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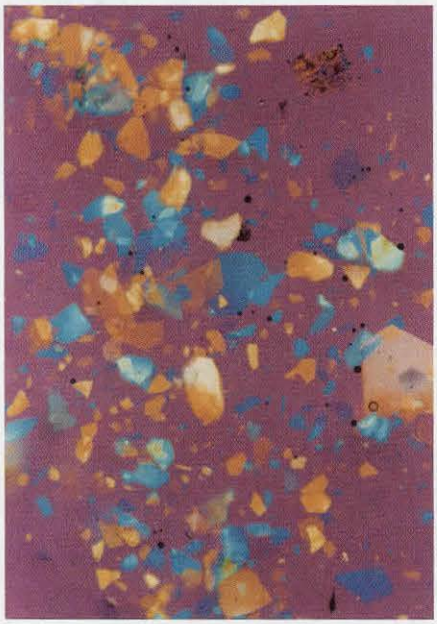

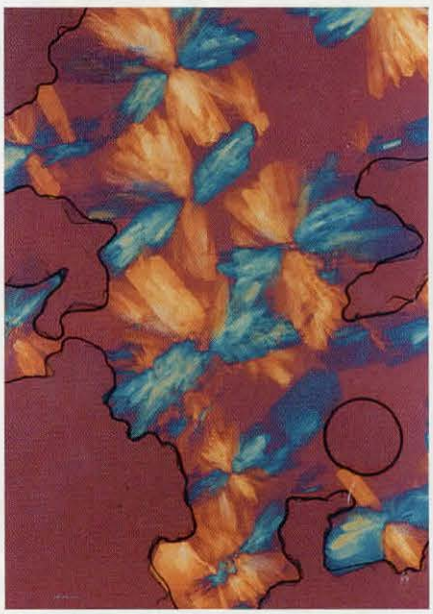

CRYSTALS IN HONEY

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

JANUARY 2000 VOLUME 128 NUMBER 1

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New Zealand has nearly licked this disease. You can too. Here's how.

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Ann Harman

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Round one of this meeting is over the industry has set the stage. Round two will see what USDA has to say and when.

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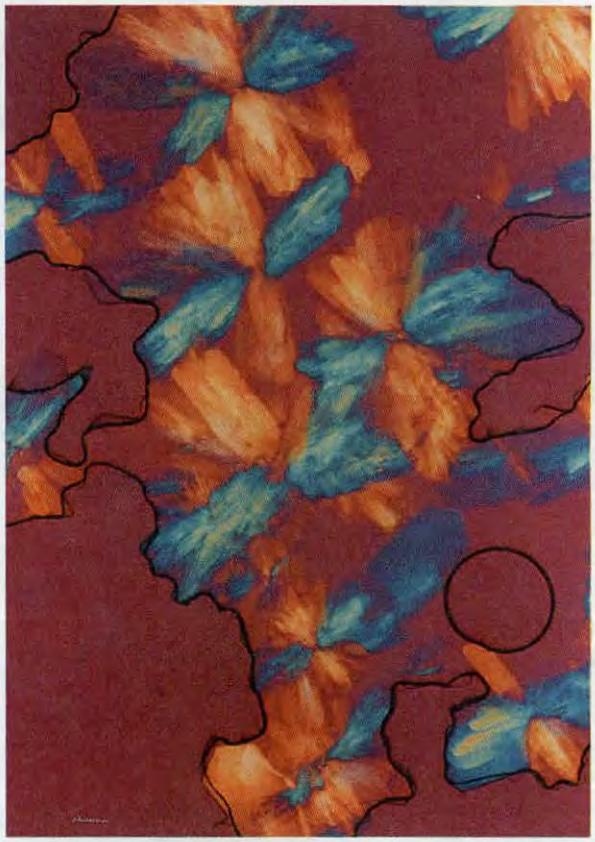
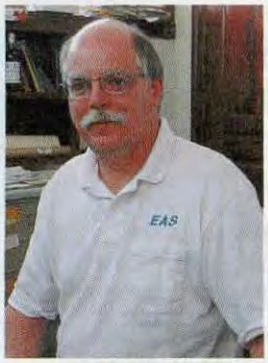


COVER

Crystal formation in honey is a given for most of us. The process, described in the article on page 23, and shown on the cover, is still being discovered.

photo by Elizabeth Enoksson.

JOHN ROOT
Publisher



KIM FLOTTUM
Editor

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

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Bee Culture is Printed on Recycled Paper

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Subscription Information

U.S., one year, $20; two years, $38. Newsstand price: $2.50. All other countries, (U.S. Currency only), $10.00 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), January 2000, Volume 128, Issue 1, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Advertising

For information on placing display advertisements, contact Dawn Feagan in our Advertising Dept. 1-800-289-7668. Ext. 3220

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

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KEEP IN TOUCH

Write: Editor, 623 W. Liberty St., Medina, OH 44256
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EMAIL: KIM@AIROOT.COM

MAILBOX

Termiteproof Paint

This paint can be used very effectively when used on wood that is in the weather or near soil level. Many extra years of use can be gained by using it, though it is more expensive than "cheap paint."

1 quart boiled Linseed oil (lumber yard store)
1 quart paint thinner (oil based, auto parts store)
1/2 lb. paraffin wax (grocery store)
1 gallon Cuprinol (copper naphthenate) paint (paint or lumber store)

Cuprinol is a trade name, another is Lumber Guard.

Mix linseed oil and wax overnight (about 70°F). Mix all items together the next day. Must be used on new (unpainted) wood and above 50°F. Can be painted other colors after weathering about six months.

Each ingredient serves a specific purpose: Boiled linseed (not cotton seed) oil forms a hard coat. Paint thinner dissolves the paraffin wax. Paraffin fills pores and waterproofs wood. Copper naphthenate kills termites and preserves wood from wood destroying molds and rots.

I try to use this mixture on all new wood, especially bottoms, deep bodies and tops. The life of the woodenware can be extended many years since water does not penetrate the wood.

M.J. Bragg
Clarksburg, WV

October Wise Guy

Justice Oliver Wendell Holmes is reported to have said "I would not give a fig for the simplicity this side of complexity, but I would give my life for the simplicity on the other side of complexity." I don't think your Wise Guy knows the difference. It would take pages and hours to clearly point out all of the false assumptions and misinformation that we've read in this column. It's been simpler to dismiss it, expecting that the vast majority of your readers are truly wise enough to do the same.

"So what if 20 percent of the market disappears when the buying public panics over quality issues?" The questions and suggestions posed in the October column went beyond reasonable debate and consideration. It was irrational and dangerous. Perhaps the suggestion that we purposely taint the image of "honey" will be enough to help everyone put the column in true perspective.

Packers, believe it or not, don't get a real kick out of paying current prices to producers. Major consolidation of customers, leveraged buying and packers scrambling for surviving market share is a real issue. For example, instead of continuing to supply a regional distribution center you're now asked to bid on a total package that may cover six merged companies/divisions. Now you've got six packers bidding just trying to hang on to what was an existing piece of business. This is a change in our environment that we do not control and it's happening with most every product going into the trade, not just honey.

We've never seen competition before like we have today. During the rapid escalation in pricing, packers had to fight with customers to get them to accept price increases, but had fewer competitors going after their business. Packers were scrambling to find honey to take care of their current customers so they weren't willing to do much competitive quoting for new business. Now we have the opposite situation where any packer can quote on new business and feel comfortable that he'll have supply if he's successful. It's a cycle, we all know where we're at in the curve, and it will swing back again.

Wise Guy, and any other producer has the right to be upset about current honey prices. Packers are upset about current competition. Advocating killing the NHB, and especially the proposed changes for honey bee research and quality assurance is not a wise response. The need for honey bee research is obvious to every beekeeper. Quality assurance is vital to help both the supply and demand side in the future.

I don't blame producers for complaining that they're paying for the NHB assessments and packers don't. There may still be some that remember me saying back in 1986 when the program started that I felt packers ought to pay at least as much as producers and I still feel that way. The proposed changes finally accomplish that, reducing the producer assessment to ¾ cent and getting ¾ cent from the packers. Real industry leaders sat down together, waded through the complexity and arrived at the proposed NHB changes as sensible solutions for the future.

At the recent Apimondia meeting in Vancouver I learned more about the future potential of nutraceuticals, and the incredible work already done or in progress in New Zealand. And, this type of research and market development could apply to American honeys just as well. There is fantastic opportunity to develop high value-added markets in addition to the current commodity arena. It won't happen without funding. It won't happen without an organization in place to continue to protect the image of honey. *There's no one but the National Honey Board that can play this role.*

Dwight Stoller
Latty, OH

Get Rid Of *Varroa*

I have been a beekeeper off and on many times in my 82 years and I have found a way to reduce *Varroa* mite populations.

Continued on Next Page

MAILBOX

NO PAVING VEHICLES

If my carwash drains became clogged with beeswax, I would add this to my signs:

NO BEEKEEPERS ALLOWED

That thought should make every beekeeper cringe. That's not a sign I'd like to see, and I think most of you would agree with me. Pressure washers can do a good job on all types of equipment. But a carwash is specifically designed to wash CARS; not to wash whatever piece of commercial equipment the public can make dirty. Please either ask the carwash owner if the cleaning job you have in mind would cause problems, or use a portable pressure washer in the back yard. Don't just pass your cleaning problems along to somebody else, that kind of thing gives us beekeepers a bad name.

Beekeeper and carwash owner,
Paul Noon
Hamburg PA

November Cover

Sorry to have this first communication to be negative, but I dislike the cover of the *Varroa* mite on a dime. That photo would have been ideal on page 20 to reinforce Dr. Calderone's article.

I am a fan of (covers with) hives in a variety of settings and seasons, bees on any nectar or pollen source, or a working yard scene. Photos of honey displays or 'bee' crafts would be fine. Yes, I know the industry is not all 'sweetness and light'; please consider positive covers with harsh reality available inside.

Thanks for your efforts. *Bee Culture* is read cover to cover in our home.

Nancy Hellman

Honey Cereal

Ever since you pointed out that not all honey products are honey products, I have been checking the ingredient statement on products I buy. Most often corn syrup or some other cheap sweetener comes before honey, even though honey bees and dripping honey are plastered all over the product packaging. I want to tell you about a cereal I found that lists honey as the first ingredient and as the only sweetener, Kashi Honey Puffed Cereal. I find it in the cereal department of Tops and P&C Markets. Not only does it contain honey as the main ingredient it is very low in fat and calories and taste great.

Dennis Pase
Ulster, PA

Blown Opportunity

Last February the American Honey Producers Association decided to pursue what we felt was a great opportunity. Due to the glut of honey in the U.S. and no movement in the market, we asked the USDA to consider purchasing 10 million pounds of honey. This honey would have been certified U.S. honey and was to be distributed into the school hot lunch programs. What a great opportunity to expose school kids to our product so that they might remember the great taste of honey and ask their mom to buy some more for home use. Also, we felt this was just a start and that if it went well the USDA would consider purchasing another 10 million. The U.S. beekeeping industry badly needed a morale boost and some hope of moving honey. We also had immediate support by several U.S. Senators.

But some packers opposed us. Their complaint was that we would be displacing their market they have established in the school hot lunch programs. Never mind the fact that these same packers have displaced our market of U.S. honey with their foreign honey. What's strange about all of this is that I still have yet to find even one school in my area, which includes eight schools, that use any honey!

The biggest surprise came later when AHPA President Richard Adee contacted the National Honey Board. His mission was to gain support from the NHB and to ask their help to facilitate the USDA purchase. The NHB response was they could not support the AHPA's proposal as this would fall under lobbying, which they are not allowed to do. Richard Adee and the Executive Committee accepted this answer and realized the NHB could not help us. Then in September we received a newsletter that stated the Almond Board had asked the USDA to purchase 40 to 50 million pounds of almonds. Naturally the AHPA thought how could this be? The Almond Board supported and the NHB did not. I called the NHB to have our questions answered. The NHB had no real answer. What they did tell me was that the Almond Board was under a state marketing authorization and they were allowed to lobby the USDA. I questioned this answer but decided well, O.K.

Then a week later I decided to carry this one step further and called Martha Ransom of AMS. Martha Ransom is the one that oversees the NHB. Her response was "absolutely the NHB could have lobbied the USDA on this purchase of honey." She also stated this is considered promotion. All it would have taken was for the NHB's CEO to present the AHPA's request to the board members. They in turn would have voted yes or no. The sad part is they were not given the chance. Furthermore Martha Ransom stated the Almond Board is under the same marketing authorization as the NHB. It is sure funny that when it comes to lobbying beekeepers with the NHB propaganda that it is O.K., but when the NHB could have actually lobbied to help the producers they choose to sit on their hands. Through all of this one thing became clear to the AHPA. One board, the Almond Board, works to support their producers. One board, the NHB seems to be working only for the packers. There is no question this was a "Blown Opportunity."

Lyle Johnston
Vice President, American Honey Producers
Rocky Ford, CO

Editor's Note: *The Honey Board CEO still contends this as a lobbying effort. The ABF Exe. Committee voted to have USDA buy the honey, but not give it to potential customers. And, this may still be a viable issue.*

INNER COVER

Planning For . . . Technological Shock.

This past fall I went through a sort of audio meltdown. It started with my car radio failing in mid-sentence during an All Things Considered program. This happened while I was driving to a meeting. I was suddenly without that taken-for-granted travel companion and left to my own devices for entertainment for a two hour trip there, and back. It was mildly distracting, but since the place my head normally goes while driving was closed, I was forced to do something else. So I practiced and refined the talk I was to give, which is something I always say I'll do, but never quite make it. I hope those who attended appreciated my efforts.

Schedules being what they are it was a couple of weeks before I could get to a place that could remedy this situation, and during that time I found myself, rather than routinely listening to the news on the morning drive, planning my day. My productivity actually went up at work. Don't tell my boss though.

On one two-hour trip I wrote in my head the intro script I'd been asked to do for Jim Tew's latest video. Then, I actually rehearsed it to where I wasn't tripping over the words. I'm not quitting my day job for a career in the cinema, but it was better than it would have been. I also, on another trip, worked out a solution to a nagging problem I was having with appointing a committee chair. Score another one for the sounds of silence.

At almost the same time, what was passing for a radio/CD/tape system inside the house died, leaving me with one, 30 year old radio for noise, information and entertainment. Since I don't have a TV (by choice) it meant some pretty quiet evenings. Almost too quiet.

Well, schedules still being what they are, once I actually got the replacement radio, it was another three weeks before I and the installer could get together, so five weeks passed in this state. Since I intended on replacing the house system at the same place as the installation place, I kept putting off that three hour task until I could do both at once. So it was quiet for quite a while.

Now, I've had that car radio about nine years. As long as the car, actually. We were old friends. Knew each other well. I didn't want a 'better' radio. Just the 'same' radio. But it doesn't work that way. It doesn't work that way at all.

Nine years, in the development of car audio systems is nearly an eternity when it comes to technological advances. The number of knobs, buttons, dials and lights increased by exactly a factor of four. The complexity of this dashboard intruder rivaled a beta version of Windows 2000. But it made those nine-year old speakers sound better than ever. Better than the manufacturer ever thought they could I bet. Mozart was even more melodic. The Beatles weren't as nearly out of tune as they had sounded recently, and even Rush seemed less cynical.

Inside was much the same. The people who designed the system I chose are really serious about sound. Really serious. Extra speakers for the surround sound experience. Multiple CD slots. Forty savable radio stations (do you even know 40 stations?). A remote. A memory actually larger than that of the first computer I owned, just for picking the order of the songs on any of the CDs it holds. And five different kareoke styles to choose from, if you're into that sort of thing. From an off/on button to a total of 196 choices to make the new system do exactly what I wanted it to do. Everything. Perfectly. By far the most entertaining part, though, was the control panel. When it's going full tilt it's busier than Mr. Spocks console during a red alert.

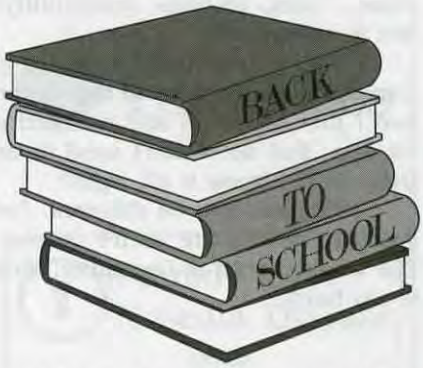
But now Garrison Keilor sounds even better. Beethoven's intensity is clear, and if you listen carefully, I swear you can hear the cows in the background during the morning farm show. Well, I think you can. Plus, I can do all these programming things. Who'd a thought it would come to this, ten years ago when I last explored audio systems?

All this got me to thinking, technological shock being what it is, about the other things in my world that are what they are because they've always been that way. Kitchen things. Tool things. Like that.

I mostly keep using something because it works. My car radio is a good example. But it might have been a 10 or 20 year old uncapper, for instance. If it works, why fix it? But if a new one is better, faster, easier, cleaner ... so much so that the time (read labor) saved would pay for it in what, two years, or even less, wouldn't it make sense to change?

Isn't better quality with reduced costs a better choice than a "If it's not broke, don't fix it" outlook? Even a short term economic perspective realizes that, when

Continued on Page10



New Books

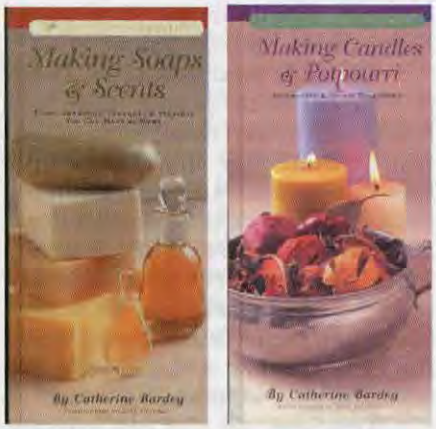
Back in the 60s and early 70s a generation of people explored and experimented with escaping from what was perceived as a less than perfect world. Returning to a 'simpler' life seemed a reasonable alternative to dealing with the strife of the time. Beekeeping thrived for a bit then as 'grow your own' advocates extolled the virtues of gardens, truck farms (organic only, please) and, in general, independence from anyone over 30.

The Whole Earth Catalog was a source of some of that information. It survives today, little changed in over 30 years. Another source of information was the series of *Foxfire* Books. Conceived to document the lives and life styles of Appalachian farmers and residents, it strived to capture a small but well defined part of Americana before it became paved, strip-malled and gone. Part of this effort described 'simpler' ways of doing things – building log cabins, digging wells, finding food in the forest. As such it fit in the mainstream of those looking for alternatives.

Foxfire 11 has just been published. The philosophy is exactly as it was over 30 years ago. Some of those in charge now were high school volunteers back then, doing interviews and writing what they heard. This edition has a section on beekeeping that records how it's being done now. It's a good picture.

"Creative self-sufficiency, natural remedies, home crafts and country folk ways," says the cover blurb. Exactly.

Foxfire 11. ISBN 0-385-49461-0. Random House Inc. Soft cover. 313 pgs. B&W $15.95.



Making Soaps and Scents, 190 pgs., and *Making Candles & Potpourri*, 180 pgs. both by Catherine Bardey, both published by Black Dog & Leventhal, New York. Both available from the A.I. Root Co., for $14 each including domestic postage.

The catch word of the day is 'value added, and whether you sell out of your house, farmer's markets or craft fairs, adding some of these honey and beeswax products to your lineup will help.

These books are beautifully done, but contain textbooks of how-to information. Making soaps using beeswax and honey in the formulas adds to the value added segment of your marketing program, certainly. But using other 'natural' products, including essential oils, herbs, and a variety of other products fits right in with selling honey and wax.

The Candle book uses many waxes, including beeswax, along with natural dyes and fragrances. Wicks are explained, as are using molds, dipping, carving and many other techniques.

Both books are packed with how-to-easily make these products, but better yet, how-to make them elegant. Plain dipped beeswax candles are fine for one market, but poured beeswax candles in eggshell holders are for another.

Each book also has a Hints and Techniques section, a using and storing section, clean up, growing your own botanicals, a large glossary and detailed index. Resources for the products used include web pages, phone numbers and addresses, and a bibliography for further study.

If candles, soaps and other natural-fragrance products are, or could be part of your marketing program, these two excellent how-to books should be part of your library.

Both are available from the A.I. Root Company. X85 is *Soaps and Scents*, X86 is *Candles*.

The Bee. Charlesbridge Publishing. ISBN 0-88106-430-0. Soft cover. Full color. 27 pages, 9-1/2" x 8" $8.95 from A.I. Root includes domestic postage.

The book is one in a series by the publisher on animal close-ups. It has excellent photos showing the life cycle of a honey bee, life inside the hive, beekeeping, foraging, swarming and other insects mistaken for bees. It has over 40 photos, every one perfect. Definitely a book for children curious about bees, it can easily be used in a classroom situation, or to demonstrate to beginning beekeepers what it is you're trying to tell them.

INNER ... Cont. From Pg. 8

weighing all costs, the "use it up, wear it out, make it do, or do without' philosophy isn't cost effective. Not anymore. It may have been when you bought to replace. Now, you buy to improve. Think about it, now that you've just been through another growing and harvesting season. What would improve your bottom line? Where is, not the easiest, but the best way to reduce costs? Improve quality?

I put up with a nine year old radio and missed the quality that existed. It didn't *cost* me anything. Can you say that about those things you use everyday to *make* money?

•

I'm not good at doing Christmas. Maybe it's a guy thing. Maybe my upbringing was sort of overbearing on the subject (sorry Mom). Anyway, it's a task for me to get excited. But sometimes I do. Like waves ... up sometimes, down others. Anyway, this year was kind of an up year. Different anyway. I had two of my three surviving hives do well and I had a couple pails of honey to use. Easy, I thought, (while driving around without a radio), honey, jars...simple. But then I got a pail of California Star Thistle (10, on a scale of 1 10, by the way) through an order mixup. So, two kinds of honey to give away ... honey, jars ... still simple.

Have you ever had honey-soaked pecans, or almonds? There's probably a law against how good those are. Gotta be, somewhere. A perfect Christmas gift, I thought. Honey, nuts, jars ... simple still.

Off to get jars. Small jars. Large jars? Well, some people like more honey and fewer nuts, I reasoned, while others like more nuts and less honey. Still simple I thought. Nuts, honey, jars. O.K. Lets see. Two kinds of nuts. Two kinds of jars. Two kinds of honey. The permutations were becoming extreme. Who gets how much of each kind of mix? When the nuts run low and the pails get low, who gets what kind of what?

This was, as you can see, really, really poorly planned. I just wasn't thinking past honey and jars. It became honey, jars, nuts, sizes, mixes, likes, dislikes, availability. Not simple at all!

I spent a lot more time *fixing* this *dilemma than it would have taken* had I just sat down and planned a bit first. But no. I don't need to do that, do I? I know it all, right?

Next year will be different. I'm going to ignore the entire season. The whole month of December. This is too hard.

•

There are, this year, several kinds of hive tools on the market. One is just right for you, and it's out there somewhere. But no matter which one it is, it needs to be sharp. So check that out. And there are a variety of smokers, too. Some good, some better. Some large, some larger. But no matter which, you need to keep them lit. Choose wisely.

By the way. Anything exciting happen at your house when '99 turned to '00? Was I completely wrong?

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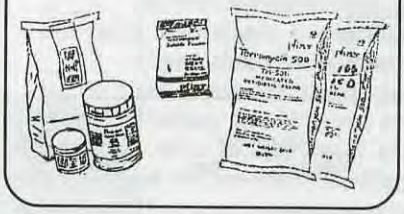

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THE WISE GUY

How do we raise honey prices for the American producer? I believe there's a very workable answer. All we need to do is change the labeling law to say "Country Of Origin," *and* there can be *no blending of one country's honey with another.* Seems way to simple but it will work. Along with this we need to promote the floral source of our honey.

If you don't believe it would work look only as far as the coffee craze in this country. Exotic coffee flavors are sold for as high as $30 per pound but you can still buy Folgers for $4.50 per pound. Look at the California wine industry where they have promoted their own flavors and types of wine and they have established a market for California wine. To do so they raised the grapes, made the wine and marketed it. Look at the bottled water market. If I would have told you 25 years ago you would be paying $1.25 for a half-pint of water to drink you would have laughed at me. They have done a great job of telling everyone the *source* of their water and the *value* of that water from that particular place in the United States.

I believe even the Honey Board should support this idea. This is a good idea for the industry as a whole. It allows each product to stand on its merits and would allow the producer *and* packer to have an increase in price plus it would stabilize the honey prices. Also it would cause a true supply and demand for products.

That is why generic promotion only allows for *reduction* in value and allows for inferior items to gain in value. With the blending of inferior honey with quality honey we have allowed the packers to make a pig's ear out of a silk purse. Every ag driven commodity is preaching value added and we need the same idea. Our biggest value added may only be honesty! All honey is not the same. If you don't believe me get a barrel of Chinese honey and try to sell it as table grade. The *value* of honey is *where and how* it is *produced*, not the *name* "honey." We currently are selling *only the name* and that is why the wholesale price of honey is 50¢!

It's time all of you independent businesses get behind an idea. It's time for national and regional organizations to get behind an idea. Simply because it's someone else's idea don't disagree with it. I read some of the letters to beekeepers' magazines and wonder when these people fell on their heads. Opinions are just like noses, everyone has one but this idea has proven in other industries. So take your opinions and compare them to your checking account. I bet your checking account is smaller than your pile of opinions. Get off your chair and support this or keep complaining and get your bee operation ready for the auction.

Wise Guy

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JANUARY – REGIONAL HONEY PRICE REPORT

And Now For Something Completely Different.

We surveyed all of our reporters this month (during December, actually), on their take on their customer's demand for honey. We wanted to know what demand was at the retail, wholesale, retail pail and barrel levels. This format will appear on an irregular basis when surveys are conducted that can be applied across the whole of our regions. We know it is more informative when information from each region is issued, but this bigger picture, at the beginning of the year will pay dividends later.

Across all products 19% of our reporters experienced an increase in demand, 49% remained steady, while 22% saw demand drop. Generally, regions 1 6 had the highest increase, while 8 12 were only steady to down.

Retail demand for honey, as reported, had increased for 29% of our reporters, was steady for 49%, while 22% reported a drop in demand at the retail level. Prices at the retail level were up a small amount across all regions since last month.

At the wholesale level, 22% of our reporters cited an increase in demand, 43% reported demand unchanged and 35% have experienced a drop in demand. This is significantly different from retail, where increased demand was much higher, and decreased demand much lower. Wholesale prices across all regions were steady compared to a month ago.

Retail sales of 60 lb. Pails, which tend to be considered in some circles wholesale sales due to the fact that the honey is used in other products (baking, etc.), or even bulk sales when just mixed with other honey and bottled. We've found that most of our reporters sell pails for the 'use as is' customer, rather than for bulk, or sell bulk at essentially a retail price. Nevertheless, our reporters send in the prices for high end users, rather than packer prices. So, for retail pail demand, 21% reported an increase, 58% claimed no change in demand, and 21% said demand was down. Pail price across all regions has dropped, however, since December.

Bulk sales, as could be expected, are different. Only 3% reported an increase in demand for barrel honey. 37% reported demand from packers steady, (but weak), while fully 60% reported a drop in demand from packers. Price for bulk across all regions, while steady, remains low. It is interesting to note that demand has increased or remained steady at all levels except bulk (two thirds reported steady to increased demand), and prices have remained steady to increasing. However, bulk sales, demand and prices are down. Imports have significantly eroded this market.

	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)	68.67	59.75	74.00	76.00	84.42	63.33	58.43	68.25	75.65	77.50	92.00	60.50	39.00-145.00	69.25	70.48	59.55
60# Amber (retail)	67.15	62.25	68.00	72.67	81.67	64.50	57.83	65.50	78.30	62.00	83.67	67.30	32.40-125.00	66.15	67.05	57.45
55 gal. Light	0.60	0.60	0.60	0.66	0.50	0.65	0.60	0.60	0.60	0.60	0.65	0.59	0.50-1.50	0.60	0.63	0.67
55 gal. Amber	0.55	0.58	0.57	0.59	0.45	0.55	0.58	0.57	0.58	0.57	0.60	0.55	0.45-1.50	0.58	0.57	0.62
Wholesale - Case Lots																
1/2# 24's	26.80	29.18	25.96	30.67	25.96	27.83	26.39	25.96	30.00	25.96	24.00	25.96	12.24-37.20	28.43	29.01	30.08
1# 24's	43.25	38.87	46.80	41.35	51.91	42.50	42.86	39.92	45.60	42.00	52.67	47.20	24.00-48.00	43.73	43.75	43.72
2# 12's	38.00	36.84	45.60	43.15	40.35	38.30	38.10	40.40	39.20	37.50	34.00	42.00	29.40-52.58	39.07	38.29	38.78
12 oz. Plas. 24's	36.60	36.15	43.20	36.88	37.74	36.40	36.08	34.74	41.10	37.60	43.70	37.20	26.40-49.40	37.43	36.35	36.93
5# 6's	40.54	39.86	54.00	45.00	42.48	43.90	40.04	39.00	44.10	41.25	40.00	40.50	31.50-44.00	41.93	41.02	41.91
Retail Honey Prices																
1/2#	1.72	1.64	2.83	2.17	0.99	1.68	1.72	1.66	2.15	1.49	3.00	1.75	0.99-3.00	1.76	1.81	1.80
12 oz. Plastic	2.21	2.29	2.85	2.33	1.79	2.14	1.99	2.01	2.46	2.26	3.10	2.13	1.39-3.20	2.26	2.22	2.25
1 lb. Glass	2.68	2.62	2.95	3.06	1.89	2.71	2.36	2.43	3.25	2.40	3.25	3.03	1.58-4.00	2.73	2.70	2.83
2 lb. Glass	4.37	4.00	4.80	5.44	3.64	4.46	4.19	4.31	4.81	4.17	4.52	5.00	2.59-6.00	4.50	4.40	4.81
3 lb. Glass	5.98	6.21	7.80	6.94	6.01	6.93	5.74	5.90	5.55	5.49	6.36	6.00	3.85-8.00	6.17	6.32	6.53
4 lb. Glass	7.29	7.66	7.87	8.73	7.87	6.53	7.76	5.95	7.00	8.50	7.87	7.87	5.95-10.00	7.66	7.79	7.84
5 lb. Glass	8.73	7.95	11.10	9.76	8.04	8.08	8.90	11.99	9.00	8.95	10.05	9.00	6.50-12.50	9.13	9.21	9.57
1# Cream	3.30	3.29	4.22	3.61	4.22	2.88	2.55	3.18	4.73	2.62	5.67	3.20	2.25-7.09	3.32	3.39	3.49
1# Comb	4.07	4.31	3.60	4.20	4.07	4.17	3.90	3.00	4.92	4.07	6.00	4.38	1.95-6.00	4.25	4.21	4.25
Round Plastic	3.81	3.23	3.60	3.94	3.98	4.00	3.24	4.16	5.50	3.98	5.08	4.15	2.00-6.00	3.95	3.82	3.76
Wax (Light)	2.33	2.58	2.30	2.33	1.98	2.33	1.58	1.73	2.50	2.98	2.20	2.50	1.10-5.50	2.35	1.57	2.89
Wax (Dark)	2.05	1.92	2.08	2.28	1.53	2.26	1.51	1.15	2.00	2.53	1.93	2.00	1.00-4.50	2.08	1.27	2.48
Poll. Fee/Col.	36.39	40.40	31.50	34.20	37.54	36.25	38.60	40.00	27.50	37.54	50.00	39.00	20.00-55.00	37.61	38.65	36.71

?DO YOU KNOW?

Winter Stress

Clarence Collison
Mississippi State University

In most of the country, Winter is an extremely stressful time of the year for honey bee colonies. Fluctuating temperatures, long periods of confinement, moisture buildup within the hive, mites, nosema disease and inadequate food stores are just a few of the conditions that impact colonies during the Winter. How familiar are you with the conditions that affect colony Winter survival and colony management?

Please take a few minutes and answer the following questions to determine how well you understand these important topics.

The first 10 questions are true and 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).

1. ____ Uniting weak colonies in preparation for Winter is a recommended management practice.
2. ____ The queen will begin laying eggs as soon as it is warm enough for the bees to break Winter cluster and they can begin foraging for nectar and pollen.
3. ____ Early in the Spring, the majority of bees, brood and food are normally located in the bottom hive body.
4. ____ Pollen supplements are more effective than pollen substitutes in building up colonies in the Spring.
5. ____ Daily food consumption of a colony in the Winter is greatest during the broodless period.
6. ____ At low temperatures, small Winter clusters are more vulnerable to death than large clusters.
7. ____ Crystallized honey stores consumed during the Winter increases the incidence of dysentery.
8. ____ During the Winter, colonies heat the entire hive, so it is important to limit the amount of space that is provided for Wintering.
9. ____ Hive-top feeders are used in the Spring for the purpose of feeding a pollen substitute.
10. ____ Hives totally buried in the snow during the Winter usually smother to death.

(Multiple Choice Questions, 1 point each)

11. ____ A hive inhabitant that feeds by taking food from the honey bees' mouthparts.
    A. Greater Wax Moth Adults
    B. Female *Varroa* Mites
    C. Migratory Tracheal Mites
    D. Bee Lice
    E. Small Hive Beetles
12. ____ Treating colonies with fumagillin in the Fall is done to suppress _____.
    A. Chalkbrood
    B. Tracheal Mites
    C. Nosema Disease
    D. *Varroa* Mites
    E. American Foulbrood
13. When keeping bees in an urban situation, a barrier in front and to the sides of the hives is recommended. Name two advantages of using this arrangement. (2 points)
14. What are the two primary objectives for making the first colony inspection early in the Spring? (2 points)
15. Give two advantages of having an upper entrance for an overwintering colony. (2 points)
16. A colony will starve in mid-Winter even though there is plenty of honey in the lower brood-food chamber(s). Explain why a colony will starve if there is little honey in the upper brood-food chamber and may also starve if the upper brood-food chamber is honey-bound. (2 points)
17. Explain why more colonies die in late Winter/early Spring than during the coldest part of the Winter. (1 point)
18. Within the Winter cluster, heat production and heat conservation are two important functions related to survival. Describe how honey bees accomplish these two tasks. (2 points)
19. In mid-Winter, explain why feeding sugar candy is preferred over feeding sugar syrup when a colony is found short of food stores. (2 points)

ANSWERS ON PAGE 46

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Roger Morse

Research Review

"Kura clover is described as a deep-rooted, long-lived, spreading, rhizomatous, perennial."

The clovers are by far the most important nectar-producing plants in the United States. One species, which has been around for a number of years but that has not been widely planted is *Trifolium ambiguum.* It is sometimes called "honey clover", "Pellett clover" "Caucasian clover" (because it was originally imported from Caucasian Russia) and "kura clover." Kura clover appears to be the most popular name but I have not been able to find its origin. Pellett (1947) thought it was one of the greatest of honey plants. Articles about it have appeared in the bee journals as early as 1945 but I am not aware that farmers who use pastures have been so enthusiastic about it until a few years ago.

Kura clover is described as a deep-rooted, long-lived, spreading, rhizomatous, perennial. In a recent paper (Cherney, 1999), it is reported that plantings of kura clover in pastures in Minnesota have persisted for over 10 years even under intense use, including being pastured by sheep. In that state, it has tolerated summer drought, poor soil fertility and poor soil drainage. It is resistant to most of the viruses that attack white clover. It is also resistant to southern root-knot nematode. As a forage plant, it yields as well as red clover. Kura clover is adapted to the same area that supports white clover though it is more productive in the northern states where summer moisture is available.

The Iowa Beekeeper's Association petitioned the federal Secretary of Agriculture in the mid-1940s to name it Pellett clover because of the work Frank C. Pellett had done in checking on its potential as a honey plant and in calling it to the attention of soil conservationists. Apparently this petition was successful because the name occurs in some of the literature.

Appearance

Kura clover resembles alsike clover to which it is closely related. The leaves and flowers are larger than those found on most closely related clovers. The leaves are not hairy and are more pointed. The flowers are a pinkish white. The plant has an extensive underground root system. In fact, in 1943 its value as an aid in soil erosion was noted as a result of its being in the Pellett garden in Atlantic, Iowa (Editor, 1945).

In the spring, the growth of this clover is fast and the plants have upright stems that may be as high as 18 inches. In the Pellett honey plant garden, and planted in rich, black soil, the plant flowers from about June 1 through the first half of July.

Not easy to establish

Kura clover has poor seedling vigor and it is not easy to establish a stand. Weeds must be controlled during the first few months after it is planted, which can usually be done by mowing. Moisture is needed when establishing kura clover and moisture stress can reduce the number of plants. However, once established, researchers in Minnesota found that one plant per square foot will result in a successful stand. One researcher reported that it was not until the third year after planting that one could be certain a new seeding was established.

Bloat

In the case of most legumes, except perhaps birdsfoot trefoil, there is a problem with bloat when animals are freshly introduced into a pastures with legumes. It is for this reason that there is a strong effort to establish grass together with the kura clover. The grass helps to dilute the undesirable qualities of the clover that cause bloat.

Research in NY State

This clover, together with several grass species, was sown in 14 test locations around New York State this past Spring and more were planted this Fall. The drought in New York State this summer made it difficult to evaluate the new Spring plantings, in fact, many failed to establish.

Here in New York I am told there is still a great need for a legume that will survive long term in pastures. Alfalfa is, and probably for many years will continue to be the favorite legume for hay because of the high protein content of its leaves but it cannot be grown everywhere and it is not a good pasture legume. Alfalfa is very much site specific as regards soil and often times sites on the opposite side of a road may be different as regards the success of an alfalfa field.

There are currently three varieties of kura clover available in the U.S. One is Cossack that is available from Geertson Seeds. The others are Endura and Rhizo that are distributed by NorFarm Seeds (see your local seed dealer). BC

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Pellett, F C. *American Honey Plants.* Fourth Edition. Orange Judd, New York. 1947.

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Mark Winston

It's A Small World, Afterall

"We cocky Canadians had stuck our necks out by promising that this would be the finest beekeeping meeting ever held in the world."

I am not fond of roller coasters. In fact, I am mildly terrified of heights, especially heights from which you fall off at high speed and go around curves. I do, however, have a daughter, and anyone with a child in North America ends up at Disneyland or Disneyworld sooner or later, and we've been to both, more than once, and Disney has every imaginable variation of roller coaster.

I quickly learned to avoid the big kid rides, and gravitated towards Kiddieland, where I could get my thrills on the flying teacups and Dumbo. Those rides are my kind of tame fun, but my favorite ride is still the one where you get in a little boat and ride slowly through a well-lit tunnel while cute statues dressed in ethnic costumes serenade you with "It's a small world, after all" over and over and over again in about a million different languages. Typical trip to Disney finds me going around minimum three or four times, and who cares about the long lineup?

In September, 1999, however, I had an experience that combined the roller coaster and small world adventures. I'm referring, of course, to the week-long Apimondia meeting held here in Vancouver, for which the Canadian beekeeping community had spent almost ten years and literally tens of thousands of hours in planning. We cocky Canadians had stuck our necks out by promising that this would be the finest beekeeping meeting ever held in the world, and as the meeting drew closer we felt like we were being carried up to the top of the roller coaster, with a terrifying drop to the bottom becoming increasingly imminent.

What surprised all of us on the Canadian Organizing Committee was that, once the meeting started, we and everyone participating had a blast. This was a peak experience, and more fun than even Disneyland. Part of the fun was that we got to run around the convention centre with walkie-talkies (my nickname moniker was "Beast Master," not bad for a 50-year-old hunk wannabee). However, the best part was that I got to spend an entire week with 3000 beekeepers, scientists, honey packers, apitherapists, extension workers, government regulators, journalists, equipment sellers, and others, all whom were in the same special "it's a small world" space that I thought could only be found in the magic kingdom.

I took two key messages home from Apimondia. The first was verification of my most fundamental, bedrock belief that magic things would happen if everyone in the beekeeping community would get together and interact at the same meeting. I have always been concerned about the separate solitudes that too-often characterize the interaction between our beekeeping and research communities, and I rejoice when beekeepers and scientists get together and learn from each other. At Apimondia, my small world heart soared seeing scientists attend, learn from, and genuinely enjoy the sessions in which commercial beekeepers talked about their operations, and beekeepers absorbed in the latest scientific findings about integrated pest management in honey bee colonies, or the controversy about whether *Varroa jacobsoni* is really *jacobsoni*, or a new species being named *Varroa destructor*.

The second message was that beekeeping today is truly global, and that provincial, protectionist national attitudes no longer are viable in the international marketplace. Trade barriers have fallen along with government subsidies world-wide, and competition has become intense on the global scene. Like it or not, the way to make money in beekeeping today is to compete by producing either a better or a cheaper product, and those who remain rooted in past dependence on government protection will not survive in the shark tank.

The beekeepers who are successful follow one of two strategies. Some are pushing value-added goods, in which the low price of honey is increased by selling well-packaged, nicely designed, heavily advertised, high-end products. The other approach to success is to sell honey at low prices in large quantities. American beekeepers often are caught in the middle; costs are too high to compete globally in bulk honey, but not enough effort is put towards marketing to compete well at the high end.

Continued on Next Page

"Unfortunately, this meeting was not typical of most Apimondia meetings, which generally are considerably lighter in content, and disorganized."

American beekeepers rarely attend international meetings, but the opportunity to attend Apimondia in the relatively close and familiar country of Canada attracted a large number of U.S. beekeepers, and also honey packers. Indeed, one of the most exhilarating experiences of Apimondia '99 was a session sponsored by the U.S. National Honey Board on honey purity, in which packers, scientists, and marketing-savvy honey producers from around the world met one night and bonded. Many beekeepers attending this meeting approached me the next day and told me that this meeting alone was worth the trip to Vancouver, and I could see the wheels turning as they prepared to return home invigorated with ideas about keeping honey pure and prices high. Deals got made, markets opened, and contacts schmoozed throughout the Apimondia week, and an astute commercial beekeeper easily made sufficient money through these contacts to more than subsidize the trip to Canada.

Unfortunately, this meeting was not typical of most Apimondia meetings, which generally are considerably lighter in content, and disorganized. A successful world meeting such as the 1999 Apimondia in Vancouver raises the interesting question of how to carry on the model of a useful, engaging, and profitable international meeting into the future. We need a viable global beekeeping forum, and Apimondia in its present form must undergo considerable change to become that organization.

Apimondia has its headquarters in Rome, and consists of the national organizations of member countries that pay annual dues to belong. The idea of Apimondia has been better in concept than reality in recent years. Heavy on protocol and light on substance, plagued by financial problems and bureaucratic inertia, the Apimondia organization is weighed down by a past history that was dependent on its relationship with eastern European countries, particularly Romania. Apimondia is teetering on the brink of collapse, its long-term viability a real issue, and many member countries no longer even pay their minimal dues. Others, such as the United States, have refused to become members.

Perhaps now is the time to revitalize Apimondia, and turn it into a functional, representative, and viable force to serve the international beekeeping community. And yes, I have some tangible suggestions:

1) Move the headquarters away from Rome. A radical break from the past is needed to resuscitate Apimondia, and there is too much baggage in Rome (including a villa with an interesting history) for Apimondia to easily change and move ahead.

2) Transform Apimondia's organizational structure to emphasize democracy and representation from diverse perspectives in the beekeeping community. The executive council of Apimondia includes too many members who are Standing Commission Chairs with scientific backgrounds, and there is not enough balanced representation from the beekeeping community through its constituent countries.

3) Merge, or at least ally, Apimondia with the International Bee Research Association (IBRA), currently located in Cardiff, Wales. It is ludicrous to have two international organizations focussed on similar objectives. Apimondia includes bee research in its organizational profile, but IBRA covers that territory much better. Why not have Apimondia address international beekeeping issues, and deal with meeting logistics every two years for the international meeting? Let IBRA deal with research matters and organize the scientific program for the biannual meeting. Each organization separately is financially weak, but together they could form a dynamic and financially viable duo.

4) The United States should join for a trial period to advocate change. The U.S. national organizations have refused to join Apimondia in the past, for reasons involving the problems Apimondia has experienced and a politically naïve approach made by Apimondia to American beekeeping groups many years ago that left a bad feeling among U.S. beekeepers. An Apimondia without American participation is a weaker world organization, but I also understand why the United States is not participating. Let's join for a year, but make membership renewal contingent on significant changes to Apimondia structure and function.

If appropriate changes in Apimondia don't appear by the next meeting, to be held in South Africa in 2001, we should begin again. I would encourage the movers and shakers of beekeeping politics around the world to work with Apimondia for change. If change is not forthcoming, perhaps it's time to set off in a different direction, with a new organization that provides the quality global service our industry deserves.

I know there is considerable talk among the Apimondia executive council about change, but the clock is ticking and the world's patience is running out. The Canadian-organized Apimondia '99 showed us all what could be done in the international beekeeping arena, and now that the bar has been raised, none of us will settle for less than the new standard. We've learned that it is a small world, but we've also learned just how much we can be when that small world works together. BC

Mark Winston is a professor and researcher at Simon Fraser University, Burnaby, B.C. Canada.

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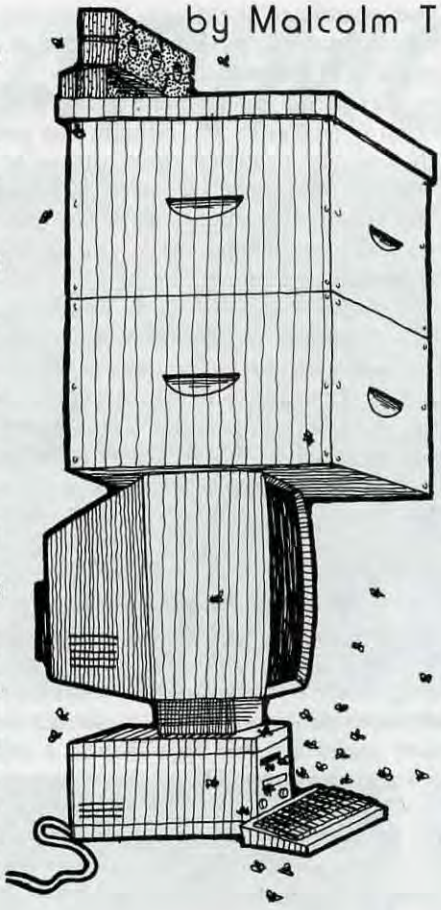
Beekeeping In The Digital Age

by Malcolm T Sanford



http://bee.airoot.com/beeculture/digital

The Beekeeper's Home Pages

The World Wide Web began only a **few years ago.** The first beekeeping home page I can remember was put up by a graduate student named Jordan Schwartz at the University of Washington. I can recall thinking at that time that this was a consequence of the digital revolution. A person relatively unknown in the beekeeping world could lay claim to the first page on the World Wide Web with this ambitious title. There's one reason; he was there first. Mr. Schwartz has now changed his site's title to the **Beekeepers Reference Page.** Domain names are somewhat different. Mr. Gilles Ratia, for example, has purchased the right to use **beekeeping.com and apiculture.com**, but no one can really lay claim to having the definitive beekeeping home page, although occasionally someone will give it a try. One site gets A for effort. It is put up by Ron Miksha in Calgary, Alberta, Canada. The URL is: **http://ourworld.compuserve.com/homepages/beekeeping/**

Mr. Miksha calls his site the beekeeper's homepages. On the first page he says, "Everything you want to know about beekeeping, honey, and honey bees is right here! (O.K., not everything!)." That's about as pretentious at you will find here; in the end, of course, the author gives up the original goal as unrealistic. Indeed, a visitor to Mr. Miksha's site has difficulty finding out the developer's name at all. In response to my e-mail query, he sent the following: "I've been getting stung for forty-five years, being a member of a family bee business that started in the 1930s. One of my older brothers is David, a queen breeder in Groveland, Florida. Members of our family ran independently owned and operated honey farms. I took off for Saskatchewan in the 1970s, continued to raise queens in Florida until the border was slammed shut. My degrees are in geophysics and today I live and work in Calgary, Alberta, in a field unrelated to bugs. I still keep a handful of bees in the Rocky Mountain foothills and I am president of the Calgary and Area Beekeeper's Club. I try to work a few hours (no more than 4) each month on my site, doing all the coding with nothing more sophisticated than a text editor. I gather what gossip I can and pass it off as unfiltered news. Surprisingly few people have complained. I started the web site in 1995, when only four other web pages for beekeepers existed. I saw interest (and, of course, web use) move traffic from 30 visitors the first week to an average of 1800 per week today."

Mr. Miksha's work has produced a comprehensive listing of home pages related to apiculture. These run the gamut from **meetings and events** to **comb honey**, which Mr. Miksha sells. The former lists meetings not only in Canada (**Ontario**), but world wide. The **Second International Conference** on honey bee mites in Tucson, Arizona is given billing as is the 7th IBRA Conference on Tropical Bees, to be held March 19-25, 2000, Lotus Hotel Pang Suan Kaew, 99/44 Huay Kaew Road, Chiang Mai 50200 Thailand.

The **computer software page** proclaims "Computer Programs for Beekeepers are WINDOWS programs designed to entertain and educate the beekeeper! Written by a beekeeper, for beekeepers!" Several programs are bundled into one package for sale. They include: (1) **Honey Calculator**: Enter the day's weather, hive, and crop conditions and the Honey Calculator will tell you how much honey the hive should have made for the day and how much money the honey is worth!; (2) **Beekeeper's Quiz**: Are you a Master Beekeeper? Over 300 fun multiple choice questions will challenge you; (3) Beekeeper's Icons: This tutorial will help you learn how to install the twenty icons included in the package. Really dress up your WINDOWS desktop; (4) Beekeeper's Data Base: Names and Addresses of North American Bee Inspectors, Scientists, and Association Leaders; (5) Beekeeper's Clip Art: Dozens of Graphics and Photos which you can use on letter heads, labels, newsletters!; (6) Beekeeper's Games: Memory Match and Puzzles for Beekeepers; (7) Bee Feeder: Calculates the amount of honey your bees will need to survive the winter; and (7) Beekeeper's Maps: Geographic Information on North America, with key nectar sources and hive production.

The beekeeper's homepages also has one devoted to **beginning** the craft. Here Mr. Miksha discusses everything from interactions with federal marshals to the immense amount of money one can spend on a beekeeping vocation. He concludes: "If you are wondering about how much cash you'll need to get started, that

Continued on Next Page

DIGITAL BEEKEEPING ... Cont. From Pg. 19

depends. One hive of bees with supers (boxes) to hold comb honey and equipment to take care of the bees (veil, gloves, smoker, feeding equipment) will probably set you back three hundred dollars. Ten hives with an extractor to separate combs from honey and all the other stuff required will be about two thousand bucks. Three thousand hives with semi-trucks, fork lifts and a couple of twelve thousand square foot warehouses will run you at least half a million dollars." Another collection of information appears on the **news page**. Here is one of the latest, dated November, 1999: "How's the honey market? A friend in Pennsylvania calls it dismal. He'll lose twenty thousand dollars this year, running just four hundred hives. Lucky for him, he has a real job. The issues are the same as always. Lower commodity prices, higher input cost. 'Farming is the only business where you pay retail for everything you buy and get wholesale prices for everything you sell,' he told me. In an interview with Hannelore Sudermann, staff writer for the Seattle daily paper, Richard Adee says, 'The market for honey right now is really, really quiet. I'd say it's dead. The president of the American Honey Producers Association adds, 'We've had 30 million more pounds imported this year over last year. There is quite a pile of honey.'" This section also links to a **collection of** writings by **Andy Nachbaur**, who had a large influence in cyberspace, which continues even in his absence. Other pages have to do with **answers** posted to e-mail questions, a series of pictures of **Benny the bee**, billed as ambassador of world wide beekeeping rescued from a carnivalous life, and descriptions of **how** honey is processed and **queens** are produced.

My favorite part of the beekeeper's home pages is the huge collection of web sites Mr. Miksha has posted. He describes this as five hundred great places to **bee on the web**. A clickable map allows one to point to anywhere in the world and find an appropriate site. For example, selecting Brazil brings up a **site in Portuguese** all about Africanized honey bee history. One can also peruse the list alphabetically. Thus under the letter f, we see **Fiji**, **Finland**, and **France**. As one might think, the Canadian beekeeping situation is well represented, including a description of **Alberta** beekeeping and a fact sheet on honey production from **Agri-Food Canada**. The link to information on **trends 1998/1999** at Ag Canada is a must see for anyone remotely interested in Canadian beekeeping. The very large list of links found on this site points to a continuing paradox of the digital information revolution. Although lots of information is out there, it seems increasingly difficult to find some that is relevant to one's need. How does one organize all these links, for example, and navigate them efficiently? Listing them by geographical location and/or alphabetically according to country as found on the beekeeper's home pages are two approaches. I will explore others in future columns. BC

Dr. Sanford is Extension Specialist is Apiculture, University of Florida. He publishes the APIS Newsletter: ***http://www.ifas.ufl.edu/~mts/apishtm/apis.htm***

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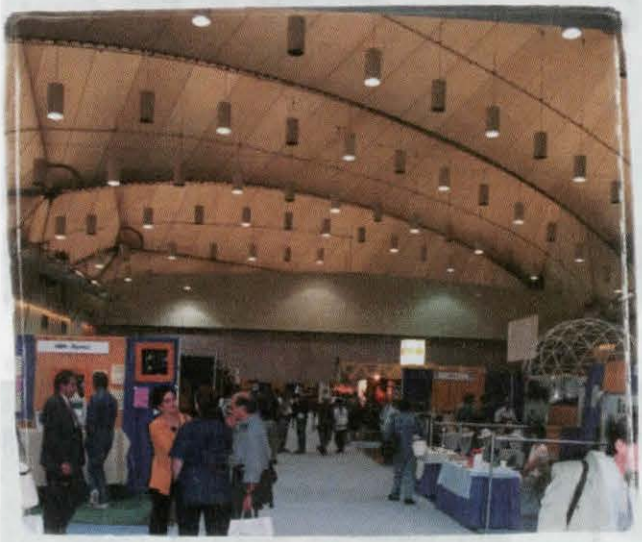
APIMONDIA 1999



The vendor area was as large as two football fields, or so it seemed.

Draper's from Pennsylvania, had a display of their observation hives.

Bee Biz, *the International Magazine of Commercial Beekeeping had a display and the Editor also gave a talk.*

From the harbor, the Conference Center, the building with the sail-like peaks behind the cruise ship, fit well in the architecture of Vancouver.

Three other U.S. businesses – Ross Rounds, BetterBee and B&B Honey Farms were on hand.

Mann Lake's large display was unique, and it won an award.

Continued on Next Page

Newton's Liquid Bee Smoke, another U.S. operation was as popular as it was fragrant.

Bees for Development's educational display drew lots of attention, and gave out lots of information.

Apistan, a Novartis product, was one of the sponsors and had a display large enough to walk through.

Paul Jackson's antique smoker display was unique, educational and a real plus for the U.S.

South Africa, host to the 2001 Apimondia conference, had a display, sponsored a reception and gave away tons of literature. They already have their vendor package, room reservation and meeting venue arranged – way ahead of schedule.

Heading up the harbor, away from the city, the rugged beauty of British Columbia becomes apparent.

The new President of Apimondia, Asger Søgård Jørgensen, from Denmark, assumed his duties at the closing session.

These photos, mostly from the ApiExpo area, were taken by Kim Flottum.

CRYSTALS IN HONEY

Bertil & Elizabeth Enoksson

Following The Crystallization Process

Abstract Extracted honey is supersaturated with regards to glucose. When it granulates, glucose precipitates as solid crystals.

A method to determine the amount of crystals formed during the granulation of honey has been developed. The sample of honey to be tested is centrifuged, and the separated liquid is analyzed. The amount of crystals is calculated from the difference in concentration of a soluble component in the separated liquid and in the original honey.

From the values for both water and glucose it is confirmed that the crystals consist of glucose monohydrate. It has been established that creamed honey is formed at a content of glucose monohydrate crystals as low as 7 percent.

This method makes it possible to follow the crystallization process and the changes of granulated honey during ripening and storage at different temperatures.

Method To determine the amount of crystals in honey simply by weighing the solid phase is not possible because the solution adheres to the crystal surfaces.

A more sophisticated method is needed. Any component whose concentration in the liquid phase changes with the crystallization of glucose can be used as a base for the calculation of the amount of crystals. I have chosen water and glucose. The water content was obtained from measurements of the refractive index in an Abbe refractometer. The glucose content was measured in a Hemocue B-Glucose photometer (after enzymatic breakdown of glucose). By measuring two components in the same sample in this way, the composition of the crystals can be evaluated.

Sedimentation At 20°C the density of glucose is 1.56 g/cm^3, and of glucose nonohydrate 1.54 g/cm^3, whereas the density of the mother liquor is about 1.40 g/cm^3.

If honey is left to crystallize without being stirred, the crystals formed settle and part of the mother liquor can be decanted and analyzed. If the crystals formed are very small, as in a good cremed honey, the separation is more difficult. However, it is possible to separate part of the liquid phase of cremed honey by centrifugation.

The first experiments with centrifuging honey were performed in a Spinco Ultracentrifuge Model L at 30,000 revolutions per minute. The experiments showed that the changes in the crystallization were slow, and thermostating the centrifuge was not necessary. This made it possible to use an MSE Micro Centaur Centrifuge at 13,000 revolutions per minute giving the gravity acceleration of 120,000 m/s^2. Yet it was difficult to separate the liquid phase from hard types of honey which had been stored at temperatures below 15°C. As this is an area of particular interest, the centrifuge method was refined. The centrifuge tubes were fitted with filters of polysulphone. The liquid phase was then obtained as a bottom layer instead of as a top layer. In experiments where only glucose content was analyzed, the centrifuging time could be reduced to below 15 minutes, which gave several advantages. Samples of honey stored at temperatures down to 0°C could now be investigated, even those with well-built-up crystalline networks.

In the beginning of the honey crystallization, the amount of liquid separated is often very small, which may be due to stoppage of the pores of the filter with small crystals. During the centrifugation procedure, the amount of separated liquid increases but decreases as a dense network is being formed.

Calculation Suppose that honey contains W_h% of water and G_m% of glucose. In the mother liquor, the water content measured was W_m% and the glucose content G_m%. If glucose crystallizes as $C_6H_{12}O_6$, the amount of crystals from the water determinations is calculated as $[C_6H_{12}O_6]_w = 100\ (W_m - W_h) / W_m$ and from the glucose measurements as $[C_6H_{12}O_6]_G = 100\ (G_h - G_m) / (100 - G_m)$.

The corresponding values for crystals of glucose monohydrate, $C_6H_{12}O_6\,H_2O$ are calculated as $[C_6H_{12}O_6$

Continued on Next Page

Bertil & Elizabeth Enoksson live at Valla, Skepptuna, Sweden. He is a professor in the Department of Physical Chemistry, Uppsala University. Elizabeth Enoksson, his wife, was the photographer for this article.

CRYSTALS ... Cont. From Pg. 23

$[H_2O]_w = 100(W_m - W_h) / (W_m - 9.09)$ and **$[C_6H_{12}O_6\ H_2O]_G = 100\ (G_h - G_m) / (90.9 - G_m)$.**

If glucose crystallizes without crystal water as $C_6H_{12}O_6$ then **$[C_6H_{12}O_6]_w = C_6H_{12}O_6]_G$.**

If **$[C_6H_{12}O_6\ H_2O]_w = [C_6H_{12}O_6\ H_2O]_G$** glucose has crystallized with crystal water as glucose monohydrate.

Glucose crystals in honey In developing the centrifuge method, glucose and water content were measured for various honeys in the temperature field from 7°C to 25°C. The crystal amount was calculated both as glucose $[C_6H_{12}O_6]$ and as glucose monohydrate $[C_6H_{12}O_6\ H_2O]$. In the following table, the samples of honey are identified by the content of water W_h and that of glucose G_h. The ratios of the amount of glucose crystals calculated from the glucose analyses to that from the water determinations $[C_6H_{12}O_6]_G$ / $[C_6H_{12}O_6]_W$ were compiled in Table 1 as G_G/G_W and the corresponding values for glucose monohydrate $[C_6H_{12}O_6\ H_2O]_G/[C_6H_{12}O_6\ H_2O]_W$ as H_G/H_W.

Table 1. Glucose crystallization in honey.

Sample of honey		Tests	G_G/G_W		H_G/H_W	
W_h	G_h	number	std dev		mean	std dev
14.7%	34.7%	7	2.036	0.27	1.003	0.12
15.9%	35.3%	12	1.788	0.10	0.996	0.05
15.7%	36.4%	7	1.884	0.10	1.028	0.05

As seen from Table 1, H_G and H_W are very nearly equal whereas G_G and G_W are markedly different from each other. This indicates that glucose in honey crystallizes as glucose monohydrate $[C_6H_{12}O_6\ H_2O]$. This is also in agreement with the conclusion drawn from measurements of solutions of glucose, fructose and water. As a comparison, a few experiments were made with suspensions of 35% water-free glucose in a solution of 73.8% fructose in water. The mixture thus consisted of 48% fructose, 17% water and 35% glucose. Fructose was completely dissolved, while glucose was partly in solution and partly as a sediment on the bottom of the vessel. The mixture was held at 24°C for two days with frequent stirring. After decantation, the liquid phase was analyzed with respect to water and glucose. G_G/G_W was calculated as 1.06 and H_G/H_W as 0.66. This indicates that the crystals had not taken up water but consisted of glucose $[C_6H_{12}O_6]$. Glucose without crystal water does not function as a starter in honey processing. Glucose monohydrate $[C_6H_{12}O_6\ H_2O]$, however, is effective. A suspension of water-free glucose in a fructose-water solution has no similarity to creamed honey in spite of its nearly equal composition. The crystals of anhydro-glucose have no ability to bind fructose solution in a crystal network. The hydrogen bonds so important to the structure and flow properties of honey cannot develop with anhydroglucose $[C_6H_{12}O_6]$. A study of solutions of glucose and fructose in a greater temperature range should contribute to our knowledge of what makes honey so special. A honey with 37% glucose and 16% water was heated to free it from crystals. Then it was cooled and stored at 15°C for 50 hours. A sample was seeded with 0.8% granulated honey containing 38% glucose. After 75 hours at 15°C, a fairly stiff cream was formed. In the same way but with only 0.4%, granulated honey, the cream obtained was soft, containing only 7% solid glucose monohydrate.

Amount of crystals in honey Figure 1 shows measurements of glucose in the liquid phase of a honey consisting of 35% glucose and 16% water. On the basis of this diagram, we can estimate the supersaturation at different temperatures and predict how much glucose monohydrate has crystallized at equilibrium.

Figure 1 also shows good agreement even with honeys which deviate from the type which is the basis of the diagram. Thus, a forest honey with 30% glucose and 18% water gave a liquid phase with 18% glucose at 17°C. However, the amount of crystals was lower, 17% against 25% according to Figure 2. This is obvious as glucose starts to crystallize at a lower temperature because the glucose content is less and the water content higher in this sample.

On assessment of the crystallization of honey the concentration of glucose in the liquid phase is particularly important. After the first crystals of glucose monohydrate have formed the crystallization process is fairly equal for most honeys. This is also valid for pure solu-

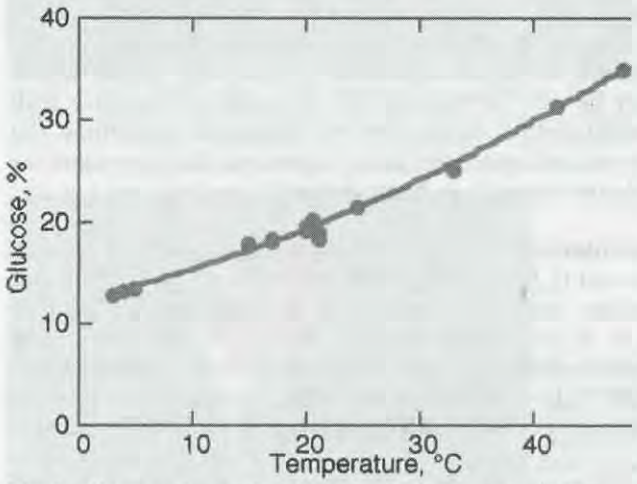


Fig.1. Glucose in mother liquor of honey containing 35% glucose and 16% water.

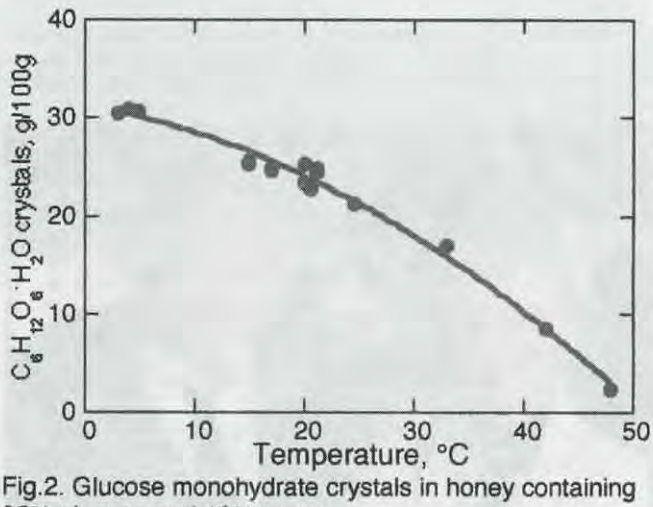


Fig.2. Glucose monohydrate crystals in honey containing 35% glucose and 16% water.

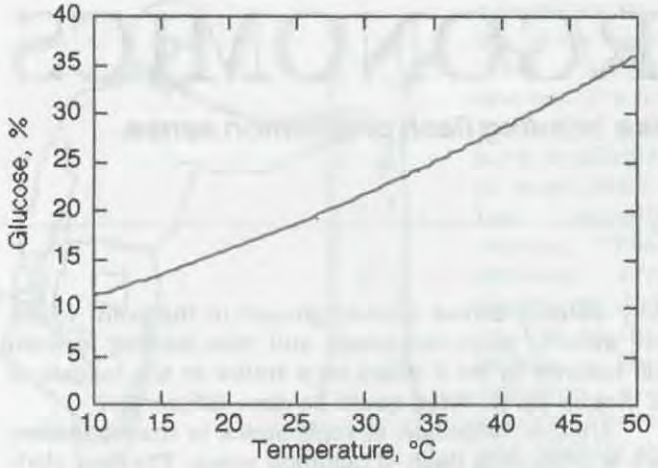


Fig. 3. Glucose in mother liquor of a mixture containing 36 % glucose, 47 % fructose and 17 % water.

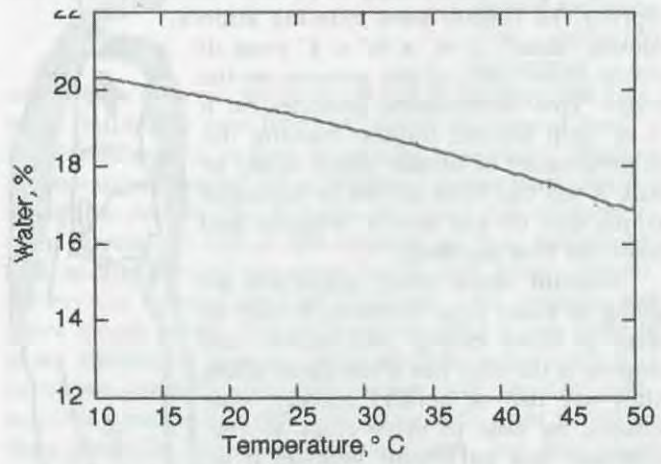


Fig. 5. Water in mother liquor of a mixture containing 36% glucose, 47 % fructose and 17 % water.

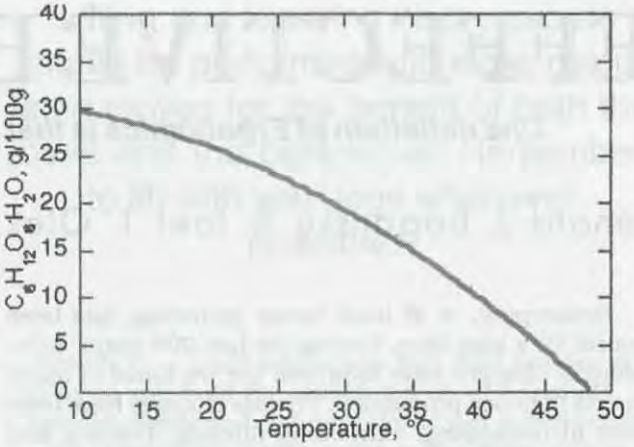


Fig.4. Glucose monohydrate crystals in a mixture containing 36% glucose, 47% fructose and 17% water

tions of glucose and fructose in water at various concentrations similar to those of natural honey as shown by the diagrams in Figure 3 and Figure 4. The values are calculated from solubility data of glucose in fructose solutions. In estimating the storage properties of honey the water content is significant. Figure 5 shows the increase of water content in the liquid phase owing to the crystallization of glucose monohydrate. BC

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EFFECTIVE ERGONOMICS

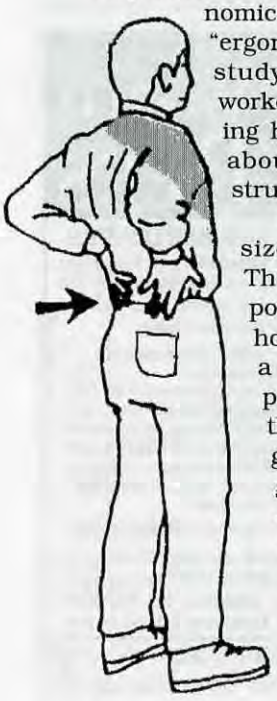
One definition of Ergonomics is that it is a blinding flash of common sense.

Ronald J. Bogansky & Joel T Oleksa

Beekeeping, or at least honey gathering, has been around for a long time. During the last 200 years, technological changes have improved the workload of many aspects of honey production. Process changes have been made in uncapping, extracting, filtering, bottling and shipping. One area, though, that remains virtually unchanged is the handling of hives.

As people identified the commercial value of honey, they realized the need to produce as much of it as possible in a particular area. A skep is adequate for household quantities but not for mass production; hence, the development of the hives as we know them. Beekeepers of the 1800s designed stackable units that the bees could easily work, provided much larger storage capacity per unit area, and were manageable by the beekeeper. For the number of hives that the beekeeper managed, the new hive design was a great development. As time rolled on, the demand for honey increased and a commercial market came into being. Beekeepers who had three or four hives on their property started "farming out" beekeeping services to other locations, increasing the number of hives from a few, to tens, and hundreds of hives. Technology changed with this mass production of honey. Different tools were developed for uncapping the comb. New centrifugal methods of extraction of honey from the comb quickened the process. Filtering and bottling procedures improved. Additional markets opened up for honey, beeswax and pollen. But the hive design did not change.

Very little has been published concerning the ergonomics of beekeeping. One definition of "ergonomics" is that ergonomics is the study of fitting the workplace to the worker rather than the worker contorting himself to fit the work. Let's think about the hives, how they are constructed, and how they are handled.



Supers basically come in three sizes: shallow, medium and deep. These supers weigh 40, 60 and 80 pounds respectively when filled with honey. Typically, the only "handle" is a ½-inch groove that is cut into opposite sides of these boxes. To move the super, it is grasped with the fingertips since the groove is the only grip point. This does not allow for a strong, comfortable grip. Because of the awkward hand positioning and weight, we tend to hurry the lift by lifting quickly (usually starting from an inappropriate position), twisting our body trunk rather than our feet to make a turn, rapidly walking across uneven ground to the point where we want to place the super, and then leaning forward off-balance to set it down on a trailer or the tailgate of a pickup truck. What could be done differently?

Another definition of ergonomics is that ergonomics is a blinding flash of common sense. The first obvious change could be to change the handhold of the super. Please note that the following should be performed on the supers before they are placed in the field in the Spring. To modify your existing supers, simply, attach a ¾" x ¾" x 4" cleat directly above each of the grooves on the sides. This modification provides for a 1-¼" grip for the hands, making the supers easier to handle when empty or full. A top bar from an old or damaged frame can be cut into 4" lengths and used for this purpose.

Second, think about where you are going to place your colonies. It may be easy to carry empty hive bodies and supers to the site, but what about when they are full of honey? Ideally, you should be able to drive close to the colonies and park your vehicle. It is realized, however, that the best placement for the landowner may not be the best placement for the bees or the beekeeper.

Now that you have thought through the process of colony placement, the next step is determining how you will get them there. An established colony can weigh well over 100 pounds depending on the time of year it is being moved. One hundred pounds is not easy to move when it is an awkwardly shaped container, or over rough terrain, or over long distances. GET HELP! There is a device called a two-person hive-lifter that is available through a number of supply houses. These work. It divides the load in half. It also provides a comfortable handle and lifting technique. If you absolutely, positively need to move the colony by yourself, use a hand truck or other modified cart. You may also consider separating the colony and moving it in sections. This may not be the best or fastest method, but dropping a colony of bees halfway through the move will make you angry, you may get hurt, and the bees will not be pleased either.

Third, is it easier to pick up something light or something heavy from ground level? Certainly, the lighter the weight, the easier it is to pick up. Think about that when placing the colonies in the field. They should be eight to 12 inches above the ground. Concrete building or chimney blocks are good for this purpose. An excellent hive stand for two colonies can be

assembled using three concrete blocks and two 3" x 5" landscape timbers available at most building supply stores. The timbers are placed parallel on top of the blocks. The colonies are placed above and slightly to the inside of the two outer blocks. The space between the colonies becomes an area where supers can be placed while working the colonies. Nothing is ever lifted or placed at ground level.

Placement of supers is equally important. Shallow supers should be placed at the lower (below waist height) positions. As the hive is built up, place the medium or deep supers on top of the shallow so that handholds will be positioned between waist and chest height. (When the supers are full of honey, this position will allow for an easier starting position lift.) If you need to place additional supers, place shallow supers when at or above chest height. (We realize that the big, commercial operations may not agree with this setup as they generally use only one size super, but they must remember that they typically use mechanical means to move the hives that are usually on pallets. The sideliner or hobbyist will almost always do things by hand using manual labor). Here is one other thought on super size. Full-depth supers should be used only as hive bodies. When full of honey, they are just too heavy to be moved and carried safely. If one wanted to standardize an operation and use only one size, then the medium should be chosen. Three mediums will make an adequate brood chamber and can be interchanged with honey supers if needed.

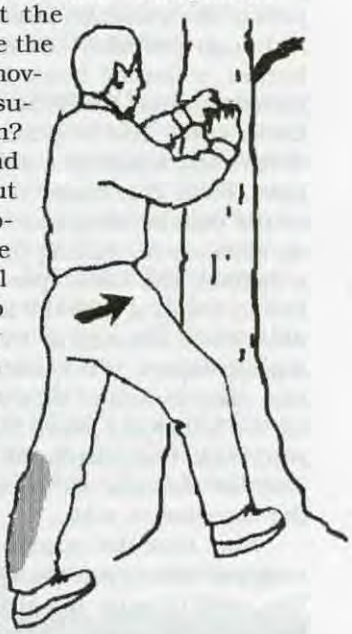
Now that the supers are in place in the field, think about how you work the colonies during the season. You arrive at the apiary and climb out of your vehicle. The first thing that you probably do is survey the situation, looking at the hives for bee activity and hive damage. You check (or at least should check) the ground access from and to the vehicle for obstacles such as rocks, branches or previously forgotten equipment. When satisfied, you start collecting tools. This is the first point where you need to change your routine. Stretch! You have been sitting in the vehicle for some time, and now you need to do some extremely physical activity. You need to warm up the muscles throughout your body before you make that first lift. Warming up can be accomplished through stretches. Follow the recommended sketches accompanying this article. (Shaded regions indicate the muscle areas to stretch.)

"Lifting and lowering heavy supers should be performed with slow, calculated moves for the benefit of both the bees and the beekeeper Remember to lift with your legs whenever possible."

- Stretch to a point where you feel mild tension and relax as you hold the stretch for 10 20 seconds.
- Breathe slowly and rhythmically as you stretch within your comfortable limits; never to the point of pain.
- To stretch correctly, the feeling of the stretch should slightly subside as you hold the stretch.

Now, start collecting your tools.

After you light up your smoker, the next thing you do is approach the hive and begin smoking the entrance. Use a nice, slow, squatting technique (rather than bending at the waist) to reach the low entrances. Squatting reduces the strain on the lower back. Now you are ready to start taking apart the colony. If you wish to examine the brood nest, this may mean removing three or four partially full supers. Where will you put them? If you use the two-hive stand described earlier, you can put the supers between the colonies. In lieu of this, spare hive bodies or similar devices will provide a *platform* on which to place the heavy supers. Every apiary should have one or two spare boxes kept there permanently. This is a good way to recycle old, unusable boxes. A used box on its side also provides a seat for the weary beekeeper.



Every beekeeper knows that jarring and jostling of supers makes for an upset colony. This can lead to a quite painful experience. Lifting and lowering heavy supers should be performed with slow, calculated moves for the benefit of both the bees and the beekeeper. Remember to lift with your legs whenever possible. Keep the load as close to your body as possible. If you already have problems with your lower back, this is the point where you would benefit from the weight advantage of shallow or medium supers. Avoid *twisting* your upper torso. Make a turn with your feet. This also reduces the strain on your back. If making many lifts, TAKE A BREAK. We tend to develop a sloppy technique when we get tired.

A habit many beekeepers get into is to hold their smoker between their legs, just above the knees when moving supers off a colony. This prevents them from moving their feet when they turn, thus only twisting at the waist so they can set the super somewhere. Though

ERGONOMICS ... Cont. From Pg. 27

it may seem efficient to work this way, the long term effects are almost always devastating. Do not hold your smoker there when lifting. Set it down, grab the already-loosened super and gently lift. Turn, using your feet and set it down, preferably on a box, hivestand or other device raised off the ground.

In late Summer and Fall, the above activity is repeated with the addition of moving the heavy, full supers to the transport vehicle and on to the honey house. Although probably too expensive for the hobby beekeeper, a flatbed truck is probably the best mode of transportation for supers. However, a flatbed utility trailer could also be purchased for a couple of hundred dollars and would be a worthwhile investment for a hobbyist. First, it is easier to place the supers on a flatbed rather than bending over the tailgate or sides of a truck, or, even worse, putting them in the trunk of a car. With a flatbed, the beekeeper can lower the load onto the bed by bending with the legs rather than with the back. Also, avoid bending at the waist when lifting or lowering the supers. It is common knowledge in the industry that each pound of honey that goes to market is lifted by the beekeeper about 30 times. Therefore, be kind to your back. Don't overburden it. Let your legs do the work. After all the lifts are completed, stretch again to help the muscles to relax.

Now that the supers are on the vehicle bed and strapped down, you transport them to the honey house. You need to move the supers again, this time from the bed into the house. Use the same process as before. Survey the path you are going to take. While surveying, stretch. Remove any obstacles or at least note those that can not be removed (curbs, steps, etc.). Have the weight of the super placed between waist and chest height. Use your legs for the lift. Turn with your feet. Do not twist your trunk. Again, if using different size supers, place the lighter, shallow ones close to the floor. As the stack gets higher, place a medium super between waist and chest height and finish off with shallow ones. Strategically place your supers, frames, buckets, etc., to minimize lifting or additional moving of the supers during the extraction process.

It is realized that you may be constrained by the placement of the colonies in the field, the type of vehicle you use, and confines of the honey house. By thinking and planning each step ahead of time, you can avoid serious injury. Beekeeping requires certain activities to be performed at specific times. They cannot be done earlier or later. A serious injury may prevent you from performing the required duties. Besides the pain that may be experienced from the injury, your bees may suffer and there may not be any harvest. If you do not have time to think of an ergonomically correct plan at the start of the honey season, you will have ample time after the injury puts you on the sidelines. We keep bees because we enjoy it. Let's not let an injury take that away from us. BC

Ron Bogansky is a regional safety manager for a large industrial company and has been keeping bees for 15 years as a sideline. With his wife, Carol, they own and operate Bogansky's Milk and Honey Farm in Kutztown, Pennsylvania.

Joel Oleksa is a consultant with C & O Solutions, Macungie, Pennsylvania. He is both a safety and ergonomic specialist, providing ergonomic consulting services to the office and industry. He is also a serious amateur bread baker who uses honey in his original, award-winning recipes.

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James E. Tew

Bee Culture's Beeyard

The BC Yard Is One Year Old! (Is that Good or Bad?)

You presently have a significant advantage over me. As I write this article, it is the very last of November, 1999, while you are presently reading it in January, 2000. I don't know how the millennium change is going to proceed, but you already know. You were there. Though we, as humans, have been intrigued by the Y2K event, my bees have never given any indication that they were interested in the least. I doubt they partied at all.

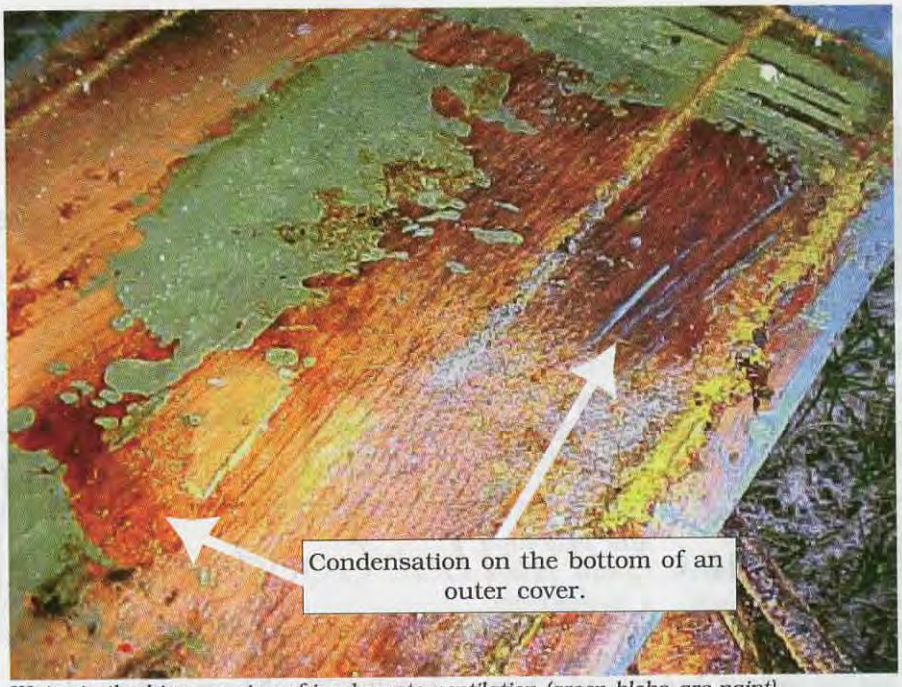
How much truth can you stand? Though I have not lost interest in beekeeping for the past twenty-seven years, I must admit that I have not always maintained a "high- burn" level during all that time. I have just finished the requisite annual Thanksgiving events and am heading headlong into the Christmas/ Y2K season. I spent some time looking for various bee-related Christmas gifts for my Dad, but didn't find anything. Other than that, my bee related activities in conjunction to my bee yard, have been minimal. In all honesty, I have not been to my bee yard in about two weeks. Is that bad? No, I don't think so. Have I lost interest? No, not in the least. There are other things on which I need to focus. Though bees are a major part of my life, they are not my total life. Having grown older and realizing that wisdom is always just a few steps ahead of me, I am comfortable telling you that you need not be consumed with bees on every day of every month. There are active months and there are months that are not so active. The period between Thanksgiving and Christmas is a notoriously slow season for beekeeping. We all have peaks and valleys in our beekeeping interest. I'm not worried about the valleys and look forward to the peaks.

Soybean Honey Thanks to those of you who wrote to tell me of your soybean honey experiences. There's no science here, but obviously soybeans do produce enough nectar in some places to provide a surplus honey crop, but those locations appear to be erratic or at best disjointed. I suppose I will leave the soybean honey topic by saying that those of you who get it should appreciate it and those of you who don't can continue to wonder why you don't. I can't offer an explanation.

Wintering colonies in a light snow. (Note Entrance reducers to exclude mice.)

Bees tightly clustered for Winter warmth. The Apistan ® strip has been removed.

Continued on Next Page



Water in the hive – a sign of inadequate ventilation (green blobs are paint).

Working Bees in Odd Conditions Some of you may recall that I briefly, very briefly, considered the possibility of working bee colonies after dark. I know it is not practical, but keep in mind that my Great-Grandparents went to bed at sundown and arose just a bit before dawn. Just this past evening, I was up reading until 1:30am. Having said all of that, I don't see much advantage in attempting to perform serious beekeeping procedures after dark. I have unintentionally developed a short list of unworkable bee conditions – working hives under water and after hard dark. To that list, I now ask that you add *hard winter*. There's just not much to do in the yard during the cold season.

In the Winter Bee Yard I had planned to visit the yard, check on my bee charges and give you a report. The problem is that it's cold there. Not as cold as February but cold enough for late November. I have a small electric heater in my bee yard shack. I fired off and prepared to record thoughts from the winter yard, but due to the cold, the old computer I keep there would not boot up, but rather just kept beeping at me. While things were warming up a bit, I went out to the bees.

The Wintering Hive All things considered, and given the early stage of winter, all things look good. The clusters were correctly down in the bottom deep and the top deeps are filled with honey in anticipation of the cold season.

Wintering Biology – A Short Course As shown in the photo, bees cluster tightly together to generate warmth. Bees don't go dormant nor do they hibernate. They just sit there quietly all winter huddled together on or very near their food supply. Micro-vibrations of the flight muscles provide heat for the cluster. Within the very center of the cluster, the temperature will stay around 70° - 75°F if no brood is present. If brood is present, the central temperature will rise to nearly 95° F in order to provide a high enough temperature for physiological processes to occur in the developing brood. After all these years, I still am awed by the fact that no matter how cold it is outside, there is a cozy spot within any healthy beehive.

The bees at the center of the nest are the warmest, while the bees at the periphery are the coolest, but no lower than 42°F. As the temperature drops near 42°F, chilling bees will force themselves into the cluster where it is warmer while warmer bees are pushed to the outer surface of the cluster. As the temperature continues to fall, internal bees that are the warmest, will increase their muscular activity and

The same view during Spring, 1999.

Some of the nucleus hives in the yard late last Winter.

will generate more heat. The cluster contracts tightly. The outer shell of the cluster serves as an insulatory layer. Researchers have reported that outer (older?) bees do not routinely get into the nest center, while younger house bees do not go to the cluster's periphery. It seems as though the bees' entire world shrank to a sphere about the size of a volleyball. Forager bees are nearest to the outside while house bees are nearest the center. It is important to know that at no time do the bees attempt to heat the inside of the hive but only heat the inside of the cluster. Don't break up a wintering cluster. Individual bees will quickly chill and be unable to reform the cluster. But, having a look at the bee cluster between the frames is perfectly acceptable.

Water in the Wintering Hive All this metabolic activity that produces warmth also produces water as a by-product. Too much water is a bad thing. Warm air rises from the cluster, cools, and becomes unable to hold all the moisture it did when it was warm. Water condenses on the walls and top of the colony. So long as the temperature is below freezing, it's not too bad. The water simply freezes and stays put. However, a thaw results in cold water dripping onto the wintering cluster, which must be miserable. Consequently, common hive management schemes recommend reversing the inner cover and providing for an upper entrance and air escape. As per the common recommendations, my hives have upper entrances (One of the things I did do right.)

In the Beekeeping Mood I write these articles for you in MS Office 2000 and insert digitized photos to support the accompanying text. It's all really pretty routine, though I have daily software questions that may or may not get answered. One of the areas that simply defies description – no matter what software system I use, is the changeable mood of beekeeping – possibly I should say the changeable ambiance of beekeeping. I don't think new beekeepers can always sense it. New beekeepers frequently have the passion and interest similar to that of newly weds. Compare that new relationship with that of a wedded couple of 40 years. Though these are the same people involved, the relationship is drastically different

Just a few hours ago, I visited the bee yard in order to get current information for you. It was a gray mid-afternoon in late November. It was brisk and was snowing a heavy, wet snow. When I opened the door to the bee shack, there were the remnants of the season just past. It was familiar but distant. The smell of old comb and old bee equipment was there. A few dead bees were on the floor and a few were hanging in small spider webs. At this point, literally thousands of memories coagulate not into one big memory, but into a mood or sense of beekeeping. I can reflect on things accomplished, on things unaccomplished, and on things I want to accomplish. But you have to be in the mood to sense all this. Many times, I go there with a definite plan of work and have no interest in visiting bee Nirvana. Today however, I was in the mood. On these days, I don't have to do any bee chores to feel good about beekeeping, but I take a few minutes to reflect, plan, and feel good about being a beekeeper.

The Year in Review By the time most of you read this, I will have completed a year of this beekeeping project. Though I have worked with bees and studied bees for many years, I am happy to tell you that I have sincerely enjoyed this project and I have enjoyed writing about it for you. In retrospect, I feel that I have won more than I have lost in my game plan. Look at the double photos to see where we were in early 1999 an where we are today (very late 1999).

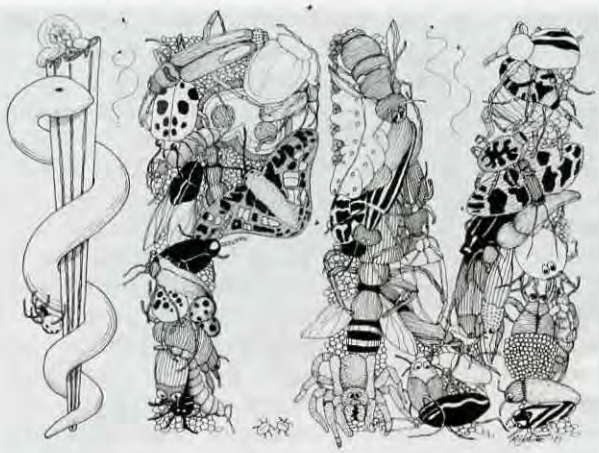
All was not successful. Several of the established colonies died from tracheal mite infestations, but surprisingly most of the 4-frame nuclei survived to become established colonies in the yard today. Packages and splits were purchased leaving me with eleven colonies and about five nucleus colonies going into this winter. You may remember that I had only planned on having five colonies, so eleven seems to be enough of an over-kill. The colonies build up fast and strong. In general, all commercial queens produced better than my natural queens. I had no swarms this year, but I suppose I should be prepared for something next year. I was caught off-guard at how successful the Varroa mites were. I had been casual about treating for mites and only did it because I was writing for you. What a surprise when thousands of mites fell out of these powerful colonies. One of the colonies has a light case of American foulbrood. This will have be addressed early next spring.

I cut grass, put down mulch, and battled skunks. I experimented with various pieces of equipment and made promises to paint all of the hives – which I have yet to finish. I cleaned out the bee shack and then messed it up again. I tinkered with something I called the garden hive and made several hundred photos. I built hive stands that were a success and I responded to most of my reader queries. Though I didn't finish painting the hives nor the bee shack and though some of the hives were under-supered when they should have had plenty of space, I fulfilled most of my goals. It puts me in the mood.

Next Year – the Year 2000 This was the year of the beginning. Next year should be the year of the honey crop. I plan on having some messy extracting with which to deal. I have not tinkered with comb honey in many years and I feel that I would like to have a few supers go on the colonies. I expect to have some problem with swarms and I will evaluate whether or not I should requeen. More and more the current recommendation is to requeen every year rather than every two years. I may sell off a few of the colonies and make splits or buy packages again. I don't think I want to totally move from the initiation phase of colony management. Though I am not committing myself to the obligation, I would enjoy producing a few queens with the new-style queen plastic gadgets that we are all now using. What else should I do? Next year is wide open. BC

Tew, James E. 1999. *In the dark, a beeyard is nearly surreal.* Bee Culture 127(11). Pp. 37-39

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



Integrated Pest Management

WAX MOTHS, MICE WASPS & ROBBER BEES

Nick Calderone

It's a dog-eat-dog world out there, and, as a beekeeper, it is important that you are aware of the many creatures that would like to eat your bees or damage your equipment. Remember! The honey bee colony, the nest that it builds, and the cavity in which it lives are potentially rich sources of food or shelter for a wide variety of unwanted creatures. If it can't be defended, somebody else is going to take it.

There are a number of pests and predators that kill bees or damage beekeeping equipment and honey. **Wax moths** destroy combs and cause damage to woodenware. They can also damage section honey and comb honey, rendering it unfit for consumption or sale. Moths cause damage during warm weather and throughout the year in heated buildings. **Mice** make nests in bee hives during the fall and winter, usually destroying several of your best combs in the process. **Wasps** of various sorts eat bees and rob honey, and **bees** themselves can be serious pests when they engage in robbing. Robbers can spread mites and diseases and can kill many bees, often destroying the colony being robbed. Robbing can also lead to serious, even fatal, stinging incidents if the robber bees attack neighbors and neighbors' pets. Bees are inclined to rob anytime there is a dearth of nectar in the field.

PHYSICAL, MECHANICAL AND CULTURAL CONTROL METHODS

In this month's article I want to discuss methods you can use to protect your bees and your crop from damage by wasps, wax moths, mice and robber bees. I selected this particular mix of creatures because there are several control measures common to their management. Bears and skunks are also serious predators of honey bees in the northeast, and I will take them up in another article.

Integrated pest management relies on many methods to keep pest population densities below their economic injury levels. There are many non-chemical methods used in IPM programs and these should always make up your first line of defense against pests and predators. Only when these methods prove insufficient should you turn to an appropriate chemical treatment. Let's take a look at some of the non-chemical methods you should be using as part of your routine management program.

The strong colony – a cultural method

The key to protecting your bees from wasps, wax moths, mice and robber bees begins with a strong colony that can defend itself. The strong colony is an example of a cultural method of pest control. I can't tell you how to maintain strong colonies in a single article. You have to follow a rigorous, well-defined management program throughout the season. I can tell you that you should examine weak colonies for disease, mites and failing queens. If you find AFB, burn it. If you find mites, treat it. If you find a failing queen, re-queen it. Combine weak but *otherwise healthy* colonies with strong colonies. Weak colonies are not worth the effort you invest nursing them along. They rarely produce a good crop and usually fail to winter.

Pest-tight and predator-tight equipment – a mechanical method

The second line of defense is a secure hive. In many ways, a bee colony is like a medieval walled city. There were good reasons for building cities with that design – the walls protected the city, including its goods and people, by serving as a barrier defense against would be 'pests and predators' Your bees are in a similar situation. Since they are naturally cavity-dwellers, it is up to you to ensure that the artificial cavity you provide for them is as good a shelter as any natural cavity they would use. This means a secure, defensible hive. A secure hive has well-fitting parts. When you stack your hive up in the field, the only place the bees should be getting in and out is through the entrance YOU provide for them. Remember! Every crack or hole in your hive bodies presents an invitation to unwanted guests. Secure equipment also has advantages when it comes to comb storage because it prevents access by wax moths, wasps, mice and robber bees.

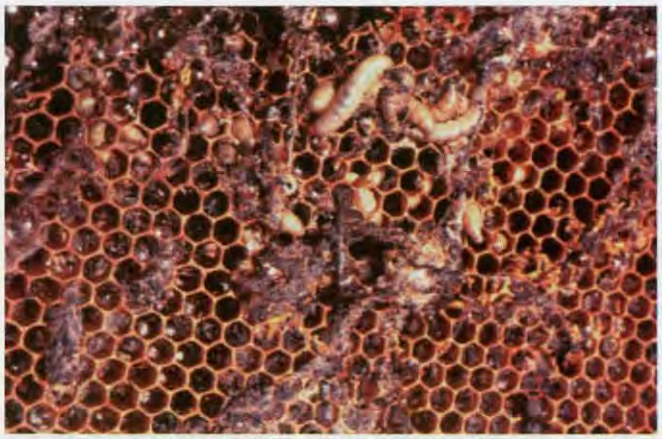
The trouble with woodenware often starts before you ever purchase your new equipment. Poor craftsmanship in the manufacturing process often results in poorly fitting equipment with gaps between hive bodies. Depending on the quality of the workmanship, these gaps

may encourage snooping and robbing and will stimulate your bees to gnaw on the wood, which will further increase the size of the opening. Gaps also provide an easy entrance for wax moths, whether the equipment is on the hive or in storage. **So, before you purchase a large quantity of new equipment, try a few pieces from each of several suppliers.** Inspect it carefully for defects, assemble it, then, inspect it again. Hive bodies should stack squarely on top of each other, with no gaps. Box joints should fit snuggly. Joints that are too tight may cause splitting, those that are too loose will promote rot and result in a shell with inadequate strength. **Pre-drilled holes** in the box joints will prevent splitting when assembling. The wood should have been cut with a sharp saw, indicated by smooth surfaces, and have a tight grain. This will reduce moisture damage. Ideally, there will not be any knotholes, although a **few** small, tight knots are all right. Fix these in place with waterproof wood glue prior to painting. Once you decide on a supplier, talk with him or her about your expectations and get a money-back guarantee that the equipment will meet **your standards**.

When assembling equipment, be sure to use galvanized nails where possible. Galvanized 7d (13.5 gauge) nails should be used for assembling hive bodies and bottom boards. Box nails are adequate for most beekeeping equipment and cause less splitting than the thicker, common nails. Use common nails where you may encounter high shear forces such as on pallets. When nailing without the benefit of pre-drilled holes, such as through bottom board side rails, be sure to blunt the tips of your nails with your hammer before driving them into the wood. This will greatly reduce splitting. If you are making your own equipment, use kiln-dried lumber. Pine and poplar work well, but poplar is especially susceptible to moisture. DO NOT make hive parts out of pressure-treated lumber although PT lumber is fine for hive stands.

The biggest problem you will have with woodenware is simply wear and tear. Constant prying with a hive tool, exposure to the elements, and some gnawing by the bees all contribute to equipment degradation. You can get a jump on the problem by treating your woodenware with an approved wood preservative. Remember! Most wood preservatives are pesticides and must be used according to label instructions. One preservative, PERM-E8™ 8%, is a soluble concentrate that is thinned with mineral spirits or some other approved solvent prior to use. It contains copper naphthenate and can be used to preserve lumber and boxes. Do not use PERM-E8™ 8% to treat frames. Do not use creosote, pentachlorophenol, tributyl tin oxide, or chromated copper arsenate (Sanford and Hoopingarner 1992) as these will adversely affect your bees.

A coat of high quality exterior-grade primer followed by two coats of exterior-grade finish paint applied to the outside surfaces of your equipment and the narrow top and bottom rails will keep hive bodies and bottom boards in good shape. Pay special attention to the joints, as this is the most common place for rot to get started. Never paint the inside surfaces of your equipment. I use latex paint for the hive bodies and oil-based paint for the bottoms. The latex paint prevents the build-up of moisture in the hive. The oil-based paint protects



Wax moth larva, webbing frass and other messy stuff.

the bottom board from moisture damage. A mix of colors may help reduce drifting and spice up your apiary.

I have dipped bottom boards in a mixture of beeswax and pine resin. This mix provides good protection against moisture, will not peel, and certainly qualifies as a natural product. Be sure to only use beeswax from a disease free source. Paraffin can be substituted for beeswax. Whenever working with hot wax and resin, remember that you are working with a serious FIRE HAZARD and a SERIOUS HEALTH HAZARD. A hot wax/resin mixture will be around 240 °F, well above the boiling point of water. It is highly flammable and can cause severe burns. You will see water boil out of your woodenware when you dip it in the hot mixture. Remove the wood from the mix when the foaming dies down. This is definitely an outside job for an experienced beekeeper with the proper handling equipment and personal safety gear, including eye protection. NEVER heat wax or resin anywhere where it will pose a fire hazard. Always wear adequate safety gear.

Probably the best thing you can do to protect your woodenware is to keep your hives high and dry. Hives should be kept on stands 6 – 8" off the ground and tilted

Continued on Next Page

One way to stop robbing, if a weak colony is going to be open for a time, is a portable cage. Keeps bees out, protects the weaker colony, and makes working a lot easier.

IPM ... Cont. From Pg. 33

about 3-5 degrees forward to prevent water from accumulating inside. Don't tilt them too far forward, because they may fall over as they get taller. Elevating your hives will also help keep out mice.

Check used equipment very carefully before buying. The price you pay should be directly related to the quality of the equipment. Tap the wood lightly in several places with a small hammer to determine its integrity. Solid wood has a distinctive sound. Practice by tapping on some new hive bodies to get a feel for the sound of good wood. Examine corners and frame rest ends very carefully for splitting. Beware of old, punky equipment held together with many generous coats of fresh paint.

Winter is the perfect time to clean up your equipment for next season. Accumulations of burr comb and propolis make it difficult to work your bees. You end up prying a lot with your hive tool, and this results in broken frames and damaged hive bodies. You can keep your equipment in manageable condition by scraping it each winter. I do this on a special table with a heavy metal grate for a top. I remove the combs from a shell, scrape ALL surfaces of the shell with a **sharp** hive tool. Next, I scrape all wooden surfaces of each frame, which are then returned to the shell. The propolis and wax scrapings fall through the grate into a drawer, which I periodically empty. This is also a good time to cull poor combs. Next season, I have supers of high quality combs that are easy to work when they go back on the colonies.

The entrance reducer

Think of the entrance reducer as the door securing the castle gateway. If you leave the door open and unguarded, somebody is going to wander in and help themselves to the goods inside. The easiest way to help your bees defend their nest from mice, wasps and robber bees is to use a dual-purpose, one-piece mouse-guard/entrance-reducer. This reduces both the equipment you need to build or purchase and the labor required to prepare your bees for winter. The entrance reducer, like no other piece of equipment, makes it very clear why standardizing your bee equipment is best. If you use bottom boards with different inside widths and different heights, you will find it impossible to use a single size of entrance reducer, and that will cause you lots of headaches in the fall.

You can use the standard entrance reducer that fits in between the bottom board and the bottom hive body. Alternatives include a piece of ¾" lumber or 1/8" sheet metal, 3"- 4" tall, with a length equal to the inside width of the bottom hoard. This reducer can be easily fixed to the front of hive with a couple of nails. It is a little easier to put in place than the standard reducer, but it does require more material, and the nails will expose your hive bodies to moisture. The metal reducer has the advantage of being resistant to gnawing by mice. So, if you rely on a wooden reducer, I would suggest making them out of hardwood. Regardless of which reducer you use, it should have two entrances. With the standard reducer, the entrances should be cut on adjacent sides. On the front fitting reducer, entrances should be cut on opposite sides. Cut one entrance 5/16" deep by 2" wide. Cut the other one 5/16" deep and 6" wide. Always position the standard reducer so that the flat side faces out. Remember! Bottom entrances can become blocked with dead bees and ice during the winter, so be sure and provide the bees with an upper entrance during that time. And by the way, be sure there are no mice in your hive before installing the reducer.

ADDITIONAL CONTROL METHODS

Wax moths

The greater wax moth, *Galleria mellonella* L., is a member of the Lepidoptera, an order of insects that includes numerous agricultural pests. The wax moth is primarily a pest of stored combs, although you will often see it in the field in weakened or dead colonies. It can also be a pest in your 'hot room' if you store your combs for too long before extracting. It also damages comb and section honey, rendering it unsuitable for sale or consumption. It is not a major pest of foundation.

The larval stage of the moth feeds on combs, cast larval skins, honey and pollen. You can often see evidence of wax moth larvae tunneling through a comb in a hive. A straight wisp of silk just under the comb surface is a giveaway. If you dig around this area you will usually uncover a wriggling larvae. Always assume that your equipment in the field is infested with wax moth eggs.

The threat from wax moths is greatest in warmer climates, but it poses a threat to stored combs in all parts of the US at some time during the year. Strong colonies prevent the larvae from inflicting too much damage. Larvae that succeed in reaching maturity spin a cocoon, often in an area that they hollow out of the wood of a frame or hive body. Large infestations can cause extensive damage to your woodenware. In addition to maintaining a strong colony, there are several other methods you can sue to control wax moths, including freezing, heating and chemical treatments.

Freezing If you live in a temperate area, store your combs in an unheated room to take advantage of the natural control provided by the outside environment. If you can, install a screened opening to the outside, as this will increase ventilation. Eggs are killed by freezing at 20°F for 4.5 hours, or at 10°F for 3 hours, or at 5°F for two hours (reviewed in Shimanuki et al. 1997). So, combs stored over the winter this way will be moth free in the early spring.

Comb and section honey must be treated by freezing within three to four days after removing it from a colony. Placing section honey and comb honey in a household freezer at 5°F for 24 hours is a good method for controlling all stages of the wax moth. Of course, section and comb honey must be protected from re-infestation after treatment. If you have room, comb honey and section honey can be kept in the freezer until needed. Freezing not only kills the wax moth, it retards crystallization. Be sure to store comb honey and section honey in the freezer in tightly-sealed plastic bags. Let it come to room temperature before opening the bags after removing them from the freezer. That will prevent condensation form building up on the comb surface.

Heating You can also control wax moths by heating your equipment to 115°F for 80 minutes or 120°F for 40 minutes (Shimanuki and Knox 1997). Start your timer when the equipment has attained the desired temperature. NEVER heat combs above 120°F, as they will sag and become misshapen.

Para-dichlorobenzene (PDB) PARA-MOTH ™ is 100% paradichlorobenzene (PDB). PDB crystals provide good control of wax moths in stored combs; but you may need to treat several times, as PDB does not kill the egg stage. Place three ounces (about six tablespoons) of crystals on a shop towel placed on top of a stack of five deep supers of combs and cover. Be sure the equipment is moth-tight. After the first treatment has vaporized, usually two to three weeks, depending on temperature, apply a second treatment. After that, check your combs periodically and treat on an 'as-need' basis. If your equipment is not moth-tight, you will need to treat throughout the warm season. Your comb storage room should be unheated and have adequate and secure ventilation [moth tight screens]. This will help keep the temperature down in the winter and reduces PDB levels in the room during the summer.

Air out treated combs for at least 24 hours prior to placing them back on a colony. Never apply PDB to comb honey, section honey, unextracted honey or any other hive product destined for food use. Always read the label for latest instructions. Follow all instructions, including the Precautionary Statements and subheadings Environmental Hazards, Physical or Chemical Hazards and the Statement of Practical Treatment. PDB vapors are heavier than air. PDB and PDB vapors are a fire hazard. Keep all pesticides under lock and key!

Robber bees and wasps

I talked about management techniques you can use to prevent robbing in November's IPM article. Let me re-emphasize two points here. First, adjust the size of your entrance to the size of the colony. Small colonies need small entrances and large colonies need large entrances during the growing season. All colonies should have reduced entrances in the early spring, fall and winter. You may also want to partially reduce entrances during a dearth, especially if you have to work the colony. Second, use the equipment tips mentioned above to maintain your equipment in bee tight shape. This will make it much easier for your colony to defend itself from robber bees and wasps. Next time, I will give you some tips on repairing damaged hive bodies.

This article has focused on some of the major pests and predators of honey bees found in the northeast and elsewhere. Beekeepers in other parts of the country will find that the extent of damage from these creatures will vary with local conditions. For example, wax moths are a threat throughout most of the year in southern states. Other areas will also have somewhat different mixes of pests and predators. Ants and termites, for example, can be serious pests of honey bees (Fell 1997), especially in the south. Contact your local apiculture extension specialist for information specific to your region. There are also several excellent books that discuss pests and predators. BC

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Controlling AFB Without Drugs New Zealand's Approach

Cliff Van Eaton

Recent discoveries of antibiotic-resistant strains of American foulbrood in Argentina, Canada and the United States are causing beekeepers to reassess the measures they use to control one of our longest-standing and most important bee diseases. This article, which was presented as a paper at the recent Apimondia Conference in Vancouver, describes how beekeepers deal with AFB in a country where antibiotics have never been used to control the disease.

New Zealand provides an interesting case study of the epidemiology of American foulbrood (AFB) in managed honey bee colonies. There are several reasons for this.

First, the use of antibiotics to control AFB is illegal in New Zealand, and beekeepers have never used oxytetracycline or sulphathiazole in their hive management. Because beekeepers in New Zealand do not use these drugs, clinical symptoms of AFB are not artificially suppressed, and we can therefore get a clearer idea of the "natural" incidence of the disease in managed colonies, and its spread to other colonies, both managed and wild (feral).

Second, New Zealand has accumulated reliable, accurate, long-term information on the incidence of AFB, a situation that doesn't exist in many other beekeeping countries. The information isn't based on estimates, or only on the findings of government inspectors. The information is far more comprehensive because it also includes the AFB findings of the beekeepers themselves.

In New Zealand, all beehives and apiaries are required by law to be registered for disease control purposes (and a hive in each apiary must be marked with the registration number issued to the beekeeper). All apiary information is lodged in a computerized database, and the record contains, amongst other details, a GPS-verifiable grid reference identifying the position to within 100 meters.

Because apiary locations are constantly changing, there is a further legal requirement for beekeepers to update all apiary information on a yearly basis in the form of a computer printout.

At the same time, beekeepers are required to report all findings of AFB in each apiary over the preceding 12 months. While the reporting could never be expected to be 100 percent accurate, compliance rates by beekeepers are good, and the information they provide allows for the targeting of further inspections.

There is also a further component of AFB information in New Zealand that is similar to that collected in a number of other countries. This information is derived from inspections carried out by government inspectors, either as part of a contracted program of AFB control with the National Beekeepers' Association (NBA), or as part of other inspection work contracted either by the Ministry of Agriculture's exotic disease surveillance program, export certification inspections, or other contracted work such as pollination audits. Altogether these government personnel inspect approximately 10 percent of the nation's apiaries each year.

AFB Incidence in New Zealand

Official information on AFB incidence in New Zealand goes back over half a century (Table 1 presents this information for the last 35 years). The historical record shows that a major increase in AFB incidence occurred in the period 1965-'90, with incidence increasing 422 percent, from 0.2 percent to 1.2 percent of hives per annum. The increase corresponded with a major increase in hive numbers in New Zealand. Over the same period, beehives increased by 75 percent, reaching a high of just over 340,000 in 1987.

The most dramatic increase in hives occurred in the late 1970s and early 1980s, as beekeepers enlarged their businesses in response to the pollination demands of Kiwi fruit, a major New Zealand horticultural crop. Plantings of Kiwi fruit increased 15-fold during that period, and hives were required for pollination of Kiwi fruit orchards at a density of eight hives per hectare, one of the highest hive densities for any crop in the world. In the 1980s, hive numbers increased by 45 percent in just seven years.

Beekeepers in New Zealand have always contended that a major reason for the dramatic increase in AFB incidence was related to this increase in hive numbers, with new beekeepers coming into the industry with less knowledge about AFB diagnosis and control. They also argue that the rapid splitting of hives to increase numbers, and the practice of evening out hives prior to Kiwi fruit pollination, which was practiced extensively in the 1980s, both exacerbated the spread of AFB spores.

Whatever the cause, there was a rapid increase in AFB incidence in the period 1985-1991, with AFB hives jumping 130 percent. Beekeepers argue that the slight lag in this disease increase compared to the increase in hives, which plateaued in 1987 was caused by the time required for AFB infections to develop and for the spores to spread to other hives.

AFB Control Program

In 1991, a concerted program was implemented to reduce this AFB

incidence. Unlike previous AFB control programs in New Zealand, which had been paid for by government, and which didn't have any direct supervision from the beekeeping industry, this program was financed and directed by the NBA. The work itself was carried out by government personnel on contract to the association, and the performance of these government personnel was strictly controlled by detailed contract specifications.

The program involved the annual inspection by government apiary officers of four percent of the country's apiaries. It also included an important component of voluntary inspections carried out by NBA members under the direction of government personnel.

These voluntary inspections are commonly referred to in New Zealand as "diseaseathons." The name plays on the popular charity events on television called "telethons." Diseaseathons generally involve commercial beekeepers donating several days of their time in the Spring period to inspect hives often belonging to hobbyist beekeepers. In many parts of the country, diseaseathons are now annual events enjoyed by both commercial and hobbyist beekeepers.

The program also included a significant counseling component, where beekeepers with AFB problems received advice and assistance from trained professional apiculturalists in reducing AFB incidence in their outfits.

Finally, there was also a research program carried out by Dr. Mark Goodwin and his team at the Ruakura Research Center in Hamilton, New Zealand. The research concentrated on factors contributing to the spread of AFB, and simplified ways of detecting AFB spores in bees and bee products.

Reductions in AFB

By any measure, the program was an outstanding success. In the seven years it was in existence, reported AFB incidence decreased on average by 12 percent per annum, reaching a low of 0.3 percent in 1999. At the same time, the government agency contracted by the NBA to carry out the program met or exceeded all contract specifications each year, and kept within the budgets set in the yearly contracts.

Table 1 – Hive Numbers and AFB Incidence in New Zealand – 1964-1999 (Note: Incidence equals the number of AFB hives reported divided by the total number of registered beehives.)

Questions were raised toward the end of the program regarding whether the decreases in reported AFB incidence were a true reflection of the actual AFB incidence in New Zealand beehives. It was argued that reports of AFB made by beekeepers could not be trusted, and that there might be other reasons, such as the stigma attached to AFB or export certification requirements, that could cause beekeepers to underdeclare their AFB.

A study was therefore carried out comparing the change in AFB incidence reported by beekeepers with the change in AFB incidence found by government inspectors (Table 2). As the table shows, the reduction in AFB incidence found by inspectors closely tracked AFB incidence reported by beekeepers, and in fact decreased at a slightly faster rate.

This was a remarkable finding, since AFB inspections carried out by inspectors were required by contract to target beekeepers and areas with a known history of AFB. One would therefore have thought that if anything, these government inspections would have decreased at a slower rate. The fact that they didn't, and that they followed so closely the trend of beekeeper reports, strongly suggests that the decreasing trend in beekeeper reports of AFB was a real decrease and not simply underreporting.

How New Zealand Beekeepers Eliminate AFB

The question overseas beekeepers often ask is, "How do New Zealanders control AFB without the use of antibiotic drugs?" There are really no great secrets or complicated systems in the approach, and Dr. Goodwin and I have attempted, as best we can, to tell the story in a book that has recently been published by the NBA. The book is entitled *Elimination of American Foulbrood Without the Use of Drugs: A Practical Manual for Beekeepers*, and in 1998 was distributed to beekeepers throughout New Zealand. The book is now also available internationally from beekeeping booksellers.

Beekeepers in New Zealand eliminate AFB by using routine and constant AFB inspection, managing their beehives in such a way that they reduce the spread of AFB, and destroying colonies that are found to have clinical infections of the disease.

The system operates on a premise many beekeepers seem reluctant to accept, but that they nevertheless know, deep down, is true. The premise is: *Most AFB infections in beehives are due to the beekeeping practices that are carried out on those hives.*

Once that premise is accepted, it then follows that the incidence of AFB in the beehives can be reduced by changes in those beekeeping practices. If the incidence of AFB in a beekeeper's hives is remaining

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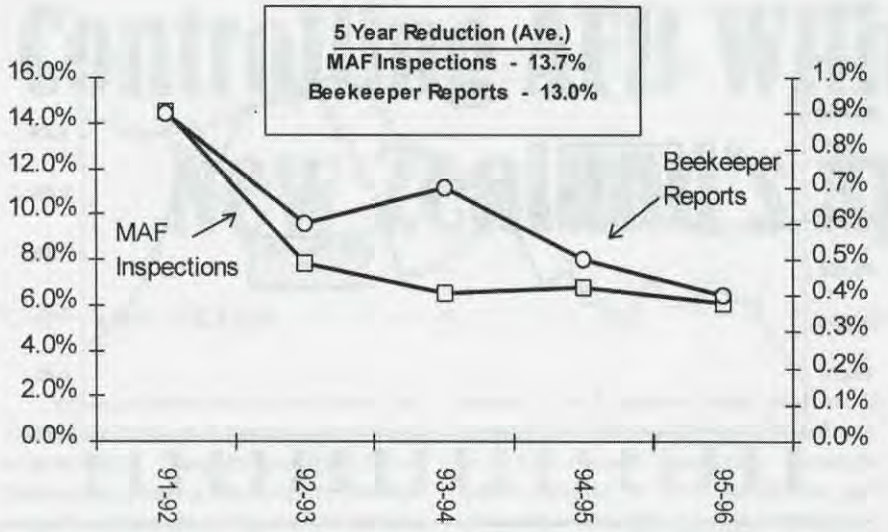

Table 2 – Comparison of AFB Incidence (Government Inspectors vs. Beekeeper Reports) During AFB Control Programme

stable, the war actually isn't being won. In fact, the beekeeper is infecting clean colonies at the same rate that diseased colonies are being found and destroyed. And if the incidence is increasing, then the beekeeper is infecting more colonies than are being found and destroyed.

Changes in Management to Reduce AFB

To alter the situation, the beekeeper can take one or both of the following approaches. First, the number, frequency, intensity and timing of disease inspections can be modified to find more AFB hives earlier. And second, changes can be made in management practices to slow the spread of the disease. An important management practice often used is *quarantines*.

First, to AFB inspections. From my own experiences observing beekeeping around the world I have come to the conclusion that brood inspections are carried out more often and more thoroughly in New Zealand than in some other beekeeping countries.

Beekeepers in New Zealand have been encouraged for many years to inspect all, or almost all, brood frames whenever they go into a hive, and especially whenever they take anything from a hive, such as brood, honey or boxes, that may immediately or eventually be put on another hive. As an example, it has been observed that beekeepers in New Zealand who have low AFB infection rates also generally inspect their beehives either when or just after they take their honey off.

While at first hearing it may sound contradictory, case studies in New Zealand have also shown that changes in the frequency and thoroughness of inspections can reduce the incidence of AFB. The reason is that more frequent and thorough inspections are likely to pick up AFB infections at an early stage, before they have a chance to produce large numbers of infective spores and before those spores can be spread to other colonies.

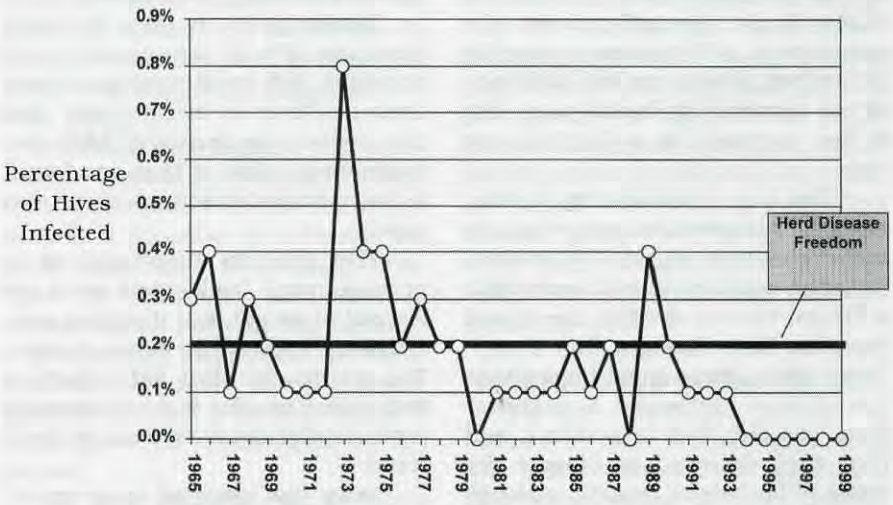

Table 3 – Incidence of AFB, Arataki Honey – Hawkes Bay
(Note: The internationally accepted veterinary standard for disease freedom is 0.2% of animals per herd per annum)

Quarantine to Eliminate AFB

In New Zealand, a major beekeeping management component that has proven successful in eliminating AFB is quarantine. Quarantine involves controlling and recording the movement of materials that have the potential to carry infective levels of disease spores. There are generally two types of quarantine: apiary quarantine and hive quarantine.

Some beekeepers in New Zealand routinely use apiary quarantines when they take their honey off. They mark stacks of supers according to the apiary site, and then either ensure the supers go back on the same apiary the next year, or only release the supers into general use after the apiary has received an all-clear for AFB following several brood inspections the next Spring.

Apiary quarantines are used as a matter of routine, rather than just when an outbreak of AFB occurs. They provide a means of ensuring that when an AFB problem is discovered, the disease doesn't spread via beekeeping equipment to other apiaries.

Hive quarantines are more time-consuming, but are definitely used by beekeepers when they experience an AFB outbreak in an apiary. In a hive quarantine, hive components associated with an individual hive remain with that hive, or are marked

with a number identifying it to that hive so that the components can be returned to the hive the next year. The general rule of thumb for an all-clear release of such a quarantine is one and a half beekeeping seasons following the finding of the last AFB hive in the apiary.

Risk Materials and AFB

The important thing in such quarantines is to control the movement of materials that actually have the potential to carry infective levels of disease spores, rather than putting emphasis, and dare we say paranoia, on materials and practices that have a much lower potential disease risk.

Dr. Goodwin's research has shown that by far the materials most capable of carrying infective levels of spores are 1) extracted honey supers, which are often taken unknowingly from AFB hives, and then put on clean hives, generally a year later; and 2) frames of brood and honey, which are often moved unknowingly from hives with subclinical AFB hives (that is, hives not showing visual symptoms) to clean hives.

Most of the other things beekeepers normally blame for the spread of AFB turn out not to be as significant or widespread as beekeeping practices. Robbing can be an important cause, of course, but it is usually the result of inadequate levels of beehive inspection, which is really just another name for poor beekeeping management practice.

Dr. Goodwin's studies of spore levels on adult bees have also shown that wild (feral) colonies are not a major source of AFB in most situations and areas of New Zealand. This was quite a revelation to beekeepers in our country, who often blamed wild colonies for their AFB woes. Dr. Goodwin's studies showed, however, that wild colonies are at greater risk of being infected with AFB spores from managed colonies, rather than the other way around.

Dr. Goodwin has also shown that drift of bees from AFB hives to healthy hives is not an important factor, and such things as hive tools, smokers and gloves, as well as the soil in front of hives, foundation and queen bees, are all of little consequence as sources of infective levels of AFB spores.

Paraffin Sterilization

In addition to inspection and management practices, there is a further component of AFB control in New Zealand, which from the evidence seems to have started as a practice in our country, and which has been used there for many years. The technique involves immersion of the woodenware for at least 10 minutes in paraffin wax heated to at least 160°C.

Dr. Goodwin's research has shown that this technique is one of the few effective ways of destroying AFB spores. His work also shows, however, that the time and temperature are very important, because lesser levels of either will leave significant numbers of viable AFB spores remaining.

Most beekeepers in New Zealand sterilize the supers, boxes and lids that are associated with AFB hives. The sterilization technique is very basic, and can be used by a beekeeper in the yard behind the honey house.

Paraffin wax sterilization has the added benefit of preserving woodenware against dry rot. It is, however, a dangerous technique if not carried out by a skilled person, and boil-overs of overheated paraffin can result in fires that can be difficult to bring under control.

Elimination of AFB – A Case Study

The effectiveness of quarantine programs in reducing and even eliminating AFB in beekeeping outfits in New Zealand is demonstrated in a set of AFB incidence figures kindly provided by Mr. Ian Berry and his sons Peter and John, from Arataki Honey Hawkes Bay in Havelock North, New Zealand (Tables 3).

Table 3 shows the number of hives found to be infected with AFB in the Hawkes Bay outfit from 1965 to 1999. From the figures, it's obvious that the outfit had two significant outbreaks of AFB during that time, the first beginning in 1973, and the second beginning in 1989.

The 1973 outbreak was the result of the purchase of used honey supers from another outfit with an unknown AFB status. Clearly, the other outfit had an AFB problem, and that problem was transferred to the Arataki Hawkes Bay hives by way of those supers. Because the supers were put on a number of Arataki hives before their disease status was determined, the outbreak could not be easily quarantined, and it took the Berry's a further 6 years to bring AFB incidence down to negligible levels.

The second outbreak, in 1989, was the result of Arataki Hawkes Bay purchasing a beekeeping outfit as a going concern. The outfit had an AFB problem, but the Berrys quarantined that outfit, and as a result the infection did not spread to other Arataki Hawkes Bay hives. The infection was therefore brought under control more quickly.

The most important point the figure illustrates, however, is that it is possible using search- and destroy-inspections, hive and apiary quarantines and beehive component sterilization, to successfully eradicate the disease, or at least to operate an outfit within the internationally accepted veterinary standard for "disease freedom" of 0.2 percent of animals per herd per annum. Arataki Hawkes Bay achieved that in 27 of the last 34 years, and in the each of the last 10 years.

Now before you dismiss the evidence presented in this case study as not being possible in large, commercial, migratory beekeeping enterprises, I need to point out that Ian Berry and his sons together run some 7,000 colonies. They put a considerable number of those hives into apple and Kiwi fruit pollination in the Hawkes Bay region of New Zealand, in close proximity to other pollination hives belonging to a range of other beekeepers. The Berrys also move many of their hives to chase several honey flows.

Over the last four years, in those 7,000 hives, the Berrys have not recorded a single AFB hive.

AFB Pest Management Strategy

The National Beekeepers' Association in New Zealand has recently embarked down a new road in relation to AFB control. In 1998, the New Zealand government replaced existing AFB control legislation with a Pest Management Strategy (PMS), and gave over responsibility for control program policy and delivery to the association. Government continues to maintain an auditing role to ensure the objectives of the PMS are met and legal powers are not abused,

Continued on Next Page

AFB ... Cont. From Pg. 39

but it is the Association's responsibility, through its contractors, and with income levied from beekeepers, to run the program effectively.

Beekeepers in New Zealand have set themselves an especially challenging goal in their AFB PMS. The goal is to eliminate AFB in managed colonies in New Zealand. The primary objective is to reduce AFB incidence by an average of 10 percent per year, with an incidence no greater than 0.1 percent at the end of the second term of the strategy in 2008.

Beekeepers, professional apiculturalists and beekeeping scientists in New Zealand believe that elimination of AFB is possible in our country both because we have a relatively small population of honey bee colonies (estimated to be 400,000 including wild colonies), and because the importation into New Zealand of additional colonies and other materials capable of carrying AFB is strictly controlled. Needless to say, in both cases it greatly helps that New Zealand is an island nation very much isolated from other major beekeeping countries in the world.

At the same time, the chances of AFB elimination are also enhanced in New Zealand by the current low incidence of the disease, and its relatively low infectivity.

Finally, beekeepers believe that AFB can be eliminated in New Zealand because some beekeepers there have already shown that elimination from their own outfits is possible. The argument goes that if beekeepers with very large hive holdings like Ian Berry and his sons can eliminate AFB from their outfits, there is no reason why every beekeeper in New Zealand shouldn't be able to do the same.

Is AFB Elimination Possible?

Is AFB elimination in a country possible? The next 10 years will tell the story. On the one hand, the track record of AFB control in New Zealand, as well as the success of beekeepers like Ian Berry in eliminating AFB, are excellent portents for the future.

On the other hand, the new PMS structure puts the AFB control program squarely under the influence of the political processes of the beekeeping industry in New Zealand. A great friend and colleague, the late Ted Roberts, often used to remark to me in his wonderful Welsh accent, "There are some things that are too important for politics, and disease control is one of them."

It is my strongly held view that members of the NBA must continue to insist on a positive commitment to the program and its objectives from their industry leaders, as well as proper financing of the program budget, if the goal of the AFB PMS is to be achieved. Put another way, the will of the NBA must match the will of beekeepers like Ian Berry and his sons if AFB is going to be eliminated in New Zealand. BC

Cliff Van Eaton is a Professional Apiculturist from Tauranga, New Zealand and one of the authors of Elimination of American Foulbrood Without The Use Of Drugs.

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Perhaps you answer by saying "my honey is bottled in bears, so everyone knows it's honey." Or perhaps customers just stop by your house and are handed a jar without a label. They know you, so they know it is your honey. That does not mean anyone else knows it is your honey.

There sits the nameless jar in the customer's home. You know perfectly well what is in the jar. But do the customer's *visitors* know? True, your customer can tell the visitor what it is, but why should the customer go into a long explanation when a label would tell what, who and where.

Think of all the colors honey represents. From something that looks like a jar of water to something that is as dark as molasses. "Honey colored" honey is more recognizable as honey. Sometimes. You may spot something that looks like honey but on closer inspection you read "Apple Jelly."

It is true that the shape of the jar can be a giveaway that it contains honey. The queenline jar is not used for other products. But not all honey is sold in queenline jars. There are canning jars in pints and quarts; gallon jugs; the round jar with a little shoulder; hexagonal jars in all sizes; and an assortment of other shapes, plus all the different plastic containers. Attractive decorations, such as a piece of cloth tied around a jar top, are common. Not only honey, but jams and jellies, mustards, pickles, and more, sport little squares of cloth tied over the jar tops. Such decorations are desirable in some markets, but they do not necessarily mean "honey."

What says "honey" is your label. What says "you" is your label. That label is an important part of the presentation of your product. Unfortunately the importance of a label is too frequently ignored.

What are you trying to achieve with a label? Basically you want a customer to stop and say "Wow! Honey I must have some." You do not want a label that whispers at potential customers. You want one that shouts at them. How loud that shout should be will depend on the type of market you are targeting. A busy supermarket needs a loud shout. An elegant gift shop needs a quieter, perhaps more dignified, statement. A farm market usually needs a loud shout because honey is in competition with jams and jellies all of which may be arranged badly.

Jams and jellies use bright labels, attractive art and even striking lids.

Your label is a cost of doing business. You want to achieve the best results for your expenditure. Therefore, you need to spend some time in planning a good label or in selecting an already-designed commercial label.

Whether you design your own label or whether you purchase a commercial label, you need to be a judge of what is effective and what is not. In a series of articles, using different shapes of jars and targeting different markets, we will take a look at what is an effective label and how you can achieve it economically. Plan to spend a little time in your search for your own label.

What is your market? What new markets would you like to enter? Now take a walk through those. You are looking for foods in jars, not necessarily honey or honey products. Which labels catch your eye? Which are really dumb or ugly? Which are confusing? Which ones can you read easily and quickly? Be critical! Now imagine where your honey will be placed and think carefully about what sort of label will be effective in that situation.

One thing I have noticed is that the jam and jelly people do a better job with packaging than honey people. See if you think this is true and see if you can determine why. Let me know your thoughts.

Before you go further, you need to decide who will be *printing* your label. You must be able to work closely with those people. You want someone who has produced labels, not just a printer who does not have an assortment of dies or who must special-order label stock. Check the beekeeping journals for ads and information. There you can find label makers who should have a line of stock labels. Send for samples. Discuss your needs with the label makers. Listen to what they have to say. They know their business – what the costs are, what is possible, what is impossible. Cooperation between label maker and honey producer will result in a good label at a reasonable price.

Let's start with color. I cannot emphasize enough that the background color for your honey label is not a large piece of white paper (even though the label may eventually turn out to be white). Neither is the background color for this label the top of your kitchen table where you are doing the designing. The background

Continued on Next Page

White letters on a red background show well, and are less affected by the honey's color. These letters were 'reversed' out.

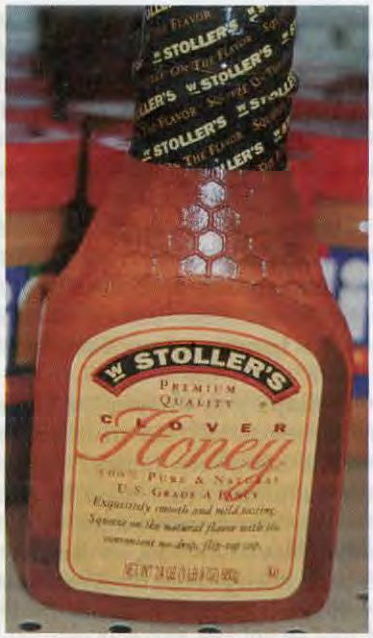
color for that label is the color of your honey, be it light, dark or in between. Those of you who bottle honey of different colors need to have your jars containing all those colors sitting right in front of you while you are designing your label. If most of your honey is one color, a rich honey color, your task is a bit easier. However, you need to have one of those filled jars at your work desk, too.

To begin the project, what color would you like to use as the label color? White is very good since all colors of print and designs show up well. Gold, either shiny or matte, is another popular choice but may not be the best choice. A gold label on golden honey seems to fade away.

A gold label with black print can work, but the color of the honey will affect contrast. By the way, what is in this jar? Prominently displaying contents is the rule not followed here.

The "homespun" look of a brown, slightly textured paper also may not show much contrast between the honey and the label. The label may very well look insignificant. Matte black is dramatic and may be useful in upscale gift shops. Red may not be a good choice. Black printing does not show up very well on a rich red background. However white printing will work. But here again you may find little contrast between your honey and a red label. Yellow paper may also make the label disappear, depending on honey color and whether the label will have a strongly-colored border. Blues and greens have to be chosen carefully, while keeping in mind how visible the printing will be. In general, on amber and darker honey, a light-colored label will stand out against the background color of honey. Water white to light amber may well look good with a deeper color of label. A completely transparent label is often a very poor choice. Although it shows the color of your honey nicely, the printing usually does not show up. Furthermore, it looks a bit weird when some honey has been used and the jar is about half full.

In reviewing an assortment of labels used across the country and around the world, yellow seems to be a popular color for the basic label. Is that because we think of honey as yellow in color and somehow a yellow label says "honey?" Will that yellow label really be noticeable? Or would another color be more dramatic? Perhaps a white label will be more useful. Again, go to a store and do some research.



A yellow label with gold, black and maroon print. This is expensive, but it works well, no matter the color of the honey behind it. The strong border helps.

To have an idea of your basic label color you can experiment with scraps of colored construction paper, pieces of stationery, note pads, wrapping paper, or anything you can find that is fairly plain but is the color you might like. Some computer programs can tell a color printer exactly the color to print. You can experiment to your heart's delight if you have access to this tecnology. Choose colors and shapes and print out, then cut out a shape like an oval or rectangle and stick to a bear or bottle. Go ahead and stick your color-test pieces of paper on the filled jars with tape. Put the jars in different places around your house

Two very effective, but expensive labels. Descriptive art, contents, background and borders make these labels stand out, regardless of the honey's color.

– on the kitchen table, in a kitchen cupboard, on the mantle (this would be comparable to a shelf in a supermarket or a shop). Certainly you can ask family and friends for comments. But, a word of caution. Do not ask anyone "which color do you like?" Instead ask "which color looks best on that jar." In that way you can remove any personal color preferences from the decisions.

If you routinely sell several colors of honey, light and dark, your choice of label color will have to be effective on all those colors. A compromise of a color that looks only OK on all of them, but not outstanding, does not serve the purpose. Perhaps a white label will be your best choice.

A border on a label can be an effective element of design, like a frame on a picture. But this border color must set the body of the label off from the color of honey in the jar. Here we go again with the scraps of colored paper or your computer. You can cut thin strips of colored paper that merely resemble a border and stick them on your basic label color choice. Do not attempt shapes yet. We will examine those later. All you are looking for now is whether you want a border or not and, if so, what color. It is very possible that a border will not be noticeable with your particular honey.

At this point an important consideration is how many colors will be on your label. The more colors, the more expensive the label will be. If you can keep the number of colors to a minimum, considering the paper color as a color, your label costs will be reasonable. With overall good design you can keep your cost to a minimum and still have an effective label.

You have now chosen your label *maker*, your label *color* and decided on having a *border* or not. Keep firmly in mind (as if we haven't had enough reminders) that we are designing a modern label, one suitable for the 2000s, not one reminiscent of the 1920s.

Next, you need to say something on your label, words like "honey" and your name, address and perhaps other information. What color lettering will you choose? Consideration will have to be given to the actual *color* of your label.

Black letters are by far the most common, with red a close second. We are accustomed to seeing black letters and black does show up well provided the label color is not too dark. Red lettering commands attention and is a popular color on labels today.

Besides red and black, many other colors are standard and will not add to your label cost. You can choose such colors as blue, green, yellow, brown, and even pink.

Yes, you can choose a custom color but here are some of the difficulties with that. Ink is expensive and is sold to label makers in quantity. However, ink has a shelf life and must be used up before it decays. People who make labels are reluctant to custom order or blend a particular color since they have to charge you for the quantity they must purchase. You may find yourself the indirect owner of a large jug of color that you will never use up before the expiration date. Stay with the standard colors available and save yourself some money and time. However, if your label order is large enough, printers won't have leftover ink, so consider this too, when discussing colors with your printer.

For large orders, a printer will use what's called the four-color process. This uses only four ink colors in such combinations to make any color at all. It is expensive for small orders, but for printing thousands of labels it is effective. It also gives you a much greater selection of colors, designs and styles, and is certainly worth investigating. Your printer will give details, but remember the order will need to be large.

Some label makers do gold or white printing in a different manner from the standard colors. The label is made by using gold paper stock, then overprinted in black with the lettering not printed. This technique gives you the appearance of gold print on a black background. However, it really is the gold background showing through the gaps left in the black. White may be done in the same way: white paper stock with the dark color (such as red or dark green) overprinted. Both of these printing options will resemble a dark paper stock with gold or white printing. However, close inspection will give away the method used. Is this expensive? It can be. Because it is not a standard way to do lettering. And such "reverse" printing has an inherent problem. Small print may not be clear and distinct. So your name, address or phone number might be difficult to read. If you are determined that you want gold or white lettering you will have to work closely with your label maker.

The color of your letters must attract attention but at the same time must be compatible with the label color. For a test of your choice of lettering, you can buy markers in a huge assortment of colors. Now is the time to print "honey" on your scraps of colored paper so that you can choose the most effective color. The market you wish to target will influence both the color of your label and the color of printing on it. The computer program you used earlier will be indispensable during this part of the creative process. If you don't have one perhaps your printer or a friend does. It will save you hours of work, and an expensive mistake later.

Now that you are beginning to notice some of the characteristics of a good label, it is time to take another walk along the shelves in the stores and shops where your honey is or could be sold. Take a look at the colors of labels and the colors of the lettering. Which combinations of colors give a good impression of the product yet attract your attention? Which combinations seem suitable in the type of shop where your honey is sold?

In general, your honey may be competing with jams, jellies, some syrups, and probably another honey. Observe well. Then think how you can make your honey jars *different* from those jars with other spreads. *Don't imitate. Instead, create.*

Designing your own label, or even selecting one available, is really not an easy task. In this article you have become aware of the effects of color. Many more aspects of a good label are yet to be discussed. For example, shapes, not only of labels but of containers. In the meantime, be observant every time you enter a store. Every container and label, whether you are looking at a cosmetic or at spaghetti sauce, can teach you something. BC

Ann Harman is a sideline beekeeper and international marketing consultant.

USDA/INDUSTRY POLLINATION MEETING

Dewey Caron

What would you list as the top three questions about bee research that could help you be a better beekeeper? Leading U.S. beekeepers, users of bees and research partners met November 19 – 20 in Beltsville, MD to help the USDA define priorities. The workshop was a "new" approach where suggestions and individual and collective opinions were offered to assist their development of a five-year program. This is because the current aim of USDA is to perform research "highly focused on needs." Research objectives, five-year programs and active research programs (termed CRIS projects) are available to anyone on the web. Sixty to 70% of such research will be on short-term approaches (such as new chemicals for pests and diseases, technology for pollination rentals, determination of pollination needs, etc.) with the remainder more long-term and basic in nature (bee nutrition, genetics and breeding, for example).

All aspects of the industry were represented among the approximately 75 in attendance – appropriately commercial beekeepers predominated. All five bee labs sent scientists, commercial beekeepers, Richard Adee of the American Honey Producers, Dave Hackenberg representing the Federation and Glenn Gibson of U.S. Beekeepers were present. Each emphasized the need as they personally saw them and on behalf of their organizations.

Gene Brandi (CA), Lyle Johnston (CO), Troy Fore (GA), Reg Wilbanks (GA) and Pat Heitkam (CA) also gave 10 minute talks. I gave remarks on behalf of partner University scientists. Others giving 10 minute presentations were Scott Rawlins of National Farm Bureau, Patrick Slavin, a NJ Cranberry grower, Dr. Ron Bitner an ID custom pollinator, Jim Langley, an alfalfa seed grower (OR) representing NW alfalfa seed growers and Howard Ginsberg, a conservation biologist of the U.S. Department of Interior.

Opinions were solicited prior to the workshop and 15 were included in a notebook provided to the workshop attendees.

The workshop participants separated to work in breakout groups. Each individual selected either Bee Management, Pollination, or Pest Management. Each of these groups developed a comprehensive list of research needs/critical issues in that topic area with a (non-bee person) facilitator from USDA. This continued on Saturday with a consolidation of larger comprehensive concerns and a prioritization of proposed research thrusts. Each of the three breakout groups gave all participants a summary and finally all partners/customers/stakeholders (but not USDA personnel) had an opportunity to individually select 1st, 2nd, and 3rd (three of each) priority projects.

The high points of the lists developed by the three groups are presented. There was obvious overlap with the subgroups. Diseases and pests appeared on the list of all three groups as might be expected. In the Pollination subgroup a number of commercial pollinators rightfully felt their needs were not adequately addressed so they drafted a separate list of five items.

So what will come of this workshop? Karl Narang, USDA National Program Coordinator, announced there would be a summary report posted on the internet for reaction with a 30 day comment period. USDA Scientists have begun to develop action plans to meet research objectives identified by the workshop. Not all items identified will be researched – there simply is not enough research dollars or adequate number of bee researchers to tackle everything. Eventually performance measures will be included.

Was this 1½ day activity worthwhile? Individuals who took time to send letters outlining their priorities (or as in the case of your editor used Journal space to voice opinion) and the roughly 60 Industry/Customer/Partner representatives (stakeholders in today's lingo) who attended and actively voiced their opinions sincerely hope their time and money was well spent (all attended on their own or on their organization's funding). I personally believe it was time well spent and most participants departed with an optimistic view.

In closing remarks Karl Narang summarized, "Industry communications with ARS researchers should help forge partnerships." He asked that the bee industry "keep us informed" and "help us together seek avenues for partnership" to enable USDA to "find answers and use ever scarcer research funds to best advantage." This workshop then should only be a beginning not the end!

Research Priorities

Pollination Subgroup

Pollination Requirements of Crops
Bee Health (stress on pollination colonies)
Pollinator Interaction
Economics of Pollination
Wild & Feral Pollinators
Africanized Honey Bees
Bee Genetics & GMO
(genetically manipulated organism) crops

Pest Management Subgroup

Most Important

Varroa mites
SHB (small hive beetle)
AFB resist, to OTC antibiotics
Tracheal mites
Developing IPM strat, & tech for control of mites/pests
Pesticide resistance to chemical controls
Nat. management plan to retain max. effectiveness of existing chemicals

2nd & 3rd Tier of Importance

Virus Research
Chalkbrood
Wax moth research
Nosema
EFB
Introduction of exotic pests & diseases

Commercial Beekeeper Priorities

Honey bee resistance to mites/AFB
Economic value of pollination, (added value of crops pollinated by bees)
Bee nutrition – feedlot feeding
Pesticide effects, protection of pollinators
Det. factors influence qn/dr durability and reproduction
effects of miticides and sublethal pesticide effects on queens
#drones needed for adequate mating

?Do You Know? Answers

1. **True** In the northern regions, only strong colonies should be overwintered. Weak colonies should be united with strong colonies in late Summer/early Fall so that they have time to arrange their brood nest and food stores.
2. **False** The honey bee queen begins to lay eggs in the Winter long before the temperatures get warm enough to break the Winter cluster. The queen stays within the cluster and moves with it as it changes position. Colonies that are well supplied with honey and pollen begin to stimulatively feed the queen, and she begins egg laying during late December or early January, even in the northern areas of the United States.
3. **False** As the bee cluster goes through the Winter, the bees normally move upward into the uppermost part of the hive. When brood rearing is initiated, it normally occurs in the top hive body as well. The bottom hive body early in the Spring may still contain some stored honey and pollen, which is of little value to the bees at that particular time, but it will be basically free of bees and brood.
4. **True** You will normally have the best results in building up colonies in the Spring when you feed pollen supplements rather than pollen substitutes. A pollen supplement contains some natural pollen which makes it more attractive and increases consumption in comparison to a pollen substitute.
5. **False** The quantity of honey that is necessary to sustain a normal, healthy colony through the Winter months will vary, depending upon latitude, altitude and local climatic conditions. During the broodless period in the Winter, the colony consumes the smallest amount of food stores daily, since they are not maintaining temperature conditions conducive for brood rearing, only survival.
6. **True** The contraction and expansion of the Winter cluster is the principal mechanism used by bees to sustain a favorable environment, as long as they have contact with their food reserves. At any given low temperature, small clusters are more vulnerable than large clusters as they must maintain higher inner cluster temperatures than do larger clusters. They have fewer bees to produce heat and form the insulating shell.
7. **True** When honey crystallizes, glucose separates from the liquid phase as crystals, while the other sugars remain in solution. As crystallization proceeds, the moisture content of the liquid phase increases. When this happens in the comb during the Winter, the bees suck the fluid from between the crystals, thus obtaining considerably more water in their diet than normal. Excess water in the diet is the primary cause of dysentery. Once the water has been removed from between the crystals by the bees, the remaining stores are very dry and are often impossible for the bees to use until Spring.
8. **False** Honey bees survive the cold of Winter by forming a tight cluster and generating heat from within the mass of bees. They make no attempt to heat the interior of the hive apart from themselves. Therefore, the number of hive bodies left for the Winter is not critical as long as they have adequate space for food stores and cluster formation.
9. **False** Hive top feeders are made of wood or plastic that cover the top of the hive and are used for the feeding of large quantities of sugar syrup.
10. **False** Colonies buried in the snow normally overwinter very well due to the insulating properties of the snow. Death of colonies from smothering have been reported only after heavy ice storms.
11. D) Bee Lice
12. C) Nosema Disease
13. A barrier forces the bees to develop a flight path above the heads of people in the vicinity of the hives. The barrier forces the bees to climb immediately when leaving the hive and to come in high, and drop fast, when returning. The barrier will provide a well-camouflaged apiary, which means "out of sight, out of mind" for the neighbors.
14. To determine if the colony is still alive. Check for adequate food stores and location of food stores within the hive.
15. Serves as an emergency exit when the lower entrance is blocked. Ventilation above the brood nest in the Winter retards condensation of water vapor, thus keeping the interior of the hive drier. The heat given off by the cluster tends to rise in the hive and will carry some excess moisture with it.
16. Distribution of food in the hive is an important Fall management consideration, since the cluster moves upward during the Winter. Even if a colony is starving in late Winter, it will not move down to get food. If the uppermost brood-food chamber lacks food the bees will starve to death. A colony may also starve if the upper brood-food chamber is honey-bound since the cluster often fails to move up and remains in the lower chamber(s). In this case the lack of open cells in the upper hive body prevents the cluster from moving.
17. Late Winter and early Spring are critical periods for overwintering honey bee colonies. Consumption of food reserves increases dramatically to satisfy the needs of an expanding brood nest. Prior to extensive brood rearing, food consumption is relatively minimal.
18. The Winter cluster plays a role in regulating the temperature of the brood nest as temperatures fall below 57°F. When forming a cluster, honey bees on the surface establish an insulating shell which varies in thickness from 1 to 3 inches. The colder the temperature, the more compact the cluster becomes, reducing the surface area from which heat energy is radiated. The honey bees within the cluster are much less compact and generate heat through metabolic processes. The heat generated within the cluster is conducted to the surface of the cluster.
19. Sugar syrup is the most common feed for bees when the weather permits easy movement of the cluster, occasional flights or when the outside temperature is above 40°F. Feeding heavy sugar syrup in the Winter is not normally recommended, since it places additional stress on the clustered bees. Inversion of the sucrose and handling excess water cause problems (dysentery) for honey bees. Therefore, sugar candy is recommended for emergency feeding in Winter.

There were 25 points in the test this month. If you scored less than 12 points, do not be discouraged. Keep reading and studying – you will do better in the future.

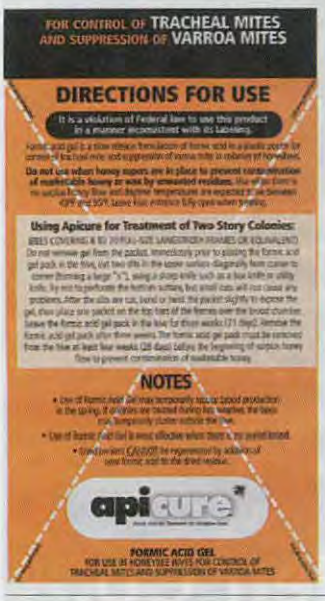
Number of Points Correct
25-18 Excellent
17-15 Good
14-12 Fair

GLEANINGS

JANUARY, 2000 • ALL THE NEWS THAT FITS

FORMIC GEL APPROVED

Bob Stevens, President of Apicure, Inc. announced in December that the formic acid gel packs, used to treat honey bee colonies for tracheal mites, and for additional control of Varroa mites are being shipped. Distributors include B & B Honey, Dadants, Midcon, Brushy Mountain Bee Supply, Glory Bee and Apicure. Beekeepers may purchase this product in boxes of 24 individual units if buying by mail, or singles if picking up packages. "Because this is considered a hazardous product by UPS" Stevens said, "we have to have the boxes we send them in registered. That's why we picked a 24 unit package". Smaller supply operations can purchase packs of 24 for resale, or can personally pick up lesser amounts for resale he added. Shelf life is stated to be at least 2 3 years, so a purchase of 24 packs will last for several treatment periods. Recommended treatment time from the label is in the spring.



The price for a single half-pound treatment is $1.95, plus shipping.. The gel comes in a 3 layered plastic pouch, made of 3 different types of plastic. The beekeeper simply lays the 4-1/2" x 8" x 3/8" packet on the top bars of the hive, cuts the bag on the premarked X on the bag with a utility knife, places the inner cover and cover on and that's it Stevens said. Formic acid is heavier than air and settles out of the colony leaving via the front door. All materials in the bag are food approved, that is the formic acid and the gel it is in so honey contamination will not be a problem. Colonies that use migratory covers will have a problem because of the 3/8" thickness of the pack.

"Beekeepers are going to have a learning curve using this material", Stevens said, "because every colony, and every apiary location is different. And this material is definitely geography oriented. Evaporation rates will vary according to exposure to the wind and other weather factors that will vary year by year. However, when used to its fullest capacity, it gives essentially complete control of Tracheal mites, and good control of Varroa, sometimes control as effective as Apistan or Checkmite+" he added.

EAS FUNDS AVAILABLE

The EAS Foundation for Honey Bee Research is a competitive grant program developed from donations received from beekeepers and others interested in funding research on topical problems in honey bees. Proposals are hereby solicited with awards to be announced at the 2000 EAS annual meeting. Requests for support for student projects (undergraduate summer employees/ graduate student) or for equipment/ supplies for distinct research projects will be given highest priority. Requests for "seed money" to provide investigators the opportunity to collect preliminary data or as "add on" funds to combine with other funding sources to continue present research will also be considered. We welcome separate discreet project proposals and requests that identify pieces of ongoing research programs where additional funds can accomplish an objective of a larger program. Grant funds may be used for supplies, equipment, salaries, travel or other appropriate uses by the recipient.

There will be one award for $4000-5000. The award will be announced at the EAS banquet but available by May 15, 2000. We intend to publicize the award to aid in solicitation of additional funds for subsequent years. Deadline for application is May 1, 2000.

Proposals should be submitted by May 1, 2000 to EAS Foundation for Honey Bee Research c/o EAS Secretary, Box 300A County Home Road, Essex, NY 12936. Three copies should be supplied. Write for proposal guidelines.

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HONEY LOAN PROGRAM FOR 1999

USDA Farm Service Agency announced in December the availability of a Honey Recourse Loan Program for a nine month period, ending March 31, 2000. Producers can request loans at the countryoffice wheree they keep theri records. The loan rate is 59 cents/lb., witha service fee of the smaller of .005 times the gross loan amount, or $45.00 per locan plus $3.00 for echlot over 1.

Loans mature on demand, but no later than the last day of the 9th calander month following the month in which the note and agreement were approved.

Elegibility of the producer and the honeyare spelled out in the notice, along with storage and container requirements. There are certification provisions, lein search and financial statements to deal with, and of course this is a non-forfeiture locan program. Not repaying draws the attention fo the IRS and other agencies.

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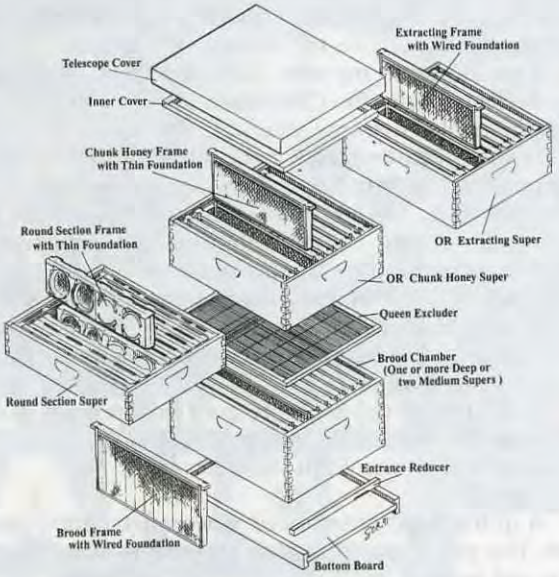

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Wellmark/Apistan ..... Back Cover

Happy New Year

The Winter months are a good time for making repairs, constructing new hive bodies and, if you're a glutton for punishment and trying to save a few pennies, manufacturing new frames. I spent most of last Winter saving a few pennies. Out of the hundreds of frames I made, each was unique. The first 10 were especially unique. After I bashed them inside a super, I designated it a permanent "feeder" super with a special warning label against ever trying to remove the frames.

I explained to my wife Bobbalee that, while the dado blades she had given me for Christmas for my table saw were good for some aspects of frame making, the more delicate frame parts called for a router and a handful of bits. Surprisingly, she was disappointed at this news. She was under the mistaken impression that dado blades were entirely sufficient for frame making.

Weeks of negotiations ensued, during which she received much re-education on the art of frame making, and I volunteered to relinquish any monies made from sales in my new high-volume frame production business. I also promised to use only scrap wood found either at new construction sites or in my friend Bill's cabinetmaking shop.

"So, this is the last piece of equipment you'll need?" she inquired during closing interrogations.

"Can I take the Fifth Amendment?"

"No."

A quick legal note about new construction sites: Always ask first. The pile of scrap lumber you think is free for the taking may turn out to be a set of new kitchen cabinets.

Out of the next 20 frames I made with the help of my new router, three were enough alike that I named them after the Three Stooges. Production, however, slumped sharply as I spent much time studying the odd scraps of pine and oak I had gotten from Bill, my cabinetmaker friend. You have to hold Bill's scraps at different angles and in different lights to see a potential frame side or frame top. After three months of work, I only made enough frames to fill 10 of what I am calling "prototype" supers.

Then, too, Bill gave me a lot more veneered pressed wood than he did real wood. I did not even try to imagine a frame made of pressed wood, but I supposed that the stuff might work in a telescoping cover. When I ran out of real wood for frames, I switched to making covers.

Let me say right upfront that pressed wood does not make a good cover. After we got about 10 inches of rain last Summer, I noticed that the pressed wood covers were beginning to bloat. A little more rain, and they filled out into large, black, spongelike objects. Shortly thereafter, the sides fell off, and with a little breeze and some dry weather, I was left with rocks encased in curled veneer sitting on inner covers.

Having had the whole Summer to think about frame making, I now realized that, while Bill does manage to make a living as a cabinetmaker, his scraps seldom have a straight line in them. You'd think they would be straight, but they aren't. What I needed was straight, cheap lumber. In short, all I lacked was a large band saw and a source of odd tree limbs and tree trunks.

To this end, I approached our financial manager with the good news that my friend Bob, who trims trees and teaches literature on the side, could supply me with any number of tree trunks.

"And where are you going to get the free band saw?" asked Bobbalee.

"You won't believe the coincidence," I chirped, "but band saws are just the thing for making wonderful kitchen cabinets. Just think of it!"

Indeed, I could tell she was thinking. The deep skepticism on her face had changed to uncertain suspicion. A wistful look came into her eyes.

"Really?"

"I'm absolutely serious, and I can get free pressed wood scraps from Bill."

"I know, but won't they bloat up into giant, black sponges?"

"Absolutely not."

"Well, new cabinets would be nice," she said, but she wanted to know why I couldn't just make her cabinets out of recycled hive body wood.

"You've got a lot of old, broken hive bodies that you're not using," she pointed out. I couldn't say right away why it won't work, but I knew what I had to do.

With the rationale for the band saw at stake, I have been feverishly making covers from old hive bodies. I also thought it a good idea to practice some cabinetmaking skills on them so when I do get the band saw, I can switch smoothly from covers to cabinets. Besides, it would prove that I might possibly come through on my promise for the new cabinets.

My new covers are sanded to the bare wood, dovetailed at the corners, have tongue-and-groove center boards, and are coated with a clear, waterproof finish. They almost look like paneled kitchen cabinets.

Unfortunately, our band saw purchasing agent has become jealous, believing that they are indeed kitchen cabinets being placed atop hives. Then, too, I have not made a very big dent in the old hive body pile.

The visions of dancing band saws in my head have switched from a happy jig to a very slow, almost mournful, parting waltz.

Woodworking For Beekeepers

Ed Hughes

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