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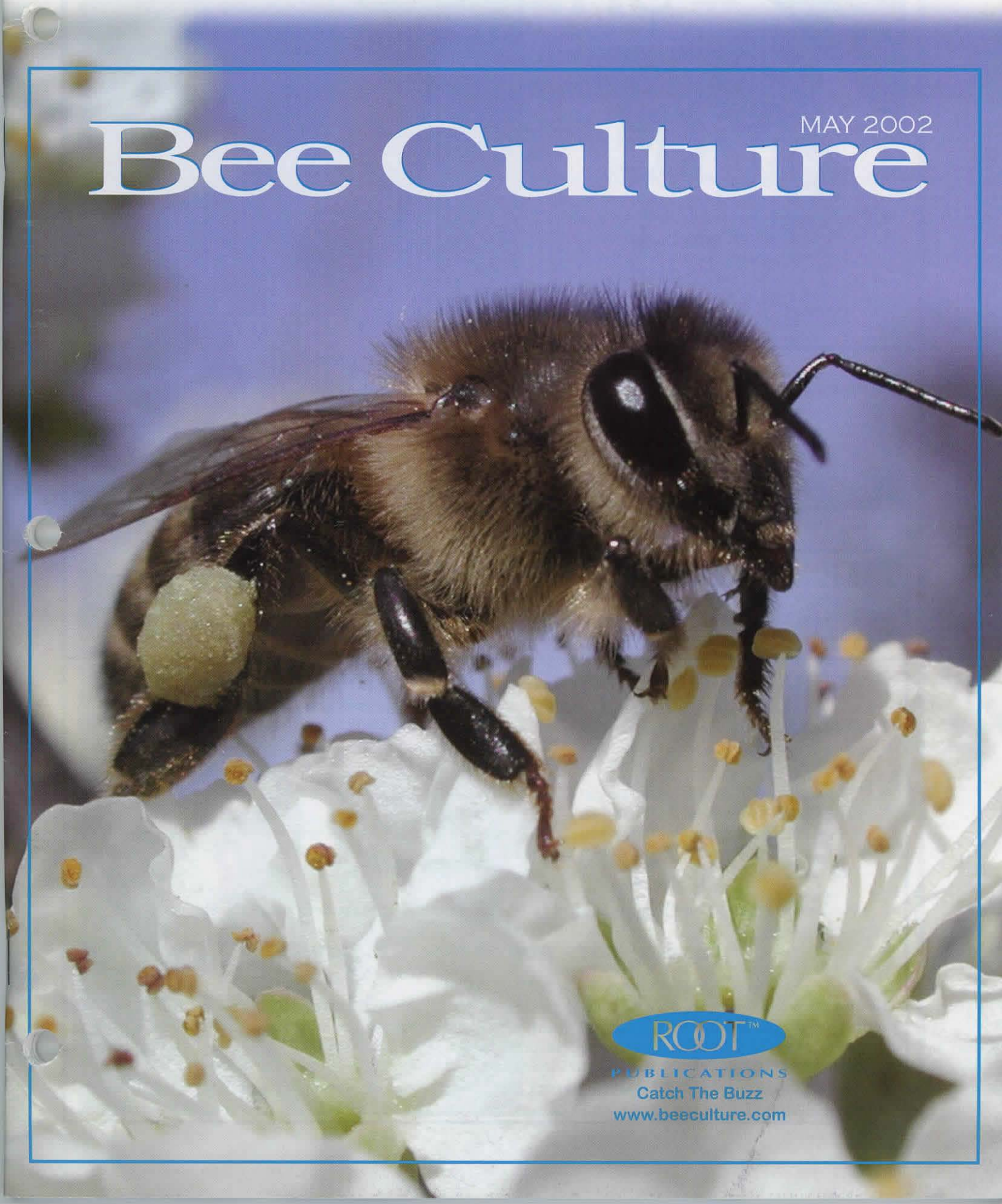

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MAY 2002 VOLUME 130 NUMBER 5

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Subscription Information

U.S., one year, $21.50; two years, $41. Newsstand price: $3.50. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), May 2002, Volume 130, Issue 5, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Advertising

For information on placing display advertisements, contact Dawn Feagan in our Advertising Dept. 800.289.7668. Ext. 3220, Fax 330.725.5624

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

Dave Green has captured the perfect honey bee / flower (plum blossom) relationship. Dave has more of these photos on his web page at www.pollinator.com – The Pollination Home Page.
Dave Green photo

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800.289.7668 • www.BeeCulture.com

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MAILBOX

Painful Beginnings

I read with much interest the *Bee Talk* article by Richard Taylor, as I do all your articles.

This one reminded me of my beginnings as a beekeeper. Those little varmints can get into any void and each sting hurts like the very devil. I have learned to "dress up" and protect myself from them.

When one has a dozen or so inside your face net and crawling down inside your collar, one gets rather animated. Thank what ever providence they only sting once, but that's too much. Running away, down an alley at night, trying to get the net off and slapping at the area where you feel crawling is not a pretty sight – nor feeling. Sort of like Keystone Kops.

I like the forearm length cotton gloves and I wear soft cotton gloves inside of them.

I discovered, by accident an escape from the attack – ya gotta get into the hive, ya gotta do what needs to be done, then get it shut up. No dallying. But now how to get rid of all these pesky critters bent on stinging you. Got sit in your truck cab! (You surely have a vehicle there.) Get in, shut the door and roll the windows down a little. Very soon the bees will fly to the windows and away from you. Seems they feel they are still in a hive – roof and all?

I am an old guy, who enjoys honey and handling bees, when I am properly clothed.

Bill Thompson
Bristow, OK

No More Lifting

Forty some years ago I didn't mind pickup up a hive and setting it in a pickup, but at 82 I gave up that idea long ago. So to keep me going, with a beekeeper friend, who was a welder, we put together a hand truck from scratch with the use of small bicycle wheels and removable front support legs with small wheels in front. We used a small 12V 1-1/2 ton bumper wench with an extended control and a battery set in a box that swivels so it doesn't tip sideways. The wench travels up and down with the two slide arms that move in under the hand bars on the hive. I put two kill switches, one at the top and at the bottom. The cable is a 1/8" 340 pound test. The hand truck folds together for placing into a pickup or storage. I can do everything I need to do at the hive without moving the truck from under. The only thing I pick up now is an empty box. It's nice not to hand carry full supers back to the pump house where I do the extracting. I just push the hand truck. I could have found an old car starter motor and made it into a power drive off the bicycle wheels, but the stands are offset so it is easy to move in from either side. Now I can do everything without finding someone to help me move hives. It's my hired hand.

Rudy Steele
Buckley, WA

Don't Do That!

I have been making, using and selling handmade soaps for several years. I was looking for something else to do with my abundance of beeswax and natural soaps seemed a lovely alternative to candles. Christina Spence's article (March 2002) instructs soap makers to use boiling distilled water. When reading the directions it appears that the soap maker is to pour the lye into the boiling water – DON'T DO THAT!!!! Lye should never be added to hot water, only cold water. The chemical reaction between lye and water is such that it will usually raise the temperature of the water to nearly boiling. I have had very good luck using only tap water (not distilled) but if one has very hard water, bottled, rain or distilled water might be used. Readers should also be warned to use only pure lye (i.e. Red Devil) not drain cleaners like "Drain-o" They contain other chemicals and would be harmful to skin. I admonish readers to wear eye protection and rubber gloves when mixing the lye and water. Also, I have had the best results melting the beeswax with the primary fats instead of adding them at the trace as Ms. Spence suggests. Beeswax not only adds rich emollients, but increases the hardness making a long lasting bar. Unfortunately, too much beeswax makes a bar that will not lather well. I find that 1 oz. beeswax to approximately 1 lb. other fat is a good ratio. In most cases, 1/2-1 oz. beeswax may be added to the base fats in a recipe without changing the lye quantity.

My husband and I keep bees together and often read "The Culture" as we travel sharing interesting articles and always quizzing each other with "Do you know?" Your publication has taught us much – thank you.

Becky Tipton
Meriden, KS

Continued on Next Page

MAILBOX

More Hints

I have just finished making the HONEY soap from scratch recipe, in the March 2002 edition. As I haven't made a vegetable soap before, I could be wrong. But it's VERY dangerous to mix lye into any kind of hot water. Any of the soap recipes I've made always stress the importance of mixing the lye with cold water (which is what I did for your recipe) and never to use any aluminum kettles or utensils, because of the chemical reaction with the lye. Just thought you may want to know this for safety reasons, in case someone who has never made soap tries your recipe. I have to say the soap did turn out a nice color.

Carrie Thurin

The Messenger

I read with interest Glen Gibson's comments on Dr. Mark Winston's column in *Bee Culture*, which was in the Mailbox section of the March issue. I have been observing Mr. Gibson's opinions and involvement with beekeeping issues for many years. I'm also aware that he was a driving force behind the formation of the AHP and more recently, an attempt to form another offshoot organization called the U.S. Beekeepers, or something similar. I know he has been a beekeeping lobbyist for many years, but know little of his actual experience with beekeeping.

Contrary to Mr. Gibson's critique of Dr. Winston's reference to the rather obscure issue of Jeremy Bentham's "Socialisitic" tendencies vs. William Blackstone's "individual rights" emphasis, I derived no such nefarious implication in Dr. Winston's column. What I did see, however, is a reoccurring criticism of Dr. Winston by not only Mr. Gibson, but other admittedly conservative political thinkers/beekeepers who seem to be prompted in part, by an apprehension that socialistic attitudes will automatically result in a loss of individual rights. This fear of loss of rights has always been a "hot button" issue with some American beekeepers, which has probably been heightened since the events of September 11th.

What I disagree with particularly in the criticism of Dr. Winston (I'm not trying to defend him personally, which I'm certain he is quite capable for doing himself) is a tendency to scapegoat the very members of our beekeeping community who are trying to improve conditions for all of us. While we are reviewing political precedents we could also benefit from remembering the extremism of the McCarthy era in the 1950s.

In traveling and associating with beekeepers from around the world, one soon realizes that the U.S. beekeeping industry is unique in respect to a hard-core, individual rights faction that continually challenges a social-consensus approach. Many of our problems could be solved or at least brought to better resolution by promoting a less adversarial approach.

Incidentally, it is highly improbable that we will ever be overrun by "commies" or dictators, since William Blackstone's commentaries on the U.S. Constitution remain as the primary source upon which most constitutional meaning and law are based in this country. Mr. Gibson should be able to take solace in this fact.

Allen Summers
Longmont, CO

Honey In History

Remarks to the *Honey In History* article by Dan McFeeley. I am 87 years young and 77 years a beekeeper and mead maker living in West Virginia. The article needed a lot of time and hard work, so Mr. McFeeley deserves a lot of credit. However, it is misleading and harmful to beekeeping, because there is no such thing as "Toxic Honey" or "Mead Madness" and the rhododendrons bloom in late July after the honey flow.

Frank Androzci
Buckhannon, WV

Response To Shilling

This letter is in regards to Gary Shilling's speech to ABF "The Future of American Beekeeping – Protectionism or Productivity?" Parts of what he said I agree with. We are certainly in a global economy and low cost labor is a major driving force.

Look what has happened in the energy arena. Well over half of our petroleum is imported. This industry has become quite volatile. Do we want to become dependent on imports for the majority of our food? What about health issues? What regulations are in place on pesticide residues or withdrawal of antibiotics in foreign countries? What about regulations on proper handling of meat? Unfortunately most nations except those of the European Union and Japan have very limited regulations on food compared to the U.S.

By the way the European Union nations and Japan all have experienced hunger after WWII. They subsidize farmers heavily because of a fundamental desire to have some level of self sufficiency in food production. Still these countries import a large amount of their food supply but with strict standards.

Another point he made was regarding productivity enhancement. I agree that better yields have been an emphasis of U.S. farmers. However, in my county and state cotton and soybean farmers set yield records on a per acre basis based on preliminary estimates. Rice yields were not a record but were not far off. Yet these same growers who have been highly productive are struggling to survive with commodity prices at 20-30 year lows. A University of Arkansas economist estimated that as many as 40% of Arkansas cotton and rice farmers could go out of business with the current farm bill without additional funds. With record or near record yields USDA government payments account for as much as 35-40% of gross farm income. U.S. farmers as a whole have been on the cutting edge of technology and productivity.

Another point he made was automation. Over 100 U.S. textile mills have gone out of business in the last 12 months. Did you know that these mills went through

MAILBOX

major technological improvements the last 10 years and were highly competitive by dramatically improving productivity while reducing labor costs. These mills spin the cotton and other materials and produce the yarn or fabric. They are highly automated and efficient. Yet due to the high value of the dollar these mills are shutting down. There is great concern that once this infrastructure is gone it will be difficult to revive.

I hope beekeeping can take advantage of productivity gains. Unfortunately, bees are not as simple as hybrid corn or dairy cows. I do know that most Americans don't care if all products we use and consume are produced overseas. Most look simply for the lowest price and if it is readily available for sale.

Steve Culp
Jonesboro, AR

•

Gary Shilling's article "The Future of American Beekeeping Protectionism or Productivity?" (March 2002) fails to make a convincing case for the author's free trade viewpoint. He takes an apples and oranges approach by comparing the steel industry to U.S. agriculture and then stretches the analogy further to beekeeping. He dismisses our successful antidumping effort by pointing out that Argentina's currency devaluation neutralizes their antidumping duties.

He also proposes high-tech productivity enhancements that he believes will be the salvation of the industry.

Finally, it should be pointed out that he passes on misleading data from a U.S. Agricultural Trade Office (USATO) report, namely that an average Saudi Arabian household consumes 1 kg (approx. 2 lbs.) per *month* compared to U.S. household consumption of 4 lbs. per year, however, a Saudi household consists of 48 people, making Saudi per capita consumption 0.55 lb. per year. An "average" U.S. household consists of slightly less than four people, making U.S. per capita honey consumption somewhat over 1 lb. per year.

Joe Rowland
Owego, NY

More From Shilling

In my January 18, A.I. Root lecture at the 2002 Convention of the American Beekeepers Federation (see March 2002 *Bee Culture*), I made the case that American beekeepers should meet competition from imported honey by improving productivity. I argued that the alternative, protectionism, does not work, at least not for long.

To prove that protectionism is a failure, I cited Argentina as Exhibit A. The anti-dumping duties imposed by the International Trade Commission last November on Argentine honey imports were a Pyrrhic victory that lasted only two months, I said. In January, Argentina broke the decade long link of her peso to the dollar, and the currency's subsequent collapse more than offset the U.S. import tariffs.

Does that matter? After all, U.S honey wholesale prices just leaped to $1.00 per pound, in part because Argentine honey isn't entering this country. Furthermore, last year's domestic production totaled 180 million pounds, a 40 million shortfall from recent years. And importers aren't buying Chinese honey with concerns over contamination from pesticides. If a honey shortage is shaping up, who cares about the peso in far away Argentina?

U.S. honey producers should care, and care a lot. Any shortage won't last long. China, desperate to export honey or anything else will clean-up her pesticide problem. American producers will respond to higher prices by increasing output. Any U.S. drought effects on nectar flow this Spring won't last indefinitely. And sooner or later, Argentine honey will flood the American market at perhaps even lower prices than before. Here's why.

Earlier the peso was 1 to 1 to the dollar. So, an exporter selling honey in the U.S., for say $0.50 per pound, could translate that 50 cents into half a peso and use the proceeds to pay the cost of transportation to the U.S., the Argentine packer and honey producer, and any necessary bribes and political contributions while leaving some for his profit.

Then came the ITC-imposed U.S. import tariffs of 33% to 61%. To simplify, let's use the average of 50%. This pushed the price of imported honey from Argentina to $0.75 per pound, pricing it out of the U.S. market.

But, the peso collapsed after the Argentine government broke its links to the dollar. Now the exchange rate is 3.1 pesos per buck (when this was written), or one peso buys $0.32 cents. So, that Argentine exporter, who operates in Argentina in pesos, is now in hog heaven. He can export his honey to the U.S. for $0.16 per pound and get the same 0.5 pesos per pound when he exchanges the dollar proceeds into local currency. Add the 50% anti-dumping tariff and he's now selling to U.S. packers at $0.24 a pound vs. $0.50 earlier. Argentine honey suddenly got 52% cheaper to U.S. buyers. So guess what? When the dust settles and the current business disruptions in Argentina are history, more Argentine honey will come to America at cheaper prices than before the ITC tariffs. That will put more downward pressure on the prices received by U.S. producers.

Looking at it another way, the Argentine exporter can send honey to the U.S. at $0.33 per pound, pay the 50% tariff and still sell to American packers at the old $0.50 a pound. But that $0.33 can be exchanged for 1.02 pesos or more than twice the 0.5 pesos he received earlier. Now, we've heard that as part of the whole restructuring of the financial mess in Argentina, the subsidies to honey exporters – the reason for the ITC tariffs – are being eliminated. Still, that 104% cushion would probably more than offset the negative effects on exporters of the end of subsidies. If they sell at $1.00 per pound in the U.S., the Argentine exporters get a real bonanza, 2.08 peso when they convert back to their own currency even after paying the American

Continued on Page 9

INNER COVER

In spite of a fairly well organized and professionally run national regulatory association overseeing this industry (the AIA), in most states inspection is pretty much a non-issue. I'm not faulting inspectors with this statement. Both beekeepers and growers have lobbied for expansive rights to move bees freely between states, and pretty much got what they needed so bees are where you want them when you want them there. Some states are more regulated, and funded, than others certainly. Some make absolutely no pretense to support a program. It's the way it is. Like many other aspects of day to day life, government has backed away from this.

"The return doesn't justify the cost," is one rationale often used to reduce or eliminate positions and authority. Another, less often-heard-in-public, but more-often cited reason, is that "no matter what we do, they'll break the rules, bend the laws and do pretty much what they want anyway." So it goes.

And, like many other government services, when the money gets tight, the industry is encouraged, or ordered, to have that service become 'industry supported' Except, that is, the interstate movement of bees. Kind of. So far.

Yes, some places still inspect bees before they leave home. Some do it quiet well. Many just don't have the people needed to check all the colonies of all the queen and package producers, and all the trucks leaving tonight. And some get them checked early in the season, and that's that. Sometimes beekeepers have to pay to get the necessary papers, generated from the necessary inspector before they leave...which would be approaching an industry supported program, I guess.

If the system was perfect and in full force, and if beekeepers weren't as casual as they tend to be most of our problems would have stayed in Florida (where they were discovered). But it's not, nor could it have been. And it certainly never will be...or can it? Can our 'industry' support a regulatory replacement? I think maybe it can. Here's my idea.

Growers need honey bees. This has been the driving force for bee movement in this country. And savvy growers, after a few seasons of buying 'cheap bees' usually see the light, if not the crop, and again pay higher prices for better bees. 'Better bees' generally means more bees and brood in those boxes. That's it, just more.

But savvy growers that need bees will, I bet, be willing, no, anxious to pay a bit more for *healthy* bees. Bees that don't crash during bloom, bees that don't swarm during bloom, bees that can fly, bees that don't need medication while they are pollinating, bees that are strong on day one, and even stronger the day they go back on the truck.

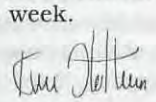
How do growers know these bees are what they want, that they are not only strong, but healthy? An independent 'regulator' (government or private) has said so, that's how. Someone who will give the grower, and the beekeeper a fair assessment of not only the strength but the health of the colonies rented...bees and brood, certainly, but also nosema spore counts, *Varroa* counts, tracheal infestation percent and load, foulbrood checks and all the rest. For a price.

Initially a beekeeper and a grower have a *contract* that determines minimum price – the grower needs bees and the beekeeper needs money – so at the end of bloom the grower has a crop and the beekeeper has a check. This wouldn't change from the way most are handled now – on strength. Frames of brood and bees. By sampling some percent of the colonies, spreading the sample out over all the bees from the producer (not just those from south Texas, but those from Colorado, too), and grading on strength, that *minimum* payment is established. But these concurrent, independent tests for pests and diseases that I suggest will establish if anything is amiss inside those boxes. If not, or if very little is amiss, the beekeeper gets a bonus. That's right, a bonus over and above the payment indicated by the strength. If problems were found, the minimum strength price has already been decided and, although there is no *bonus*, there is no further penalty either. This would probably mean that the highest payment a grower may make won't be made simply on strength. In fact, it shouldn't. The highest payment should be based on not only strength, but health.

This sounds simplistic, and one person experienced in this said it would take significant grower education to get them to pay a bonus over the price established simply for strength. But healthy bees will do better. Healthy bees won't infest neighboring pollinators in an almond orchard or blueberry field. And healthy bees will live to see another day, and probably another year, so can be counted on to return again. And growers will need fewer healthy colonies, so they will, in the long run, save money by paying a bit more for fewer strong, *healthy* colonies.

Yes, strong colonies are probably healthy already. And weak colonies probably have problems that led to not enough bees to do the job. But those simple tests will determine the A+ beekeepers from the regulars, the B and C operations. And isn't that worth a bonus? And, won't it make for healthier colonies all around...at least in the commercial arena? And isn't that where all this started? This year, start planning for a bonus for your healthy colonies next year.Look at your bees, and talk to your growers.

Now, go answer that swarm call. It's only the twenty third this week.



Industry Supported Regulation

MAILBOX

import tariff. That gives them a whopping four times more than the 0.5 peso they received earlier.

There cushions also probably offset any jump in Argentine inflation caused by the currency devaluation. Just as the peso's collapse made Argentine exports cheaper in dollar terms, it made imports from the U.S and other hard currency countries more expensive. A $100 import used to cost 100 pesos, but now requires 310 pesos. This price hike in pesos discourages imports in favor of locally produced goods, and it also increases the cost of things coming from abroad that can't be made internally, adding to over all price inflation. Still, Argentine imports are only 8% of her overall goods and services, so any inflation generated by peso devaluation will be small. Despite the peso's collapse, consumer prices there rose just 3.1% in January.

Once we get below the level of Argentine honey exporters, how will the beekeepers on the pampas fare? Those guys probably never got much of the fruits of their and their bees' labors. Before devaluation, Argentine wages were only 27% of those in the U.S. and many beekeepers there, like here, are probably on the lower end of the income spectrum. Indeed, the March 5, 2002, *New York Times* article on Argentine beekeeping mentions a beekeeper with 1,000 hives who says he had a family income of $12,500 a year before the ITC tariffs, or about 20% of the U.S. average.

Consequently, unless they are unbelievably inefficient, a distinct possibility, or unless middlemen, graft and corruption intervene, Argentine beekeepers earlier were only getting a small fraction of the honey export revenue. Think about it. If American beekeepers could at least break even when wholesale prices were about $0.50 per pound, their Argentine counterparts, with much lower costs, should have been rolling in the clover unless they got the short end of the stick.

They obviously did and it also looks like they were clubbed again by the U.S. import tariffs. The same *New York Times* article, discussing the situation with Oscar Paira, the manager of a big Argentine honey cooperative, said producer's income per pound fell 17% after the anti-dumping action was imposed as middlemen squeezed Argentine beekeepers to offset some of the U.S. tariffs.

Time will only tell how Argentine beekeepers do after the financial crisis there subsides. Still, the peso collapse probably made it possible for them to be restored to their previous financial health and much more. The windfall of devaluation should also prevent any lasting disruptions for the packers who often provide the equipment to the beekeepers in a sort of sharecropper arrangement. Whatever Argentine honey production costs were, they just got 68% cheaper in dollar terms due to devaluation.

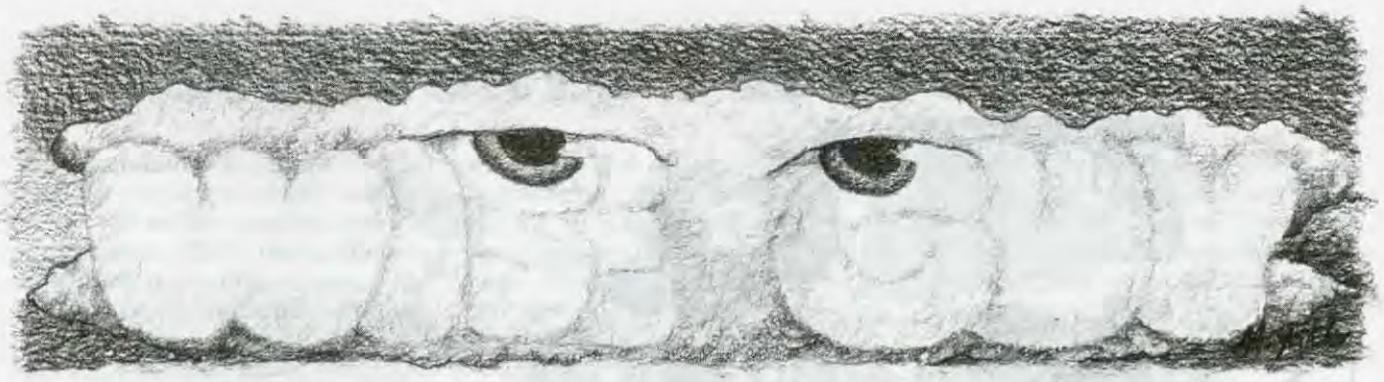
The previous honey subsidies on Argentine honey were probably designed to offset at least part of the peso's over valuation relative to the dollar when it was pegged to the greenback, 1 to 1. Now that the currency peg has turned to sawdust, the resulting much cheaper peso has made Argentine honey exports to the U.S. cheaper than before, even after the ITC-imposed import tariffs.

The ITC also introduced 26% to 184% import tariffs on Chinese honey, but as noted in my ABF Speech, China may also devalue. That is especially likely if the Japanese yen continues to fall, making Chinese goods less competitive than Japanese exports in global markets. A competitive devaluation of the Chinese yuan would offset the effects of a weak yen. The Chinese economy is oriented toward exports, and between a pesticide-free product and devaluation, honey exports will probably overcome U.S. anti-dumping tariffs.

Many American beekeepers looked to anti-dumping import tariffs to elevate them from purgatory to salvation. They may learn the hard way that currency devaluations by major foreign competitors will convert a brief sojourn in honey heaven to a fast ride down the elevator to honey hell. The fact remains that the only way to compete with low labor cost countries is to promote productivity and otherwise reduce costs.

Gary Shilling
President, A.Gary Shilling & Company, Economic Consultants and Investment Advisors

(Mr. Shilling is also a columnist for Forbes Magazine and a hobbyist beekeeper.)



The number of honey packers in the United States has decreased over the past few years and it appears that it will thin down some more. Reasons include low profits, loss of market, inability to update plant (due to low profits or taking too much out of company) and inability to actually sell their company due to above reasons. With this consolidation the remaining packers should grow stronger due to alleged consumption increases and fewer vendors to sell product. I believe this is a cycle that will last. I am not sure how long, but it may last for a lengthy period and to me 10 years is a long period when dealing with food processing.

There are and will be more small honey packers to emerge that fill niche markets that the new large packers can't work with or won't work with due to volume vs. profit, or other reasons. As these small, niche packers expand they will pick the low hanging fruit. They will capture markets that the large packers have taken for granted or are having problems with. Any real battles will come when small packers try to compete with the large packers for a large account. Then, the competitive bidding makes the real loser the beekeepers, and the price of honey goes down.

At least this has been the case for years, but I believe this will change. One change will be Sioux Honey, the producer owned packer that is taking in new producers. They could easily control 60 to 70 million pounds of honey. How will all this affect domestic producers and packers? Commercial producers number about 450 or lower depending upon who you believe, and are losing 10% to 15% each year. In a 10 year cycle this means there would be fewer than 200 left, under normal conditions. But *normal* may be leaving this side of the honey business. Producers are aging and many businesses are for sale. Lending institutions are not willing to finance new ventures in our business, whether family or not. So the only options are auctions or other beekeepers. Either way pasture and equipment ends up in the hands of successful beekeepers. That number will condense to less than 100 beekeepers. With Sioux holding their 50 million pounds, domestic producers holding between 100 and 110 million, there's only 30-50 million pounds of domestic honey left.

Also consider that pollination is financing the majority of these soon-to-be purchases, plus ongoing expenses. The major shift in the producer area will occur when honey production becomes a profit area and pollination income will only cover expenses. The biggest kicker will be when large producers become honey packers. The advantage the large producers have is that they control large blocks of honey, know where they came from and how it was produced. If a producer generated 10 - 20 million pounds of his own honey he could become a moderate sized packer in the future.

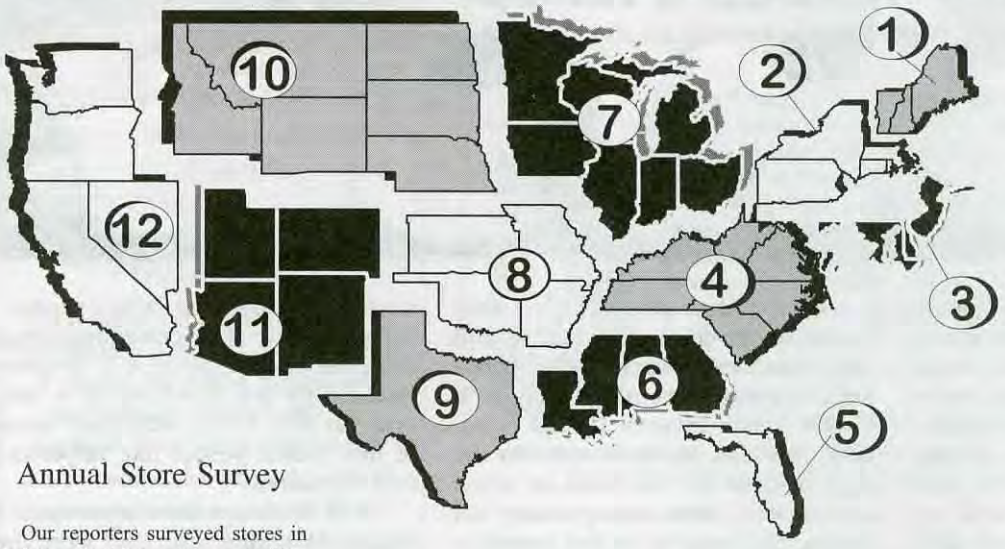
One wild card in all this is the International market for honey. It appears that today Thailand is suddenly producing millions of pounds of honey that, interestingly, resembles Chinese honey. That type of commerce will stop and here's why. We've been told that the world price of honey is the market price here, which is why all honey prices were low in the mid to late 1990s. But instant global communication will surely change the commerce of the world. When people in other countries that produce honey learn that producers in the U.S. are getting 75¢ per pound (while in China the price is 5¢, Argentina, 25¢) business will change fast. When producers worldwide start communicating, then the world price will become realistic for the first time in a long time. In fact, it may eliminate some of the middle people like importers and exporters.

Will there be room for everyone? Ask K-Mart. One time they were the king of retail. Why did they slip? Did they take care of customers? Did they work over their suppliers? Did they treat everyone fairly? Who is next? Is someone in our business going to be the next K-Mart? Will there be room for all the players in the future? That's up to each player. If domestic honey packers continue to use domestic honey as a *secondary* market for their production needs, some will go. If domestic producers don't expand their operations to include pollination services or other profitable side items they will be gone. The change in producers, however, will come quicker because of their worse financial condition, their age, or both.

What does the future hold? The only thing I know for sure about the future is things will change. So if you want to be part of the future, be ready for change.

Wise Guy

MAY – REGIONAL HONEY PRICE REPORT



Annual Store Survey

Our reporters surveyed stores in their area for this month's report. This is the third year for this survey. We asked for total fronts, or rows of honey, how many different brands the stores carried, how many brands were local or regional, how many 'store' brands there were, and of all of these how many had honey from another country as part of the blend.

For total fronts of all honey, the average was 15.6. This compares to 13.5 last year, and 12.7 the year before. Average fronts ranged from a low of 5 in region 3 (low, we suspect) to 26.3 in region 10. Total range was from 4 – 80.

There were, on average 4.7 brands in each store, up just a bit from the 4.6 of last year. However, this gives about 3 rows/brand. The number of brands/store ranged from 1 – 8.

Local/regional brands, on average, were at 2.3/store, or about half the brands available, ranging from 1.3 to 4.3/store. Last year there were 1.7 local/regional brands and 3.8 local/regional brands the year before.

National brands on the shelves, held, on average, 2.1 positions, compared to 2.9 last year and 5.2 the year before. And store brands, those bottled by, usually, large packers/food processors who put anything their customers want in a bottle, average only 1.5 rows – the same as last year.

Brands that contained foreign honey this year averaged 3.5/store, or 74%, way up from 54.3% last year and 41% the year before. This number does not support the notion that 'most' domestic honey is used in retail, and 'most' imported honey is used institutionally.

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Antidumping has changed bulk prices dramatically. Some $1.00/lb. prices for honey in the barrel are reported, along with some multiyear contracts to firm in supply. This, coupled with a short crop in Argentina, no matter what price, and concerns over contamination problems with honey from China have caused bottlers to seek domestic honey which is also short this year.

Wholesale and retail prices are fairly steady across the board this month compared to last month, with pail prices up moderately. Both should be moving up in the next few months as warehouse supplies dwindle and shortages become apparent. All this providing new sources of foreign honey do not become available, no matter the source.

	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																
60# Light (retail)	88.07	80.25	74.00	37.63	81.24	72.50	71.25	73.75	85.00	77.33	86.60	64.00	37.63-88.07	74.30	73.94	70.14
60# Amber (retail)	74.00	72.24	68.00	76.28	78.17	71.50	73.00	63.33	87.50	72.00	85.33	57.00	57.00-87.50	73.20	67.36	68.15
55 gal. Light	0.72	0.75	0.72	0.72	0.75	0.74	0.76	0.72	0.72	0.75	0.78	0.73	0.72-0.78	0.74	0.71	0.63
55 gal. Amber	0.65	0.65	0.71	0.60	0.69	0.71	0.70	0.75	0.71	0.68	0.64	0.65	0.60-0.81	0.69	0.66	0.59
Wholesale - Case Lots																
1/2# 24's	32.62	28.19	31.08	31.97	31.08	27.43	28.77	31.08	30.00	39.96	33.00	26.40	23.00-39.96	28.74	30.19	29.91
1# 24's	49.40	42.19	48.00	45.00	33.40	53.00	40.26	43.92	45.00	50.72	49.50	47.58	33.40-53.00	45.66	44.91	42.65
2# 12's	43.17	37.89	46.80	43.72	40.74	40.00	37.26	41.90	39.00	31.80	45.00	40.39	31.80-46.80	40.64	41.74	39.80
12 oz. Plas. 24's	43.27	36.94	45.60	35.64	39.15	42.00	33.07	36.96	40.00	40.88	37.50	36.52	33.07-45.60	38.96	38.06	36.79
5# 6's	49.09	43.79	57.00	46.25	47.04	45.00	38.49	39.00	42.00	47.04	50.00	35.75	35.75-57.00	45.04	44.74	42.72
Retail Honey Prices																
1/2#	1.90	1.63	2.71	1.92	1.49	1.75	1.51	1.79	2.00	1.50	3.50	1.77	1.49-3.50	1.95	1.88	1.88
12 oz. Plastic	2.71	2.17	2.95	2.21	1.99	2.52	1.90	2.30	2.53	2.30	2.77	2.22	1.90-2.95	2.38	2.46	2.29
1 lb. Glass	3.11	2.45	3.00	2.84	2.10	2.58	2.28	2.82	3.79	3.07	3.47	2.91	2.10-3.79	2.87	2.98	2.85
2 lb. Glass	5.52	4.25	4.80	5.20	3.59	4.23	3.95	4.82	5.00	4.80	5.94	4.64	3.59-5.94	4.73	4.65	4.44
3 lb. Glass	6.13	6.24	7.80	6.69	6.49	6.40	5.24	6.78	7.00	6.58	5.88	5.76	5.24-7.80	6.41	6.32	6.36
4 lb. Glass	10.50	6.69	8.88	9.34	8.88	7.03	7.70	8.24	7.00	8.88	15.00	8.88	6.69-15.00	8.92	8.49	7.94
5 lb. Glass	12.75	9.64	11.00	11.05	8.92	10.00	8.74	10.55	9.00	8.92	7.47	8.25	7.47-12.75	9.69	9.81	10.89
1# Cream	3.71	3.14	4.11	3.33	4.11	3.06	2.78	2.77	5.00	3.46	4.44	3.05	2.77-5.00	3.58	3.63	3.37
1# Comb	4.50	3.80	3.60	4.20	4.93	4.17	4.20	3.92	4.93	4.93	8.00	4.58	3.60-8.00	4.65	4.39	4.36
Round Plastic	4.50	3.18	3.60	4.20	4.34	3.75	3.67	3.99	4.34	5.00	4.83	3.75	3.18-5.00	4.10	4.03	3.82
Wax (Light)	4.51	3.15	2.25	1.65	4.32	3.33	2.65	2.50	4.00	3.00	1.70	2.25	1.65-4.51	2.94	1.58	2.21
Wax (Dark)	3.85	2.36	2.08	1.53	3.83	3.17	1.03	3.83	5.00	3.83	1.42	1.93	1.03-5.00	2.82	1.39	1.86
Poll. Fee/Col.	44.14	41.00	36.00	35.33	30.00	38.50	39.63	40.00	24.00	39.57	45.00	35.67	24.00-45.00	37.40	37.71	39.38

2001 HONEY PRODUCTION

Honey production in 2001 from producers with five or more colonies totaled 186 million pounds, down 16 percent from 2000. Honey production in 2001 was the lowest since 1989, when 181 million pounds was produced with a yield per colony of only 51.2 pounds. There were 2.51 million colonies producing honey in 2001, down 4 percent from 2000. Yield per colony averaged 74.0 pounds, down 10.1 pounds from the 84.1 pounds in 2000. Colonies which produced honey in more than one State were counted in each State and yields per colony may therefore be understated. Colonies were not included if honey was not harvested. Producer honey stocks were 64.8 million pounds on December 15, 2001, down 24 percent from a year earlier Stocks held by producers exclude stocks held under the commodity loan program.

Prices for the 2001 crop averaged 66.9 cents per pound, up 12 percent from 59.7 cents in 2000. Prices are based on retail sales by producers and sales to private processors and cooperatives. State level honey prices reflect the portions of honey sold through retail, co-op and private channels. U.S. honey prices for each color class are derived by weighing quantities sold for each marketing channel at the U.S. level. Honey prices for 2001 were higher than the previous year for all marketing channels and all color classes except 'All Other Honey, Area Specialties'

Looking closer at the data some obvious trends become apparent. The top 10 honey producing states (CA, FL, ID, MI, MN, MT, ND, SD, TX and WI) put 90.6% of the U.S. honey crop in their barrels. The remaining 40 states could only pony up 10%. Of course those top 10 states ran 70% of all U.S. colonies. The next 10 biggest states have only 18%, leaving the rest – 12% of all U.S. colonies, spread out over 30 states. Recall that these honey-production numbers are only for those beekeepers with more than five colonies. Beekeeper distribution is significantly different. The top 10 honey producing states have a total of about 12,000 resident beekeepers*, which amounts to about 12-15% of the total. Carried further, the 12,000 beekeepers in the top 10 states produced, on average about 14,000 pounds of honey each. That's over 20 barrels each. The next 10 states, with the same number of beekeepers produced on average 2,500 pounds of honey each or roughly only four barrels each. Which means the remaining 30 states support about 70-75% of the beekeepers.

2001 USDA Honey Data

State	Honey Producing Colonies 1,000	Yield per Colony Pounds	Production 1,000 Pounds	Stocks Dec 15 2/ 1,000 Pounds	Average Price per Pound 3/ Cents	Value of Production 1,000 Dollars
AL	14	73	1022	235	71	726
AZ	43	59	2537	1142	78	1979
AR	58	98	5655	1872	66	3732
CA	425	65	27625	7735	67	18509
CO	26	55	1430	529	70	1001
FL	220	100	22000	3432	62	13640
GA	55	57	3135	188	70	2195
HI	8	87	696	84	85	592
ID	100	46	4600	1610	66	3036
IL	6	76	456	251	172	784
IN	8	76	608	213	86	523
IA	33	51	1683	875	73	1229
KS	13	51	663	530	85	564
KY	3	78	234	94	131	307
LA	45	106	4770	572	60	2862
ME	11	20	220	106	70	154
MD	4	46	184	55	172	316
MI	76	60	4560	2827	78	3557
MN	135	81	10935	1859	63	6889
MS	17	66	1122	224	60	673
MO	25	61	1525	381	68	1037
MT	136	102	13872	4578	65	9017
NE	43	48	2064	1115	66	1362
NV	11	50	550	44	201	1106
NJ	11	34	374	71	82	307
NM	15	70	1050	525	65	683
NY	53	70	3710	1781	68	2523
NC	11	44	484	145	158	765
ND	280	96	26880	9408	65	17472
OH	16	81	1296	505	85	1102
OK	4	47	188	105	141	265
OR	44	44	1936	1200	69	1336
PA	17	57	969	514	87	843
SD	235	65	15275	12220	64	9776
TN	9	59	531	147	137	727
TX	97	79	7663	1533	64	4904
UT	23	38	874	315	65	568
VT	7	81	567	249	91	516
VA	9	52	468	94	117	548
WA	42	52	2184	917	67	1463
WV	7	65	455	410	155	705
WI	67	81	5427	3419	76	4125
WY	38	77	2926	468	63	1843
Oth Sts 4/ 5/	13	40	523	173	153	799
US 5/	**2,513,000**	**74**	**185,926,000**	**64,750,000**	**66.9**	**$127,060,000**

1/ For producers with 5 or more colonies. Colonies which produced honey in more than one State were counted in each State. 2/ Stocks held by producers. 3/ Prices weighted by sales. 4/ CT, DE, MA, NH, RI and SC not published separately to avoid disclosing data for individual operations. 5/ Total colonies multiplied by total yield may not exactly equal production.

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A Decade's Worth of Data

	91	92	93	94	95	96	97	98	99	2000	01	% Change
Retail Price/lb.	78.9	78.7	81.3	89.1	100.00	115.9	125.7	114.7	126.6	130.4	140.6	+78.2%
Av. Price/lb	55.6	55.0	53.9	64.4	89.4	72.8	65.5	59.9	59.4	59.7	66.9	+20.3%
# Colonies	3181	3030	2876	2770	2648	2564	2579	2633	2688	2620	2513	-21%
U.S. Production	219171	220584	230665	217168	210516	198197	196536	220613	205250	220339	185339	-

Another item to consider is per capita consumption during 2001. Let's look. To calculate, add up all of the plusses – production, stocks remaining from 2000, honey still under loan and imports. Then subtract the minuses – stocks remaining at the end of 2001, (both from domestic producers and importers), and exports. What's left is how much was consumed. Divide that by the population (we used the July 1, 2001 census figures) and you have honey consumed/person (see figures below). for 2001. The number is 1.18 pounds/person.

Per Capita Consumption

Plusses	Pounds
Production	185,926,000
Stocks In	85,328,000
Loans	600,000
Imports	157,001,000
Total	**428,855,000**

Minuses	Pounds
Stocks Left	64,750,000
Exports	14,053,963
Remain Import Stock (10%)	15,700,100
Total	**94,504,063**

Consumption	Pounds
Production	428,855,000
– Removed	94,504,063
= Consumed	334,350,937 lbs.
÷ Population	284,800,000 people (July 1, 2001)
Per Capita =	**1.18 lbs./person**

*Accurate estimates of the number of beekeepers in the U.S. are difficult to come by, but we have numbers we are fairly confident in. We use numbers from bee supply companies (customers/state), state inspectors (registration or their estimates), and our subscriber base. Combining these, analyzing them from both a historical perspective (radical changes either up or down require further digging), and a comparison to current USDA numbers, this year's estimate, using the above analysis, puts our ever-shrinking numbers at between 80,000 to 95,000. We are comfortable saying 90,000 hobby, sideline and commercial beekeepers in the U.S. in 2002

Honey Board Referendum Passes - Barely

In a related story, the 2002 National Honey Board continuing referendum vote was completed in early March. The referendum passed by a 51.47% 48.53% margin (717 yes vs. 676 no votes, 1333 total). From the producers, 676 producers voted yes (50.71%) producing in the last two years, 98 million pounds of honey or 145,000 pounds each; 657 producers voted no, who produced 150 million pounds of honey, or 228,000 pounds each.

The total then, 247 722,087 pounds (for crop years 2000 and 2001) represents (of the 406,265,000 pounds produced in the U.S. in two years) about 61% of the total honey produced. There were 70 votes not counted (46 late and 24 invalid), or 5% of the votes returned.

Importers voted (they pay the 1¢/lb. too). 60 importers voted. Forty-one voted yes, representing 186,000,000 imported pounds, while 19 importers voted no, representing 126,000,000 pounds.

To pass, the continuing referendum needed support from both a majority of the voters, and the honey they produced or imported. The aggregate vote (people) totals were: yes - 51.47%; no 48.53%; yes, honey 50.77%; no, honey 49.23%. This was very, very close.

NHB supporters close to the Board, before the vote, were discussing a variety of changes they thought would improve the Board's performance. These included increasing the limit from 6,000 to 250,000 pounds, rearranging the regions, radically reorganizing the nominations committee, moving the headquarters and other changes. No doubt those who listened have long memories, so change, it would seem, is in the air. The hair-thin margin of victory dictates that there is not significant industry support for the NHB as it is now.

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To identify the issues that have led to this lack of support, especially from the producers, the Honey Board called, in early April, for another industry Round Table to be held in Chicago in mid-May. There was little room for discussion on when, where and who from the Board to the participants, according to one of the invited organizations and the news release announcement.

Invited organizations included the American Beekeeping Federation, American Honey Producers, National Honey Packers & Dealers, Sioux Honey, Western States Honey Packers & Dealers. Each group was offered two members' costs covered – travel, room & board, with each group given a single vote on deciding issues. Each group was given 10 days to identify issues and attendees, regardless of schedules or other conflicts. The time table was set by the Board.

Concurrent with this action is the pending case against AMS regarding the Honey Board and free speech. This will come to court this Summer and all the plans at this meeting may, or may not have a future.

Two key issues brought up previously and mentioned again were the nominations committee and assessment exemption level.

Interested parties and additional members of the invited organizations, along with the press were also invited, but will have no, or very limited opportunity to speak.

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"On the transfer of coumaphos from beeswax into syrup and honey."

From the viewpoint of most beekeepers in the temperate climates of the world, *Varroa destructor* is aptly named. Having successfully made the "host-shift" from Asian *Apis cerana* to the western *Apis mellifera*, this parasitic mite often proved to be fatal to untreated colonies of its new host. Following detection in US honey bees in 1987 the parasite has been reliably controlled through the use of chemical pesticides (known as miticides). However, the need to dispense miticides inside beehives to effectively reach the mite population raises concerns about inadvertent effects on the bees, the potential contamination of hive products and human safety.

In recent years, the documented loss of effectiveness of the pyrethroid miticide, fluvalinate, (Apistan) to control some *Varroa destructor* populations, together with the need to develop a treatment, the small hive beetle (*Aethina tumida*), led to the production and emergency use registration of an organophosphate miticide, coumaphos (Checkmite +). In general, the organophosphate (OP) class of pesticides poses a more serious health concern for humans than do pyrethroids. Consequently, a number of OP's have undergone severe restrictions in use or are being phased out of agricultural applications. While the future of OP's as a class are uncertain, there has been strong industry support to continue the registration of coumaphos as a control measure for fluvalinate-resistant *Varroa destructor* and small hive beetles.

To minimize the amount of coumaphos entering hive products, the current label requires a treatment-free period in beehives prior to the addition of honey supers. Thus, unlike fluvalinate, colonies treated with coumaphos must have the coumaphos strips removed 14 days **prior to** the addition of honey supers. In a recent paper, Kochansky and colleagues (Kochansky et al 2001) examined the nature of coumaphos transfer from beeswax into honey and sugar syrup. Their findings underscore the importance and common sense of following label directions of this product.

The researchers prepared beeswax containing three different concentrations of coumaphos, 10, 100 and 1000 ppm (ppm = parts per million). They then placed 10 grams of the various concentrations of coumaphos-impregnated beeswax into glass flasks to which they added 100 grams of either honey or 2:1 sugar syrup (sucrose:water 2:1 by weight). Flasks were stored in the dark at 93°F (34°C). Five-gram samples were taken 3 times over 20 weeks from the sugar syrup and 11 times over 16 weeks from the honey. The syrup samples were analyzed for coumaphos levels using a technique known as high performance liquid chromatography (HPLC). Due to the presence of pigments in honey that interfered with the HPLC method, honey samples were analyzed using a different system (gas chromatography/mass spectrometry).

The authors found that coumaphos moved out of the wax into sugar syrup "at low but detectable concentrations increasing to an apparent equilibrium after 2-3 months" They found that syrup that was in contact with wax containing 1000 ppm coumaphos reached levels of 200-340 ppb (parts per billion) coumaphos after 19 weeks. Wax with 100 ppm and 10 ppm coumaphos yielded syrup with 20-40 ppb and 8-12 ppb, respectively. These results were similar to those found for honey. Honey sampled from flasks with wax containing 1000 ppm coumaphos contained 300 ppb after 12 weeks and 430 ppb after 26 weeks. Honey from flasks containing beeswax with 100 ppm coumaphos reached 15 ppb after 12 weeks and 37 ppb after 26 weeks. No coumaphos was detected in the honey that contacted the wax contaminated with 10 ppm. Syrup and honey from the control flasks (wax with no added coumaphos) did not exhibit detectable levels of coumaphos.

The research of Kochansky and colleagues demonstrated that coumaphos can enter honey or syrup through transference from wax and that coumaphos concentrations in honey can be readily detected using their techniques. The US Environmental protection agency has a granted a "tolerance" for coumaphos of 100 ppb in honey and 100 ppm in beeswax. A tolerance is a maximum allowable amount of compound that can occur on a raw product when it is used and still be considered safe. Based on these results and other published work, the authors conclude "for any concentration of coumaphos in wax below the tolerance (100 ppm), there will not be a level in honey that exceeds 100 ppb." They go further to suggest that to minimize the potential for contamination, beekeepers should avoid extracting honey from any combs that come into contact with coumaphos, "reserving them only for use in the brood chamber" As long as miticides are required inside beehives, actions of beekeeper in the apiary (as well as the honey house) will make a difference in the quality and purity of hive products. BC

Kochansky, J, K. Wilzer and M. Feldlaufer. 2001. Comparison of the transfer of coumaphos from beeswax into syrup and honey. ***Apidologie*** *32: 119-125.*

Mark Winston

Flavor Of The Month

"I've lived through enough beekeeping emergencies layered with that veneer of impending doom to reserve my panic."

I was talking on the phone the other day to a fifty-something colleague and friend about the latest urgent crisis to hit the Canadian beekeeping community. I don't even remember what the emergency was about. Perhaps it involved political maneuvering among beekeepers who want to import bees from the United States and those who don't. Perhaps there was a concern about a recent government ruling requiring more honey house inspection, or maybe a worry about the latest incidence of a disease or pest resistant to the myriad chemicals we now routinely bathe our hives in.

After chatting about it for a bit, he chuckled and referred to this "crisis" as the "flavor of the month," not belittling its importance but rather recognizing that beekeeping has survived many seemingly fatal problems and will likely survive this one, too. That's one of the few advantages of getting older, perspective, realizing that today's crisis won't turn out nearly as bad as it might seem.

I've lived through enough beekeeping emergencies layered with that veneer of impending doom to reserve my panic. Killer bees, mites, resistant pests, economic downturns, trade wars, and issues about honey purity have all reared their economically disastrous heads during my time in bees, yet somehow our industry has survived the hyperbole of disaster and rhetoric of tragedy that has clothed each of these dilemmas.

My first experience with looming crisis was the killer bee invasion, a subject I had the good fortune to study during my Ph.D. research. The language of doom trumpeting the impending arrival of these horrific insects certainly scared the bee suit off of me. I traveled to South America to begin my work in 1975 with considerable fear of the bees and trepidation that if our mission failed, beekeeping in North America would disappear.

This "crisis" was magnified in my mind after reading the beekeeping press and the public media, each of which depicted the killer bee invasion in the most lurid terms. The mood around the beekeeping community at the time was solemn. Even the most sanguine and level-headed commentators considered africanized bees to be a serious threat. The possibility that beekeeping would be destroyed by these invading pests when they arrived in North America was a commonly voiced concern around industry tables.

The africanized bee turned out to be immensely interesting to study, somewhat difficult to manage, and occasionally feisty beyond any honey bee in our previous North American experience. It did not, however, end life as we know it, either for civilians or beekeepers, and its eventual arrival in Texas in the early 1990's quickly defused the expected disaster. The bees have been an irritation, and there have been a handful of fatalities due to excessive stinging during the last decade, but the bees' impact was quickly downgraded from "crisis" to "manageable nuisance" as they failed to live up to their fiery reputation.

The next bit of doom descended during the 1980's, with the arrival of tracheal and then *Varroa* mites to the United States. Tracheal mites came first, and in the flush of their initial discovery they did induce considerable colony losses. Extensive and disruptive quarantines were slapped into place, first on bee movement between countries and then more locally, but within a short time all attempts to contain these pests were abandoned because of the importance of migratory beekeeping within the United States and package and queen shipments into Canada.

Researchers quickly mobilized, and within a few years a cornucopia of effective management methods was developed. Simple chemical tools including oil patties and menthol brought the mites to heel, and longer-term breeding for resistance has dropped these mites into a benign and manageable category from their initial status as industry-threatening pests. As for killer bees, it is difficult to reconcile the early language of doom with the mites' currently minimal impact.

Varroa was next, and again our industry appeared threatened by imminent demise. These pests have proven more problematic than africanized bees or tracheal mites, and more than any other pest have been responsible for a decrease in colony numbers in both the United

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"What crisis will hit next? If I was a betting guy I'd put my money on honey purity, an industry-wide problem that I predict will erupt into a must-deal-with-now emergency."

States and Canada. Costs have risen, colony wintering losses have increased, and quarantines on bee movement between the United States and Canada and between certain Canadian provinces have remained in place for more than a decade. Still, the realignment of beekeeping to deal with the reality of their presence has stabilized, and we now treat *Varroa* as a fact of beekeeping life rather than as an impending crisis.

The 1990's and the new millennium have seen our pest crises change from new pests to resistant ones. Today, our industry faces antibiotic-resistant American Foul Brood and miticide-resistant *Varroa*, issues which now are engaging the full attention of researchers and beekeepers. The advent of resistance is new to beekeeping but commonly experienced in other agricultural commodities, and it's just a matter of time before beekeepers wake up to the reality that only integrated pest management methods will be successful at keeping pests and diseases below economically damaging thresholds. That future is predictably manageable, as is the gradual shift from crisis to the development of the sustainable management methods that we will see over the next few years.

Industry emergencies in my professional lifetime have not been limited to feisty bees and novel pests. Economic crises have hit beekeeping, as all agriculture, on a regular basis. All commodity groups suffer from occasional downturns in price that drop formerly viable industries below the poverty line, and North American beekeeping was hit by the double whammy of *Varroa* and a precipitous drop in honey prices during the late 1980's. The value of bulk honey dipped down into the forty cent a pound range and below, and only beekeepers with deep pockets and friendly bankers were able to survive.

These were the hardest times in my experience, with a mood of doom that made attending beekeeping meetings a truly painful experience. Whispered tales of bankruptcy pervaded the hallways, and many a beekeeper disappeared from the community to pursue other, more lucrative pastimes. Yet this crisis also passed, and those who survived were rewarded with the highest honey prices ever seen during the mid-1990's, triple what they had been during the honey depression. Today, prices are once again on the rise, and there is a mood of optimism among beekeepers that seemed impossible to imagine a decade ago.

Part of the economic emergency that faced beekeepers during the 1990's involved trade wars, another doom-and-gloom issue that often rears its evil head throughout agriculture. A few years ago it was cheap Chinese honey, then Argentina stepped in with its price-cutting exports to the United States. Once again the rhetoric of emergency heated up the phone lines, with crisis language and emergency meetings leading to intense lobbying for trade barriers to protect American beekeepers from cheap imported honey. And once again the industry survived, emerging from these impending disasters bruised but intact.

What crisis will hit next? If I was a betting guy I'd put my money on honey purity, an industry-wide problem that I predict will erupt into a must-deal-with-now emergency. It could come from miticide residues found after overusing legal miticides and the increasing use of illegal, unregistered products. Or, perhaps a media expose about antibiotic residues in honey will become the next smoking gun. Maybe it will be yet-another corn syrup adulteration case, or a renewed concern about bacterial spores in honey, but dirty honey in some form is likely to follow pest and disease resistance as the second beekeeping crisis of the new millennium.

The outlook awarded by middle age has taught me that no crisis will be fatal, so long as ingenuity and clear-headed leadership are available to respond. A strong research community and adept industry organizations have been the twin pillars keeping beekeeping afloat during the last often-turbulent few decades. We may lurch from crisis to exigency to emergency, but during my lifetime each issue has emerged from the maze of initial confusion into the clarity of workable if imperfect solutions.

If there is a lesson to be learned from this litany of crises it would be that maintaining a strong infrastructure is our best defense against an unpredictable future. Diverse research laboratories staffed by talented scientists, state and national beekeeping organizations led by skillful leaders, forward-thinking extension bureaus linking beekeepers to new information, these are the tools that mediate emergencies and downgrade their impact from hurricanes to storms.

A vibrant beekeeping community is the best protection against change, and we should not forget that our current and future success depends upon the people who serve our industry. Crises are certain, but good leadership is not. Clear-headed and industry-serving helmsmen must be nurtured and developed by each generation

Talented, capable leaders are our best buffer against new challenges and our strongest resource to deal with the never-ending emergencies that have littered our past, typify our present, and inevitably will characterize our future. BC

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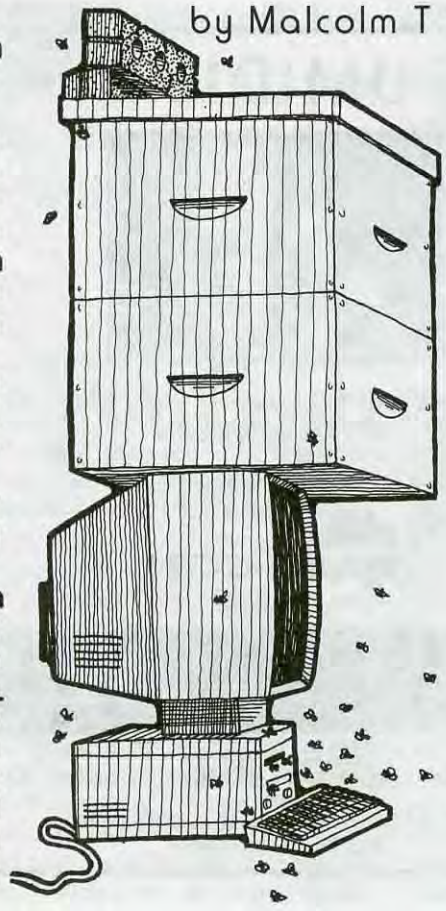
Beekeeping In The Digital Age

by Malcolm T Sanford



Productivity vs. Protectionism

I was interested in the remarks of Dr. A. Gary Shilling made at the 2002 American Beekeeping Federation convention in Savannah, Georgia. The title of his talk as published in the March 2001 *Bee Culture* issue indicated that the future of American beekeeping was either in protectionism or productivity. According to his **February 2002 Insight** newsletter, Dr. Shilling says: "The Future of American Beekeeping – Protectionism or Productivity?: Rapid productivity growth fueled the success of American farming, but not in beekeeping for 127 years. So, the industry is labor intensive and vulnerable to imports from low labor cost lands. Beekeepers have opted for protectionism, but productivity growth is a much better solution." Dr. Shilling makes an admirable case that in the long run, protectionism cannot save beekeeping any more than it can the U.S. steel industry, which employs "a bevy of lawyers and lobbyists." The result of recent lobbying efforts for steel is the following published March 5, 2002: "The **American Iron and Steel Institute** (AISI) today, on behalf of its U.S. member companies, commended President Bush for his decision, under Sections 201/203 of U.S. trade law, to impose tariffs ranging up to 30 percent on certain steel imports for a period of at least three years, noting that this will give the industry a much needed breathing space to begin to recover from the worst crisis in the history of the American steel industry." This decision to place high tariffs on imports of steel, according to ***The Economist*** (March 9, 2002) magazine, is "disgraceful." As Dr. Shilling points out, however, beekeeping will never approach the U.S. Steel industry in political clout.

A **search** of the World Wide Web using Dr. Shilling's name results in numerous references to his expertise on economic issues. Specifically he continues to be associated with the concept of "new" deflation. His **website** contains the following description of his body of work: "His first book, *Is Inflation Ending? Are You Ready?*, was published by McGraw-Hill early in 1983. In 1986, he wrote *The World Has Definitely Changed: New Economic Forces and Their Implications for the Next Decade*, and in early 1988, published the sequel, *After the Crash: Recession or Depression? Investment and Business Strategies for a Deflationary World*. His next book, published in June 1998, was entitled *Deflation: Why it's coming, whether it's good or bad, and how it will affect your investments, business, and personal affairs*, and was subsequently translated in China and Korea. A year later, McGraw-Hill published *Deflation: How to Survive and Thrive in the Coming Wave of Deflation*, which was translated for readers in China. Dr. Shilling is also the creator of *The Deflation Game*, a board game that illustrates and reinforces his long-term forecast that deflation is a greater threat than a return to high inflation."

Dr. Shilling continues to be sought after for his economic advice and is a prolific writer for *Forbes* magazine. One of his latest columns (**February 18, 2002**) advises to "look for the 'good' deflation of excess supply driven by new technology. This was true in the late 1800s, when the Industrial Revolution and railroads created tremendous productivity growth and excess capacity. The U.S. economy grew an extraordinary 4% per year in real terms between 1870 and 1896, as wholesale prices fell 50%. Similarly, the Roaring Twenties were deflationary, as electricity and autos spread. Today's new technology will sire another era of good deflation. But it won't seem that way at first, since deflation is arriving in the midst of recession."

Returning to apiculture, Dr. Shilling says in his *Bee Culture* article the best bet for beekeepers is to increase productivity by employing such things as plastic frames and boxes and pest- and disease-resistant stock. He also is particularly intrigued with "using modern technology" to find out what's going on inside the hive. This includes utilizing computers and allied instruments, which conceivably would reduce labor by avoiding manipulating hives to get basic information about their inner workings. He mentions **Dr. Jerry Bromenshenk's** innovative work with tiny transmitters and other electronics. I reviewed some of these in the **July 1999** edition of this column.

Dr. Shilling says he is not talking about reinventing the wheel, but instead recommends applying today's technology to an industry that has not taken advantage of it. By employing known technology, he concludes, one can create leaps in productivity "achieved by slashing the time needed to produce a pound of honey." He suggests that perhaps beekeeping should emulate the sock industry as 90 percent of socks continue to be made in the U.S. The reason for this is that only 20

percent of cost is labor and many of those people are skilled machine workers. Beekeepers are in fact skilled workers as well, and many producers are reducing reliance on unskilled labor, so this concept may indeed be something worth exploring.

The productivity gains Dr. Shilling refers to may be in the cards for beekeepers, but the focus on producing a pound of honey must also be complemented with others. We are in the digital age and so access to the knowledge arena (information) is also a known technology that beekeepers can employ. This is in fact the essence and razon de d'etre of this column. So I am somewhat surprised that Dr. Shilling did not emphasize more this aspect of increasing productivity. Certainly this area is not necessarily a comforting close-to-the-hive beekeeper-friendly one, but, nevertheless, huge potentially productive gains are possible and should not be overlooked. For example, consider the **American Productivity & Quality Center**. Its maintains a mission of working with people and organizations around the world to improve productivity and quality. A nonprofit organization supported by nearly 500 companies, government organizations, and educational institutions, the Center seeks to:

- discover, research, and understand emerging and effective methods of both individual and organizational improvement;
- broadly disseminate findings through education, advisory, and information services; and
- connect individuals with one another and with the knowledge, resources, and tools they need to successfully manage improvement and change.

Certainly beekeepers could ally themselves with the above Center, but serendipitously an organization already exists that does much of this already. It is one that Dr. Shilling did not specifically mention in his article, but is known to most in the industry, the National Honey Board. A slight majority of beekeepers appears to believe the activities of the Board benefits them. The voting in February 2002 to continue to operate the Board under the Honey Research, Promotion and Consumer Information Act was extremely close with 51.47 percent of those who voted favoring continuance. Those favoring continuance represented 50.77 percent of the voted honey pounds produced and imported. Many in the industry, including myself are surprised at this outcome.

I reviewed the activities of the National Honey Board by describing its innovative website in **June 1999** in this column. Since then it has continued to be an important information (knowledge) resource for both beekeepers and food technologists. One of the newest ideas concerns the honey locator, which I reviewed in the **March 2002** edition of this column. Another is Bee-Mail, The National Honey Board's newly-developed, electronic newsletter that provides up-to-date information on everything from market opportunities to industry data. To subscribe, send an e-mail with your name, company name and address to **honeybuzz@nhb.org**. You'll receive a Yahoo! signup request via e-mail to confirm your membership in the group, followed by regular Bee-mails about twice a month. The latest edition describes 2001 honey **production** and price estimates, **Eastern Apicultural Society** grants and awards, and innovations in **food** processing and **home brewing**. An index of **past issues** of Bee-Mail can also be accessed.

A most exciting activity of the Board is sponsored research that is helping honey become more recognized and positioned as a health food. The **National Honey Board website** links to seven studies that are to be presented at the Institute of Food Technologists annual Meeting, June 15-19, 2002, in Anaheim, CA. According to **one**, "A variety of antimicrobial activity exists within the floral source of the honeys. Tarweed and Montana Buckwheat samples impeded growth of *Listeria monocytogenes* at one-quarter and one-eighth dilutions, respectively, as well as *Lactobacillus*, *Bacillus*, *E. coli* and *Salmonella* at stronger dilutions. However, the Chinese Buckwheat sample was effective against *E. coli* and *Salmonella* only at full-strength. Gram negative bacteria seem to be inhibited by honey's high sugar concentration while Gram positive bacteria appear to require a threshold inhibitory level of antibacterial activity in order to prevent growth."

With respect to mead, another study revealed that fermentation of soy musts resulted in meads ranging from 6-8% alcohol and 15-20% residual sugars while that of buckwheat resulted in meads of 10-11 % alcohol and 2-3 % residual sugars. "The antioxidant capacity of buckwheat mead, while not as high as red wine, was 131 % higher than that of soy mead, which was comparable to white wine and commercial mead. Meads produced from boiled must had 25-34% higher antioxidant capacity than those from gently heated must. Results of this study suggest that mead may contribute similar health benefits as are contributed by wines, due to dietary consumption of antioxidants. Dramatic heat treatments that are often avoided because of their flavor impact in mead production have been demonstrated to enhance antioxidant capacity of mead."

There is also a report on the antioxidant characteristics of honey: "The inhibitory effect of all honeys on *in vitro* lipoprotein oxidation was dose-dependent. The concentration of honey producing 50% inhibition of oxidation, ranged from 0.62 g/L (buckwheat honey) to 3.3 g/L (acacia honey), and were all significantly lower than the concentration of sugar analogue ($p<0.0001$). There was a significant correlation between ORAC values of the honeys and inhibition of lipoprotein oxidation ($R^2=0.665$). Data collected from the human study suggest that consumption of black tea with honey results in a slight increase (10%) of water-soluble plasma antioxidants as measured by ORAC. Lipoprotein oxidation was not altered dramatically by consumption of the different beverages. This research provides primary evidence of the biological potential of honey as a dietary antioxidant, strongly supporting incorporation of honey into the human food supply as a healthy alternative to sugar."

For those with a scientific bent, these are exciting results. However, they are preliminary only and cannot be considered definitive in any sense of the word. Some questions come to mind. Under what circumstances can or should this research continue, and is it what the industry wants or needs?

Given the narrowness of the vote to continue the National Honey Board, CEO Nathan Holleman said, "we

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DIGITAL ... Cont. From Pg. 21

also recognize that this close vote is a clear call for action to get feedback from industry members on how best to meet their needs." This seems a perfect opportunity for the industry to take Dr. Shilling's advice. As he concluded in his article, "It appears that big efficiency gains are possible in beekeeping, but will they prove cost-effective? No one knows now, but I urge the industry to find out." At the present time, the National Honey Board appears to be one of the best possibilities for contributing to this effort within the confines of the digital, information (knowledge) revolution. BC

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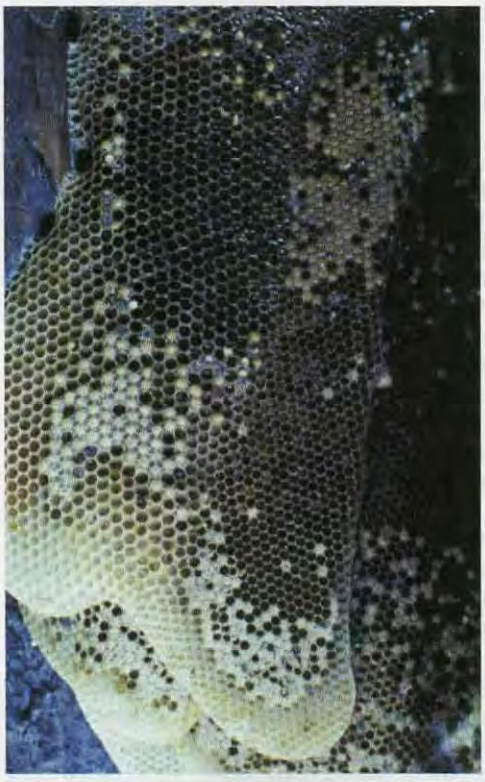

DRONE COMB

Good for bees, but good for beekeepers?

Tom Seeley

"It appears that the annual cost to a colony of rearing and maintaining a crop of drones is some 35-45 pounds of honey."

Modern beekeeping is based on four key inventions from the 1800s: the movable frame hive, the bellows bee smoker, the honey extractor, and comb foundation. The last of these, comb foundation, benefits beekeepers in several ways. It helps ensure that the bees build planar combs, it saves the bees much wax synthesis during comb construction, and it inhibits the bees from rearing drones, by doing away with most of a colony's drone comb. Langstroth (1866, p. 51) stated emphatically this third benefit of using worker comb foundation:

"...the breeding of so many drones should be discouraged. Traps have been invented to destroy them, but it is much better to save the bees the labor and expense of rearing such a host of useless consumers. This can be readily done, when we have control of the comb; for by removing the drone-comb, and supplying in its place with worker-cells, the over production of drones may easily be prevented."

Although it may seem self-evident that reducing the number of drones ("useless consumers") in a colony will result in greater honey production, it would be good to know just how much a beekeeper benefits by removing drone comb from his or her hives. This is especially true now that the mite *Varroa destructor* is a problem. One method for controlling this mite without pesticides involves supplying colonies with drone comb and periodically removing and freezing the drone brood, thereby killing the mites, which parasitize preferentially the drone brood. Clearly, giving colonies drone comb provides benefits in the control of *Varroa* (and, of course, in the production of drones needed for the proper mating of queens). Presumably, however, it also imposes costs in the production of honey. How much is a colony's honey production depressed by giving it drone comb? Until recently, there were just two studies (Allen 1965, Johansson and Johansson 1971) that examined the impact on a colony's honey production of providing it with plentiful drone comb. In both studies, the authors conclude that providing colonies with drone comb, and so increasing their drone populations, does not reduce the capacity of a colony to produce honey. However, both studies have shortcomings, such as the use of imprecise techniques for measuring a colony's honey production and the use of weak colonies that reared rather few drones. Given these problems, I decided to study the matter further and recently I published the results of a three-year investigation of the effect on a colony's honey production of providing it with a natural amount of drone comb (Seeley 2002). I would like to share with you the methods and results of my study.

The general plan of the study was as follows. I compared the weight gains from mid-May to late August of five honey bee colonies occupying hives with drone comb

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"Installing drone comb in your hives to help control Varroa will lower substantially the honey yields of your colonies."

to those of five colonies occupying hives without drone comb. This was done with 10 different colonies in each of three summers: 1998, 1999, and 2000. Because 17 ± 3% (mean ± standard deviation) of the comb area of natural nests of honey bees is devoted to drone comb (Seeley and Morse, 1976), the hives with drone comb were equipped with 20% drone comb, hence a normal supply.

All 10 colonies were located in an apiary in a rural valley a few miles east of Ithaca, New York. Here the colonies were arranged in a line, facing south. Each colony was overwintered in two Langstroth hive bodies each of which contained 10 full-depth frames. In mid April, each colony was given strips of Apistan to kill *Varroa* and was requeened with a marked Buckfast queen purchased from Weaver Apiaries. Also, the frames of each colony's hive were inspected for patches of drone cells; any frame with a patch larger than 10 cm^2 (about 2 sq. inches) was removed and replaced with a frame that contained worker cells only and that matched the removed frame as closely as possible with respect to brood and food. Finally, each colony was randomly assigned (by a coin toss) to one of the two treatments, i.e., with or without drone comb. Colonies receiving drone comb were given four frames of drone comb, by removing four frames of empty worker comb and replacing them with four frames of empty drone comb (comb that had been built on drone comb foundation). The drone combs were positioned in the #3 and #8 frame positions in the two hive bodies thus positioning the drone comb in its natural location, on the edge of the broodnest.

In mid May, hence before any of the major nectar flows in the Ithaca area, each colony was given two more full-depth hive bodies of empty combs, as honey supers. A queen excluder was placed between the lower two hive bodies (brood chamber) and the top two hive bodies (honey supers). This hive configuration (two full-depth hive bodies for brood rearing and two full-depth hive bodies for honey storage) is typical for colonies managed for honey production in the Ithaca area. To keep the percent drone comb at 20% in the colonies with drone comb, I made sure that each of their honey supers contained two frames of drone comb. Finally, I weighed each of the four hive bodies of each colony's hive. This was done by temporarily dismantling each hive and weighing each hive body to the nearest 0.1 kg (about 4 oz.) on platform scales. Thus, for each colony I knew the total weight of its hive (that is, the weight of the hive proper, the bees, and the food stored in the hive) early in the season, before it had produced much, if any, honey.

In late May, I removed the Apistan strips from each hive. Other than this manipulation, I left the colonies undisturbed from mid May to late August. During this period they were free to exploit the various nectar flows in the Ithaca area. The principal nectar sources of this time period are dandelion (*Taraxacum officinale*), black locust (*Robinia pseudoacacia*), raspberry (*Rubus* spp.), sumac (*Rhus* spp.), basswood (*Tilia americana*), white clover (*Trifolium repens*), and purple loosestrife (*Lythrum salicaria*).

In late August, hence after all the major nectar flows except the autumnal ones from goldenrod (*Solidago* spp.) and aster (*Aster* spp.), I reweighed the four hive bodies of each colony's hive. Also, I inspected each frame of worker comb in the lower two hive bodies of each colony's hive to see if the bees had added a patch of drone comb; all frames with a patch of drone cells greater than 10 cm^2 (about 2 sq. inches) were counted. Furthermore, I checked each colony's queen for a paint mark, to see if there had been queen turnover since April. I also replaced each colony's queen excluder with a bee escape board, in preparation for removing the two honey supers, now partially or completely filled with honey. The honey supers were removed several days later, at which time I installed Apistan strips and left the colonies alone to prepare themselves for Winter.

In the third year of the study, I checked whether the colonies with drone comb were indeed rearing and

The apiary in Ithaca, New York where the study was performed.

In the hives supplied with drone comb, two frames of drone comb, marked with red on the top bar, were placed in the #3 and #8 positions in each hive body.

maintaining more drones than those without drone comb. I did so by measuring the rate at which drones departed each colony during 3 warm and sunny afternoons (1 June, 3 July, and 4 August 2000). On each afternoon, from 2:00 to 4:30, I cycled among the 10 colonies, visiting each one every 15 min, and during each visit I counted the number of drones exiting the hive during a one minute period. Thus, on each day and for each colony, I obtained 10 measurements of the rate of drone departure.

When I tallied the results from all three years, I found that the weight gains, between mid May and late August, of colonies with and without drone comb differed markedly: colonies *with* drone comb, 55 ± 35 lb; colonies without drone comb, 107 ± 33 lb. Thus, there was an average difference of 52 lb. of honey. A year-by-year comparison shows the same trend. Each year, the mean weight gain of colonies with drone comb was less than that of colonies without drone comb: 1998, 46 vs. 101 lb; 1999, 38 vs. 108 lb; 2000, 82 vs. 114 lb.

The drone departure rates of colonies with and without drone comb also differed markedly: colonies with drone comb, 55 drones/min; colonies without drone comb, 9 drones/min. This difference was confirmed when I dismantled each hive for the August weighings and made a visual inspection of the drones in each hive. Colonies with drone comb overflowed with drones whereas colonies without drone comb contained noticeably fewer drones.

The mean number of frames of worker comb to which the bees added a patch of drone comb over the summer was much lower for colonies with drone comb (0.6 frames/colony) than for colonies without drone comb (4.6 frames/ colony). There was, however, no difference in the probability of queen turnover between the two types of colonies. Of the 15 colonies *with* drone comb, four had a turnover in their queen, and of the 15 colonies *without* drone comb, 3 had a turnover in their queen.

My results show that the colonies with a natural amount of drone comb produced less honey than the colonies with little or no drone comb. They also reared and maintained more drones and produced fewer patches of drone comb on frames of worker comb.

By giving colonies a natural amount of drone comb, one enables them to invest in a normal way in reproduction through males. Evidently, in honey bee colonies as in many plants and animals, the impact of reproduction on physiological condition—including food reserves—is considerable. It is known that when not deprived of drone comb, a honey bee colony will rear between 5,000 and 15,000 drones per year. The total weight of these drones is 2.5 to 7.5 lb. Assuming a 50% efficiency of converting honey into bees, we can estimate the cost to a colony of rearing this many drones at 5-15 lb of honey. Of course, this estimate of the cost of rearing drones does not take into account the "opportunity cost" of drone rearing, that is, the cost that is incurred when (productive) workers are not reared because (non-productive) drones are reared. This opportunity cost can be estimated at about 10 lb of honey. This follows from noting that in rearing about 10,000 drones a colony forgoes rearing about 30,000 workers (since a drone's weight is about three times that of a worker), that 30,000 workers is 20% of a colony's annual production of some 150,000 workers, that having 20% more workers would likely result in producing 20% more honey, and that 20% of 55 lb (the mean weight gain of colonies with drone comb) is about 10 lb.

What about the cost of maintaining these drones, especially the cost of fueling their mating flights? Assuming that each colony produces 10,000 drones and that each drone lives for 20 days after reaching sexual maturity and makes four mating flights per day, we can calculate that a colony bears the cost of some 800,000 drone mating flights per year. Using published estimates of the energy consumption of a flying drone, I estimate the cost of a single mating flight at about 10.5 mg of honey, which implies that the cost of fueling all 800,000 mating flights is approximately 20 lb of honey.

Thus it appears that the annual cost to a colony of rearing and maintaining a crop of drones is some 35-45 lb of honey (about 5-15 lbs. of rearing cost, 10 lb of opportunity cost, and 20 lb of fueling cost). Notice that this estimated cost to a colony of investing in drones is quite close to the measured cost: some 50 lb of lost honey production.

What are the practical implications of this study? One is that installing drone comb in your hives will result in "cleaner" frames of worker comb, that is frames of worker comb without patches of drone comb. In my hives with drone comb, for example, the bees added drone cells to only 4% (0.6 of 16 frames in the brood chamber) of the frames of worker comb, whereas in my hives without drone comb, the bees added drone cells to fully 23% (4.6 of 20 frames in the brood chamber) of the frames of worker comb.

The second, and more important, implication of this study is that installing drone comb in your hives to help control *Varroa* will lower substantially the honey yields of your colonies. It may be, however, that by regularly removing and freezing the frames of capped drone brood, to kill the *Varroa*, you will greatly reduce the negative consequences of adding drone comb to your hives. Certainly, by steadily killing the drone brood, you will reduce the costs to a colony of fueling the drone's mating flights. But will the steady removal of drone combs filled with capped brood erase fully the negative effect of drone comb on a colony's honey yield? It seems doubtful that it will, for a colony with plentiful drone comb will still experience the rearing and opportunity costs associated with producing thousands of drones, but a conclusive answer to this question awaits further research. BC

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References

Allen, M.D. 1965. *The effect of a plentiful supply of drone comb on colonies of honey bees.* Journal of Apicultural Research. 4:109-119.

Johansson, T.S.K. and M.P. Johansson. 1971. *Effects of drone comb on brood and honey production in honey bee colonies.* Annals of the Entomological Society of America 64:954-956.

Langstroth, L.L. 1866. *A practical treatise on the hive and the honey-bee.* Third edition, Lippincott and Co., Philadelphia.

Seeley, T.D. 2002. *The effect of drone comb on a honey bee colony's production of honey.* Apidologie 33:75-86.

Seeley, T.D. and R.A. Morse. 1976. *The nest of the honey bee (Apis mellifera L.).* Insectes Sociaux 23:495-512.

Honey Display

Ann Harman

Bottles, lighting, height and Good Taste all count.

Exactly what is a Honey Display? It most definitely is different from an Educational Display. Honey Displays are a showcase of honey and perhaps other hive products. The display is supposed to be absolutely magnificent and impressive. Yes, there is some educational value in that the observer may discover that honey comes in many colors but there will be no descriptions or explanations such as those for educational purposes.

State and local agricultural fairs sometimes list Honey Display as a class. Sometimes beekeeping organizations will create one, not for competition, but as a backdrop for their association promotion. Sometimes a bee association may be asked to make a honey display in a shopping mall or other public place. Beekeepers make a small display of their honey as an advertisement.

Honey Displays were really at their best in the 1920s to 1950s. If you have a chance to look through the beekeeping journals of those years, you will see photos of incredible displays, usually for some fair or competitive event. Today individuals do not seem to have the time to create a display involving many, many dozen jars of honey. Frequently we see excellent displays done by associations since a cooperative effort makes the construction easier.

Honey Displays can be any size from small individual ones to huge ones that require several people to assemble and a truck to move it from place to place. Honey Displays can be anything from one-time displays to those that will be used time after time in various places.

Are you or your association thinking of making a display this year? Perhaps we can think about some ways to approach the construction of a good display.

First of all we need to look at the honey container that will be used. The queenline jar and the Gamber Classic were actually designed to display honey at its best. The shape is suggestive of a skep and the thin, side profile is designed to let light pass through the honey so the color can be appreciated. Since this shape comes in various sizes from 8 ounces to 4 pounds it is ideal for a display.

What about plastic queenline style? Yes, they can be very useful if the display will be in a public place where safety is important. The last thing you want is a broken jar with glass and sticky honey on the floor. Plastic is particularly important if the display will not be staffed all the time.

Bears can lend some variety to a display but these should be the completely clear bears, not those that are the translucent polyethylene style. Bears look very attractive wearing the spout caps. Since these come in a large assortment of colors, the use of different colors, perhaps for different honey colors or varieties can be effective.

Many other styles of honey containers exist but they do not have the thin profile of the queenline style. Completely clear plastic cylinders may fit the design of part of your display. The glass antique style and the hex style also may be useful in some cases.

Most displays will not have labels on the honey containers. Labels block the view of honey and generally detract from the overall appearance. If the display is designed as an advertisement, literature can be offered on a table in front of the display.

However, do not combine many different styles of containers. An assortment will make your display difficult to have a cohesive appearance. The display will just end up looking like a jumble of jars.

Draw some sketches of your ideas before you proceed any further. Is the display just a backdrop? Or perhaps a center section with two wings, set at an angle? Are all the pieces of background the same height? Or will the wings be at an angle with the front lower than the junction with the background piece? Will there be towers of honey jars? Or will the jars sit on a shelf or shelves of some sort? Try out different designs and arrangements on paper first. For large elaborate displays a drawing may be necessary to determine materials and costs. Whatever you plan, large or small, do a

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HONEY DISPLAY ... Cont. From Pg. 27

drawing first.

Perhaps the one thing that benefits a good display is lighting. Fluorescent lights come in an assortment of sizes and shapes. The fixtures are lightweight and easily mounted. You need to design the overall display so that it can be lighted from behind, allowing the light to shine through the honey. Lighting from underneath can be very effective also and is suitable for a small tabletop display. The circular fluorescent shape is very useful for lighting the jars from underneath.

For effective lighting some sort of material that diffuses the light needs to be in place between the light source and the honey. One beekeeper uses sheets of butcher paper, certainly an inexpensive approach. Frosted or white glass can be used and is especially useful with lighting from underneath the honey. The jars can be set on the glass surface. Obviously glass will be the most expensive method but may be economical for a permanent display. However glass is heavy and needs to be mounted safely. It would be worth while to investigate various sheets of plastic for both light weight, lower cost, and ease of installation. Do not skimp on the lighting. The effect should be uniform over the entire display.

One layer or tier of jars is suitable for a small tabletop display. However, for anything more than that, height of display is really necessary. Remember, you want the viewer to be impressed. Glass makes wonderful shelves, giving the impression of a tower made of honey. Each glass shelf is supported by the jars underneath and when lighted from behind is truly a beautiful sight. Transparent plastic can be used in place of the glass and is safer for some situations.

Wooden hexagons can be made rather easily on a table saw. Once the angle is set, many hexagon sides can be cut quickly. These hexagons become "honeycomb" but they do not all need to be the same size. You may want these hexagons, stacked up and fastened together, to resemble a honeycomb. Or you may just want to suggest a honeycomb and make the hexagons of different sizes. Different designs can be created using the hexagons. Make some sketches to see what effects are produced by different arrangements.

There is nothing wrong with using empty hive bodies or supers as shelving. Non-beekeepers will not know what they are, but beekeepers will. The boxes can be set on end or side and the arrangement of them is quite flexible. Therefore, these boxes can make a quick temporary display or one that can be adjusted to fit different situations. The boxes can be left natural wood or painted. Butcher paper thumbtacked to the back makes a quick effective light diffuser.

An ideal selection of honey would be different colors ranging from a dark amber to a light amber. In general the honey should be characteristic of the region. However an eye-catching display can be made of a single color. Try different arrangements of colors of honey to find the most dramatic effect.

Creamed honey will not make much of an impact since it is opaque. However it may be necessary for a particular theme of the display. Chunk honey can be very effective if the honey is light in color so that the comb shows through the honey. The best container for chunk honey in a display is the round jar, one pound size. The piece of comb should be the correct size, filling the jar from top to bottom and side to side. Small or narrow pieces floating in the honey do not give a good impression – the piece of comb looks skimpy.

The containers for honey should be washed before being filled. The thin film of mold release will keep the containers from looking sparkling clean. You want to make certain that the jars are filled correctly – the honey level above the bead with no air gap visible between honney and lid. When filling the containers make certain that the jar threads are clean. Any honey on the threads will slowly seep down the sides of the jar. With the lighting, any irregularity will be very visible.

If, for some reason, labels are necessary, they must be straight! All the containers must look absolutely identical. Labels that are not at identical height will be more noticeable than if the honey were sitting on a table or shelf in a market. The backlighting will also show up any bad flaws in the glass containers. Unfortunately today the quality of the glass jars is such that your display jars have to be individually selected.

If you foresee a problem with the stability of glass jars you can purchase something called "museum putty." This comes in an absolutely clear color and is used to hold art objects in place without being visible. It is rather expensive but may be handy in certain circumstances.

One beekeeper's association was asked to place a small display of honey in a shopping mall. The beekeepers were certain some of the jars would be stolen so they created the display using various concoctions instead of honey. Apple cider vinegar, water with food coloring, water with soy sauce and various other combinations of liquids were used. Yes, jars were stolen which were replaced with the missing mixture. The beekeepers thought that those who took the jars got what they deserved. Such a decision is up to you. Some may prefer honey be stolen and enjoyed.

Do your planning and figure your costs. But always keep in mind that the display must cause people to stop and admire and be impressed. Honey is beautiful! Let your display show just how beautiful it is. BC

Ann Harman is a sideline beekeeper and international marketing consultant.

James E. Tew

Bee Culture's Beeyard

Living With Mice and Moving Colonies

House Mice

In relationship to beekeeping, I must have used the "mouse" word thousands of times. In the Fall, we put entrance reducers on our hives to keep mice out. When they get in anyway, people such as I photograph the damage and repair (or destroy) mouse-modified frames. They are a pain for the hive and though I am tender-hearted, I have few qualms about harassing mice at anytime of the year.

However, there is an aspect of mouse intrusion that I have never directly discussed – mice in the honey house. If I were a mouse, I feel that I would love the honey house. There are sweets and protein everywhere. Honey for the carbohydrates, dead bees and pollen for protein and wooden and cloth materials in abundance. Mouse heaven. It is a disgusting subject – in the same category as discussing a case of athlete's foot fungus at a social function. Mice are a way of life everywhere, but many times we just don't want to mention it. I don't.

My lab and storage barn are reasonably clean, but we do frequently find evidence of mouse invasions. I was particularly annoyed a few days ago to stumble into the remains of a small mouse colony that had set up housekeeping in a box of new bee veils and bee suits. What a mess. A few mice had chewed holes in new suits and fouled other suits with their excrement. I put most of the equipment out with the trash.

Some background

I am afraid that this subject could quickly become tiresome, but please let me blow by some of the finer points of the honey house lives of mice. The common house mouse (*Mus musculus*) is ranked as one of the most abundant and economically important rodent pests in this country. Nothing is special about honey houses when compared to countless other mouse nesting sites.

Some mouse facts[1]

House mice are small rodents with relatively large ears and small black eyes. They weigh about 1/2 ounce and usually are light gray. An adult is about 5-1/2 to 7-1/2 inches long, including the 3- to 4-inch tail. Although house mice usually feed on cereal grains, they will eat almost anything. They are sporadic feeders, nibbling bits of food here and there.

Mice have keen senses of hearing, smell, taste and touch. They are excellent climbers and can run up any rough vertical surface. They will run horizontally along wire cables or ropes and can jump 12 inches from the floor onto a flat surface. Mice can squeeze through openings slightly larger than ¼" in diameter. Entrance reducers are designed to close the entrance down to just about a ¼" height.

In a single year, a female may have five to 10 litters of usually five or six young each. Young are born 19 to 21 days after mating, and they reach reproductive maturity in six to 10 weeks. The life span of a mouse is usually nine to 12 months.

How do they get in?

I don't know of any specific mouse-borne bee diseases, but they are nasty enough that we should all do whatever we can to keep them out. Mice come into your honey house or storage facility probably by two main ways: they let themselves in or you bring them in empty supers and other equipment. During warmer months, bees do a great job of rodent control themselves within the hive, but during cold months, mice can run freely while bees must stay clustered. When

[1] From: Controlling House Mice. http://www.ianr.unl.edu/pubs/wildlife/g1105.htm

Baby mice aren't cute, and several generations a year are possible.

Bees have a way of dealing with mice, but in the honey house this control doesn't exist.

you move empty equipment, there is a chance it has the occasional mouse in it. You can do many things to decrease mouse entrance – and these things should be done – but none-the-less, you will still have the occasional mouse make it in.[2]

What to watch for

You've got a mouse infestation when you actually see them, or, when you see their marking – fecal droppings, staining, or chewing damage. If you see a single mouse, that's enough. All the others are somewhere else yet unseen.

What should we do?

We are not the only food handling endeavors that must deal with mice. They can be happy nearly anywhere. We have three options: sanitation, trapping, and rodenticides – probably in that order. Our honey houses and storage facilities should be clean and orderly anyway, but that may be an illusive goal for some of us. Trapping works okay, but must be an on-going process. Poisons are the last weapon in our arsenal. If you feel you must use them, follow label instructions implicitly.

I use traps mainly. When I suspect an outbreak, the traps come out and I make the rounds on a daily basis. This is time consuming and may be seen as barbaric by some, but it is a proven mechanical method of control. Peanut butter is a good bait.

Common sense dictates when to stop the mouse control program – when you stop trapping mice. You should not assume that by catching one, you have controlled the problem. Should you leave poison bait laying about all the time? I suspect it is done, but I would not. I put the poison out and then take it up when I feel the problem has past. In the worst-case situation, contact a professional exterminator.

That's enough

I could go on and on about trap placement, mouse populations, or specific incidences of mouse problems in the honey house, but I sense that I have said enough. We don't have honey house mouse problems any more than other industries have mouse problems, but we do have them occasionally. If you find a mouse in the honey house, apply common control techniques. Be very respectful of poisons and don't talk about your mouse problem too much. And be persistant.

Having written that, now I write that if you have had novel mouse problems in your honey house or in your equipment storage, let me hear from you. You had great suggestions about honey liquefiers in past articles. Maybe you have some special methods for this problem, too.

Moving hives (a short distance)

As I write this for you, my co-worker, Dave, is loading up to go to Alabama to bring back a dozen colonies that were given to us to use in applied research projects. For such a move, Dave will need to take both top and entrance screens, straps, and a few of the annoying hive staples. He will arrange the trip in such an order as to stay on the move once the hives are loaded. He will only make short stops to eat and rest – otherwise he will be rolling. He will be driving an open truck and will probably have a foul attitude toward bees when he gets back home. Moving beehives a long distance is always an adventure and results in stories – both good and bad – to be shared later. But moving beehives a short distance has little in common with moving them a long distance. It's a whole different ballgame.

The bee books say...

To move hives a short distance, move them no more than at least two, but no more than five feet per day thereby giving bees an opportunity to re-orient to the new location. To accomplish the move all at once, move the colonies to a completely new location *at least* a couple of miles away. Allow them sit there for a week or so and bring them back to your new location within the original yard. The lapsed time allows the bees to forget the original location. Most of the time, things are pretty straight forward.

Occasionally, I have read that the entrance of the moved hive should be covered with brush or litter in order to make the bees re-orient. I have not found that to be of much use.

How far will you need to move the hives?

If you are moving the hives more than a few feet, the slow move approach can become tedious. However, if you're not on a tight schedule, move them today a few feet and move them again whenever you can. Just

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[2] For beginning information on mouse control, see http://www.co.st-louis.mo.us/doh/environ/rodents.html

During Winter bees are least committed to their location, thus least likely to drift.

Moving only one of these colonies a few feet will result in significant drifting back to the remaining colonies.

Mechanized moves aren't available to most of us if you make the long move, but they sure make life easier. (Hendrickson photo)

guessing, if you are moving colonies more than....say 20 feet...I would go with the relocation procedure.

What is the season?

Hives occasionally need to be moved at any time of the year. Obviously, moving them during late winter would be best for they will be at their lightest weight then (but even then, they should still be heavy). Additionally, the bees will have made the least commitment to the current hive location. Until this year, I would have boldly said that during winter months, just pick up the dormant hive and put it wherever you want. However, we really didn't have much of a winter this year and the bees have been flying a lot. I suspect I would have serious drifting problems if I did that with my wintering hives this year.

During the summer months, moving the hives will be work – no matter what you do. The hives will be very heavy. The slow move system will still work, but you will probably need to lighten the colony before attempting it.

What other hives are close by?

Are you moving all the colonies or just some of them? Slowly moving one of them, while leaving all the others in their original locations, can cause drifting in some cases as the bees from the moved colony return to the original location and wander into one of the remaining colonies. This will occur frequently during a honey flow. Be prepared to equalize or relocate some of the others to compensate for the confusion of the one being moved.

The relocation move

Simply making position adjustments of a few feet within the yard is no big deal, but what if you are making drastic moves of several colonies? I strongly suggest that you move the colonies completely away from the original yard, and then bring them back in a week or so. This results in no less work, but probably saves time overall.

Having recommended that...

Having boldly made that recommendation, I must tell you a short story. I was given two packages for the yard behind my home. I installed the packages near my house. After about a week, my neighbor voiced concern (for all the published reasons) so I agreed to move them to the opposite back corner of my yard (about one acre). I took the two light colonies out to the BC yard and left them there for just a bit less than two weeks and then returned them to my yard and put them at the new location.

The next morning after the move, I had thousands of bees flying around the original location. All the books, and I, say that one to two weeks is long enough, but I was completely wrong on this one. And here comes the neighbor yet again.....

Do what you must

Moving hives is rarely boring and is always work for either short or long moves, but do what you must. For short moves, relocate them a few feet per day while for longer moves take the hives to a new location (for at least two weeks and three is probably better) and then bring them back to the new location in the old yard. BC

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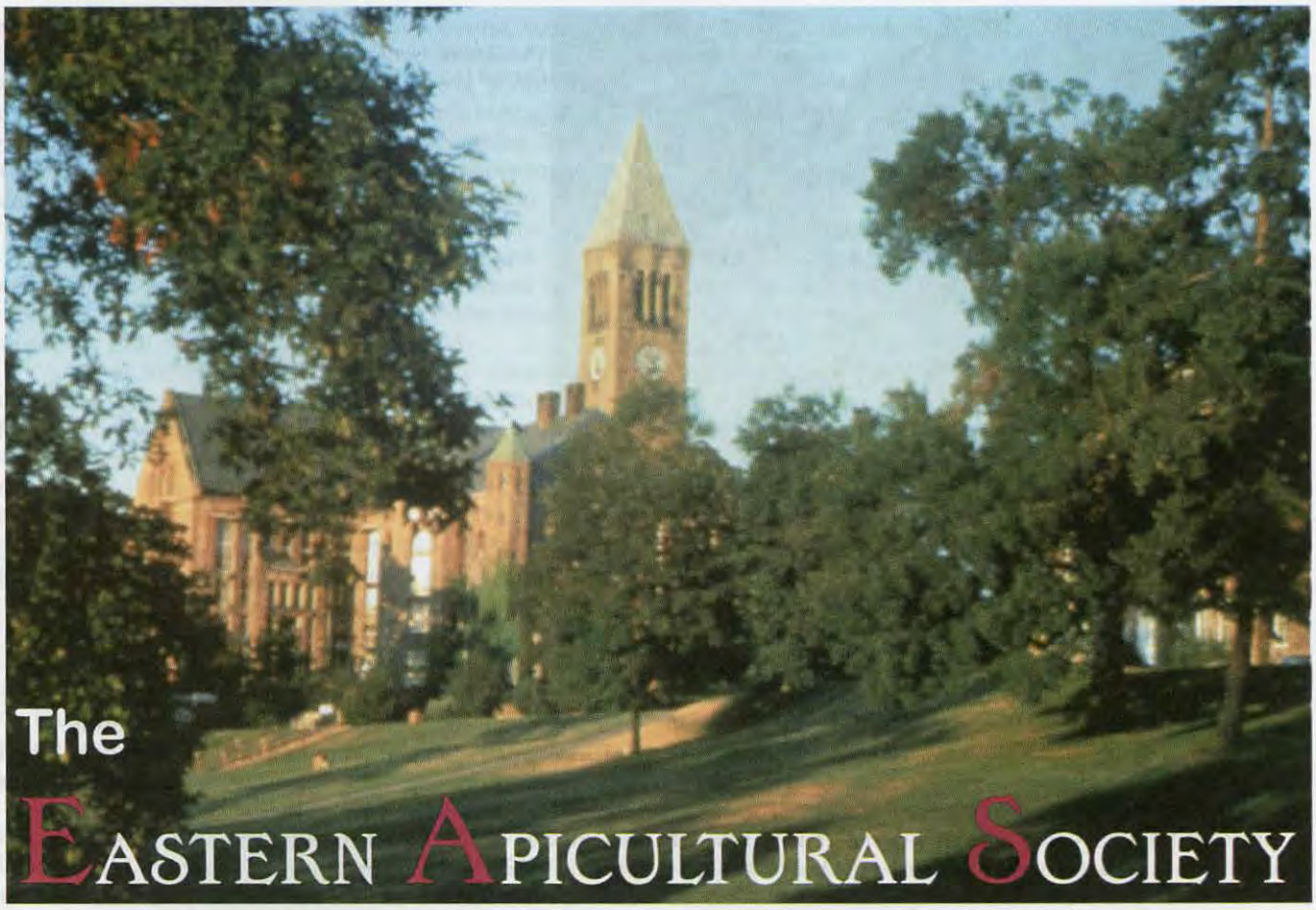

The EASTERN APICULTURAL SOCIETY AND CORNELL UNIVERSITY

Richard Taylor

Come visit my part of the world this Summer at the EAS meeting in August.

Few beekeepers would fail to recognize the initials EAS, and they evoke warm memories in all those who do. I've attended most of the meetings of the Eastern Apicultural Society, including the very first, which I believe was nearly 50 years ago. I have never failed to learn something, in addition to rejoicing in the company of the hundreds of people who shared my passion for beekeeping. If you have never attended these meetings this Summer will be the time to come, and if, like me, you have been to lots of them, then you will need no urging. There's an intensive short course the first part of the week and the regular meeting, in addition to the workshops, complete the week, including an enjoyable barbeque and banquet.

Cornell University, in the heart of the beautiful Finger Lakes region of New York, will host the meetings this Summer, and over 600 people, beekeepers and their families, are expected. I believe the last meeting there was in 1968, and it was memorable.

Outsiders are usually surprised to learn that agriculture is New York's leading industry. Orchard fruit, especially apples, are a huge product, and many beekeepers profit handsomely from pollination fees early in the season. I didn't know this, and was surprised to learn, many years ago, that this state is a primary beekeeping region. A few years later I got the chance to move here and, soon after, I had apiaries in three counties.

Sometimes a beekeeper here can build his colonies up in time to get honey from the fruit bloom, but a better chance comes in May, when the black locust trees bloom. This is quite a sight. The creamy white clusters, somewhat resembling sweet pea blossoms, line the roadsides and the hills, and offer a sweet fragrance. The light honey competes in flavor with the finest honeys in the world. But we are at the mercy of weather, and more often than not this flow is abruptly ended with a rain shower.

The bees then build up to the basswood flow, which starts on the Fourth of July. That is our most reliable

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The Cornell Plantations at Cornell University

honey flow, seldom failing to yield a bumper crop. When, for some reason, it fails, as it did this past Summer, then the honey crop is decidedly short.

Clovers and alfalfas come and go, and there is usually a good flow from the sumacs, which yield a darker and delicious honey, which usually gets mingled in with the other sources. Then, in some areas, the buckwheat, followed finally by the Fall flows from goldenrod and wild aster. These impart a yeasty odor to the apiary, very different from the very unpleasant odor of apiaries in parts of New England and elsewhere at this time of year, which indicates quite different species of goldenrod. The honey is delicious, totally unlike the smell of the nectar. It is one of my favorites. It granulates fast, and is perfect for making cremed honey, always a top seller.

In the northern tier of the state they get abundant flows from the star thistle, often called spotted knapweed. That's a good region for making comb honey, and the late Raymond Churchill, who lived up there, used to take home the prizes for comb honey year after year.

In some parts of the southern tier beekeepers can usually get a crop of buckwheat honey, certainly one of the most distinctive honeys in the world, much sought after by those who are used to it, but regarded with suspicion by others, for it is dark and strong. You don't find it very often in stores, and when you do, it is likely to be mingled with other sources. You'll have a chance to take some home with you.

Ithaca is a good candidate for the title "Mecca of Beekeeping," since there have always been lots of commercial beekeepers living nearby. The Coggshall family, starting in the early 1900s, have passed their beekeeping down through several generations. The founder of this family tradition was among the first to show that you could make a lot of money raising bees. His method was straightforward: he just bought up, at bargain prices, apiaries whose owners had lost interest. He figured that the more bees you have, the more honey you are going to get, quite regardless of what the production per hive happens to be. But he does not seem to have been a very fastidious beekeeper. He shocked Mr. E.R. Root, the oldest son of the great innovator of beekeeping, A.I. Root, by his rough method of harvesting supers. Mr. Root, back in those days, liked bicycling all over the country visiting beekeepers, and those trips included a tour of New York. To some extent Mr. Coggshall's rough and ready methods have persisted among commercial beekeepers here, as I learned when, from time to time, I sold off some of my apiaries. Still, you can find some of the most skilled and knowledgeable beekeepers in the world here, and you will be able to meet some of them at this Summer's meeting.

The buckwheat should be starting to bloom when you come, creating vast snow-white fields. This was once the buckwheat capital of the world, when buckwheat was widely used in chicken feed. Tons of buckwheat honey were shipped out of Ithaca by train. It is far less plentiful now, as the demand for buckwheat has declined, but they still have a buckwheat festival every year up in Penn Yan, not far away.

When you come to Ithaca you'll have a chance to see Cornell University up close. It is unique among the great universities of the world, in combining two quite distinct institutions into one. The college of agriculture, called the statutory colleges, shares the same huge campus with the endowed college of arts and sciences. It thus resembles no other university in the Ivy League, and indeed, no other university in the world. One result is that apicultural research, traditionally pursued in the statutory college, has a place also in the endowed college, although the emphasis is different. In the statutory college the bee research is both scientific and practical. Roger Morse, who directed these programs for so many years, guided a great many students to their doctoral degrees, and many of these have distinguished themselves in universities and research centers far and wide. In the endowed college, Dr. Tom Seeley pursues purely scientific research, with his own separate laboratories.

Dr. Morse, who was always very active in the EAS, was always involved with beekeepers and obviously enjoyed being with them. He knew them all, big and small. All you had to do to get him to speak at a meeting was ask him. He combined a very high level of bee science with the down-to-earth problems of practical beekeeping. I doubt that anyone will ever come along who will know as much about bees as Roger Morse. He was the giant in the industry and his passing marked a great loss.

Dr. Seeley's research is in the realm of pure science. At his youthful age he has become one of the

world's leading ethologists. His monumental book, *The Spirit Of The Hive*, based on his own extensive research and published by Harvard University, is probably the most important contribution to honey bee biology in several generations. But along with his passion for pure science, Dr. Seeley also has a love for beekeeping, tending his own small apiary for honey production. He will be on the program at this EAS conference, and this by itself is a strong reason for being there. He doesn't spend much time giving public talks, but when he does, what he says is always fresh and new. His article elsewhere in this issue speaks to that ideal.

Are you interested in bee books? The library of the statutory college has what I believe is the largest collection of bee literature in the world. Some of its older volumes are almost priceless treasures. I once held in my hands there the most valuable item of bee literature in the world, Langstroth's journal, where he recorded, with crude drawings, his idea of the moveable frame. Some have disputed that this was his invention, and to be sure, predecessors had used moveable frames, but it was Langstroth who combined this idea with his discovery of the bee space, and that was his greatness. There's a tour of the library, and a private viewing (but no touching) of these books scheduled during the meeting, hosted by Dr. Dewey Caron, a graduate of the University who is well versed in the collection.

The Dyce Laboratory for bee research is here, and you'll have a chance to visit it. Dr. Morse was its director from the start, and it is now under the direction of Dr. Nick Calderone. It was named for Dr. Elton Dyce, who developed the Dyce method for making cremed honey, now used throughout the world, both in commercial plants and by back lot beekeepers. The laboratory was established with the proceeds derived from the commercial use of this process.

I cannot think of a setting more suited for a convention of beekeepers, and indeed, so many are expected that overflow is likely to be a problem, although I am told that living accommodations will be plentiful. Mr. Mike Griggs, the dedicated and energetic president of my Finger Lakes beekeeping club, has the unenviable job of pulling everything together, and he is sure to do a good job.

There are, however, additional reasons for making these meetings not just a learning experience for beekeepers, but a holiday for their families, these being the solicitations of the Finger Lakes region itself. People who have come to know Ithaca never want to leave, and I'll say why, next time. BC

The EAS Conference will be held August 5-9, 2002 at Cornell University. For more information contact Mike Griggs, 607.564.0656 or president@easternapiculture.org or visit www.eas2002.cornell.edu

Richard Taylor is a lifelong beekeeper and lives just up the road from Ithaca, NY. He will be at the EAS meeting. Stop by and say hello.

SCREENED BOTTOM BOARDS

Lloyd Spear

I purchased my first beehive in 1967 and since have seen several "new" developments. Some, such as Ross Rounds™ equipment for producing comb honey, have become a permanent part of beekeeping on every level. Others have persisted for a few years and gradually disappeared. In this article, I will outline some of the history of screen bottom boards as well as current applications in the United States and Europe. Finally, I will offer my personal perspectives and opinions on the utility and economy of this "new" tool.

A friend recently sent me the following from a Letter to the Editor column:

"Ventilated Bottom Board. The bottom-board illustrated (a screen was pictured) is the best that I have ever tried. It should be 10 or 12 inches above the ground so the air can pass up through the screen wire. The screen allows the trash to drop through to the ground, while the air passes up to the combs. This does away with swarming to a great extent." This was published in *Gleanings in Bee Culture* in March 1905! So much for the concept being "new".

My personal experience started in 1998, when I purchased several colonies from Ed Lord, a former commercial beekeeper in upstate New York. Now 83, Ed has approximately 150 hives but formerly had more than 500 and supported his family solely by producing honey and pollination. During the 1950's, Ed once had difficulty with bees overheating when being brought back from Florida, and decided to add screen bottom boards to improve ventilation. His custom was to keep the bees in New York State until late January, when he would take them south for splits and early buildup. For the cold months of November-January, he would change from screen bottoms to solid bottoms, believing that the cold drafts would harm the bees. Inevitably, the year came when he didn't get time to change all the bottom boards. He was amazed to find that the clusters on screen boards were as strong or stronger as those on solid boards. Thereafter, he left screens on all year and the hives I purchased all had screens on the bottom.

It was just about then that several prominent researchers in the US, including Jeff Pettis and H. Shiminuki reported that large numbers of *Varroa* mites routinely dropped from the brood nest to the bottom board. They observed that the mites were unable to climb from the bottom board unassisted, but waited for a bee to chance along and hitched a ride. They speculated that *Varroa* populations might be somewhat limited if screens were used in place of bottom boards so that mites would drop to the ground and not be able to regain access to the brood nest.

Pettis and Shiminuki were not the only two to make this observation, and work started (and continues) to provide a definitive manner in which such screens might be used for *Varroa* control. However, most or all researchers have emphasized that such screens can be only one of several means of controlling *Varroa*. In other words, at best destructive population levels of *Varroa* might only be *delayed*, not prevented, by use of screens.

At least two researchers have done controlled studies of *Varroa* populations using hives with solid and screen bottoms. After starting with approximately equal populations of bees and *Varroa*, they measured the *Varroa* populations at intervals throughout the Spring, Summer and Fall. Both found that during the Spring and early Summer the hives with screens had significantly lower populations of *Varroa*, but by late Summer and Fall the *Varroa* populations were approximately equal, regardless of the solid or screen bottom. Moreover, the *Varroa* populations rose to a lethal level in both types of hives. Thus, screen bottoms seem to delay, not prevent, lethal *Varroa* populations. This indicates that screen bottoms might be best used as part of an Integrated Pest Management (IPM) program, and, alone, should not be considered as a substitute for either Apistan™ or Checkmite™.

Are there other benefits of using screen bottoms? Decades before *Varroa*, Ed Lord used them for improved ventilation while moving bees. Those of us participating in the internet discussion group Bee-L (to join send the message SUBSCRIBE BEE-L to Listserv@listserv.albany.edu) have learned of a beekeeper in Holland that started using screens 30+ years ago after being convinced they would improve honey production. Are these claims valid? I don't think there is any question of bottom screens being beneficial when moving bees, but increased honey production?

For decades, progressive beekeepers have promoted high levels of ventilation for increased honey production. Consider the Imirie shims (sold by Brushy Mountain 800-233-7929), the advice to somehow elevate the inner cover during hot weather, and solar powered ventilators sold by BeeCool (www.beecool.com or 1-888-233-5665). All these, and more, claim to significantly increase honey production. If they do (and I believe they do) will not screen bottoms also improve ventilation and therefore increase honey production? During 2001, one researcher set up proper controls and measured honey production with both solid and screen bottoms. He re-

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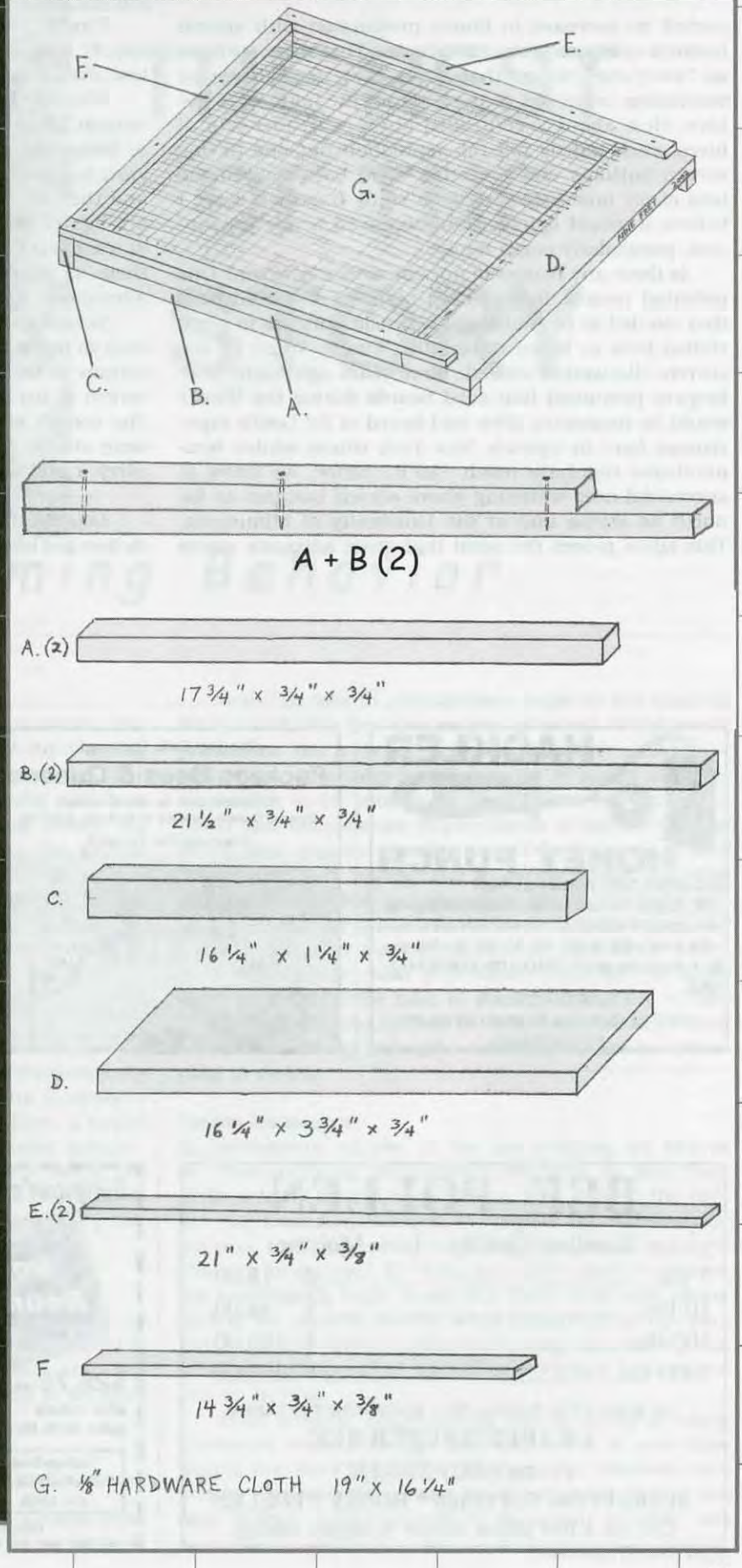
ASSEMBLY INSTRUCTIONS

Use 1" (nominal) scrap or boards to cut pieces according to the dimensions shown. Rip a 3/4" (actual) board to produce the pieces shown as 3/8" Slightly less than 3/8" is acceptable if not preferable. You may prefer to delay cutting part (F) until the other parts are assembled. See item 6, below. *Use outdoor-rated glue everywhere nails or brads are used.*

Use 1/8" hardware cloth for the screen. Generally available locally, but several bee equipment dealers also offer it in their catalogs.

1. Assemble parts, (A) and (B), as shown. Make two sets.
2. Attach part (D), at the end of part (A). It should be approximately flush with the end of part (B).
3. Attach one end of part (C) to the flush ends of the subassembly for parts (A) and (B). Use glue plus two brads, or drill holes and use glue plus two #7 nails.
4. Use glue, and lightly tack the other end of part (C) to the other subassembly of (A) and (D). Measure both diagonals. The measurements should be within 1/4" or less. If not, release the tack and slightly twist the parts to bring the diagonal measurements closer together. Check again. When the measurements are within 1/4" of each other, firmly nail the other end of (C).
5. Measure the space for the wire. The wire need not extend the entire width of part (D), but no harm is done if it does. Cut and *staple* the wire in place.
6. Attach parts (E) and (F). Trim part (F) if necessary. If too short, fill the gap(s) with ordinary bathtub silicone sealant.

The brood nest sits on top of parts (E) and (F). (NOT on top of part (B))! No Winter mouse guard will be necessary due to the restricted entrance. Provide plenty of top ventilation both Summer and Winter.



BOTTOM BOARDS ... Cont. From pg. 37

ported no increase in honey production with screen bottoms compared to solid bottoms. That is no surprise as "everyone" knows that since heat rises the extra ventilation is needed at the top, not the bottom, of the hive. How about a controlled study with two sets of hives, each having full top ventilation but one having screen bottoms and the other solid bottoms? To the best of my knowledge, no such study has been done. I believe it would demonstrate improved honey production, particularly comb honey.

Is there any reason to not use screen bottoms? One potential reason, for northern beekeepers, would be if they needed to be exchanged for solid bottoms to avoid chilled bees or brood during the Winter. When all the current discussion started, three years ago, many beekeepers presumed that solid boards during the Winter would be necessary. (Few had heard of Ed Lord's experiences here in upstate New York where winter temperatures regularly reach –20°F.) Since, we know of successful over wintering above screen bottoms as far north as Maine and at the University of Minnesota. This again proves the point that given adequate stores of honey where it can be reached by the bees, cold is not harmful!

Finally, there is the cost factor. Today, beekeeping supply companies sell screen bottom boards for $2-$3 less than solid boards.

What do I do? I have long had extensive top ventilation on all my hives...Summer and Winter, I have a ½" or better top gap for heated air to escape. All but one yard is now completely converted to screen bottoms, and they are left on year round. Screen bottom boards are lighter and less expensive then solid bottoms and at least one beekeeping supply company is now offering them as an option for beginner's kits. Are there any advantages to solid bottoms? None that I know of.

Screen bottom boards do not need box joints, so are easy to make for anyone with access to a table saw. Be certain to use 1/8" wire mesh for the screen. Window screen is too fine, and bees can get through ¼" mesh. The correct size mesh can be difficult to find at hardware stores, but several beekeeping supply companies carry it and will ship. BC

Lloyd Spear is a sideline beekeeper and owner of Ross Rounds. He lives and keeps his bees in upstate New York.

THE REST OF THE STORY

Swarming Behavior

James E. Tew

Swarming and baseball games

Common discussions of swarming are much like going to a baseball game in the top of the third inning and leaving in the bottom of the seventh inning. The game is well underway, but you are not really sure how it will end. With swarming, a lot goes on before the swarm issues and a lot must go on after the swarm departs. The entire process, taking about four weeks, is superficially confusing and is truly dangerous for the colony. Failure rates are high. But it must be done, for otherwise there is no general population growth in colony numbers.

Swarm management from a management perspective

In previous articles, I have discussed the more obvious aspects of swarming and what the beekeeper should do. To round out my comments here, I would suggest that you have a look at that earlier article[1] Also, the beekeeping literature is filled with honey bee swarm information. A classic publication is *Swarm Control*[2] a USDA publication, unfortunately long out of print. I have put a copy on my web page.

Swarming – the first stages

It's clearly true – swarming is stimulated by cramped brood space. However, if that was the only cause, we as beekeepers could completely stop the swarming behavior. We have not been able to do that, so other factors are involved.

Actually, swarm preparations begin in the dead of Winter with the first production of brood. Were brood production not a factor, a wintering colony could survive on an amazingly small amount of honey stores – maybe five to 10 pounds per year. However the nutritional and temperature requirements of the developing brood nest require massive use of food stores in late Winter and early Spring. The wintering colony probably reaches its smallest population in March in colder climates. Warmer climates should roll that date back to late Winter/early Spring months in their area. Colonies begin spectacular population increases in early Spring – around the time of the first naturally occurring pollen sources. By May to June, most colonies have reached swarming strength – even if they are not planning to swarm.

Timing the swarm

As beekeepers, in awe of our bee charges, we like to see bees as being instinctually infallible. In fact, they make a lot of swarming mistakes. To a degree, the earlier the swarm can leave, the better its chances for success and much improved are the parent colony's chances for survival. Even so, mortality rates for swarms are surprisingly high. From New York data, only about 25% of the swarms survive while about 90% of the parent colonies survive. Clearly, hiving and caring for swarms is an aspect of bee biology in which beekeepers can be helpful.

Most swarms issue during late morning or early afternoon hours, though they can leave at any time during the day. Restrictive weather is a common reason for bee swarms leaving at an odd time during the day. Indeed, longer periods of inclement weather can

Continued on Next Page

[1] Bee Culture, May, 2001. *Swarming, Beekeeping's Friendly Curse.* http://bee.airoot.com/beeculture/months/01may/01may4.html

[2] Swarm Control. 1921. http://www2.oardc.ohio-state.edu/beelab/ (requires Acrobat Reader)

SWARMING ... Cont. From Pg. 39

force colonies to forestall swarming for several days. Beekeepers should be watchful during rainy swarm months. After the rain stops, the swarming will start. In a highly populated beeyard, you could expect a swarming frenzy.

A likely colony for swarming.

Queen cups – sometimes a sign – sometimes

The first real sign that swarming preparations are proceeding is the appearance of new queen cups. Actually, some of these cups are within the colony year-round – probably about 10 to 20. As many as 55 have been reported. Bees are peculiar about these cups. They build them, tear them down; build them but never use them; or build them at the wrong time of the year. However, if we simply accept the confusion of the queen cup issue, it is safe to say that a colony will not swarm before queen production procedures have started. Cups are a sign, but not the only sign.

A "queen cup" becomes a "queen cell" once an egg is placed in the cup. At that point, the prospect of swarming significantly increases. Generally, a colony will finally complete and seal about 15 to 25 queen cells. Interestingly, Mark Winston and others have reported that workers infrequently move either eggs or young larvae to queen cups, but much more commonly queens lay eggs directly into queen cups.

The diverse role of the queen

Colonies commonly swarm at about the time the first cell is capped or about eight to 10 days after queen cell production starts. One of the queen's first responsibilities is to lay eggs in selected queen cups. Who knows why or how she chooses various cups? During this time, the queen is put on a restrictive diet that would make *Weight Watchers* envious for she looses about 30% of her body weight. For comparison, I will use my personal numbers. I weigh roughly 200 pounds (though I am presently on a weight-loss diet and will, no doubt, be much lighter by the time you read this). If I went on the same diet as the queen, I would drop to 140 pounds in just a few weeks.

During this time, in my opinion, the queen seems undecided. She may put *a few* more eggs into cells or she may destroy existing cells. I don't know why. As I reviewed the literature in preparation for writing this article, it seemed that the entire process was random, but I know there must be more to it than that. No doubt, it has something to do with timing the swarm's departure. Apparently, all aspects of the swarm procedure must be in balance. The adult bee population, the amount of brood, the incoming food supplies, the amount of stored food and the weather could all be reasons that a queen, or some of her workers, would decide to destroy what appears to be a perfectly good queen cell.

As the time approaches for the swarm to depart, the queen seems to get ever decreasing amounts of respect. She is bitten, shoved, and otherwise treated roughly by various workers. In general, the hive is in a bit of a tizzy. Finally, all is ready and things become quiet.

Then the call comes. On the selected day, only the bees know that day for sure, bees start a ruckus within the hive. Waves of bees move throughout the colony and queen harassment procedures start again. In general, there is confusion throughout the colony, until the bees boil from the front of the hive. Sometimes the queen goes while at other times she does not. I suppose she gets lost within the crowd. Swarms that leave without the queen are called "false swarms" and return to the colony and will try again.

In flight At approximately the same time that queen cell production was started, workers bees begin to engorge on honey. They are essentially filled and ready to go for about 10 days. On average, non-swarming bees have about 25% of the honey within their honey stomachs as bees that are preparing to swarm. This extra honey, making up about 40% of the bees weight will be used to initiate the new colony. About 60% of the bees within the hive leave with the swarm and a high percentage of them are younger bees.

This is the point where beekeepers come in.

The swarm moves along at about seven miles per hour and alights within a few yards of the hive. The queen flies along within the chaotic cloud of bees and probably determines the temporary landing site of the swarm.

Meanwhile, back at the ranch

Back at the hive, after weeks of preparation, all is loudly silent, but not for long. Depend-

ing on the characteristics of the remaining components of the parent hive, the emergence of the first virgin queen can start the process all over again.

Secondary Swarms (After swarms)

The first and largest swarm to leave with the mated queen is called the primary (or prime) swarm. It has the greatest chance for succeeding. As many as four after swarms may depart. The chances for these small swarms succeeding are low – especially in cold climates. While to beekeepers it may appear that a colony is swarming itself to death, in reality, the number of secondary swarms departing from a colony is correlated with the remaining resources within the parent colony. Everything must stay balanced in this fission-like procedure. Even the emergence of the virgin queens is controlled in order not have all new queens coming out at once.

At some point, again known only to hive members, the swarming events stop and queens begin to emerge, one of which will become the queen of the parent colony. Released queens will "pipe[3]" within the colony, find each other and fight to the death – or near death. If a queen is nearly dead, workers will finish her off by balling around her. Suffocation, stinging, physical mutilation or neglect are probable reasons that a virgin queen finally dies. Some queens, while still confined, will be stung to death within their cell. Seems harsh to me.

After swarms, headed by virgin queens, are much more difficult for a beekeeper to hive. They are skittish and small. However, in warm climates, they can establish themselves and become a productive colony.

It seems confusing

Cups are built and cups are destroyed. Cells are nurtured and cells are destroyed. Queens develop and queens are killed. Swarms leave and swarms return. Small swarms leave that have low chances of success. Workers leave with the swarm but some return to the parent colony. It all seems confusing, but colony reproduction is absolutely critical. Maximum honey crops, from the bees' perspective, are useful only to support more swarming – not to sell at the local farmer's market. It looks like a train wreck to us as beekeepers, but the bees have been doing this for a long time. It must make sense to them.

How can we help?

As we so often do in beekeeping, we take very complicated situations and give them very simple solutions. We are not capable of doing much more than that. Once the swarm has gone, forget swarm control. It's too late.

Replace the swarm queen

After hiving a captured swarm, ***replace the original queen***. You will not be a queen bee murderer. The bees, themselves, have already killed numerous queens to get to this point. It is important to the swarm that it survives – even if the old and faithful queen must die to improve the chances of survival. Since the old queen will have tremendous pressure put upon her to produce a large brood nest and produce it quickly, she frequently fails and must be superseded. This only slows the new colony's development. You can help by jump-starting the swarm colony by providing it with a new queen.

Feed and protect the colony

Provide all that you can – comb, sugar syrup, honey, a hive – to help the colony build up faster. The first Winter is the worst. Mites probably will not be a problem within the new swarm, but check just to be sure. Since a new swarm has no brood to feed, it will take large quantities of feed to build comb and store honey all in preparation for the development of the brood nest. Let them suck it down. Give the new swarm as much space as it needs. One of the reasons the colony swarmed was crowding. Don't start the new colony in a crowded situation.

After swarms

Is the after swarm worth saving or was this just a bad call by the colony? You decide. In some climates, after swarms can be fed and babied and can become productive colonies. Many times, it's a lost cause for both you and the parent colony.

Finally

Some swarming will happen. If it doesn't you are probably doing something wrong that is preventing your colonies from building up. Keep swarming as low as you can in your operation, but help those that do get away. BC

Thanks to:

1. Gould, James L. and Carol Grant Gould. 1988. The Honey Bee. Scientific American Library. New York. 239 pp.
2. Winston, Mark. 1987. The Biology of the Honey Bee. Harvard University Press. Cambridge, MA. 281 pp.
3. Swarm Control. 1921. U.S.D.A., Farmers' Bulletin #1198. 28pp.

Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684, Tew.1@osu.edu

[3] For sounds of a queen piping, go to: *www2.oardc.ohio-state.edu/beelab/sights/Queenpiping.wav Note that this is a large file and will require some download time.*

?DO YOU KNOW?

Honey Bee Senses

Clarence Collison
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The activities of honey bees are regulated by many different factors associated with the environment in which they live and their internal physiology. Bee behavior in its simplest sense would be defined as the automatic reactions of an individual to stimuli found within or in the immediate area of the bee's body. The honey bee is well endowed with senses which are very much like our own. Like other animals, the honey bee has to be in tune with its environment in order to survive. Honey bee senses include vision, touch, taste, smell, hearing and vibration detection, the ability to record the distance to forage, detection of relative humidity and carbon dioxide concentration and to detect the position of its body relative to gravity. These senses are also needed for the coordination of its body functions.

Take a few minutes and answer the following questions to see how well you understand this topic.

The first nine questions are true or false. Place a T in front of the statement if entirely true and F if any part of the statement is incorrect. Each question is worth 1 point unless otherwise indicated.

1. ____ Foragers are able to distinguish between sweet, salty, sour and bitter tastes.
2. ____ The sound produced by a queen known as piping is produced by the hind legs of the queen.
3. ____ As the number of queen cells in a colony increases, the amount of queen piping also increases.
4. ____ Most of the worker honey bees sense organs concerned with tasting food are located on their feet.
5. ____ *Apis mellifera* and *Apis cerana* have similar olfactory sex attractants.
6. ____ The primary means by which honey bees can hear is concerned with the detection of air borne sound waves.
7. ____ Footprint pheromone is more stable (persistent) than Nassanoff pheromone.
8. ____ Virgin queens and drones pay no attention to one another in the hive or near the hive entrance when they are leaving on their mating flight.
9. ____ A flying forager's body temperature is maintained at a higher temperature than its surroundings.

(Multiple Choice Questions, 1 point each)

10. ____ A drone can be attracted from a distance as great as _____ meters downwind by the odor of the sex attractant of a queen on her mating flight.

A. 200
B. 500
C. 20
D. 60
E. 100

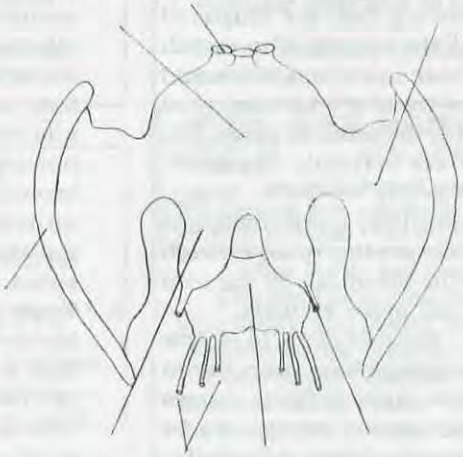
11. ____ Honey bees are able to distinguish between sugar concentrations as small as:

A. 2.5%
B. 5.0%
C. 7.5%
D. 10.0%
E. 12.5%

12. ____ Honey bees are able to sense temperature differences as small as:

A) 3° F.
B) 1.5° F.
C) 0.45° F.
D) 2° F.
E) 1° F.

13. What are the two functions of queen "substance" during a mating flight? (2 points)
14. Name three situations in which odor is used by honey bees. (3 points)
15. Below is a frontal view of the worker honey bee brain. Please label the diagram with the following parts: A. Optic lobe B. Antennal lobe C. Ocellus D. Sub-oesophageal ganglion E. Compound eye F. Protocerebrum G. Duetocerebral lobe H. Labial nerve, maxillary nerve, mandibular nerve (8 points)



Answers on Next Page

?Do You Know? Answers

1. **True** Honey bees are similar to man in that they can distinguish four qualities of taste: sweet, bitter, salty, and sour.
2. **False** A queen pipes by working her wing beating apparatus without spreading her wings. When a wing is folded its mass is brought close to its axis of rotation. The result of this is that the thorax vibrates about twice as fast with the wings folded as it does with the wings spread, so the pitch of the sound produced is higher when the wings are folded than when they are spread. Also when a queen pipes she crouches down and presses her thorax against the comb surface.
3. **True** When young queens are kept in cages in an incubator, some pipe a lot and others do not pipe at all, so the more queen cells a colony has, the more likely it is to have piping queens. If a queen's piping encourages workers to keep her in her cell, the more queen cells a colony has, the more it will be inclined to confine the queens in them. It is known that the sound of queen piping encourages queens to pipe, so an increase in the number of confined queens gives a more than proportionate increase in the amount of piping.
4. **False** In honey bees, most of the sense organs concerned with tasting food are clustered around the mouth. The mouth parts bear numerous hairs and some of these will be concerned only with the sense of touch, but others are certainly important in the sense of taste. Somewhere on these hairs concerned with taste are tiny holes through which the chemicals in the food reach the nerve endings.
5. **True** Ethanol extracts of *Apis cerana* queens have been shown to attract *Apis mellifera* drones and *Apis cerana* drones can be stimulated by the odor of *Apis mellifera* queens. This evidence suggests that both species have similar olfactory sex attractants.
6. **False** Nobody has yet shown that bees respond to sounds when they are flying. On the other hand they do respond to loud airborne sounds when they are standing on a surface large enough to act as a receiving diaphragm, and they are very sensitive to vibrations directly applied to their hive. It is believed that bees perceive vibrations by means of sense organs in their legs. The primary means for hearing is the detection of vibrations of the substrate on which they are standing rather than the detection of air borne sound waves.
7. **True** Nassanoff pheromone is not persistent and seems to operate over a short range only, probably not more than 100 mm and is used to attract bees to a small area temporarily. Worker honey bee footprint pheromone persists for at least four hours at 23°C. and longer at colder temperatures, many times longer than Nassanoff pheromone. Another explanation for the persistence differences is that Nassanoff pheromone is disseminated into the air while footprint pheromone is secreted onto a substrate.
8. **True** Virgin queens and drone honey bees pay no attention to one another either in the hive, or at or near its entrance when leaving on their nuptial flights. This is true in spite of the fact that from the time she is five or six days old, onwards throughout her life, a virgin (or mated) queen has 9-O-2, her olfactory sex attractant, on the surface of her body, and is therefore, continuously releasing it into the atmosphere. Drones are not attracted to her until she leaves the hive and reaches a minimum height above the ground which varies with the speed of the wind.
9. **True** A flying honey bee is burning fuel at such a high rate that a lot of heat is generated by the thoracic flight muscles. This is used by the bee to warm itself up before flight. The excess heat produced during flight is gotten rid of by the bee's movement through the air and by the pumping action of the muscles on the air-filled tracheae which penetrates the muscle fibers. Even so, a flying bee is up to 10° C. hotter than its surroundings.
10. D) 60
11. B) 5.0%
12. C) 0.45° F.
13. Serves as an olfactory sex attractant stimulating a distant drone to turn upwind and fly towards her.

When a drone closely approaches a queen, queen substance acts as an aphrodisiac stimulating the drone to mount her, when the sting chamber is open.

14. Differentiate between floral sources

Long range attraction of drones to a queen on her mating flight

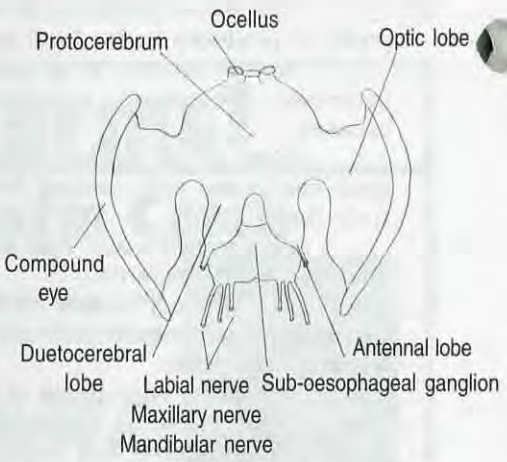
Recognition of intruders by guard bees

Recognition of a colonies queen

Recognition of the various pheromones

Recognition of the presence of smoke

15. See diagram below.



There were a possible 25 points in the test this month. Check the table below to determine how well you did. If you scored less than 12 points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of Points Correct
25-18 Excellent
17-15 Good
14-12 Fair

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Suppressing Mite Reproduction

SMR

An Update

John R. Harbo & Jeffrey W. Harris

Breeding honey bees for resistance to *Varroa* (*Varroa destructor*) has been a goal since *Varroa* began to move into the worldwide population of honey bees. At times this goal seemed unreachable. However, we now know that resistance to *Varroa* does exist in honey bees, and it seems to exist in more than one form.

This article describes one mechanism of resistance that we have studied for the past seven years. It is a trait of the honey bee that suppresses the reproduction of *Varroa* mites. We call it the SMR trait. The gene or genes affecting this trait are probably present in populations of honey bees all over the world, and we used traditional breeding methods to increase the frequency of these genes in our local bees. We will describe the SMR trait and explain how bee breeders and beekeepers may benefit from having this trait in their bees.

Beginning the breeding program

Our goal was to produce honey bees that are genetically resistant to *Varroa*, and we defined mite resistance in honey bees as a slower growth or a decline of the mite population in a colony. Therefore, we began by developing ways to measure mite populations. We also measured four characteristics of honey bees that other researchers had linked to mite resistance. These were hygienic behavior (bees uncap dead or diseased brood cells and remove the contents), grooming behavior (bees bite and remove mites that are free-living on adult bees), duration of the capped period of worker brood (mites have less time to reproduce), and nonreproducing mites (mites enter the brood cell but do not produce progeny). This early work was designed to show which if any of these four characteristics were related with the growth of mite populations in our bees.

In our test group of about 60 colonies (test queens from the USA, mostly from Louisiana), nonreproducing mites was the only characteristic that correlated with the number of mites in the colony at the end of the test. To estimate the level of nonreproducing mites in a colony, we examined at least 20 mite-infested cells that contain worker bees at the pupal stage (purple eyed or older). For example, a colony estimate of 80% nonreproduction meant that we had found nonreproducing mites in 16 of the 20 mite-infested cells that we examined in that colony. In our tests in Louisiana and Michigan, colonies with a higher percentage of nonreproducing mites tended to have fewer mites.[6]

We then learned that nonreproducing mites was a heritable trait of the honey bee.[3] We estimated heritability for this trait by measuring mite reproduction in a group of colonies that had known genetic relationships. When measurements of a trait are more similar among colonies of bees that are genetically related than among colonies that are unrelated, then the trait has a genetic component. If relatedness has no effect on the expression of a trait, then the trait is not heritable and selection for the trait would not be possible.

Heredity in the honey bee was responsible for about 44% of the variance that we observed in mite reproduction. Environmental factors such as temperature, colony to colony migration of mites, colony location, measurement error, etc. probably accounted for the other 56%. However, a heritability level 44% is high enough to suggest that selective breeding for the trait should succeed, and it did. With selective breeding, we reduced mite reproduction to less than 10% in worker brood. Thereafter, we used the term "suppression of mite reproduction" (SMR) when referring to a characteristic of the honey bee and the term "nonreproduction" when describing mites.

Nonreproducing mites have been reported in bee populations throughout the world. When examining natural resistance to *Varroa* by honey bees in Tunisia,[9] Uruguay,[10] Argentina,[2] and Brazil,[1] resistance was associated with a high occurrence of nonreproducing mites. These resistant populations may have been caused by the SMR trait of the honey bee. Thus, the SMR trait may be widespread and relatively common. One could probably find the SMR trait anywhere in the world by inseminating each of 30 queens with single drones collected from 30 unrelated colonies. Single-drone inseminations are good for detecting traits at the colony level, but multiple matings are usually preferable thereafter.

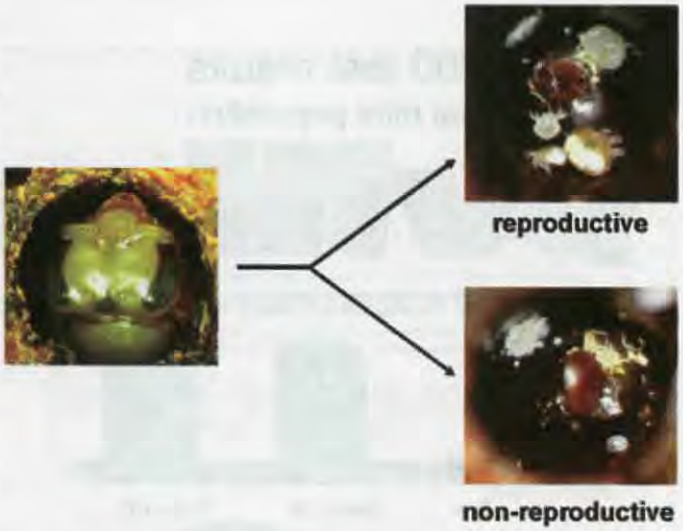
Background information on SMR bees

In a normally susceptible colony, a mite produces as many as four daughters and one son while in a worker cell. Rarely will all the progeny survive. A daughter mite will die if she has not reached adulthood by the time the host bee emerges from the cell; all males die at this time regardless of maturity. A typical mite-infested cell in a susceptible colony will produce one or two adult daughters during the 12-day period in a capped worker cell.

Bees with the SMR trait will prevent mites from successfully producing progeny. In colonies with SMR bees, mites enter the cells as if to reproduce, but they

do not produce progeny that survive. They may lay no eggs, lay eggs that do not hatch, or delay their egg laying so that none of the progeny has time to mature before the bee emerges from the cell. However, the important category, and fortunately the simplest to measure, is mites that lay no eggs[7]. See the May 2001 issue of *Bee Culture*[8], or the website http://msa.ars.usda.gov/la/btn/hbb/jwh/vrepro/vrepro.htm for more details and pictures of both nonreproductive and normally reproductive mites (Fig. 1).

The SMR trait is a delayed effect, so it is sometimes called SMRd to distinguish it from an immediate SMR trait (SMRi) that also exists in bees. Mite reproduction is not suppressed in the first cycle of brood when a queen with genes for SMRd is introduced into a susceptible colony. It takes about 6 weeks for a colony to suppress mite reproduction.



Field tests of SMR queens

We wanted to know if the SMR trait would provide an acceptable level of resistance when SMR queens were free-mated with unselected drones. The test consisted of three groups of colonies (colonies with SMR queens, with control queens, or with SMR x control queens).

Five commercial queen producers were involved in this project. We provided SMR breeder queens to the queen producers, and they sent us SMR daughter queens that had free-mated with unselected drones at their location (SMR x control). They also sent us some queens from their commercial stock, also free-mated, to serve as controls (control x control). We added a third group to the test, SMR queens that were artificially inseminated with SMR drones (SMR x SMR). In 1999 and 2000, we tested about 80 of these queens in Baton Rouge.

We found that colonies with SMR x control queens (free-mated daughters of SMR breeder queens) expressed a significant level of resistance to *Varroa*.[4,5] These colonies had fewer mites than colonies with control queens but more mites than colonies with pure SMR queens (SMR x SMR) (Fig. 2). In a separate test, Spivak et al.[11] had similar results: fewer mites in colonies with free-mated SMR queens than in colonies with control queens.

With additional selective breeding, we found that the SMR trait continues to be additive. Therefore, bee breeders can increase mite resistance even after they have diminished the SMR trait by mating SMR queens with drones at their location. For example, the daughter queens from a free-mated SMR queen would have about 50% of the SMR genes (higher than 50% if drones at the location had some genes for the SMR trait, but for the sake of this example we assume they had none). If these queens are mated to SMR drones, the colonies would be 75% SMR. We made and tested this cross and, on average, fewer than 20% of the mites were able to reproduce after they entered a worker cell. Therefore, in bee breeding, the SMR trait seems to have a simple additive effect.

Most of our work with SMR has involved small colonies in the summer in Louisiana. These colonies had no drones, and it is well known that varroa mites prefer to reproduce in drone brood. To keep experimental number of variables, we intentionally eliminated drone comb in our early experiments. When we encouraged drone production in SMR colonies, we found that mites had a higher rate of reproduction in drone cells than in worker cells. However, mites had a lower rate of reproduction on drones in SMR colonies than on drones in control colonies.

A cooperative project with Glenn Apiaries

Because of the benefits associated with the SMR trait, we have established a Cooperative Research and Development Agreement (CRADA) with Tom Glenn at Glenn Apiaries in Fallbrook, California, (http://members.aol.com/queenb95). The purpose of this agreement is to provide SMR breeder queens to anyone who wants them at a cost of $50 per queen. We (USDA-ARS at Baton Rouge) are responsible for selecting breeding stock and sending it to Glenn Apiaries; Glenn Apiaries has agreed to raise queens and drones, artificially inseminate the queens, and sell and ship the queens.

The SMR queens (SMR queens mated to SMR drones) produced by Glenn Apiaries are intended to be breeder queens only. These queens should produce colonies that are resistant to mites. A colony with an SMR breeder will have normally reproductive mites for a few weeks but should have nonreproductive mites in six weeks. Sometimes the brood becomes very spotty in colonies with SMR breeder queens, even though the queen may start out producing a very solid brood pattern. This does not always happen, and we don't know why it happens, but we're trying to find out. As a result, a colony with an SMR breeder queen may not grow rapidly enough to become a productive field colony. However, queens that were free-mated daughters of these breeder queens (SMR x control) did not have this problem.[4]

From a beekeeper's perspective

The SMR genes are commercially available as SMR breeder queens (see above) or as free-mated queens from other various queen producers. Free-mated SMR queens supplied by commercial queen producers will be variable, depending not only on the skill of the queen producer, but also on chance: how well the daughters of the SMR queens combine with the drones at a particular location. The degree of mite-resistance and the quality of the queens will also depend on the breeding

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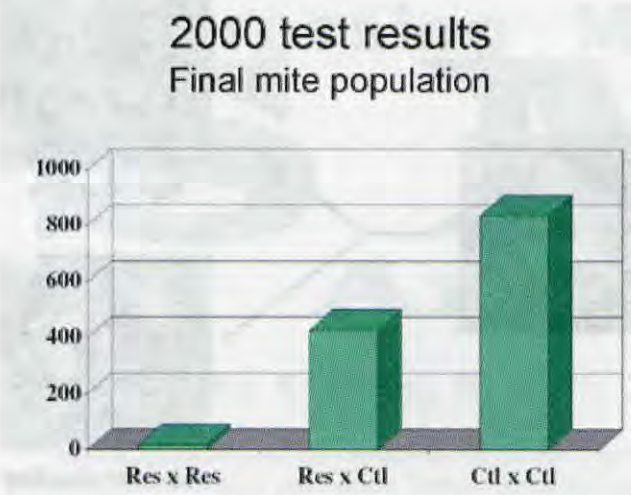

(crossing, backcrossing, and selection) done by the queen breeder.

SMR is not a stock, a population, or a race like Carniolan or Italian bees. The SMR trait is a group of genes (it may be only two additive genes) that can be put into any population of bees.

Conclusion

We are in a transition period where honey bees in the USA are still susceptible to *Varroa*, and we want to make them resistant as quickly as possible. Our plan is to insert mite-resistant genes into this population of bees without losing the genetic diversity and the beekeeping qualities that we now have. The release of the SMR trait is our attempt to assist bee breeders in making their bees resistant to mites and to increase the frequency of mite-resistant genes in our nationwide population of bees.

However, this transition presents a dilemma. If beekeepers stop using miticides and rely totally on mite-resistant bees, they risk losing their bees as well as their income. On the other hand, why should beekeepers buy mite-resistant bees if they are planning to treat them with miticide? There are various reasons. For some, mite resistant bees will be a first step in their effort to increase the frequency of mite-resistant genes at their locale. Others will attempt to reduce and in some cases free themselves from using miticides, and they need to monitor their colonies to verify that mite populations remain low. Still others may use mite-resistant bees as a second line of defense against mites that may become resistant to pesticides.

There is much yet to be learned about mite resistance and about the SMR trait. Free-mated SMR queens have done well in Baton Rouge. However, bees that are resistant to mites in Louisiana may not be resistant at some other locations. Resistance may vary because of different climatic conditions, food resources, management systems, and even differences in the virulence of mites. Therefore, we recommend that beekeepers use caution as they modify their present methods of controlling mites. BC

References cited:

1. Camazine, S. 1986. Differential reproduction of the mite, *Varroa jacobsoni* (Mesostigmata: *Varroidae*), of Africanized and European honey bees (*Hymenoptera: Apidae*). Ann. Entomol. Soc. Am. 79: 801-803.
2. Eguaras, M., J. Marcangeli, M. Oppedisano, and N. Fernandez. 1995. Mortality and reproduction of *Varroa jacobsoni* in resistant colonies of honey bees (*Apis mellifera*) in Argentina. Bee Science. 3: 174-178.
3. Harbo, J. R. and J. W. Harris. 1999. Heritability in honey bees (*Hymenoptera: Apidae*) of characteristics associated with resistance to *Varroa jacobsoni* (*Mesostigmata: Varroidae*). J. Econ. Entomol. 92: 261-265.
4. Harbo, J. R. and J. W. Harris. 2001. Resistance to *Varroa destructor* (*Mesostigmata: Varroidae*) when mite-resistant queen honey bees (*Hymenoptera: Apidae*) were free-mated with unselected drones. J. Econ. Entomol. 94: 1319-1323.
5. Harbo, J. R. and J. W. Harris. 2001. Suppression of mite reproduction: a characteristic of honey bees that produces resistance to *Varroa destructor*. Proc. Am. Bee Res. Conf. Am. Bee J. 141(12): 889.
6. Harbo, J. R. and R. Hoopingarner. 1997. Honey bees (Hymenoptera: Apidae) in the United States that express resistance to *Varroa jacobsoni* (*Mesostigmata: Varroidae*). J. Econ. Entomol. 90: 893-898.
7. Harris, J. W. and J. R. Harbo. 1999. Low sperm counts and reduced fecundity of mites in colonies of honey bees (*Hymenoptera: Apidae*) resistant to *Varroa jacobsoni* (*Mesostigmata: Varroidae*). J. Econ. Entomol. 92: 83-90.
8. Harris, J. W. and J. R. Harbo. 2001. Natural and suppressed reproduction of *varroa*. Bee Culture 129(5): 34-38.
9. Ritter, W. 1990. Development of *varroa* mite population in treated and untreated colonies in Tunisia. Apidologie 21: 368-370.
10. Ruttner, F., H. Marx, and G. Marx. 1984. Beobachtungen über eine mögliche Anpassung von *Varroa jacobsoni* an Apis mellifera L. in Uruguay. Apidologie 15: 43-62.
11. Spivak, M. & G. Reuter. 2001. Comparison of hygienic, SMR, Russian, and Italian honey bees in a commercial apiary. Proc. Am. Bee Res. Conf. Am. Bee J. 141(12): 894.

GLEANINGS

MAY 2002 • ALL THE NEWS THAT FITS

A Small World Gets Smaller

BARKMAN'S & STOLLER'S MERGE

On February 21, 2002, management of Barkman Honey Company in Hillsboro, KS and Stoller's Honey in Latty, OH announced that their firms have reached agreement to combine their operations into a newly formed company, Golden Heritage Foods, LLC.

The transaction was effective March 9, 2002. Headquartered in Hillsboro, KS, with management in KS and OH, Golden Heritage Foods will rank as the nation's third largest honey manufacturer. Brent Barkman, president of Barkman Honey Company, will serve as president and chief executive officer of Golden Heritage Foods, and Dwight Stoller, president of Stoller's Honey, will serve as executive vice president of Golden Heritage Foods.

"Golden Heritage Foods is being formed because we truly believe it is the way for us to provide greater benefits to our wholesale and retail-consumer customers," said Brent Barkman. "With our combined size, geographic distribution and increased management talent, this combination promises a better future for everyone involved."

The new company's management also announced that it is not contemplating changes to the products offered and that it plans to continue producing and distributing the brands of the two predecessor firms. Other strengths cited by company management resulting from the merger include the compatibility of the products manufactured by the two companies and the lack of overlap in retail distribution. Golden Heritage Foods will distribute its products nationally.

"Combining these companies results in different strengths being brought to Golden Heritage Foods," said Dwight Stoller. "But there are two significant strengths that our companies share, and those are a deep sense of values and servant leadership. We will demonstrate our deep commitment to the welfare of our customers, employees, domestic beekeepers and suppliers."

Golden Heritage Foods will employ approximately 80 people. Its plants and operations in KS and Ohio will remain fully operational, and no reduction in workforce is anticipated as a result of this transaction.

OBITUARY

Norman Edward Farmer, Sr., 75, of Perkins St. Bristol, CT, husband of Mavis (Young) Farmer died Friday, February 22, 2002 at home. He was born May 10, 1926 in Billerica, MA. A long time Bristol resident, he was a U.S. Navy Veteran of WWII, having served in the pacific theatre. Mr. Farmer was employed at Pratt and Whitney for 20 years, until his retirement. He was a commercial beekeeper for the past 40 years, having owned and operated the Honeycomb Apiaries in Bristol. He was a member and past vice president of the Connecticut Beekeepers Association. He was a life member of the Eastern Apicultural Society and a member or the Empire State Honey Producers Association. Mr. Farmer was instrumental in teaching many beekeepers, supporting honey bee research programs and working to enact legislation, in Connecticut to protect beekeepers rights. Mr. Farmer was also a member of the United Pentecostal Church of Bristol and the VFW. Besides his wife, 1 brother, 4 sons, 4 daughters, 17 Grandchildren and 7 great grandchildren survive him. Mavis and Mr. Farmer's son, David Farmer, will continue the Honeycomb Apiaries business.

New Zealand Moves Fast

ORGANIC *VARROA* CONTROL

The New Zealand government approved two organic options for control of the *Varroa* bee mite.

The products, formic acid 85 percent and oxalic acid dihydrate, are cheaper than synthetic chemicals and are also acceptable to organic certification agencies.

Use of either product is conditional on compliance with a code of practice established by the ministry's Agricultural Compounds and Veterinary Medicines Group. A key requirement is that neither product should be applied when honey boxes are on beehives.

Acting Agriculture Minister Paul Swain said the approval provided a breakthrough for beekeepers in their battle with *Varroa*.

"Every effort has been taken to ensure beekeepers have these options available to them as part of their arsenal and the Ministry of Agriculture will continue to work with beekeepers to assist them to develop new management and control strategies," he said.

Varroa program coordinator Paul Bolger said organic acids can also be used in rotation with synthetic products by conventional beekeepers to reduce the risk of *Varroa* developing resistance to one group of chemicals.

"Although the products are cheaper than synthetic chemicals there is some trade-off in their effectiveness compared with commercial products," Bolger said. "Further trials are being carried out by HortResearch to assess the effectiveness of different application methods under New Zealand conditions.

The ministry's Agricultural Compounds and Veterinary Medicines Group is in the process of providing a code of practice for "own use of substances" for beekeepers.

In addition, the ministry has published a guidebook for control of *Varroa* with detailed instructions on use of the products which has been distributed to beekeepers throughout New Zealand.

Alan Harman

"KILLER" BEES MOVING IN CALIFORNIA

UC Davis entomologist Dave Nielsen has identified two Africanized bees in Tulare County, the first time the highly defensive bees have been found in the central San Joaquin Valley.

Last Fall, Nielsen sampled about 150 bees from 30 different sites between Atwater to the north and Bakersfield (Oildale) to the south, in the region of Highway 99 and the Sierra foothills. The two Africanized bees were identified near the towns of Lindsay and Posey, using PCR-amplified mitochondrial DNA markers.

"There are a great number of bee colonies in the area," Nielsen says. "If you don't find Africanized bees, it doesn't mean they're not there. Therefore, our results are a conservative estimate of their range expansion."

"They're moving up the San Joaquin Valley," says Scott Kinnee of the California Department of Food and Agriculture's (CDFA) Plant Pest Diagnostic Center. "They're probably even further up than that, but the sampling hasn't been done yet."

Reprinted from California Agriculture

AUSTRALIA NEWS

AFB Found American foulbrood has been found for the first time among bees on Kangaroo Island off South Australia.

The discovery was made while testing was being carried out for chalkbrood which was found on the island for the first time last month.

The island had been one of the few regions in Australia free of American foulbrood.

The South Australian Department of Primary Industries is putting a brave face on the finding of the two diseases with a spokesman saying the news might not be all bad.

"Anecdotal evidence from the mainland has certainly shown that operations affected with American foulbrood can actually in some cases see increased hive productivity," apriculture project manager Elena Petrenas said.

"Because of the improved management practice and more intensive inspections they put in place they identify other aspects of their operation that they can improve and hence earn indirectly more dollars in the bank."

The introduction source of foulbrood is unknown.

"Given the extent and stage of the disease detected, it is unlikely that the source was a feral hive found in farming equipment brought over from the mainland in November." Petrenas said.

Laboratory results suggest the infection is localized but further testing of new season honey from the island's managed hives and feral swarms is required.

"The results will allow us to determine the spread of the disease and whether eradication is a cost-effective option," Petrenas said. – *Alan Harman*

High Prices Competition in Australia's export and domestic markets has pushed honey prices up by 30 cents a record high of A$2.25 a kilogram.

It is the first time prices have reached A$2.

Industry players said the increase was because of a world-wide shortage of honey and competition in Australia's export and domestic markets.

Much of the competition has come because the low value of the Australian dollar – worth around 51 U.S. cents – encouraging domestic producers to export.

The fifth coolest summer on record has also seen pricing pressure with bees reluctant to leave hives and poor flower blooms.

Growers reacted enthusiastically to the increased prices.

"Oh it's excellent, pure profit," one said. "It costs us no more to produce our honey, so 30 cents, that's $90 a drum for us extra in our pockets.

"The $2 market has been broken. That was always the barrier. I expect it to come back to $2.10 or $2.15 early in the next season, but this season I think it will stay up." – *Alan Harman*

New Zealand honey exports plunge New Zealand exports of honey plunged to 67,500 kilograms in January from 190,000 in the same month a year earlier.

After a wet southern summer and with the varroa mite spreading throughout the North Island, the National Beekeepers Association said annual production has dropped to half the average of 9,000 tonnes.

Association vice-president Lin McKenzie said the wet weather had seen bees stop flying while also stopping honey-yielding crops from growing and resulting in less nectar in flowers.

"There is strong anecdotal evidence that we are facing the worst year we have ever had," he said. – *Alan Harman*

WV GETS BEE

West Virginia House of Delegates has passed Senate Concurrent Resolution #9 which made the honey bee the official state insect of West Virginia.

The reason for the choice was that no state insect existed. The sale of honey has produced an ever-growing segment of the state's economy and honey bee activity produces more benefit to the state than any other insect.

Dewey Caron
OUTSTANDING CONTRIBUTION

Dewey M. Caron, Professor of Entomology & Applied Ecology at the University of Delaware was the recipient of the Free State (Maryland) Beekeeper Citizenship Award. The Award of the Maryland State Beekeepers Association, now in its 5th year, is given to recognize beekeepers who have made outstanding contributions to maryland beekeeping. The award consists of a distinct sculpture of bee cells (large stainless steel lug nuts) with two "bees" crafted by renown artist (and hobbyist MD beekeeper) Hugh Cassiday. Previous honorees were George Imirie, Jerry Fischer, Ernie Miner and Dr. H. Shimanuki last year.

Right to left – Barry Thompson, Dewey Caron and Bart Smith

More Convenient
NEW USDA SYSTEM

Agriculture Secretary Ann M. Veneman has announced that farmers and rural residents will soon benefit from a common customer computer database used by agencies in USDA Service Centers. The database, called the Service Center Information management System (SCIMS), will help reduce paperwork requirements for USDA programs and will allow customers to sign up for programs from their home computers. "These enhancements to the information system will lead to our customers being able to access their individual records, apply for loans, and sign up for USDA programs from their personal computers, or other remote locations," said Veneman. SCIMS is a major step to provide more convenience and quality service to agency customers.

TERRAMYCIN IN TROUBLE

If you're having trouble finding TM25 this year, don't feel you've been singled out. When Philipp Brothers Chemicals, Inc. bought the feed additive products of the Animal Health Group from Pfeizer a couple of years ago, the focus of the company changed.

Reregistering the dozen or so products (in the myriad sizes, strengths and uses each had) has been ongoing, but profit and sales were definitely involved when weighing income vs. Expense on a per product/per use basis. Bees are low on that list!

As a result, existing supplies of the Pfeizer product began running out last Fall, and U.S. Bee Supply companies are, with few exceptions, out of TM25. (TM25 is the 6.4 oz. bag of Terramycin commonly sold for use by small-scale operations.)

Still available are the many mixes available that contain TM50 and sugar that is applied directly without premixing. All of these are effective and relatively inexpensive.

With the increase in AFB outbreaks resistant to TM, the timing could be considered opportune, as new products enter the marketplace.

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Talking To Queens; And Old Equipment

Richard Dalby

Back when I was in school, we were always told that a piece of writing should have a beginning, a middle, and an end. What that meant, I suppose, is that an essay or a story ought to have some sort of form, in just the same way that a bee has a head, a thorax, and an abdomen. Problem is, achieving some lucid and logical form is easier said than done. And since I want to ramble a bit from topic to topic, I am going to ignore what I was taught and just forge ahead. The result may well be a beginning, a muddle, and an end, but perhaps along the way I might write something that you will find of interest.

I was perusing some old bee journals a while back and ran across a description of a beekeeper talking to his queens. I don't remember now just what he was talking to them about, but the fact that he was talking to them at all seemed amazing enough. Seems that queens, when they are talking to one another, say either *zeep, zeep, zeep*, or *quahk, quahk, quahk*, and generally it is only the young queens, some still in their cells, that engage in this sort of conversation. By opening a hive and imitating these sounds, the beekeeper in question was apparently able to get his queens to respond. Whether he was able to interpret what they were saying to him I do not know. Myself, in all my years of beekeeping, I have never had a queen say anything in my presence. But then I've never said *zeep* or *quahk* to a young queen, either.

Speaking of old bee journals and old bee books, they make great, great reading during long Winter evenings, or any other time, for that matter. I particularly like some of the quaint old beekeeping tools of the past which are illustrated and described in the early American beekeeping literature. For instance, on page 704 of the 1923 *ABC & XYZ of Bee Culture* is illustrated the Willis queen-clipping device, and I would love to have one. Never mind that I have never clipped a queen's wings and have no immediate intention of doing so. The day may come when I have to clip the wings of some errant queen and, in that event, the Willis queen-clipping device would, no doubt, be worth its weight in gold. Too bad it doesn't appear in the current bee supply catalogs. Neither does the swarm-catcher pictured on page 801. This is basically a wire cage three or so feet high and 12 to 15 inches square and made to fit against the front of a hive. The idea was that, if you were in your apiary and saw a swarm begin to issue from one of your hives, you could grab the swarm-catcher, attach it to the hive, and catch the issuing swarm in the top of the cage as they pour from the hive. In this way the swarm has no chance to take off and cluster in some unhandy place. Swarm catching devices such as this were popular for a time way back when, but they had one drawback. You had to be right there when a swarm began to issue so you could slap the swarm-catcher onto the hive. I'd like to have one of these swarm-catchers, too, even though I'd probably never use it since I prefer to apply management measures before a swarm appears. If I could communicate with my queens, like the beekeeper previously mentioned, I could simply ask them please not to swarm. Who knows but what that might just work.

Now, while I'm on the subject of old beekeeping equipment, wouldn't it be wonderful if we had some sort of national beekeeping museum where the history of our industry could be on display, as well as its present and future importance. Perhaps it should be called a center rather than museum. Centers seem to be in vogue right now. I know there are small, even large collections here and there of beekeeping equipment and memorabilia, but they are not on the national radar screen. I know that beekeeping is, in terms of money, just a small part of the agricultural industry. But, in terms of our importance, we are giants. We need to do all we can to get that message across to the public and to those in power. A National Beekeeping Center (NBC) could be a big step in that direction. Who should run it, how it should be funded, where it should be located – these and similar questions would need to be decided.

In the meantime, perhaps we as an industry with a fascinating past and an important future could set up some sort of virtual museum of American beekeeping on the world-wide web. With such a website, folks from around the world could log on to check out a Peabody extractor, a Quinby smoker, a Heddon hive, complete with explanatory text and links to other relevant sites. Our beekeeping history is disappearing. Much has already been lost. Let's figure out some sensible way to preserve what we still have left.