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A Shadow Of A Honey Flow. This Bee Bee tree blossom, snuggled tight against the window casts a perfect shadow against the blind inside late in the afternoon, when the nectar is gone and the bees are elsewhere.
photo by Kim Flottum

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING
AUGUST 2007 VOLUME 135 NUMBER 8

FEATURES

DEPARTMENTS & COLUMNS

Observation Hive Difficulties

In 2006 I started renting a two-frame – one over the other – observation hive to Mr. Pepper's Pumpkin Patch, one of my pollination contractors. Mr. Pepper has a you-pick pumpkin patch catered to children and adult entertainment.

Being close to the beach he has whole families come for entertainment. He has bus loads of children that come from as far away as Virginia for field trips. Among his many activities is a corn maze, a school house complete with a bell he rings and the children file in and sit on benches and he gives a class displaying and talking about the different types of pumpkins and their uses. Leaving school and heading to the pumpkin patch, you pass a new building which houses a bug collection and the observation hive which sits on a table.

The problem I'm having is two-fold. First, October is late for an observation hive outside with the cole weather and second is I must exit the bees about seven feet up through a four-inch plastic pipe in the roof. Out of harms way!

There is a 1½-inch wide and ½-inch high hole in each end at the bottom – one for a feeder and one for exiting. I have a vent cap on top of my four-inch plastic pipe above the roof to stop rain.

I could not get to the exit through my stand pipe!

Unless you can give me a better idea, I will transfer my feeder and exit pipe somehow to the top of my hive. But if I do this it will be difficult to open the hive to change frames and clean the hive.

John Isenhower
P.O. Box 1101
Seaford, DE 19973

Editor's Note: *Got a solution for John's observation hive problem? Send in a short idea on a quick sketch and we'll see if we can't solve this.*

My First Swarm

Being a beekeeper with years of experience (three years total), I am quite sure that I know just about everything there is to know about beekeeping! Especially after reading all the books and *Bee Culture* magazine all these years. Why, I had help from the State Bee Inspector himself, Bill Sheppard of North Carolina, getting started in the bee business. He not only helped me care for my bees, he taught me how to make the hives. Don't call him Mr. Sheppard though; that is a title reserved for his father. Well Mr. Sheppard, thank you and may God bless you in your upcoming retirement. You will be missed by your many friends.

Well, back to the story of my swarm. On Friday, April 13 I arrived home after a day of helping my good friend Bill Laythan (or maybe hindering would be more accurate). I stopped my old truck in the backyard where my newly constructed stock of nucs are located. Well, what do you know? There were five or six scout bees looking over my nucs. Being a master beekeeper, I immediately recognized what was going on since all of my bees were on pollination. These bees had to be from the neighbor's bees by the blueberry field across the road. With the help of my beloved companion Mary, who helps me without complaining (except for the hat and veil that I promised her would not mess up her hair) about the bee stings, we started looking for the swarm that I was sure was there, but to no avail.

Since I had a hard day watching Bill work and giving him all the advice I read about in Bee Culture about his missing bees, I became thirsty. After retrieving a cold drink from my fridge. I walked back outside and guess what? There was the largest swarm of bees that I had ever seen (actually the only swarm I had ever see) heading for my nucs. There had to be at least 20 frames! As it turned out there were only four. I then lifted up the nuc, put a bottom board under it, another hive body of foundation and a top. I had successfully captured my first swarm!

I proceeded to sit nearby and watch what God had sent me. Well, he must have because three bees perched right on my hand that was holding my drink. I am sure they were telling me something.

Now, when my fellow beekeepers brag about the swarms they have caught, I have a story of my own. A story worthy of passing down to my grandchildren, I am sure.

Larry Smith
Cypress Creek, NC

Bee Awareness

"Honey Bee Restoration Saving the World Food Supply" has been submitted to the American Express "Members Projects." This is an American Express contest open to card holders to gain support for their favorite causes. This was submitted by beekeepers Jim and Wilda Dodder in conjunction with the project originator, John and Jennifer Dusek with Faber's Greenhouse and Floral. Being located near a big honey producer, Terry and Mary Klein, they have observed which plants attract honey bees, times of day they are active and which plants the bees favor. With this information they have formulated a plan to launch a "Honey bee trail" with these bee friendly plants across the nation.

What your magazine can do for the bees and this project is get the word out. The only draw back is you must be a member to submit a project and vote on them. But think where this might lead if this project gets publicized across the country. The project is being advertised nationally on prime time TV, but the submissions are not mentioned, just the contest.

The Wildrose

Mad Honey

Well, it happened to me. I had heard or read vague references to poison mountain laurel honey

– otherwise known as mad honey. I've been a sideline beekeeper about 15 years. I pulled a super from one of my five hives and extracted it and let drain and strain overnight. I had a taste of it the following morning – about a tablespoon – tasted bad. I thought, darn – a big batch of nasty tasting honey. A couple of minutes later I was intoxicated and was reeling and staggering around.

After this adventure later that day I found an article regarding "mad honey" on the internet. It is well documented that ingestion of pure (non diluted) mountain laurel honey is not good for you.

Our Spring here in north Georgia was not typical – a freeze over the Easter weekend blackened all of the emerging tree leaves and blooms. However, the mountain laurel did not suffer. In fact the resulting mountain laurel blooms were spectacular. The result was that normal tulip poplar and blackberry blooms were absent and the mountain laurel blooms were profuse. I typically do extracting in small batches to isolate a bloom source (such as sourwood) – this resulted in a pure batch of mad honey.

Gary Gabriel
Waleska, GA

Mandarin War, Again

Assembly Bill 771 (AB771) that seeks to impose severe restrictions on beekeepers' ability to earn a living is currently being considered in Sacramento but "anything passed will likely be so watered down as to be ineffective – or will be repealed (or watered down) as soon as legislators learn what they passed."

This whole situation could have been avoided if growers with the current problem varieties (those that set seeds in the presence of bees) had exerted due caution before planting these varieties. It was well known that bees caused seeds in these varieties in both Spain and Morocco and growers were warned to isolate the varieties from other citrus pollen sources. Two large growers ignored these warning signs and did not sufficiently isolate their plantings, not from bees, but from other pollen sources. Smaller growers followed suit, likely figuring "these guys must know what they're doing." There has been a "planting panic" of these problem varieties in recent years by growers that ignored the warning signs.

When seeds were first found in the initial plantings in the Maricopa area (southwestern Kern county) the large growers were surprised and initiated a campaign to cleanse the area of bees. This campaign was successful and bees were relocated to California's citrus belt – the east side of the San Joaquin Valley from Bakersfield to Madera. There was some grumbling on the part of beekeepers but by and large the relocation was amicably done. Now, growers of problem varieties want bees cleared within two miles of their citrus belt holdings but there is a vast difference between the approximately 10,000 acres of citrus in the Maricopa area and the approx. 250,000 acres in the citrus belt. Clearing the citrus belt (or a good portion of the citrus belt) of bees would represent the Final Solution for California's bee industry.

A few prescient beekeepers cried "appeasement" when beekeepers moved out of the Maricopa area. Appeasement can embolden those appeased. Some have made the analogy to Hitler's territorial march through Europe, but lets not go there (unless I just did).

Smaller mandarin growers, having been encouraged to plant problem varieties, are now being encouraged to support the likely illegal provisions of AB771. Some may follow the leaders, lemming-like, over the cliff; others may take to heart the adage "fool me once, shame on you, fool me twice, shame on me."

Beekeepers have been taken to task by some in the citrus industry for refusing to cooperate or compromise on a workable solution to the problem. Beekeepers and citrus growers have lived amicably under one roof for years. Some citrus growers have brought a snake into the house and are now asking beekeepers to move out of the house. Such "cooperation" would be the death of California beekeeping as it exists today.

Fortunately, there are solutions to the current impasse. The unfairly maligned Satsuma mandarin has been around for years and is seedless in the presence of bees and pollen. In a side-by-side comparism, Satsumas came out ahead of Clementine mandarins in both ease of peeling and flavor (test done on my kitchen table; try it yourself). Here's an idea: banish the name "Satsuma" and replace it with "Cutie" and back it with all the promotional efforts that have gone into marketing "Cuties." Top-working represents another solution. Top-working of trees and vines is done by nectarine, peach, plum and grape growers all the time as new, improved varieties come on line. New mandarin varieties that

are seedless in the presence of bees (and pollen) are coming on line.

Relocating 300,000 bee colonies from California's citrus belt or concentrating them in smaller and smaller areas (in concentration camps) is impractical, unwise and likely impossible – it ain't gonna happen. Twenty years from now, when all mandarin varieties in California will be seedless in the presence of bees, the current imbroglio will be viewed as a brief but unpleasant chapter in the long history of cordial relations between beekeepers and citrus growers; and among citrus growers that supported the ill-conceived AB771 there will likely be a Mutual consensus: "What were we thinking?"

Joe Traynor, Mgr. Scientific Ag Co.
Bakersfield, CA

INNER COVER

The management activity this month is to get rid of all the bad things that are in your colonies now and to get all the good things your bees need into your colonies. Late Summer bees need to be healthy so they raise absolutely healthy Fall bees, so they, too are healthy and raise absolutely perfect overwintering bees. And you absolutely need perfect overwintering bees so they live long and prosper... and raise strong, healthy early Spring bees. You've heard it here again and again and again – take care of the bees that take care of the bees that go into Winter.

Mite Control. If you've been on top of things this past Summer you don't have many mites to begin with because your mite resistant stock has done what it's supposed to do. But if you aren't using Russian, hygienic, survivor, or homegrown stock, and drone comb removal, powdered sugar, queen confinement, or making splits hasn't removed all or nearly all of these nasty eight-legged demons (and you know because you've been measuring with sticky boards or powdered sugar shake, right?), you'll have to resort to stronger, meaner and nastier tricks to clean house.

If you treat, of course, use the most effective, least toxic material you can that causes the least stress, and, most importantly, you can put on at the right time. Late Fall is, usually, far too late to be effective. Formic and the essential oils in all their forms fill that bill as long as the honey is off. And they're legal. If you use any of these be sure to do a before and after count to make sure you did get control and your bees will do well this Fall, this Winter...and especially next Spring.

Food. Randy Oliver's article on food and feeding covers that fundamental perfectly. Why you should feed, what you should feed, how to feed it, and what to expect. This article and those he's published elsewhere are the best Extension Bulletins I've seen – good science explained to those who can use it. Basically, you need to make certain that your colonies have enough of the right stuff in the right place at the right time. Enough said.

Queens. Requeen now with one of those you've been raising, or one from a local producer, or one from an outfit that's producing stock that's tough on mites, but fits in your program and location.

Good food along with good bees that are healthy – if you have that you won't have to rely on good luck hardly at all to make it through the Winter and have a really great Spring.

•

Speaking of queens, this has been the season of discontent and queenlessness in our apiary.

Two overwintered and one is doing fine. The other came through but went queenless in April. It was requeened, she was rejected, and the colony joined to the healthy survivor. (That's one).

Four packages. Four queens released after seven patient days. And four queens gone after fifteen. (That's four more). Two left to requeen themselves, two requeened the hard way. The two left to their own devices never did though both had and then lost queen cells by the score. The two requeened rejected those within a week, even after a careful six-day introduction. (That's two more, or is it four?).

This year there won't be any black ink in the ledger. No wonder frustration rules and beekeepers have as many stress disorders as their bees.

•

As we put this issue to bed an Action Plan to study Colony Collapse Disorder (CCD) is about to be unveiled. I don't know enough about the policy and procedures of this to let you know much more than that at the moment. But funding is moving through the system, probably to be a farm bill add-on, which, if you follow these things, promises to be more of the same, or much different and much less, depending on which side you listen to and who, ultimately, has enough votes.

For the very latest news check out our web page, **www.BeeCulture.com** and click on the CCD Link, and be sure to sign up for CATCH THE BUZZ. Everything's on both the minute it comes out. Don't be a month waiting to find out....check it out today!

•

Food from China is suspect. We knew that months, even years ago when imported Chinese honey was found loaded with contaminants.

"Don't say anything", pleaded the packers, "we don't want to scare people away!" So not much was said outside of our little world.

Now, everybody is screaming about all kinds of bad Chinese food, but honey packers, believe it or not are still telling everybody to be quiet for the very same reasons. But some U.S. producers tell me, they've added a twist.

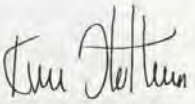
"You spread the word about cheap, contaminated Chinese honey and we'll start talking about the problems we're having with expensive U.S. honey," a few packers have said out loud. Some U.S. honey has been found with problems".

Interestingly, the response from beekeepers has been, "Go ahead, we can live on pollination. What will you do then, with no U.S. honey, and no Chinese honey?"

Yes, what will they do, where will they go?

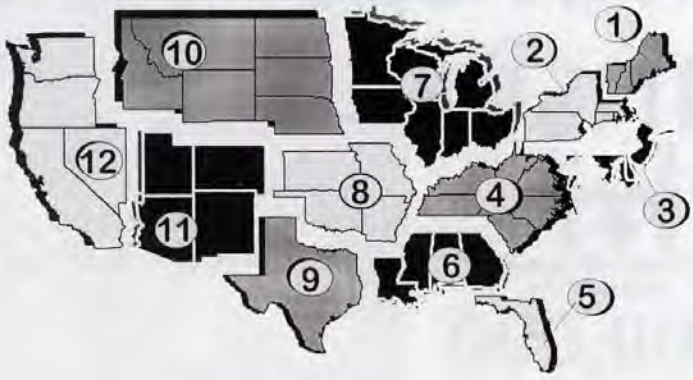
The answer, of course, is to buy pure, natural U. S. honey that's been tested and finally, finally, quit that imported stuff.

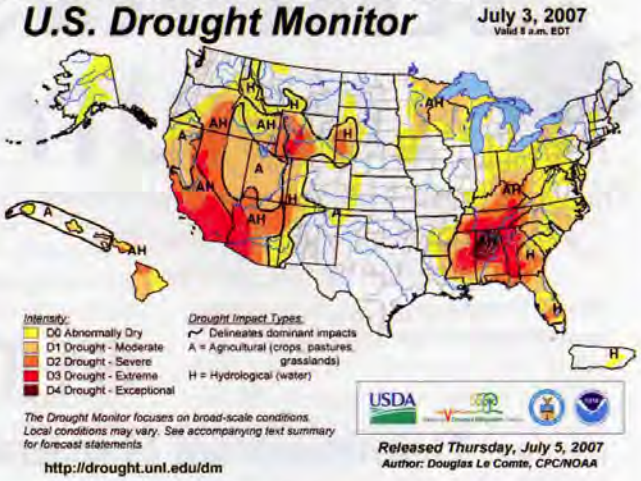
Any bets?



Take Care
Of The Bees

AUGUST – REGIONAL HONEY PRICE REPORT





So how's things? We checked our reporters for their regions' conditions:

Drought – 1 = No trouble to 4= Too dry.

Spring Weather – 1= Warm and wet to 5 = Cold and dry.

Summer Buildup – 1 = Too cool, good moisture to 8 = Too warm, but dry.

Honey Crop So Far – 1 = Way below average to 6 = Way above average.

Prices This Season – 1 = Down for everything to 5 = Up for everything.

Next Season – 1 = Will run fewer colonies to 3 = Will run more.

Scores are averages of all reporters in a region, so scores will be somewhere between lowest and highest. For instance, for Region 1, the drought score is 1.2, or just barely above (or worse) than No Trouble. A score of 3.7 would have been very close to Too Dry.

Region	1-4 Drought	1-5 Spring Weather	1-6 Spring Buildup	1-8 Summer Buildup	1-6 Honey Crop	1-5 Pricing	1-3 Next Year
1	1.2	4.0	2.7	4.3	3.0	3.8	2.2
2	1.5	3.5	3.0	4.0	2.3	3.8	2.5
3	2.3	3.3	3.5	6.4	3.3	4.0	2.3
4	3.3	3.4	3.6	4.9	2.1	3.8	2.2
5	2.9	2.0	5.1	8.0	3.1	4.8	3.1
6	1.7	3.1	2.4	6.1	2.7	3.7	2.9
7	2.3	3.1	2.9	5.0	3.3	4.3	2.5
8	1.7	3.2	2.7	6.0	2.3	4.2	2.3
9	1.0	2.4	2.8	4.4	2.2	3.2	2.4
10	2.0	3.3	4.3	2.0	2.0	3.3	3.0
11	1.5	2.9	2.4	4.5	3.2	3.1	2.3
12	2.1	2.9	2.7	5.9	4.1	4.1	2.1

Analysis

The Drought – (#1) seems to not be too much of a problem in most places for bees (see the drought map). Values go from 1.0 - 3.3 – No trouble to it better rain soon.

Spring Weather – 1 - warm and wet, to 5, cold and dry mostly in the 3s, OK to cold and wet.

Colony Buildup – Seems about average to pretty good this Spring, but weather played a role in slowing them a bit.

Summer Buildup – About right, but wet weather and dry weather seem to be problems.

Honey Crop – So far is below average pretty much everywhere.

Pricing – Is going up, everywhere. About time.

And finally, next year, beekeepers everywhere will be increasing. From some to lots, but the direction is going in the right direction!

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.02	1.35	1.02	1.18	0.82	0.75	1.05	1.02	1.02	0.95	1.10	1.20	0.75-1.35	1.04	1.08	1.02
55 Gal. Drum, Ambr	0.99	1.00	0.99	1.19	0.73	0.95	0.91	1.10	0.81	0.99	1.10	1.20	0.73-1.20	1.00	0.97	0.94
60# Light (retail)	110.00	115.50	120.00	106.88	110.00	113.33	107.00	105.16	121.62	121.62	144.67	138.50	105.16-144.67	117.86	117.32	105.91
60# Amber (retail)	110.00	105.00	120.00	106.83	110.00	103.33	103.60	110.00	100.00	114.52	145.00	134.67	100.00-145.00	113.58	113.82	101.05
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	47.52	49.95	40.80	42.62	61.92	43.25	41.28	61.92	61.92	45.50	40.20	86.00	40.20-86.00	51.91	48.47	38.29
1# 24/case	62.33	63.03	67.20	69.49	60.00	66.27	70.96	63.20	51.25	77.76	75.25	93.90	51.25-93.90	68.39	71.65	65.80
2# 12/case	70.92	61.08	61.80	55.33	54.00	56.93	66.00	69.00	53.50	57.84	60.00	78.55	53.50-78.55	62.08	59.99	55.13
12.oz. Plas. 24/cs	58.56	58.23	49.80	61.71	48.00	52.20	64.23	49.56	48.00	47.28	58.49	62.67	47.28-64.23	54.89	57.64	49.84
5# 6/case	66.75	65.98	71.25	59.20	68.72	65.00	69.18	70.00	54.60	61.86	62.00	86.67	54.60-86.67	66.77	71.30	59.18
Quarts 12/case	88.19	100.35	66.00	87.31	78.00	75.67	88.92	77.06	88.19	101.20	87.97	99.25	66.00-101.20	86.51	89.51	85.60
Pints 12/case	68.04	49.95	112.20	62.20	58.00	45.00	59.40	54.29	68.04	60.00	56.00	63.00	45.00-112.20	63.01	55.35	53.90
RETAIL SHELF PRICES																
1/2#	2.88	2.52	3.64	3.09	3.86	2.50	2.57	2.04	2.79	3.86	2.86	5.25	2.04-5.25	3.15	3.04	2.51
12 oz. Plastic	3.50	3.33	2.75	3.37	2.99	3.30	3.21	3.31	3.35	2.99	3.54	4.25	2.75-4.25	3.32	3.28	3.17
1# Glass/Plastic	3.80	3.74	4.76	4.33	4.00	4.09	3.67	4.06	4.15	4.50	3.83	6.00	3.67-6.00	4.24	4.06	3.91
2# Glass/Plastic	7.58	6.80	6.80	6.31	6.50	6.53	6.45	7.25	6.65	6.62	6.91	10.83	6.31-10.83	7.10	6.74	6.49
Pint	9.08	7.38	6.50	5.79	5.50	5.55	6.19	5.22	6.25	6.50	5.49	11.58	5.22-11.58	6.75	6.34	5.90
Quart	12.41	8.98	11.00	8.86	7.50	9.33	8.86	8.87	11.00	12.00	9.39	16.41	7.50-16.41	10.38	10.37	10.17
5# Glass/Plastic	15.83	13.95	15.09	13.73	14.70	12.99	14.36	17.00	12.69	14.68	13.46	18.50	12.69-18.50	14.75	14.82	13.66
1# Cream	4.75	5.37	6.69	4.74	5.91	3.50	5.81	3.65	5.91	5.78	4.76	6.75	3.50-6.75	5.30	5.43	4.98
1# Cut Comb	5.00	4.96	5.19	4.18	7.19	5.13	7.35	4.95	7.19	7.00	22.00	7.00	4.18-22.00	7.26	5.96	5.98
Ross Round	6.68	3.97	4.97	5.00	6.68	6.68	5.38	5.00	6.68	6.68	5.98	8.50	3.97-8.50	6.02	5.66	5.40
Wholesale Wax (Lt)	2.25	2.15	2.00	2.10	1.90	2.60	2.12	2.50	2.95	2.75	2.37	2.65	1.90-2.95	2.36	2.34	2.45
Wholesale Wax (Dk)	1.88	1.85	1.80	1.98	1.70	2.50	2.05	2.36	2.75	2.75	2.01	2.16	1.70-2.75	2.15	1.84	2.14
Pollination Fee/Col.	62.50	91.00	57.50	37.20	42.00	27.50	47.00	55.00	76.87	76.87	75.00	95.00	27.50-95.00	61.95	64.46	52.09

RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

"Queen Mating and Sperm Numbers"

Honey bee queens face severe limitations related to their access to males in the context of insemination. That is, only early in their adult life do they take "nuptial flights" to receive (with the assistance of multiple male partners) a supply of sperm to be stored in a special organ known as a spermatheca. To provide a bit of biological background – the semen from the drones are initially deposited within the oviduct of the queen and, from there, only a small percentage of the sperm actually migrates into the spermatheca within about 24 hours. Honey bee queens live a long time relative to other individuals in the colony and the sperm held within their spermatheca also remain viable throughout the reproductive life of the queen.

Given that mated queens sometimes "run out" of sperm during their lifetime (often seen by us as a normal laying queen that becomes a drone layer), it is clear that the number of sperm received and stored by the queen is a critical factor for the overall fitness of her colony. But what about the role of individual males in contributing to this pool of stored semen? Previous work has suggested that there is no advantage related to "mating order" among the seven to 20 or so drones that mate with the queen. That is – there seems to be no measurable difference in the utilization of sperm from males that mate early in the nuptial flight compared to those that mate with the queen later. However, until recently there was little information on the importance of sperm numbers or volume in mating success.

A team of German researchers recently published the results of their experiments to simultaneously evaluate the question of the importance of sperm number and mating order in honey bees (Schluns et al. 2004). In the experimental design, they employed instrumental insemination techniques to inseminate eight virgin queens with precise amounts of semen from either six or seven males. For one queen – they inseminated her with 1.0 microliter (ul) of semen from a single drone and 0.5 ul of semen from six other drones (a microliter is one millionth of a liter). For the remaining seven queens, they inseminated each with semen taken from six drones, four that contributed 0.5 ul volume of semen and two that contributed 1.0 ul of semen. The insemination sequence of the two drones contributing 1.0 ul of semen was randomized. Therefore, all the queens received a total of four ul of semen. The researchers used a set of genetic markers to precisely determine the male parent of about 90 daughter workers sampled from each queen 32 days after the insemination. Overall, the researchers identified the male parents of 745 honey bee worker pupae. The results were scored as the percentage of workers fathered by each male (patriline). The researchers found that semen volume had a "significant influence on the patriline frequency." That is, when a double volume of semen (1.0 ul) was used from a particular male, progeny from that male was over represented in the offspring produced by the queen compared to the males contributing a single volume (0.5 ul). As had been reported from previous studies, they found there was no significant impact of mating order of the insemination sequence (early or late) on usage of sperm.

The researchers pointed out that with natural matings, a queen receives about three times the semen volume as they used in the experimental set up. However, the lower number of drones used in the study allowed them to more easily screen the resulting offspring for paternity analysis. In their discussion, they also noted that under natural mating conditions, only 3% to 5% of the sperm from any individual drone actually reaches the spermatheca of the queen. They concluded that, given the competition that sperm faces en route to finding a place in the spermatheca of the queen, there likely was strong evolutionary selection pressure in honey bees for males to maximize sperm numbers/volume. They contrasted this to a presumed lack of such pressure in some other bee species, such as certain bumblebees, that have single matings. Such species would exhibit no "competition" among sperm from different males within the female reproductive track. Consequently, while bumble bee males are of similar size to honey bees, they produce only about 10% of the sperm volume of drone honey bees.

A relatively safe observation to make is that beekeepers who are involved with their bees are willing to spend the time and effort needed to increase their knowledge of honey bee biology. While the immediate applications of the research of Schlüns

et al 2004 to queen production may not seem apparent, understanding what constitutes adequate mating parameters and the possible implication for management actions should be. Thus, while we now know that individual drones are selected to produce a relatively large volume of semen, the very small amount that actually enters the spermatheca from each male serves to remind us of at least one particular management requirement for optimum queen production. This requirement? To produce a queen who will be the reproductive engine to power a healthy and long-lived colony, she must be mated with a large number of unrelated drones. While this may seem to be an obvious fact, the magnitude of the issue is clarified by this research, because it shows how unlikely the semen from any individual drone is to be used. Moreover, in a queen production operation where inbreeding is on the rise (for whatever reason) we can see that genetically similar semen from related drones (which have a higher probability of sharing sex-alleles) would gain increasing "representation" within the reproductive tracts of queens. The outcome would be the contribution of a disproportionate amount of those shared sex-alleles into successive generations (e.g. not a good thing).

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Malcolm T Sanford

What Would Langstroth Do?

"What's a beekeeper to do? Perhaps it's time to return to the basics and reread the classics like Langstroth to try to gain some perspective."

One of the icons of beekeeping history is the Rev. L.L. Langstroth. Known for designing the honey beehive that bears his name, Langstroth was a consumate observer. His reflections over the years are culminated in a series of books entitled: *The Hive and the Honey Bee.* The 1853 edition was called *Langstroth on the hive and the honey-bee: a bee keeper's manual.* The full text of this book is found online as part of the Cornell University's Mann Library E.F. Phillips Collection, also called "The Hive and the Honeybee."[1]

In that edition, Langstroth begins with the following: "The present condition of practical bee-keeping in this country, is known to be deplorably low. From the great mass of agriculturalists, and others favorably situated for obtaining honey, it receives not the slightest attention." A reason for this statement was his assessment of the state of beekeeper knowledge about hives in general, and how new and experienced practitioners appeared to be scorning his newly-patented model, which eventually was to become the one most beekeepers continue to use in today's modern beekeeping environment.

One wonders what Langstroth would think of today's beekeeping climate. Would he also refer to it as "deplorable." It's easy to conclude that he might, but for different reasons, considering the transformation of the activity over the last 20 years. Yes, 2007 is the 20th anniversary of the introduction of the Asian honey bee mite, *Varroa destructor.* Since then, beekeepers have seen their craft metamorphose from a let-alone, pesticide-free activity to one where only active treatment sometimes using some of the world's most toxic substances will keep their bees alive.

Now days *Varroa* control is almost an after thought as in quick succession honey bees and beekeepers have become victims of other exotic organisms such as the small hive beetle. If one adds viruses to the mix, along with effects of a raft of other pesticides in the honey bee's environment, conditions seem overwhelming for the modern practitioner. On top of that Colony Collapse Syndrome or CCD has appeared with resultant loss of beehives in many regions for no apparent reason. What's a beekeeper to do? Perhaps it's time to return to the basics and reread the classics like Langstroth to try to gain some perspective.

Reading Langstroth online is a bit tedious. The full book can be loaded onto a computer, but at least for this author, reading from a screen is not my preference. I also have some old versions of *The Hive and the Honey Bee,* but they are falling apart and are not a joy to prop up in bed with. Enter Dr. Roger Hoopingarner, Professor Emeritus, Michigan State University. His *The Hive and Honey Bee Revisited: An annotated updating of L.L. Langstroth's beekeeping classic,* published by Bee+ Books, Holt, MI (424 pp) is a welcome addition to my library.[2] It's a paper back and perfectly suited for the modern reader's environment. It's also a "two-for;" one gets two perspectives in one volume. First one from Langstroth himself, but then followed by additional remarks from a respected scientist, who began a 60-year apicultural career as a Boy Scout as a teenager.

In the Preface, Roger says he decided to use the third edition (1862, written in 1859) for a number or reasons, one being that it was authored by Langstroth himself. Later editions were penned by others including C.P. and M.G. Dadant. Both Roger and I contributed to the latest edition of *The Hive and The Honey Bee,* published by Dadant & Sons, Inc. in 1992. He concludes, "I know you will be surprised, as I was, when I re-read this edition just how much bee biology he (Langstroth) knew! Some of it he read from other sources, but much of it was from just good, keen observations. He did not have the equipment or the background we have today – in many ways that makes his discoveries that much more remarkable."

In Chapter I, the Movable-Comb Hive we read a similar introductory paragraph to the 1853 edition, but "deplorable" has been replaced by "depressed condition." Again, this is in response to beekeepers believing that "so called 'Improved Hives' are delusions or impostures; and that they must return to the simple box or hollow log, and 'take up' their bees with sulphur in the old-fashioned way." Roger reminds us that in those days beekeepers routinely killed half their colonies with sulfur fumes to extract the honey, leaving the other half to produce in the next season.

In the same section, there is a reprinting of a letter received from Samuel Wagoner about Dr. Jan Dzierzon who was the first person to declare that drones were haploid (resulting from unfertilized eggs). "In the year 1848, a fatal pestilence, known by the name of foul brood, prevailed among his bees, and destroyed nearly all his colonies before it could be subdued. Nevertheless, he succeeded so well in multiplying by artificial swarms, the few that remained healthy, that in the Fall of 1851, his stock consisted of nearly 400 colonies. He must therefore have multiplied his stocks more than three-fold each year." Roger states: "You have to wonder how many times bees may have been selected for resistance to disease. Then we forget about the problem until the resistance characteristics have been diluted to the point the disease strikes again. Or in recent years we have relied upon antibiotics to control the disease. In earlier times

the selection for resistance would have been one of the major roles of the beekeeper."

Besides the chapter on the Movable-Comb Bee-Hive, the book contains those on the following topics: The Honey-Bee capable of being tamed, The Queen, or Mother-Bee – The Drones – The Workers – Facts in the Natural History, Comb, Propolis, Pollen or "Bee Bread," Ventilation of the Bee-Hive, Requisites of a Complete Hive, Natural Swarming, and Hiving of Swarms, Artificial Swarming, Loss of the Queen, The Bee-Moth, and other Enemies of bees – Diseases of Bees, Robbing, and how Prevented, Directions for Feeding Bees, The Apiary – Procuring Bees to Stock it – Transferring Bees from Common to Moveable-Comb Hives, Honey, Bee Pasturage – Over-Stocking, The Anger of bees – Remedies for Their Stings, The Italian Honey Bee, Size, Shape and Materials for Hives, Observing-Hives, Wintering Bees, Bee-Keeper's Calendar – Bee-Keeper's Axioms.

In the natural history section, Langstroth writes, "As the breeding cells may eventually become too small for the proper development of the young, very old combs should be removed from the hive. It is a great mistake, however, to imagine that the brood-combs ought to be changed every year. If it were advisable, this might easily be done in my hives, but to remove them oftener than once in five or six years, requires a needless consumption of honey to replace them, and injures the bees in Winter, as the new comb is much colder than the old." Roger adds that "This argument has raged up until this day. There is little scientific data to support the notion the cells will become so small as to affect the size of the bee. However, the replacement of combs, as Langstroth suggests, about every five or six years is valid. Diseases and pesticides will build up in the old combs and can affect the development of the larvae. The old combs do not provide warmth but generally have pollen in the combs. The pollen is needed in the winter cluster to produce new young bees."

With reference to finishing hives, Langstroth says, "The smell of fresh paint is well known to be very injurious to human beings, and is so detested by bees, that they will often desert a new hive sooner than endure it. If the hives cannot be seasonably painted, paints should be used which contain no white lead, and which are mixed so as to dry as quickly as possible." Roger concludes that "Beekeepers still have a dilemma about paint, though most just use white paint as it is now considered 'traditional.' In the northern states a darker color would probably be more beneficial to the colony since the darker colors would attract more solar radiation. There may be a little period during mid summer when the colony may benefit from white paint. However, most of the time the hive would benefit from darker colors."

It is important to remember that both Langstroth and Roger have gained their experience in the temperate latitudes. There is little question that all beekeeping is local in the sense that place and geography (climate) play a huge role in how a colony can be effectively managed.

The race of bee used is also an important issue, again reflecting a specific geography, and Langstroth spends a good deal of time considering the Italian honey bee, *Apis mel-*

lifera ligustica Spinola in his book. Spinola is the official author of the subspecies or race (ecotype) and according to Roger spoke of these bees as "velociores motu" – quicker in their motions than common bees. A letter dated August 5, 1856, again from Samuel Wagoner, reflects on the bee's qualities, as reported to him by a Captain Baldenstein. "1. The queen, if healthy, retains proper fertility at least three or four years. 2. The Italian bee is more industrious, and the queen more prolific than the common kind; because in a most unfavorable year, when other colonies produced few swarms and little honey, his Italian colony produced three swarms, which filled their hives with comb, and, together with the parent stock laid up ample stores for Winter."

Dzierdzon was also a fan it seems and The Baron Von Berlepsech confirms this, according to Langstroth, stating: "1. That the Italian bees are less sensitive to cold than the common kind, 2. That their queens are more prolific. 3. That the colonies swarm earlier and more frequently...4. That they are less apt to sting."

The challenge of beekeepers at the time appears to have been keeping the Italian subspecies characteristics in the face of competition by the so-called common bee (probably *Apis mellifera mellifera*, the Dark or German bee). Thus, Langstroth spends much time discussing breeding techniques; "Just before the young Italian queens emerge, adjust the non-swarmer to all the hives containing common drones so as to *shut them in*, while free egress is given to queens and workers. As only the drones bred by the Italian queen have their liberty, all the young females will be fertilized by them." Roger adds "This idea was expanded by Dr. John Hogg of Augusta, Michigan in a technique he called after-hours mating. He kept his virgins and selected drones closed up until after the normal mating time before he released them. The advantage of this technique is that he avoided all other drones including all feral ones, and so had more 'pure' mating."

The biggest problem beekeepers had during Langstroth's time was the wax moth. To a great extent the development of the movable-frame hive helped beekeepers to manage the insect by keeping stronger colonies of bees that is the time-honored control for this pest insect. His maxim was "The careless will obtain a *'moth-proof'* hive only when the sluggard finds a *'weed-proof'* soil." Colonies did not have to suffer much due to wax moth to be a major problem as many beekeepers produced comb honey at that time and the very small larvae, according to Roger, although removed effectively by the bees, often ruined the face of the comb. This can now be effectively controlled by quickly freezing sections harvested from the bees before the larvae hatch. He also adds that the idea prevalent in Langstroth's day that wax moth larvae cannot live by wax alone, but must get other nutrients from the skins of caste larvae in brood combs was correct. Thus, he concludes "combs of an old stock are more likely to be devoured than those of a new one."

Something that is not often emphasized in books on bee management is the importance of the beekeeping calendar. Langstroth provides a detailed one in his volume, concluding: "I recommend to the inexperienced beekeeper to read this synopsis of monthly management, again and again, and to be sure that he fully understands and punctually discharges the appropriate duties of each month, neglecting nothing and procrastinating nothing to a more convenient season; for, while bees do not require a large amount of attention, in proportion to the profits yielded by them, they *must* have it at the *proper time* and in the *right way*."

And returning to the question of what would Langstroth do, given the conditions modern beekeepers must work under, his axioms, published over 150 years ago are just as relevant, today as ever:

1st. Bees gorged with honey never volunteer an attack.

2nd Bees may always be made peaceable by inducing them to accept liquid sweets.

3rd Bees, when frightened by smoke,..fill themselves with honey and lose all disposition to sting.

4th Bees dislike any *quick* movements about their hives.

5th Bees dislike offensive odor of sweaty animals.

6th The beekeeper will ordinarily derive all his profits from stocks, strong and healthy, in early Spring.

7th In districts where forage is abundant only for a short period, the largest yield of honey will be secured by a *very* moderate increase of stocks.

8th A moderate increase of colonies in any one season, will, in the long run, prove to be the easiest, safest, and cheapest mode of managing bees.

9th Queenless colonies, unless supplied with a queen, will inevitably dwindle away, or be destroyed by the bee-moth, or by robber bees.

10th The essence of all profitable bee-keeping in contained in Oettl's Golden Rule: KEEP YOUR STOCKS STRONG. "If you cannot succeed in doing this, the more money you invest in bees, the heavier will be your losses; while, if your stocks are strong, you will show that you are a *bee-master*, as well as a bee-keeper, and may safely calculate on generous returns from your industrious subjects." BC

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The SKINNY And The FAT On Honey Bee Nutrition

Randy Oliver

Colonies that eat well perform well, for pollination, honey production or wintering.

Whether you're going to pollination, trying to make a honey crop, or just trying to get your bees through Winter, how they're fed makes all the difference in the world! To get the most bang from your feeding buck, it pays to understand the dynamics of protein utilization within the colony.

What's all the hoopla about feeding bees, you may ask. For the hobbyist, the point may be moot. A few colonies in a good location will likely never need any help with feeding. Unfortunately, what with urban development, agricultural monoculture, excessive herbicide use, as well as drought conditions in portions of the country, your bees may not always get enough nutrition on their own.

The real problem becomes evident as your operation grows, and you start unnaturally crowding a number of colonies into one beeyard. Just like cattle on pasture, the flora within the flight range of the colony can only support a certain number of bees before they start seriously competing for resources. This is especially true if you have neighboring beekeepers or large numbers of feral colonies in the vicinity. Natural colony densities of European honey bees range from one to 12 colonies per square mile. However, even at this density about half of all feral colonies starve to death or otherwise die each Winter. How many colonies are in the square mile surrounding your beeyard(s)?

I'm using the square mile figure, since a colony does most of its foraging within a half mile. It is able to forage much further afield if necessary, but at considerable economic cost. When resources are meager, stronger colonies are able to forage more effectively than weak ones – in fact, nucleus colonies can be starving in the same yard that strong colonies are drawing white comb. That's why giant two-queen colonies can still make honey during a drought (these same strong colonies can also rob a weak colony clean if given the chance).

The urban hobbyist, surprisingly, often has advantages over the rural beekeeper, especially in dry Summer areas. The irrigated landscapes and lawns provide a continuous bloom of (often exotic) plants. In California, many of us seek the edges of towns for beeyards, since wildlands generally dry up completely by July.

So one way to give your bees a chance is to simply not crowd them. Easy to say if you only keep a few colonies! But what if you run hundreds or thousands? Many commercial beekeepers migrate to better pasture, just like cowboys moving their herds. This may be the cheapest way to feed bees if there's good pasture not too far away – the price of fuel and labor may be less than the supplemental feed and labor would cost if you left them at home.

On the far extreme is "feedlot" beekeeping, in which the beekeeper supplies the feed to the bees. In California just before almond bloom there are holding yards with up to 5000 colonies sitting in one place! There may only be enough natural forage available for a few colonies at that time, so the other 4995 just beat each other up trying to steal from each other! Once the colonies are distributed to the orchards, we can observe the limits of carrying capacity of even the incredibly dense almond bloom – solid white as far as you can see. Stocked at two colonies per acre, bees will strip every last pollen grain from the almond flowers before noon each day. If stocked at three to four colonies per acre, the colonies may not even gain weight during bloom!

So what's the problem with bees going a little hungry, they've got honey stores, don't they? It turns out that it is a big problem. A little hunger during the months before the honeyflow will result in smaller colony populations and short-lived foragers, and thereby a greatly diminished honey crop. ***Low colony protein levels at any time can result in greatly increased disease incidence and increased susceptibility to mites. If this happens in the late Summer and Fall it could leave you with short-lived Winter bees, poor Winter survival, and slow Spring buildup.***

A day's trapping of mixed pollens. A mixture of pollens generally provides the best nutrition.

Bee nutrition depends upon two essentials – nectar and pollen. Nectar is simply a sugar source for energy, and the bees convert it to honey for storage for lean times. It is also the raw material from which they synthesize beeswax. Pollen provides them with the real nutrition – protein, fats, sterols, vitamins, minerals, and trace elements. Pollen is essential for brood rearing and disease resistance. Any time that colonies are light in weight, or lacking a ring of pollen around the brood, you can assume that they are in a state of nutritional stress. A major part of bee husbandry is to alleviate that stress if possible.

The grower plants mustard in this prune orchard so that beekeepers will pollinate for free. The combination of plum and mustard pollen is very nutritious!

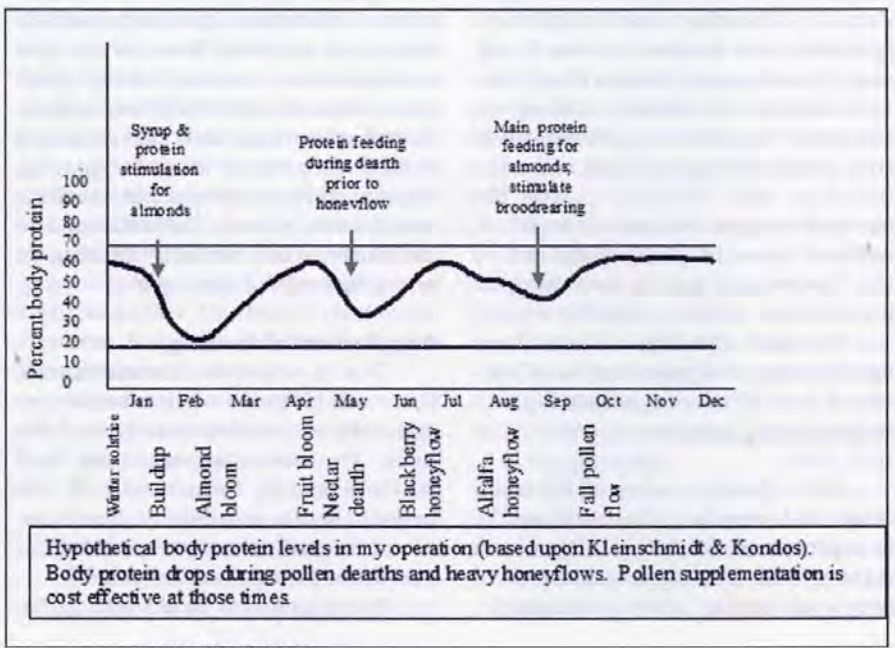
Vitellogenin

You can easily heft your colonies to judge the amount of honey stores, and watch the entrances for pollen loads, but that is only part of the story. Yes, colonies store food in the combs, but ***what is really important is what the bees have stored inside their bodies***.

Bees convert food into body fat, and especially into a protein-rich molecule called vitellogenin. Vitellogenin is used by other animals as an egg yolk protein precursor, but bees have made it much more important in their physiology and behavior, using it additionally as a protein storage reservoir in their bodies; to synthesize royal jelly; as an immune system component; as a "fountain of youth" to prolong queen and "Winter bee" lifespan; as well as functioning as a hormone that affects future foraging behavior!

Here's how it works: recently-emerged female honey bees eat all the pollen they can from stores around the brood nest. Then, instead of producing eggs, they produce and store vitellogenin in their "fat bodies," where it assists in metabolism and protein synthesis, and in their heads, where it concentrates in their glands to produce royal jelly. Recent research shows that vitellogenin also boosts the bees' immune systems and acts as an antioxidant scavenger of "free radicals" to prolong the life of the queen and "Winter" bees. Once the bees age enough to become foragers, they deplete their remaining vitellogenin by feeding jelly back to larvae or other bees. This strategy conserves protein within the colony, but to the detriment of the now expendable foragers. Their low vitellogenin levels now mean that they give up the (metabolically expensive) life-extending and immunological properties conferred by vitellogenin in return for greater foraging efficiency (other short-lived animals often make this tradeoff).

Hang on, vitellogenin is not done yet! According to recent research by Nelson, et al., the vitellogenin level developed in workers' bodies in the first four days after emergence predisposes them for subsequent foraging behavior. Young bees well fed with pollen develop high vitellogenin titers, begin foraging relatively later in life, tend to collect more pollen, and have a longer lifespan. Low vitellogenin bees, however, start foraging earlier, preferentially collect nectar, and die younger. This is a beautiful example of a feedback loop that regulates colony behavior! Well-fed young bees raise more brood to build up the colony population; starved young bees leave home early and start looking for nectar to restock the colony's larder. An interesting side note is that Africanized bees tend to have lower vitellogenin levels – which may help explain their frentic lifestyle and poor wintering.



Hypothetical body protein levels in my operation (based upon Kleinschmidt & Kondos). Body protein drops during pollen dearths and heavy honeyflows. Pollen supplementation is cost effective at those times.

So what does this mean to the beekeeper? There are key times when you want to make sure that your bees develop plenty of fat bodies and vitellogenin:

1. Any time you want to build up colony populations
2. Prior to a honeyflow, to ensure maximum production
3. In the late Summer and Fall, when the generation of "Winter" bees is being raised and emerging
4. Any time that the bees are stressed by mites, disease, or poor weather.

Dr. Graham Kleinschmidt from Australia has studied colony protein levels extensively, due to the unusual multiple honeyflows experienced there, and the often poor quality of native pollens. Surprisingly, he found that colony protein levels drop during a heavy honeyflow, even when pollen is being stored! He suggests that beekeepers manage their colonies to recover protein reserves between honeyflows.

With regard for preparation for almond pollination, the above point should be taken into consideration. Since almonds bloom during the Winter, it is critical for the colony to enter Winter with a population of young, well-fed "fat" Winter bees. By fat, I mean having well developed fat bodies and vitellogenin reserves. The "skinny" field force of the late Summer will largely die of attrition during the Winter, leaving only the "fat" bees who haven't previously raised brood to get the brood buildup rolling in January. After they raise brood, these bees will then become the first foragers in the almonds. Unless those winter bees had substantial vitellogenin reserves, they will die quickly when they begin foraging once almonds bloom in mid February – thus the commonly observed colony crash at almond bloom. It is critical to ensure that colonies headed for almonds have ample pollen available during the time that the future Winter bees are emerging in September and October. If they don't you definitely want to feed them a pollen supplement at that time!

When the bees come off the main Summer honeyflow, they may well be in a protein-deficient condition, and recovery will take some weeks unless plenty of quality pollen is available. Unless there is a good Fall pollen flow, they may go into winter with low vitellogenin levels. This happens every year in California, and occurred last year in the Midwest due to drought. As far as the timing for protein feeding, research by Drs. Eric Mussen and Christine Peng demonstrated that feeding pollen supplements in late Summer gave more bang for the buck than in Winter prior to almond bloom. Dr. Mussen has been pointing out for years that bees going into Fall with substantial high-quality pollen reserves and plenty of honey stores make premium colonies in the almonds.

I've found that January feeding of pollen supplement to weak colonies wasn't worth the cost. Better to feed it to the ***strongest*** colonies, and then steal bees and brood from them to boost the weaker colonies just before bloom. Strong colonies with plenty of honey do not appear to require syrup stimulation to utilize the pollen supplement.

Good nutrition is the best disease preventative there is.

Varroa mite feeding really suppresses the honey bee immune system. High vitellogenin levels boost it. ***Low protein bees are immunologically stressed – good nutrition is the best preventative for bee diseases!*** Bees can tolerate nosema infections much better if well fed. Nothing provides better nutrition than a good pollen/nectar flow from a ***mixture*** of plants (especially European natives). Some of the best sources are the rose family (fruit trees, almond, blackberries), willow, clover, plantain, and the mustard family (mustard, radish, turnip, canola). Some authors also include sweet corn pollen. Dandelions and sunflowers are notably lacking in some essential amino acids.

Supplemental feeding

Due to whatever circumstances, there will be times when a beekeeper will wish to supplementally feed his bees. The hobbyist may only feed while drawing foundation in the broodnest of a new colony. The commercial operator may run a feedlot operation at times of the year.

There are two basic feedstuffs: sugar and protein. Sugar can be fed as a light syrup simulating nectar in order to stimulate egg egglaying or drawing of comb, or as a heavy syrup (or even solid granulated or candy) to take the place of honey for Winter stores. Pollen supplements provide protein when quality natural pollen is lacking.

Sugar syrup

Feeding syrup is widely discussed in most bee books, and I don't wish to be redundant, nor do I consider myself to be an expert. I am not a big syrup feeder myself – I generally move my bees to better pasture. I have friends who feed more syrup in a month than I'll see in a lifetime! Anyway, here are the basics:

1. Feed 50% sugar syrup (1:1) for stimulation – higher concentrations do not have the same stimulatory effect. In hot or dry weather, you can feed 33% sugar (one part sugar to two parts water).
2. For Winter honey stores, feed 2:1 sugar syrup – 30 lbs of sugar to two gallons of water is close.
3. General notes about feeding light syrup: Feeding 50% syrup will get the queen laying, but don't stimulate her unless there is adequate pollen, otherwise the bees will have to "steal" protein from their bodies in order to raise brood. Note that in the absence of adequate stores or stimulation, the queen may lay eggs, but the nurse bees will eat them! With experience, you may find feeding light syrup useful to help with queen introduction, or to improve colony "morale." Feeding light syrup frees the bees from the need to forage for sugar, and allows them to concentrate their efforts on pollen collection, expanding the broodnest, and wax production.
4. Bees prefer sucrose to high fructose corn syrup (HFCS) in most cases. They take it more readily, Winter better on it, and build better on it. However, HFCS is cheaper, and is successfully used by many commercial beekeepers. Some use 50:50 sucrose: fructose mix. If you purchase HFCS, it should be clear, and taste sweet, with no off flavors. Darkened or off-flavor syrup can cause serious problems in the hives. Use

only white granulated table sugar for sucrose solutions – raw sugars or other types of sugar can cause serious digestive problems in the bees.

5. A tip for small batches: white granulated sugar and water weigh just about the same by volume, so 1:1 syrup can be easily measured either way (one qt sugar to one qt water will make 1-2/3 qt syrup). Don't sweat the exact proportions!
6. Thin sucrose syrup will ferment rapidly in warm weather. ***Do not feed syrup that you wouldn't drink yourself!*** Some beekeepers retard this process by using one cup of household bleach per 55 gal drum. I cannot find documentation for use of the common food preservatives potassium sorbate or sodium propionate in bee syrup, but I will be testing them myself this season.
7. When the risk of robbing is high, minimize problems by filling feeders late in the day.
8. Feeding sugar syrup stimulates flight activity. This can be a problem during adverse weather.
9. Every beekeeper has his favorite feeders – from three gallon pails, one gallon cans, plastic bags, jars, Miller type top feeders, inside feeders (Motherlode Plastics makes an especially nice one), to Boardman entrance feeders. I've tried them all, and then some. Each has its advantages and drawbacks. Boardman feeders have more of the latter!
10. For the hobbyist: **make a dedicated feeder lid out of a 16¼ x 20" scrap of plywood** to temporarily take the place of your regular hive cover. Drill or saw a 1" – 2" hole in the center. Use an inverted quart jar with a few small holes punched in the lid to feed – cluster the holes in the center to avoid wicking. Clear jars allow you to see the syrup level easily. Reduce the hive entrance to avoid robbing. Feed to the extent that the bees are producing fresh "white wax," but do not overfeed colonies to the point that there is no room for broodrearing! About a quart of syrup a day is generally sufficient for stimulation.

Pollen supplements

Pollen is the real "meat" of feeding – the source of protein. You can trap your own natural pollen during surpluses for feeding back later, or purchase commercial pellets or "bee feed" cleanings. All pollen should be stored frozen if possible to maintain its nutritional quality – it degrades within a year at room temperature (and in a few years even if frozen). You may wish to try fermenting "beebread" – **http://www.fao.org/docrep/w0076e/w0076e11.htm**. All purchased pollen should be irradiated or ETO treated to kill disease spores (chalkbrood is notably spread by trapped pollen). Most commercial pollen comes from China, along with the associated pesticide questions (imidacloprid is widely used there).

Many beekeepers stretch natural pollen with a supplement. Most formulations involve soy or yeast as the main protein source, with other ingredients to balance the nutrition (the product Wheast was very successful, but is no longer available). Common ingredients include soy flour (toasted, fine ground, some fat), brewers yeast, low salt torula yeast, lactalbumen, skim milk, rice bran (pollard), vegetable oil, vitamins, and minerals. This is a chance for every beekeeper to indulge in the fantasy of being a kitchen alchemist. Some recipes probably do more to make the beekeeper proud than to actually help the bees.

You can purchase commercial pollen supplements from the major bee suppliers. At this writing, I can't say that there are any true pollen *substitutes* on the market. Many ingredients and formulas have been tested and tried, but some secret has eluded us. We still just can't match natural pollen (although some formulas appear to have come close). I do not wish to raise the ire of any proprietary product, so I won't mention any names. The commercial products are generally improved by the addition of natural pollen. I've heard (and experienced) favorable and unfavorable things about them all.

If you wish to experiment and mix your own pollen supplement, here are some guidelines:

1. The best level of protein (dry weight, including sugar) is generally recommended at about 25%. Formulations over 50% protein may cause elimination problems.
2. Generally, try to add about 10% natural pollen to any formula. This amount will encourage the bees to eat the mixture, and provides unknown necessary factors.
3. Bees generally like their patties sweet! About 50% sugar, dry weight.
4. Bees prefer sucrose over other sugars, but sucrose patties can harden like a rock if not fed in the middle of a large cluster of bees. Honey is best, but can spread disease if not irradiated.
5. Use fresh materials. Materials stored over a year lose nutrient value.
6. Keep sodium low, potassium high, starch below 3%.
7. You may wish to add some egg (fresh or dried) to provide cholesterol (a vitamin to honey bees).
8. Some fatty acids are likely desirable (I'm experimenting with this).
9. ***Patties must be placed in the middle of the cluster, in close proximity to open brood.*** *Material even ½ inch outside the cluster may not be touched!*
10. ***In order to encourage buildup, you must generally feed stimulating syrup along with pollen supplement.***
11. Minimize the opening of hives in cold weather – repeated opening is stressful and can lead to nosema outbreaks. To avoid this problem, feed larger patties at

Bees taking dry brewers yeast from a bucket. They completely cover themselves with the powder, then fly home.

Jars of syrup and three-pound chunks of pollen substitute staged. We'll quickly split the boxes, smoke the bees out of the way, toss in the chunk, and let it squish between the frames.

less frequent intervals (perhaps two to four lbs every two weeks to strong colonies).

12. If you have small hive beetle, pollen patties can become breeding grounds for the pest!
13. Soy flour or brewers yeast can be fed dry in the yard, if it's ground powdery fine, and protected from dew. You must generally break the crust daily. This method gets less food to the bees than feeding patties.

Liquid protein feeds

Beekeepers in some countries recommend liquid soy amino acid/multivitamin feeds to mix with sugar syrup. It's unlikely that these supply adequate protein alone, but may well provide missing "limiting nutrients" – allowing bees to better utilize what they have available. I've been unable to obtain samples yet, but there may be similar horse or livestock formulations in this country. Please let me know if you try one!

Dr. Gordon Wardell, in association with the USDA Agricultural Research Service, has been developing a new generation of bee feeds. The first permutation consisted of soymilk, dried egg, citric acid, vitamin C, an emulsifier, and a preservative. It was nutritious, but was not very attractive to bees. He has a new and different formulation coming to market – perhaps as early as August this year. It can be used in either a liquid or patty form. I've spoken with Dr. Wardell, and find it exciting to see bee scientists returning to the formulation of bee diets after a long period of inactivity following Dr. Herbert's work in the late 1970s!

The economics

The question of course arises for the cash-strapped beekeeper: Is it worth it to feed? What will be the return on my investment? The answer depends upon your situation, but you wouldn't be asking that question unless you already suspected that your bees were malnourished. If your income depends upon having strong colonies for pollination, or to make a large honey crop, then I'd consider Australian Charlie Stevens' words: ***"Your bees are what you feed them, feed them well and they will feed you well."***

First, be smart – calculate the cost per pound of protein in any supplement. Some cost three times as much as others, meaning that you're paying an awful lot for sugar. That said, pay for premium ingredients.

On a small scale you can mix 10 lbs. granulated sugar, two to three lbs pollen, one cup vegetable oil, with *about* three quarts of hot water. Add and stir together in five-gallon bucket *first!* Then add 10 lbs of brewers yeast (animal feed grade), and mix with a four-blade plaster paddle in a ½" drill. The final mix should be like thin peanut butter (it will firm up overnight). If additional water is needed, only add ½ cup water at a time, or you'll get soup! Pour/scrape the mix into a well-oiled rectangular plastic tub to set up overnight. In the beeyard, invert the tub on a piece of plywood, and cut up the feed into cakes with a square spade. Dust the cakes with dry brewers yeast for handling. I don't see any advantage in rolling it into patties. The job is best done by two people – one sticky, one working the bees. This recipe makes 35 lbs of supplement – enough to feed about 12 colonies a three-lb chunk each (you can put up to six lbs in a hive at a time). If you feed more than 100 colonies, you'll want to get a large mixer. Stucco, dough, or meat mixers all work.

Three pounds of the above mix, and a gallon of sucrose syrup costs me about $2.50. Three feedings would cost $7.50 for feed. Add the cost of labor, and we're talking in the range of $10.00 per colony for two brood cycles (feeding a round every two weeks, three times). This amount of feed will take a weak colony in late August in our California lean pickings, and turn it into a strong colony ready to Winter for almonds! An unfed weak colony in August earns me zero in almonds; last year a strong one earned me $165. You do the math!

If I were to feed a lagging colony in Spring, beginning six weeks before the honeyflow, that $10 would easily double its strength. Kleinschmidt found that "on a good honey flow, colonies of 50,000 bees can produce twice as much as colonies of 35,000." It's up to you to determine if twice the honey crop would return your investment.

Feeding colonies is a pain, especially on large scale. I try to avoid it as much as possible by moving my bees to better pasture. However, there are times when a round of feed (or three) really pays itself off (especially with regard to almond pollination)! By understanding the dynamics of protein reserves in a colony, the beekeeper can make informed decisions as to when supplemental feeding is worthwhile. BC

Randy Oliver is a commercial beekeeper from Grass Valley, California.

Further reading

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Preparing For Winter In The Summer

It's Not That Far Away

James E. Tew

A disclaimer

For the past few years my bee colonies have not thrived. Weather, pests and diseases, and my decreased management attention seem to have been the fundamental reasons. This has culminated in the largest Winter die-off that I can remember experiencing. I lost 53 of my 80 colonies. Of some consolation was the fact that many of you had significant colony loss numbers, too. In past articles, I have kept you informed of my sad story every step of the way.

My disclaimer is that the experiences and procedures I am writing for you in this piece should be considered *conversation* and not *advice*. The manner in which I have decided to run my bees this season is not necessarily the right manner for all of you who read this.

My present situation

I ended up with 27 colonies. I was relieved to have that many for there was a period of late Winter coldness when I was sure that I would have no surviving colonies. Simply stated, I was traumatized – and there were other factors needing consideration. While I don't feel old, neither do I feel as young as I once felt. I have two young grandchildren and besides bees I have other commitments in life. I realized that, for the present, I needed to keep fewer colonies, but I need to manage those fewer colonies better. I now am back up to 37 and may get an even 40.

The upcoming Winter season

Winter is still months away but preparations are best made for it starting as early as the Spring already passed. When the last Winter season finally ended I found that some of my colony management philosophy had changed. I felt both relieved and warned. Do not be caught short with light Winter honey stores. In no particular order, I have written the following comments to present some of the decisions and management plans I have implemented.

The Summer yard.

Colony Increase

Of the 27 that survived I estimate that 20 of them were depleted, defeated, and ratty. They looked whipped. The remaining seven colonies ranged from okay to two that actually looked good. I decided not to make any splits – even from the few good ones. I bought 10 packages to get to my present number. I hoped to get some swarms, but none came my way. In fact, we only had three swarm calls the entire season and they were too far away. So my colony number is set at a significantly reduced level.

Colony intrusion

By colony intrusion I mean reducing the number of times I open and manipulate my colonies. Increasingly, I have been feeling that in order to help manage colonies we must harm them. I am wondering if opening a colony is more stressful for the colony that we realize. With our protective gear and smokers we can be formidable enemies. We completely overrun the bees' defensives. In past articles I have written the comment that I read somewhere years ago, *"On the day you open a hive, that colony loses that day's honey production."* Essentially, I am employing the adage *"If it ain't broke, don't fix it."* But our trained background is to open colonies and do important colony management things. Check for mite levels. Check incoming stores and add additional space. Look for signs of American foulbrood. Analyze the queen's productiveness. Are they making swarm preparations? This past season, I have tried to look at my colonies' needs differently.

Today is a beautiful Summer day – absolutely beautiful. Gentle breezes and blue skies abound. Crows calling in the distance, butterflies fluttering by, it's a great day to have a look at the colonies and check all the things that beekeepers check. Problem is that it is also a beautiful day for the bees. I expect their plans for the day are to forage, make honey, and care for their brood. My point? Beekeepers choose good days to perform their colony inspections – the same good days bees need to produce honey in preparation for the upcoming Winter season. Yesterday was thunderstorms and rain. That would not have worked for bees or beekeeper. For this season I am trying the approach that bees need the good days for foraging more than they need me performing a routine maintenance check.

Entrance activity

That is not to say that I am completely shelving my responsibilities as a beekeeper. Seven days a week I look at my bees in some fashion. Even if I have reduced my number of hive openings I have increased the number of times I study entrance activity. If the colony has good, active flight activity I pass along to the next one. I watch for *external* signs of *internal* hive stress. Misshapen bees, discarded pupae, incoming pollen, wax bits, bees amassed on the hive front, and drone activity are all external indicators of the colony's internal health. If a colony has poor

flight on a good day, it merits me knowing why. If that colony is failing now, it will surely fail this Winter.

Patience and acceptance

I suspect that it is every beekeeper's goal to have each colony be a perfect one. That's just not going to happen. It can only be colony genetics that allows one colony to develop into a powerful unit, while the colony sitting right next to it just can't make a go of it. I am trying to accept the fact that there is just so much I can do help the lesser colony. If I requeen, there goes my newly implemented principle of reducing colony stress. To requeen, the colony must be opened multiple times. The queen introduction process may not always be successful and all the while the season is passing. Increasingly I am trying to be tolerant of lesser colonies that could be made better – but at a cost. This season only colonies that are truly headed by poor queens will get my queen-replacement attention. If I use multiple "good" days to do this queen replacement project I will be left with a small colony, headed by a new queen – one that will need feeding and have a reduced chance of Winter survival. It's tough. Patience and acceptance are not natural virtues of mine.

Supering

Even as I tell you I am not as young as I once was, now I'll tell you I supered only with deeps and, oh my, they are heavy when full! I am intentionally sacrificing the entire honey crop this year in order to get honey in deeps that I could use as emergency honey stores this Winter. It sounds as though I am over-reacting but my bees have used all of their resources during the past three poor spring seasons. This past Winter I had absolutely nothing that I could give them to help them with their starvation. It is not my intention to have hundreds of pounds of aging honey sitting around for years on end but it is my intention to get these colonies safely through the upcoming Winter. If any of my lesser colonies need honey as Winter approaches, I will be able disperse full deep frames to them.

Water

Some of you have or are experiencing a serious drought this season. So far in Ohio that has not been a problem. Even so, my colonies have had to deal with hot, dry Summer days. In the yards in which I could I have provided dependable, clean water sources. This is simple, and can be done without intruding on the colony and reduces colony stress.

The Winter yard.

A colony supered with deeps for Winter stores.

Supplemental protein sources

Without support from any recent science I suspect that my colonies could profit from supplemental protein, vitamins, and trace elements. Though some formulations could be found that could be fed externally I've decided that the nutritional help provided by ading supplemental protein was offset by the interruption caused by opening the colony to provide the material. This management procedure is a good idea, but for another time.

Hive equipment

Some of my comments here are for the good of the bees and some are for my personal good. Since I am a work crew of one I have tried to stop loading and unloading spare equipment. On those special days when I am actually opening productive colonies I want to be prepared. Invariably, I seem to need something I don't have on the truck. Colony needs go lacking. The following simple procedures have helped me and my bees.

The dummy hive

I set up an empty hive made up of two deeps. To keep mice out, I completely closed the entrance. Within this unit in a lidded five-gallon bucket, I store dry smoker fuel (pine needles and burlap) and matches. Within the empty hive I store a hive tool, smoker, and a retired hammer accompanied by a few assorted nails. Normally I have these items on the truck, but on those abnormal days when I forget I use the components of the dummy hive. The only problem is that I must remember to put them back as I leave and not put them on the truck.

Spare equipment

I maintain a small inventory of bottoms, inner covers, and outer covers stacked on a hive stand in the yard. As I see that equipment needs replacing I use stuff from this pile. In this way I contribute to my policy of reduced colony openings by dependably having common replacement equipment at hand at the time I need it.

Inside the dummy hive.

On the colonies

Just above the second brood chamber I have placed additional deep supers for honey storage for the bees' use this Winter. Due to Summer heat I offset the supers one-half inch to provide for increased ventilation. I have already flipped reversible bottom boards to the shallow side in order to eliminate the future need for entrance reducers as Winter approaches. On colonies having screened bottom boards I removed the metal sheet and placed it beneath the brick that is on top of the hive. I installed a top feeder on the colonies which I will leave on indefinitely. I use the top feeder as necessary but I have stopped hauling them to and from storage. Essentially, I am trying to keep all the hive parts on the hive rather than having to remember to bring them to the yard as the season changes.

Future tasks

Mite treatment

After giving the colonies all Spring and Summer to produce honey, I will treat for mites, if needed, in early Fall. Since I am not putting on surplus honey supers I suppose I could treat at any time, but again, I am trying to leave the colonies alone as much as possible.

Dysentery treatment

Too many of my colonies that survived showed obvious signs of dysentery. It could very well be that foraging bees were forced to visit honeydew sources that they do not normally visit if given a good foraging season. Even so I plan to use the feeders to feed the recommended amount of fumagillin in case my colonies' problem is the new (or maybe old) variety of Nosema that is plaguing some of our industry.

Supplemental carbohydrate feed

As the Fall flow ends, if some colonies are light I will provide sugar syrup in the top feeders. Last season when I tried this robbing became a serious problem that overrode any good I was accomplishing. If this appears to be a problem this year I will try filling feeders in the early evening or even at night. At all costs I am trying to save any capped honey in deep frames that I might acquire as my last resort for Winter feeding. Feeding – at any time of the year – is never a perfect process, but it is very nearly impossible to feed sugar during the winter season.

Substandard colonies

As the Fall season passes colonies that are not in suitable wintering condition will either be given food stores from other colonies or I will combine them with other colonies. Last season clearly taught me that there is absolutely no reason to go into Winter with light stores and simply hope for a mild Winter. I am trying to do something while I can for Winter preparation while I can – right now.

Speaking of "right now"

After all the U.S. beekeeping industry has been through during the past year, presently – shockingly - most of my colonies look good – even real good. I credit a decent Spring season and fewer colonies competing with each other.

For me and my bees this year has strictly been a time of colony healing. Without any hope of a surplus honey crop I have spent the entire warm season preparing for the upcoming cold season. I don't want to ever experience a die-off like the one I had last year if there is anything under the Summer sun I can do, but there's only so much I and my bees can do. At times, even good colonies die. I wish the best of luck to you and me both. BC

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An upper entrance for ventilation and stress reduction.

All The Buzzz in...

www.beeculture.com

Happy Birthday to ME!

Celebrate my birthday! Have a chance to win a cool CD!

Hello Friends,

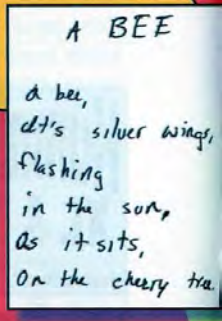
It has been one year since I've had the pleasure of being on this bee page. To celebrate, I will be giving away a CD called "The Supa Dupa Pupa" by Lucas Miller. If you have sent me a question, poem, artwork, recipe or birthday card within the last year, your name will be included in the drawing. There is still time. Get out your paper and send me your creations by the end of September. Have fun!

Your Friend,

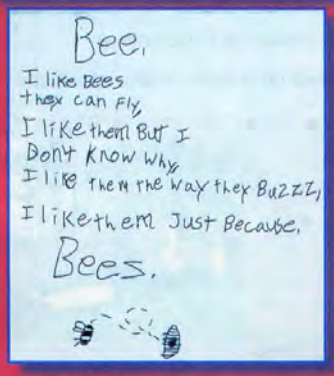
Bee B. Queen

Bees collect pollen on their feet,
And make lots of honey for us to eat.

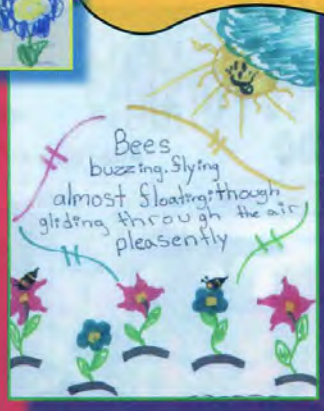
Cora, age 6,
from Kingston, MI



Sarah Waldner,
age 10
from Elkton, SD



William, age10,
from Fairacres, NM



Katrina, age 12,
from Fairacres, NM

Get to the point

The stinger of a bee is an amazing thing. If a worker bee stings a mammal or bird the barbed stinger will get caught and be pulled out of the bee's body. Yes, the bee will die. This causes an alarm to let the other bees in the hive know where the danger is.

Yet, if the worker bee stings another insect the stinger does not pull out of the body so the worker bee will survive to sting again. In this way there will be more bees to protect the hive against the bigger threats, like bears, instead of the bees losing lives to defend against other insects.

Did you know that drone honey bees (the male bees) do not have stingers?

Most other bees and wasps like bumble bees and yellow jackets don't have barbed stingers so they can sting over and over again.

www.pbs.org/wgbh/nova/bees

... Bee kid's corner

Produced by Kim Lehman -www.beeladyprograms.com
August 2007

We will survive

The worker bees in the hive have stingers to protect their home, their babies, their food and the entire colony. When they sting, they die. In other words everything they do is for the good of the entire hive, even if that means giving up their life.

"A bear after bees." Hannah, age 8, from Kalkaska, MI

Buzz off

Honey bees need to protect themselves from these intruders. Circle the words in the puzzle.

ANTEATERS
ANTS
BADGERS
BEARS
HUMANS
MICE
OPOSSUMS
RACCOONS
ROBBERBEES
SKUNKS
WASPS

J	L	Y	S	L	G	T	O	M	S	S	H	S	H	R
C	P	R	D	K	R	N	C	P	E	V	P	B	C	A
G	S	O	M	T	N	Q	Y	E	O	S	L	Z	W	C
M	B	M	M	N	P	U	B	K	A	S	Q	X	L	C
F	G	Z	P	X	D	R	K	W	T	C	S	A	B	O
H	Y	K	F	E	E	F	T	S	Z	T	G	U	U	O
V	W	J	K	B	M	O	O	H	M	N	T	R	M	N
W	D	X	B	G	A	A	N	T	S	M	X	N	X	S
S	M	O	V	Y	I	B	R	E	C	O	F	G	H	F
R	R	I	B	O	A	Y	P	U	V	A	Z	H	R	T
A	F	O	C	D	A	N	T	E	A	T	E	R	S	K
E	H	T	G	E	Q	E	C	B	S	N	A	M	U	H
B	U	E	N	U	A	A	V	H	R	S	F	E	H	O
V	R	A	Q	V	E	Q	M	X	P	R	H	S	N	J
S	L	Y	D	V	G	D	E	C	O	D	J	Z	R	W

I'm Hooked

Ask an adult to help you with this experiment. You will need a:

- fish hook
- straight pin
- piece of leather or suede (an old shoe or purse will do)
- piece of fruit (apple, banana, pear…)
- And of course an adult

How does a barbed stinger work differently than a straight stinger? Using pliers straighten out the fish hook to represent a barbed bee stinger. Now pretend to be a bee. While making a buzzing sound stick the "barbed stinger" (fish hook) and the "straight stinger" (pin) into the fruit. Pretend the fruit is a robber insect. Now pull out the "stingers." What happens? Now push both "stingers" into the leather. Pretend the leather is a bear, raccoon or skunk. What happens?

Lori Anne, age3, is our first international Bee Buddy. She lives in Manitoba Canada.

Never Too Late

Meet Lucille Haas, our most mature Bee Buddy at age 88. She writes from Sevierville, TN:

"I realize I'm a little late for this but it would mean the world to me to be one of your Bee Buddies...It would be a great surprise to my beekeeping son Mike..."

Send all questions, photos and artwork to: eebuddies@hotmail.com or mail to the above address.

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 2743, Austin, TX 78768. We will send you a membership card, a prize and a birthday surprise!

Name: _____

Address: _____

City, State, Zip code _____

Age: _____ Birthday: _____

E-mail (optional) _____

Honey Bee

Stepping on a bee with bare feet can be painful. That's why you need a pair of Bee Buster Flip Flops. They help protect your feet wherever you go. The bee design on them reminds you to be careful not to step on bees, and lets everyone know that bees and beekeepers are important.

These ornamental bees make great looking flip flops, but don't stop there. You can use them to decorate refrigerator magnets, pencil tops, picture frames, and hair barrettes. Try selling some of your bee crafts along with your honey at the farmer's market, or anywhere else honey and bee products are sold.

Before starting, gather together all your tools and supplies. You can find everything you need at most large department and sewing stores. To make a pair of Bee Buster Flip Flops, you will need:

One pair of black flip flops in your size

Yellow, white, green, and red Peel and Stick Foam Sheets (if you are unable to find peel and stick sheets, you can use regular foam sheets and craft glue)

7 mm wiggle eyes, 2 per bee

Black chenille pipe cleaners (1 pipe cleaner for every 4 bees)

A large bead or small button for each flower

Craft glue

You will also need the following tools:

Scissors

Pen or pencil

Wire cutters

Fine point indelible marker

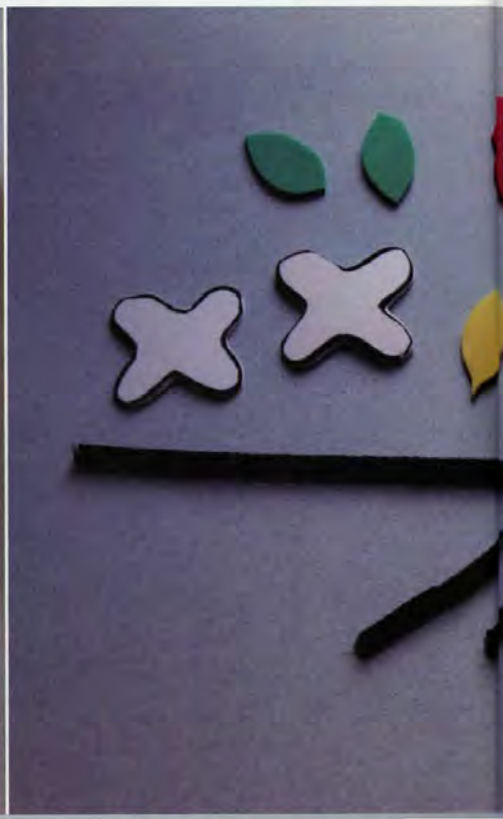
Old newspapers

Cover your work area with old newspapers to protect it from glue and ink.

Trace the patterns onto a piece of paper, or make a copy of the page from this magazine.

Cut out the patterns. Trace the wings four times onto the back side of a sheet of white peel and stick foam, the body four times onto the yellow, the flower twice onto the red, and the leaf four times onto the green. Cut out all the parts. Do not peel off the backing at this time. Glue a bead or button to the center of each flower, and set them aside to dry.

Using a permanent black marker, draw stripes on the bee bodies. Be careful not to drag your hand through the ink or touch the bee body before the



Flip Flops

Peter Sieling

ink has dried to avoid smearing your work. Next, outline the edges of the wings with the marker. Once the wings and bodies have dried thoroughly, remove the paper from the back of one of the bodies and center it on a pair of wings, aligning the flat end just above the wing joint. Repeat the process with the other three bees. Decorate the wings with dots or veins using the marker. Set them aside to dry.

Remove the paper from the back of one flower and stick the front side of two leaves to the adhesive side of the flower so they are visible. Be sure that enough of the leaf is touching the adhesive on the flower to make a good bond. Remove paper backing from the leaves. Place a large drop of glue on the center of the adhesive side of the flower. The adhesive backing bonds foam to foam very well, but extra strength is required to attach the foam parts to the flip flops permanently. Repeat process with the second flower and second flip flop.

By now, the ink on your bees should be dry. Glue two wiggle eyes to the flat end of each bee body. To make the antennae, cut a pipe cleaner into four equal sections. Bend each one into a V at its center and curl under the raw ends.

Peel the backing off one set of wings. Press the bottom of the V into the adhesive behind the eyes. Run a bead of glue down the center of the back (adhesive side) of the body from head to tail, covering the V. Press bee firmly in place on the right side of the flip flop. Apply pressure for several seconds to one minute, until the glue is holding it in place. Repeat with the second bee on the left side of the flip flop, and then repeat the process on the other foot.

Be sure to let the glue dry and harden before wearing your Bee Busters so you don't lose your bees! You can wear them everywhere – to the mall, to school, the farmer's market, or on vacation. BC

Peter Sieling, his wife and their children avoid honey bees on clover around their home in Bath, New York, by wearing these honey bee flip flops.

Parental Stress Influences How Bees Enter Winter

Larry Connor

Grandma B, who helped Grandpa B run a coal-heated greenhouse and raised four children during the Great Depression and World War II, when asked how she did it, shrugged her shoulders and replied, "We didn't know as much." Now human couples spend a great deal of time putting energy into their kids' futures. Grandma B would say too much effort. In the past few months I have heard or read about parents who want to go with their adult children to their first post-college job interviews, about a new book that encourages boys to be boys – roughhouse, run, jump and yell, and about chickens that get stress from their parents. Grandma B may not have understood, but there is a link here for bees and beekeepers.

"Parental" Nutrition

Most beekeepers learn about the differences between Summer Bees and Winter Bees. Summer bees live about six weeks after emerging from the pupal cell. They rapidly pass through their predictable hive assignments, working as nurse bees, house bees and foragers and then dying. But in the Northern Hemisphere, at about this time of year in the middle latitudes, the bees start to produce Winter Bees. These are the bees that will live six months or longer, and are part of the cadre of bees that forms the Winter cluster. Winter Bees must have the ability to survive the Winter and build the colony in the late Winter and early Spring before the first of the Summer Bees are produced. They must be healthy and well fed. The honey bee's genetic strategy for colony survival rests in these bees, not the residual Summer bees that soon will die.

The tips of their abdomens out of the cell, these nurse bees are busy feeding larvae. The nutrition of the nurse bees is key to good Winter Bee production.

If you read my column last month, I suggested you read about the Australian work on *Fat Bees and Skinny Bees*. If you did you already know what Grandma B did: offspring that are well fed and well cared for will be more useful, indeed, more successful, than the ones that are poorly fed. The Fat bees are those that are fed the full component of all aspects of nutrition, especially ten essential amino acids, lipids, steroids, vitamins and minerals. These materials must come from hive resources and *the bees that raise these bees* – the nurse bees that produce the Winter Bees, along with the entire colony that supports the nurse bees. This "parental" effect is huge in beekeeping, and must be learned by every beekeeper to be successful over the long haul.

So, if your colonies' nurse bees start making their Winter Bees in early August this year, how well were the nurse bees reared? What were the conditions in the hive at the time? They were probably produced in July, so their care and feeding is now important to us. How many beekeepers worry about the bees produced mid Summer, when the nectar flow is on or about to end? So, how was your beekeeping environment *last* month? Did the nectar flow arrive? Or did things dry up and were the *Varroa* mites sucking on the blood of your bees at a heavy rate? Maybe you bought or raised a bunch of bad queens and your nucleus increase colonies had a stressful start with late egg laying and slow colony buildup?

Obviously it is easy to ask these kinds of questions, and you can become completely neurotic worrying about what is going on in the hive. And in most years, and in most locations, the bees will do just fine. But if you are in an area of single crop (monoculture) production, or if you have been experiencing high *Varroa* levels, or if you have had a poor year for nectar and pollen production, you should be concerned about your Winter Bee production and the nurse bees that produced them!

Let me say this another way – the success of your bees NEXT Winter and NEXT Spring depends on the proper nutrition and a high quality hive environment these past few weeks. If the bees in your hive have had a diverse supply of pollens – dozens or more pollen sources producing pollen the bees collected – and the nectar flow provided plenty of surplus honey, then the bees may be off to a good start for 2008.

But if your bees have been sitting on the edge of a corn field, and the bees have "mostly" collected pollen from

just one plant, then things may not be so fantastic. The average protein content of corn pollen is 14-15% (most grass pollens have a low protein level; pine pollen runs 7-8% protein), but in many areas corn is the primary pollen the bees are able to find in late July, and it goes against the natural instinct of bees to have one primary pollen source for nutrition. Given a choice, studies have shown that most colonies will collect pollen from 20 or more plants at the same time. This is probably an effort to get a balance of essential and non-essential amino acids for proper brood growth. Like Grandma B said, eat a little bit of everything, and don't fill up on just one thing.

Where do we have areas of monoculture? Quite frankly, most agricultural land is focused on one or two primary crops. The focus on alcohol production from corn and diesel fuel substitutes from soybeans is rapidly changing agriculture in the United States. So watch out! If you rent bees for cucumber or pumpkin pollination (26% protein in the pollen but not much of it), my guess is that the bees come back to you in very poor shape. The exception, and it is quite a big exception, is when there is a clover, buckwheat, or "weed" field nearby that the bees are able to visit. I've driven through large sections of the country these past few years, and there are few places I can name where there is a huge diversity of Summer flowers. One of the best was downtown Detroit, where houses have been torn down and fantastic wildflowers grow in their place.

What can you do if your bees are not healthy? Bees that live under the constant feeding demands of a parasite like *Varroa* are giving up part of their nutritional and probably biochemical nature to feed the beasties. If you had a parasite the size of a flattened orange feeding on your child, you would freak out. And if you walked around all week and tried to work normally with a Frisbee-sized beastie feeding on your back, one you could not pull out because it had mouthparts that went deep into your body, I bet you are not having one of your best days.

"Parental" Stress

Recently I stumbled over an article in *The Economist* (Epigenetics, "Serenity and the Farm," April 21, 2007) that explained how chickens get stress from their parents. When both junglefowl (wild chickens) and domesticated leghorn chickens were raised in either a stress-free or stressful environments (the stress was created by putting birds into a night/day pattern that changed constantly), the stressed domestic chickens acted quite differently when they were expected to follow a maze to food. What is significant for beekeepers is the fact that the *offspring of the stressed chickens* acted the same way, even when the offspring were raised in a calm environment. "Those (chickens) raised in an unpredictable environment had a worse spatial memory than their calmer counterparts, and, weirdly, that effect was repeated in their offspring, even though those chicks had grown up contented." The researchers looked at the level of coricosterone, a stress hormone in the yolk and whites of the stressed hen's eggs, but there was no difference than the unstressed hens. The authors suggest that maybe changes in patterns in the genes of the stressed hens were passed on their chicks.

Grandma B would have commented that some families she knew were just like that. The parents were always stressed-out over something, and the kids were always getting into trouble, and were "just not right." Now, it is a big leap to go from chickens to children, but what if stressed bee colonies passed on stress-related behaviors to *their* offspring? I like to think of the genetic nature of any animal is like having thousands of switches that control everything. Each gene's switch may be on, or off or partway on. So nurse bees, when they feed the larvae royal jelly secreted in their glands, may contribute chemical signals that turn on, or off, certain genes when they feed the Winter Bees, Well, it's something to think about Grandma B would say.

Cucumber flowers are very attractive to bees because of the relatively high sugar level in the nectar, and crops like pumpkins have a relatively high protein level in the pollen. The problem, for large acreages of vine crops like this is simple. There are simply not enough plants and thus flowers per acre to support the number of bees needed to pollinate the crop. Many beekeepers rent bees on cucumbers and pumpkins only to learn that they will be weak and die over Winter.

Last year I focused on this, and came up with a possible method to use to increase nutrition, decrease mite feeding, and maybe even produce a low-stress colony. The answer is to make up summer increase colonies – two- to five-frame nucleus colonies – that are allowed to build up into full sized colonies over the Summer, or are over wintered as nucs. A lot of this ended in up in the book, *Increase Essentials**. Here are some reasons you should consider Summer nucleus production in your apiary, even if you only have one or just a few colonies:

1. *Young, locally produced queen* – In the summertime you can raise your own queen, or get one from a local producer. She may be in several forms:

A. Swarm cell – As you work your colonies and find a swarm cell, remove the entire frame with the cell (if there is more than one cell, leave them all on the frame). Make sure the frame does not have the Mother queen on it. Move this frame to a nucleus colony or a 10-frame box with a follower board (a dummy frame to reduce the volume of nest the bees must guard). Add a frame of pollen

Bees on pollen: The diversity of colors reflect a wonderful array of essential amino acids bees need to produce new bees. By August, these include the Winter Bees. If a single color of pollen is found, it may be from just one plant source, and may lack enough of a particular amino acid bees need to thrive.

and honey, plus the bees that are on it. Add extra drawn combs (if you have them).

B. Purchase a ripe queen cell – If you have a local beekeeper who produces queens and queen cells, arrange to pick up ready-to-emerge queen cells. Carry them in a padded container and use up the same day. If they are ready to emerge, one virgin – the first one to emerge – will destroy the rest. From a strong colony, remove one or two frames of brood and bees, a food frame, and install them into a nucleus box as described above. If you want to keep the new colony (-ies) in the same apiary try this, from G.M. Doolittle's book, *A Year's Work in an Out-Apiary**: Gently shake or brush all the bees off one or more frames of brood. Replace frames of drawn comb or foundation into the hive to prevent the bees from building burr comb. Put a queen excluder over the hive, and put an empty hive shell over the excluder. Close up the hive. In a few hours the nurse bees will have crawled through the queen excluder and covered the brood. Since they are young and have never flown, they may be located in the same apiary without fear of drifting. Keep the entrance of the hive small to reduce robbing from other colonies. Once in position, a queen cell or queen may be added.

Queen cells should be handled only at the base, and gently pushed into the top of one of the brood frames so the tip of the cell points downward. Or push two frames together with the queen cell in between. This works very well if the queen larva was grafted into a plastic cell cup, since this gives you a solid base and is less likely to be damaged. If the queen cell was produced in a clear cell cup, look for surplus royal jelly in the base of the cup. If there is no surplus jelly, I strongly recommend you not purchase or use the queen cell, since it shows that the queen larva was not well fed.

C. Mated Queen – A queen from a nearby mating nucleus may be added to your increase colony using a push-in cage. Since she has been laying, her pheromone production should be normal, and a locally produced queen has huge advantages over a mated queen shipped to you from a queen bank from a producer miles, or states, away.

2. *Find a diverse floral location* – Move the nucleus colony to an out apiary location surrounded by a diverse supply of Summer and Fall flowers. You might find this along parks, rivers and streams, utility right-of-ways, etc. Many suburban locations are ideal places to produce queens and make increase colonies, since there are many gardens, parks, and floral plantings in the flight area of the colonies. During late July and August my suburban city location may have more floral diversity than Mom's farm just nine miles away.

3. A break in brood cycle – Many beekeepers have discovered that a break in the brood cycle has a significant impact on the development of huge *Varroa* mite populations. This happens when you make up a nucleus with a queen cell. There will be a period of several weeks where there is no new ready-to-seal brood for the *Varroa* mite to enter, and the worker bees will be better able to groom each other to remove the mites. When the mites are not able to enter brood cells, their reproduction rate stops. That's a good thing in mid Summer. (This is also an ideal time to treat this with any of the treatments that require no brood – powdered sugar is a good choice, too.)

Several beekeepers have looked at the smaller colonies and concluded that they do a better job o keeping mite levels low. Perhaps there are more resources for bee-to-bee grooming than in a larger colony. Perhaps some hygienic "switch" in on in small colonies and off or suppressed by something else in large ones. Who knows!

4. Local stocks – There are a growing number of us who want to produce queens locally. We want to produce queens from stock that has survived Winters and Summers and *Varroa* mites in the area where we keep our bees. We are less interested in getting queens from distant parts of the country, and we really don't want queens with genes from Australia or Africa. Yes, we know we cannot control mating very much, but if we use local stocks for several years, we should get our desirable local genes out into the mating environment.

5. Well-fed, low-stress nurse bees and Winter Bees – If we reduce *Varroa* mites, provide colonies with a diverse array of flowers to visit, and provide a break in the brood cycle, we may produce increase colonies that are better fed and less stressed than we might have had otherwise. This should put them in great shape as they enter Winter, and will then explode with rapid growth in the Spring of 2008. BC

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PERFECT COMB

WITHOUT FOUNDATION

Charles Martin Simon

Old plastic-core comb. Get rid of this.

One of my beekeeper friends, a lady very committed to the benefits of beekeeping without foundation, was complaining to me the other day that she was getting crooked and crossed combs. She is very frustrated because she needs straight combs because she wants to extract because she wants clean, clear, beautiful honey in the jar. I didn't have time at the time to explain the facts of life to her.

First of all, new comb, no matter how lovely, no matter how straight, no matter how wired, crimp-wired or rebarred, is subject to go splat in the extractor, and some of it definitely will. It requires some maturity before it will have the strength to survive the operation. And I'm not talking about plastic comb, which you can run through the extractor regardless of the condition of the comb. And I'm not talking about traditional top-bar combs, which are traditionally not extracted.

Me, I don't extract anyway. I gave it up (or evolved past it) years ago. I am only interested in completely unprocessed honey in the comb, wild or as close to wild as I can get it. My goal is to manage my hives in such a manner as to keep them wild. Oxymoron? Maybe so, but it works.

If I *were* to extract, I would want straight comb, obviously. However, extraction is not the only or even the best reason for straight comb. Straight comb harvests easier and packages neater. But does it taste better? Maybe not, but that's not the point. What good are moveable frames if you can't move them because they are all cross-combed and stuck together? Moveable frames allow you to get straight combs and straight combs allow you to move moveable frames. It is the ability to move them that allows you to perform the various manipulations that make the difference between success and failure.

Raw beginners maybe shouldn't be considering foundationlessness yet. You need straight combs in order to get straight combs, and where is the raw beginner going to get them? Unless she or he begins with foundation. So begin with foundation, and later on, a year or two or three down the line, start thinking about foundationlessness, and be prepared to go slowly.

One definition of maturity is the ability to defer gratification. If you want clean, filtered honey in the jar and you want it right now, go to the store and buy it. The same applies to good straight comb, which you're going to need before you can harvest that good clean honey, but you can't go to the store for that. Maybe you can beg, borrow, purchase or steal some from a more advanced beekeeper. Failing that, you have to start somewhere, and it might as well be right where you're at with what you've got, a set of top bars or old frames, or new frames, with or without foundation. Getting good straight comb without foundation is not a right-now operation. It is an ongoing process that keeps getting better and better year after year, once you get the hang of it. If you're not in it for the long run, maybe you shouldn't be in it at all.

If you can get a frame of good old (don't worry if it's dark – bees like dark comb. Look at the picture with this article to see what they did with a piece of the blackest, oldest, funkiest comb I could find, and, believe me, I've got some of the oldest, blackest, funkiest comb on the planet.) straight comb, cut it into longitudinal strips an inch or two wide and fasten them to the bottoms of the top bars with melted wax, just enough to hold them in place; the bees will firm up and cosmeticize the connec-

You can use new comb, like this from that swarm.

Or cut old comb into strips.

Strips ready to use.

Fasten with a bit of wax.

Or don't use any strips.

tion. Let the bees do as much of the work as possible, don't be doing everything for them. It's better for us and better for them.

If you can't come up with some good straight old comb to cut up, you might use one-inch strips of foundation – or not. (Let's go with not; using any of it only encourages them. There's no such thing as moderation here. A little foundation and you end up with corporate grief, agribusiness, food processing, drugs and, let's not forget CCD. Am I saying a little foundation leads to CCD? Let's say it leads to a state of mind that leads to a condition that leads to all things bad in beedom. In that sense, yes, I am saying that. Let me put it this way: You will never get different results when you keep doing things the same way, and I do mean never. And CCD is a result of the way we ((not we – *they*)) have been doing things – cause and effect.)

Let's say you use regular old frames, or new frames, wood, with neither foundation nor strips of old comb, put them in a brood chamber and hive your bees. If they don't abscond, they will begin drawing comb. And if you're lucky, you will get some straight ones. Even cross-comb, if it's straight, or fairly straight, or relatively straight, can be used. Anyway, you only need a little bit to get them started.

Whether you are using traditional rounded-bottom top bars, SuperUnfoundation Frames with triangulated-bottom top bars and triangulated-top bottom bars, or conventional frames with slots for crimp wire or pressure bars for foundation, the procedure is the same. The operative word is rotation. Rotation, rotation, rotation – an interactive, living relationship with your hive.

Slow, careful, deliberate movements are key when working with bees. But you already knew that. That's why you don't get nervous or anxious, regardless of what is going wrong, regardless of how many times you're being stung. You never hurry, except when you are running away.

The simple, straightforward way to get a straight comb on an empty frame or top bar, is to insert the frame or bar between two straight combs in a hive that is building comb. In this part of the country, central coast California, they build comb between the middle of February and the end of June. Trying to get straight comb, or any kind of comb, at any other time is a waste of time. There are exceptions; I did see a colony I was removing from an attic crawl space in January completely replace a fairly large comb overnight. Seeding the top bars with strips of straight comb might be a plus when starting a new hive.

The photos here are of the conversion of pretty bad examples of old frames with dead useless, plastic-core comb. (This stuff is so bad you don't even want to use it to start a fire in your fireplace or stove unless you clean it first – like washing the dishes before you put them in the dish washer, one of civilization's more intriguing tautologous practices.) into good, straight, fresh comb. I seeded one frame bar with a small piece of wild comb taken from the branch of a tree where a swarm had started to build three years ago.

Here is a piece of old comb cut into strips, one of which is fastened to the bottom of a standard frame top bar. After fastening the comb with melted wax, I decided I had made the strips too wide but went with them anyway, it being too much trouble to correct them and unnecessary anyway for the purpose of this demonstration.

I also used one completely empty frame.

I put these frames into brood areas to replace combs containing open brood that I am coincidentally using to remove bees from various walls around town and in a

Foundationless frame started with the strip.

Foundationless frame started on a completely empty frame.

The end result.

few far away places. But you will want your combs for harvesting, so you will not remove them from the hive. Predicated on having a strong hive that is drawing comb, you remove a comb of brood from the brood nest, place it in the center of a super above that is populated with empty frames (provided the colony is ready for a super), or rotate it outwards from the cluster (if it's not ready for a super), and put your new frame, with or without a strip of old or new starter comb, in the open position. You can leave it there or, as soon as nice straight comb is started and going nicely, remove it up into the super next to the comb you put there before or rotate it outward in the same brood box and put a new, old, empty or baited frame into the vacated position.

After I had developed the SuperUnfoundation Frame and got all excited about it and found that other beekeepers around the world were excited about it as well and sold it worldwide for a few years only to be forced out of business by the price of wood doubling and then tripling until it was costing more for the raw wood than I could get for the finished frame, after many years of using it and not using it, I have come to realize it is superfluous after all. Any standard frame designed for foundation will work just as well without foundation, with the correct manipulation under the correct conditions. Read the last sentence again, a few times if necessary to get the meaning; think about it; it is one of the best-kept and potentially most profitable secrets in beekeeping. Doesn't even matter if it's wired or not. If it's wired just leave the wires; the bees will build around and through them, imbedding them just as well as if it had been done with an electric imbedding gadget. If it's set up for crimped wire, just leave it empty. Note: Some years ago the Peace Corps published a method for getting straight combs with slotted top bar frames and no foundation: Take some comb and roll it between your hands into a string (maybe 1/4 inch in diameter) and force that wax string into the slot. I've never done it, but it sounds like it will work if you don't have any straight combs to cut from.

A good piece of comb is relatively straight (no straight comb is really straight – there are no straight lines in nature) and durable, and will uncap and extract fine. Of course, as stated, I don't extract and don't approve of it, because it is better for the bees to draw new comb than to keep reusing old comb, albeit less profitable for the humans. But it doesn't matter what I approve of or don't. You'll do it if you want, or not if you don't want. But straight combs, whether you extract or not, serve everybody's interest best, including the bees'. They allow for more graceful manipulations, and more graceful manipulations means less inadvertent damage by hapless beekeepers.

The two frames with straight comb well started pictured here were photographed after a week in the hive. One was started with the strip of dark comb minimally fixed to the top with melted wax. You can see how beautifully the bees fastened it to the top and integrated it with the new comb they are drawing below.

But the strips of starter comb are superfluous also. They might be useful to satisfy the human need to be doing something, but the bees could care less and do just fine without them, as shown by the other comb pictured, which is an inch or so behind the other one because it was started on a completely empty frame. This is a true case of less is more. Empty frames are full – or will be soon enough, as shown by the well developed comb pictured, which was also started and built on a completely empty frame. BC

Charles Simon keeps bees, and makes foundationless comb from his home in Soquel, California. Photos were taken by Maria Correia and Sharon Lucchesi.

HONEY & POLLEN PLANTS at EAS 2007

Dewey Caron

At EAS 2007, participants will have an opportunity to view a selection of some great images of honey/pollen plants of DE. The prize-winning photos will include extreme close-ups of pollen grains. Peter Lindtner, head horticulturist of the world-renoun E.I. DuPont Garden at Hagley Museum will be on hand to discuss his photos, which can be viewed both as framed photos and in a photo essay.

Peter continues the specialty garden established by E.I DuPont 1803-1834. It is a French-style potager (kitchen) garden, approximately two acres in size. The garden consists of formal planting beds, crisscrossed by gravel paths and bordered by the largest collection of espaliered (trained to flat form) fruit trees in the entire U.S. Flower and vegetables fill the neat, orderly rows during the growing season, with cooler season daffodils, strawberries and spinach early replaced by beans and Summer then Fall blooming plants and warmer season vegetables. Old fashioned roses and herbs are also featured. EAS members may wish to view the gardens themselves as a side trip during the EAS conference.

Peter cultivates the distinctive, horizontally stretched fruit trees of apple, pear and peach. Peter started many of the 150 + trees he now tends with mostly volunteer gardener help. Central leaders of apple arch gracefully at ankle-length to produce living fences around the garden. Visitors marvel at pear trees shaped into Christmas tree form and peach trees massed into fan-shaped forms.

The cultivation of espaliered trees date back to E.I. DuPont himself who studied cultivation at the Jardin des Plantes in Paris. Drawings and records from the original gardens of the early 1800s reveal the planting is patterned after the world's largest collection of espaliered fruit at Versailles, outside Paris. To achieve the distinctive forms, Peter prunes from Thanksgiving to March and works to control fruiting and forms branches into the distinctive shapes. Although espaliered plantings are frequently grown along a wall to take advantage of reflected heat, at Hagley, Peter has mastered their cultivation in the open.

Peter emigrated to Canada in 1968 from his native Czechoslovakia as eastern Europe was occupied by Russia. He worked initially at an Ag Canada Experiment Station. He moved to the U.S. as a student at Purdue University in the Horticulture Department. While working on his thesis studying breaking peach seed dormancy he heard of a possibility of a position at Hagley for someone skilled in the European practice of espalier. Having learned espalier gardening from his grandfather and during his horticulture training in his native Czechoslovakia, he thought, as did the Museum, that it was the "perfect" fit. He moved to Delaware before he could complete his thesis – 34 years later he remains at Hagley.

Peter resumed his graduate studies and received a MS degree at University of Delaware in 1982. Dr. Charles Mason helped supervise his studies and it was one of the first thesis completions I participated in as Department Chair. For his thesis, entitled "Identification of honey bee pollen loads of Hagley" he "borrowed" four University of Delaware colonies in 1978 to study pollen foraging. He identified pollen for 93 plant species by color and their pollen grain size, shape and surface morphology using front mounted pollen traps (then available from W.T. Kelley Co). He compared collected pollen with an atlas of pollen collected directly from plants, mounted using water and fuchsin stain, viewed and photographed under a light microscope with up to 400X.

Following his thesis, Peter established his own apiary on the Hagley museum grounds to pollinate his growing garden restoration efforts. He lost those colonies in 1993 to *Varroa* mites; since then he has assisted Nick DuPont with his colonies, immediately adjacent to the gardens. Unfortunately those bees recently perished this past winter so for the first time in 30 years the Museum is without bees to pollinate the extensive fruit trees.

Peter first took a beekeeping course during his Pomology (fruit culture) studies at University of Brno in the Chech Republic under professor Tomšik. His professor wrote the beekeeping text Vèelaøství, a copy of which Peter still refers to. Peter's interest in bees began at age 13 when he started building hives. By the time he started horticulture studies at the University, he had increased to 19 hives; they helped support his studies.

Peter is a prize-winning photographer with the Wilmington Photography club. His exhibit will include a selection of his outstanding bee flower photographs and light and electron microscopic photos of their pollens. He hopes to expand to a book on plants and pollen using his photos taken over the years at Hagley, Wintertur and Longwood Gardens, three former DuPont estates, now all public gardens within 30 minutes of the EAS 2007 meeting site at Clayton Hall, University of Delaware. EAS visitors are encouraged to visit one or more of these outstanding museums before or after attending EAS 2007. BC

Dewey Caron is Program Director for EAS 2007. To find out more, see www.EasternApiculture.org.

Keys To Successful Wintering

Ross Conrad

The work of securing next year's honey crop begins in mid- to late August.

Winter survival is one of the main concerns beekeepers in northern latitudes must contend with. Unfortunately, the cold temperatures that hives will face are typically given more attention than they deserve, while the most important ingredients of Winter survival: a large population of healthy bees, plenty of honey stored within the combs, and the ability to stay dry, are not always properly attended to. With these basic items in place, your bees should have little difficulty withstanding the frosty breath of Old Man Winter.

Rather than hibernate through the Winter like many other bee species, honey bees literally snuggle together and form a cluster within which each bee shares its body heat with its hive mates. While we humans typically work to keep the entire interior of our homes warm during Winter, the honey bee cluster serves to focus and conserve the colony's energy by keeping warm only the space they are using and is necessary for survival.

Because a successful Winter cluster requires a large number of healthy bees I harvest my honey around the middle of August so that a high-impact *Varroa* treatment can be applied to ensure that the population of mites is as low as possible during the crucial autumn brood-rearing season. By reducing pressures from Parasitic Mite Syndrome (PMS) and ensuring that other diseases are under control, the bees which are raised during September, October and November will not have their immune systems compromised by mites and therefore have the best chance of carrying the colony through Winter and surviving to emerge strong in the Spring, able to take advantage of the first honey flows. Thus, the work of securing next year's honey crop, which used to start in autumn before the advent of *Varroa*, now begins in mid-to-late August.

When treating for *Varroa* it is important to keep in mind the sub-lethal effects of chemicals on the bees. Some miticides that have been approved for use in hives against *Varroa* have also been shown to have adverse impacts on the bees. Conventional thinking is that such adverse impacts are worth the price of removing 95% or more of the mites in a hive. However, beekeepers now have numerous non-toxic mite control options that can be utilized without worrying about toxic chemicals or the synergistic action of residues building up from more than one chemical that may have been used within the hive. Such treatments include the use of essential oils, organic acids, powdered sugar with a screened bottom board, and Sucrocide among others.

Having plenty of honey stored away in the hive is the second basic requirement of a successfully overwintered hive. The amount of honey a hive needs to successfully navigate the Winter differs from region to region. In Vermont a strong hive typically requires a minimum of 60-80 pounds of honey to get through Winter without starving. Placement of this honey is crucial, as a significant amount of it must be located above the brood nest so that as the cluster naturally moves upward during the Winter it is able to maintain contact with these crucial honey stores. Thus, the anatomy of the hive well prepared for winter finds a large, healthy cluster of bees surrounding the brood nest near the bottom of the hive with plenty of honey stored above to provide room for the hives slow and steady upward Winter migration.

To help ensure that the bees always have sufficient honey stored above the brood in Autumn, I like to leave a shallow super full of capped honey on top of each hive. This is accomplished by peaking down between the frames of each super below the honey super I am about to harvest and if there is a significant amount of brood in the super below, I leave the full super of honey where it is. Nucleus colonies or weak hives that have not filled a shallow super with honey above the brood nest receive a full shallow harvested from a stronger hive. This standard operating procedure goes hand in hand with the management technique I like to use that utilizes hives consisting of a deep 9-5/8-inch hive body sandwiched between two shallow 5-11/16-inch supers, which act as shallow hive bodies, as opposed to the conventional hive consisting of two deep hive bodies.

As I wrote in the recently published *Natural Beekeeping*, there are a number of benefits to using two shallows and a single deep as the main body of a hive. The greatest benefit is realized when having to feed colonies. When it comes to feeding a hive, the best food we can offer is honey already sealed in the comb and a weakened hive makes

an especially good recipient of such feed, because it will save them from expending additional energy converting sugar syrup into honey. When using shallow or medium supers as part of the main hive unit, honey can be fed in the comb more efficiently than if only deep hive bodies are used for the hive proper. For example a nucleus colony that has filled their deep hive body with honey, pollen, and brood can be provided with all the feed they will require for the Winter by adding a full shallow containing about 30 pounds of honey on top of the deep hive body, rather than giving them another full-depth super that can hold as much as 75 or 80 pounds of honey – especially since there is honey already stored along with the brood in the hive body below.

The other big plus, of course, is the fact that shallows full of honey are much easier to lift than full deeps – a benefit that becomes more and more significant the older one gets. Also, if mice get into the hive during the Winter, they typically build their nest in the bottom super. In such instances it is preferable to have shallow frames of drawn comb damaged by mice rather than the more valuable deep frames. Inserting a piece of one-quarter-inch hardware cloth cut to fit neatly into the bottom board opening when bent into a "V" shape will go far in discouraging mice from taking up residence and causing damage during the cold season.

Some beekeepers will remove most of the honey from a hive and feed the hive sugar syrup in return since sugar and corn syrup are much less expensive than honey. As mentioned above, exploiting the bees in this manner weakens the bee's and stresses the hive making it more prone to viruses, diseases and other disorders.

If hives have not been able to secure enough honey for the Winter, and no additional frames of honey are available, feeding is required to prevent starvation. Any bee food other than honey will likely be lacking in enzymes and trace minerals and may even contain components that are toxic to bees that can severely sap the hives strength and weaken their immune systems. Bees are meant to eat honey made from the nectar of flowers, not sugar water or corn syrup, thus if honey in the comb is not available, the next best thing to give the bees is honey syrup. This can be made by mixing some water with honey from colonies known to be disease free. Following honey syrup, sugar syrup made from white sugar is the next best thing to use though it will not contain the enzymes found in raw honey, nor does it have any trace vitamins or minerals like nectar does. Brown sugar contains some of the minerals missing from white sugar, it also contains matter that is indigestible to the bees and promotes dysentery if given to bees before Winter. Don't use it.

Although it is not ideal, at least syrup made from white sugar does not contain components that are toxic to bees, unlike corn syrup which should never be given to bees, unless you want to weaken the strength of your colonies and increase the potential for them to develop health issues and become more susceptible to parasitic invasion. There are a number of ways in which corn syrup harms bees. To begin with, as Dr. Pamela Gregory of the Weslaco Bee Lab has reported, High Fructose Corn Syrup (HFCS) contains small amounts of sugars that are toxic to bees. Bees given HFCS will have shorter life spans than those fed honey or a mixture of white sugar and water. When corn syrup sits in a tanker truck out in the hot sun too long, the high temperatures degrades the syrup and additional toxic compounds are created which further weaken a bee's immune system and causes them to die even earlier than those that are fed good batches of HFCS. The base material for making HFCS, corn, is one of the most commonly genetically altered crops grown in the U.S. This genetic material once released into the environment migrates, reproduces and mutates. Thus, most corn syrup is contaminated with at least small amounts of genetically modified DNA. The proteins expressed by such Genetically Modified Organisms (GMO's), have been shown to weaken the immunity of the honey bee causing them to have shorter life spans. GMO's have also been shown to disorient bees so that they have difficulty differentiating between the scents of flowers. It's possible such learning disabilities could also cause bees to become lost and unable to navigate back to their hive. Protein powder derived from soybeans, another crop that is typically Genetically Modified, also contains these toxic sugars and may weaken a hive's immunity when fed as a pollen substitute. As with you and me, high quality natural foods are required to nourish the body properly.

Leave the bottom open and the screened bottom uncovered - really.

Once you have ensured that your bees are healthy and have plenty of honey stored away for Winter, you'll want to be sure that the bees stay dry. The first line of defense against excessive moisture in the hive is the outer cover. A solid cover that does not leak and stays in place will keep out many forms of water. Many beekeepers will use a rock or brick to weigh down the outer cover so that strong Winter winds will not pry the cover loose, flinging it aside and allowing precipitation to enter. This usually works fine unless the apiary is located in an area where cows or horses may use the hive as a scratching post and inadvertently push a colony over while rubbing up against it. Wet areas that experience severe frost-heave activity can potentially cause our little bee condos to topple over

Filled with plenty of honey and healthy bees along with a sheet of insulation above the inner cover and an outer cover that is tied down securely, these hives are well prepared for Winter temperatures that can reach 20°F below zero.

as well. During major storms, floods or powerful winds can pick up a hive and transport it a considerable distance. To help defend against these types of occurrences, or when you have so many hives that the number of rocks or bricks needed to weigh down the covers is unwieldy, outer covers may be tied down securely with thin rope or twine. At a minimum, the twine should wrap around the two uppermost supers and hold them together, to increase the chances of colony survival in the event that the hive becomes dislodged from its base during the Winter. If the twine or string used to tie down the covers in the Fall is made from a natural material such as jute or hemp that is not treated with chemicals to prevent rot or repel rodents, it can be saved after being removed in the Spring and safely reused as smoker fuel.

Another source of moisture that may find its way into the hive during the Winter comes in the form of water that runs in the bottom entrance and collects on the bottom board. Placing a piece of wood or some other material under the rear of the hive will tilt the colony forward so that water from rain or melting snow will not run into the hive. This is especially important for colonies with bottom boards that extend out in front of the hive to provide the bees with a landing area, because these extensions can catch a significant amount of snow and rainfall. Colonies outfitted with screened bottoms made of wire mesh or hardware cloth open to the ground in order to reduce *Varroa* populations don't need to be concerned with this possibility, since any water that runs into the hive will drain through the screen rather than collecting on the bottom board.

A large amount of moisture is created within the hive during wintry weather as a by-product of honey bee respiration. The importance of providing adequate ventilation to help remove this vapor during cold weather cannot be overstated. This is why the reduction in ventilation created by most hive wraps, blankets, or packing materials often causes more harm to the hive than any insulating benefits they provide. Packing insulation can also serve to lock in the cold and prevent the colony from responding to temporary warm periods that would normally allow the cluster to shift its position within the hive and keep in contact with crucial honey stores. The colony's ability to take advantage of short winter thaws is also important because they provide the bees with the opportunity to go on cleansing flights and relieve themselves of the indigestible products of feeding activity. By the same token, the well packed hive will take longer to warm up in the spring delaying the ability of foragers to take advantage of the earliest pollen sources that are so crucial to the colony's Spring build up. For these reasons I prefer to place apiaries where hives will receive direct sunlight during the day and have some level of protection from the prevailing winds.

Along with an upper entrance for improved ventilation and a mouse guard, this hive sports a tack strip nailed to the bottom board to discourage feeding by skunks.

To help guarantee adequate airflow during the Winter, it is not wise to reduce the opening in the bottom entrance of the hive. This advice will go against much of what you are likely to read in books, and it certainly runs counter to how we maintain our own living spaces during the Winter. In my opinion, entrance reducers should only be used during the Spring and early Summer when a colony, captured swarm, or nucleus colony is small and weak and needs a smaller entrance to defend. If a weak colony is discovered in the Fall, it is better to combine it with another hive rather than to try to carry it through the Winter by itself, because such efforts typically end in failure. A three-quarter-inch hole drilled into a hive body just below, or off to the side of the handhold, will provide an upper entrance that can greatly improve ventilation. Should the bottom entrance become clogged with snow, ice, or dead bees, an upper entrance becomes especially important, not just for ventilating, but also to allow egress for the colony. A screened bottom board that removes a small percentage of mites on a year around basis should become standard equipment on all hives and will do much to improve hive ventilation especially when open to the ground. Initially I was concerned about how hives would survive the Winter with just a screen for a bottom board. However, I am pleased to report that opening up the bottom of the hive, as opposed to reducing the openings during the Winter months, has not adversely affected my colonies' ability to survive during the long, cold Vermont Winters. My concerns were based on anthropomorphic thinking and have proved to be quite unfounded. Hives are able to regulate the temperature of their living space without much regard for the size of the opening built into the floor of their abode. Over the years the bees have proven to me that as long as they have plenty of high-quality honey available and are kept dry, they can typically handle whatever cold temperatures Winter wants to throw their way.

It is also a good idea to insert a one-inch-thick sheet of foam insulation between the inner and outer covers. An empty grain bag with a piece of three-inch fiberglass insulation inside of it that has been cut to the size of an inner cover also works well. I have even heard of folks filling an empty super placed on top of the inner cover

with materials such as loose straw or dried leaves as insulation. Such material placed between the outer and inner covers acts like a hat, keeping much of the heat created within the hive from leaving as it rises from the Winter cluster. More importantly, it helps prevent the moisture riding on the breath of the colony from collecting on the underside of the inner cover, freezing during a cold spell, and then thawing out later on, only to drip back down on the bees.

Generally, the bee cluster can handle being wet when it is warm, and it can deal with very cold temperatures as long as the cluster can stay dry and maintain its access to honey. However, like with people, if honey bees become wet and are exposed to cold temperatures, it is a recipe for disaster.

So there you have it, insulation under the inner cover and adequate ventilation that will help the bees control and remove excess moisture from the hive, plenty of honey, a large population of healthy bees, a secure hive cover, protection from the wind, and exposure to direct sunlight – your keys to successfully overwintering hives located in a northern climate. BC

Ross Conrad successfully Winters his bees in Vermont. He is the author of the just released Natural Beekeeping, *published by Chelsea Green Publishing. www.chelseagreen.com.*

Connie Krochmal

Nectar & Pollen Trees For Northern Beekeepers

Crabapple

Despite the long Winters, many kinds of trees thrive in northern regions. Among those are some excellent landscape plants that happen to be good honey and pollen plants.

Buckeyes (*Aesculus spp.*)

Sometimes known as horse chestnut, these shade trees have large, lush foliage. They thrive in full sun and partial shade. Preferring slightly acidic conditions, these need a deep, well drained soil. Buckeyes can't withstand drought. With a medium growth rate, most are suitable for zones three through seven.

There are several species of buckeyes that are well suited to the North. These include Ohio buckeye (*Aesculus glabra*), a medium sized tree that reaches 20 to 40 feet in height with a matching spread.

Red buckeye (*Aesculus pavia*) is a small tree that grows from 10 to 20 feet in height with a slightly larger width. This thrives in zones four through eight.

Yellow buckeye (*Aesculus octandra*) is a large tree that grows from 60 to 75 feet tall.

Opening in May, buckeye blooms can be quite large and showy. They open in huge, terminal panicles. These are well liked by bees. This excellent quality, light colored honey is thick bodied. A small surplus is possible – around 25 pounds per colony. Though some reports indicate that pollen and nectar from the European horse chestnut and the California buckeye can be toxic to bees under certain conditions, this isn't a problem with the other species.

Crabapples (*Malus spp.*)

Of all the flowering trees, the crab apples are among the best. These thrive in a moist, well drained soil. Adapted to every type of soil, they prefer slightly acidic conditions with a pH of 5.0 to 6.5. These need full sun.

Hardiness can vary slightly from one cultivar to another. Generally, most varieties are recommended for zones three through seven, unless noted otherwise below.

Many crabapple varieties are prone to the same insect and disease problems as regular apple trees, particularly apple scab, rust, and fire blight. For that reason, I recommend cultivars that are known to be disease resistant, which include the following.

Adams crab reaches 24 feet in height. Initially, the blossoms are reddish-purple, fading to pinkish-white. This is recommended for zones four through seven.

Beauty crab is a narrow, upright tree that can grow to about 25 feet tall. The showy blossoms are white to whitish-pink.

Dolgo crab apple was originally introduced in the early 1900s. A rather tall cultivar, this grows from 30 to 40 feet tall with a spread of 25 feet. It has white flowers, and tends to bloom heavily in alternate years.

Professor Sprenger crab reaches about 12 feet in height with a slightly smaller width. This upright, spreading tree has white blossoms.

Blooming in the Spring, crab apple blossoms can be white, pink, or red. These are basically like apple flowers so far as their nectar and pollen potential are concerned. The honey resembles that from fruit trees.


Bee bee tree.

Evodia or beebee tree (*Evodia daniellii*)

Also known as Korean evodia, this medium sized tree can reach 25 to 30 feet tall with a slightly larger spread. It has a medium to fast growth rate.

Considered to be somewhat short lived, this has few pest or disease problems. Evodia needs full sun. It prefers a rich, moist, well drained soil. Adapted to every kind of soil and pH range, this tree thrives in zones four through eight.

Blooming during the Summer in July or August, the small white blossoms are sweetly fragrant. These open in abundance on the new wood in large, rounded clusters, which can easily reach six inches across.

As excellent nectar and pollen sources, evodia blossoms are much loved by bees. However, the trees are rarely plentiful enough to yield pure evodia honey.

Golden raintree (*Koelreuteria paniculata*)

Also known as varnish tree, this grows from 30 to 40 feet in height with a matching spread. This carefree tree adapts to a wide range of soil types and pH conditions. It also tolerates drought and wind. Needing full sun, golden raintree has a fast growth rate. It is suited to zones five through nine.

The showy, yellow blooms open in July. These appear on very long, loose panicles that are up to a foot in length. They provide generous quantities of nectar and pollen. Few details are available about the honey as there usually aren't enough trees in a given location to produce pure golden raintree honey.

Hawthorns (*Crataegus spp.*)

A number of different hawthorn species and cultivars are available. These are suited to northern growing conditions. The size differs considerably from one kind to another. If thorns are undesirable, select thornless cultivars. Most survive the winters in zones three.

Hawthorns need a well drained soil. However, they aren't particular as to pH or the kind of soil. They prefer full sun.

Corkspur hawthorn (*Crataegus crusgalli*) reaches about 20 to 30 feet in height and spread. It is recommended for zones three through seven.

A native tree, downy hawthorn (*Crataegus mollis*) grows from 20 to 30 feet tall. This is hardy to zone three.

English hawthorn (*Crataegus laevigata*) reaches 15 or 20 feet in height with a slightly smaller spread. It does well to zone four.

Glossy hawthorn (*Crataegus nitida*) grows 30 feet tall. It is Winter hardy to zone four.

Lavalle hawthorn (*Crataegus x lavallei*) is a hybrid that reaches 15 to 30 feet in height. This thrives in zones five through seven.

Single seed hawthorn (*Crataegus monogyra*) is between 20 and 30 feet tall. It is recommended for zones four through seven.

Washington hawthorn (*Crataegus phaenopyrum*) reaches 25 to 30 feet in height with a slightly smaller width. It grows best in zones three through eight.

In May and June, hawthorn trees are covered with masses of white blooms. These appear in flower clusters that are three inches across. In some species, the blossoms can have a slightly foul odor, while others are sweetly fragrant.

Hawthorn blossoms are favored by bees. In addition, these trees have extra floral nectaries. Regarding their nectar and pollen status, they're about equal to fruit trees. The color of the honey can vary slightly from one hawthorn species to another. In some cases, it is white, while in others it is dark amber. Considered high quality, the thick bodied honey has a pleasing flavor, which ranges from delicate to rich.

Maples (*Acer spp.*)

As attractive shade trees, maples are the workhorses of northern landscapes. Generally, they need full sun with a few species tolerating partial shade. Maples do best in a rich, moist, well drained soil. These can tolerate a range of soil conditions from slightly acidic to slightly alkaline. Among the recommended species are the following.

Amur maple (*Acer ginnala*) is an excellent small tree. Growing from 15 to 20 feet tall, it is almost as wide. This very hardy plant does well in zones two through six. It can take light shade.

Hornbeam maple (*Acer carpinifolium*) is a relatively low growing species, only 20 to 25 feet or so. Unlike some maples, this can be grown in partial shade. The plant is best known for its hornbeam-like foliage.

Nikko maple (*Acer mandshuricum*) is a medium sized tree, reaching 30 to 40 feet with a somewhat smaller spread. This does well in zones four through seven.

Paperbark maple (*Acer griseum*) has lovely peeling bark. This tree grows from 20 to 30 feet tall with a spread of ten feet or so. It is recommended for zones four through eight.

Striped maple (*Acer pensylvanicum*) is named for the green and white stripes on the stems. This small, native tree reaches 15 to 20 feet in height. Hardy to zone three, it needs some shade.

Sugar maple (*Acer saccharum*) towers over the other species since it can be 60 to 75 feet in height. However, space saving cultivars are available. This is recommended for zones three through eight.

Among the best of the Spring blooming bee plants, the maples provide nectar and pollen and occasionally honeydew. Assuming enough trees are available, a good surplus of honey is possible – from 50 to 200 pounds or more per colony.


Maple

Mountain ash (*Sorbus spp.*)

Requiring little care, mountain ash trees thrive in cool climates. So long as the spot is well drained, these adapt well to a range of pH conditions and soil types. They have a medium to fast growth rate. Closely related to apple trees, mountain ash suffers from fire blight. The hardiness can vary slightly, depending on the kind being grown. Among the recommended species are the following.

American mountain ash (*Sorbus americana*) is a small tree that only reaches ten to 30 feet in height. It does well in zones two through seven.

European mountain ash or rowan (*Sorbus aucuparia*) is a medium sized tree, growing from 20 to 40 feet tall with a spread of 15 to 30 feet. It is recommended for zones three through seven.

Kashmir mountain ash (*Sorbus cashmiriana*) reaches 20 to 40 feet tall and wide. This is hardy to zone four.

Korean mountain ash (*Sorbus alnifolia*) is a rather large tree, 40 to 50 feet in height with a spread of 20 to 30 feet. It is hardy to zone five.

Whitebeam mountain ash (*Sorbus aria*) is a tall species, growing 35 to 45 feet tall. This is Winter hardy to zone five.

Opening in May, mountain ash blossoms are pure white. These appear in large, flat clusters that are three inches across. Sometimes, the trees tend to bloom heavily in alternate years just like some fruit trees.

Eagerly worked by bees, the flowers provide nectar and pollen though there are seldom enough trees in one location to produce pure mountain ash honey as it is used extensively as a specimen plant.

Pears (*Pyrus spp.*)

A number of pear species are used for landscape purposes in the North. Adapted to most types of soil, these will tolerate dry weather. They need full sun. Pear trees are particularly prone to fire blight though some species are less susceptible than others.

Bradford pear (*Pyrus calleryana 'Bradford'*) is much planted as an ornamental. This large tree can reach 30 to 50 feet with a spread of 20 feet or so. It is recommended for zones four through eight.

Chinese sand pear (*Pyrus pyrifolia*) is a large tree that reaches 40 feet in height. This is hardy to zone five.

Ussurian pear (*Pyrus ussuriensis*) is rather tall, growing from 40 to 50 feet in height. Less susceptible to fire blight than most pears, this is hardy to zone three.

Willow leaf pear (*Pyrus salicifolia*) is a small to medium-sized tree that reaches 15 to 25 feet tall. This is hardy to zone four.

Ornamental pears bloom during the Spring in April or May. White blossoms, over an inch in diameter, cover the tree. These can have a slightly unpleasant odor and usually aren't at the top of a honey bee's list.

Concerning their nectar and pollen status, ornamental pear trees are somewhat comparable to fruit trees. The nectar can be so abundant it drips from the flowers but generally the sugar content is low, and, as mentioned, the odor can be disagreeable. Assuming enough trees are available, a surplus of pear honey is possible. BC

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ROBBING

Ann Harman

I am sure that as far back as we can go in history – even before written history – theft was common. The prizes desired may have changed over the millennia, even as they have changed in recent years. The silver candlesticks of 50 years ago have given way to electronics and desirable cars. Flamboyant bank robbers like Bonnie and Clyde have given way to the knucklehead who writes his "this is a holdup!" note on his own deposit slip. Theft can even enter into humor. We chuckle over the exploits of the comic strip hero Hagar the Horrible and the insane episode in Monty Python where the booty was lupines taken from the rich and given to the poor – who had no use for lupines.

But there is no humor among the animals when it comes to robbing. Try giving three dogs two bones. Or give two cats one fish head. My advice is run! Don't get involved. However, with our beehives we do need to get involved when robbing occurs. We can lose colonies and see general disruption of normal foraging. The entire beeyard can become a combat zone. If robbing is ignored the winners will be the robbers.

Robbing in bees is all about food – honey. Stored honey means survival – during the Winter, during dearth. You cannot blame the bees really. Instinct says survive.

How do we recognize robbing (I guess we'll let Hagar call it pillaging) in our beeyard with all of the flying activity normally found on a warm, sunny Summer day? Just stop for a minute and observe what the bees are doing,

We may see bees hovering in front of a colony. Their flight pattern seems to be just going up and down and back and forth without going anywhere while facing the hive. Activity at the entrance is limited to bees doodling around, flying in and out, standing around, walking here and there. These bees are having a normal day, some older ones foraging and the young ones taking orientation flights to learn their home in the beeyard.

It's a lovely Summer day, warm, sunny and one hive seems to have a flurry of activity. Bees running around on the outside of the hive, bees in the air and a general sense of excitement. The other hives in the beeyard are calm but working hard. This colony is in the first stages of swarming. If you just stand around and wait you will have a sight to watch. And if you re fortunate the swarm will settle nearby. I hope you have some equipment ready to put it in.

It's another lovely, warm Summer day and most of the hives have lots of activity: bees flying in and out as fast as they can. What direction are they headed? Are most of them flying way from the beeyard in one direction? Somewhere, probably out of sight, some desirable nectar source has just bloomed. All this activity is a case of "all able-bodied foragers get to work!" These bees are not robbing – they have no need or desire to rob.

Leaving extra supers setting with exposed honey combs, or frames unprotected, or just having a colony open for too long, especially during a dearth, can allow robbing to begin. This can be disastrous for a weak colony, which can be killed outright by robbing bees. It also causes bees to randomly sting people or pets some distance from your colony. DO NOT let robbing begin.

Now we need to consider the conditions that turn the bees to robbing. In many parts of the U.S. you will find a profusion of Spring and Summer blossoms. In some parts, however, Autumn flowers are abundant. If you know your surroundings and your honey plants (and you should) you will find that during some weeks or months there will be a naturally-occurring dearth of nectar blossoms. Now the colony has unemployed foragers.

Are you a good weather watcher? As a beekeeper you should be. All too often we worry about whether the tomato plants have had enough rain. It's time to water the lawn. Don't wash the car – we're having a drought. You must put the needs of your bees on that list of things to worry about. Prolonged dry weather, when it is not the normal pattern, can mean a limited supply of nectar. Those plants in arid and semi-arid regions are able to survive in their familiar conditions. But plants that depend on a certain amount of rainfall do not perform very well in drought conditions. So the foragers search and return home with little or no nectar.

Just the opposite of drought is increased rainfall. The bees are kept at home but the need for honey still exists. During a break in the seemingly-endless showers the bees will search. Some blossoms have had the nectar washed away. Some nectar may be too dilute to be of value to the bees. The rains will stop but the bees need to replenish their supply of food – honey.

Beekeepers, especially new beekeepers, tend to feel sorry for a weak colony. "Those poor bees. Perhaps if we feed them they will do better." Weak colonies have a reason for being weak. It is your task as a beekeeper to try to discover the reason and do something with a weak colony. Feeding may just be the worst thing you can do.

Many beekeepers make nucs for a variety of reasons. These small colonies may have very few guard bees *or none at all.* The hives also have a nice supply of honey given to them because there are more nurse bees than foragers. Defenses are usually poor in nucleus colonies.

In any colony a small number of bees are acting as guard bees. They can cope with one or two intruders; they can permit "foreign" foragers

bearing nectar to enter the hive. But sheer numbers of intruders will overwhelm them. Robbing is done in sheer numbers.

Robbers can be distinguished by their flight pattern. These bees tend on fly into the entrance directly, no stopping at the entrance to be inspected. And they fly out directly, too. Since the scout bees have determined that a good source of food – honey – exists just a short distance from their home hive, recruitment of foragers is swift. Robbing can quickly go from a few bees to an "army" of bees in a very short time.

Even a weak colony will put up a defense. Bees can be seen tussling and fighting at the entrance and on the ground in front of the hive. Paying attention to the activity at the entrance can give beekeepers many clues – is it robbers and defenders? Or is it just normal activity during a strong nectar flow? Dead bees – whether robbers or defenders – may litter the ground. Robbing may spread from the initial hive to others in the apiary until the air seems full of bees flying in different directions but not leaving the apiary on a true foraging flight.

Serious robbing can completely decimate a colony because of the loss of bees accompanied by loss of honey stores. Unfortunately we are not always in our beeyards. Our only clue to a robbed hive may well come on our next inspection, whenever that occurs. Robbers are very efficient. The combs will have not one drop of honey left. Dead bees may well be found inside the hive but sometimes scavengers will remove many of them. Dead bees on the ground get cleaned up quickly during the Summer months. As you inspect your other hives you may find one or more with more honey than expected. Robbing? Very possibly.

Sometimes beekeepers inadvertently set the stage for robbing. Remember that poor little weak colony you were going to feed? Weak means limited defenders. Feeding at the entrance with Boardman feeders practically invites robbing. Feeding inside the hive either with division board feeders or hive top feeders is much safer. But reduce the entrance to give the few guard bees a better chance.

Beekeepers usually do not think of their nucs as weak colonies, but they really are. The colony is small and at times will have few or no guard bees. Those with few foragers will need to be fed. So the problem can be considered to have the same solution as a weak colony in a full-sized hive.

Drought with little or no nectar coming in may mean you need to feed *all* your colonies. Robbing is generally not a problem in this instance. Every colony is busy with its own syrup source. But you will need to check those feeders. If one stays empty for a few days those bees can easily turn into robbers.

Robbing tents have been in use since beekeepers started to keep bees. (This from 1891 ABC & XYZ of Bee Culture.*)*

When you took that sugar syrup out to the beeyard did you spill any of it? Did you spill any on the outside of a hive? During a dearth situation syrup spills can initiate robbing. Use care. An ordinary garden watering can with the spray head removed can help fill feeders without spillage.

Beekeepers sometimes set their wet honey supers out for the bees to clean up after extracting. The bees do love them! Where did you put them? If you set them near the beeyard the bees robbing them may well move on to robbing each other's hives when the supers are all cleaned up. It is better to put the wet supers over the inner cover, making sure each hive has a super. The situation here is like feeding every colony.

Some beekeepers make themselves an anti-robbing cage in order to inspect colonies during dearth times. You can make a simple four-sided one or a more elaborate one with an entrance in one of the sides or at a corner. It needs no roof since robbers will not discover it has no top. Make a four-sided screen "house," using 1x2 as frames for some light-weight aluminum or plastic window screen. Make it a convenient size for you and one hive, allowing room to work. Just move it from hive to hive with you as you go through your apiary.

Robbing screens, sometimes called moving screens, are available. These small, screened frames are placed over the entrance of a hive. The resident bees find their way in and out of the top which is open. Robbers crash into the screen since they are attracted to the odor of honey or syrup coming from the entrance. They simply do not figure out how to enter. Robbing screens can be very useful for nucs that are placed in the beeyard with full colonies.

It is possible to take emergency measures to stop robbing. These will give you time to assess the situation: weak colony, dearth, syrup spills? You will have to pick a solution that fits your apiary.

Quickly stuff entrances with grass and weeds. Even if you trapped a few robbers inside, the resident bees will take care of those. By the time the grass has withered and blown away the bees will have forgotten their project and it gives you some time to discover why robbing began.

Grab the lawn sprinkler and garden hose. The gentle "rain" from the sprinkler will send all the bees home again giving you time to figure out what happened.

Run through the beeyard taking the tops off all the hives. Although this sounds strange, the bees now have a reason to defend their own hive. You can put the tops back on after it gets dark. In many cases by the next day the bees have forgotten their project of the day. But you still need to think about why the robbing started.

Don't let your bees become Robin Hood and His Merry Band. You need to be the Sheriff of Nottingham. BC

Ann Harman keeps the peace with all the bees around her home in Flint Hill, Virginia.

? DO YOU KNOW ?

Keeping Up With The Basics

Clarence **Collison**
Mississippi State University

Once again the mid-south area is suffering from a serious drought and it is indirectly affecting honey production in many areas. There are numerous factors that affect nectar secretion, i.e. solar radiation, soil moisture, temperature and soil pH. Any time that plants are under some sort of stress, it is likely to negatively impact flowering and nectar secretion. Honey bee colonies currently under stress are also encountering problems. Several forms of stress associated with *Varroa* mites, moving colonies, poor nutrition, bacterial, viral and fungal diseases, may be involved. There is also evidence that the honey bees have compromised immune systems which would be stress related, as well.

Please take a few minutes and answer the following questions to determine how familiar you are with basic beekeeping knowledge.

Level 1 Beekeeping

1. ____ Larval workers and queens less than 2.5 days old have the same number of ovarioles. (True or False)
2. ____ Tracheal mites are a serious problem during the Summer. (True or False)
3. ____ *Varroa* mites have higher reproductive rates on European honey bee brood in comparison to Africanized honey bee brood. (True or False)
4. If you remove a queen from a colony, they have only ____ days to begin queen rearing before the colony loses its ability to produce a new, functional queen.
   A. seven B. three C. six
   D. four E. two
5. ____ Queen mandibular pheromone is highly volatile and is spread through the colony by the bees fanning their wings. (True or False)
6. ____ *Varroa* mite reproduction is closely synchronized to the development of honey bee larvae and pupae. (True or False)
7. ____ Queen mandibular pheromone is responsible for the inhibition of queen rearing in queenright colonies. (True or False)
8. ____ A newly emerged virgin queen honey bee has about one-half of her queen-mandibular pheromone blend within her glands in comparison to a newly mated queen. (True or False)
9. ____ A queen cell cup is a precursor of an emergency, swarm and supersedure queen cell. (True or False)
10. ____ Acute bee paralysis virus kills larvae, pupae, and adult honey bees only in association with *Varroa* mites, otherwise bees seem healthy. (True or False)
11. ____ Peak drone production occurs in the temperate region in mid-summer. (True or False)
12. ____ When foragers discover unproductive food sources they mark them with a scent. (True or False)
13. ____ Brood production shortens the life of the worker honey bee. (True or False)

Advanced Beekeeping

14. ____ Picorna-like virus particles have been isolated from *Varroa* mites in the:
   A. Brain B. Gastric caecae C. Salivary glands
   D. Rectum E. Reproductive organs

Geraniol, Nerol, (E,E)-farnesol, (E)-Citral, (Z)-Citral, Geranic Acid, Nerolic Acid

15. The chemicals listed above are associated with the _____ gland and are known as _____ _____ pheromone. (2 points).
16. ____ A honey bee can be infected with multiple viruses at the same time. (True or False)
17. Please indicate why a class of insecticides, the neonicotinoids such as imidacloprid are being considered as a possible cause of colony collapse disorder. (1 point)
18. ____ Groups of old queenless worker honey bees develop ovaries more quickly than do groups of young queenless workers. (True or False)
19. ____ Both queens and worker honey bees internalize a portion of the queen mandibular pheromone produced by the queen in the colony. (True or False)
20. ____ Volatiles produced by the honey bee larval cuticle initiates egg development in the *Varroa* mite. (True or False)
21. ____ Ecdysone is known as the molting hormone and is produced by the corpus cardiaca. (True or False)
22. ____ Enzymes involved in the digestion of pollen are produced by the:
   A. Salivary Glands B. Ventricular Wall
   C. Mandibular Glands D. Intestional Wall
   E. Peritrophic Membrane
23. ____ Maximum production of Nasonov pheromone occurs in nurse bees. (True or False).
24. ____ Laying workers are able to produce queen substance (9-oxodecenoic acid). (True or False)
25. ____ Name the cells that are responsible for secreting the chorion of the egg. (1 point).

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **True** All female larvae initially have the same number of ovarioles whether they ultimately become either queens or workers, until they are 2.5 to three days old, when nurse bees stop giving larval workers 100% royal jelly and feed them a mixture of jelly, pollen and honey. After that the number of worker' ovarioles dwindle. Larval queens get only royal jelly and so by day five, workers and queens differ vastly in ovariole count. Workers reabsorb their ovarioles during the pupal stage.
2. **False** Tracheal mite populations build up during Winter confinement so colonies are most affected during Winter confinement and early Spring mites are at a maximum in the early Spring.
3. **True** Different studies have shown that *Varroa* mites have a higher reproductive potential on European honey bee brood in comparison to Africanized honey bee brood.
4. C) six
5. **False** The chemical components of queen mandibular pheromone are not particularly volatile. The retinue of workers remove the pheromone by touching her with their antennae and licking her, then, traveling throughout the nest and contacting other workers.
6. **True** Volatiles from the honey bee larval cuticle activate the female *Varroa* mite to begin producing eggs.
7. **True** Queenless colonies receiving one queen equivalent or more of pheromone per day, made almost no attempt to rear new queens for four days and even six days after queen loss, there was no difference between queen cells in treated colonies and queenright control colonies.
8. **False** A newly emerged virgin queen has virtually no pheromone in her glands. The full blend, including the aromatic compounds, is secreted only after a queen has finished mating and begins to lay eggs.
9. **False** Swarm and supersedure queen cells begin from cups, but emergency queen cells usually begin by enlarging a worker cell containing a young larva.
10. **True** Honey bees with acute bee paralysis virus seem healthy, but when infected bees are in association with *Varroa* mites, the virus kills larvae, pupae and adult bees.
11. **False** Peak drone rearing in the temperate regions occurs about four weeks before swarming. Colonies produce fewer drones in the Summer when few virgin queens are produced.
12. **True** Research has produced evidence that honey bees may mark unproductive food sources with a scent (deterrent pheromone) discouraging other foragers. Sources from which bees are able to obtain food are marked with an attractive odor.
13. **True** The length of a worker honey bee's life is determined to a great extent by pollen consumption and brood rearing. As a result of brood-rearing protein stored in their hypopharyngeal glands and fat bodies soon becomes exhausted and their life spans are reduced.
14. B) Gastric caecae
15. Nasonov or scent gland, Nasonov pheromone
16. **True** Both drone and queen honey bees have been shown to harbor two separate viruses at the same time.
17. There is some evidence that the neonicotinoids such as imidacloprid may cause honey bees to become disorientated while they are foraging, thus they are unable to find their way back to the hive.
18. **False** Research has shown that groups of young queenless workers develop ovaries more quickly than do older groups of queenless workers.
19. **True** The queen internalizes some 36% of the pheromone she produces by swallowing it or some is adsorbed on or bound to her cuticle, and some moves through the cuticle into the blood. Messenger bees internalize some also. Nearly all of the pheromone is eventually internalized.
20. **True** Volatiles from the honey bee larval cuticle activates the female *Varroa* mite to begin producing eggs.
21. **False** Ecdysome is produced by the prothoracic glands found within the thorax.
22. B) Ventricular Wall
23. **False** Newly emerged workers have little or no secretion, but reaches a maximum when workers are foraging.
24. **True** Queen substance has been found in the mandibular glands of some laying workers.
25. The chorion of the egg is produced by the follicle cells that surround the egg during its development within the ovariole of the ovary.

There were 13 points in eachlevel this month. Check below to see how you did. If you scored less than six points, do not be discouraged. Keep studying – you will do better in the future.

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

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

GLEANINGS

AUGUST, 2007 • ALL THE NEWS THAT FITS

QUEENSLAND BEEKEEPER MURDERED

A New South Wales man has been charged with murdering Queensland Beekeeper Association official Anthony Ross Knight.

Police released few details as they arrested a 33-year-old man from Tenterfield in northern NSW, who was charged with one count each of murder, robbery with violence and stealing.

Donald Robert Alcock was not required to enter a plea during his brief appearance.

Knight, 41, was the quarantine chairman of the Queensland association and a recognized expert working with the state Department of Primary Industries.

He was found shot dead on his property at Stanmore, 45 miles northwest of Brisbane, on June 4.

There are reports up to five tons of honey in 50 containers and worth about A$40,000 (US$33,659) may have been taken from Knight's property.

During their investigation police interviewed Capilano Honey Ltd. employees responsible for monitoring the delivery and purchase of honey, including Knight's.

Knight was a honey supplier to Capilano for more than 10 years.

Under Queensland law magistrates cannot grant bail to a person charged with murder and as such no alleged facts about how or why Knight had been killed were mention in court.

Details could be made public should he apply for bail from a Supreme Court judge.

The magistrate ordered Alcock remanded in custody for committal mention Aug. 8.

Alan Harman

CERANA SEARCH CONTINUES IN AUSTRALIA

The Asian honey bee incursion in Queensland, Australia, continues to be treated as a potentially serious threat, despite indications that the species found in Cairns recently is less likely to carry the destructive *Varroa* mite.

Department of Primary Industries animal biosecurity general manager Allison Crook says conclusive results on tests of the bees have been delayed by equipment problems at an independent laboratory.

"Early indications are that the strain of Asian honey bee detected in Cairns on May 4 is of a type less likely to carry the feared *Varroa* destructor mite," Crook says. "But until results conclusively prove this, we need to be on our guard."

Department officers have been out in the field since the detection of the nest using survey techniques to help determine if Asian honey bees are still present in the Cairns area of northern Queensland.

Officers have been using "boiling-up" lures where beeswax is boiled to create a plume to attract bees so they can be gathered for identification. Sweep netting of naturally foraging bees is being conducted as well to identify bees in the area.

This has been complemented with strategically placed pheromone traps.

No Asian honeybees have been detected to date.

Beekeepers attending an industry meeting were given equipment for their hives with "sticky" traps to catch any *Varroa* mites if present.

Crook says the department and the beekeeping industry are continuing to treat this latest incursion as a serious threat.

"We will not drop our guard because this mite can not only impact on the honey industry and amateur apiarists but affect all associated industries and crops that rely on the honey bee's services for pollination," she says.

Alan Harman

NORTH AMERICAN POLLINATOR PROTECTION CAMPAIGN

The U.S. Department of Defense, which manages nearly 30 million acres of U.S. land, signs a memorandum of understanding to support pollinator protection with the Coevolution Institute, manager of the North American Pollinator Protection Campaign (NAPPC), during National Pollinator Week.

The memorandum signing at the Pentagon came during the first ever National Pollinator Week.

The event coordinated by the NAPPC, is a partnership of more than 120 organizations in the U.S., Canada, and Mexico. NAPPC works to promote awareness of the importance of pollinators - the birds, bees, bats, butterflies, beetles, and other animals that enable the reproduction of over 75% of flowering plants and are responsible for as much as one-third of the food supply.

The Bureau of Land Management also sign a memorandum with the Coevolution Institute during National Pollinator Week, paving the way for awareness and action on the 258 million acres of U.S. land that it oversees – 40% of all land managed by the federal government.

Coevolution Institute previously signed agreements with other government agencies including the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the National Park Service.

With the latest signings, more than 30% of the landmass of the continental U.S. will begin to factor in pollinators in their conservation efforts.

National Pollination Week was backed by a proclamation by Secretary of Agriculture Mike Johanns and a unanimous vote by the U.S. Senate.

Among the events during the week was the release of a series of four commemorative stamps entitled Pollination. The stamps portray pollinators with their corresponding native plants.

At the legislative level, pollinator conservation advocates in the U.S. Senate are working to pass the Pollinator Habitat Protection Act, which would assure that language promoting pollinator conservation is included in the Farm Bill, as well as a pollinator research billl. The House Natural Resources Committee plans an oversight hearing to understand the role of pollinators in public lands.

Alan Harman

THE POLLINATOR GARDEN WHEEL

The National Academies and the North American Pollinator Protection Campaign (NAPPC) release their pollinator garden wheel to help gardeners, teachers and everyone looking to improve the health of plants in their community/

The Pollinator Garden Wheel is a colorful information resource aimed at generating a more active gardening population, aware of the importance of pollinators - the birds, bees, bats, butterflies, beetles, and other animals.

The content of the Pollinator Garden Wheel shows pollinators and their corresponding host plants, allowing gardeners to make an informed decision as to which plants to include to attract more or certain types of pollinators. It promotes simple, concrete actions that everyone can do to support pollinators, such as ways to create habitat and food resources for pollinators in both urban and rural environments.

The wheel is available for a $5 postage and handling charge and its production and distribution is being underwritten by corporate and government sponsors.

Alan Harman

OBITUARY

Howard Herman Schmidt, ("The Bee Man") age 89, of Winner, SD passed away peacefully at his home on May 13. Howard was born to Oscar and Anna September 25, 1917 in Bay City, MI.

Howard attended school in Bay City and graduated from Bay City Central High School in 1936. At the age of 21, Howard purchased a bee outfit in Filion, MI and then moved the bee operation to Winner, SD in 1955. A few years later, he joined in partnership with his brothers Russell and Don. This was a business that he thoroughly enjoyed. In fact at the age of seven, Howard had his first two colonies of bees. He continued to stay active in beekeeping all of his life and served as chairman at times of the MI, SD and Midwest Beekeepers Associations.

Howard married Marjorie Schade on September 16, 1939 in Flint, MI. To this union three children were born – Gary, Dennis and Joan.

LEARNING SPANISH

There has been a mounting interest on the part of farm employers in learning a little Spanish, based on a desire to better communicate with their Spanish-speaking employees. So, a few years ago, a Spanish language Project was started at the University of California Cooperative Extension, based on the following principles:

- Focus on learning by first listening.
- Focus on learning by repeating after native Spanish-speakers.
- Preserve the correct use of the Spanish language.
- Avoid the use of slang or "Spanglish."
- Where several correct words are available, provide those used in Mexico, or words of more universal usage.
- Provide a neutral-sounding Spanish that avoids regional accents.

While a dictionary has been available online for several years, the audio portion of the project is now taking form. The first lessons are now available on the Web. They include strategies for learning Spanish so you sound like a native speaker as well as several practice audio tracks to work on rolling your "erre" and pronouncing some of the more difficult vowels and consonants.

The project is available at **www.cnr.berkeley.edu/ucce50/ag-labor/spanish**. If you would like to suggest words or expressions to translate, or for more information, contact University of California Cooperative Extension farm adviser Gregorio Billikopf at gebillikopf@ucdavis.edu or call 209.525.6800.

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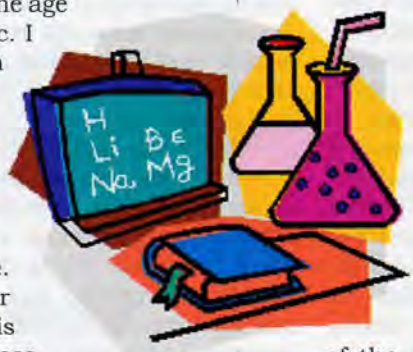
Better Cooking Through Chemistry

At all the beekeeping workshops I attend, I have a sick need to subject myself to the tortures of the cooking with honey classes. I don't know if it's the part of me that can't look away from train wrecks or the part of me that is a well of eternal hope that one day someone is going to say something interesting and new.

I attended a typical one this Spring. This workshop bore all the warnings that it was about to jump the track, but I couldn't bring myself to look away. We started the session with lots of volunteers scurrying around with trays of little styrofoam bowls filled with cornbread and chili. It turned out to be inedibly sweet cornbread with a beef chili sweet enough for me to justify serving it to my kids as dessert. It just got better from there. I was sitting next to Bonnie and her husband Bob when the lecturer du jour, a county extension agent with a hardcore background in food safety reminded us not to eat raw eggs or feed honey to infants under the age of one. This is classic-cooking-with-honey rhetoric. I have yet to kill any of my children with a homegrown botulism neurotoxin and this lady is giving me a stern reminder not to. The average person in the room has probably been keeping bees for a decade or more, some lots more. I'm guessing that most of them haven't poisoned any infants either.



The next stop in classes like these is always the "honey is sweeter than table sugar" lecture. Bonnie and I take a few moments to discuss our children, her grandchildren, the potato plant Bob is trying to grow on the windowsill at home. Some class participants start audibly nodding off.

My husband is across the hall learning about the latest research findings out of the University of Smartysmarts regarding advancements made in rearing queens from superior genetic stock retrieved from survivor colonies. I'm getting a treatise on the timing of adding club soda to a "quencher" because people really seem to enjoy the "fizziness." When the recipe for the "quencher" finally gets passed our way Bonnie and I exchange looks. Do you really need to pass out a recipe whose only ingredients are pineapple juice, club soda, honey and a lime wedge? I call these type recipes the "squirt and stir" school of cooking. All the recipes involve nothing more than squirting honey into things that are already plenty sweet enough, or are actually made worse with the addition of honey. I was concerned that Bob was going into a diabetic coma after we tasted the honey sweetened sauerkraut.

Cooking schools have been around since our ape-like ancestors ate ants on a log and called it "ants on a log." About 10,000 years ago cooking classes involved our hairy forebearers teaching one another how to raid a beehive. More recently and more to the point, at the turn of the century in America, cooking schools sprung up like weeds. Fortunes were made on teaching women how to use new fangled appliances like stoves. Fannie Merritt Farmer altered the course of cooking by standardizing level measurements. Gone were the days of butter the size of an egg. Harvard and MIT created annexes to their universities to allow in this new crop of domestic scientists. Scientific cookery was the way of the future and the visionaries imagined that every kitchen would be a laboratory where wives and mothers would calculate the caloric contents of their meals and serve them with industrial efficiency. Why then am I sitting here listening to the fruit juices that I can substitute for pineapple in a "quencher?" What happened to the scientific cookery movement? Have we regressed to little more that "ants on a log" only in this case it's a banana log smeared with honey and raisins.

There's no lack of interest in cooking with honey. The interest is there. These train wrecks..er..classes are always packed. The problem is that most of the women and men in the classes have been cooking meals for themselves, children and grandchildren for a half century or more, but they are not given due credit for this kitchen experience. Cooking meals every day, three times a day, for years and years should count for something. Instead we're stuck sitting through the same curriculum as your average seventh grade home economics student- and not even an honors student. We know how to squirt and stir. We are tired of the classic mid-western fare of chili, casserole, stew and fruit crisp. We've made honey wheat banana bread so often our kids bolt for the door when it comes out of the oven. We do not need more recipes for fruit punch, thank-you. Why bother teaching this honey laden mid-western fair to Midwestern cooks? Our mothers have already beat you to the punch, or rather, to the "quencher." Where's the science? The learning? The innovation and new technology? If beekeepers get the honey bee genome project why am I just squirting honey into ground beef?

I think the problem has three parts: instructors, content and recipes. First of all, although I appreciate the value of food safety I don't think that scare tactics have much of a place when it comes to encouraging cooks to try something new. Instructors should not foster an unreasonable fear of egg shells or micro-

Continued on Next Page

BOTTOM BOARD

organisms. Not all instructors push such an agenda, but unfortunately it seems that those without that requisite food safety background offer little more than "breathing" and "willing" on their resume. Fannie Farmer and Julia Child these people are not. They endeavor to enlighten and entertain with as much enthusiasm as I put into tuna noodle casserole.

Secondly, let's depart from the familiar and explore a little in our course work. I like rhubarb crisp as much as the next person, which really isn't that much at all when you come to think of it, but I'd like some exposure to recipes that are either totally foreign to me or much improved with some instruction. Can we please use a balloon whisk once in a while, or a micro plane zester or how about a pastry bag, immersion blender, baking tiles, offset spatula... ANYTHING but wooden spoons! Furthermore, where is the talk of infusions, emulsions, caramelizing and reductions that all the kids in the honors classes get at school? There are small cooking schools, seminars, lectures and classes throughout the country, and people are pouring money into established cooking schools like crazy. I myself have attended several classes and even arrived early for the King Arthur Flour bread baking workshop because everyone knows those classes are standing room only. The instructor was an ex-nuclear submarine big shot turned baker, and the ladies swooned when he explained the gluten molecule's role in producing quality egg enriched sweet breads. Personally, my knees would go weak in a Indian flat bread workshop that offered chutney recipes made with honey.

There are other models for teaching about cooking too, *Bon Appetite, Gourmet, Cooking Light,* even the *New York Times* very often feature honey recipes that I've never seen taught in beekeeping workshops. Pardon the pun, but can't we poach these recipes and enjoy the food trends that the rest of America is experiencing?

Speaking of trends, what about the recent phenomenon of cooking science books. The dining car on the cooking with honey train doesn't have a view, or a clue, that bookstores are filling with cookbooks turned chemistry textbooks. My personal favorite is Harold McGee's book *On Food and Cooking*, published by Simon and Schuster. He includes a great chapter on the characteristics of honey and its uses and limitations in cooking. This is exactly the caliber of instruction being taught in the other rooms of the beekeeping symposium when the cooking class has a head on collision with whole wheat and carob chips. Granted Mr. McGee can be a little over the top if you're just trying to impress the in-laws at the next cookout, but it's a fascinating read if you really like to know the nitty gritty of your grits. Christopher Kimball, editor of *Cook's Illustrated* magazine, has an exceptional ability to present science and technique with recipes in a fresh and interesting manner. All this is nothing new of course which is my point, entirely.

The really noticeable difference between great classes and ho hum classes appears to lie in the teacher's willingness to embrace a topic and flush it out for the audience with techniques, recipes and experience having destroyed it enough to claim mastery. I heard once the Julia Child spent three months perfecting a boiled egg. *Cooks Illustrated* once featured, yes featured, plain scrambled eggs. Don't misinterpret what I'm saying, however, I don't want to see honey sweetened scrambled at the next symposium. Whether scrambled eggs or brownies, there are nuances to cooking that can make the difference between cookin' and cooking.

The point is that a good presenter has focus and a goal for the class which comes through in the choice of content. If you attend a cooking class, regardless of the sponsoring organization, you should learn something to improve *all* manner cooking. New skills encourage experimentation that will likely encourage new recipes for honey. Here's an example for a class I'd pay to see- "Pate a Choux and You" or the more authentic sounding "Pate a Choux et vous." This is a versatile dough that is the base for cream puffs, eclairs, choux paste swans, profiteroles and the fabulous croquembouche (think cream puff tower drenched in golden caramel). It's a recipe that appears in every cookbook but can be intimidating. Master this relatively simple dough and you are "Miss Pastry Chef" of your bee club. Encourage students to make the caramel or flavor the cream filling with honey and here we come Hot New Food Trend. The croquembouche is the equivalent to the big box office draw and the honey scores an Oscar for best supporting actor. Which brings me to my last qualm (or whine-fest, call it what you like) with the honey classes.

Honey is a marvelous substance, but sometimes it should play a supporting role and not the lead. (I know, I know Blasphemy!!!) Face it, sometimes honey is not George Clooney. Foods cooked with honey don't have to taste only like honey. In Regan Daly's book *In the Sweet Kitchen* she has "flavor pairing chart" that lists complementary flavors to popular food items. For honey she lists no less than 60 different pairings! This is way beyond cinnamon and nutmeg, and surprise! surprise! her list does not mention sauerkraut or ground beef. The value of honey as an ingredient is severely limited by the presentation of sub par recipes that feature it as a main source of flavor. It's value to the home cook is dramatically increased by using honey as a more subtle flavor compliment in scores of excellent recipes. This is how we are going to encourage people unaccustomed to using honey to use it more often.

Our graduating class of highly skilled, experienced beekeeper/chefs will return to the kitchen and prepare new, modern dishes and share them with their friends and neighbors. Sounds a little reminiscent of the scientific cookery movement, doesn't it? At least it's a step more in the direction of the Culinary Institute of America and away from our the status quo.

So here's the big caboose. We want, for sure I want, cooking classes that are taught by an energetic and interesting person. An instructor who likes food and food trends, who experiments with recipes and knows enough about the chemistry of cooking to teach very experienced cooks something they don't already know about recipes they don't already use. Follow?

Also, we should encourage new honey recipes by encouraging all recipes not just the ones with a pound or more of honey. And finally let's have some fun! Experiment, eat and enjoy. All aboard? BC

Gwen Rosenberg cooks with honey, experiments with cookery; and hasn't poinsoned anyone that we know of. She lives in Kent, Ohio.