassium were almost non-existent. Only the fact that I was young and in good shape kept me from dying."

It took him 12 weeks to recover. "I had no medical insurance," he said. "Couldn't afford it at the time – like 35 million other Americans. And who expects to get sick at forty-one? I'm *still* paying the medical bills."

He pauses, suppressing anger and frustration.

"We have weird politics in America. Rapists, murderers and child molesters get free medical care in prison, but honest poor people die. Average citizens

Killer Bee honey comb.

Reed Booth's honey bottling and marketing center.

are taxed to support a system that favors the rich, while giant corporations hire scores of lawyers to avoid paying any taxes." He laughed. "In fact, I saw on the news that Medicare buys Viagra for convicted child molesters."

Months of convalescence didn't hurt Booth's charisma or his reputation as a killer bee expert. The next three years saw his business grow, new products produced, and – a big coup – a 2002 invitation from the Small Business Administration to fly him to Washington D.C. and enlist his support for small business loans. He met Condoleezza Rice and Arizona Congressman Jim Kolbe and was presented with a Small Business Award.

In 2003, he was designated Arizona's Entrepreneur of the Year as a result of *Killer Bee Honey LLC* being among the top three small businesses in Arizona. At a Tucson breakfast and awards ceremony, Booth said,"I'd like to thank all the killer bees in Arizona."

Booth's drive to receive attention for his business efforts, and hi efforts to utilize publicity any way he could, has paid off for him. He sends out mailers and says his website (www.killerbeeguy.com) has increased his business many times over Above all, he strives to maintain a visible presence, both as a killer bee remover and with his colorful labels. And last May, a huge billboard near Sierra Vista, Arizona, blazoned his bee-toon and killer bee services to a hundred thousand people and soldiers at nearby Fort Huachuca.

Thanks to the International Mustard Museum in Mount Horeb, Wisconsin, he's also internationally known. They invited him to exhibit his mustards at a competition in Napa Valley, California, in 2005.

"We went and we won – we beat the Europeans!" Booth crowed. "Man, that felt good. We now have a gold medal, a silver, and a bronze for our honey mustard line and its 21 flavors.'

Living 20 miles form the border (He recently removed bees from the 60-foot Border Patrol camera towers), Booth has a cure for illegal aliens.

"Hide bee hives every few yards along the border and rig them for anyone passing will disturb the occupants. That'll make the bees madder than hell, and they – but you got the picture.'

Okay, but let politicians test it first. BC

William "Chilly" Childress is a photogrounalist and columnist from Folsom, CA.

Oh, Death Where Is Thy Sting?

Jim Fischer

Recently, there have been a number of municipalities who were prompted to consider restricting or even prohibiting the keeping of bees. The usual scenario involves someone who fears bees, and demands that the local government legislate the bees away through restrictions on beekeeping.

Never mind that this won't reduce the number of wasps, yellow jackets and other stinging insects in the area one bit. Never mind that bees can forage miles away from their hives and pay no attention to municipal boundaries, the issue might come up.

We can blame *Varroa* and tracheal mites for this. Feral colonies have become very rare since the 1980s as a result of these parasites, and as a result, an entire generation has gone from childhood to parenthood with a very low probability of stepping on a bee while barefoot. A foraging honey bee is an unusual visitor to the modern yard. Not having ever seen the effects a bee sting, the perfectly normal localized swelling around the sting is viewed as an "allergic reaction," and anyone stung is then presumed to be "allergic to bee stings" as a result.

Those who grew up before the devastation of feral colonies are much more likely to have been stung multiple times as a child, so they don't have an irrational fear of bees. Softball games were a regular event in my backyard, and we had a good crop of dandelions, clover, and weeds, so it was only a matter of time until someone stepped on a bee. Of course we were barefoot. It was Summer!

The usual treatment was a hug and a cookie. Yes, there may have been some localized swelling, and of course there were tears, but this did not stop the stung child from playing their position, and taking their turn at bat.

These days, a single bee sting is viewed as life-threatening by parents who are convinced by advertising and paternalistic regulations that their children need thousands of dollars in safety equipment that most beekeepers grew up without (bicycle helmets, baseball batting helmets, air bags, seat belts, anti-lock brakes, water filters, air purifiers, smoke detectors, soccer shin pads, skateboarding knee pads, the list goes on forever). It is a wonder that any of us survived to adulthood given the list of "must have" items that we grew up without. It may be a futile effort to try to educate a neighbor about the fact that it is extremely difficult to even get stung by a foraging bee. We now live in an era where zoning laws prohibit tree houses!

If you are a beekeeper, you may be viewed as not only "strange," but a bigger threat to children than a child molester. Face it, you do appear a tad strange to modern folks – you have an affinity for not just bugs, but bugs that can sting. This is highly unusual in communities where dandelions and clover are considered weeds to be eradicated by the Chem-Lawn man, and yards look like putting greens rather than being permanently scarred with the faint outline of baseball diamonds.

So, what's a beekeeper to do? Offer some facts. The local government clearly has a responsibility to protect its citizens from undue risk, so define for them in clear terms exactly what sort of risk are posed by bees relative to other common risks.

Make a photocopy of this article, and simply hand it to whatever authorities are considering the issue, or download it from www.bee-quick.com/reprints/.

The question "Oh Death, Where Is Thy Sting?" has remained unanswered since it was first asked (The quote is from *I Corinthians 15:55* in the Bible, so we've had several thousand years to think about it.)

The reason that the question remains unanswered is that it is hard to find the sting in death, as there are very few deaths from stings.

In 2000 (the most recent year for which data has been reported to the World Health Organization) 54 people were reported as having died in the USA due to encounters with any type of stinging insect (wasps, bees, hornets, yellow jackets, you-name-it). This number is sure to include some number of deaths due to insects other than bees, and can also be assumed to include a certain number of deaths from "Africanized" Bees, something that is simply not an issue in most of the country.

In Canada, two people were reported as having died in 2000 from insect stings.

Canada has no "Africanized" bees, but has about the same percentage of their population keeping bees in suburban and urban areas as in the U.S. Canada is thereby a better model than the U.S. for how "risky" bees are if one wants to eliminate the "Africanized" bee factor, which would be reasonable for places where there are no "Africanized" bees.

When you look at mortality versus population, the odds of dying from the sting of an insect in any one year are:

U.S.: 1 in 5,555,556

Canada: 1 in 16,666,667

In contrast, there are many many other things that are much more dangerous and kill many more people every year. Things that are much more within the legitimate regulatory grasp of a municipality than bees, and things that can be controlled by a municipality. Lots of things kill many more people.

Things like walking down the street.

In the U.S..

What Killed People	Deaths in 2000	Odds of 1 in	more risk of death than from stings?
Pedestrian Hit By:			
Passenger Vehicle	3101	93,633	59.3
Truck/Bus	295	990,099	5.6
Train	449	649,351	8.6
Stairways	1307	222,222	25.0
Slip/Trip On Level	565	515,464	10.8
Fall Involving Bed	450	649,351	8.6

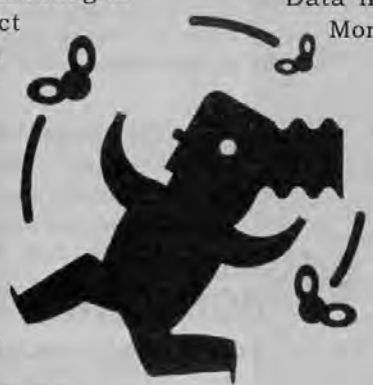
In Canada:

What Killed People	Deaths in 2000	Odds of 1 in	more risk of death than from stings?
Pedestrian Hit By:			
Passenger Vehicle	209	154,321	108.0
Truck/Bus	28	1,162,791	14.3
Train	32	1,010,101	16.5
Stairways	236	136,612	122.0
Slip/Trip On Level	85	380,228	43.8
Fall Involving Bed	62	520,833	32.0

So, if the town fathers want to do something to protect those who are unable to protect themselves, they should start with a ban on walking down the street, all passenger vehicles, all stairways, and all walking on level surfaces.

Note that the bus is much safer, so everyone will have to take the bus everywhere, even if the journey would only be a few steps. Busses can't go up stairways very well, so they will also have to mandate elevators for all multi-story buildings.

When they are done with that, the next logical item to ban would be either beds or trains. (I have no idea what to do about beds ON trains, but one might jump to the conclusion that they would be much more risky than either one alone.)



"The chances of dying from a bee sting are remote. The liklihood of convincing some folks of that is equally remote."

Since all the items listed are common in nearly every town, they are a much more serious risk to the entire population rather than a risk to a tiny subset of the population who were dealt a bad genetic hand of cards, yet have made no effort to obtain a readily-available cure for the affliction.

Moreover, municipalities can impose bans on things like walking and passenger vehicles and expect to be able to enforce them. In contrast, a "ban" on beehives within the municipal limits is easy to prove as useless, ineffective, and providing no tangible amount of additional protection, even to the one person who has an affliction that they refuse to treat. Stinging insects fly where they wish. No one can stop them.

Insects tend to be oblivious to political boundaries. Yellow jackets and wasps would be nearly impossible to eradicate, making any "ban" on bees alone even more useless.

While presenting these statistics may not directly convince the local government officials to change their minds, presenting these statistics to the local press would allow them to have a grand time poking fun at how the government officials deal with the basic concept of risk management, which would then have a high probability of prompting the outcome you desire.

As another sanity check and point of reference, in 2000, 65 people died in the U.S. of food poisoning ("gastroenteritis of presumed infectious origin") and in Canada, 13 people died.

Was this the "quiche of death"? BC

Data Source: World Health Organization Mortality Data http://www.nationmaster.com/cat/Mortality

James Fischer keeps bees in the mountains of Virginia and has a morbid fascination with mortality statistics.

Commercial Beekeeping In Norway

Hans-Otto Johnsen

Winter's are tough, there's *Varroa*, and still they manage to survive. Here's how they do it, and how you can too.

Scandinavia is dominated by hobby beekeepers and hobby beekeeping, but there are some that make their living on bees.

I'm not just a beekeeper that wants to make money on honey. Life is more than money, it's a good quality life. Such a life requires good quality food. Natural food from the beehive is outstanding in many respects and has the potential of adding many good properties in a health giving food supply. Scandinavia is lucky as we live in a very little polluted area of the world and thus we have good possibilities of producing residue free food. This is challenged by the *Varroa* mite.

The beekeeper takes the consequences

As a producer and beekeeper you are dependant on your own decisions, even if there exist many regulations and often conflicting advise. Scientists try to be correct. Therefore they often have difficulty in giving answers that they can stand for with 100% certainty. This may create uncertainty among practicing beekeepers. Which of course the anecdotal experiences of fellow beekeepers may also do. For a commercial beekeeper all this may put him in a not so easy position. With all the information he can get, scientific reports, anecdotal stories and his own observations, it is the beekeeper himself that will make the decision on his beekeeping management. It is he, not his advisers, that will have to take the consequences.

How we fight the mite

In Norway, where I live, you are not allowed to use what are called pesticides against pests. To fight the *Varroa* mite we use what we call biotechnical methods and organic acids. The purpose is to keep the bee colonies and bee products free from residues and not to produce a multi-resistant mite. But even acids have their drawbacks. The biggest is withholding the long term solution of mite resistant bees.

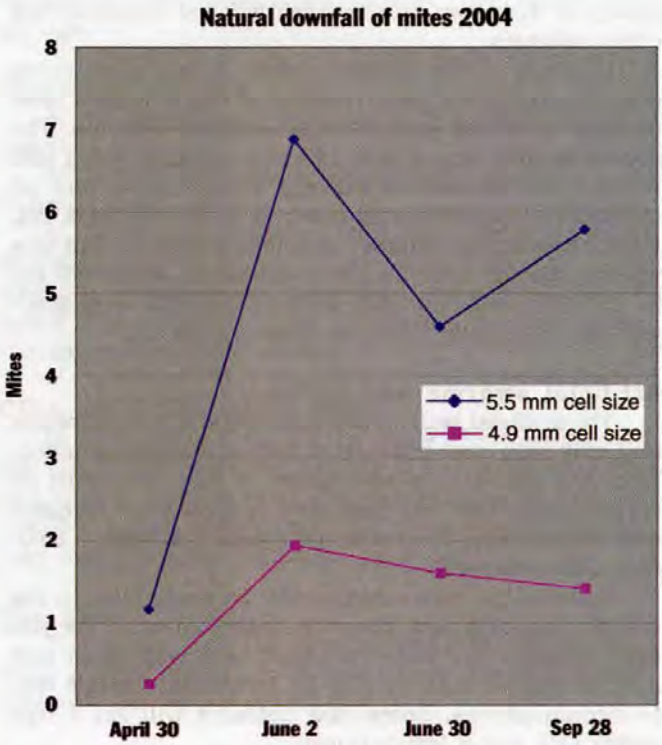
Additionally you do things to the bees that influence their health when you pour foreign substances and high concentrations of otherwise innocent stuff into the bee colony. All these act as poisons. We seem not to know much about how these substances influence the bee colony other than they kill a lot of mites.

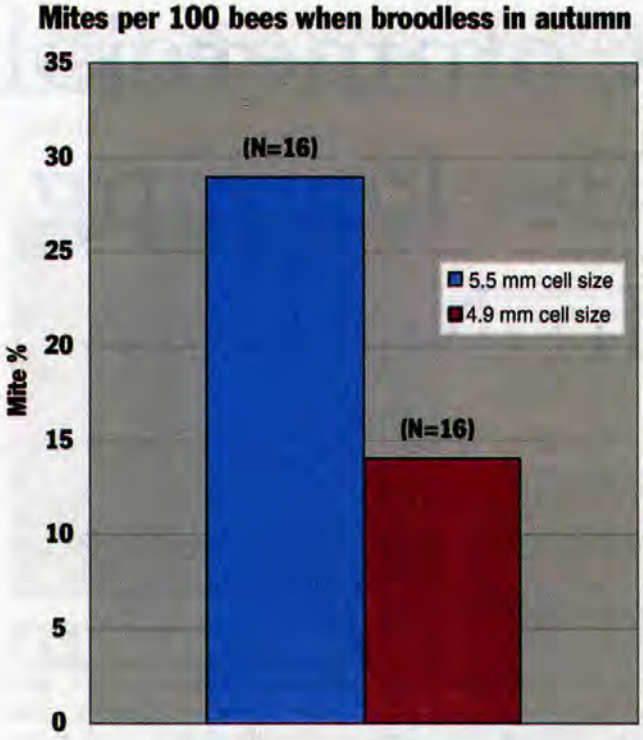
My focus is on biotechnical methods, selective breeding for mite resistant bees and a management system that helps the bees to survive and produce.

I saw the first *Varroa* mite in my operation in 1997 I tried different methods available, but soon came to use only what is described below.

My operation

I wintered 650 colonies in the Autumn of 2004. Due to my experiences the last years I expect 5-7% Winter loss, or about 40 colonies. Come Spring, for a number





of different reasons, around 100 colonies will have too slow development. Most of these are old production colonies. *Varroa*, nosema, chalk brood, failing queens and "just slow" are some of the reasons. These 100 or so weak ones will end up as 30 colonies after uniting them in different ways. Those united colonies will give a crop. This makes an additional loss of 60 colonies. Of course these united colonies will have a new queen eventually. But this early in season we don't have new laying queens in Norway. These united, somewhat affected colonies of different ailments are moved to an apiary of their own so that they will not influence the other colonies.

In June at the earliest, when I have new laying queens, I make my main number of new colonies. Most of them could be described as artificial swarms. The goal is to have about 200-250 new colonies going into Winter If I succeed in making 250 colonies that all survive and no additional colonies of the old ones fail, I will increase the number of colonies by 150. But this will not be the case as some additional ones will fail for different reasons, and some of the new ones some will fail. Hopefully I will increase somewhat.

Artificial swarms and splits

The artificial swarms are made without brood frames and only with new foundation and a new laying queen. They are placed in a new apiary of their own with no old colonies. Now they just have to grow until Autumn and be wintered. They will make good production colonies next season.

Some of the new colonies will be made later in the season due to a lack of newly mated queens. As you may understand I have to adjust to a very short and intense season and have to be somewhat flexible due to circumstances. Some new colonies will get a ripe queen cell, not a laying queen.

New colonies which I make later in season will have a number of brood frames, more the later they are done. It's all about availability of queens how many of each type of new colonies are made. We don't have easy to get big batches of new laying queens in Norway. Especially not of the breed I work with.

Breeding

Those production colonies that survive well for a couple of seasons, give good crops and are satisfactory in different respects will be those among which I choose my breeders.

My aim is to let my new queens mate under satisfactory controlled circumstances. I sometimes use an isolated island. Many times I use an apiary, fairly isolated, in an area dominated by my good bees. To this apiary I move selected drone colonies, which could have sister queens, or they could have queens of different mother origin.

The breed

The breed I use is called Elgon and has its origin in Sweden with Erik Österlund, the editor of the Swedish Beekeeping journal "Bitidningen." This breed is a mix between mainly the Buckfast bee and the east African mountain bee *Apis mellifera monticola*. It's bred with the purpose of surviving on its own in spite of the presence of the *Varroa* mite.[1]

But sometimes I buy an apiary due to its good site, including a number of colonies. There are also always colonies that make supersedure queens, sometimes when they have been moved to the heather in late Summer Many times they are then standing close to apiaries with other types of bees. And I havn't succeded in shifting to only Elgon stock to begin with either. So I will have a certain amount of different stock in many of my apiaries. About 80% is of mainly Elgon heritage.

Management system necessary

My anecdotal observations tell me Elgon stock is more resistant. Small cell size gives more resistant bees, as the results from a Norwegian small cell size test tells me. But resistance varies, all colonies are not Elgon and all beekeepers in the neighborhood do not have Elgons or small cell size. This creates a higher mite pressure, especially maybe when the bees are moved for the Heather flow in late Summer. This makes a management system necessary that can take care of differing mite pressures.

Natural compromises

One essential part in my beekeeping is to help the bees to live as natural as possible. Totally natural is impossible for modern beekeepers, due to mites and other problems. One essential part in this natural context is the wax. In nature bees move around, leave old wax and make new. Bees swarm, mother colonies die. Wax is left to others. That's why I work with artificial swarms moved to new locations and let the bees draw a lot of new combs.

A compromise that helps is wax foundation. Natural cell sizes vary[2], sometimes little, sometimes more. The smallest ones are in the brood area and the biggest in honey storage area.[3] Therefore I mainly use 4.9

An Elgon queen on a newly drawn 4.9 comb. In the Elgon breed color is not a selection parameter, which sometimes results in a "rainbow" coloration of the worker bees. The majority though is to the darker side. (photo by Erik Osterlund.)

A 4.9 mm cell sized capped brood comb in an Elgon colony. (photo by Erik Osterlund.)

mm cell size in the brood area. But I still have colonies with 5.1 mm cell size in brood area. I use queen excluders above the brood boxes so I use my enlarged cell sized combs of 5.5 mm cell size in my honey supers.

Cell size is not the only aspect constituting the amazing structure that the bee comb is. The fairly good regularity of the six-sided cell and how the cell bottoms are formed are others. To mimic nature as much as possible the cell bottom can't be flat. It consists of three rhombs at certain, quite deep angles. And naturally built cells are many times much more regular than the imprints in the wax foundation we buy. In what aspects these unnatural irregularities influence the bee colony we don't know.

Quality wax foundation

I have been quite occupied trying to produce good quality wax foundation. Because of the variations of the wax foundation machines on the market in Europe I went to the U.S. to buy a machine and create a production line myself. The problems in Europe are stretching the wax foundation during milling and centering the embossing rollers so that the bottoms of the cells on opposite sides of the foundation are misplaced. In addition the cell bottom rhombs are meeting each other at a too small angle creating a too flat bottom. Of the commercially available equipment the one that was closest to what I wanted was from the Hawley Honey Company in Iola, Kansas.

My biotechnical methods

The biotechnical methods I use to fight the *Varroa* mite are the following.

1) I make artificial swarms, which are put in apiaries of their own to avoid reinfestation.

2) In Summer if I come across colonies that seem to have mite problems, I take a lot of bees from those to make artificial swarms (and some from weaker colonies, thus leaving the good producing colonies to give me a big crop). Thus the mite population growth is broken in those colonies as the brood will be small due to fewer bees, and any later influence from them is hindered. Later in season the queen is shifted. You may argue that the new colonies will have too many mites this way. But the new colonies will have small mite population growth too due to being small in size. They in addition get queens from mothers selected for mite resistance. My experience is that this works well enough.

3) I use a breed with resistance traits, which I further select.

4) All colonies are supplied with screened bottom boards.

5) I use natural (and not enlarged) cell size, at least in brood area.

6) Those odd colonies that seem to develop an alarming level of mites at the same time as colony strength is decreasing more than average, are terminated. The reason for this is to avoid eventual negative influence on the others.

CELL SIZE TEST 2002-2004

In 2002 I established a test apiary for testing small cell size. There were two groups of bee colonies in the test apiary. The two groups were placed as far away as possible in the apiary, but still close enough so that they together could be called an apiary.

The goal

The goal of the test was to measure the development of the *Varroa* population during the test and to measure the honey production.

The start

One group in the apiary had enlarged cell size (which have been "normal" for many years) in the brood area (5.5 mm – 55 mm measured over the parallel sides of ten cells). The other group was established on bees born in 5.1 mm cells. The following year (2003) cell size was worked down to 4.9 mm in the small cell size group.

All queens in the test apiary were sisters bred from the same colony. And they were all mated at the same isolated mating station with sister queens producing the drones. The breed was Buckfast.

I started with 20 colonies in each group, with the two groups 200 meters apart to avoid robbing and drifting between the groups. To further avoid unwanted influence harvest was done late in the day, escape boards were used and entrances were reduced.

Late in Autumn 2002 when there was no brood, the test colonies were treated with oxalic acid. The aim of this treatment was to even out the mite population and start with a low amount of mites.

4.9-foundation drawn

The small cell colonies at first did not draw the 4.9-foundation well. Uneven cell sizes appeared though some patches were of good appearance. The poorest drawn combs were replaced as soon as possible with new 4.9 foundation and the bees drew them better and better.

When the small cell group was given new foundation, the big cell group also was given new foundation (then of course of 5.5 mm cell size). Only a few measurements were made in 2003. An alcohol wash in October when no brood was at hand showed a lower amount of mites among the small cell colonies.

Results in 2004

Throughout the season in 2004 the mite population was significantly lower in the small cell group. See figure 1. The natural downfall in average in the small cell group peaked with 2 mites per day and then decreased steadily. In the big cell group it peaked at seven mites a day, decreased and then increased again.

An alcohol wash was made in Autumn when no brood was present in the colonies. See figure 2. In the small cell group mites per 100 bees (%) was 14 (the range was 3-26%), and in the big cell group 29% (the range was 3-64%). The 3% colony in the small cell group gave an average crop, while the one with 3% in the big cell group gave a very small crop suggesting it was a weak colony, which it was. The three 26% colonies in the small cell group and the 64% colony in the big cell group all gave good crops indicating strong colonies with good opportunities for the mite to reproduce.

The small cell group of colonies averaged about one box stronger at peak strength in the middle of Summer. The average honey crop in the big cell group was 36 kg (79.2 lbs.), range 8-57 kg (17.6 - 125.4 lbs.). In the small cell group it was 24% bigger with 44,5 kg, range 23-62 kg. An interesting observation was that the honey crop from the small cell colonies were more even, besides the top colony and a few at the bottom. The rest were very similar, while in the big cell group the sizes of the crop were more spread out. The top crops were similar in the two groups.

Both groups were affected by chalkbrood. Chalkbrood is difficult to measure, but my anecdotal eyes told me the big cell group was evidently more affected. This may have contributed to the smaller crop in this group. Would the mite population had been bigger without the chalkbrood?

In September 2004 the queens were shifted in all remaining colonies, which was 16 in the small cell group and 16 in the big cell group. During the requeening, supersedure queens were found in seven colonies in the small cell group and in eight colonies in the big cell group.

Finally, there is no observation that small cell size have any negative effect on the performance of the bee colony.

New breed for the rest of the test

The new queens introduced were of another breed, Carniolan. None of the colonies was treated with any substance for the mite. The test continues. The Carniolan breed in Norway is a stock selected in a breeding project by the Norwegian Beekeepers Association and has been going on for several years. The stock has a good reputation and I want to test it against the breed I mainly work with, the Elgon. Therefore I have set up an apiary with Elgons not to far away from the now Carniolan test apiary.

Cell size test with the Norwegian Beekeepers Associaton

Professor Stig Omholt in Norway invited scientists and beekeeper associations in the Nordic countries in 2001 to discuss the possibilities of testing small cell size. The Norwegian Beekeepers Association launched a cell size test in 2002. I am one of the test beekeepers. The results up till now look promising. Therefore more test beekeepers will be engaged during 2005 and 2006.

Thank you!

I want to thank Prof. Stig Omholt in Oslo Norway, Dee and Ed Lusby in Tucson Arizona, Dr Eric Erickson in Tucson Arizona, the staff at Dadant in Hamilton Ohio, Raymond Cooper in Iola Kansas, Myron Kropf in Middletown Missouri and Editor Erik Osterlund in Hallsberg Sweden for illuminating discussions, without which I'm sure I wouldn't have survived this long as a commercial beekeeper. BC

NOTES

1. Osterlund Erik, (2001), *The Elgon Bee and Varroa Mites*, American Bee Journal, March, vol 141, March, p 174-177 http://beesource.com/pov/osterlund/index.htm
2. Cowan, T.W., *The Honey-bee; its Natural History, anatomy and Physiology*, Houlston & Sons, London, 1890, p 180: 'The average size of a worker cell between the parallell side is 1/5th of an inch, or 0.2.... We say average, because considerable variation exists in different parts of the same comb, as both Réaumur and Huber found.' The average 0.2 inch was 5.08 mm in naturally built *combs*.
3. Dennis Murrell website: http://wind.prohosting.com/tbhguy/ *Page on comb structure: http://wind.prohosting.com/tbhguy/bee/comb.htm*

Honey Plants

Connie Krochmal

Joe-Pye-Weed

Fall Blooming Perennials For Bees

In the Fall, beekeepers count on late blooming bee plants to carry the colonies through the Winter Goldenrods and asters generally deliver However, a number of other perennials can make important contributions. Among these nectar and pollen plants are wildflowers and garden perennials. For the most part, these are easy to grow, displaying few insect or disease problems.

Any surplus honey is generally mixed with that of other Fall blooming species. With a few exceptions, honey descriptions are rarely available for these plants.

JAPANESE ANEMONE (*Anemone x hybrida*)

This graceful, sturdy hybrid has become a very popular, Fall-blooming garden plant. Most cultivars are hardy in zones five through eight. Provided they are given adequate winter protection, a few will make it as far north as zone three.

Depending on the cultivar, Japanese anemone features erect, slender stems, which grow from 1½ to five feet in height. The toothed, dark green leaves have three lobes. These occur mostly as a neat mound. Initially slow to become established, this freely flowering perennial blooms throughout the Autumn. Often solitary, these blossoms perch atop tall, drooping flower stalks. They come in shades of white, pink, purplish-rose, and red. Bees collect lots of pollen from the single-flowered cultivars.

Japanese anemone especially likes partial shade, but tolerates some sun. It prefers a rich, well drained soil, particularly ones high in organic matter Taller cultivars often need staking.

JAPANESE SEDUM (*Sedum spectabile*)

Also known as showy stonecrop, the refined Japanese sedum has become an all-time garden favorite. It thrives in zones four through nine. This all-weather species tolerates heat, drought, cool conditions, and high humidity.

Around one to two feet in height, this succulent is the showiest of all the Sedums. It develops stiff, fleshy, erect stems. The large, widely spaced leaves grow to three inches in length. Oppositely arranged, these are greenish-gray. They have toothed margins.

From August to October, the abundant, delicate blooms make their appearance. New flowers open white, and then change to pink, ending in a crescendo of rose-red. Lacking petals, the individual blooms are small. They emerge in large, flat heads up to ten inches wide. Much loved by bees, these blossoms provide nectar

Japanese sedum adapts to sun and partial shade. It needs a well drained soil. Of all the various cultivars that are available, 'Autumn Joy' is by far the most popular.

JOE-PYE-WEEDS (*Eupatorium spp.*)

Among the most reliable of the wildflowers, joe-pye-weeds are most prevalent in the East, particularly in zones four through nine. These bring excellent nectar flows along with pollen.

These vigorous plants have a coarse, weedy appearance. They're sometimes seen in cultivation. Due to their aggressive nature, joe-pye-weeds are best suited to wildflower gardens and meadows. The exceptions are compact cultivars, such as 'Gateway '

Easily reaching seven feet in height, their stems are statuesque. These often display tinges and/or dots of purple, which occur most frequently at the leaf nodes. A unique feature of the joe-pye-weeds is the whorled leaf arrangement. The actual number in a whorl varies from one species to another with anywhere from two to seven.

Very floriferous, the joe-pye-weeds remain very popular with bees. What the flowers lack in size they make up by their sheer abundance. The crowded, terminal heads are initially white or pink. Later, they mature to light purple or lavender-purple.

Demanding moist conditions, joe-pye-weeds dislike dry weather These perform well in full sun and partial shade with the latter being best in the South.

The best known species are the following:

Green-stemmed joe-pye-weed (*Eupatorium purpureum*) is also

Goldsturm Coneflower

known as bluestem joe-pye-weed. This species occurs in the East westward into Nebraska and Oklahoma. It thrives in a variety of wet and dry habitats, but favors rocky woods. Green-stemmed joe-pye-weed is best known for its vanilla-scented foliage.

Joe-pye-weed (*Eupatorium maculatum*) has one of the widest distributions, occurring in all regions of the country. Its habitats include low, marshy places, meadows, shores, and damp thickets. This prefers spots with rocky or rich soils.

GOLDSTURM CONEFLOWER (*Rudbeckia fulgida 'Goldsturm'*)

This bold, long-lived plant outshines all the coneflowers. Withstanding the toughest of Summer heat, humidity, and Winter weather, it grows well in zones three through nine. The cultivar name 'Goldsturm' is German for gold storm.

This eventually forms a generous-sized clump. Considered one of the top 10 perennials, Goldsturm coneflower produces shapely, upright, branched stems. These reach 1½ to 2½ feet in height. Both the stem and foliage are hairy. The alternate, dark green foliage is lance-shaped. While those on the flower stalk are reduced in size, the others reach six inches in length.

Glowing yellow, daisy-like blooms smother the plant in Summer and Fall. They're two inches across. The attractive, dark cones can be most any shade of brown or black. Blooming nonstop for months, these provide nectar and pollen.

Goldsturm coneflower adapts well to partial shade and full sun. It thrives in a wide range of soil types – even clay. But, this performs best in a well drained, consistently moist one. Though Goldsturm coneflower tolerates mild drought, it will bloom better if it receives enough moisture.

This plant was chosen as Perennial of the Year in 1999 by the Perennial Plant Association. It is a cultivar of the showy coneflower, which is native from New Jersey west to Indiana, south to Kentucky, West Virginia, and Virginia. Typically a woodland species, this native perennial frequents dry and moist spots in both shade and open places.

MANY-FLOWERED SUNFLOWER (*Helianthus x multiflorus*)

Suitable for zones three through nine, this towering plant reaches four to seven feet in height. Both the foliage and sturdy stems become clothed with hairs. Its large, coarse leaves grow to around five inches wide and twice as long. Flowering freely in August and September, the many-flowered sunflower boasts masses of sunny yellow, zinnia-like blooms. These open in heads up to five inches in diameter. Some cultivars bear double flowers, which aren't as good for bees.

Though most any garden soil will do for the many-flowered sunflower, it does best in a moist, well drained one. This requires a lot of water.

The many-flowered sunflower is a hybrid of the annual sunflower and a native perennial – the thinleaf sunflower. Various cultivars can be found at nurseries. Like the annual ones, this provides nectar and pollen. When sunflowers of any type are abundant, they can yield a surplus crop of honey, which is generally amber and strong flavored.

SNEEZEWEED (*Helenium autumnale*)

A stout, floriferous wildflower, this native is found over much of the East, Midwest, and Southwest. Sneezeweed grows in the rich, moist soils of bottomlands, swamps, meadows, and other wet areas. It is hardy to zone three. In addition to the species plant, numerous cultivars and varieties are available, including dwarf ones.

Also called false sunflower, this vigorous species reaches three to six feet in height. Sneezeweed has a straggly, coarse appearance. Its winged stems develop numerous branches. Lance shaped, the alternate leaves reach six inches in length. Their edges are coarsely toothed.

Sneezeweed quickly overflows with blooms in late Summer and Autumn, lasting into November in warmer regions. Providing nectar and pollen, the daisy-like blossoms are three inches across. They open in crowded, flat heads. Colors include various hues of yellow, and orange along with the jewel-like tones seen in sunsets. The dark centers are either black or brown.

Preferring full sun, sneezeweed will grow in most ordinary soils, but achieves its best performance in a rich, moist one. Water it during dry periods. In warmer areas, sneezeweed tends to get leggy, and will often need staking. Keep it compact and bushy by pinching it back, which is rarely necessary for the dwarf cultivars.

Though the honey from this species can taste somewhat bitter, it is less so than that from bitterweed – a related species. Apparently, the pollen lends this unpleasant flavor Best reserved for the bees, this honey shouldn't be mixed with that intended for human consumption.

SPOONLEAF YUCCA (*Yucca filamentosa*)

Also called silkgrass, this perennial is native in most areas of the East, being especially common along the coastal plains. Spoonleaf yucca has also escaped from cultivation and expanded upon its natural range. Its habitats include woods, old fields, dunes, and sandy soils.

A heat loving native, this wildflower is hardy in zones four through ten. Spoonleaf yucca sports evergreen, sword-shaped foliage that arises as a rosette from the woody stem. Its stiff, erect leaves seem leathery. When young, they're thin, becoming thicker with age. Long threads can be

Autumn Ivy

seen along the leaf margins.

From late Summer into September, spoonleaf yucca puts on a spectacular show. A number of graceful, purple-tinged flower stalks develop from the base. These spikes, held well above the foliage, measure three to six feet in height. Waxy, creamy white blooms open en masse along the length of the stalks. Yielding lots of pollen, these flowers are bell-shaped.

This plant needs full sun and a well drained spot. It thrives in light, sandy soils.

In addition to spoonleaf yucca, there is a similar, late-blooming species called Adam's needle (*Yucca smalliana*). This one grows in the Southeast westward into Louisiana. It frequents bluffs, sandy soils, and old fields.

TUBE CLEMATIS (*Clematis heracleifolia*)

A native of China, the tube clematis is suitable for zones three through nine. This swiftly reaches two to four feet in height. It tends to be woody at the base. While some types of clematis are vines, this nectar and pollen plant assumes the form of a shrubby perennial.

Its coarse-looking foliage is toothed. Oppositely arranged, the broad, compound leaves consist of three leaflets. Small, fluffy flower clusters arise from the leaf axils. Blue in color, the showy blossoms open in late Summer through the Fall. They're noted for their delicate fragrance. An inch in length, tube clematis blooms feature four, eye-catching sepals that resemble petals. These curl backwards. The flower clusters give way to attractive, wispy seedheads.

Tube clematis grows well in both full sun and partial shade. It is somewhat finicky. Disliking wet and dry spots alike, this demands a rich, moist, well drained soil, preferably one that is alkaline in nature. Apply a layer of mulch around the stems to keep the roots cool and moist. A vigorous, fast-growing species, the tube clematis benefits from staking. It often becomes overgrown and sprawling, thus creating a need for an occasional pruning.

Though a honey description for this species is not available, it would likely resemble that of the other clematis, which is very heavy-bodied and light amber with a pleasing taste.

While Spring brings a rich array of bee flowers, nature tends to be less generous during the Autumn months. Nonetheless, there should be enough nectar and pollen plants available to provide stores for the bees' Winter needs. This generally comes from late blooming garden perennials, wildflowers, and woody plants. BC

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It's Not Too Soon!

Start planning now for your Spring beginner's class.

Ann Harman

A Spring short course for beginning beekeepers is proving to be very popular throughout the country. Just listen to the oneupmanship between local beekeeping associations – "we had over 40 this year;" "well, ours topped 60 for the first time." It would be difficult to find all the reasons for the increase in beekeeping. Perhaps it is just cyclical. Perhaps there is no one reason. It doesn't matter. But why start planning now? Autumn is barely getting started.

Planning now makes good sense. If your local association had a short course this past Spring it may still be fresh enough in the minds of the instructors to make changes, improvements, additions. If your local association is planning their first ever short course, it is time to sit down and make preliminary plans – and change plans, and remake plans. When February or March comes – sooner than you think – you will be ready.

A good starting point is to decide on the length of the course. One day just won't do it. But one day a week for four weeks gives enough time to cover the minimum of information. Certainly you can have one that goes for six weeks or even eight weeks. However, some people, no matter how interested, may not be able to commit to a long course. A long course may also seem like force-feeding too much information. After all, this course is for beginners and the course is given before anyone has bees. No matter what the length of the course, you will need to add a day or (better) two days actually in a beeyard – open-hive days. These would be scheduled when the weather is suitable in your part of the country.

How long should a session be? Well, you might try an hour and a half with a short break in the middle. Everybody stand up and get a cup of coffee or tea and a honey cookie. Emphasize getting started on time. One good way to do this is to start each session right on the dot. Latecomers get the message.

You might give some thought to a two-part course for those beginners. One section before they get bees and another section some weeks or a couple of months afterwards. That's when all their questions will appear! Actually those questions start the minute they have bees inside a hive.

In any case your first decision for planning this short course will be *When*. How many days, weeks? What month or months? In areas expecting heavy snows in February you might wish to consider March instead of having weather-related postponements. Those postponements can be affected by your choice of *Where*. Your choice of venue might not be available. In the warm parts of the country January might be a better choice. Don't start jumping ahead of yourself at this point. You will be making the course to fit that *When*. Keep in mind that package bees and queens are not available until approximately the first of April. Nucleus colonies will be later.

Now that you have *When* established, the next bit of planning is *Where*. If you are fortunate in having a suitable, free meeting place for your local association it just might be the best place for the short course. Otherwise you can consider Extension offices, libraries, fire halls, churches with meeting halls. Local colleges can be quite nice but you will probably have to pay a fee. Establish your classroom now even if it is September. Most places are glad to fill in their calendar well in advance of the date.

One association took care of registration and handouts by having a Sunday afternoon short social before the course began. Coffee, tea and honey snacks were served, everyone wore a nametag, and the handouts were given. The class members could find their way to the building and classroom and meet each other. In this way the first class could start on time since the preliminaries were all done. Yes, you will have one or two who heard about the course at the last minute or who could not come to the social. Take care of their needs during the short break at the first session. Remember – you want to show the class you start on time. So schedule a brief social event at your classroom prior to the beginning of the course.

Now – the part you've been waiting for. The *What*. What are you going to teach these beginning beekeepers? You may have formed a committee in your local association to plan the lessons and the teachers. Be careful – you do not wish to produce a camel (remember – someone said the camel was obviously designed by a committee). You want to give these beginning beekeepers information that will give them some confidence not confusion.

At the beginning of this planning you can certainly take any and all suggestions, including queen rearing and moving for pollination. The more the merrier. Now look through these suggestions and start throwing away, including the queen rearing and moving for pollination.

These beginners want to know how to light a smoker. They want to know how many queens are in a colony. They want to know what a drone is. They want to know where honey comes from. They have no idea what foundation is. To you, a beekeeper for some years, these questions may sound completely dumb. But can you think back to the day you first became a beekeeper? These are exactly the things you wanted to know. You have just forgotten the questions you had.

Your instructors are not there to show off their knowledge. Your instructors are there to introduce a group of very nice people to the fun of being a beekeeper. If you have used unfamiliar vocabulary and kept babbling along and thus produced a barrage of questions, then you need to go back and redo your approach. No matter who your students are,

or how old, they are in kindergarten when it comes to learning about being a beekeeper. Keep that firmly in mind.

It would be nice to make a glossary of basic beekeeping terms as a handout. You need to introduce these students to words like frame, foundation, queen cup, queen cell – and more. Then make sure your instructors use the same words. It certainly is confusing when one says "brood chamber" and the next one says "super" and the next one says "box." Suppose I threw the words "century" and "leg before wicket" at you. Some of you might know what they mean but if you don't then whatever I am talking about remains a confusing puzzle.

To make a plan for your course you may wish to follow the chapters in a book. Now is a good time to talk about what things you might provide for your students. If you are planning for them to have a beginning beekeeper book then you will have to have a charge for your course. If you are paying for a classroom that cost must be included in your fees. Handouts, such as the glossary mentioned earlier, should be included also. Don't worry that charging for the course will keep people away. If you explain what you are providing you should have no problem. You may wish to have a schedule of fees – single, family, youth. Don't be stingy with your handouts and books. I have found that if a youth is interested he/she wants his/her own book and handouts. You should include a year's membership in your local association as part of the fee. Belonging to an association insures that the beginning beekeeper will have support, more answers to the more questions that arise, and hopefully find a mentor, a very valuable beekeeping friend.

Books for beginning beekeepers will be reviewed next month to help you choose something suitable.

Still on the subject of handouts, the free equipment supply catalogs are essential. A quick phone call to the major suppliers will bring you a sufficient number for your class. These catalogs actually are like a text. They are filled with the names and accompanying pictures of the equipment. Prices show what a beekeeper can plan to spend on both necessities and frills. And the items for processing wax and making candles and ornaments show the beginning beekeeper that honey is not the only thing that can be done with a hive of bees. Catalogs are important – be sure you give at least five or six.

Now back to the planning. If you have selected a text see if the sequence of chapters fits the plan you have in mind. Read the text yourself. Yes, I know you may have read it years ago when you were a beginner but the book may have been updated – or not. Read it to see if and where you need to make corrections, modifications, additions. You can assign chapters for the students to read either in advance of the next lecture or afterwards. Encourage them to write down their questions as they read. If they put their questions on file cards you can collect these at the beginning of class and quickly review them. If a particular topic brings a number of questions perhaps it is best to include a review of that topic before going ahead with the scheduled lesson for the day. Keep that topic in mind and see if you can improve that particular lesson next year

Slides, videos and Power Point presentations do help break up the sessions and prevent them from being just mounds of talk. If your sessions are on a weekday evening keep the AV presentations fairly short. Too long a time without much light will put people to sleep after a day of hard work. Try to maintain a light level enough to enable students to make notes. Preview the AV material beforehand to make certain it is suitable and not contrary to your spoken information. There is no point in showing something and then telling everyone not to do that. Pictures of the most common local honey plants are really helpful. Your students may be excellent gardeners but they need to recognize what plants honey bees can use.

Now you have the schedule of classes, your instructors lined up, your materials in place. You are not done yet. The short course needs to be advertised otherwise you will have no students. You can put a notice in the two bee magazines. This notice will only affect a beekeeper who knows someone who wants to be a beekeeper. You need to reach throughout your community to those who have always wished to keep bees but never knew what to do or where to go.

Local newspapers frequently have a calendar of events. Write a nice press release giving the particulars of the course – the when, what, where – and provide a contact person and the phone number and email. A conversation between hopeful beekeeper and a real beekeeper (you) leads to a new student.

Make some simple posters. Use a computer so they look professional. These posters can be placed on bulletin boards in post offices, grocery stores, libraries, nurseries, pet food stores – anywhere people go who have an interest in gardening and the outdoors. Perhaps give a notice to the local Master Gardener group, as well as service organizations as Rotary and Lions. Look around you. Find groups, places people shop and gather, bulletin boards, the local café. All these need an attractive poster announcing your beekeeping short course.

Watch out! You may need to find a bigger classroom. Remember – we need all the beekeepers we can get. You can help them get started. BC

Ann Harman organizes and teaches beginner's classes from her home in Flint Hill, VA.

? DO YOU KNOW ?

Master Beekeeper

Clarence **Collison**
Mississippi State University

Inexperienced beekeepers as well as the general public often look to experienced beekeepers as experts in all aspects of the industry. Being able to handle all of these inquiries requires an individual to have a broad working knowledge in many different areas of apiculture, entomology and botany. Beekeepers need to be keen observers and good naturalists or be "in tune with nature." A large part of this knowledge base is derived from personal experiences (learning from your own mistakes). In addition, beekeepers learn from reading a vast assortment of beekeeping literature, by attending beekeeper meetings and short courses as well as sharing experiences and ideas with other beekeepers. One quickly learns that there are many different ways of keeping honey bees. While I am preparing this column, I am also working with a committee of beekeepers in developing the written and laboratory exams for the Master Beekeeper Certification Program sponsored by the Eastern Apicultural Society. In addition, some state organizations also sponsor similar certification programs. The primary purpose of these programs is to identify and certify individuals who have a detailed knowledge of honey bee biology, expertise in the proper practices of beekeeping and can present this information to the beekeeping and non-beekeeping public in a detailed, accurate, clear and authoritative manner. Will you ever be a "Master Beekeeper?"

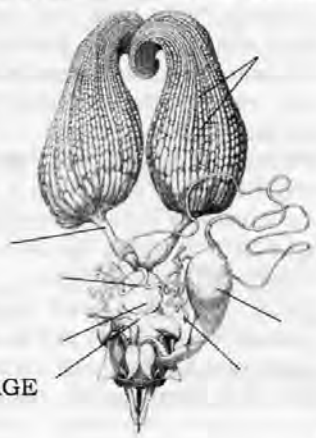
Please take a few minutes and answer the following questions.

Level 1 Beekeeping

1. ____ Finding dead larvae of all ages within a honey bee colony would indicate that the brood was killed by either sacbrood or European foulbrood. (True or False)
2. This is the scientific name of a honey bee. Please indicate what each word composing the name indicates and what kind of honey bee it indicates. (4 points) *Apis mellifera ligustica*
3. ____ An individual has a local rather than an allergic reaction to a bee sting when the reaction remains in the immediate area of the sting, resulting in extensive swelling and itching. (True or False)
4. ____ Fogging a colony with food grade mineral oil is an effective technique for suppressing *Varroa* mites in a colony. (True or False)
5. ____ The queen will begin laying eggs as soon as it is warm enough for the bees to break Winter cluster and they can begin foraging for nectar and pollen. (True or False)
6. ____ Drifting honey bees are more likely to move from strong colonies to weaker colonies and from queenless colonies to queenright colonies. (True or False)
7. ____ Most deterioration of honey during storage can be prevented by maintaining storage temperatures below 50°F (True or False)
8. ____ Foraging honey bees collecting nectar are more effective in achieving pollination than pollen collectors. (True or False)
9. ____ Honey that is slow to granulate results in creamed or finely crystallized honey. (True or False)
10. If under the emergency impulse, the bees construct a queen cell around a 48 hour old larva within a worker cell, the queen will emerge from her cell in ____ days.
    A.16 B.13 C.21 D.11 E.12

Advanced Beekeeping

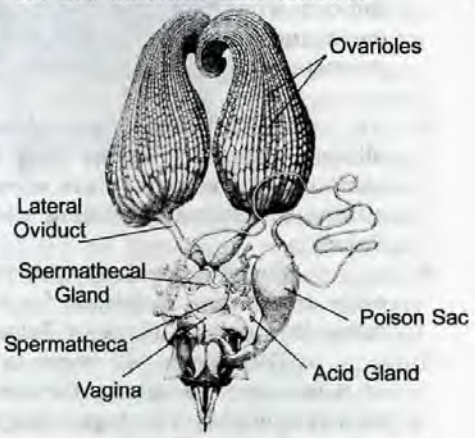
11. ____ Species of Strepsiptera (twisted winged parasites or stylops) are commonly found parasitizing honey bees. (True or False)
12. ____ Both *Varroa* mites and Apistan® Strip treatments cause substantial early mortality in adult drone populations. (True or False)
13. Upon finding a dead colony in the spring, how would you differentiate between a colony that had starved to death and one that had died of other causes and then had the honey robbed out by bees from other colonies. (2 points)
14. Queen honey bees are occasionally closely surrounded, mauled and even stung by their own workers. What is this behavior called and under what conditions will it normally occur? (2 points)
15. Please label the diagram of the queen's reproductive system with the following structures. Ovarioles, Spermatheca, Spermathecal Gland, Poison Sac, Lateral Oviduct, Vagina, and Acid Gland. (7 points)



ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **False** Finding dead larvae of all ages within a honey bee colony would normally indicate chilled brood or possibly death due to pesticides. The primary symptom associated with chilled brood is brood of all ages being killed at the same time. No single brood disease kills equally in the egg, larval or pupal stages.
2. *Apis*= genus; *mellifera*= species; *ligustica*= race or subspecies Italian honey bee
3. **True** Symptoms associated with a localized reaction to a bee sting normally remain in the immediate area of the sting, whereas, sting-induced allergic reactions of the body occur at body locations distant from the sting site. Specific symptoms associated with a localized reaction include immediate pain caused by the sting itself, followed by burning, redness, itching and swelling.
4. **False** Even though numerous claims have been made that fogging a colony with food grade mineral oil is an effective control technique for suppressing *Varroa* mite populations, research has shown that it is ineffective.
5. **False** The honey bee queen begins to lay eggs in the Winter long before the temperatures get warm enough to break the Winter cluster. The queen stays within the cluster and moves with it as it changes position. Colonies that are well supplied with honey and pollen begin to stimulatively feed the queen, and she begins egg laying during late December or early January, even in the northern areas of the United States.
6. **False** Drifting honey bees are more likely to drift from a weak to a strong colony or from a queenless to a queenright colony, than vice versa.
7. **True** Honey stored for long periods above 70°F. will be damaged just as it is with excessive heating. Storage of unheated honey at 50° to 70°F. is inducive to granulation and fermentation. Most deterioration of honey during storage can be prevented by maintaining storage temperatures below 50°.
8. **False** Foragers collecting pollen from flowers are considered to be the most efficient pollinators since they actively work the anthers for pollen. In doing so, more pollen is deposited on their bodies and there is greater chance of making contact with the stigma. In a few crops, honey bees learn how to extract nectar from the flower without contacting the reproductive structures at all. This non-pollinating behavior is quickly learned and once established, the forager is unlikely to deviate from it.
9. **False** When honey is allowed to granulate slowly and naturally, the sugar crystals are coarse and gritty. However, speeding up the granulation process, in addition to seeding the liquid honey with finely crystallized honey, will produce creamed honey with small crystals of uniform size.
10. D) 11
11. **False** Twisted-wing parasites (Strepsiptera, stylops) rarely parasitize honey bees. These unusual parasites are associated with other types of hymenoptera, including bees of the families Andrenidae, Halictidae and Colletidae and wasps of several families, particularly paper wasps of the subfamily Polistinae, are known to serve as hosts.
12. **True** Research has shown that both *Varroa* infestation and Apistan treatments results in substantial early drone mortality. In untreated, mite free colonies, 97.5% of the one-day old drones were alive. In contrast, significantly fewer (86.1%) of the drones that emerged in colonies treated with Apistan were alive. Only 59.7% of the drones emerging in *Varroa*-infested colonies survived their first day of adult life. These trends continued as the drones developed to sexual maturity. Most of the mite infested drones will die before they reach sexual maturity.
13. In a colony that starved to death, one would typically find a cluster of bees in a compact mass with some dead bees head-first inside the cells. If honey is still in the hive, then the bees probably lost contact with it during the cold weather. If no honey remains in the hive, then most likely the colony consumed it all and starved. If the bees died of other causes with honey remaining, robber bees usually start removing unprotected honey when the temperature becomes warm enough for flight. Even if the robber bees were not seen, we can still tell that they removed the honey by examining the empty combs. When robbers uncap the cells, they tend to leave the face of the comb a little ragged or uneven.
14. The mauling and possibly killing of a queen by worker honey bees is called "balling behavior" or "balling the queen." This behavior is normally observed when a colony is disturbed soon after a new queen is introduced to the colony.
15. See diagram that follows:



There were 13 points in each level this month. Check below to determine how you did. If you scored less than six points, do not be discouraged. Keep reading and studying.

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

SEPTEMBER 2005 • ALL THE NEWS THAT FITS

MINNESOTA BEEKEEPERS & DNR SETTLE CLAIMS

Minnesota beekeepers received compensation from the Department of Natural Resources (DNR) for losses incurred from negligent pesticide spraying.

The settlement reached between the Minnesota beekeepers and the DNR includes payment to the Minnesota beekeepers of $335,000 for damages to commercial bee hives caused by pesticides sprayed on trees enrolled in the Federal Conservation Reserve Program (CRP).

The nonmonetary terms of the settlement serve to prevent future harm from the pesticides and educate landowners on the pesticides harmful effects to bees. The settlement states that the DNR will refrain from using the pesticides on CRP trees and must give notice if pesticide use resumes. The DNR also must provide written warnings to private land owners about the potential harmful effects that pesticides used on CRP tress have on commercial bee hives.

In the 1990s, Minnesota beekeepers began to notice high mortality rates and sharp declines in honey production of commercial bee hives that were in range of trees enrolled in the CRP. The CRP trees were sprayed with various pesticides and herbicides. The spraying incidents happened on numerous occasions in several different central Minnesota counties, including Douglas, Pope, Morrison and others.

ALTERNATIVE TO MOVING APIARIES

Australian research has found there may be a worthwhile alternative to moving apiaries further afield in search of forage.

Federal Agriculture Minister Warren Truss launched the publication, Fat Bees-Skinny Bees, at the Victorian Apiarists' Association's annual conference after work by the honey bee industry and the Rural Industries Research and Development Corp.

Beekeepers constantly move their colonies around the countryside to satisfy the bees' nutritional requirements for normal growth and development.

"Bees – like human beings – need a balanced diet to maintain peak health and efficiency," Truss said. "In Australia's variable climate, bees face a significant challenge in gathering the range of foods necessary for the health of their colonies.

"Fat Bees-Skinny Bees, which is a manual on honey bee nutrition for beekeepers, provides information on their known essential requirements, including the components of nectar and pollen.

"It provides practical guidance on preparing and feeding sugar and pollen supplements."

Truss says there is limited knowledge of pollen supplements but it's an area of great interest for those in the industry.

"Sugar syrup feeding is a commonly practised management tool in many countries but, so far, Tasmania is the only Australian state using it," he said.

The new publication provides information for beekeepers to seriously consider providing sugar syrup to bees to help manipulate bee behavior.

"As the costs and returns of beekeeping change, the sugar syrup feeding option may provide a worthwhile alternative to moving apiaries further afield in search of food. – *Alan Harman*

BEE ENVELOPE – SILVER ANNIVERSARY

September 23-25, 2005 will mark the silver anniversary of the issuance of the commemorative honey bee embossed envelope by the U.S. Postal Service in Paris, IL. To celebrate this occasion, the Paris Honey Bee Antique Association is issuing a commemorative cachet envelope in honor of the Killion Family who worked for many years to have the U.S. Postal Service recognize vice to mankind.

The envelopes are priced at $2.00 each and can be ordered from the Paris Honey Bee Antique Association, P.O. Box 1122, Paris, IL 61944. You may have the envelope cancelled by the Paris Honey Bee Station free of charge. Size of the envelopes are #10 called legal size. In ordering, send a self-addressed stamped manila enveloped.

KEEPING *VARROA* OUT OF AUSTRALIA

Australian beekeepers are asking the government for more funding to keep *Varroa* out of Australia.

Australia now is the only major country classified as *Varroa*-free.

South Australian Apiarists Association spokesman Barry Popke said New Zealand's experience had shown the current Australian budget of A$50,000 to protect the industry was not enough.

"At the moment in the South Island of New Zealand they're spending $750,000 a year to try and keep *Varroa* out of the South Island," he told ABC Radio. "Whereas Australia probably only spends A$50,000 to keep it out of Australia," he said. "That's far from adequate, by the time we find any trace of *Varroa*, it will be widespread."

SUGGESTED GUIDELINES FOR THE PACKER/ IMPORTER BOARD

A) Create a U.S. Honey Producers Promotion and Research Board.

1. Made up of a 7 member board from 7 equal producing regions reapportioned every five years.

B) Voting producers must have paid into the board a 5-year average of 100,000 pounds of honey or more.

1. First 5 years use old honey board records.

C) Producers under 100,000 pounds may request refund minus processing fee in the month of February for previous year.

D) An assessment of two cents a pound is to be paid by the producer collected 1st handler. Future increase in assessment is not to exceed 5 cents per pound. Any changes in assessment will be made in ½ cent increments and is not to exceed more than one cent change in one calendar year.

E) All assessments subject to refund minus processing fee if requested in February for previous calendar year.

F) Board members are to be nominated and elected from producers of districts they represent.

1. Elections are to be conducted by FSA county offices.

G) Up to 10% of monies collected each calendar year will be made available for honey bee research in the following year.

If not used, it will roll back into promotion research fund.

Display Advertisers

At War of the Worlds the other night the ticket girl said, "Are you over 55?"

"I am," I replied. "Why?"

"Because you get in for $5, instead of $7.50" she said.

"That's a great deal," I said. "But how do you decide who to ask if they're 55? Some people might get offended."

"I have to ask anybody with white hair," she said.

"But I'm bald," I said.

She eyed me closely, and maybe the hint of a smile crossed her face. "You are bald," she said, "but I can still see some white hair on your head."

The great thing about getting old is that you get wiser, or at least you think you do. I see kids with their whole lives stretched out before them and sometimes muse, "It'd be great to be young again – but only if I knew what I know now!"

The flip side of aging is that you do lose some mental acuity along the way. You walk into rooms and wonder what you're looking for You can't remember names. You lose your train of thought. You laugh about these "senior moments," because you have to.

Last Spring I had three beehives sitting in the back of my flatbed Ford parked next to my beeyard at home. I was going to haul them to Palisade to pollinate some pear trees, but the deal fell through, and I never bothered to unload them off the truck.

I had two beeyards at the time – one at home in Peach Valley and the other on Silt Mesa.

When the fruit trees blossomed in our neighborhood in May, I decided I'd be smart to bring home some of my Silt Mesa bees. I still had those three hives in the back of my truck at home, and I needed to use that truck for the move. I remembered the old "three feet or three miles" rule for moving bees. If you move them more than three feet but less than three miles, they can't find the hive, because they return to the spot where the hive used to be. I didn't want to disorient the little darlings by moving them off the truck six or eight feet to a new hive location, so I decided to drop them off at my Silt Mesa yard and bring back a truckload of different bees. Are you with me?

The bee swap worked fine, and I decided to make a second trip that evening. It wasn't until I returned with the second load, basking in the glow of Mission Accomplished, that I realized that I'd brought home the same three hives I'd hauled to Silt Mesa earlier in the day.

You want to shoot yourself when you do things like this.

Back in January I e-mailed a "Bottom Board" column to *Bee Culture* editor Kim Flottum. It would have been for the March issue, I think. I thought it was an OK column, and I was pretty sure Kim would run it.

When my piece didn't run in March, I wrote to Kim. He replied, "I never got it." Oh, sure. Kim's about my age, I reckon, so I chalked this little slip-up to senioritis. His, not mine. But I understood perfectly.

I re-submitted my column by e-mail the following month. Once again I assumed Kim received it, and once again I was disappointed when it didn't appear in print. I remember thinking that Kim was probably losing it, and in an odd way I felt reassured knowing I wasn't the only one. I promised myself that in the future I'd always make sure he confirmed receipt of my submissions.

It wasn't until sometime in April, I guess, that I sent the piece a third time. As soon as I e-mailed it, I realized that I'd neglected to tack on a little reminder to Kim to confirm receipt. So I sent him a second, separate e-mail. I heard back right away. He said, "What column? I never got one."

Now I picked up the phone. "Kim," I said, "Something weird's going on."

"Well, we do have these filters on our e-mail ," he said, and that was when the light popped on.

I said, "Kim, the column has the word 'Viagra' in it." Your e-mail server thinks I'm a spammer. (Just in case you're not a computer person, a "spammer" is somebody who sends you unsolicited e-mail, and is generally trying to sell you something.)

He laughed and said, "Send it again, only this time put little stars instead of letters after the 'V'"

So I did, and of course this time it went through. My column ran in the July issue. Except somebody at *Bee Culture* neglected to replace the little stars with letters, so it appeared in the magazine as "V*****," instead of "Viagra."

I say "somebody" forgot to change back the spelling. I have no way of knowing who, for sure. But then I have a pretty good idea.

Ed Colby

Over 55

BOTTOM BOARD