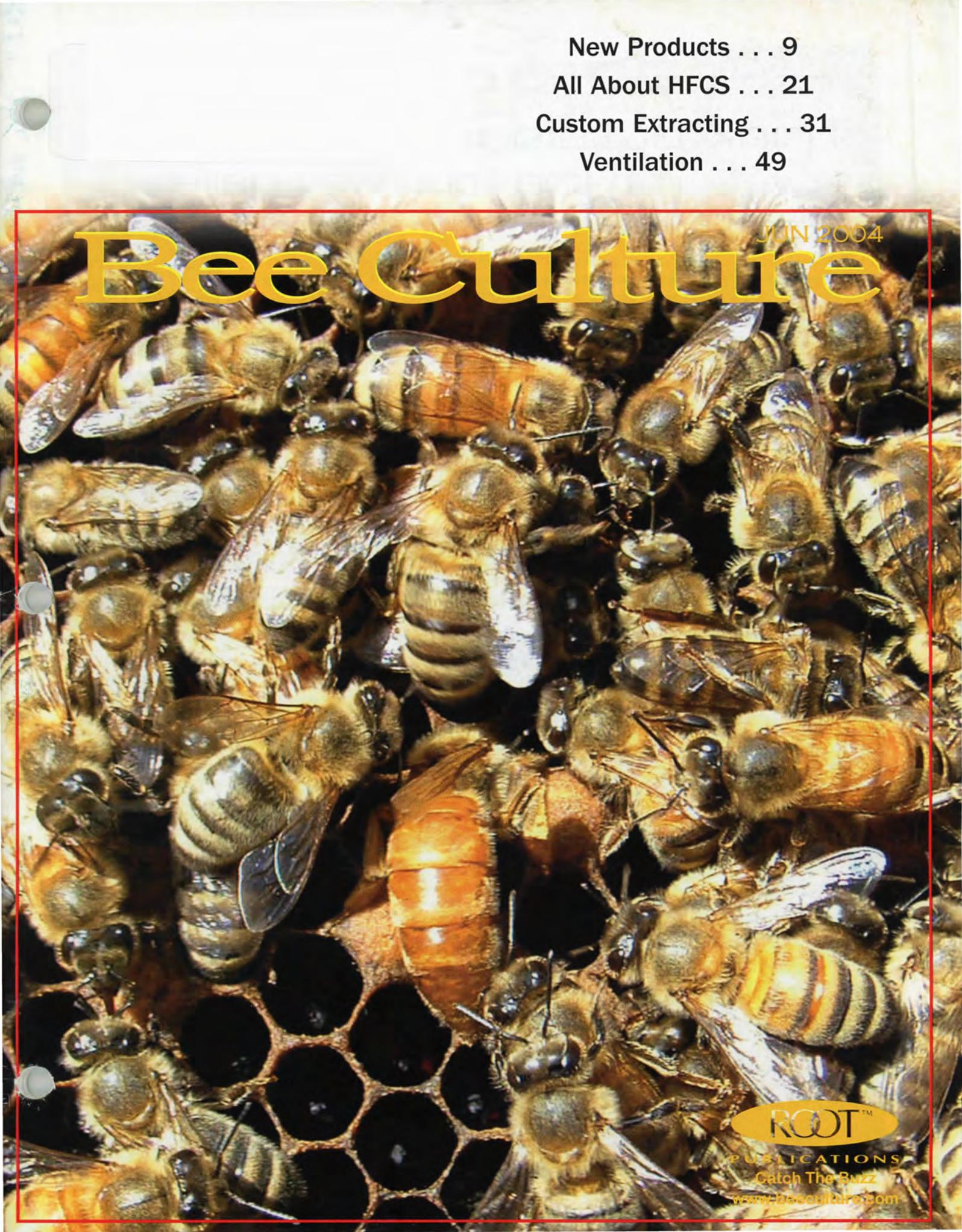


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JUN 2004

Bee Culture



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A queen just finished laying an egg. If you look on the cover you should be able to see the egg in the cell. This photo was taken by Gary Johns of Stillwater, OK.

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

JUNE 2004 VOLUME 132 NUMBER 6

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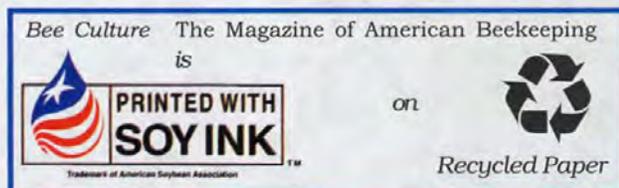
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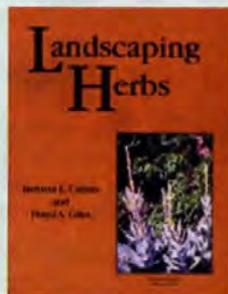
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Plant Ahead This Season

Landscaping Herbs \$29.95 X116

Stunning photos. If you grow herbs for food, fun or for your bees, this is the book you need. 204 pages, soft cover, color photos and black and white drawings..

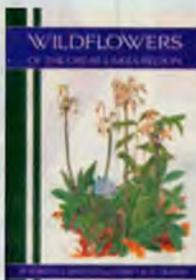
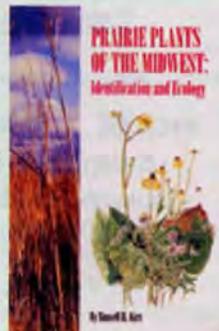


Insects & Gardens \$30.00 X95

What goes on in your garden. Spectacular photography and excellent biology of the other bugs in our lives.

Prairie Plants of the Midwest \$15.95 X114

Plants grouped by plant family. Unique are the ecological notes that explore importance of the plant in the prairie community, pollination ecology and unique characteristics. Soft cover, 137 pages, black and white line drawings.

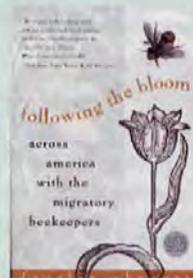


Wild Flowers of the Great Lakes Region \$15.95 X115

A book devoted to plants, grouped by season – when they bloom and by habitat. Soft cover, 146 pages with black and white line drawings.

Following The Bloom \$18.95 X118

First published in 1991, this book follows the trials and tribulations of some of America's migratory beekeepers. Soft cover, 246 pages, black & white



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KEEP IN TOUCH

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EMAIL: KIM@BEECULTURE.COM

Russian Queen Update

I received a shipment of the Russian/Russian queens in late April.

I installed 62 hives on four way pallets and put three into nucs. I sold 34 to my partner and gave three to a beekeeper friend.

All were installed in nucs/ hives within 36 hours.

I released mine after five days caged due to the introduction problems I had last year. I did not have any introduction problems this year and found only one queen dead in a cage when I went to release the queens. I have got 64 installed and hopefully laying.

These Russian queens were grafted from a Russian II breeder queen from Glenn Apiaries and open mated to another Russian/Russian line on a 2500 acre ranch in California. One can never say for sure about open matings but we went to a huge amount of effort to control the open mating by setting up many drone colonies on the ranch.

When these queens arrived they were four days late and at the Kansas City airport. I was shocked to see all the queens were light colored! Last year's were black to dark brown. Because these queens are an important part of my testing of the Russian bee to see if it might work in our area and need less treatment for *Varroa* & tracheal mites than the bees we have been using I needed to make sure I got the bees I ordered and a mistake had not happened (mistakes happen) and I was shipped regular production queens.

I called the queen breeder in California and talked to the breeder. She said she thought the bees were Russian/ Russian but the person which filled the order would check and call me back. She did the next morning and the bees were yellow/orange Russian/Russian from the ranch project.

Charlie Harper (Russian

MAILBOX

Breeder Queen producer) said color was not a marker for the Russian bee this year as he had sent a light colored queen when he sent Glenn Apiaries this year's breeder queens.

I can't help but think the workers will be dark as the drone source I would think would be dark bees. Charlie said the workers would most likely be from gray to black in color I guess I will find out in a couple weeks.

Last year I recaged about half after five days because they were trying to ball the queen. None this year which I have no explanation for

I did see something I never saw before. One queen kept trying to sting the workers. I checked the nuc for another queen but not so. I had cut a couple queen cells from the nuc. I picked her up and held her for a minute (kind of like time out) but when I put her back on the frame she started trying to sting workers again. They were not fighting back so I recaged her and returned about two hours later. Was getting dark so I sprayed her and the workers with a sugar / solution and released her figuring she would get over her rage at her new subjects by the time they had all cleaned up the syrup.

Bob Harrison
Odessa, MO

Gourmet Medicine

Kim Flottum's article giving the NHB list of selling points for honey is excellent. However, I failed to see anything on honey as a help in dealing with human ailments.

Passed down by word of mouth from generation to generation and in writings, honey has been known as a natural medicine probably from the time man first took honey from bees as a food. Medicinal properties of honey are widely recognized and increasingly used today. All medicine originally

comes from natural sources and as health care costs soar older people in particular seem to be returning to relatively cheap natural products to deal with various ailments.

Here in New Mexico several doctors often send patients in search of honey to combat seasonal allergies. The feedback has been fantastic.

The most recent book I've seen on the subject is *Honey, The Gourmet Medicine* by Joe Traynor. I believe it would be a mistake to exclude honey as a natural medicine from the list of reasons to buy honey. Years ago, an expanded honey market followed publication of a book authored by a Vermont doctor touting honey as a medicine. It could happen again.

Jeanne Clayshulte
Mesilla, NM

Smoker Fuel

Last year I wrote an article for *Bee Culture* about using cardboard for smoker fuel. Since that time I've come up with a very simple and easy way to make this fuel.

Using a table saw, cut the cardboard (single weight) into strips 4" wide. Make sure the corrugations (holes) go across the narrow width.

Wrap (roll) the cardboard around a 3/4" dowel, pull the dowel out leaving a 3/4" hole.

Tape the roll so that it will not unroll.

Dip each end into 1/8" of water

Place the one end on a flat surface and then hammer the corrugations until they are closed. Do both ends.

Place in the sun for a day or two until dry.

To light the smoker, cut a triangle piece of cardboard, one inch wide and 1 1/2 inch tall and push the pointed end in the hole, then light.

If you burn just plain card-

Continued on Next Page
5

MAILBOX

board without hammering the ends shut, they will give you smoke for one hour Hammering the ends shut will give you smoke for about three hours.

Harley B. Crawford
Santa Rosa, CA

Contamination

I have read James Fischer's rather cynical yet amusing essay on the rather serious contaminated honey issue that is currently sweeping some parts of the globe, including Australia.

A couple of points I would like to address.

His reference to Australian Dr Geoff Skurray as a "scientist's 15 minutes of fame." We approached Dr Skurray because of his area of expertise. He is an accredited and respected scientific researcher specialising in toxins in food. His credibility has not once been drawn into question since our series on nitrofurantaminated prawn/shrimp and honey except only from FNZAS, the Australian regulatory authority whose inaction on this matter has been badly exposed.

Our program has only recently undertaken its own testing on samples of honey gathered at random from Australian supermarket shelves. Twenty two samples were tested at Advanced Analytical in Sydney - the only Australian laboratory accredited for nitrofurantamin testing at low levels, similar to Applica. Not only did we find a problem with some Capilano products packed between July and December 2003 but also with another product imported into Australia from Denmark by another company for Woolworths. In fact this particular product recorded the highest level of 3.4 ppb of nitrofurantamin. Products that claimed to be 100 per cent Australian tested negative to nitrofurants.

Curiously - and one for you to ponder - jar containers with metal lids also returned significant readings of semicarbazide.

Frank Pangallo
Sydney, Australia

A Chilling Effect . . .

The article "A Chilling Effect On Beekeeping" managed to fire me up. The typical "chicken little" warning was accompanied by unsubstantiated, inconsistent and contradictory statements. According to Mr Fischer scientific journals are more trustworthy than newspapers and yet "one only need read the newspaper..." to realize that "strange things are happening." We are supposed to accept without question that Mr. Fischer's statement against the "one person" interviewed against the extreme opinion of the so-called "experts" is wrong and that people are the cause of "global warming." He accuses anyone who disagrees with the so called "experts" and "scientists" of being in the pocket of "heavy industry" and is a "laughingstock." He ends his smearing of those who would dare to disagree with this theory (unproved idea) with the statement that "paleoclimatology" has discovered that this whole phenomena of "global warming"

happened 12000 years ago and is obviously beyond our control! It will happen again! And this is based upon the "best" computer models, which have to be programmed with someone's opinionated data. Therefore his conclusion is that "no one knows" and "no existing atmospheric computer model can accurately predict" yet we must not "allow" global warming to continue. Friend you can't stop "mother nature."

We need to be good stewards of the earth. But that does not mean that Americans and American beekeepers must go to extremes that are purely responding to fear mongering (reverting back to the days of no A/C, no modern conveniences, no fossil fuel, no nuclear energy) while at the same time not insisting that the countries of China and Russia not clean up their polluting and that somehow Central and South America are cleaner environmentally than the bureaucratic rich U.S. (This is why many oppose the Kyoto Treaty.)

Beekeepers and Americans in general should be good conservationists but not extremists and "chicken littles."

Surely *Bee Culture* can find more useful articles for its usually fine publication. We get enough fear mongering and unsubstantiated blather from the general media.

Jeff Hawkins
Eastern Kentucky

Jim expresses well some of the effects of global warming and one of widely promoted guesses that we the people are causing it. Warming may or may not be occurring, but either way, unless you can explain away one important fact, civilization is not causing global warming.

As Jim points out, about every 12,000 years the earth suddenly flips from hot to cold or cold to hot, and it has done so for hundreds of thousands of years. Civilization certainly didn't cause those flips. The longevity and regularity of the flip cycle says there is a relentless natural phenomenon at work other than

20% ←

White vinegar is counteractive to chalk brood, nosema spores, foul brood and parasitic mites (varroa, tracheal).

A special quick tach method that turns 5 tablespoons of white vinegar into steam (vapor) and introduces it into the front entrance for one minute and you are finished. (No need to take the lid off.)

Spraying straight vinegar into the colony does not work. It must be volatilized by steam.

Beekeepers who have used this machine claim a massive buildup of brood and bees, increasing splits and tremendous production. Requires a 120 or 240 volt generator.

References can be supplied.

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the presence of civilization. Our puny efforts to stop it are futile if they are based on thinking we are causing the problem to begin with.

A cost benefit analysis would show that the environmental laws designed to stop the next cycle are exacting enormous costs on society without any proven benefit. Thirty-seven different grades of gasoline mandated in the U.S. cost us every day at the pump, and \$400 extra cost for each car or home with an air conditioner are just two of the thousands of environmental costs imposed which are probably not worth the benefit. The Kyoto Treaty should never be agreed to by the U.S. I believe we are paying too much right now to the gods of environmentalism and we should cease and desist until we know what is happening. Smog in cities we can understand, but global warming? We are still like the alchemists of old who prescribed bleeding to cure ailments they didn't understand. The patient would have been better off if left alone until the disease was understood. The "cure" caused harm, not help to the patient.

Jack A. Wilson
Winchester, MA

Organic Spin . . .

In response to Gunther Hauk's article, "Organic Beekeeping" in the March issue of *Bee Culture*. I am a 250 hive honey bee operator, 200 cow/calf livestock producer and a 1200 acre cereal and oilseed crop producer. I make my living producing food and take great pride in the quality food my farm produces. Reading Gunther's article was slap in my face, just as any other organic feed promotion article does. Seems to me Gunther is overlooking very important aspects of food production. The consumer drives the industry of food production. The food must be produced and presented in the expectation of the consuming public. The consumer demands quality, quantity, affordability and easy accessibility

of food and those demands are what molded agriculture to its present state. If we went back 80 years in food production, the consumers would be outraged with the lack of quality and lack of abundance of the food produced, along with huge price hikes to follow afterwards.

Gunther talks about decreasing life expectancy of dairy cattle, antibiotics and tranquilizers for pig survival, hormones, diet changes, chemical controls and so on. Gunther should sharpen his pencil, for he may state whispers of facts, it seems he is presenting them in a very irresponsible fashion. Feeding off the public's total absence of any food production knowledge to encourage his message, and it seems to me organic food marketing focuses on these misrepresented facts to sell their products. At the end of the day, his organically produced honey, or any other type of food, is no safer, no healthier, and of no better quality than the food I produce on my farm. And next time before you allow Gunther or any other organic food promoter to express ideas against modern day agriculture, tell them to remove all their spin and start showing science behind their facts.

Ian Stepler
Miami, MB, Canada

Comb Honey Ventilation

No, screened bottom boards have not changed 'my' ventilation requirements as outlined in last month's article. I'll explain.

Along with everyone else, I always understood that comb honey hives should not have upper-ventilation as that would interfere with having the comb well drawn out. So, I had to contend with huge 'beards' of bees during hot weather, and no bees doing work!

Then someone told me about using shingles for upper ventilation during the Winter, and I said to myself 'why not during the Summer'?

Thereafter, all my hives have about 3/4-inch upper ventilation in the front all year. I no longer had beards of bees in hot weather, got much higher production, and also

eliminated the hundreds of bees on top of the inner cover when I opened the hive. (Instead, I have several dozen bees on top of the top bars, under the inner cover, beating their wings like mad to draw up outside air from the bottom, cool the brood and evaporate the nectar, and vent it out the top.)

So, 'most' of the ventilation problem was solved before SBB's. Would SBB's have provided the same degree of ventilation . . . don't know, but doubt it. Not enough room at the top to allow venting.

As for effect on comb honey production . . . the supers have to be reversed (turned lengthways) as the bees will not draw out the comb immediately below upper ventilation space. But that is really not a problem as comb honey hives have to be visited every seven to 10 days in any case.

Hope this helps.

Lloyd Spear
Guilderland, NY

Comments . . .

I would like to make two comments about the articles in *Bee Culture*, April 2004.

First I would like to thank Kim for pointing out that everyone wants more from our hives. Whether it is a college or a resort we can all expect to pay a bit more for attending meetings in the future. I made a mistake when I told a Board of Directors that a meeting in Maine would be expensive. In actuality it wasn't all that bad when I start looking at the costs of the last few years and the cost of this year coming. I think a lot more people are going to be looking at those costs and their budgets. As for giving things away for free, I have learned that when it is free it is worth what you pay for it.

Second I would like to thank Mark Winston for his article. Especially the last paragraph which places in the open a thought perhaps a great many of us have had over the last several years.

Rick Cooper
Bowdoinham, ME



INNER COVER

If you tuck away a few days every Summer to get to a bee meeting somewhere your choices this year are all good. Which makes it tough.

Most state associations have a Summer meeting, so there's always that. But in July the Heartland Apicultural Society (HAS) does three days in Lebanon, Tennessee. You can

find out all about it at www.Heartlandbees.org and see their humorous ad on page 8 for more right now. They're three years old now, and growing fast. The Western Apicultural Society (WAS) meets in Missoula, Montana July 14-16. This is a way different program this year, covering some of the hot button issues at the moment - pesticides, bears and bear fences, state of the art hive environment monitoring technology and fool proof microchip branding. See the story on page 58 for more information and contacts.

In August the Eastern Apicultural Society (EAS) meets at the 7 Springs Resort and Conference Center in Champion, PA. They have a whole week planned. (In the spirit of full disclosure, yes I have a vested interest in EAS, and certainly in the success of HAS and WAS.) You can find out more about EAS at www.easternapiculture.org.

You'll find the programs as varied as the people choosing the topics and assembling the schedules. Even if you know none of this is going to happen for you this Summer take a look at the programs of each group. The topics covered reflect what's happening and will clue you into things to ask about, look for, or read about.

I hope you can make it to your State meeting this Summer, or one of these regional get togethers. Trust me, and them - your bees will live longer

One of the things I like about June in this part of the country is that things are cookin' in a beehive. Lots of brood, lots of fresh pollen, lots and lots of nectar in all stages of almost honey, and lots and lots of bees.

With all that inside, when you lift that last cover a thermal wave of this volatile bouquet rises to escape. If you don't drown it in smoke (try not to) you'll soon learn the subtle nuances of different nectars, different pollens, and different populations. There is no aroma like it, anywhere.

Take a look at Clarence Collison's column on page 55. There's now two sections for his topic of the month. There's the beginner's section (similar to what was before, but a bit easier), and now he's added the advanced section. Thought you knew it all, eh? So, what percent of the genes do super sisters have in common? Take a look, and be prepared for a real challenge.

The cold, wet Spring is finally over, I hope, now that it's early May. The rains came during Willow bloom, Maple bloom and it snowed on the dandelions. In fact at almost full dandelion bloom it was so cold the earth recalled those yellow blossoms. It seemed to suck them back to where they came from.

As a result, buildup was slower than expected and some colonies were still being fed in mid-April. Strong, over Wintered colonies, were actually starving around here.

So why do colonies die? We asked our honey reporters that question. Even if you don't normally read the report take a look this time. Weather related events (too cold, too long; too wet/dry too long) accounted for over 40% of reported losses this year That's more than mites, which surprised me.

With the less than ideal Fall flows, and a lousy Spring, one wonders about those unseen problems - nutrition for sure, stress and diseases

Be glad you're not a honey packer right now. It's gotta be one tough place to be. They either take the high road (and thank you to those who do), and stay away from honey imported from those places that use illegal antibiotics, and pay the going price of good domestic honey; or, to compete with the rest of the garbage users choose to blend good honey with junk, and make it all junk. It's sad, isn't it, that we suddenly have two classes of honey - domestic, and junk? What's sadder is that we accept it.

It's bee season finally, for most of us. And for those in the south, harvest time already. Sharpen that hive tool and go see how they're doing. Oh, and keep that smoker lit.

Spring Fever

JUNE - REGIONAL HONEY PRICE REPORT



We surveyed our reporters about the aftermath of this past Winter, measuring their percent Winter loss, the causes of those losses, and current colony conditions - current as of a month ago, at the very end of April. We also asked about demand compared to this time last year.

Overall, losses ranged from 0% (those really good beekeepers among us) to several with as much as 80% loss in several regions. Causes included starvation - 25%; (general) mites - 20%; queen loss - 20%; the 'weather' - 16%; *Varroa* mites - 8%; tracheal mites - 3%; other - 4%. Conventional wisdom suggests that weather and starvation go hand in hand, thus combined for 41%; all mites then - 31%; add in queen loss at 20%, and those three factors add up to over 90%.

Colony conditions were rated as 1 very, very weak to 5 buster. A score of 2.5 would be average for this time of year.

Region 1 - 20% overwinter (OW) loss, colony conditions 2.9. Prices steady to down a bit, demand strong this Spring.

Region 2 - 34% OW loss, colony condition 2.88. Prices down but demand steady.

Region 3 - 35% OW loss, colony conditions 2.9. Prices down to steady, demand right about average.

Region 4 - 35% OW loss, colony conditions 3.0. Prices steady since last month, demand steady to increasing slightly.

Region 5 - 23% OW loss. Colony condition 3.0. Prices steady to up a tad since last month, demand strong and rising.

Region 6 - 25% OW loss, colony conditions 2.75. Prices steady to up a bit. Demand strong.

Region 7 - 37% reported OW loss. Colony condition 3.18. Prices steady to up a bit since last month. Demand only moderate though.

Region 8 - 43% OW loss on average. Colony conditions 3.67 (the strongest in all regions). Prices steady to down, and demand strong.

Region 9 - 13% OW loss, colony conditions 3.38. Prices for bulk down but all the rest up. Demand strong.

Region 10 - 36% OW loss, colony conditions 3.33. Prices up just a tad since last month, with demand steady, but increasing just a bit.

Region 11 - 29% OW loss on average, with colony conditions 3.5. Prices steady to down just a bit, with demand steady compared to last year.

Region 12 - 50% OW loss recorded, but lots of this due to high-stress pollination. Colonies that weren't quite so stressed, 3.50. Prices steady to down just a bit, and demand unchanged.

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Yr.
Extracted honey sold bulk to Packers or Processors																
Wholesale Bulk																
55 gal. Light	1.10	1.35	1.13	1.25	1.25	1.10	1.27	1.13	1.13	1.40	1.41	1.32	1.10-1.65	1.39	1.29	1.36
55 gal. Amber	1.03	1.25	1.03	1.00	1.04	1.07	1.03	1.03	1.03	1.40	1.50	1.08	1.00-1.50	1.12	1.27	1.32
60# Light (retail)	98.67	102.70	109.60	96.25	115.00	101.67	116.71	91.50	110.00	115.00	116.00	105.25	90.00-120.00	106.74	108.03	93.55
60# Amber (retail)	110.00	97.95	101.03	95.70	93.15	98.00	112.80	90.00	110.00	101.03	118.00	110.00	87.00-120.00	102.79	96.98	84.96
Wholesale - Case Lots																
1/2# 24's	39.90	40.78	42.67	35.06	54.50	36.50	37.84	42.67	42.67	35.76	22.50	50.40	21.00-59.04	40.36	35.28	45.25
1# 24's	53.31	53.66	57.60	50.89	63.28	58.00	59.82	66.00	50.50	77.76	89.93	69.60	49.92-94.80	62.89	61.00	54.93
2# 12's	52.18	52.79	55.20	47.19	57.99	50.00	52.44	48.00	45.20	57.84	36.00	59.90	33.00-60.90	51.06	53.99	49.38
12 oz. Plas. 24's	47.84	47.90	54.00	49.59	58.96	48.00	48.35	48.00	43.00	47.64	69.72	51.20	42.96-70.80	51.27	51.33	46.93
5# 6's	51.71	57.39	61.98	50.81	61.98	60.00	57.26	61.98	54.60	56.43	41.20	62.33	37.00-62.00	56.10	56.37	53.03
Quarts 12's	62.75	100.35	82.20	70.32	71.82	78.50	79.49	66.36	74.00	95.00	95.40	96.00	60.00-110.88	82.11	81.86	71.71
Pints 12's	48.00	49.95	54.60	50.05	41.10	45.75	47.07	40.20	42.90	58.60	45.25	54.00	25.00-60.00	46.55	48.12	46.81
Retail Honey Prices																
1/2#	2.28	2.40	2.76	2.52	2.65	3.39	2.45	2.80	2.60	2.75	2.89	2.97	2.24-3.49	2.69	2.48	2.28
12 oz. Plastic	2.92	2.87	3.77	3.03	3.42	3.37	2.90	3.52	2.92	3.18	3.11	3.12	2.81-3.95	3.18	3.23	2.94
1 lb. Glass	3.48	3.36	3.95	3.83	3.56	3.87	3.49	4.25	4.32	4.05	4.36	4.09	3.26-4.36	3.88	3.86	3.50
2 lb. Glass	6.21	5.64	6.49	5.60	6.79	5.99	6.08	6.08	6.78	6.89	5.80	6.78	5.50-6.98	6.26	6.32	5.80
Pint	5.88	6.45	5.95	5.24	5.50	5.00	5.35	5.16	4.88	6.25	4.44	5.50	4.45-7.28	5.55	5.81	5.56
Quart	10.63	8.55	9.50	7.59	8.68	8.67	8.88	7.63	8.13	12.90	8.10	9.66	7.08-13.56	9.05	8.75	8.40
5 lb. Glass	13.95	12.08	13.06	12.98	14.00	11.25	12.47	12.39	12.59	10.06	11.66	13.60	10.06-14.30	12.53	12.89	11.71
1# Cream	4.19	4.58	4.47	3.88	4.75	3.90	4.12	4.83	4.47	4.63	4.92	4.60	3.85-5.00	4.46	4.43	4.11
1# Comb	4.08	4.18	4.10	4.63	5.50	4.25	5.35	4.00	5.50	5.59	6.25	5.92	3.95-6.50	5.12	5.65	4.63
Ross Round	4.25	3.56	3.60	4.75	4.72	3.25	5.49	4.72	4.72	5.75	5.58	5.00	3.00-6.00	4.62	4.49	4.19
Wax (Light)	1.31	3.25	1.11	1.03	1.23	1.35	1.72	2.00	1.50	2.00	1.43	1.25	1.03-2.59	1.95	1.85	2.07
Wax (Dark)	1.01	1.03	1.75	1.05	1.10	1.21	1.14	1.68	1.40	1.00	1.50	1.55	1.10-1.84	1.66	1.47	1.66
Poll. Fee/Col.	48.33	36.75	40.00	39.25	36.67	42.50	43.14	40.00	30.00	40.89	30.00	41.25	30.00-48.33	39.06	38.47	39.10

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"Preventing PDB Residues in honey and beeswax. And long live the sperm."

The colonization and destruction of stored combs by the wax moth, *Galleria melonella* can be a vexing problem for beekeepers. Populations of moth larvae can quickly reach injurious levels, especially in warmer climates, and beekeepers have limited options to protect combs. Where possible, physical control of moth infestations can be achieved by storing combs at reduced temperatures. However, beekeepers typically use some sort of fumigant to control infestation in stored combs. Worldwide, the chemical fumigant most widely used for wax moth control is Para-dichlorobenzene (PDB or

PDCB). In the US, the compound is sold both as a specific registered product for wax moth control in bee

equipment and also as a general clothes moth control product for household use. One concern of using fumigants on stored combs is the potential contamination of hive products. Recent research reported by Bogdanov and colleagues from Switzerland demonstrated that this can be a reality with PDB, as they report evidence that compound could be found widely dispersed in samples of beeswax and honey collected over multiple years and from different countries.

Bodonov et al (2004) and colleagues reported the results of chemical analysis to detect PDB in 460 honey samples collected in five

different years within the period 1997-2002. 173 of the samples were from Switzerland and 287 were from other countries in Europe, Asia, Australia and North and South America. They also reported the results of PDB screening of beeswax from Swiss beeswax manufacturers for seven different years (between 1994-2002).

The researchers reported that "a substantial number of Swiss honeys are contaminated with (*para*-dichlorobenzene)." In fact, 30% of all the samples of Swiss honey were found to contain PDB contamination and 13% had levels of PDB that were above the "Swiss tolerance value" of 10 mg/kg. PDB was also detected in 7% of the imported honeys, including samples from Europe, North America and Australia. Beeswax from all the Swiss manufacturers was also found to contain detectable levels of PDB contamination.

The researchers conclude that the likely means by which PDB gets into honey is through contact with contaminated beeswax foundation and combs. They suggest that residues of PDB can be reduced in honey by implementing alternative control methods for wax moths. As a guide, they list "important principals" that include: "regular exchange of old comb with new, timely recycling old comb into beeswax, storage of comb under airy, light conditions or at temperatures below 12°C (54°F) and treatment with non-toxic substances". While beekeepers in the U.S. do not generally consider wax moth control to be a significant danger to the quality of the hive products they sell, an awareness of the ease with which PDB contamination can occur is important. Such knowledge can be put to good use in making a reasonable effort to design and

implement safe wax moth control program for each operation.

Upon completion of "mating flights" early in their adult life, young honey bee queens have received all the sperm they will use for the rest of their egg-laying activities. The sperm are stored in a special organ known as the spermatheca and are used as needed for fertilization. As queens age – both the number and quality of the sperm available for fertilization may decline. In a recent scientific note, Lodesani and colleagues (2004) reported their measurements of the changes that take place in the storage process. They used 12 queens of three different age classes: two, 12 and 24 months. All queens had been inseminated with the same amount of sperm when young and maintained in 10 frame colonies. The queens were dissected and the spermathecal contents were evaluated for both sperm number and sperm viability. The latter test involved use of a chemical stain that differentiated non-viable sperm. Their results indicated that the total number of sperm decreased significantly with the age of the queens, with about five million sperm being present in two month old queens, four million sperm in 12 moth old queens and 2.6 million sperm remaining in two year old queens. The percentage of non-viable (dead) sperm remained low in the two and 12 moth old queens (around 21%) but increased to around 34% in two year old queens. The authors concluded that if the presence of a high percentage of non-viable sperm can be shown to be correlated to the likelihood that a queen becomes a drone layer (in



a future study), "then improved technology for storing and manipulating semen should be sought" While the answer to long term sperm storage still eludes scientists working with honey bees (unlike their counterparts working with cows and horses), the current study points out that even the queens themselves have some limitations in maintaining high quality sperm reserves for their old age. **BC**

Bogdanov S. V. Kilchenmann, K. Seiler H. Pfefferli, Th. Frey B. Roux, P. Wenk and J. Noser. 2004. *Residues of para-dichlorobenzene in honey and beeswax.* J. Apic. Res. 43:14-16.

Lodesani, M., Donatella B. and A. Galli. 2004. *A study on spermatozoa viability over time in honey bee (Apis mellifera ligustica) queen spermathecae.* J. Apic Res. 43:27-28.

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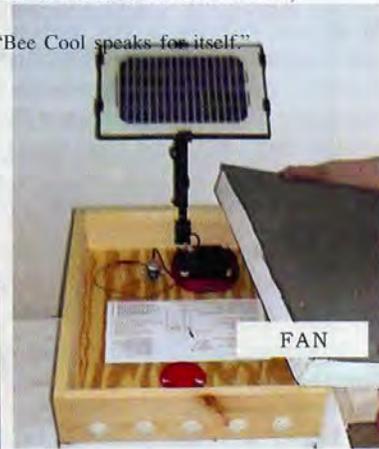
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ABJ Vol. #8, pg. 575-576 1995, V. Shaparew

"Gentle flow of air, egg laying increased." (University Paris Le Gurgue France 1995 Alteddad Darchen Study.)

"Optimal internal environment reduces swarming." (Hebrew University Jerusalem, fac. Y. Lenski & H. Seifert 1980)

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Mark Winston

Due To Legal Considerations

“Even if imidacloprid is found guilty by a jury of our fellow citizens, I doubt it’s the only guilty party in colony dwindling and death, or even the main player.”

Meeting cancelled. The meeting, that is, that Bayer CropScience had scheduled outside of Washington, D.C. to explore the latest research on chloronicotinyl insecticides and bees. Reason for cancellation? Legal considerations due to a lawsuit filed against Bayer by 13 U.S. beekeepers alleging impact of imidacloprid on their bees.

The meeting, like many meetings that Bayer has sponsored over the last decade, would have been unusual in including scientists, regulators, concerned beekeepers, industry officials, and representatives of Bayer in an open presentation/discussion format. Ironically, Bayer has been a model corporate citizen in funding independent research on imidacloprid and bees, putting no restrictions on publication of the work, and organizing public meetings that have included their most vocal opponents.

And, when no smoking gun concerning imidacloprid appeared, Bayer generously continued to fund research to determine just what was killing beekeepers’ colonies if it wasn’t their product.

That’s all come to a grinding halt, though, as the lawyers step in and bring the former atmosphere of open discourse to a sudden and brake-screaming halt.

In case you’ve had your head in your hives for the last ten years, concerns about imidacloprid arose in the early 1990’s. French beekeepers had moved their colonies

to pollinate sunflowers, and subsequently noted that colony populations were dwindling over the Summer, with some colonies dying the following Fall and Winter. Coincidentally, the novel insecticide imidacloprid had been used commercially on sunflowers for the first time that year.

Imidacloprid was a logical culprit to investigate. It is applied to crops as a seed treatment in which the seeds are soaked in the insecticide prior to planting. The insecticide becomes systemically incorporated as the plant grows, killing insects when they feed on the crop. Imidacloprid and related pesticides are considered progressive and environmentally friendlier than past compounds, since they are dispersed through plant tissue rather than being broadcast-sprayed, are specific to particular pests but non-toxic to vertebrates, are present only in minute quantities, and degrade rapidly.

Miniscule residues of imidacloprid migrate into nectar and pollen, around one part per billion, and the French beekeepers speculated that it was these residues brought back to colonies that were killing their bees. Never mind that resistance to miticides had become rampant that year, and *Varroa* was in outbreak mode. It was clear to the beekeepers that someone else was to blame, and the evil multinational pesticide emporium was a predictable target.

Unfortunately for this theory, voluminous research in France and elsewhere around the globe, including Canada and the United States,

has failed to find a supportable link between imidacloprid and colony death. Nevertheless, rumours and beekeeper lore continue to point the finger at imidacloprid.

I recall, for example, one meeting at which a Canadian beekeeper spoke passionately and definitively about how imidacloprid had diminished the colonies he had put into canola fields for pollination. Since the insecticide wasn’t being used within about 2000 miles of his bees, and wasn’t registered for use on canola at the time, his theory seemed a bit far-fetched, but he stuck to it even when confronted with that data.

It is, of course, possible that at some point some evidence will surface condemning imidacloprid, and the mob that has ganged up on Bayer will prove to have been correct. However, the evidence to date is slim to non-existent. The focus on imidacloprid has obscured the fact that colonies are dying around the globe, and research is not being well-focused to determine the real cause.

What research has been done on imidacloprid and bees, and has it been the type of independent, unbiased work that beekeepers can trust?

The research on imidacloprid and bees has been voluminous, much of it conducted by respected scientists with no-strings-attached grants from Bayer. The company, of course, has done its own in-house studies, published publicly in peer-reviewed scientific journals, but those suspicious of industry will be soothed by the even greater volume

Continued on Next Page

“Blaming Bayer for our problems may be good sport, but the energy and focus that has gone into tilting at that particular windmill has detracted from finding out what really is killing our bees.”

of work conducted outside of Bayer's laboratories.

I'm familiar with the grants Bayer has provided to university and government laboratories, since we have some funding from the company to conduct research concerning agricultural practices and wild pollinators. Our agreements are admirably free of any restrictions.

The design, conduct, analysis, interpretation, and reporting of the work are entirely in our hands. All the funds for the three-year project were received prior to commencing the work, insuring that there would be no possibility of financial blackmail should Bayer not agree with our results. Also, Bayer is only one of many funders, and financial support through partnerships with government and environmentally focused foundations insures that the interests of any funding group do not become predominant or overbearing.

Research globally has been exhaustive and comprehensive, including laboratory and field work. Studies have examined residue levels in nectar and pollen, biodegradation of imidacloprid in soil, behavioral investigations focused on sublethal effects on foraging, lethality studies in both field and laboratory situations, population growth in colonies, and the impact of long-term exposure to imidacloprid on colony growth and survival and worker behavior.

These studies, now numbered in the many dozens and published in publicly available reports and peer-reviewed scientific journals, have been remarkably consistent. Basically, imidacloprid has no effects on honey bees or wild bees at doses similar to or an order of magnitude above residue levels in nectar. This work has been highlighted by government regulatory authorities as model examples of how to establish risks of pesticides to pol-

linators, and imidacloprid has been approved for use as seed treatments for quite a number of crops around the world.

The “gang of 13” suing Bayer in the United States is seeking to establish a class-action lawsuit, and both sides have brought out their heavy legal artillery. It will be fascinating to watch the maneuvering, and illuminating when the evidence from the 13 beekeepers emerges from legal limbo. I assume from the money they must be sinking into their quest that they have some smoking gun data that will contradict the weight of previous studies, and look forward to the plaintiffs being as forthcoming as the defendants have been with their data.

In the meantime, I'm more interested in what has been killing colonies around the globe. I've always found it interesting that the timing of death-by-imidacloprid has coincided with the onset of serious resistance to miticides and antibiotics commonly used in honey bee colonies. It's also notable that many examples of dwindling populations and colony loss similar to those blamed on imidacloprid have occurred in places and times where the insecticide has not been used. Remember, for example, “disappearing disease,” a malady still not clearly linked to any cause.

I also find it notable that beekeepers today are among the least progressive practitioners of integrated pest management paradigms used to reduce pesticide use in all other agricultural endeavors.

Do we monitor mite levels and pathogenic infections before using miticides and antibiotics? Rarely.

Are we using outdated compounds that are being phased out for other agricultural uses? Yup.

Do we rampantly use illegal products, unapproved formulations, excessive applications, and unacceptably high doses of compounds

in our colonies? Sure do.

Are there residue issues concerning illegal products in honey that have led to product recalls and consumer concerns? Yes again.

Blaming Bayer for our problems may be good sport, but the energy and focus that has gone into tilting at that particular windmill has detracted from finding out what really is killing our bees. I doubt any one cause will emerge, but consider it more likely that we ourselves are the main agent of colony demise.

I predict that our own pesticide and antibiotic use in colonies will emerge as one factor, but it's not the only one. We push our bees too hard, moving them too often into crop situations in which colony nutritional needs may not be met due to the monocultural nature of the nectar and pollen being brought back to colonies.

We also have not kept up with changing agricultural trends in understanding how current crop patterns and beekeeping practices may be interacting. Crop production has changed to an extent, and at a pace, that may be overwhelming established bee management paradigms. A thorough examination of honey bees and agriculture is long overdue.

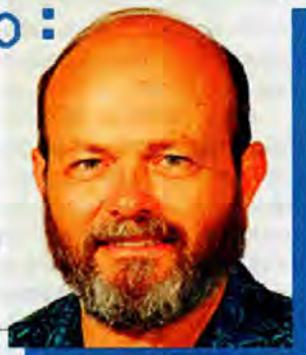
Quality of our genetic stock is a fourth issue, with highly variable reports from across North America concerning queen performance and colony traits.

Beekeeper quality is a fifth problem we need to address. Keeping bees has become considerably more difficult than it was 10 or 20 years ago, and requires way more knowledge and education to be successful than it used to. “Bee Havers” can no longer succeed in our industry. Only the most astute, well-trained, well-informed and perceptive beekeepers have a chance of surviving the complex management situations we face today.

Even if imidacloprid is found guilty by a jury of our fellow citizens, I doubt it's the only guilty party in colony dwindling and death, or even the main player. But, a jury may not be the best authority to resolve beekeeping issues.

Our colonies are in poor shape, and no lawsuit will solve that problem. **EC**

High Fructose Corn Syrup: A Revolution in the Making (Part I)



Malcolm T. Sanford

"Does the stimulation provided by the sucrose of cane sugar make for a bigger and better colony buildup and comb building than does HFCS, which requires no enzyme to be added by the insects?"

It was during my stint as a graduate student at the University of Georgia that I attended my first convention of the American Beekeeping Federation.¹ I recently became a 31-year member of that organization and have participated at most of its national meetings during my active career as an extension Apiculturist. I got many ideas from those conventions, but that first one sticks in my mind. At one of the booths in the commercial exhibition area, I saw a fountain running a clear liquid. The person manning the display proudly informed me this was a brand new bee food on the market. It was the first time I was to hear the words High Fructose Corn Syrup (HFCS). Little did I know that I was seeing and participating in a revolution in the making.

Over the next few years, HFCS invaded commercial beekeeping and more than a few sideliners and hobbyist operations in the bargain. The material had a lot to recommend it. It was inexpensive to purchase (cheaper than sugar), especially in large quantities. Most important, though, it came in liquid form. This threatened (joyously so for anyone who had fed many a colony of bees like myself) to end one of beekeeping's most time-consuming and labor-intensive tasks, making cane syrup by mixing, usually by hand, cane sugar crystals and water. This was somewhat of a two-edged sword in the early days, because it meant that the larger the volume the less expensive the feed. Smaller operations were often put at a disadvantage because the material was cheaper and more easily available in large (tanker truck) loads. Today smaller volumes are available, but at a cost. A local supplier will sell a five-gallon bucket (you bring the bucket) for a little less than \$10.00.

As beekeepers began to convert to HFCS, several things became apparent. One was that the syrup came in two types from the manufacturer, HFCS 42 and HFCS

55. The number refers to the amount of fructose solids present in the material. For a period there was a debate in beekeeping circles about the merits of both products. HFCS 42 was less expensive and appeared to provide the bees with all that they needed. However, the fact that it had fewer solids meant that a specific volume of the 42 variety was less nutritious than its HFCS 55 cousin. In addition, the 42 variety, because of the way it is manufactured (older technology), may have a number of "contaminant sugars" that 55 does not. Finally, it is difficult if not impossible to recover HFCS 42 should it crystallize. This is apparently due to the larger amount of glucose (dextrose) present than in 55. Thus, the beekeeper must ensure that the bees consume it fairly quickly, especially in colder weather. My most recent information is that the vast majority of beekeepers use HFCS 55, whereas the 42 variety is only employed, if at all, in the southern U.S. where temperatures are warm which avoids crystallization.

HFCS is made from corn. It is the inevitable result of a very large corn-growing industry in the United States searching for more markets. More recently, there have been efforts to make fuel out of corn, by converting it to alcohol to power engines, as sugar is now used in Brazil. Many argue that both HFCS and ethanol are only inexpensive due to massive subsidies given to those who farm corn and question the products long-range sustainability. Corn subsidies in the United States totaled \$34.6 billion from 1995-2002.²

Sweetness is the bottom line for HFCS. Fructose is sweeter tasting than sucrose (cane sugar) or glucose (dextrose or grape sugar), as well as most other sugars commonly in use. Thus, less of it is needed to increase sweetness. Honey is such a sweet product because it too contains a high amount

1. <http://www.abfnet.org/> American Beekeeping Federation web site accessed April 20, 2004.

2. <http://www.ewg.org/farm/progdetail.php?fips=00000&progcode=corn> Environmental Working Group web site accessed April 20, 2004.

of fructose. Chemically speaking honey is very similar to HFCS. This brings into play another situation corresponding to the arrival of HFCS, economic adulteration of honey.

Because of its relatively high price, honey has been the target of adulteration for centuries. In an effort to make a profit, there are few strategies more economically rewarding than adding some cheap ingredient to honey, and charging a higher price for the whole shebang as if it was a pure product. Because of its chemical nature, HFCS is almost the perfect material to adulterate honey. Why not add a material selling for 14 cents a pound to honey and sell the resultant product at 40 cents? And if its worth doing at that price level, think of the profit margins at today's prices.

For some folks, this is simply too good a proposition to pass up. According to a study funded by the National Honey Board, "The effect of adulterated product in the marketplace is significant, as the resulting increase in supply affects all levels of the industry. Thus, a one percent increase in quantity or supply (adulterated or not) results in a producer price decrease of 5.07 percent and a retail decrease of 3.88 percent. Just a five percent quantity increase results in a 25.35 percent lower price for the producer and a 19.40 percent reduction for the retailer. A 10 percent increase in quantity will result in over a 50 percent price decrease at the producer level and 38.80 percent at retail."³

Honey adulteration using HFCS was especially rampant in the late 1980s and 1990s, when it was virtually impossible for regulators to determine that honey had in fact been adulterated (in some cases up to 80%) with HFCS. This practice was so epidemic that the American Beekeeping Federation developed a program of testing suspect honey samples sent in by beekeepers. This was only possible, however, through the efforts of Dr. Jonathon White,⁴ who literally came out of retirement to develop a reasonable testing procedure. According to the *Syndicat des Producteurs de Miel de France*, "It is only when the result of the mathematical formula is below 5% that it is deemed certain that a truly natural honey is being dealt with. This technique has become the official method for the Association of Official Analytical Chemists, registered in 1991 under the n° 991-41. It is used throughout the world, and for the moment the most fallible and economic."⁵ This landmark research led to a curbing of HFCS adulteration, and was responsible for putting out of business some of the major outfits engaged in this deceptive practice.⁶ At least one company now aggressively markets this testing procedure.⁷

Dr. White's test uses isotope ratio analysis (Stable Carbon Isotope Ratio Analysis or SCIRA) and is based

on an interesting and simple premise. It turns out that plants assemble their sugars differently depending on their evolutionary history. Honey generally comes from what are called "flowering plants," or the angiosperms of the plant world. One division or class of these plants is known as dicotyledons or simply dicots. They are named because they have two seed leaves, but for bees and beekeepers they are important because of their sexual organs, flowers that produce pollen and nectar. Another class of the angiosperms is called monocotyledons or monocots. This includes the grasses; they have one seed leaf and do not produce classical "flowers." The dicots assemble or manufacture their sugars differently than the monocots. Thus, by comparing the carbon ratios in resultant sugars using isotope analysis, one can determine if a substance like honey comes from the nectar of a dicot or comes from a grass like corn (HFCS). Legitimate honey in the vast majority of cases comes only from dicots. Sugar cane too comes from a grass. It is mostly sucrose, however, and requires an enzyme from the bees (invertase) to produce a product rich in one of its components, fructose (fruit sugar). Thus, cane sugar syrup, modified and then stored by bees as a part of the honey crop (in supers), is also considered a honey adulterant.

Although on the surface both sugar cane syrup and HFCS appear similar, can it be taken for granted that the use or "metabolism" of these products by honey bees is the same and/or there is no risk involved in using them? This is a complex question and to my knowledge there is no specific answer developed for honey bees. From a users standpoint, after almost four decades of use by beekeepers, it must be concluded that there seems to be little risk involved.

On the other hand, astute observation in the field by beekeepers reveals some interesting conclusions. Comparing their use of the two main bee foods, cane sugar syrup and HFCS, has convinced some that the two foods do in fact function differently. Thus, several use them in distinct ways: cane syrup is employed to help colonies build population and comb, whereas HFCS is used simply to maintain populations. Intuitively this makes sense, given that nectar, responsible in nature for building colony populations, is mostly sucrose just like cane syrup. It requires the bees to actively invert the sugar using their own enzyme system. HFCS on the other hand does not. Questions still persist, however, at least in this writer's mind. Does the stimulation provided by the sucrose of cane sugar make for a bigger and better colony buildup and comb building than does HFCS, which requires no enzyme to be added by the insects? And what differences, although extremely subtle, might be seen among colonies fed nectar or cane sugar or HFCS, given they have distinct stable carbon isotope ratios?

HFCS is the result of processing corn into another product. There are two ways this can be accomplished, through either acid or enzyme hydrolysis. The process most used employs enzymes just like honey bees do when they convert (invert) sucrose from nectar or cane syrup into its two principle components, fructose and glucose by adding the enzyme invertase.

According to the Corn Refiners Association, "Corn

3. <http://apis.ifas.ufl.edu/apis99/apoct99.htm#3> Apis Newsletter web site, October 1999, accessed April 20, 2004.

4. <http://www.libraries.psu.edu/speccolls/FindingAids/white.html> Penn State Libraries web site accessed April 19, 2004.

5. <http://www.apiservices.com/spmf/adulteration.htm> Apiservices web site accessed April 19, 2004.

6. http://www.fda.gov/fdac/departs/1997/397_irs.html FDA Investigations web site accessed April 20, 2004.

7. <http://www.iso-analytical.com/page9.html> Isoanalytical web page accessed April 20, 2004.

syrup technology advanced significantly with the introduction of enzyme-hydrolyzed products. In 1921, crystalline dextrose hydrate was introduced. Then in the mid-1950's, the technology for commercially preparing low conversion products such as maltodextrin and low DE syrups was developed. The purification and crystallization of dextrose meant for the first time that corn based sweeteners could compete in some markets that had been the sole domain of the sugar industry.

"The next developments involved enzyme catalyzed isomerization of dextrose to fructose. The first commercial shipment of high fructose corn syrup (HFCS) took place in 1967. The fructose content of the syrup was around 15 percent. Further research enabled the industry to develop a higher conversion and the first commercial shipment of HFCS-42 or 42 percent fructose syrup took place a year later. Further refinements in the process were developed in the late 1970's and by the mid 1980's, HFCS became the sweetener of choice for the soft drink industry in the U.S."⁸

The use of HFCS in soft drinks really set the stage for the current consumption trends, and the technology to produce the product continues to improve: "High fructose corn syrup (HFCS), a primary sweetening agent, is currently produced in a long, multistep process under highly exacting processing conditions. To obtain commodity scale quantities of a fructose-rich (55 percent) corn syrup mixture, which has a sweetness equivalent to sucrose, manufacturers must recycle the glucose rich stream from an ion exchange separation step many times. This entire process requires that the active enzyme (glucose isomerase, or GI) be immobilized and that the process be conducted under precise temperature and pH conditions.

"Goal: To develop a stable cross-linked crystalline CLEC® enzyme form of glucose isomerase (GI).

The additional thermostability of the CLEC® form of the GI should enable a more direct conversion of glucose to fructose syrup and eliminate the chromatography and water evaporation steps from HFCS processing."⁹

Although the vast majority of HFCS is produced via enzymes, there continues to be some manufactured by the older technology, acid hydrolysis.¹⁰ Some of this material (called in some cases "off spec," and thus rejected by food manufacturers) may still be available and has been found to be damaging to honey bees in Canada. Research by Dr Rob Currie at the University of Manitoba showed that "although there is a good deal of evidence that off-spec syrup is indeed the culprit in the Manitoba incident (bees dying during the winter), Dr Currie cannot point to the actual mechanism causing the problem. He does warn beekeepers, however, to be aware of two possible problems in off-spec HFCS: low pH (4.0 or lower), and a colored syrup. Most HFCS is colorless; colored syrup may be an indication that it was manufactured by acid hydrolysis."¹¹

The first part of this series discusses the rise of high fructose corn syrup (HFCS) use in beekeeping and some of the consequences of this new bee food for the apicultural industry. In addition, it reveals a little of the history of corn processing and specifics of corn syrup manufacture. In the second part, I will describe the ubiquitous use of HFCS in the human food chain, and what the future might hold for this amazingly successful food product. **EC**

Dr. Sanford is a former Extension Specialist in apiculture at the University of Florida. He publishes the APIS newsletter, <http://apis.shorturl.com>

8. <http://www.corn.org/web/history.htm> Corn Refiners Association web site accessed April 20, 2004.

9. http://www.oit.doe.gov/agriculture/factsheets/corn_syrup_processing.pdf Office of Industrial Technologies Energy Efficiency and Renewable Energy U.S. Department of Energy web site accessed April 20, 2004.

10. <http://www.corn.org/web/history.htm> Corn Refiners Association web site accessed April 20, 2004.

11. <http://apis.ifas.ufl.edu/apis97/apfeb97.htm#3> Apis Newsletter web site, February 1997, accessed February 20, 2004.

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HERDING BEES

Those Controlling Bees

Larry Connor

Many of us had our first encounter with bee pheromones when we installed our first package of bees, or watched a hive 'being worked' for the first time. We either noticed or were shown worker bees with their 'tails in the air.' We saw the exposed gland at the end of the abdomen of the bee. We noticed that there were a number of these bees usually all facing the same way, toward the entrance of the hive. The bee was stationary, and fanning her wings.

The gland on the abdomen is called the Nasanov gland,¹ and bees produce the Nasanov pheromone along a groove or canal between the 6th and 7th abdominal segment. A series of glandular cells are connected via 600 or so 'minute ducts' to this canal. The gland is ordinarily covered by the 6th abdominal tergite, so the bees expose it by raising the abdomen into the air while keeping the tip of the abdomen pointed downwards. By fanning their wings, worker bees move air over the canal and disperse the chemical.

The Nasanov gland is present in workers of all species of *Apis*, but is not found in either queens or drones. The Nasanov pheromone is similar (but certainly not identical) in these races of bees, and is not either colony- or race-specific.

It was F W.L. Sladen² (author of *The Humble-Bee* (1912) and *Queen Rearing in England* (1913) which includes an Appendix titled *A scent-producing organ in the abdomen of the worker honey-bee*) who, in 1901, noticed a scent produced by hundreds of worker bees during the hiving of a swarm. When he dissected the abdomens of several of these bees, he found that the membranes of the gland area produced this same scent,

but the rest of the bee did not. He further noticed that other worker bees responded to the odor from the gland.

Today we know there are several different behavioral situations where bees will release the Nasanov (scent or calling) pheromone:

In a moving swarm (including hiving a swarm).

To mark the entrance of a hive.

To identify an unscented water source where bees are gathering water.

To identify a supply of unscented sugar solution.

Moving Swarms

We are familiar with the behavior of a swarm when

it leaves the parent colony. It is a swarm's nature to aggregate on a temporary re-grouping site, usually a nearby tree or structure not far from the issuing colony. The bees that first arrive at the site will expose their Nasanov gland and fan their wings. This attracts the other bees still in transit from the hive to the temporary re-grouping site. If you move the queen during this process to a nearby location, the

bees will go into a searching behavior to find her, and once located, scent the new location to draw the bees to the queen. Thus, **both** the queen's pheromone and the Nasanov pheromone are used during swarm translocation.

Once the swarm is settled on the tree, scout bees recruit other scout bees to possible permanent nest sites by using a combination of dance language and Nasanov scenting at the entrance of the potential home. Once the scout bees have determined which site will be the swarm's new home, it is thought that the scout bees (and perhaps the queen) lead the way to the new home, combining the queen pheromone and the Nasanov pheromone to direct the flying bees.

Entrance marking

From time to time, undisturbed colonies demon-



¹ Named after the Russian who described it in 1883; there are several spellings, including Nassanoff.

² Sladen was the first scientist to investigate chemical attraction of bees to each other, and is considered the pioneer of pheromone studies in bee colonies.

strate some scenting bees. Young bees on their orientation flight may scent at the entrance of the hive. This may be useful when large numbers of new foragers are flying at one time, say after a period of poor weather when the bees were confined, when the Nasanov scenting adds chemical orientation cues to an intensive visual experience for new foragers. We certainly can understand the benefit of such orientation if even a few orienting foragers are blown off course by a strong gust of wind; the pheromonal scent gradient will eventually lead them back to the hive entrance.

Bees are more likely to use the Nasanov gland when they experience a change in location of their colony. This can be demonstrated by relocating a colony a few meters in an apiary. Any change in position of the entrance will cause a great deal of entrance scenting. This will continue until foraging patterns have been reestablished to the new location. This usually lasts for several hours or until the end of flight for the day. Bees moved at night will still need to reorient themselves in the morning.

There is an infectious nature to Nasanov gland scenting – the first bees to detect a change in entrance will scent and stimulate other bees to scent as well. Scenting continues until the bees have aggregated successfully.

There are reports that when a virgin queen is ready to leave a hive for her mating flight, worker bees assemble at the hive entrance and release pheromone. The bees may be drawing the virgin queen to the entrance of the colony where she leaves for her mating flight. This is another example of how worker bees 'manage' a queen bee, providing her with stimuli to perform certain duties. The bees are waiting after mating as well by 'calling' her back to the hive after the mating flight is completed. In a natural setting this must be remarkably effective in drawing the queen back to a remote location in the woods where she belongs; in a commercial mating yard, I wonder what type of pheromonal confusion arises when the air is filled with scent pheromone from hundreds of nucleus colonies all issuing queens at approximately the same time. Do the bees continue to scent at all in large mating areas, or do they stop?

Queenlessness

When a beekeeper removes a queen from a colony, a day later the bees will scent vigorously if the colony is opened. Likewise, worker bees on a queen cage will often scent and fan, drawing additional bees in the air to the cage. I have seen solitary instrumentally inseminated queens attract a few worker bees and start scenting while the queens were being handled by the beekeeper.

At water or sugar syrup

It seems clear that bees are adding a scent attraction to water and sugar syrup that lacks a natural scent. Scenting at flowers is performed by other species of *Apis*, but reports of *A. mellifera* scenting at flowers are rare. The use of sugar syrup feeders as a method of study for dance language communication is a specialty use of this behavior, but it is important to note that bees scent more the further they travel to sugar syrup

An opened colony will have bees in the air that are not yet oriented, and scenting by other bees helps them return home.

feeders and remote food stores, indicating that there are more tools to communication in the bee's evolution than just the use of dance language.

CHEMICAL MAKE UP OF NASANOV GLAND PHEROMONE

The chemicals making up the Nasanov gland pheromone include geraniol, nerol, farnesol, citral, geranic acid and nerolic acid. While geraniol and nerolic acid are produced in the largest quantities, a 'highly specific enzyme system' transforms the geraniol into a form of citral. This allows the bees to use citral as a key component of Nasanov pheromone while being very volatile and released at very low levels. Because these molecules have different volatility, their ratio will change with distance from the scent gland. It is suspected that searching bees are sensitive to this gradient, and will use the change in the ratio of the different molecules as a clue in orientating to the entrance of the hive.

There is little geraniol produced in the Winter months. The youngest bees produce the least, and forager bees produce the most. Thus, in full buildup periods, the level of Nasanov pheromone peaks with the increase in foragers. Other molecules are present at all times, and must have other functions, yet defined.

Why such chemical complexity?

We are inclined to wonder why bees would evolve a complicated chemical system for a certain behavior, when, to us humans, a simple chemical or two would appear do the job. A hint at the complexity of this system is shown in the discovery of similar glands in bumble bees.³ *Bombus terrestris* workers alert nestmates to a food source using a pheromone produced by glandular cells from the same region of the abdomen as the Nasanov gland appears in the honey bee. In fact, honey bee Nasanov gland extract may be used to alert bumble bee workers, 'suggesting a possible homology of the glands.'

It will require a great deal of further research to determine if these structures in the two species are a result of convergent evolution, where the two structures evolved separately, or a result of a common origin, where one ancestor evolved the structure now shared by different species.

³ Dornhaus, A., A. Brockmann and L. Chittka, (2003). Bumble Bees alert to food with pheromone from tergal gland. *J. Comp. Physiol. A.* 189:47-51.

Beekeepers can use artificial pheromone lures to attract bees to swarm boxes.

Significantly, bumble bees are not alerted by geraniol or citral, the two primary components of honey bee Nasanov pheromone. Otherwise, bumble bee workers would be attracted to scenting honey bee colonies, and wasteful defensive behaviors would result to the benefit of neither species. By having different chemical signatures, chemical recipes so to speak, each species is able to define its chemical signal with remarkable species-specific precision.

What it means to the beekeeper

Recognition of Nasanov gland pheromone use by our colonies gives us a valuable lesson in bee behavior. It is an easy illustration of the bee's pheromonal nature, as well as a reminder that every colony inspection, move, or other manipulation is usually an intrusion into the colony's evolved nature. But it also reflects the fact that such intrusions are not uncommon in colonies, otherwise this complicated behavior would not have evolved! While searching on Google for new information on this subject, I noticed that there are several websites dealing with classroom application of bee scents. If you are a teacher or need to arrange a lesson for the local bee club, you might search for group activities using the Nasanov pheromone. Because swarms move through space calling their workers to stay together, stray worker bees, perhaps foraging on nearby flowers, are drawn into the traveling swarm. This is one way parasitic mites are spread; it certainly undermines our concept that each colony is a discrete entity – instead we see that Nasanov scenting draws stray bees into swarms and scenting colonies.

Nasanov pheromone lure

Beekeepers are able to use the components of Nasanov glands with or without the queen mandibular gland pheromones as a means of attracting swarms. Various lures have been developed which incorporate the primary chemicals found in the Nasanov gland into plastic straws or containers; the chemicals then re-

lease through time from or through the impregnated plastic.

Free⁴ describes one such lure as “a polyethylene vial (30 mm long, 15 mm diameter), loaded with a 1.1.1 mixture (10 mg of each) in hexane (100 microliters) of (a) (E)- and (Z) citrals, (b) geraniol and (c) necrolic and geranic acids.” The chemicals pass through the walls of the lure and are diffused outside, into the air. These lures may be used in bait hives, empty hives or empty chambers to attract bees. They are very effective when compared to hives without such a lure, but not quite as attractive as lures containing both the Nasanov pheromone and the primary component of the queen mandibular gland, 9-ODA. For this reason, the 9-ODA plus Nasanov pheromone lures have become standard in many regulatory and swarm capture operations.

Use in Pollination

In the 1960s, a proposal was suggested to use the Nasanov pheromone as a part of a spray on crops that require honey bee pollination as a means of increasing pollination activity. Researchers developed chemically synthesized Nasanov pheromone and applied it as part of a spray to increase bee foraging. This was considered valuable in those crops where bees are reluctant to visit due to poor nectar-pollen supplies or perhaps repellent properties of the flowers.

The results have not been exciting. In a perfect example of “You can take a horse to water but you cannot make it drink” it was possible to increase the bee foraging on the target crop, but very limited success was found in overall pollination. The pheromone was successful in increasing bee forage in some cases, but unless there was a nectar or pollen reward suitable to sustain additional foraging, the bees faded in their enthusiasm for the target.

All this serves as a reminder or lesson about the complexity of the bee colony. As chemically-controlled animals, they are constantly surrounded by different stimuli of many types. The next time you work your colonies, spend a minute and look at the scenting bees. Enjoy the moment you first saw this fascinating behavior **EC**

Larry Connor is owner of Wicwas Press, New Haven, CT where he edits and publishes books on bees and beekeeping – LJConnor@aol.com or www.wicwas.com.

⁴ John B. Free, *Pheromones of Social bees*, 1987, Comstock Publishing Associates, Cornell University Press, Ithaca NY, page 129



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From the Cultural Center of The Honey Bee Design Universe, The Current . . .

TREND REPORT

Marina **Marchese**



A visit to the New York City International gift fair and the Extracts Cosmetic Trade Show in the same city introduced me to quite a few companies from exotic places like Japan, Africa, India, China and Italy manufacturing and marketing honey bee related products here in the U.S. Hold on to your hive cover, the honey bee is here to stay and her wonderful image and products from the hive are going to rule the mainstream consumer!

It became clear to me when working in Asia and Europe that the honey bee had a rich history in the visual arts and have always had a special place in the natural cosmetics and skin care industries. Honey bees adorned the interior murals within the walls of the Vatican, and Napoleon adopted the honey bee as his icon for all his Empire style design and architecture.

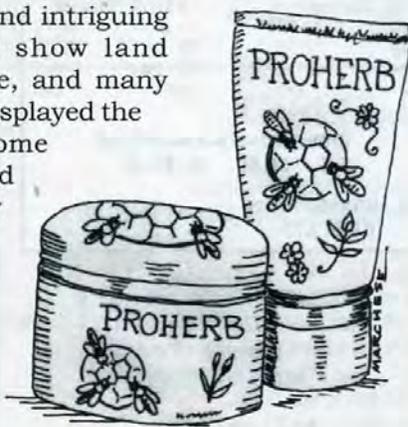
The Chinese are known for their Tiger balms made with beeswax and their honey loquat cough syrups. Now, far-away manufacturers are realizing the enormous appeal that the honey bee holds and the U.S. consumer's quest for fancy wares, health and beauty products. I found novel and intriguing merchandise out there in trade show land featuring products from the beehive, and many companies have actually branded or displayed the honey bee icon on their labels. Some even use a photo of an old fashioned bee skep. As I browsed over the many different bee themed goodies, I did mention to a few of the sales people that I was actually a beekeeper. A few didn't know what that meant and others were absolutely intrigued. I came to the conclusion that none of

these manufacturers are actually keeping bees and I think it would be a great sales approach if the consumers were educated on the benefits of the honey bee, what exactly are products from the hive and how each ingredient is beneficial to humans. Lets go to the showroom floor for a peek.....

One of the most interesting new products that caught my attention was from a company in Japan called ProHerb. Although all of their labels are completely written with Japanese characters, there were charming illustrations with honey bees on a honeycomb and whimsical drawings of herbs in what we on the eastern side of the world may consider lovely, but chaotic design sensibilities. Honey bees were displayed on large posters throughout the booth. As a designer myself, I must confess that I tend to chose products by the attractive packaging and design but in the end, I truly judge it by the actual quality of the product....honest! The main ingredient featured in

ProHerb's product line was miraculous propolis, appearing in all sorts of skin lotions and potions that can give just about anyone that natural honey bee glow!

My next visit was to the African Dawn Trading Co's booth where I was treated to handsome samples of Redbush and honey soap. Redbush is an herb found in South Africa and has gained popularity as an herbal drink, now it has been



combined with honey and essential oils to create a tantalizing combination of natural soap to help us ...yes, relax. African Dawn did not feature any indication of honey or the honey bee on any of their labels; one would have to read the ingredients to know there was honey in their sweet smelling soap. Nevertheless, I was assured that honey from Southern Africa was inside each bar of each of these handmade goodies.

The Italians have been making honey, pollen and beeswax skincare for ages and a distributor named European soaps is bringing all the loveliness of Italy and the honey bee right here to our doorstep. The many skin care collections they distribute contain honey, beeswax and propolis. One line called Midani Erbe had a honey bee pattern across all their containers and although the labels are written in Italian one would know by the well-designed honey bee logo and the word propoli that these creams were made with illustrious honey bee propolis.

Their hand-milled soaps are made with real beeswax and feature scents like lettuce, chamomile and carrot with a bee skep patterned wrapper. Another product, Honey dust by Kama Sutra looked like an after shower powder packed in a typical powder dispenser. This product is well scented with honey for your powdering pleasure but there was no indication of a honey bee on this label.

Out of India I spotted a manufacturer of cosmetics that included honey, beeswax and unusual essential oils. One product was called Protectors; it was to be used externally as a sun block to shield the skin from the harmful rays of the sun. Beeswax has been touted as a natural sunscreen with a SPF factor of 15. This company used honey in almost every one of their hand creams and lotions.

Here, honey bee labels did not draw me to this product but the genuine use of honey, beeswax combined with essential oils is the type of quality I would look for in a product.

Honey bee drinking cups, anyone? I admit my own weakness for an attractive honey bee pattern gracing an exquisite line of porcelain mini trays, cups and boxes.

Manufactured in China by a company named HomArt, these well-designed gahtcha-dels, as my Italian family would refer to needless knick-knacks, stopped me in my tracks. Ravished in sophisticated color and a textile style pattern, these items would impress any beekeeper with a serious decorating flare. This was another well-designed product using the honey bee icon and gets my design approval.

The bee all and end all were the fantastic beeswax candles manufactured by Honeycomb lights in South Carolina. These hand rolled gems were configured into amazing little beehive skeps. Each candle was presented like a fragrant treasure upon a tray made of glass, carefully wrapped and bejeweled with those mini plastic honey bee tacks

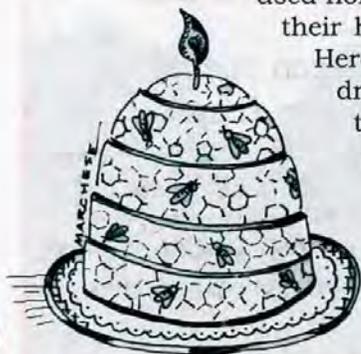
beekeepers constantly search for. They appeared good enough to eat. A wide variety of sizes and shapes were available for that special beekeeper in our life. This booth also sold umbrellas and embroidered pillows adorned with a honey bee icon. I could not help but notice the bee skeps hanging from the display walls and the hive theme displayed throughout the booth. The

pleasant aroma of the beeswax candles brought me right to my own beeyard. This booth was hard to walk away from but it was time to move on and explore the rest of the show

Honey bee hand towels, garden pots, beeswax night creams and much more seemed to be all the buzz for this season's newly featured product trends. How can the average consumer possibly resist just one more beeswax mud mask or queen bee shower curtain, let alone a beekeeper? Only to add to the entire buzz about bees I couldn't help but notice sprinkled among the showroom landscape, copies of the recent book "The Secret Life of Bees" by Sue Monk Kidd. This popular book about how a runaway and her guardian end up on a bee farm ran by three sisters, contributed to the celebrated honey bee theme.

The truth is, honey bee design and products are catching on and we can be sure to see more people buying everyday products with honey bee magnetism on them. I predict that the interest in actually keeping bees in the next few years is also going to become just as fashionable.....just you wait and see. **BC**

Marina Marchese is an illustrator, product designer and beekeeper. Her business, Red Bee® Studio can be reached at www.redbeestudio.com or +1.203. 226.4535.



EXTRACTING MONEY

Have you considered extracting someone else's honey?

Jeff Ott

Do you have your own extractor? Most of the year, do you see it sitting there, collecting dust, and dirt? Have you ever looked at it and thought that it is one of the most expensive coat hangers you've ever purchased? (Besides the Nordic Track shoved off to the side of the family room...) Maybe you have something a bit larger, so it has its own place (and collection) in the garage. Well, I don't know of a year round use for that investment, but I'd like to offer an additional use maybe you should consider: add to your honey house income through custom extracting. Whether you have a small set-up consisting of a six or eight frame extractor or something larger, custom extracting is something you might consider as you plan for this coming year.

What is Custom Extracting?

As used here, the business of custom extracting is simply extracting someone else's honey for a fee. If you do your math right, it should be done at a profit. Beekeepers seem to not want to pay themselves for their own labor. However, if you are interested in extracting other beekeeper's honey, plan on charging

for your time. There is no sense doing it for free!

What is Needed to Custom Extract?

The equipment you use may very well be what you already own. It can range from a simple set up of an uncapping tank, extractor and bucket to something specifically designed for the job (see sidebar on Turnkey Extracting Systems).

Why Consider Custom Extracting?

I cannot imagine anyone actually setting up and extracting honey for other beekeepers unless they wanted to make money doing it. Face it, extracting is a laborious and sticky job. The only way to reduce the labor is through automation, which costs money and takes an investment. However, the plus side is that you can accelerate the pay-off through custom extracting.

Along these lines, you might consider custom extracting if you plan on expanding your operation. Often it is difficult to cost justify your investment in extracting equipment to your CFO (read: *spouse*), because you do not run enough colo-

nies to warrant the size of extractor and other equipment that you believe you'll need in three or four years. However, through custom extracting you may be able to keep your equipment in use until the time you have enough colonies to stop extracting for other beekeepers and focus solely on your own needs. Essentially, your customers finance your beekeeping future. Not a bad way to go, if you can do it.

Who Uses Custom Extracting? Know Your Customers!

Like any business venture, you need to first decide if there is a demand for custom extracting. To do that you need to do a little market research. Talk with other beekeepers at local and state meetings. Beginning beekeepers are often looking for someone to extract their super or two of honey.

There are beekeepers that enjoy beekeeping, but not really the extraction of honey. There are probably as many reasons for this as there are beekeepers; from financial, to time, to just plain old interest... there are beekeepers that for whatever reason, prefer to have someone else extract their honey

Al's customers unload their supers into the warm room where they wait until extracted.



Al's Cowen uncapper makes a quick job of this chore. In Al's operation, the cappings drop directly into a hopper.





Al loads his Cowen extractor with another load of frames to extract.



A cappings spinner does a thorough job of separating the wax from the honey.

In fact, in light of the Public Health, Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act) that requires all facilities that manufacture/process, pack or hold food for consumption in the United States, to follow specific guidelines - having someone else extract your honey may exempt you from registration regulations. However, check the National Honey Board website for more information before you make a decision.

Let's take a quick look at the financial reasons why someone may consider using the services of a custom extractor. Using some general figures it is easy to see the reason why it makes some sense. First, let's look at two potential setups.

Hobbyist

This beekeeper has five colonies and produces, on average, 60 pounds of honey per colony or 300 pounds per year. Let's say the beekeeper purchases the following equipment for his honey extraction.

Motorized 6-frame	
Extractor	\$600
Electric Uncapping Knife	\$80
Plastic Uncapping Tank	\$85
Total	\$765

If the current price per pound for custom extracting is \$0.40 per pound, this beekeeper would have to pay for the custom extraction of 1,912.5 pounds of honey before he'd pay for the equipment set up (\$765 ÷ \$0.40 = 1,912.5 lbs.). At his current rate of production, it would take him into his 7th year of beekeeping before he'd see his return

on investment (1,912.5 lbs. ÷ 300 = 6.4 years) - as compared to using a custom extraction service.

Sideline/Small Commercial Beekeeper

Using the same formulas, you can see that if a beekeeper purchased the Cowen 28-Frame System, it would take 26,250 pounds of honey before the beekeeper saw a return on his investment (\$10,500.00 ÷ \$0.40 = 26,250 lbs.) - as compared to using a custom extraction service.

You can see that unless you have other business considerations, someone interested in maximizing their profits would consider the using the services of someone else.

Two Custom Extractors: Two Different Approaches.

Where I lived in Colorado, there are two beekeepers that are widely known to custom extract honey: Al Summers of Ichiban Honey Company, in Longmont; and Jerry Webb of The Beekeeping Company, in Littleton. Both of these men are active in the beekeeping community and work to promote beekeeping.

Al Summers began beekeeping by working for Miller's Honey Company in his teens. Today, Al runs the Ichiban Honey Company in the Northern Colorado town of Longmont where he maintains 10 colonies and teaches a beekeeping course with the Boulder County Extension office. Al's honey house was the topic of his *Bee Culture* article, "Honey House Efficiency" in the March, 2002 issue of *Bee Cul-*

ture. He extracts for about 30 area beekeepers.

Jerry Webb's Beekeeping Company, is in the south Denver community of Littleton. Jerry has been a beekeeper for many years and teaches a beginning beekeeping course at the Denver Botanical Gardens and can be seen in the National Honey Board video on the Pride Program. Jerry runs his own colonies, runs a store and in 2003 he custom extracted for about 80 people. His teaching and his store provides a constant flow of existing and potential customers for his operation.

Both of these gentlemen approach their custom extracting a little different in approach and size. Their systems work for them. As with any endeavor in beekeeping, there are as many right ways of doing something as there are beekeepers. What they are sharing here is the desire to help other beekeepers. Between Al and Jerry, you should be able to see something that fits for you, your goals and limitations. See the sidebar, *The Equipment of Two Custom Extractors*, for a detailed description of their operations.

What Size Works Best?

If you are considering using your existing equipment to launch into custom extracting this coming season, you will probably make do with what you have. If you have the means to consider upgrading or expanding you need to have an understanding of just how big of a set up you want, the limitations it presents and how it impacts your workflow.

As with all things in life, size is a matter of personal need. You may be comfortable with your current set up, but, if you are looking to add equipment, there are guidelines that you should consider that may not be important when extracting just for your self.

How Much Time Do You Want to Spend Custom Extracting?

Perhaps the most important question you need to consider is this one. Setup, teardown, cleanup and maintenance all take valuable time. Al is self employed and keeps bees and extracts as a sideline. Jerry is retired and runs his store and extracts as needed. They are more flexible than if they held a regular nine to five. Jerry extracts only during the month of September, when it is still warm and honey flows easily from the frames. Al extracts starting in September and then through November into December. He keeps a warm room during this period, in addition to heating the extracting room. Honey can flow year round for Al, as long as it doesn't crystallize in the frame.

Seriously weigh your time constraints, and possible schedules. Dealing with beekeepers, sharing stories, discussing honey prices and what queens are best all take time out of your day. Plan on it. Then double it.

How Many Frames Will You Process?

This may seem like a simple enough question to answer. Usually a beekeeper buys the largest affordable extractor they can find. I suspect market analysis might say something different, but I think this is pretty close to the truth. If you are planning on custom extracting, you may be able to *cost justify* (remember the CFO...) a larger extractor than you would otherwise, but before you do, you need to think about how you are going to handle your customer's honey.

Both Al and Jerry take pains to deliver to their customer the honey from that customer's super. The complexity of achieving this goal is proportional to the size of the operation. (See the sidebar on their setups for more detail.) A small extracting job is easier and completed more efficiently using a small set

up, such as Jerry's. With two 12-frame extractors, Jerry can easily extract the honey from one or two supers and hand over the bucket(s). Al, on the other hand, has to load his Cowen extractor, prime his sump and the wax auger. This takes a bit more time to get ready. It is a time consuming task for Al to ready his extracting system for small jobs, and provide the beekeeper the honey from the supers they brought in.

So, in order to find the answer to the question, you need to define the average size of your custom extraction job. Do you want to handle a few supers at a time or do you want to handle primarily in lots of five or more supers? Also, I would not consider any other option than providing the beekeeper the honey from their supers. I think most beekeepers would feel the same way. Quality control is important and both Al and Jerry would agree. I know I would not want to try and sell honey that I knew was not mine.

One consideration is this: if you are planning on upgrading your own equipment, hang onto your old extractor and use it for the small lots, or for separating light from dark honeys. Some beekeepers may be willing to pay extra if you are able to *really do custom* extracting.

How Do You Plan on Uncapping Frames?

I would not recommend using a hot knife to do the bulk of your uncapping. If you are going to provide custom extracting as a service plan on using a mechanical uncapper for speed and efficiency. Whether you choose a flail or serrated knife unit is up to you. Ultimately, you need to consider how it fits into your operation and your budget. Closely tied to this question is the next . . .

How Will You Handle Cappings?

This may be a non-issue for you if you are already set up to handle the cappings, but if you aren't, take some time mulling over your options. Are you going to return the separated honey and wax to your customer? If you are familiar with cappings you know it takes a lot of cappings to make a pound of wax. In fact, you have to process about 300 pounds of honey to make one

EQUIPMENT

There are as many different extraction and honey house setups as there are beekeepers. One is not necessarily any better than the other. What you need to consider is designing and building a setup that maintains the quality and cleanliness expected of anyone handling a food product and one that fits your budget and production needs.

Thanks to Allen Summers and Jerry Webb for sharing this information with us.

Ichiban Honey Company Allen Summers

As mentioned Al's honey house was the topic of the March, 2002, *Bee Culture* article, "Honey House Efficiency". Central to Al's setup is the Cowen 18-Frame parallel radial extractor (no longer available from Cowen). He uses a Cowen manual vibrating dual-blade knife uncapper (electric heat) over a Maxant cappings auger. The auger pushes the cappings to the Maxant cappings spinner. Cappings and honey are separated, where the honey drains to the Maxant clarifier, next catching honey from the extractor. Cappings wax is then melted in a Maxant cappings melter. Using this system, Al can process up to five 9-frame supers in an hour.

The Beekeeper Company Jerry Webb

Jerry uses two 12-frame Dadant Radial extractors. Using these two extractors, he can process two customers' supers at the same time or he can separate light from dark honey, if requested. He warms the extractors using commercially available heat tape for extractors and insulating blankets to keep the honey warm as it is extracted. Honey from the extractor flows directly into the customer's 5-gallon bucket. Jerry uncaps using a Maxant chain uncapper directly over a Maxant cappings spinner. Jerry uses a Better Way Wax Melter to melt and process the cappings.

Continued on Next Page



In Jerry's operation, customers bring their supers right into the extracting room.



Jerry and a young customer sample the goods.



A busy Saturday in September brings many beekeepers to Jerry's extraction room. Lots of bee talk and tall tales are the rule!

pound of wax. However, some of your customers will want the wax for their own projects, no matter how large or small a lot they receive. How do Al and Jerry handle cappings? Jerry uses a Maxant chain-flail uncapper over a spinner and immediately places the frame into one of his radial extractors. He does not return the cappings or the honey as most of his clients bring in small lots and the effort just does not pay for itself. He uses a Better Way Wax Melter to melt the cappings.

Al uses a different approach. He uses a Cowen Serrated knife uncapper over a Maxant hopper and wax auger that pushes the wet cappings to a Maxant cappings spinner. The honey is returned to the honey sump. The cappings are manually removed to his wax melter where he processes the wax. Al provides a credit (a percentage of the honey extracted) to his customers who do not want the wax returned.

Both approaches work. You must consider the size of the loads you are extracting. If you are only doing one or two supers at a time for different customers, then it just takes just too much time to deal with the cappings than it is worth.

What do you do with the wax you get? Both Al and Jerry sell the wax; Jerry in his store and Al to buyers who use it for cosmetics and candles. You could also sell processed wax to your customers at a discount.

You also need to think about the footprint of the operation. Are you working in your garage, a shed or a honey house? Make sure you can keep your operation clean. Not only should it look clean, but plan on

cleaning it often during the operation. Consider the cost as being part of your marketing. A clean operation sells.

Managing Your Customers

There are several aspects to this. Beekeepers are a varied lot, and how you deal with them depends on how you run your operation. First thing you need to think about is when do you want beekeepers to bring in their supers? Many beekeepers will want to bring you the supers as soon as they are pulled. During the month of September, Jerry's weekends are busy. His customers pull up to his door one right after another. Since Jerry really does not have the ability to store the supers, his customers wait while he extracts and buckets their honey. If they do not have buckets, Jerry keeps a supply of 'bottling' buckets and nylon straining sleeves on hand that he sells to his customers. Jerry extracts the honey and it flows directly from the extractor into the customer's bucket. They browse his shop while the honey is being extracted, pay him for the extraction and any other purchases they may have picked up and leave, honey in hand.

Because Al generally deals with customers with larger loads, he is set up a bit differently. His customers will call and let him know when they plan on dropping off their supers. If Al is available, he will help them unload and store the honey in the warm room. If not, the beekeepers will unload their supers just inside the loading dock door. They must mark their supers if they are not already branded or otherwise identified and leave their own buckets. Al notifies them when the honey has been extracted and when the beekeeper can pick it up.

Problems? You Bet!

Do not expect your custom extracting to go problem free. What is the number one problem? Without hesitation, both Al and Jerry will tell you, their number one headache is opening the super and being met by a face full of disoriented honey bees. Jerry's most surprising super was the one he opened and not only did it have frames of bees, but one with the queen! Obviously, you must be willing to educate your customer

TURNKEY EXTRACTING SYSTEMS

Traditionally, systems built and designed from the ground up to provide an all-in-one extracting solution were available only to commercial honey producers. Smaller operations that wanted a self-contained system were forced to piece their setup together from the traditional equipment manufacturers such as Dadant, Maxant and Kelley. Recently, beekeepers requiring a smaller but no less efficient system have been introduced to new solutions from Cowen Manufacturing and Kelley Beekeeping Supplies. Below are the highlights of these systems. Watch for more systems to follow as other manufacturers note the popularity of these bundled honey processing systems.



Cowen Manufacturing: 28 Frame Extracting System

Cowen Manufacturing (Parowan, UT) has been around since the mid-1960s. Cowen, manufacturer of large commercial extractors and other honey processing equipment has recently introduced their 28 Frame Extracting System. This system readily fills the needs of the sideline/small

commercial producer as a turn-key system, as delivered. The system includes an uncapper, extractor, wax spinner, sump and pump. The system is thirteen feet long and 46 inches wide. It requires a minimum of 17 feet to operate. Price on the web is listed at \$10,500.00. Leasing is available. Call Cowen Manufacturing at: (800) 257-2894 or visit their website: www.cowenmfg.com.



The Walter T. Kelley Company

The Kelley Company announced in the December issue of *Bee Culture* their new turnkey system. The systems will enable the beekeeper to uncap, extract, filter, warm, bottle and process the cappings. The unit features a single frame uncapper, 12-frame extractor, jacketed sump, honey pump, jacketed bottling tank, plus a multi-purpose tank for melting the cappings. Also included is a power spray washer to help with the clean-up.

Many of your customers will be newcomers. What they bring you may be the results of their first experience at harvesting their honey crop. If they used a porter escape on their inner cover and left it on for an hour or two... well, you know the results.

Another problem to expect is the quality of the woodenware you receive. You will need to know how you will handle broken frames – still in the super, broken frames in the extractor, rotten supers, etc. Be prepared to receive everything and anything. Because it ultimately makes their lives easier, both Al and Jerry will try and repair a frame if it is broken. It's usually the end piece that separates from the top bar that gives them the most grief.

Are You Still Interested?

Custom extracting can add to the bottom line of your beekeeping operation. However, unless you are independently wealthy and like to do things for free for others, you'll need to consider what it will cost you in time and materials to do this, and then add enough to make a bit of a profit on your effort. What is

that number? What should you charge for custom extracting? That number can only truly be determined after considering the cost of extracting a pound of honey, *including your own time!*

Since you are to the point of considering this you already know just about how long it takes to uncap and extract a super, how long to set up, take down and clean up afterwards, and what to do with the wax.

Many custom operators figure labor at \$\$/hour, then so much per super. And the pros factor in a volume discount – that is one price for one to five supers, another for five to 20 or so, and yet a third for more.

Some don't repair frames or supers that arrive broken or break in normal use, some do. It adds time that must be considered.

The price of honey usually isn't factored in, but it may be. Nor is separating light and dark frames. Recovering the wax usually isn't a part of the bargain for small jobs, but probably is for larger jobs.

So how much? Your time first. To figure that, simply find out how much you would have to pay some-

one to do the work if you weren't there. That's base. Then add the extras, the grief, the overhead (lights, heat, water) and pretty soon a reasonable figure will emerge. \$2.00 to \$5.00/super (shallow to deep) isn't uncommon. Or, you weigh supers before, and after extracting and charge per pound – \$0.30 \$0.75/lb. isn't uncommon.

In this article I've identified the major issues and considerations involved in custom extracting. I've provided the examples of two beekeepers who successfully provide this service to beekeepers and who approach their business a bit differently. Read the side bars on Al and Jerry's setup and also the equipment offerings of the manufacturers who are now supplying equipment packages that are basically all inclusive of everything needed to run the main line in the honey house. If you have the minimum equipment and the space, custom extracting can bring you additional money each Fall. **BC**

Jeff Ott is a sideline photographer living in Olympia, Washington and is a frequent contributor to these pages.

This Year, Try A

Bob Harrison

FARM

This is the time of year I have to think ahead, and, along with all the management tasks I have to yet perform, I need to start thinking about marketing the crop my bees are producing. My thoughts drifted to a time a few years back when I pulled off the road in New Mexico when I saw a sign "Honey for sale" on a raggedy piece of cardboard. The old beekeeper was sitting in the back of his old pickup with a couple cases of jars on the tailgate. A partial case of pints and a partial case of quarts. Many of the jars were half crystallized. Labels were dirty.

After I stopped others started to stop. Amazing the way customers do not want to be the only person at a stand. The old beekeeper was not talkative, the jars looked dusty and the beekeeper looked as if he could use a bath.

When I inquired as to the floral source of the honey all he would say was the quarts were his "Spring squeezing" and the pints his "Fall squeezing"

I could not help see the look on several customers' faces as they looked at the old beekeeper's honey for sale. I was trying to wait until the people left to talk directly with the old gentleman but realized I needed to get back on the road so I bought a jar of each and as soon as I did many of the tourists did also. One thing I always noticed about a honey stand is that all it takes is one person to make a purchase and the sales start.

Looking back, I wish I had stayed and talked to the old beekeeper as I bet he had an interesting story to tell.

About the only thing the old beekeeper had correct in his presentation in my opinion was price. His prices were double the store prices and about right to compensate for sitting along a main road all day.

I have years of experience selling at farmer's markets and doing inside honey selling booths. At one time we did four different farmers market's a week. We currently do the largest farmers market in the six state area. The rules are strict. Farmers are evicted if rules are not followed. Stall fees are high and attendance a certain num-

ber of days per year are required or you lose your annual stall. The produce you sell must be local and come from your farm. Vendors selling similar items are not put side by side and vendors of certain items are held at a certain number. Crafters selling items they made fill empty stalls. If you are not certified organic and have not got a copy of your certification on file in the market office you can not use the word organic on your sign.

I am the fourth beekeeper to occupy the stalls I am in. Some beekeeper has sold honey in the stalls I am in continually since 1926. I tease my wife the place is haunted by the ghosts of beekeepers past.

Many customers, the market office and other vendors have complimented us on our stand. It takes extra work to set up and we have to be in place and ready by 6 a.m. or we lose our stalls for the day. We live an hours drive from the market, and every once in a while I am still loading trucks for the market at midnight the night before. I look forward to doing the market in Spring but glad when the season is over at the end of the season. Our stand is run by me, my wife and occasionally some hired help, which means I don't have to be there every time.

Here are some of my secrets to setting up a successful farmers market stand.

Many people today live in a plastic, fluorescent light world most of the week, looking at computer screens in an air-conditioned office, without windows and without a clue as to the outside world. Fast food is a way of life. Those people especially look forward to attending a Saturday Farmers market. And, since the farmer's market experience is divided into sight, smell, touch, taste and sound, I will discuss each as it applies to your farmers market stand.

When people first arrive at a farmers market they are overwhelmed with things to see. Most are in an excellent mood, as Saturday is their first day of the weekend, and the first day off in a week. They are looking to find wonderful, locally grown produce and visiting again with their favorite

Continued on Next Page

A R K E T



Last Fall at the Old Historic Kansas City Farmers Market – We are using three stalls. The two stalls to the right of my wife, Elizabeth are for honey and hive products. The stall to her left is being used for fruit sales from our orchard.

vendors. Rules make for a better market in my opinion, so much of what I cover here may not apply to very small markets for obvious reasons.

Like I said most of your customers are in an excellent mood when they arrive so you need to be also. Smile, and greet them when they stop, or just walk by. Repeat sales are the key! Always, always sell a clean, full jar of honey. If selling produce or fruit, do not put the bad on the bottom and the best on top. People may buy from you once, but don't count on repeat sales. Honesty is what they look for most!

Sight and your booth. First impressions are important. People eat with their eyes. The impression of abundance is absolutely necessary at a farmers market stand. You can stand for an hour trying to sell a single jar of honey. If you have had a large display, but now you are running low on a particular size move the display together to give the look of abundance without that two foot section of table with only a single jar Use different types and shapes of containers. Try using vertical displays, and colorful tablecloths. Use different color combinations to create interest in your stand. Make eyes move across your booth by the way the table is arranged. Studies have shown people look from left to right across a booth. In marketing seminars I have attended it is always recommended to end the table on the right side with an interesting and attractive color. Use combinations of light and dark honey to your advantage to create interest in your display.

Taste and your booth. Samples increase sales. At a typical market you can almost skip breakfast before attending because vendor after vendor offers samples. Getting a person to sample your honey creates interest. Other people see samples being given away and they'll move over to your table. Free is a strong draw. **YOU WANT PEOPLE AT YOUR TABLE.** At slow times either my wife or I will go around to the front of the booth and straighten jars of honey so people think the booth has a customer

People notice the booth that's getting attention and want to know what they are missing. Many buy honey on impulse, but I once had an older lady buy a honey bear after taking a sample, and now she buys a bear every week, all season long. I have asked her why not buy a larger amount and fill her own bears? She replied "A bear a week will do just fine, sonny!" I think she thought I was trying to increase sales and not save her money!

Always ask the customer if there is anything *else* on the table they want to buy, or to taste or to touch. This definitely will increase sales, and it gives you the opportunity to explain other products they might be interested in. When it's slow, every time a potential customer picks some-

thing up and looks it over you have got an opportunity to make conversation and do a subtle sales pitch as to why your product is unique.

Bring enough money to make change and pay attention. Going from booth to booth at the busy time of the day looking for change from other vendors is a royal pain. Meanwhile the line builds at your stand turns off customers and many will just walk away. City folks are most of the time in a hurry but once they learn they can trust you and your product they shop fast. Pay attention. Usually most sales are made during a short period of time. If you are reading, sleeping or visiting you will miss a sale. People generally won't stand around and wait while you are a couple booths down the aisle visiting with another vendor I've seen vendors leave their booth unattended while they shopped for their own produce, I've seen vendors fall asleep and miss sales, and keep small talk casual enough that you can bow out of the conversation and wait on a customer. I try to stay away from politics, religion and health problems. Your next customer standing in line with a jar of honey and the exact dollar amount wanting to continue shopping will not like waiting for any of those subjects. Once the money has been taken and the product bagged it's time to move to the next customer *if* busy.

Hearing and your booth. Talk to your customers. Learn their names and the type of honey they buy on a regular basis. Tell a funny story to break the ice, which happened in the beeyards or around the farm. City folks are all ears to hear about your lifestyle. Many are jealous. Not the bee stings and hard labor, but the fact you do not punch a time clock and are your own boss. You can see they are all ears when they think of a lifestyle different than getting up at a certain time, grabbing a quick breakfast, fighting rush hour traffic and watching the clock all day I keep literature around for those people interested in keeping bees and take the time to explain beekeeping. If overwhelmed with people at the stand I give the prospective beekeeper my home phone number and invite them to our next Midwestern Beekeeper's Association meeting. I

try to get their mailing information so we can send out promotional literature on our annual beginning workshops.

I cater to the ethnic market. They are new in our country and usually have few friends or acquaintances. I work to build trust with these people and can price my products in both Spanish and Japanese (I spent three years in Japan). The Chinese are loyal customers and familiar with hive products. I have a Chinese customer that buys honey from me and always leaves me a small package of Chinese green tea. Having traveled to other countries and attended their markets, I quickly learned the value of a friendly smile. Try to smile often while working in your booth.

It is the custom in many open markets in the world to haggle over prices. Some vendors are rude when the ethnic market tries to get a lower price. I'm usually not surprised, since I've traveled to several countries and seen other markets first hand. Here is my solution. I do not reduce price on a single jar of honey. But, I will on two or more items on the table. Not much but some. But remember that those people are generally from a very small community and if you start reducing prices on a single jar then you'll have a crowd of buyers wanting a lower price because word travels fast.

Cleanliness. Keep your booth organized, your jars clean and not sticky. The floor picked up and trash off the table.

Pricing. Display your prices. Even mark each jar. Many people are embarrassed about money and will walk away without asking the price.

Signs. Easy to read signs with large letters and numbers work best. I like signs made on my computer but about any sign will work if it is easy to read. Signs, which stand up, are better in my opinion than those which lay flat.

Banners help with sales but need to be above the booth or in the background rather than on the table or counter front to be effective. Observation hives certainly help but they take time to man and can cause congestion if placed on a small table. I do observation hives early in season and late in season when crowds slow down. I also sell from two or three stall spaces so I can use the booth I use for selling fruit or to do an observation hive before the fruit season begins.

Farmers markets are growing in popularity because people are becoming concerned about the food they eat, and local (did I say to advertise your honey is LOCAL?) is always better than

Be Friendly, Courteous, Kind, Cheerful, Fair and Honest

the stuff from somewhere else.

A few comments about pricing

Price=costs + profits

1. Your costs will determine the *minimum* price you can sell for
2. Your competition will determine the *maximum* price you can charge.

Many small business owners try to compete on price alone without realizing the consequences concerning business survival. A sideline beekeeper can not price his honey as cheap as honey sold at Sam's Wholesale!

Consistency and high quality creates loyal customers. If you are a sideline beekeeper selling your honey through direct marketing and running in the red you have got three options to get back into the black. Number three is my choice and the best solution.

1. Work harder?
2. Get bigger?
3. Raise prices!

If you enjoy direct marketing perhaps selling honey at your local farmers market is for you. Because both my wife and my assistant will read this article I should add that they say if I did as much selling as talking when I'm there sales would be at record levels! My solution to what they say, which is true at times, is to bring extra help at busy times. An over staffed booth is better than one that's short on help. **BC**

Bob Harrison keeps bees, and sells honey and fruit, near his home in Odessa, Missouri.

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Tools Of The Trade

A Hive Mover & A Pressure Washer

James E. Tew

A wheel-barrow style single hive mover

I tend to buy nearly anything that helps me move things without really having to pick them up. I have several hand trucks, truck ramps, "come-alongs," and portable furniture rollers. When I saw Brushy Mountain's single-wheeled hive mover, I naturally made the investment. Even if it doesn't work, it would serve as an excellent conversation piece.

The device is much like a wheel barrow that articulates on two hinged handles. Two angled pieces at the bottom of the carrier slip beneath the hive. Under ideal conditions, this latching process can be usually done without effort, but more often than not the hive must be tilted a bit as the angled supports are teased underneath the hive side edges. At that point the entire moving device is pulled backwards to force the hive against the front stop. Once the hive is positioned, the two rear extending handles are pinched



A loaded hive mover.

against the hive and a nylon strap connects the handles together. In the photo, only one handle shows and only a small portion of the connecting strap is visible. Once loaded and strapped, just as you would a wheel barrow, pick up on the handles and off you and the hive go. Overall, I like the unit.

Observations and comments.

1. On soft ground, it's often easier to pull the loaded unit rather than push it.
2. The loaded unit is a bit ungainly but much of that was operator incompetence. In the confines of a truck or trailer, forget trying to turn around or do any maneuvers. I get the loaded unit on the truck, release the hive and push it into position. Obviously, the mover is of no value in stacking hives should that be necessary.
3. The unloaded unit is really ungainly – nearly comi-

cal. Without the structural support provided by the hive, the mover is disjointed. I felt like a kid learning to ride a bike. At first I was all over the place (to the amusement of onlookers), but I quickly learned how to lean the unloaded device when pushing it in order to steer it.

4. Even though it has a large wheel, small bumps still require a hefty push to get the loaded mover over them. (i.e. going up the truck ramp, ground surface ruts, or pushing the loaded mover up on the truck hydraulic tailgate.)
5. The device is sturdy and well built and is balanced nicely for a two-deep hive. I didn't move anything other than two-deep hives.
6. If the device is to be used frequently, I suspect the plastic snap on the strap will fail, but I am only guessing. So far, the snap has performed perfectly. If it does fail it would be simple to replace it with a ratchet strap like the one shown in the photo that I am using to hold the hive together. Either way, the handles will have to be connected in order to move the hive. Otherwise, the hive will bounce off the bottom angle brackets.
7. As with all hive moves, it is a great idea to ratchet-strap the hive being moved. The temptation is always great to "hope the propolis seal holds." Don't take the chance.
8. I would guess that the unloaded device weighs about 40-50 pounds, but the shipping weight is listed at 70#. The device sells for \$169.95 and is available from Brushy Mountain Bee Supply Company (www.beeequipment.com).

Though the years, I have bought many devices, each performing to a greater or lesser degree. So far, I have liked this mover. It allows me to work alone and is superior to a common hand truck. For the beekeeper with the occasional hive to move and a fairly level ground surface, this seems to be a good piece of equipment, maybe even a Christmas gift for some deserving beekeeper.



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A Pressure Washer

I seem to accumulate more and more old, unloved beehive equipment every year. It is not really worth the time and money to repair, but I can't stand to put it in the trash – so it accumulates. I explored using a pressure washer to clean up some of this old stuff.

Purchasing a pressure washer solely for the bee operation is a bit like buying a hammer *only* to assemble hives. Both should have myriad uses inside and outside of beekeeping (or at least that's what I told my wife...about the washer – not the hammer).

Pressure washers come with many different options – electric or gasoline driven. The one I purchased is



A pipe clamp holding a frame for cleaning.

powered by a 7.5 hp gasoline engine, reaches 3000 psi (pounds per square inch of pressure), and uses 2.76 gallons of water per minute. It costs about \$400. There are much larger units and there are much smaller units.

There are no specific bee instructions for using a pressure washer. I have used it to clean frames, hive boxes, tops and bottoms. Under high pressure with the appropriate nozzle, the washer will blast paint off in preparation for repainting. It does not always re-



Frame after cleaning.

move firmly attached wax and propolis, but it gets most of it.

Pressure washing would have essentially no effects on cleaning equipment of American foulbrood spores (though it certainly won't hurt), but I hope that the soap solution would be helpful in removing dysentery spots from hive boxes.

I thought I was being clever when I bought the device thinking that I would spray a disinfectant solution (sodium hypochlorite) through the sprayer and that I would use hot water from my shop water heater. Instructions #1 and #2 in the owner's manual were (you



A pressure washer-cleaned bottom board.

guessed right), not to use disinfectant solutions and hot water can never be used. The pump is actually designed to shunt hot water away from the pump in order to prevent it from overheating. I am stuck using cold water only and pressure washer approved soaps.

When cleaning frames, I considered using a large machinist's vise to hold the frame while washing. Afterwards, I planned to dry the steel vise and drench it in WD-40 to forestall rusting, but when it came time to misuse this heavy, old classic vise, I couldn't do it. Instead, I used a pipe clamp. I could use some suggestions in this area. If you have experimented with pressure washers, how about letting me know how you hold frames while cleaning.

Observations and comments

1. Be prepared to be soaked from your knees downward, but you will have clean shoes.
2. The simple, improvised pipe clamp device was useful, but far from perfect. But frames must be held with something (not your hand) or they go scooting across the yard. This frame-holding idea needs improvement. I simply laid the frame, held by the pipe clamp on the ground for spraying. While that worked for cleaning the frame, I quickly generated mud that splashed everywhere. Overall, the entire job is somewhat messy.
3. The maximum pressure (3000 psi) of my sprayer was not required; indeed, it was not even desired. I estimate that I was using about 1200 – 1400 psi based on engine throttle speed (a high engine idle).
4. I had the best results using the 0° high pressure red spray tip. Any of the other fanning spray tips (yellow, white and black tips) didn't perform as well.
5. The sprayer did a pretty good job on cleaning frames infested with wax, propolis and wax moth residue, but I did get a noticeable amount of wood fraying due to the intensity of the spray.
6. In general, broad surfaces were not cleaned as well as corners and crevices. The sprayer did a good job of cleaning out the frame rests in hive boxes.
7. Initially, I thought the waterproof wax and propolis would be impervious to the cold water spray but they both came off reasonably well. My cold well

water must have made the wax and propolis brittle and therefore possible for the spray to knock off.

8. The sprayer does take paint off the boxes, but it frequently leaves a streaked appearance as is shown in the bottom board photo.
9. Heavy plastic foundation cleaned up pretty good, but I had to be careful not to punch a hole through it with the intense spray.
10. Pressure cleaning was quick, but required quite a bit of moving around to position the sprayer nozzle. The sprayer did a good job of cleaning the groove in both the frame top and bottom bar

As the extracting season closes, I plan to see how the sprayer works in cleaning extractors and ancillary equipment. I am guessing that the sprayer will work okay in this capacity, assuming that I am outside and

can blow honey water everywhere.

Bottom-line

If you have access to a pressure washer, it can be useful in cleaning bee equipment, but I would be hard-pressed to recommend that you buy one *only* for cleaning bee equipment. At this point, pressure washing bee equipment is an interesting idea, but an idea in need of fine-tuning. At least I get a break from the drudgery of scraping old equipment. It appears that refurbishing unloved beehive equipment will continue to be a pain. **BC**

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How Much Honey?

Here's how to figure out how much honey you have, without lifting so much as a frame.

Michael Burgett

When I was a graduate student at Cornell University in the late 1960s, one of the many tasks required of the graduate students at the Dyce Laboratory for Honey Bee Studies was the annual extraction of honey from the university colonies. The philosophy of the Cornell apiculture professor at the time was that there is but one comb size to be used in beekeeping and that is the deep comb. After hefting a seemingly inexhaustible supply of deep supers, full of honey combs, I asked Dr. Morse, "Sir, how much does a deep comb full of honey weigh?" His quick reply was "Eight pounds." This then became an unquestioned "fact" that was neatly tucked into my growing knowledge of bees and beekeeping and never to be questioned until much later in my apiculture career.

In 2002 I embarked on a small project that, among other things, measured honey production between colonies housed in standard 10-frame hive bodies compared to the frequently encountered eight-frame hive body configuration, more often seen in the western U.S. The methodology for this very applied research required that all test colonies be supered with new frames possessing foundation beeswax. At the conclusion of the primary honey flow in the Willamette Valley in western Oregon, the honey production was calculated. These new combs, so well capped with an abundance of blackberry honey begged the question; "How much honey is there in the average deep comb?" So I took this opportunity to see how correct Dr. Morse had been 33 years earlier when he told me that a deep comb, full of capped honey, weighs eight pounds.

Our method involved selecting 24 deep, fully capped combs and weighing each comb individually before extraction. This gave us the combined gross weight of the wooden frame, the wax comb, wax cappings and the honey. The combs were uncapped by hand using an electric uncapping knife. The extraction was done in a hand-cranked, four frame, tangential extractor. The combs were exposed to 400 revolutions in the following manner: 100 revolutions - reverse comb sides - 100 revolutions - reverse comb sides - 100 revolutions - reverse comb sides and then a final 100 revolutions so that by the completion of extraction, each comb side had undergone 200 revolutions. The honey combs had been kept in a warm room (ca. 90°F) for 48 hours prior to extraction.

Following extraction, all combs were individually weighed to give what I term a "wet" comb weight. The combs were then exposed to robbing worker bees for 24 hours and re-weighed for what I term a "dry" comb weight. The total weight of honey in the comb could then be determined, as well as the amount of honey left in "wet" combs (honey that is unrecoverable by the beekeeper). The weight of the cappings honey was averaged by weighing the cappings wax and honey mixture following extraction of all 24 combs.

The results are shown in Tables 1-3. The gross weights of a comb pre-extraction, post-extraction ("wet") and post-robbing ("dry") are averages from the 24 comb sample. All data were originally recorded in metric weight and converted to Avoirdupois weight for the purpose of this article.

Table 1. Gross honey weight in a deep comb.

Gross weight (uncapped)	8 pounds & 3 ounces
Dry comb weight (post-robbing)	1 pound & ½ ounce
Gross honey weight in comb	7 pounds & 2½ ounces

Table 2. Recovered honey weight from a deep comb.

Gross honey weight	7 pounds & 2½ ounces
Extracted honey weight	5 pounds & 6 ounces
Cappings honey weight	1 pound
Recovered honey weight	6 pounds & 6 ounces

Table 3. "Lost" honey weight from a deep comb.

Wet comb weight (post-extraction)	1 pound & 13¼ ounces
Dry comb weight (post-robbing)	1 pound & ½ ounce
Un-recovered honey weight	12¼ ounces

So what does this tell us? Firstly, Dr. Morse was very close to the mark when he said a deep, fully capped comb, weighs eight pounds. The average weight in this study was eight pounds and three ounces. The "dry" comb, post-extraction and following robbing, weighed one pound and one-half an ounce. Therefore the total amount of actual honey in a deep comb weighs seven pounds 2½ ounces.

But there is more too it. Not all of that honey be-



Full deep comb, before extracting.



Deep frame, post extraction and bee-cleaned.

longs to the beekeeper. Following extraction there will always be some amount of honey left coating the cells and by allowing our “wet” combs to be robbed out by worker bees (never a recommended practice for reasons of disease transmission) it was shown that the unrecoverable honey was almost 13 ounces *per comb* (12¼ ounces, to be more precise). This surprised me, although perhaps it shouldn’t have. But that means from a deep super with ten honey combs, the beekeepers is losing eight pounds & four ounces of honey. And using an average wholesale honey price of \$1.40 per pound, that equals a dollar loss of \$11.55 per deep super, which is not a trivial amount of money. A commercial beekeeper from the state of Washington told me that, based on the calculations from this study, he tossed out \$80,000 worth of honey in 2002.

A well filled deep honey super is going to give you 63 pounds and 12 ounces of honey in the barrel.

There should be some cautions about this lost honey calculation. Could we have recovered more honey had we allowed the combs more time in the extractor? Could we have recovered more honey had we used a more “modern” type of extractor, as opposed to the old “hand crank” method? Could we have recovered more honey had we left the capped combs in a warmer room for a longer period of time prior to extraction? The answer to these questions is, yes probably so. However no uncapping and extracting system will remove 100% of the honey from the comb and what this study really tells us is that individual beekeepers should evaluate their entire extraction system to minimize the honey lost in “wet” combs.

But rather than focus too harshly on lost honey,

let’s look at the recovered honey, that six pounds and six ounces of honey that you get to keep. Knowing this more accurate figure can be very useful when calculating your honey crop when it is “on the stump”, i.e., when evaluating honey supers on the hives. A well filled deep honey super is going to give you 63 pounds and 12 ounces of honey in the barrel. A factor which will influence the amount of honey in an individual comb includes nine frames vs. 10 frames in the honey supers. Hypothetically a nine-frame configuration will allow the bees to draw out the cells a little farther than 10-frame, which sounds logical and would result in a bit more honey per comb. Also the density of the honey (moisture content) will influence the weight, so drier honey in the comb will weigh more than wetter honey. Purists will also note that the average figure calculated for honey in the comb also includes the weight of the wax cappings, which I can assure you is an insignificant figure.

One of my early observations after leaving graduate school and getting an actual “job” as an academic at Oregon State University, was that most Oregon beekeepers I encountered rarely would use deep honey supers, preferring instead to use a “shorter” frame size, a very popular size being “western” frames. So while this study focused on deep combs, the amount of honey in well-filled and capped frames of other comb sizes is relatively easy to compute, based on the known area of comb surface. Table 4 summarizes that information.

Table 4. Comb size and recoverable honey.

Comb size	Comb area	% area vs. deep	Recoverable honey
Deep	296 in ²	n.a.	6 pounds & 6 oz.
Semi	205 in ²	69.3%	4 pounds & 6-2/3 oz.
Western	174 in ²	58.8%	3 pounds & 12 oz.
Shallow	144 in ²	48.7%	3 pounds & 1-2/3 oz.

There are a number of reasons for utilizing a comb size less than deep for honey supers, and after an on-going 35 year association with honey bees, I firmly believe that honey supers designed to hold anything less than deep will save a beekeeper thousands of hours of back pain and stress. Another practical aspect to the smaller honey comb size is that for those of us not using expensive, mechanized uncappers, smaller combs are far easier to uncap with a hot knife than those heavy, bulky and unmanageable deeps.

This small study was interesting and fun to conduct and I hope it is valuable to all of us who associate

ourselves with honey bees. It reinforced the thought that paying attention to details can be important in managing your bees. It reminded me that my beekeeping mentor from Cornell was most often correct. However, there were two things that struck me after learning bees and beekeeping in New York State and then moving to the Pacific Northwest: deeps are not the only hive body (super) size and that Italian queens do not dominate beekeeping in the western U.S. **BC**

Michael Burgett is an Emeritus Professor of Apiculture at Oregon State University in Corvallis, Oregon.

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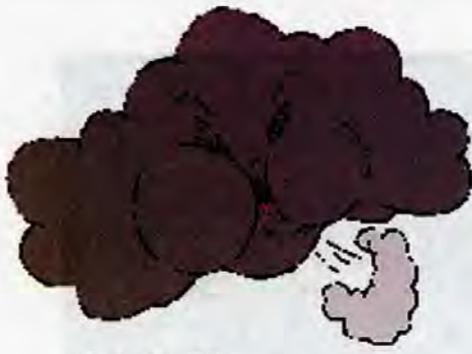
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“Wait For A Good Strong Wind . . .”

Ed Colby

Linda has this recurring dream about us dumpster diving to make ends meet in our old age, which isn't so far down the road. Linda and I both somehow managed to avoid career paths that might provide even a humble pension for our golden years. Now we feel like two little squirrels who played all Summer and never stored away any acorns.

Linda and I aren't insider traders, so let's not talk about the stock market or our IRAs. The other day we decided to look for a rental property that might provide an income someday when I can't lift a super, and we're reduced to relying on Social Security and a battered shopping cart.

We tried to pick an honest, no-nonsense real estate agent. When we thought we'd found one, he and Linda went looking at fixer-uppers in Rifle.

Linda asked the realtor, “Why is every house on this block for sale?”

The realtor said, “I don't know. They just are.” Later, when Linda called the city, they said the block was in a flood zone. Realtors! Boy! You have to watch those guys.

The realtor said to Linda, “Oh, and what does your husband do?”

Linda said, “He's a professional ski patroller and a beekeeper.”

The realtor said, “You know, I used to work with bees. I always found moving bees fascinating. You just put the hives on the truck, and the bees swarm and follow along right behind!”

OK. Conversation is an art. Maybe I exaggerate a little sometimes, too. Maybe we all do. But who does this guy think he's talking to?

Probably no aspect of our venerable craft so intrigues the public as the simple act of moving bees. It intrigues me, too. You load a few million of the little darlings onto the back of a truck, and you head on down the highway. Hopefully you keep it on the road. Can you even imagine a bee truck rollover?

Colorado doesn't have a law requiring netting your bees in transit, and I don't own a net. I admit I hang it out there when I just load and go. I rationalize this because I don't travel very far, and I always leave at night, or early in the morning, or when the weather's rotten. And I'm a really good driver. Still, bad things can happen to anybody.

A few Decembers ago, Little Nic helped me move a pickup load of bees from Crystal Springs back home to Peach Valley. It was some job in the snow. When we bypassed Glenwood Springs, I stopped at a stop sign, but right behind another vehicle. When the car ahead of me started up, I followed, but without stopping again directly in front of the sign. Right away I saw flashing lights in my rearview mirror

When the cop got out of his car, I noticed that he looked like a nice young man. I said, “Nic, watch this.” As the policeman approached the truck, I leaned out and said, “Good evening, officer. You're not allergic to bees, are you?”

The cop literally jumped back when I said this. Regaining his composure, he came up to my window.

“What do you mean, ‘bees’?” he said.

I said, “I'm hauling some in back, and they might be a little stirred up, even though it is the dead of Winter. You just never know,” I said.

“Whose bees are they, and where are you going with them?” he said.

I said, “They're mine. I'm taking them home to my place in Peach Valley. Is there a problem, Sir?”

The cop sized up the situation, and there wasn't a lot he could say about the bees. Plus I can turn on the charm when I need to. I apologized for my poor driving. I'm a courteous detainee whenever I get pulled over. The young man issued me a stop sign warning, and I thanked him for it. Little Nic chuckled all the way to Peach Valley.

Veteran Aspen Times columnist Su Lum once openly and publicly questioned my hauling bees to Aspen to feast on lush May dandelions growing on America's priciest real estate. What the heck did I think I was doing, anyway? She was actually pretty cute about it. She was mostly just amazed at the audacity of my undertaking. But what seemed to most intrigue her was how I got my bees up to Aspen in the first place. Did I lead them to greener pastures “like the Pied Piper?”

Maybe Su got this from our realtor.

I once told a friend about shipping bees to California to pollinate the almonds. My friend is a very sincere guy who would never pull your leg, like I generally do. He said, “OK, so let's say you've got all these bees out in California. Fine. Now how do you get them back to Colorado?”

I paused for just an instant, then said, “You wait for a good strong west wind. Then you turn them all loose. They're home in about three days.”

My friend took this in without even cracking a smile. I looked him right in the eye. Why shouldn't he trust me? Just about everything else about bees is astonishing. Why wouldn't he believe that, given a chance, good bees would head straight for home, like Lassie?

But then I broke the spell. I always do. You see, even though I'm a big kidder, I can almost never keep a straight face. **BC**

Ed Colby keeps us entertained with his tall tales from his home in New Castle, CO.

Summer Hive Ventilation When, Why, and How Much

You can't overdo, and shouldn't overlook good ventilation when it's hot.

James E. **Tew**

Bees need air, too.

Bees need air, too. No surprise there. But it's not just about respiration, but also about heat, cold, moisture accumulation and pheromone dispersal. In fact, there are different kinds of ventilation and all are important to the beehive.

Right now, during this warm season.

If allowed to gather water, a beehive can withstand a lot of heat. Bee books love to make the comment that bees "air-condition" their hives and, it's true, they do. In their own way, they have a very real hive thermostat. Several factors affect the way bees use this thermostat.

Where is the hive physically located?

Is the hive in the desert on the outskirts of Tucson? Is the hive in the shade in downtown Birmingham, or is the hive on the sunward side of a barn in rural Minnesota? It matters where the hive is located. I have two outside thermostats that are located 40 feet apart. Though similar, they never read exactly the same temperature. (Yes, I realize this could strictly be a variation in thermostat calibration.) My point is that the temperature in one place can be surprisingly different from the temperature just a few feet away. Such micro-climates are a factor in beehive ventilation, but probably a fairly small one – so long as the bees have access to water.

Water for cooling, water for metabolism.

Bees need water for cooling the hive and for basic metabolic functions. As do many of you, I have numerous stories of honey bees visiting animal feed lots for water (ugh), visiting the neighbor's pool or visiting bird watering devices during hot Summer months. Bee books come into play again by recommending that, "Dependable supplies of water should be made available to colonies," but just let that supply run out once and the bees are off to the neighbor's pool again. Nearby dependable natural water is invaluable to a colony. Sometimes you can help while other times, supplying water is much more difficult.

How large is the hive?

Does the hive have 50,000 bees or 17,000? Is there a high brood population? Are bees processing nectar? Ventilation principles for removing moisture from nectar are not exactly the same as providing ventilation for brood production. This "large hive" question becomes significant during hot Summer months when adult bees physically cluster on the front of the hive during hot periods of the day. One basic way to manage high internal hive temperature is for adult bees to simply get out of the hive. Smaller populations of adults and brood will not require adult bees matting on the hive front. More on this topic follows.

Lesser factors.

Lesser factors such as relative humidity and wind cannot be ignored. A heavy dew fall allows bees to tank up on water during wet periods to use during hot times of the day. Is there a prevailing hot, dry wind? That occasional factor would dry hives excessively.

Basic hive ventilation during warm periods.

Fanning bees.

While all bees need water for physiological purposes all the time, cooling the hive does not immediately require water. Fanning bees will position themselves at various points throughout the hive and move air through the entire hive cavity. I have no idea who assigns the locations or why specific locations are selected. An important part of this fanning function is to remove carbon dioxide from the colony, a feature that is not related to hive cooling.

Fanning bees are not the same as scenting bees. Selected bees will scent when there is a need for a hive location marker. Other bees will fan only to move air and I suspect that some bees will mix the two tasks ventilating for a time and adding scent to the air stream for a while. The exposed Nasanov gland on the tip of the scenting bee's rear end will be your clue if the bee is hive cooling or hive scenting.

Water gatherers.

I don't know what triggers the water collecting pro-

Continued on Next Page



Water collectors gathering rainwater.

cess for heat control, but at some point, water foragers are recruited to gather water. House bees appear to be aware of the brood nest temperature and will preferentially accept the load from water gatherers while ignoring bees with nectar loads when the internal temperature rises. This inspires water collectors to go back for more water until they become ignored (i.e. the hive is cooled enough) in preference to nectar-bearing bees. It appears that inside bees decide inside needs.

Water droplets are placed about the hive inside – usually in open combs. As fanning bees circulate air, the water evaporates and cools the hive. Other bees will regurgitate a single water droplet and allow it to evaporate from their mouth parts.

Hive evacuation by adult bees.

At some point, the temperature cannot be dropped enough by fanning and water collecting. The next phase is for unneeded adult bees to leave the hive interior. I'm sorry, but again, I don't know the specific cue that instructs unemployed adult bees to simply get out of the hive. These bees mat on the hive front in the classic look of the overheated hive. These hot, unemployed bees can frequently be testy so I tend to give them all the consideration I can when opening a hive in this condition.

I have never been told that bees on the front of the hive are a cue of anything particularly serious other than a nuisance to the beekeeper and appearing particularly frightening to non-beekeeping neighbors. Make no mistake – this hive with matted bees on the front is hot, but if no nectar is flowing and these bees have nothing else to do within the hive, I see, no great need in moving heaven and earth to get them inside.

I suspect that this matting event occurs more than most beekeepers realize. At night, when all the bees are home in the hive and water cannot be collected, bees readily mat outside, but since it's dark, you don't see them. I have seen this phenomenon many times when moving colonies at night during hot months. At these times, these outside bees are a pain. There re-

ally is not room for them inside and I am stuck with crawling, stinging bees that I have difficulty controlling under the veil of darkness.

The final phase – absolute desperation.

Okay, for the sake of this discussion, let's say that the colony has played all its heat-control cards and the hive is still exceptionally hot. Eggs and pupae are particularly hardy and can withstand more temperature variation than larvae so larvae will be the first to die. Adult bees, in desperation, will regurgitate the contents of their nectar crop and cover themselves in it in an effort to cool themselves. They will have a wet, sticky look. This will be a hive in serious trouble. Mist it with water and protect it from the sun. Even if you are able to help, some damage will already have occurred.

Beekeeper ventilation procedures during the summer. To shade or not?

In warm climates, put bees in the shade (as much for beekeeper comfort as for bee comfort), while it is normal – even desirable – to put bees in the sun in cool climates. Shade is commonly provided by trees, fencing, or a building but bees in the desert are sometimes covered by a improvised tent having no sides.

Provide water.

If natural water is not available, especially in a warm climate, provide a dependable water supply. Let a faucet drip or keep tubs filled, but do something.

Stagger supers.

Staggering supers (leave about 1/2" for an opening) provides upper ventilation openings and is simple procedure to do. Are having all adult bees inside the hive a good thing all the time? I guess so, but I'll bet that many older forager bees are doing little more than just sitting around in the hive waiting for the flow to start.

An overheated hive.



If water is readily available, I suspect that staggered supers primarily keeps more adult bees inside, but even so, this procedure would allow the beekeeper to keep better control of the hive.

Be aware that during very hot times of the year, giving bees multiple openings may unintentionally aid in establishing robbing behavior. Nectar flows are not great during very hot days so bees have little to do but harass neighboring hives.

Prop up the outer cover.

It's okay to prop up the outer cover and inner cover to allow a small opening at the top of the hive for top ventilation. Probably about 1/4" to 1/2" should be enough.



A properly ventilated hive ready for relocating.

Auger holes here and there.

Sometimes, beekeepers bore holes in the brood boxes for ventilation. This is primarily for winter ventilation, but certainly some benefit would come from Summer ventilation. Do as you wish, but I don't care much for the hole-boring technique.

Work hives during cooler parts of the day.

This is just common sense. I would tell you to work beehives during cooler parts of the day primarily for your comfort as much as the bees' comfort. All that protective gear is hot during summer months.

Ventilation during a hive relocation.

As beekeepers, when we move bee colonies, we normally screen the entrances. Commercial beekeep-

ers net the entire load but that is not practical, indeed, not even necessary for the smaller load. But a closed colony is a non-water collecting colony. As the bees realize their confinement, they become frantic to find an exit. All this running about only adds to the heat production, which leads to more frenzy which ultimately leads to the absolute desperation phase discussed above.

Never completely close the hive.

The temptation to stuff grass or use a board to close a hive will be great. "I'm only going a few miles" will be the common excuse. A large colony that is completely closed will overheat remarkably quickly. Several commercial closing devices are available for the entrance that work reasonably well. I commonly use aluminum window screening to make a quick entrance closing structure. Fiberglass screening is too soft and will collapse allowing bees to escape.

You should improvise a top screen for the top of the hive. Probably the best screening for a top screen is 8-mesh hardware cloth in a simple wood frame, but this screening is a bit expensive and requires tin snips for cutting. I suspect the top screen is more important than the entrance screen in providing for hive ventilation.

The vehicle

Ideally, the truck will have a cap or you can put the hives inside with you in van-type cars (always an adventure). Even if it has a cap or some other cover, open all windows to allow as much air movement through the enclosed truck. There is no way to chill bees on a hot day. An enclosed vehicle not being possible, consider moving the hives during cooler parts of the day. My primary point is not to have confined colonies exposed to the hot Summer sun with no air movement.

Water.

If conditions are hot and the hives are not adequately protected from the sun, take a water hose along or some other container for wetting the screened hives occasionally. Unless it's really hot, the colonies will be okay so long as the vehicle is moving. Water only if you must sit for a while.

Important year-round

Proper hive ventilation is important all year essentially for the same reasons. Even though we have had many colonies die due to mite predation, beehives are surprisingly hardy and will be fine so long as they have access to water. Offer help only when needed. **BC**

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STOP! WAIT!

Come baaaaaaack!

Ann Harman



Wait! Stop!! Come baaaack!!!

That is the fourth swarm you have lost from that hive on the corner. You have seen two swarms from the hive in the middle of the apiary. Were there others?

Perhaps, but since you are not standing in your apiary all the time you may well have missed some. Maybe missed many. And what about those swarms that you saw in late August last year?

For lots of reasons your bees swarm. As beekeepers know, swarms decrease honey production.

Almost half the hive goes. Even if you capture the swarm you cannot stuff it back in the same hive it came from. The bees will leave just as fast as you can stuff. The bees have good reasons for doing that.

The colony is in a swarming mode that started months before you saw a swarm emerge. The preparations the bees make are generally not noticed by the beekeeper until it is too late. Too late means swarm cells are present. Really too late is when those swarm cells are capped.

Could swarming be a reason for the poor honey production of your hives? If you started out in early

Spring with a good strong population and you are aware of the nectar-producing plants in your area, certainly swarming could be a cause of poor production.

Don't you think it is about time to find out why your Summer months are filled with swarms. And if swarming persists until you can fix the problems, what can you do with those swarms. These Summer swarms seem to get smaller in size



as the months go on. And late Summer and early autumn swarming seems to be popular with bees in certain years and in certain beeyards.

I am certain that you looked through the books and magazines. What did you find out? Congestion. Genetics. A natural thing for bees to do. Pheromones. Too many bees. Wrong ages of bees. Old queen. Unknown reasons. Weather. Any, all, most and some of those reasons and possibly others are causing your bees to swarm. You asked a beekeeper who has kept bees for 40 years. The answer was not useful – he said “A swarm of bees in May is worth a load of hay,...” (I do not think my hay farmer would trade a load of hay for a swarm of bees.)

In the early years of beekeeping, with bees kept in straw skeps or logs, swarming was desirable. Beekeepers frequently killed the bees just to obtain honey. So if you had 20 colonies and you planned to kill 10 of them for honey, the other 10 were supposed to swarm to bring your total back up to 20. Production per hive was not considered. If the beekeeper wanted more honey it was necessary to have more colonies.

However, with the advent of the moveable-frame hive various management techniques became possible that led to greater honey production. Now it became necessary to limit swarming in order to keep a large population of bees. Beekeepers and bee scientists alike, through a process of selection, have reduced the swarming instinct in our modern bees.

But swarming has not disappeared and will never disappear. Swarming is a way of continuing the genetics of a particular colony and a form of renewal of the genetic pool. The old queen that travels with the primary swarm will be replaced in a short time. The afterswarms are generally traveling with a virgin queen, but not necessarily. Late swarms that leave the hive after a period of weeks will probably be traveling with a mated queen.

Perhaps you should take a look at some possible factors for your swarming bees.

Yes, they are swarming – they just can't stop doing that. It is time they stopped. And it is time your honey production became something to be proud of.

Just when was the last time you requeened? Or have you ever

requeneed? Or did you just toss a new queen into the hive without first removing the old queen?

If your queens are not marked, frankly you have not the foggiest idea what is going on. The only certainty of introduction of a new queen – a marked new queen – comes with removal of the old queen. Now you will know what is going on.

Yes, I know that finding the old queen can be a problem but the books and magazines are full of ways to find the old queen. It can take time to find her but it is time well spent. You will be introducing new genetic information into your colonies – something they may badly need. Find help from another beekeeper if you need it, but once you accomplish a successful introduction the benefits will become apparent and you will have the confidence to keep up the new queen introductions every year or two. From an economic standpoint you will gain more profit from honey sales than you spent on queens.

Now to take a look at congestion. In the Spring bees move upward eating their way through Winter honey stores. When they start bumping their heads on the inner cover it seldom occurs to them to move downward. You want a large population for honey production. The bees are capable of providing that as long as there is room to do that.

Do you ever inspect the brood area of your hives? Do you ever take a look at the condition of the comb in the brood area of your hives? Although bees can take care of their lives very well, it is up to us, the beekeepers, to provide them with the best possible accommodations for the best possible results.

Comb that is full of drone comb, full of holes, weird layers of comb masquerading as a full frame of comb, wavy comb all are not good comb. Comb with a thin plastic center that has lost its wax and cannot be rebuilt is wasted space in the hive. Although the Springtime is a good time for inspecting comb, with your swarm problems now is a good time.

Take each brood chamber frame out and take a good look. Did you miss the mouse nest built back last Autumn? That nest can destroy at

least 1/3 of good comb on several frames. Were you one who decided to draw comb with less than 10 frames, thinking that 6 or 8 would make no difference to the bees? Or were you the one who tried to draw comb in August during a dearth period? The bees are very good at making a mess of things in such cases. The result is that you are not providing a full set of excellent comb for the bees to use as their home.

No wonder they are running out of a place to raise brood.

Another problem is just plain too many bees. They don't fit too well into your brood chambers. You have a nice new queen and your comb is really excellent.

Your hive is just boiling over with bees. Now you have an opportunity to reduce that number



and still preserve the field bees for their work of nectar collection.

You are going to remove some of those frames covered with bees and create a new colony. Many hobbyists are reluctant to do this since they are happy with the number of hives they have. However, it does not mean that you are stuck with the new colonies that have increased your apiary more than you wish. These new small colonies, nucs, may come to your rescue during the Summer and early Autumn if you suddenly need a new queen or one or more of your colonies needs a boost in Autumn for good wintering. The nucs are also a good way to introduce a new queen into the main hive.

One thing to consider is where are you going to find a queen for these splits, these nucs made from overflowing colonies. The

recommendation would be to buy a new queen for the split instead of taking the chance and letting the bees raise their own queen, possibly another swarmy one. Keep the genetic pool changing.

You will find the information for creating nucs from congested hives in many books and magazines. I certainly hope that you have good comb to replace the frames you are removing from the congested hive. Remember, good drawn comb is your most valuable possession in beekeeping. Without it you can only make do and hope all goes well. Fortunately bees don't mind our mistakes. They can make do also but the result is low honey production or even an insufficient hive for pollination.

Although it may be a bit late in the season for repairing all the problems your swarmy hives have, you can certainly do something with those swarms your hives are producing. True, you have to be able to capture the swarm. Let's assume that you have.

A swarm does have one advantage. It is ready, willing and able to draw comb.

Of course one of those tiny late swarms is not going to do a great job but if fed very well it will make some good comb. These late swarms have a queen, virgin or not. These are queens you do not want. Remember, they are swarmy queens.

Let the little swarm get established. Now review your other hives. Do any of them need a boost in population? Be critical. Examine the brood. How are the ratios of uncapped to capped to adult bees? Make your decision and then unite that swarm with the needy hive.

Whatever you do, don't imagine that a little late swarm is going to live through the Winter all by itself. If left on its own, out in a tree somewhere, it would not survive the Winter. You can give it a chance to survive and to help one of your other hives to survive.

When Spring arrives next year review all the possible problems and see if you can keep those bees inside their hive to make a good honey crop. **BC**

Ann Harman chases and catches swarms near her home in Flint Hill, VA



? DO YOU KNOW ?

Honey Bee Behavior

Clarence Collison

Mississippi State University

The various activities and behavior of honey bees has fascinated man for many centuries. As we study the honey bee society, we have to be careful not to interpret our observations from an anthropomorphic standpoint. We tend to ascribe human attributes to bees such as the ability to think and plan ahead because of their high degree of social organization. The activities of honey bees are regulated by many differ-

ent factors associated with the environment in which they live and their internal physiology. Bee behavior in its simplest sense would be defined as the automatic reactions of an individual to stimuli found within or in the immediate area of the bee's body.

Please take a few minutes and answer the following questions in regards to honey bee/colony behavior to see how well you understand this insect society.

Level 1 Beekeeping

1. ___ Virgin queens and drone honey bees pay no attention to one another either in the hive or at or near its entrance when leaving on their nuptial flights. (True or False)
2. ___ When many plants are in bloom, honey bee foragers have a low sugar threshold of acceptance. (True or False)
3. ___ Each drone produces more sperm than a single queen can store in her spermatheca. (True or False)
4. ___ Queens go on orientation flight(s) prior to going on a mating flight. (True or False)
5. ___ The drone's testes are composed of many tubules, the testicular follicles, in which the male sex cells develop. (True or False)
6. ___ Kin recognition within a honey bee colony is involved in determining the composition of a swarm cluster. (True or False)
7. ___ Scout bees associated with a swarm cluster searching for a new nest site dance on the cluster surface both day and night. (True or False)
8. ___ When virgin queens are about 24 hr old, they produce a pheromone that repels workers and other queens. (True or False)
9. ___ Larval and pupal honey bees produce pheromones that significantly affect the behavior of worker bees. (True or False)
10. When workers become guard bees or begin foraging, they produce a very odorous compound in their mandibular glands which serves as an alarm pheromone. Name the compound. (1 point)
11. Name two pheromones that are associated with the colony entrance. (2 points)
12. ___ The following pheromone is associated with the stabilization of a swarm cluster.
 - A. Nasonoff pheromone
 - B. Isopentyl acetate
 - C. (E)-9-oxo-2-deconic acid
 - D. (E)-9-hydroxy-2-deconic acid
 - E) O-aminoacetophenone

Advanced Beekeeping

13. ___ Queen piping encourages swarming. (True or False)
14. ___ 9-Oxodecenoic acid is very persistent. (True or False)
15. ___ Footprint pheromones are produced by tarsal glands and differ in chemical composition for queens, workers and drones. (True or False)
16. ___ Honey bees show aging characteristics indicated by deterioration in flight performance and a change in thermal preference for warmer temperatures. (True or False)
17. ___ The allergens in bee, wasp and ant venoms are alkaloids. (True or False)
18. ___ Honey bee eggs and sperm undergo meiosis during their formation. (True or False)
19. Man's visible spectrum includes the following color bands: violet, blue, green, yellow, orange and red. What are the four "spectrum of colors" that are detectable by honey bees? (4 points)

A honey bee colony consists of a large number of subfamilies of workers. Members of the same subfamily share both a queen mother and drone father. Multiple mating and the haplo-diploid reproductive system effect the degree of relatedness between sister groups within a colony. A) 25% B) 75% C) 100% D) 0% E) 50%

20. Half-sisters, workers fathered by different unrelated drones and the same queen mother have ___ of their genes in common.
21. Super-sisters, workers with the same father and queen mother have ___ of their genes in common.
22. Full-sisters, workers fathered by brother drones have ___ of their genes in common.

Answers On Next Page

?Do You Know?

Answers

- 1. True** Virgin queens and drone honey bees pay no attention to one another either in the hive or at the hive entrance when leaving on their nuptial flights. The queen from the time she is five to six days old (sexually mature), onwards throughout her life, a virgin or mated queen has 9-O-2, her olfactory sex attractant on the surface of her body and is therefore continuously releasing it into the air. However, drones are not attracted to her until she has left the hive and gone up into the mating altitude.
- 2. False** When many plants are in bloom, honey bee foragers have a high acceptance threshold, selecting only nectars that contain high concentrations of sugar, so that they receive the greatest caloric reward. In the Spring and Fall, when few plants are blooming, the acceptance threshold may be as low as 5% sugar.
- 3. True** Each drone produces about 10 million identical sperm, more than a single queen can store. After mating a queen normally stores five to six million sperm in her spermatheca, the sperm storage organ.
- 4. True** A virgin queen initially takes brief orientation flights about four days after she emerges from the queen cell. She becomes sexually mature when she is five to six days of age and workers literally drive her out of the hive for her mating flight(s).
- 5. True** The drones testes are flattened and somewhat kidney-shaped. The testes are composed of many tubules called testicular follicles. Within these testicular follicles, the male sex cells develop.
- 6. False** Recent research has shown that kinship recognition within a honey bee colony does not effect the subfamily composition of either a primary or secondary swarm. Either bees in a swarm do not recognize their kin, or if they do, this does not dictate which bees leave with the swarm and which ones stay behind in the parent colony.
- 7. True** Research has shown that scout bees looking for a new nest site dance on the surface of a swarm cluster during both the day and night. Even during the night when the sun cannot be seen, the scout bees indicate the correct position of the sun. Orientation to the sun is innate, but the calculation of the pathway of the sun must be learned. Foragers compensate for the rotation of the earth relative to the sun's position using an internal clock.
- 8. True** When virgin queens are about 24 hr old, they produce a pheromone that repels workers and other queens. This pheromone is produced for about two weeks, during the period when the queen may have hostile encounters with workers or sister queens in the hive. This pheromone is discharged as a fecal exudate from the rectum.
- 9. True** The ability of workers to readily distinguish worker and drone larvae and pupae is correlated with the presence of brood-recognition pheromones. The brood recognition pheromones must be perceived by contact, demonstrating that they are of low volatility. There is evidence that workers are able to differentiate pupae of different stages of development.
- 10.** 2-heptanone
- 11.** Foot print pheromones, Nassenoff pheromone, 2-heptanone
- 12.** D) (E)-9-hydroxy-2-deconic acid
- 13. True** When a colony with a queen a few days old has much queen piping, it is likely to swarm. When there is no piping it is not likely to swarm. Studies using caged piping queens or by applying an artificial sound, resembling queen piping encouraged swarming.
- 14. True** 9-oxodecenoic acid, a component of queen substance that serves as her olfactory sex attractant, is a very persistent compound. Only a few molecules are necessary to stimulate a flying drone to turn upwind. Objects dipped in 9-oxodecenoic acid several years ago are still able to attract drones.
- 15. True** Honey bees produce a variety of footprint pheromones. Chemical components include alkanes, alkenes, alcohols, organic acids, ethers, esters and aldehydes. Tarsal glands secrete 12 compounds specific to queens, 11 specific to workers and one specific to drones.
- 16. False** Honey bees show aging characteristics. Specific changes that are observed as workers age include a deterioration in flight performance and a change in thermal preference toward cooler temperatures. Older bees are normally found at the broodnest periphery or near the colony entrance. A number of changes in gland ultrastructure and biochemistry also occur over time, as honey bees age.
- 17. False** The allergens in bee, wasp and ant venoms are all proteins. These proteins cause or enhance toxicity and all are capable of inducing hypersensitive reactions in some individuals.
- 18. False** Meiosis is involved with the formation of the queen's egg cells. Since the drone is haploid, there is no need for a reduction division (meiosis) in the development of spermatozoa. As a result all of a drone's spermatozoa are genetically identical.
- 19.** Ultraviolet, Bee Blue, Blue-Green, Bee Yellow
- 20.** A) 25%
- 21.** B) 75%
- 22.** E) 50%

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

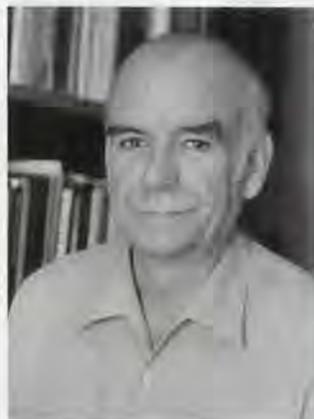
Number Of Points Correct	
13-11	Excellent
10-8	Good
7-6	Fair

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

GLEANNINGS

JUNE, 2004 • ALL THE NEWS THAT FITS

ELBERT JAYCOX 1923-2004



Elbert Ralph "Jake" Jaycox, age 80, died March 8, 2004 after suffering a heart attack at his home. He was born October 13, 1923 in Miami, Arizona. His father died shortly after and he moved to Los Angeles to be with relatives in 1943 at the time of his mother's death.

Elbert Jaycox became interested in honey bees when he was looking for an elective class as an undergraduate at the University of California at Davis in 1947, after serving in the Air Force in WWII. He debated whether to take viticulture (grape growing) or apiculture. It was an easy decision because viticulture was taught at 8:00 a.m., apiculture at 1:00 p.m. Not long after that selection, Jaycox worked for two commercial beekeepers in California and seriously considered entering commercial beekeeping before deciding to continue his studies with honey bees. He obtained MS and PhD degrees in entomology/apiculture at U.C. Davis where he studied the use of diluents for honey bee semen and the sexual maturity of drone honey bees.

His first professional appointment was as supervisor of bee inspection for the state of California. After that, he was a research entomologist for the USDA at Lo-

gan, Utah and studied the effects of pesticides on bees. He also taught Insect Ecology at Utah State University. From Utah he went to the University of IL where he remained for about 18 years, teaching beekeeping and bee behavior, studying bee behavior and the pollination of soybeans, and serving as extension specialist to beekeepers and growers. During that period he spent a year in Switzerland studying the role of juvenile hormone on the behavior of worker honey bees. With Swiss colleagues, he showed that the amount of the hormone in their blood helped to determine the sequence of duties performed by worker bees.

While at IL, Jaycox also demonstrated that honey bees visit soybeans in large numbers and that they can be used to pollinate the beans when needed in the future to produce hybrid soybeans. Soybean honey is an important part of the harvest in IL and other Midwestern states. In another project, Jaycox found that swarms of bees of different races have different requirements for living space in a hive or a natural cavity.

Jaycox left the University of IL in 1981, and became adjunct professor of entomology at New Mexico State University, Las Cruces, NM. In Las Cruces he taught two international beekeeping classes and helped to establish a beekeeping program at an agricultural school in the Yemen Arab Republic. He also taught beekeeping and queen rearing to Yemeni students on campus.

Jaycox was recognized for his writing by inclusion in *Who's Who in U.S. Writers, Editors & Poets* and *The International Authors and Writers Who's Who*. He wrote more than 210 publications of all kinds, including two excellent books, *Beekeeping in the Midwest* and *Beekeeping Tips and Topics*. He

authored nine leaflets in the Arabic language which were printed for use by beekeepers in Yemen. From 1975 to 1981, he edited a newsletter, *Bees & Honey*, and produced *The Newsletter on Beekeeping* for several years. He wrote a column for *American Fruit Grower* about pollination and the use of bees for fruit production.

On leaving IL, Elbert and his wife Barbara selected Las Cruces, NM for its climate (it is about 4,000 feet elevation), and easy access to a good university, high mountains, and a large city (El Paso/Juarez). The Jaycox's had four children, but no other beekeepers in the family. After retirement they enjoyed travel, especially to Chili, and gardening. He took up the art of gourds, which he grew, decorated and sold at the Las Cruces Saturday morning market.

From 1986 until 1990 he wrote a monthly column in this magazine entitled "The Bee Specialist," which explored many beekeeping subjects.

Jake was preceded in death by his oldest sister, Dorothy Jaycox Clark of La Jolla, CA and by his oldest daughter, Susan Kay Jaycox Kontos of West Lafayette, IN. He is survived by his wife, Barbara, a sister, son John, daughters Julie Jaycox and Holy Jaycox and grandchild Wynne Emily Kontos.

SCHOLARSHIP ANNOUNCEMENTS

The Foundation for the Preservation of Honey Bees, Inc. is a charitable research and education foundation sponsored by the American Beekeeping Federation, Inc. The ABF recently gave the Foundation a grant of \$50,000 from funds the ABF received from the estate of Glenn and Gertrude Overturf.

The Foundation Trustees have chosen to use a portion of the grant to offer five \$2,000 scholarships to graduate students in apiculture with the stipulation that a portion of the funds be used to attend the 2005 American Beekeeping Federation in Reno, NV, to present their research. The Board hopes the scholarships will encourage young apicultural scientists and look forward to their contributions to the 2005 ABF meeting.

Applications for the scholarships will be accepted until July 1, 2004. Applicants should submit a cover letter from their advisor, a curriculum vitae and a research summary (not to exceed three pages) to the Board for consideration. The research summary can cover research completed within the past 12 months or proposed research that will be completed prior to the American Beekeeping Federation meeting. Recipients will be selected in July of 2004.

Send applications to Dr. Marion Ellis, University of NE, Dpt. of Entomology, 202 Plant Industries Bldg, Lincoln, NE 68586-0816.

"HIGH" BEES IN CHINA

Police intercepted some 600 pounds of heroin hidden in 63 beehives being moved by truck in southwest China. The official Xinhua News Agency said it was China's largest drug seizure this

year. Police acting on a tip off made the seizure near the border between Myanmar (Burma) and China's Yunnan province and arrested four suspects.

— Alan Harman

Bunker Mentality Abounds NEW ZEALAND DEBATES IMPORTS

The New Zealand beekeeping industry is divided on the approval given to breeder David Yanke to import Carniolan honeybee semen from Germany.

Yanke, an American who has lived in New Zealand for 23 years, took 10 years to get the importation permit. Now he is set to import semen from around 1,000 drones from Germany this month. His plan is to cultivate a breed with a higher tolerance for the *Varroa* mite.

The Ministry of Agriculture on March 9 produced a draft import health standard for semen from Carniolan honey bees – *Apis mellifera carnica* – imported from Austria and Germany.

The Carniolan bee is adapted to cold climates and produces a honey crop over a shorter timeframe. Opponents of the plan said this would mean Carniolan populations would grow more quickly than New Zealand's Italian-derived honey bee and this could cause the bees to swarm.

"The Carniolan stock tends to be a breed very prone to swarming," National Beekeepers Association president Jane Lorimer said. "While our bees do swarm, we try to minimize it, and the Carniolan breed is worse than the Italian breed we have here."

But the rival New Zealand Bee Industry Group said it supported the import plan.

"It is possible that an average New Zealander in their lifetime might see a bee swarm once," spokesman Lin McKenzie said. "After the introduction of Carniolan, it might be twice."

He said *Varroa* is becoming increasingly resistant to fumigants and New Zealand has a very closed bee stock. "We could do with some hybrid vigor in the bee population," he said. "No bees have been imported officially into New Zealand for more than 50 years."

Ministry of Agriculture *Varroa* program Paul Bolger said Carniolans would swarm.

"The general industry belief is they will behave differently from what we have now but that's a management issue irrespective of the strain of bee," he said.

Yanke said the local beekeeping industry sometimes had a fortress mentality.

"I guess there's a lot of fear of the unknown but this bee has gone everywhere else in the world," he said.

Meantime, government research company HortResearch said it was using New Zealand bees of Italian extraction in breeding trials in a search for resistance to *Varroa jacobsonii* mites. It said the program has the potential to make quite substantial gains in a relatively short timeframe. – Alan Harman

MORE HONEY RECALLED IN CANADA

There are more recalls of honey in Canada, the latest involving local product produced in British Columbia.

The Canadian Food Inspection Agency warned consumers not to consume the honey because it may be contaminated with chloramphenicol.

Elias Honey Ltd. of Prince George, B.C. voluntarily recalled its 500-gram and one-kilogram Elias Buckwheat Honey No. 1 Dark along with its 500-gram and one-kilogram Pure Buckwheat honey.

Two EE's Farm Ltd. of Surrey, B.C., recalled its one-kilogram

Pure Buckwheat Honey as well as its variable weight plastic tub of the same honey.

All the recalled honey was distributed in British Columbia and Alberta.

The food inspection agency said the presence of chloramphenicol in honey poses a risk although small of a serious blood disorder known as aplastic anaemia. Chloramphenicol is an antibiotic drug, which is not permitted for use in Canada in food producing animals, including bees. There have been no reported illnesses associated with the consumption of these products.

– Alan Harman

WAS - Missoula, Montana July 13-15

The Western Apicultural Society will hold their annual conference, July 13-15, 2004 in Missoula, Montana.

EPA, the bee industry, the pesticide industry, and conservation groups will present a day-long workshop and panel discussion on Pesticides and Pollinators: The State of the Nation.

In addition to the pesticide forum are workshops and conferences with the Native Plants Society, and one or more of the Pollinator conservation groups.

Plus, bear experts, since the U.S. Fish and Wildlife bear recovery program is located here. (We might even get a visit from Monte, the back-flipping, motorcycle-riding

Grizzly, who's out to defend his title as the Nation's No. 1 mascot!)

Included is a tour day to the National Bison Range, then to Western Bee's equipment fabrication plant in Polson, and will end with a Barbecue on Flathead Lake, the largest inland lake west of the Mississippi.

Speakers include Jerry Bromenshenk, Patty Denke, Robert Seccomb, Steve Rice, Bill Ruzicka, Gabe Patrick, Dan Mayer, Eric Mussen, Kim Flottum, Matthew Shepherd, and more.

For more information contact Jerry Bromenshenk, President, Western Apicultural Society, 406.544.9007 or 406.243.5648; beeresearch@aol.com.

GUM TREES SAVED IN SOUTH AFRICA

The South African government placed a moratorium on the removal of eucalyptus trees after beekeepers said they faced a loss of 1.25 billion rand (US\$198 million) from the conservation measure.

Working for Water, a government agency in the Department of Water Affairs and Forestry, put a stop to the removal of the gum trees that had been ordered under conservation legislation designed to protect watercourses and block the entry of foreign species into sensitive ecosystems.

The agency halted the tree removal while research is conducted into the economic impact. An independent survey is

also to be carried out that is expected to lead to a national strategy on handling eucalyptus trees in sensitive areas.

Beekeepers said the eucalyptus trees are an extremely important source of nectar and pollen.

"The removal of these trees will lead to a reduction in bee populations which subsequently will have a negative effect on commercial pollination," Western Cape Bee Industry Association chairman Dawid Smith told the South African Farmer's Weekly.

"This in effect will have dire consequences on the viability of important crops such as deciduous fruit trees and vegetables that depend on bees for pollination." – Alan Harman

CLOSER WATCH ON IMPORTS

Import Policy Administration Board wants a closer watch on honey after reports a large volume of substandard Chinese honey had been smuggled into the country.

The board urged the FDA to tighten its inspection procedures.

Some 187 million baht (US\$4.73 million) worth of honey was imported legally last year with almost 90% of it coming from China. The rest came from Australia and Switzerland. It is not known how much honey was smuggled into the country.

Thailand exported 2,000 tons of honey – 25% of total production – with 58% shipped to the United States, almost 17% to Taiwan and 15% to Malaysia.

Production of Thai honey is expected to rise to 12,000 tons this year, up from about 10,000 tons last year.

The board has asked the Ministry of Agriculture to set up a standard for that honey production that meets international health standards.

GLASS JARS

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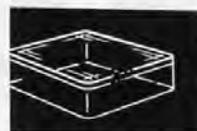


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Sunday afternoon is my only chance to rest, read, and relax. I inserted that clause in the marriage vows, then coughed loudly as the minister read them to my new bride. Unable to put me to work, Nancy spends Sunday roaming the house and looking for jobs to add to the list, in case I need something to do after work during the rest of the week.

One Sunday after lunch, I lay comatose in the recliner.

"Dad?" Was someone calling me to supper already?

"Dad!"

I opened one eye. My family stood in a semi circle around me.

"Huh? Wha?"

"Happy Father's Day!" My wife held out a long narrow box. She had a strange look in her eye. I warily recalled the bee veil and smoker she had received on Mother's Day. With luck it would only be a box of neckties.

I tore off the wrapping paper. On the box was a picture of a beautiful mechanical thing. The text was in French. I turned the box. The text was in German. On the third side the text was Chinese or maybe Swahili. I gave up and opened the box. Whatever it was, it looked like the best Father's Day gift ever!

It was bright orange, with a 2 cycle engine on one end and a row of razor sharp teeth sticking out the front like the snout of a saw shark. Maybe I could mount it on the wall next to my giant 13 inch salmon.

"I love it. What do you do with it? Is this what women use to get that modern celebrity hair style?"

"It's a hedge trimmer." Nancy explained patiently. "You remember the Chinese elm hedge we planted five years ago? You were going to make a nice trimmed hedge. I thought it would give you something fun to do on a Sunday afternoon."

"Those are 12 feet tall. I prefer the wild and free look. They feel the same way I do about crew cuts."

Nancy looked hurt. Her lower lip started to quiver

"Well, maybe I could flatten the sides. They'll thicken up, and it might keep the neighbor's Rottweilers out of the yard. I'm tired of them chewing on our children."

"Let's see how to start this." I opened the phone book sized manual. The first 250 pages covered safety rules in sixteen languages, including Braille. Apparently the only safe way to use the trimmer was to hire a certified and insured professional landscape engineer.

The next 300 pages covered starting the trimmer. It is a seven step procedure and if you do it in the wrong sequence, it will either blow up, sending radioactive materials into the atmosphere (I would be responsible for the cleanup cost and any resulting lawsuits) or it would melt down into a puddle of molten plastic and aluminum.

Nancy read the steps:

"Switch on."

"Check."

"Choke on."

"Check."

"Disengage teeth"

"Check."

"Set at half throttle."

"Check."

"Pull starter cord twice"

"Pbpbpbpbpbpbpbpb. Pbpbpbpbpbpbpb."

"Check."

"Set at half choke."

"Check."

"Pull cord three times."

"Pbpbpbpbpb Pbpbpbpbpb Pbpbrrroar!"

"Now what do I do?"

"Quick! Push the throttle to disengage the half throttle button!"

Ten minutes later, the trimmer hummed happily. Lampshades and curtains can be replaced. Nancy suggested taking the trimmer outdoors. I remembered the grass and brush clogging the hive entrances in the apiary.

"Don't you think I should get the hang of this thing before starting on

the hedge?" I suggested. "I wouldn't want to do something stupid."

Nancy seemed relieved. I put on ear protectors and walked up the hill into the beeyard. I admired the shiny orange engine and the deadly teeth, then revved the engine a couple of times, listening to the whine of raw power

Next to the hive tool and extractor, a hedge trimmer could be the most important tool in a beekeeper's tool kit. Brush has an annoying habit of growing. It clogs colony entrances and forms hazardous obstructions. A well trimmed yard is not only a safer area, it is more pleasant to work in.

Within minutes the hive fronts were clear of grass, brambles, small sumacs and choke cherries. I thought about the hedge, and then noticed a honeysuckle bush. I trimmed a little on one side, then clipped the other until it was nearly perfectly spherical.

Next I noticed a bush that reminded me of a land tortoise from the Galapagos Islands. I rounded its carapace and trimmed out a large mouth. Now it looked like an extinct carnivorous tortoise from the late Jurassic period.

With a little practice, hedge trimmers open up great possibilities. A nip here, a tuck there: voila! A black bear! Most of the local beekeepers have suffered losses from bears. That gave me an idea. In the center of the beeyard I found another large honeysuckle and started to cut. This sculpture took nearly an hour. It was a seven foot statue of a man holding a 300 magnum rifle and more life-like than any scarecrow. I named him Wyatt Earp.

By dusk, the bee yard was littered with strange, hideous creatures. While finishing a sculpture of a flying saucer wreck with dead and dying aliens, I shuddered as something touched my neck. I turned and looked down the barrel of a 300 magnum rifle. "Time to head on home, bud," Wyatt Earp seemed to drawl.

The porch light was on. Dinner was cold. "I think I'm ready for the hedge tomorrow," I told Nancy while flipping through the Chinese section of the instruction manual. "I visualize the Great Wall of China, guarded by a dozen of those life sized terra cotta warriors along the top."

Nancy looked pensive. "I think I prefer the natural look after all. It reminds me of the hairstyles women celebrities are wearing these days."

Peter Sieling

Happy Father's Day

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