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Commonly called Texas Bluebonnet, Lupines, one of the showy legumes, provide beauty for the beholder, and food for the honey bee.
photo by Ted Keller, Round Rock, Texas

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Subscription Information
U.S., one year, $25.00; two years, $45. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), May, 2007, Volume 135, Issue 5, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

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

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MAY 2007 VOLUME 135 NUMBER 5

FEATURES

DEPARTMENTS & COLUMNS

Brazilian Honey Update

As is well known, the European Union had banned Brazilian honey due to non-compliance with the protocols for quality control that the EU had established. This effectively took Brazilian honey out of the European market and made Brazil dependent upon exports to the U.S. market. As of April 1, 2007, the European Union is re-allowing imports of Brazilian honey. Since the European honey market has substantially risen in Europe as of February, 2007; and since the Euro is strong relative to the U.S. dollar which remains under pressure because of large U.S. national deficits, the Europeans are in a position to pay Brazil much more attractive prices. We anticipate that the re-opening of the European market to Brazilian honey will divert Brazilian honey to Europe. This will likely put upward pressure on prices for Brazilian honey as there is more international demand searching for this limited supply.

Ron Phipps
CPNA Int.

Likes BC

I am a member of the Forsyth County Beekeepers Association and a member of the North Carolina Beekeepers Association. I've just fulfilled the first level requirement for the NC Master Beekeeper Program. I look forward to receiving my Bee Culture each month. Thank you.

Al Parrish
Walnut Cover, NC

Al Parrish gathering a swarm in North Carolina.

Beekeeping & Trapping

First off thank you for the nice calendar (January 07) – very good pictures and excellent information.

I'm writing in regards to the tips on skunks by Jim Doerr (January issue). I've never tried eating skunk, but would be willing to try (I think). I've eaten bobcat once. The "bob" part went down OK, but I had a little trouble with the "cat." I've also eaten cougar and beaver which were quite good.

The part of Jim's letter that I found interesting was his mention of the trapping magazine Fur-Fish-Game, so I assume he does trap. I've noticed that beekeeping and trapping seem to go hand in hand, at least that's my experience. I've trapped for more years than I've kept bees – 62 years minus two years during the Korean war.

I was just wondering what the correlation was between the two? If in fact there is any.

Jim Cowan
Aberdeen, WA

Learning About Bees

Time to send you my thoughts and tidbits of experience in beekeeping and my preferences for *Bee Culture.*

My 33-year-old daughter and I took a beekeeping class in March, 2003, then started with three hives. Never was I as knowledgeable as that first year! We joined a county organization presided over by the class teacher (Wally Nass of Watertown), volunteered for club projects, and subscribed to *Bee Culture* (me) and *ABJ* (Tracy). Living less than a mile apart, we traded monthlies.

I decided, and Tracy agreed, *BC* was the choice to give as a gift subscription to our new county honey queen at Christmas. I like articles about newbies' experiences, stories about marketing, soaps and girl stuff. I really like James Tew's stories about how he does those campus honey shows. And when you wrote about yellowjackets, I sure identified with that. And I always check retail honey prices to see if I should change mine.

At the very first club meeting, I volunteered for the county fair. I took the vice presidency job, (two years) followed by president for another two. I had said no office to three people, but when I came home, the President's briefcase was on the kitchen table. I was on the committee to host the Wisconsin Honey Producers Convention in 2006. And found a new location for the Spring District meeting.

All I really want to do is sit in the woods, watching the bees, and going to small farm markets in my area selling honey and honey products. I like promoting at schools, nursing homes, and dairy breakfasts. I kinda like seeing my photo and story in the paper when a small town newspaper wants to do a feature.

Two of my adult children live within spittin' distance of my house. Between them there are four grandkids under six. When I say honey girl or honey boy, they know just what I'm talking about. They already know to be careful by the beehives. They know a little sweet talk will get them a honey stick or jar to take along home.

I probably bend people's ear when they get me started on the subject of beekeeping, but you know, there are not a lot of us out here anymore. Until I became a beekeeper, I didn't eat honey. If I baked something that called for honey, I'd buy a bottle from the store just for the recipe, let it granulate, then toss it out. That experience helps me with customers unfamiliar with honey's "never going bad" trait.

I hope I haven't rambled past your point of staying interested. I don't want to learn about computers. You see this is just a Smith Corona electric typewriter, errors

fixed with whiteout tape. But I'm glad to still be learning about bees – through other beekeepers and through *Bee Culture*.

Jeanne Malterer
Iron Ridge, WI

Jeanne Malterer and her grandchildren.

INNER COVER

A Mistreated Queen; Global Warming; and The EPA

Easter Sunday. Inches of snow surround and cover the backyard beeyard and all of the beeyards within driving distance. Cold and snow envelop most of the north, the east, the south this Spring.

A week ago it was 70 degrees... willows and maples and daffs and more were in full bloom. Perfect to work both, (of four) of my remaining colonies on that sunny, warm day. One - strong, brood, bees, honey; the other - average, bees, honey, and spotty drone brood scattered all over. Requeening time, for sure.

Got a distant queen from a local supplier in a California mini-cage without attendants (easy for the queen shipper, hard on the queen buyer). Got her transferred into a three-holer, and then the weather turns ugly. Way ugly. For at least two weeks it turns out.

But after only two days in the new cage the new queen is shutting down. She needs more attention than these old, failing winter bees can offer. She's got to get inside a colony. So, on a balmy 27 degree afternoon with flurries, clouds and wind, and it's generally ugly, messy, muddy and miserable outside, I fired up the smoker (more to keep me warm than to control bees) and headed out to the beeyard to requeen that forsaken colony with a queen that's not so good.

I use both 10 frame and eight-frame equipment. This was an eight framer, with all mediums – brood and honey – and the bulk of the bees were mostly in the second, with some in the third box. There was spotty brood in both. So I put her in the very bottom of the third box wedged between two frames facing down for maximum exposure and maximum protection. You'd think that'd work, right? Wrong.

It got colder. And windier. And worse. Those bees shrunk down in a cluster tighter than a granny knot and pulled away from that forsaken queen – and she froze as solid as crystallized honey. Poor queen.

Well, this is going somewhere besides the funeral for a mistreated and ill-managed queen, an inconvenient queen cage and lousy weather. There is a bigger picture here and it's this weather! Inches of snow in April, everywhere? Something's going on. Major reports have documented the significant climate changes that have been and will be. Global warming. U. N. Reports. Al Gore. And now, the Supreme Court and EPA. A most recent ruling says the EPA has to sit up and actually pay attention, no matter what their boss says. It's Supreme Court and Global warming – 1. EPA and the White House – 0. That's one. A good one.

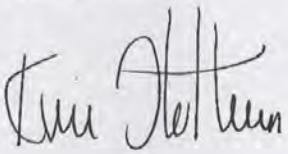
So, what do you say we get Congress and the Supreme Court to start twisting EPA's other arm so they start enforcing the rest of the rules they're in charge of? The day-to-day mantra for this group – the Administrators, the EPA appointees, the guys in charge – is, "If you want us to do the job we're supposed to do, and the current administration doesn't want us to do (like the Global warming, carbon dioxide thing), Sue Us!"

That's the way to do it. That's what the carbon dioxide, Global warming folks did, and finally won. And stuck it to 'em. The EPA is going to have to enforce the laws already on the books. (Ain't it a shame we have to sue our own government to get them to do what they are supposed to do? Can you believe that?).

So now, let's get the EPA to actually enforce the rules and regulations on pesticides plainly and simply written on pesticide labels. Not suggestions. Not maybes. Not recommendations. But Laws. How simple can you get? Let's get the EPA to force State Departments of Agriculture to do the right thing, by beekeepers and everybody exposed to the poisons in our lives. Why isn't Congress screaming mad that this isn't being administered by the EPA? Why?

The EPA and the present administration just got their heads handed to them on a platter. It's what they deserved on this single, though important issue. Now, it is absolutely time they get what else they deserve, and the rest of us should only expect.

The laws and regulations of pesticide use MUST be enforced, now. The EPA MUST do its job, now. The abuse, the neglect, the overt and covert avoidance of responsibility on pesticide regulation must finally stop. The killing must end.



Know About *Nosema Ceranae*

Kim Flottum

Colony collapse disorder (CCD) continues to be a mystery, though the Working Group, at least as of early April, had begun to rule out a whole Pandora's box of causes. One problem they ruled out, at least for most beekeepers that had experienced CCD, was *Nosema*, and specifically this new *Nosema* from Asia – *Nosema ceranae*.

This new-to-the-U.S. pathogen hasn't been studied in detail yet. And though it seems to *NOT* be the root cause of CCD you should be aware of the differences, and the similarities of the now two *Nosema* strains, *ceranae* and *apis*.

Nosema diseases, and there are several of them affecting many insects and other animals, are caused by organisms called microsporidians. These generally cause low-grade, chronic infections, and gross symptoms are usually absent. Infections may shorten the life span, alter behavior or modify some body functions of the host, however. *Nosema apis*, the microsporidian that we are familiar with that infects the European honey bee, *Apis mellifera*, was identified in 1909, but recorded observations of the disease go back to 1857.

The infection agent of the *Nosema* attacking honey bees is a spore. These spores travel between colonies with drifting and robbing bees and can be found at water collection sites – or anywhere bees deposit their feces. Inside the colony, comb contaminated with spore-laden feces is the primary means of transmission between bees. Comb becomes contaminated when bees deposit fecal material in the hive because of dysentery or periods of too-long winter confinement. Honey bee colonies in the warm-winter parts of the U.S. have far fewer problems with *Nosema apis* due to the fact that the bees can fly much more often that honey bees in the north, thus keeping comb freer of spores. *Nosema* is still present in colonies in the southern areas, however.

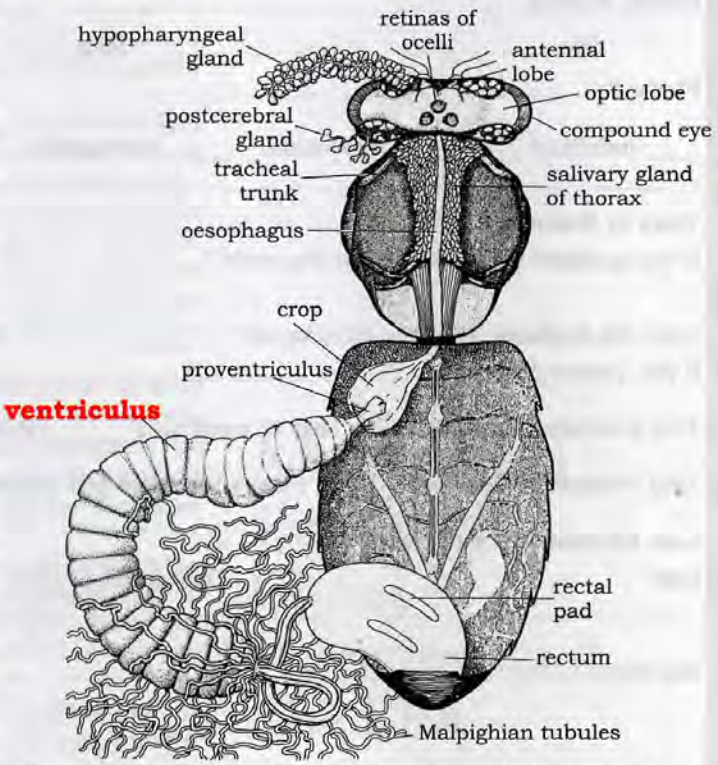
Adult honey bees ingest these spores, primarily when they are cleaning cells, which pass through the proventriculus into the ventriculus, often called the mid-gut. These spores have a tough outer wall and are hardy and long-lived in the outside environment. Once ingested though, gut juices begin to work on that wall. Internally these spores contain a tightly coiled, and very long polar filament, much like a spring. Once the spore wall is compromised by gut juices the coiled polar filament is discharged. Like a hypodermic needle it penetrates one of the cells that line the ventriculus called an epithelial cell. Once an epithelial cell is penetrated, the spore injects an infective cell, a sporoplasm, into the epithelial cell through the hollow polar filament. Sporoplasms mature in the epithelial cells, forming additional spores. This maturation process slowly destroys the epithelial cell. The entire ventriculus can be infected with *Nosema apis* disease within two weeks. Two types of spores are produced – one has a durable outer shell mentioned earlier, and is passed out of the bee in fecal material to infect additional hosts when ingested. They can remain viable in fecal material in a hive for a year, maybe more and are resistant to freezing. The other spore type produced is less robust and remains inside the ventriculus, infecting additional epithelial cells. This may be an immature spore without a durable shell, or it may be specialized. It is not known which.

Adult queens, workers and drones are susceptible to *Nosema*, but not larvae. More workers are affected than drones or queens because of their cell cleaning activities. Drones and queens become infected only when fed by workers that are infected that pass spores on unintentionally when feeding. *Nosema* infected bees have a reduced life span, and infected queens stop laying because their ovaries degenerate as a result of the infection. Infected queens are soon superseded.

The hypopharangeal glands of workers degenerate, too, and their ability to feed larvae is seriously hampered. This in turn affects the next generation, especially larvae produced in early spring. Infected bees have trouble storing protein in their winter fat body (reducing wintering ability), and a host of other physiological and behavioral activities are detrimentally affected. Eventually infected bees die of starvation due to extreme damage of the epithelial cells. Moreover, there are some lethal viruses that infect only *Nosema*-infected bees.

A typical *Nosema apis* infection has low or undetectable spore levels in the summer, a small peak in the fall and a slow rise during the winter. The infection increases rapidly in the spring as brood rearing (and cell cleaning) increases along with an increase in general colony temperature. *Nosema apis* is very seldom fatal to an entire colony, though infected individuals in an infested colony die prematurely.

Many cultural practices reduce *Nosema* disease. Removing spore-contaminated combs should be your first defense, but providing food – both carbohydrates and proteins – when natural sources are limited also helps.



The ventriculus is where Nosema spores end up, infecting epithelial cells that line the gut. Adult bees eventually starve to death because they are unable to absorb nutrients. (from Dade)

Basically, any action that reduces the stress on your bees from diseases and pests and the environment will help reduce outbreaks of *Nosema apis*.

Colonies can be treated with the antibiotic fumigillin to control (but not cure) *Nosema apis*. This drug prevents development of the parasite once it has infected an epithelial cell. This, in turn, reduces further spore production essentially halting the spread of the disease. The drug should be fed dissolved in sugar syrup to colonies entering Winter, to all package bees before shipping, and in the candy in queen mailing cages.

Identification of *Nosema apis* spores with a light microscope is fairly easy, but distinguishing *Nosema apis* spores from *Nosema ceranae* spores is nearly impossible with a light microscope.

So, enter *Nosema ceranae*. In 1995, Dr. Ingemar Fries, from the Swedish Agricultural University in Uppsala, Sweden, while visiting China discovered a new microsporidian, *Nosema ceranae* in the local *Apis cerana*, honey bees (commonly called the Asian honey bee). The spores were slightly different in both appearance and genetics. Dr. Fries subsequently found that *Nosema ceranae* could infect *Apis mellifera*. In 2005 Dr. Robert Paxton, from Queens University, Belfast Ireland, discovered that this new disease was infecting *Apis mellifera* bees in Taiwan. Dr. Paxton and his colleagues quickly developed a rapid and accurate molecular detection system to differentiate the two species. This rapid system soon enabled scientists in Spain to discover this new pathogen was widespread there, also. And severe colony-losses in the winter of 2005-2006 in Spain were linked to this disease.

Nosema ceranae has been found in western honey bees in north and south America, the Caribbean, across Europe and Asia. Although field trials are still incomplete, results of early lab studies are troubling. In one study published this year bees were fed 125,000 spores in sugar syrup. Infection was 100%. Three days after infection, just under 5% of epithelial cells were infected. By day six, two thirds of these cells were parasitized. In the control group (fed sugar syrup without spores), only one bee was dead by day six. Of the infected bees, 66.7% were dead by day six. By day seven, 94.1% were dead, and by day eight...all were dead. The spread of the disease between epithelial cells was extremely rapid and by day three mature spores were being produced.

Another study showed *ceranae* spores in *mellifera* bees increasing from about 30,000 to 140,000 in two days and to 1,400,000 in two more days. In the same study *ceranae* spores in *cerana* bees increased from fewer than 1000/bee to only 120,000 in the same amount of time. Clearly, *Nosema ceranae* seems to grow much faster in our European honey bee than in the Asian honey bee, its original host. The regulator for spore production seems to be missing.

It appears, at least from these studies and reports from the field that *Nosema ceranae* is far more virulent than *Nosema apis* when infecting European honey bees, spreading within the ventriculus much faster than *Nosema apis*, resulting in rapid mortality of infected bees. *Nosema apis* is still considered a benign, but chronic disease, causing individual and colony stress, but wholesale destruction isn't part of the picture.

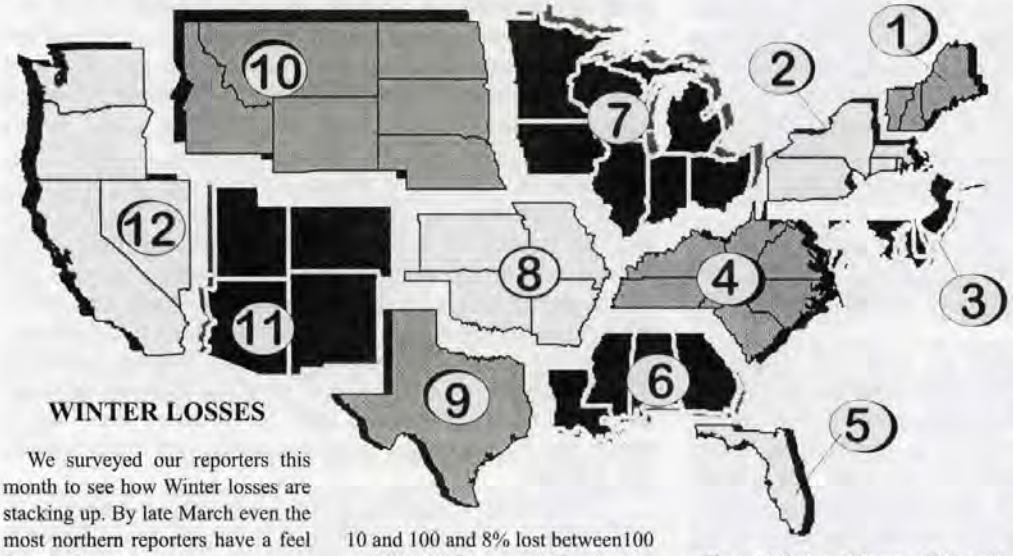
The seasonal development cycle of *Nosema ceranae* in *Apis mellifera* is not yet known in temperate climates, though studies are underway. Moreover, there are no easy tests to discern one *Nosema* spore from the other since the spores appear nearly identical under a light microscope. Until these factors are known it would be prudent for beekeepers to remain vigilant for signs of *Nosema* infection, and to manage colonies to avoid stress.

Remove old, soiled comb; make sure nutritional requirements are met; and keep colonies in dry, full-sun and wind protected sites as much as possible. Treating with fumigillin, which is an antibiotic, is a last resort but may be necessary if a serious infection occurs. This, of course is difficult to detect since there are few outward symptoms. A visual examination of the fluids in the ventriculus for spores is not difficult, however...only requiring a scope with 250x – 500x power. Spores are easily visible and have their own unique shape and color. Which spores are which remains impossible to determine with only a scope. Strong evidence from Europe indicates that fumigillin is as effective in treating *Nosema ceranae* as it is in treating *Nosema apis*. So for now, when spore levels are high treating with fumigillin will help reduce the problem.

Prevention, certainly, is the wiser choice it seems, at least for now. However, until more is known about *Nosema ceranae* in this country, remain watchful for any signs of the disease (dysentery is the most obvious sign of *Nosema* problems, though in and of itself is not the cause of the dysentery). Remove as much inoculum as possible...get rid of those old combs...and as is often heard on these pages...reduce stress in your honey bee colony. BC

Much of the information in this article was taken from a chapter in *Honey Bee Pests, Predators and Diseases*, edited by Roger Morse and Kim Flottum. Ingemar Fries wrote the chapter on Nosema and other protozoan pests.

MAY – REGIONAL HONEY PRICE REPORT



WINTER LOSSES

We surveyed our reporters this month to see how Winter losses are stacking up. By late March even the most northern reporters have a feel for what's out there.

A general overview of the survey shows 18% are commercial, 57% sideline and 25% hobbyists. Not a representative view of U.S. beekeepers, but a very good picture of U.S. beekeepers who sell honey.

Of these, 5% run 1000+ colonies, 34% between 100 and 1000, and 60% have 100 or fewer.

How a loss is measured depends on how many colonies the beekeeper has, but by their own estimates, 34% had low losses, 46% moderate and 20% severe losses. Put into numbers, 7% had no losses, 43% lost 10 or fewer colonies, 40% lost between 10 and 100 and 8% lost between100 and 500. 2% lost over 500 colonies.

What caused the losses. Sometimes it's a guess, but most often beekeepers have a pretty good idea. There was a small percentage of colonies lost purely to starvation – too cold, too long mostly and those were noted. The great majority, however, has a cause: 4% lost directly to pesticides (see *Inner Cover*, this month), 29% attributed losses to 'disappearing,' but weren't specific (though some spelled out symptoms similar to CCD), 33% to mites or diseases and 34% didn't know, or couldn't tell.

Not surprisingly, losses were noted last Fall before Winter - 44%, and this Spring after the first of the year - 52%. A small number – 4% – died during last Summer.

On another note our international trade lawyer in Washington, D.C. informed us that on April 2nd the major exporter of Chinese honey will have a duty increase from 22% to 212%, which must be paid in cash. For your reference, this decision was expedited from the due date at the end of April, after a formal complaint was launched to the D.O.C. that there was what is legally called "changed circumstances". The D.O.C. determined that there was an "extraordinary surge of honey exports" from China to the U.S.

As a consequence, the D.O.C. expedited the imposition of the 212% cash duty rate effective April 2nd. As a result, at least 2 million pounds of honey, that was about to be shipped to the U.S. from Chinese ports, was withdrawn and the shipments cancelled under these force majeur conditions. The impact on the honey market is obvious. Not only is the supply of white honey tightening and prices rising, but maintaining quality parameters will face new challenges.

The decision was formally published in the Federal Register on April 2nd, 2007. This situation regarding Chinese honey exports has been clarified and the ambiguity has been eliminated.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS													Range	Avg.		
55 Gal. Drum, Light	1.06	1.25	1.06	1.14	1.03	1.08	1.09	1.06	0.85	0.93	0.93	1.14	0.85-1.25	1.05	1.01	0.90
55 Gal. Drum, Ambr	0.95	1.08	0.95	1.10	0.78	1.00	1.02	0.95	0.80	0.95	0.78	1.00	0.78-1.10	0.95	0.92	0.87
60# Light (retail)	96.00	115.00	120.00	98.17	112.50	110.33	110.57	97.50	100.00	96.00	106.00	120.50	96.00-120.50	106.88	109.92	105.84
60# Amber (retail)	96.00	108.50	120.00	96.60	106.00	91.50	106.67	97.90	100.00	100.50	102.25	131.67	91.50-131.67	104.80	107.53	101.70
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	44.64	50.12	40.80	40.44	59.04	54.00	41.04	48.60	48.60	41.75	39.60	63.50	39.60-63.50	47.68	44.24	42.19
1# 24/case	61.44	63.26	67.20	59.64	70.00	72.00	60.82	55.80	51.60	77.76	69.90	79.72	51.60-79.72	65.76	65.94	63.02
2# 12/case	61.68	58.46	61.80	58.63	63.23	58.50	56.61	65.88	49.00	57.84	48.80	74.04	48.80-74.04	59.54	58.61	54.75
12.oz. Plas. 24/cs	57.12	56.06	49.80	56.03	58.40	58.00	50.80	42.08	42.35	47.64	51.20	61.50	42.08-61.50	52.58	54.38	52.98
5# 6/case	67.52	68.99	71.25	58.23	87.01	75.00	74.23	55.50	57.30	56.43	50.50	77.75	50.50-87.01	66.64	61.74	60.07
Quarts 12/case	89.86	100.35	71.85	84.03	80.82	73.83	82.78	70.77	96.00	110.88	79.80	109.00	70.77-110.88	87.50	85.16	85.58
Pints 12/case	66.86	49.95	61.75	53.20	53.50	44.25	60.66	48.50	60.00	49.50	39.80	59.00	39.80-66.86	53.91	57.79	49.57
RETAIL SHELF PRICES																
1/2#	2.75	2.55	2.43	2.89	1.99	2.47	2.48	1.89	2.62	2.24	2.13	4.25	1.89-4.25	2.56	2.53	2.50
12 oz. Plastic	3.13	3.19	3.62	3.40	3.22	3.38	3.18	2.99	3.05	3.08	2.86	3.96	2.86-3.96	3.25	3.24	3.26
1# Glass/Plastic	3.94	3.70	4.00	4.26	3.46	4.36	3.93	3.58	3.87	3.89	3.78	5.15	3.46-5.15	3.99	3.97	3.91
2# Glass/Plastic	7.33	5.83	7.21	6.32	6.42	6.17	6.06	5.39	6.47	6.58	6.32	9.10	5.39-9.10	6.60	6.61	6.52
Pint	7.01	7.38	6.50	5.58	5.42	5.13	6.67	5.01	5.33	6.33	5.20	7.45	5.01-7.45	6.08	6.15	5.25
Quart	11.61	8.98	11.00	8.93	7.76	8.18	9.96	8.37	9.33	13.46	8.40	13.00	7.76-13.46	9.91	9.91	8.90
5# Glass/Plastic	13.00	13.55	17.10	13.33	15.00	14.50	14.37	15.99	13.85	13.81	13.45	18.00	13.00-18.00	14.66	14.81	12.95
1# Cream	4.38	5.11	4.89	4.93	5.48	4.50	5.51	4.66	5.48	4.94	4.05	5.75	4.05-5.75	4.97	5.40	4.69
1# Cut Comb	5.00	4.80	5.19	4.94	6.40	4.17	5.68	4.50	7.43	7.00	8.00	8.86	4.17-8.86	6.00	5.80	5.19
Ross Round	5.75	3.97	4.97	4.60	5.00	4.50	5.01	5.75	5.75	7.00	5.69	7.50	3.97-7.50	5.46	5.16	5.10
Wholesale Wax (Lt)	2.33	2.65	2.19	2.07	1.93	2.69	3.24	2.00	2.00	3.00	2.83	3.00	1.93-3.24	2.49	2.26	2.12
Wholesale Wax (Dk)	2.00	2.07	1.80	1.84	1.80	2.00	3.27	2.75	1.95	2.00	2.25	2.00	1.80-3.27	2.14	1.76	1.73
Pollination Fee/Col.	62.50	75.00	50.00	43.00	43.50	56.00	46.29	83.06	125.00	140.00	120.00	111.67	43.00-140.00	79.67	62.04	56.50

The Committee For The Promotion HONEY & HEALTH In America

Ron Phipps
Ron Fessenden

There are individuals in the honey industry who believe that the harsh winter markets of '06 and '07 can be converted from sour memories to enjoyment of a sweeter future. A few of those optimistic folks met one evening around an open table during the California State Beekeepers Association meeting last November in Tahoe. From that meeting has come a "call to arms" of sorts. Calling themselves the **Committee for the Promotion of Honey and Health in America**, this volunteer band believes that the concerted voices and actions of a few can have a huge positive impact on the state of the honey market in the United States and around the world.

To that end, the Committee, co-chaired by Ron Phipps and Dr. Ron Fessenden has organized itself for action. A mission statement has been drafted and a series of action plans have been adopted stretching out through 2007 and following.

The committee is composed of members of the honey industry including beekeepers, large honey producers, packers, importers, and science and health experts. The underlying goal that unified all participants was the drive to foster greater consumer appreciation and demand for honey nationwide.

Several commonly known facts and principles underscored this unity. First, all accept the fact that honey enjoys a good public image and that honey's image, like that of other natural foods, can and should be *enhanced by incorporating contemporary scientific and medical information regarding the role that honey can play in the human diet and its positive effect on human health.* Second, the primary goal of the beekeeper is to protect his bees while producing and promoting a healthful product. Third, the positive message of honey and health can be enhanced by emphasizing the romance of honey as a natural and historic food; the quality and diversity of colors and flavors of honey (drawing from the parallels in the wine and tea industry); the natural beauty of the orchards, fields and flowers with which the bees interact to produce honey; and the historic and current beliefs regarding the healthful benefits to humans. Fourth, quality standards should not come before the science necessary to back them up, i.e., bad science should not drive standards for acceptable tolerance and testing limits. And finally, it is critical in today's marketplace to maintain an international perspective with regard to the promulgation and support of both standards and research on honey's health benefits.

The **Committee for the Promotion of Honey and Health in America** will function as an independent organization in order to preserve freedom of initiative, passion of commitment and clarity of vision. However, participation, constructive input and cooperation from other organizations and members of the beekeeper's and honey industry are welcome. It was the collective opinion of the committee participants that no one sector of the industry should drive the agenda.

A mission statement has been adopted by the **Committee for the Promotion of Honey and Health in America.** The Committee's mission is to:

1. Create and promote a positive Honey and Health agenda that will result in greater consumer appreciation and demand for honey nationwide and enhance the already favorable image of honey by advancing sound scientific information that underscores its healthful benefits

2. Support and promote the development of quality standards from within the industry, and promote an educational campaign that reinforces the need for good science to be applied in the promulgation and establishment of standards, including realistic tolerance and testing limits

Among the first action steps planned by the Committee are the publication of articles highlighting the healthful benefits of honey; the creation of a speaker's bureau which will feature noted individuals from both the honey and healthcare industries; and the sponsoring of an international symposium early next year which will address the topic of honey and health.

There are excellent examples from both the tea and almond industries in the United States that validate and inspire the mission of this Committee and its goals of increasing national consumption of honey. Over the past 10 or so years, tea has increased from a little over a billion dollar a year industry to over $6 billion a year. Similarly, the almond industry has witnessed in the past few years a *doubling of consumption as well as doubling of prices.* The common thread between these success stories is the positive promotion of the healthful benefits of these natural products. The story of honey in America is about to experience a similar success.

Individuals who share a passion and enthusiasm for honey and would like to participate as members of an Advisory Committee to see this mission carried out are asked to contact Ron Phipps at **info@cpnaglobal.com** or Ron Fessenden, MD, MPH at **ron@worldclassemprise.com** or 713-865-3145. Further information regarding the action plans of the Committee is available from the above contacts. BC

Ron Phipps, President, CPNA International, Ltd and Ron Fessenden, MD, MPH, Executive Secretary, WorldClassEmprise, LLC, Co-chairman of the Committee for the Promotion of Honey in America.

Malcolm T. Sanford

Colony Collapse Disorder (CCD): An Update

"Beekeepers that have been most affected so far have been close to corn, cotton, soybeans, canola, sunflowers, apples, vine crops and pumpkins."

Subsequent to the CCD workshop held in Stuart, Florida last month sponsored by The Foundation for the Preservation of Honey Bees,[1] there have been several research initiatives about the disorder and new reports about its effects. According to its Winter 2007 Newsletter, The Eastern Apicultural Society[2] has provided $5,000 in addition to that already donated by the Florida State Beekeepers Association, the Tampa Bay Beekeepers Association, the National Honey Board and others. The total is now in excess of $40,000 and climbing. In addition, The American Beekeeping Federation's (ABF) delegation visiting Washington got a sympathetic ear about the disorder, and a hearing was held on this issue by the House Subcommittee on Horticulture and Organic Agriculture on 29 March 2007, chaired by Dennis A. Cardoza, (D-CA): The jurisdiction includes fruits and vegetables; honey and bees; marketing and promotion orders; plant pesticides, quarantine, adulteration of seeds, and insect pests; and organic agriculture. See the House web site for members of the Subcommittee.[3] Now is the time to contact your congressional members via phone (Senate 202-224-3121; House, 202-225-3121) or via the Internet[4] on this issue.

The written transcript of the hearing is available at **http://agriculture.house.gov/hearings/statements.html** and you can listen to the entire hearing at **http://bee-quick.com/ccd/**

According to its March 12, 2007 Legislative Update, the ABF urges beekeepers to check colonies, feed and evaluate locations more often in an effort to stave off the disorder. In addition, there may be some disaster relief available in the future, so beekeepers should ensure that any losses are well documented. There also may be some research funding from this initiative. New documents at the Mid Atlantic Apiculture Research and Extension Consortium[5] include the following advice:

"1. DO NOT combine collapsing colonies with strong colonies.

Why? We do not currently know the cause of CCD. If an infectious agent causes it and you combine a collapsing colony with a healthy colony, the healthy bees may succumb to the illness and you may lose both colonies.

"2. When a collapsed colony is found, store the equipment where you can use preventative measures to ensure that bees will not have access to it. Put the equipment in this storage area within TWO WEEKS of collapse to prevent robbing by neighboring colonies. CCD colonies tend not to be robbed out by colonies immediately after collapse. When you take this equipment out for reuse, wear a protective face mask to prevent the inhalation of any mold spores that may grow on the comb.

Richard Adee, left and Jim Doan testify before the House Subcommittee on Horticulture and Organic Agriculture.

Why? The CCD team is currently investigating various sterilization techniques that allow for comb reuse. We are hopeful that we will soon have a sterilization technique in place to treat equipment before it is reused. We DO NOT recommend burning infected equipment at this time. Keep it in storage (with necessary wax moth and SHB precautions) for the time being.

"3. If you feed your bees sugar syrup, use Fumagillan.

Why? At this time the CCD working group does not believe that nosema disease is the underlying cause of CCD. However, infection with nosema is a stressor that can reduce the bees' tolerance to other disease agents. Treating for nosema helps reduce colony stress.

"4. If you are experiencing colony collapse and see a secondary infection, such as European Foulbrood, treat the colonies with Terramycin, NOT TYLAN.

Why? The effectiveness of Terramycin has been well documented, while Tylan has not been tested as an EFB control agent. We know that Terramycin works for the treatment of EFB.

"5. If you observe high levels of *Varroa* mites, treat them using soft chemicals, such as Apiguard, Apilife VAR, or MiteAway II. We DO NOT recommend the use of oxalic acid, or home made hard chemical mixtures.

Why? Colonies experiencing CCD have been shown to have kidney (Malpighian tubule) problems similar to those seen in colonies treated

with hard chemicals. There are some reports that Oxalic acid may damage bee Malpighian tubules. Also the harder chemicals (fluvalinate, coumaphos, and amitraz) may have a sub lethal affect on bees which may add additional stress on the bees. By treating for *Varroa* mites with soft chemicals, you are helping to keep the colonies mite population low while avoiding the potentially negative effects of hard chemicals.

Finally, these recommendations will probably change as understanding of this disorder evolves."

All researchers on colony collapse disorder advise beekeepers to complete the survey devoted to this phenomenon[6]. This information will be valuable and treated confidentially. Every beekeeper should participate whether or not they believe their colonies are affected.

David Hackenberg, one of the first people to lose hives to the CCD phenomenon, has sent a letter to all his pollination customers making some of the following points:

"First, some people referred to this as 'disappearing disease' because the bees literally disappeared. The second symptom is that bees left behind frames of brood (young baby bees) and boxes filled with honey that no other bees came in and robbed out as normally happens. The third symptom is that the small hive beetle and wax moth would not move into the hive for at least three weeks as if something toxic was in the hive. When you place a dead CCD hive on top of a live hive nearby you kill the hive below. This makes us think that there must be something toxic in the hive from CCD. But when aired out for several weeks the toxicity levels seem to go away. The last symptom is that the dead bees always seem to have a fungus found in the bee's mid-gut and sometimes through their entire body.

"Preliminary work has identified several likely factors that could be causing or contributing to CCD. Among them are mites associated diseases and viruses, some unknown pathogenic disease and pesticide contamination or poisoning. I have been in CCD group discussions from the beginning. I have had detailed talks with affected beekeepers, researchers, bee inspectors, growers, farmers, seed company representatives and anybody that might be able to contribute any useful information. The picture that has emerged so far has many people in this industry extremely concerned.

"Beekeepers that have been most affected so far have been close to corn, cotton, soybeans, canola, sunflowers, apples, vine crops and pumpkins. In conversation with farmers, growers and seed and spray company representatives we have learned that there has been a big change in pesticides used to treat these crops. From what I have learned so far, I am convinced that neonicotinoids may play a role in CCD and exposure to these materials is something that is under our control. From research on the internet I have learned that neonicotinoids are systemic insecticides used to control sucking insects on plants, everything from corn, tree crops, most vegetables, cranberries, blueberries, strawberries, cotton, canola, ornamentals, forestry and turf.

"I think that the reason neonicotinoids may be so damaging to honeybees is that they are found in fairly low "sublethal" levels in the pollen and nectar of the plants. The field bees often do not die when working on plants treated with these products. Instead they may bring the pollen and nectar back to the hive and store it in their comb to use later. The young bees raised on this (contaminated) food may exhibit memory loss and impaired immune response. Of course, these symptoms appear several months after exposure to neonicotinoids and up until recently the cause of effect appeared unrelated."

Mr. Hackenberg concludes his letter with a plea to growers to use something beside the following products this season: imidacloprid[7] (brand names: Confirdor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise); thiamoxetham (Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship); acetamiprid (Pristine, Tristar, Assail, Intruder, Adjust); clothianidin (Poncho, Titan, Clutch, Belay, Arean; thiacloprid (Calypso); and dinotefuran (Dinotefuran).

Because so little is known at the present time about CCD, skeptics remain. Some call this nothing more than the inevitable consequence of beekeepers pushing their colonies to the point of collapse, exacerbated by their own pesticide use (organophosphates particularly) inside colonies for *Varroa* control and malnutrition while on pollination contracts. Others suggest that so-called "disappearing disease" has been with us for many years in a variety of forms, and that this is nothing more than the consequence of inadequate mite control.

In the latter case, Dr. Bromenshenk, one of the prime investigators of CCD, stated in a response:[8] "Please be careful of sweeping generalizations. There are beekeepers who have experienced CCD and who have also had problems controlling mites. We've

also seen tracheal mites in high levels in recovering hives (but these mites were not in the same hives before collapse). We've seen CCD in operations with no evidence of mite problems.

"I just saw a new collapse in CA where aggressive mite treatments were used in the fall, repeated in Jan when a few mites were found. Colonies were strong, wall to wall bees, four to five frames of brood, no evidence of mites (two weeks ago). Yesterday, out of 400, only 30 were strong enough to shake bees from, and the majority had collapsed down to three to four frames or less of bees, with lots of brood, 40 lbs honey, and frames of fresh pollen.

"Finally, most of the CCD work is still unfunded – we all have to prioritize which samples we're going to take, analyze – just don't have the funds to check every sample offered – and at this point, we're not short of operations from which to obtain samples, so we're trying to take samples in ways that will allow us to make comparisons within a beeyard or operation, and among yards and bee operations."

One observer remarked on the Bee-L list that there seems to be a remarkable similarity between the symptoms of CCD and those of "Marie Celeste Syndrome" in the UK.[9] He referenced an interesting and comprehensive set of minutes of the annual meeting of the Department of Environment Food and Rural Affairs (DEFRA) with beekeeping organizations dated 9 December 2005.[10] This is a must read for anyone comparing the European and U.S. beekeeping situations.

In that document, a Mr. Craig reported that beekeepers in Scotland who had been treating *Varroa*-infested colonies (usually with Apistan) had been finding hives empty of bees, but not winter stores. Together with these unexplained colony losses ("Marie Celeste" Syndrome) there were failures in queen mating. These events were happening particularly in oilseed rape growing areas. While acknowledging that these could possibly be explained by the effects of viruses, for which the *Varroa* mite provides a vector, he was concerned that we might be observing sub-lethal behavioral effects of systemic insecticides such as imidacloprid, causing disorientation in the bees leading to an inability to return to the hive. He quoted the losses of French bees in the late 90s and the subsequent banning of imidacloprid by the French Government.

This brings us to the Melksham Beekeepers publication known as *Beelines* and "Chuckle With Chad." His response in part to the Marie Celeste Syndrome is:

"I feel that, yet again, I need to give a new personal perspective on an old theme, that of Mary Celeste Syndrome. For the beginners, the characteristics of this syndrome are startling; seemingly healthy colonies of bees will disappear over night, leaving no trace or clue as to their disappearance. Scientists' heads are being scratched all over the country as theories of varroosis or environmental factors affecting queens' fertility are expounded.

"The problem is, of course, that the majority of beekeepers are too well-meaning, straight laced and altogether too wholesome for their own good. One needs only look at the strong tradition of beekeeping in the clergy, to realize that the majority of beekeepers are a decent bunch. However, Reverend Digges would have had a truly different outlook on life if he'd grown up on a housing estate in the suburbs of Manchester.

"Let me shout it loud so that you hear me, Mate, your bees have been nicked! Closer scrutiny of data will show that Mary Celeste Syndrome has never been reported in hives that are inaccessible to the public. I bet you the bees in my bedroom observation hive won't suddenly vanish, 'without a trace.' The thing is, of course, that the venerable Rev. Digges could not have entertained the thought that his neighbor might be so brazen as to break the Eighth Commandment. But, as I say, the beekeeping community must drag itself into the modern mind set; there are baddies out there."[11] BC

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RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

"Welcome to 1984 . . . again."

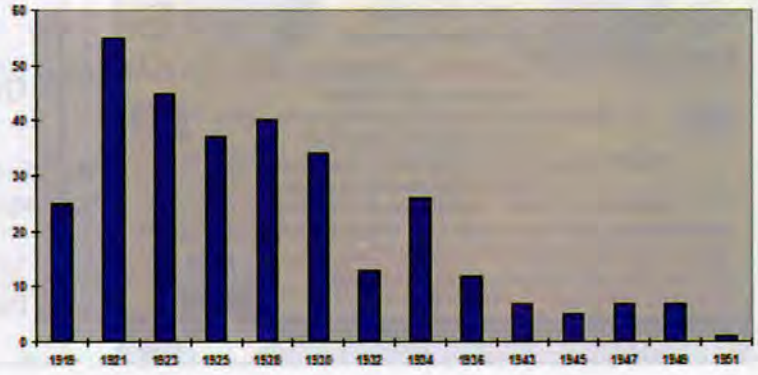
The normal *modus operandi* for this column is for me to describe the contents of one or more peer-reviewed honey bee articles, with the hope that the information will be of interest to beekeepers. This protocol has two consequences. First, it provides an abstracted view of what is "happening" in the scientific literature, although biased by my choice of which articles to cover. Secondly, over time readers of Research Reviewed can gain an understanding of how hypothesis testing is central to scientific inquiry. Moreover, they can see how "conclusions" from scientific studies are always subject to further scrutiny, refined experimental testing and modification or rejection in the future. This month I am going to step off the usual path and instead, will do something more akin to offering an opinion. However, I suggest there are logical signposts pointing toward the place we will end up...so please bear with me and read on.

Early in the 20th century, the tracheal mite, *Acarapis woodi*, burst onto the scene of beekeeper awareness in Europe and the United States. The history of the discovery of this mite is itself a fascinating story, but one for another day. In 1922, with the tracheal mite gaining fame as a terrible pest in Europe, the U.S. passed a law restricting further importation of honey bees. What do we know about the overall European "experience" with tracheal mites? We know that many colonies perished from the so-called "crawling disease" caused by these mites, leading to the publication of a number of homemade remedies. Interestingly, some of these remedies included peppermint oil as a component. Given that a large component of peppermint oil is actually menthol, a compound currently registered for tracheal mite control in the U.S., those early recommendations may have been somewhat effective.

Continuing the historical journey...what about tracheal mites in Europe today? As it happens, tracheal mites are no longer considered to be a problem by European beekeepers and, as far as I know, there are no current treatment recommendations. The mites are simply "off the radar screen" in Europe. So the obvious question... "How did this come about?" Perhaps the first step toward finding the answer is to ask a different question; "When did this come about?" A search of back issues of a major European beekeeping journal from 1919 to 1951 provides some insight into the tracheal mite story. The chart shows a numerical compilation of the tracheal mite articles published in *Bee World*, the former beekeeping journal of International Bee Research Association (IBRA). The published number of tracheal mite articles reached a peak soon after the initial discovery of this mite and its movement to continental Europe. However, by 1945 the number had declined to less than 10 papers per year.

Overall, it appears that the tracheal mite problem was worthy of discussion for about 26 years, based on the reports in *Bee World*. What happened to remove tracheal mites as a newsworthy subject? One hypothesis is that selection by mites (*i.e.* by causing the death of susceptible bee colonies) led to honey bee populations in Europe that could survive with tracheal mites. Further selection by humans (for honey production, etc.) could have resulted in honey bees that also were productive in the presence of mites. Unfortunately, we do not have the luxury of data from controlled experiments to test this hypothesis during those 26 years. However, in addition to making inferences from the declining number of mite articles that appeared in *Bee World*, we have other suggestive evidence that bees in Europe became more resistant to mites. That evidence derives from the writings of Brother Adam, a beekeeping monk who imported honey bee queens from the U.S. and placed them in colonies alongside local bees in Buckfast Abbey in the 1950s. He reported that the colonies headed by the imported U.S. queens rapidly perished from the effects of tracheal mites, while his own stocks survived nicely. In summary: 1) after mites were introduced into continental Europe, it took about 26 years for them to become "resistant" to tracheal mites (at least to the extent that beekeepers ignored them)

Number of tracheal mite articles in Bee World 1919-1951



and 2) U.S. honey bees were highly susceptible to tracheal mites in the 1950s, having not yet been exposed to them.

Enter the year 1984. Tracheal mites were found in the U.S. and significant colony losses occurred soon enough (not unlike 1920s Europe). Menthol (and peppermint oil in Washington State) was approved and labeled for tracheal mite control. History's clock was reset. It is tempting to imagine that, all things being equal, after 26 years (or by 2010), we here in the U.S. could also be keeping tracheal mite resistant honey bees, therefore freeing the pages of *Bee Culture* for more articles on...whatever is your favorite topic. There are indications that tracheal mite resistance is higher in current U.S. populations that in the years immediately following 1984. However, compared to early 20th century Europe, queen production in the U.S. is much more centralized and typically located in southern regions of the country where, coincidentally, tracheal mites are less of a problem than in northern climates. Without strong selection pressure for mite resistance in the queen breeding and production areas of the U.S., fixation of tracheal mite resistance in U.S. honey bee populations is likely to be on a longer timeline than it was in Europe. Nonetheless, history has shown us that honey bees of European ancestry, such as ours, do have the capacity to handle the tracheal mite problem on their own. However, regarding tracheal mite resistance; are we (beekeepers) part of the problem or part of the solution?

Recently, two large-scale beekeepers (about 20,000 colonies) active in pollination in California, estimated that during this past almond season around 100,000 queens/packages of bees were imported into the U.S. from Australia/New Zealand. This number is a rough estimate, based on their own purchases and what they heard from friends, but for our purposes it will serve. Is 100,000 a significant number in this case? It depends entirely on *where* the queens and drones from these colonies eventually settle. For example, in California alone nearly 500,000 queens are produced annually and sold across the U.S. Many of these queens are reared and mated in a relatively small region of California. The total production of queens in California is derived from a set of mothers (breeder queens) numbering in the hundreds (Schiff and Sheppard 1996; Delaney and Sheppard unpublished data), with each queen mother being used to produce an average of over 1000 daughter queens. Thus, distribution or eventual movement of Australian/New Zealand honey bees into areas where honey bee queens are produced could introduce genes into the U.S. breeding population that will spread quickly throughout the country. Given that honey bees in Australia and New Zealand have no historical exposure to tracheal mites and, presumably, are unselected for tracheal mite resistance. Is this a cause for concern?

The need to provide adequate pollination for U.S. crops is unquestionably of national importance. Finding the most appropriate way to address potential pollination shortfalls will not be simple. While European populations of honey bees are almost certainly more tracheal mite resistant than are those from Australia and New Zealand, European queen producers do not have the capacity or seasonal advantage to provide packages in the numbers and on the dates to meet projected California importation demands. One approach would be for U.S. consumers of southern hemisphere-produced bees to demand that tracheal mite resistant parental stocks from the U.S. (or Europe?) be used to produce queens that will be sold here. However, current restrictions on germplasm movement make the importation highway a one-way street. No U.S. honey bee stocks can go to Australia/New Zealand (because they might get more mites or AHB), while the U.S. is willing to accept bees from the southern hemisphere that have no historical exposure to tracheal mites and, hence, a low likelihood of expressing resistance. The numbers of Australian/New Zealand queens entering the U.S. (and likely to come this way in the future) are high enough that, unless U.S. queen producers are extremely diligent to keep such bees out of areas where queens are mated, significant genetic contributions from tracheal mite-susceptible stocks could be made to the U.S. honey bee gene pool. If that happens, tracheal mites will again find themselves in the midst of susceptible bees and the selection story begins again. Welcome back to 1984. BC

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BACKYARD QUEENS

Marked queens are soooo much easier to find. (photo by Jennifer Berry)

Jennifer Berry

Grafting, splits, swarms or supersedure cells – Making a few queens can be easy!

Raising your own queens can be a rewarding adventure. First, you know the history of your queen – her roots, her mother's background, her age. Second, she's your baby. You were responsible for bringing her into this world. Too sappy? Maybe, but there're not too many people who aren't fascinated and overjoyed at the sight of their first queen. But the best part about raising queens is you can have one emerged (16 days), mated (21-25 days) and laying eggs in 23- 28 days and it didn't cost you a dime.

Still, why raise your own when there are so many good queen producers out there? One answer is the local queen producer has no queens until next year and the following has occurred: your colonies are busting at the seams, the queen just died, disappeared, left the building, you mashed (southern for smash) her, you didn't order enough, your relatives, friends, and neighbors decided they really like your honey and want more, more, more so you have to expand. Or maybe you have decided to join the "Brethren of Better Beekeepers" and rear queens that you've selected from colonies that can thrive in this rough world we have created for them. What ever the reason is, you can do it.

There are many ways to rear a queen, the most popular being the Doolittle or grafting method. Simply put, grafting is the transference of young larvae into artificial queen cells. Mastering this technique takes time plus a variety of equipment and supplies: grafting tools, queen cell cups, grafting frames, queenless starter colonies, queenright finisher colonies, and mating nucs to name a few. This can be overwhelming for the beginner especially one who just wants to raise a few queens. So let's simplify queen rearing the best we can.

First, you will need to order, build or set aside the number of hives/nucleus colonies needed to raise the queens. One complete hive or nuc per queen desired. Four or five frame nucs work the best since it takes fewer frames and bees to set them up.

Next, you need to select the colony from which to rear a queen. This is a very important step because the queen is the HEART of your colony. Starting off with excellent breeding stock is the key to producing an excellent queen. When you have an exceptional queen you have the right ingredients for an exceptional colony. 50% of her genetic makeup comes from the mother queen. Her genetics, like brood production, gentleness and disease and mite resistance, is what she confers onto her progeny, which in turn makes the type of colony you desire.

Here at the bee lab each colony goes through a series of tests before a queen is selected to become a breeder queen. This may be a bit extreme for your operation however you may want to incorporate a few of these techniques. For disease and mite resistance we want queens which display hygienic behavior (something Marla Spivak has been talking about for decades). We test for hygienic behavior by freezing a circular section of capped brood with liquid nitrogen. The frame is returned to the colony for 24 hours, and then the number of cells removed are counted. Knowing the number of cells within the circumference, then counting the number of cells removed results in a percentage of hygienic behavior. The higher the percentage the better. In conjunction with mite resistance each colony's *Varroa* mite population is measured with 24 hour sticky sheets. Next, we determine how well the queen is laying by measuring brood production. We take a plastic, frame sized grid which is marked off in centimeter squares, place it on a frame with brood and then count the total. Again the higher the number the better. Another trait we measure is colony temperament. Every time we manipulate a breeder colony we evaluate their temperament on a scale of one to five with one being extremely gentle and five being extremely hot. Finally, we measure honey production and brood spottiness to determine the rate of inbreeding. Granted, this is probably more than you want to tackle for raising a few queens, however, you can definitely evaluate mite population, brood production, honey production and colony temperament.

Now we need to locate the queen in the colony you have selected. The best advice I can give for finding queens is spend the extra dollar and have your queens marked. This makes life so much easier when trying to find queens. But you still need to find her, mark or not. Let's say you have several hive bodies and supers with no queen excluders. Where do you begin? Remove the honey supers and place them on the inner cover. Next place the second hive body (if you have one) on the lid, leaving the main

hive body intact and start your search there. More than likely you will find the queen on frames with a mixture of empty cells, eggs and milk brood. Queens are usually, not always, but usually **not** on frames with honey/pollen, sealed brood or frames void of bees much like the empty ones you find on the ends. Scan for the queen from left to right, flipping the frame over and scanning again from left to right. Don't forget the bottom or end bars. If she is not on that frame, place it outside the colony, leaning it up against the box you are working. Don't lean it against the other boxes since she may be on that frame and travel into those boxes. If you can't find her on the frames check the sides of the box. If no queen is found move to the next hive body, or supers and resume your search like before.

Still can't find the queen? You're not alone. Even the most experienced of beekeepers can't find queens every time. You can either continue on with another pass or put the colony back together with queen excluders between each box and return in four days. Look for eggs and your search is at least narrowed to that box. When you find the queen, temporarily cage her or set aside the frame with her on it until you are finished with the next step.

You are now going to transfer frames from the parent colony into the new hive. Whichever colony not housing the old queen must have eggs or at least very young larvae, (preferably less than 24 hours old), in order to produce a viable queen. The queenless colony will also need young nurse bees in order to raise a queen. One way to ensure nurse bees are in the box is to do the split while the foragers are out in the field. If using a four or five frame nuc, remove one frame of eggs, milk brood, and bees, one to two frames, depending, of emerging brood with bees, and two frames of pollen/honey. Transfer these frames into your new box. Put the brood frames in the center, with honey/pollen frames on either side. Shake several frames of bees into the box. If using a 10 frame hive, fill in the spaces with foundation or drawn comb. To the remaining colony add foundation or drawn frames to fill the hive. You will need to move the new colony to a different location until the new queen has emerged, otherwise all the field bees will return to the original colony. Take care in transporting the hive. Frames tend to sway back and forth, thus mashing bees, including queens.

Another easy way to rear a few queens with the least amount of work is to take advantage of the swarming season. If you come across a colony that is preparing to swarm (visual swarm cells), make a split from this colony. Make sure you have a queen cell and not a queen cup. Queen cells have the egg/larva in place while the cup is empty. Take the old queen along with half the bees, brood and honey/pollen and place them into a new hive. Make sure to cut any queen cells from this colony if you want to keep that queen. Move this colony to a different location. In the remaining colony, leave the swarm cells intact, moving them to the center of the brood box. Make sure this colony has plenty of honey/pollen and young bees. Not only does this give the illusion to the workers from both colonies that they have swarmed, but now you get a free queen.

A new item just introduced by Brushy Mountain Bee Farm is worth mentioning. It is called the queen castle and simplifies queen rearing even more. Basically, it consists of a hive body that has been separated into four compartments with alternating entrance holes into each section. Each compartment holds two frames, so you now have four-2 frame nucs in one box. You can also remove the dividers to make two-4 frame nucs. Take one frame with eggs/milk brood or one with swarm cells along with one frame of honey/pollen and place it into one section. Don't forget to add plenty of bees, enough to cover each frame and the walls. Continue until all four sections are filled. Carefully move the box away from the parent colony. If you transferred capped queen cells be extra careful. This is a delicate time for the queen pupa so try not to bounce the box too much.

You can use an emergency cell to raise your queen.

You can use a swarm cell to raise a queen.

Just a few quick reminders. Maturing queen larvae need an abundance of royal jelly to develop into healthy, vigorous queens. Royal jelly is produced by young worker bees which need plenty of honey and pollen to do so. Make sure the colonies rearing your queens have plenty of both. Also, try not to bother the colonies too much once they have started rearing the queens or during the queen mating flights. Remember it takes 16 days for a queen to emerge from the egg, three to five days before she takes her first mating flight, two to four days to mate and then two to three days to start laying eggs. The earliest you will begin to see eggs are 23 days if your queen started from an egg. Don't be alarmed if you see a few eggs per cell in the beginning. Sometimes young laying queens will put a few eggs in a cell. However, if this condition continues you either have laying workers or a bad queen.

After your queen is laying and you are pleased with her performance, don't forget to mark her. Now sit back and enjoy your newest title, Queen Breeder Extraordinaire. See ya! BC

NAKED COMBS EMPTY SPACES

Where's The Queen?

Larry Connor

Week 1

We have used great energy to rapidly expand the area occupied by the young ones, for our queen is fed at every opportunity to lay dozens of eggs in rapid spurts. This queen is responding and producing a large compact area of young bees. She inspects each cell and we have been cleaning so she is able to detect the smell of a freshly polished cell before she deposits an egg. When she stops for a few moments to rest we rush to feed her, groom her, and remove any waste she has to share. She is so intoxicating to be around; to touch her is to receive the essence of her being, so we remain compliant and obedient daughters. The queen drugs quiet us, and provides every worker with a special inner focus on hard labor, efficiency and energy management that is our traditional colony mandate.

Two full cycles of young ones have passed since the day of equal light and dark, and we are at a frantic pace to produce new members. *Now. Now is the time, we must grow now or our colony, our family will fail.* Our drive is frantic and we have expanded from two frames to nearly a dozen, moving up into the second chamber of our large home. Yet empty, naked combs haunt us, drive us, inspire us to work harder and harder until every cell is filled so the returning foragers are unable to find a place to remove their pollen, and the nectar processors are unable to find empty combs to place our riches. That has not happened. We aren't there yet. We are some time away from that. Our queen is working with us to reach that need.

We are the colony on the north end of the hedgerow. Only a few weeks ago we were tight in our cluster, unable to reach the frame of honey the human put on the edge of the brood nest. That comb is now filled with food and young ones, and we are working to clean cells for the queen as we expand the brood nest as rapidly as we can.

Dandelions are open as are so many fruit trees. We find pollen and often nectar in so many of the flowers we visit. Our numbers are finally where we have the field force needed to gather the food for expansion. Until now we were fighting to keep enough bees on the young ones and field bees to forage. But finally we have enough bees to feed the young as well as foragers to harvest the crop.

Some of the house bees hang on the combs, their legs intertwined as they rest and digest the incoming nectar. They wait quietly to make more wax scales from the underside of their bodies. They hook each scale and bring it to their mouths to chew and soften it. Finally, this tiny bit of wax is placed on the growing comb as many of us labor in concert to repair the combs the human has given us. We put tiny bits of wax on the combs to help reshape it, form and repair it so we can raise the young ones and store the riches of the field.

Week 2

The fruit trees are fully a-flower, secreting their magical scent that drives us to them. The weather has been pleasant and we are able to visit these flowers most days. This year the showers came at night, and the fruit blossoms – the apples, the cherries, and the plums – draw us to them with their odor and abundance to sustain our rapid growth. Many new bees have emerged and are building combs for the production of yet more young ones. Older nurse bees process honey, make wax, and guard the hive. The oldest bees are in the field, gathering food. We do this day after day as long as the daylight and the weather allow. Only when the weather turns do we stay in, to watch the large bumble bee queens work the flowers on cold days and in misting rain. Our furry cousins are able to do this, but we are from the tropics and did not develop in this climate, and on cold days it is a foolish bee that leaves the hive.

Week 3

Today the human came with another. They were laughing and singing their joy for such a beautiful day. Then, they tore our home apart in a search of unknown purpose. We were exposed. Our nest was torn apart and scattered on the grass and against the rocks on the hedgerow. But we kept ourselves busy as there are too many flowers to visit and young ones to feed. And the humans passed comb by comb to each other, searching and struggling to see something that we did not understand.

Easy to see.

Not so easy to see.

Look carefully on this side.

Watch for her to run and dodge underneath.

But flip the frame and find her here, maybe.

The returning foragers noticed it first: it was weak. The Queen's drugs were fading and not being replaced. It was getting weaker and weaker. Hive bees moved about to check, but the queen was not to be found. Guards and scouts searched for the place the queen was last seen, but there were too many conflicting reports. Many minutes passed as we searched in all our conflicting stimuli.

Then we understood. The intoxicating drugs of our Queen were gone. Workers spread into the air and found our Queen, quiet on the grass, her head crushed by one of the humans and her body discarded like a meaningless leaf. Our Queen was dead!

One moment our Queen is putting eggs in cells on the comb and the next . . . she is gone.

Instead, we smell the faint odor of a strange bee, one that smells like an unmated Queen, but different. If this is a Queen there is something not right for she is sick or injured and not producing the quieting drugs of a good Queen. She is in confinement, unable to free herself. Some nurse bees start to feed the sick bee inside the cage, and she eagerly laps up the food she is offered, the same food of our bodies we feed only to Queens and young ones.

Late the next day

The nurse bees released the sick bee and she has entered the area of the young ones in our home. Some of the young nurse bees continue to offer her food and report that there is a trace of that which all all good Queens are made of, but other bees, older nurse bees, crawl over her body and find the amount she produces not enough for a good Queen, and they cover her tightly, and form a covering over her with their bodies. After a few minutes they fade away, leaving the sick bee clinging to the comb with one of her legs, no longer alive. The dead removers carry her body to the entrance of the hive and fly away with her body as far as they can and drop her in the weeds.

But even before the sick bee was gone many nurse bees started to locate and feed small young ones of the age needed for making Queens when unexpected things happen. Our missing Queen did not need to be replaced, and we are not even close to making a swarm that could survive the season. The humans changed that. We must produce a Queen under the instinct of when a Queen disappears unexpectedly.

It is our tradition to find many young ones and feed them the special food to see how they develop for a day or so. Each of our 18 sister groups find larvae of their type and start to feed them as they are able, but there is great competition and only those that show the greatest growth as future Queens survive. Rival sisters remove a poor Queen candidate and eat her as the pressure to find the best Queen larvae continues.

Week 4

We have nine Queen cells. There were many more when we started.

As the Queen cells mature there is much adding and removing of wax from the surface of each cell. The different sister groups have the conflicting stimuli of their own sister in becoming the next Queen, and the needs of the entire colony to produce the best possible Queen that we can. The entire colony must prevail.

We are the hive at the north end of the hedgerow, and we wait for a queen to emerge, produced in an emergency, caused by the humans.

TO FIND QUEENS

1. If a colony is larger than one brood box, put a queen excluder between the boxes of brood at least four days before searching for the queen so you have fewer combs to examine. Inspect the hive body with eggs in it. (Yes, both may have eggs.)

2. Carry an empty hive body to the yard and systematically remove each frame in sequence from one side to the other, keeping the same order, placing the examined

combs into the empty box to prevent cross contamination and potential queen movement.

3. Your queen is able to cover a large distance in the hive very quickly. Work quietly but quickly, using a minimum of smoke, looking at both sides, ends and the bottom of the hive with a top to bottom rotation (frame flip) as you use your eyes to look for the fullness of the body of the queen, as well as her greater length.

4. When you remove a frame, look into the brood chamber for a flash of the abdomen of the retreating queen. Many queens run from the light and will continue doing this.

5. If you can, bring a second beekeeper to examine each frame after you do.

6. Work through the entire brood chamber and check the bottom and sides of the hive. Check the ground where you are working to see if the queen has dropped, and your pant legs to see if she is crawling into a dark place to hide.

7. If you do not find a queen on this inspection, decide if you should shake all the bees through an excluder to find the queen, or return in a few days to repeat this experience.

8. Do you have a queen? Certainly you have checked for eggs in the brood cells. If not, what other explanation might there be?

9. To shake bees, position a queen excluder over the brood nest, place an empty hive body over the excluder and gently shake and/or brush the bees into the box. Smoke the bees gently to drive them down. The queen, if there is one, should be on the queen excluder or the wall of the box.

10. So you found a queen! Fantastic. Now, don't stop, since 15-20% of spring hives have a mother and daughter (supersedure) queen laying in the same hive. Keep looking for a second queen.

Bonus: If you make increase nuclei from a hive, you may return to them in four days and find the old queen by seeing which nucleus unit has eggs. Then inspect the smaller unit for the queen.

In the story, the queen was rejected by the bees because they released her so quickly. Perhaps the queen had been in transit for several days, and had lost nearly half her body weight in the process. Leave the queen caged for five to seven days and feed the colony to allow the bees time to feed the queen and return her to her egg-laying condition, when pheromone production is at its peak. BC

Dr. Larry Connor has moved to Kalamazoo Michigan to be closer to the center of his travels, his 92-year old mother, his family and his best friend. He continues to think and write obsessively about sex, Bee Sex his next book due out whenever the moving dust settles. All the old phone and mail contacts have changed, but feel welcome to check in by email at ebeebooks@aol.com to get fresh contact data.

LEAFCUTTERS & BUMBLEBEES

Kathy Birt

"Without bees you're not going to get pollination – and without pollination you're not going to get blueberries," says Richard Farmer, a Prince Edward Island (Canada) beekeeper who lives in York Point.

With 9,000 acres of PEI blueberries to pollinate and another 3000 under development, pollination is crucial. Hence, the more bees available to blueberry growers, the quicker new crops in development will produce.

With that in mind, Farmer has been experimenting with Alfalfa Leaf Cutter Bees and bumblebees.

Farmer points out that in the early stages of developing blueberries, growers can rely on native bees and they will do all the pollination. But he says, as growers intensify their operation, they have a tremendous demand for bees.

"Right now in a developed field, we would use from 20 to 50,000 bees an acre," says Farmer and adds that in his 40-acre field of blueberries, he has over a million Alfalfa Leaf Cutter Bees, plus eight hives of bumble bees.

Blue tent-like plastic structures dot Farmer's blueberry field where these one million Leaf Cutter Bees swarm to do the work of pollinating.

Farmer points out that, originally, one can start out by capturing local bumblebees, but he explains that he got his bumblebees from Biobest Biological Systems, a company that breeds the bumblebees and keeps the bred queens over Winter.

Those queens are put out into specifically manufactured plastic containers, secured in a waxed corrugated cardboard box where they stay to develop their own brood. "And its those workers that go and do the pollination," says Farmer.

Biobest Biological systems are a company in Leamington, Ontario, and were the first company (in the world) to develop an industrial rearing method under controlled conditions for bumblebees.

Richard Farmer with leafcutter trays.

A PEI blueberry field with leafcutter shelters.

This method makes it possible to produce top-quality bumblebee colonies year round. By applying the latest technologies, Biobest has developed a safe, completely maintenance-free; easy-to-monitor and easy-to-use hive for bumblebees.

The entire set up consists of three main elements. The nest box, the feeding system and the cover. The NEST BOX (there is four in each system) is plastic and contains the actual hive with the brood (eggs, larvae and pupae). There are several ventilation holes in the walls, lid and bottom to provide enough (ventilation) to prevent condensation from occurring inside.

The FEEDING SYSTEM developed by Biobest is known as Biogluc. This food solution contains sugar, a preservative and a coloring agent to monitor food levels. The sugar provides nectar to the bumblebees as a source of energy.

This Biogluc is in a plastic container situated under the nest box. This food, which provides the bees with nectar, is moved to the brood through a capillary wick. The amount of Biogluc provided varies with each hive, depending on the crop they have to pollinate. Farmer says different crops provide different amounts of nectar.

The COVER encloses the nest box and feeding system and is made of solid, recyclable cardboard, coated with a moisture-resistant wax for protection (from the elements).

The hive contains two flight holes. One is for the bees to fly in and out and the second flight hole is equipped with a pointed tube and is a one-way hole for trapping bumblebees. This hive has a window for monitoring the level of Biogluc in the feeding system.

As complex as it sounds, more Island beekeepers and blueberry growers are looking into resourcing local

David McNearney with a bumblebee quad.

bumblebees for pollinating, due to on-going problems with *Varroa* mites in honey bees. Beekeepers must treat for these mites at least once and often twice a year, which can be costly to their on-going operation.

Farmer's alternative is to build up his bumblebee population and continue working with Alfalfa Leaf Cutter Bees for the annual pollination of his 80 acres of blueberries.

He explains the intricate workings and life cycle of these tiny bees.

"Bumblebees and honey bees are social bees. They have hives and work together," says Farmer, and adds that Leaf Cutter Bees are all individual or solitary.

But, though each leafcutter lives and raises new young in her own nest, leafcutters put their nests in community settings.

The Leaf Cutter Bee shelter contains two polystyrene blocks with many holes drilled in it. The bees gather leaves to construct divisions within the tubes. They then lay eggs in those holes on a clump of pollen and nectar. Another leaf is gathered and cut into a circular shape and those little plugs fit into that hole and seal off the first egg. "Imagine the number of trips a bee has to make for each one," says Farmer.

He explains that Leaf Cutter bees have a life span of only six to eight weeks. Getting through those complex weeks is crucial to producing new bees.

With the eggs solidly secured, they develop into a larvae and pupate the rest of the Summer and during the Winter. This is not done without Farmer's help.

He transports the blocks to a specially constructed incubation room where they are put in "storage" at about 5°C (41°F) for most of the Winter, with a low humidity. The following Spring he warms those blocks up to 30°C (86°F) and a humidity level of 70 per cent. "That's starts the ball rolling again," he says.

Hence, Farmer has new bees each spring to pollinate his blueberry crop.

However, there is never enough food on PEI to feed all his Leaf Cutter bees for their life span. "We don't have alfalfa here and it's harder to move them to other areas where they can feed," says Farmer. The food supply is only good for about two weeks, thus, reproduction rate is limited and Farmer doesn't get full replacement. "So every year I have to buy more of these bees from out West."

The beekeeper puts these bees out to pollinate in two waves; half his bee population each time, at about two to three days apart. There is a reason for that. "We are developing a methodology for this. If I put them in the field too early, or when we have blossoms, but we get frost, the blossoms are lost and I lose my bees. So timing is extremely critical," he says.

Farmer says this (frost) is a scary thought as he looks over his 40 acres of blueberries noting that there is possibly $100,000 worth of blueberries spread across the field.

He says temperatures of about 20°C (68°F) are needed, with no threat of frost, to get optimum work from the bees, both in pollination and laying eggs. This Spring the weather cooperated. Blossoms were two weeks early and pollination began two weeks ahead of last year.

"We need both food and sunshine to make them work," says Farmer.

Meanwhile, capturing and raising local bumblebees may be another strategy for pollinating PEI's ever increasing blueberry crop.

With 240 acres of blueberries to pollinate, David McNearney another Prince Edward Island grower from Brudenell is opting to do just that. Armed with a bee rearing business he purchased privately from a beekeeper in Quebec, McNearney has already captured local queens to begin the process.

"My strategy is to use a combination of bumblebees and honey bees, (for pollination)" says McNearney.

He explains some of the different advantages between the two species.

Although fewer in numbers, the bumblebees are more efficient pollinators that will fly at lower temperatures and higher wind speeds. "So if we get marginal weather, the bumblebees will still get out and work," says McNearney.

On the other hand, he says honey bees like a lower wind speed and warmer temperatures. They are not as efficient (as bumblebees) but the numbers in the field are usually greater.

"So I have 50 honey bee hives with, say a population of about 30,000, of which 10,000 would be field workers. Theoretically, I've got 500,000 honey bees working in my fields," explains McNearney.

Whereas he has 50 bumblebee colonies of which there would be 200 workers, and only 150 of these would be field workers. "So a bumblebee would have to be 50 times more efficient - - which they may or may not be – no one really knows the number," says McNearney.

Essentially, McNearney, who is just beginning his blueberry business, is going with a little bit less than the recommended bees (for pollinating).

He rented about 50 hives last Spring at $100 each and purchased 50 ready-made bumblebee colonies, which are produced at Biobest. But he says with his fields just being developed, he is still getting good pollination. "As time goes by, I'll have to increase my numbers," he says.

With the purchase of his bee rearing business McNearney says, essentially, he is maintaining bumblebees in captivity their entire life. "So you control the mating and take the mating queens and trick them into thinking it's Winter, so they will hibernate. Then trick them into thinking it's Spring (early) to break the hibernation."

At this point the bumblebees are fed pollen and nectar that allows them to build up a population just prior to the blueberry blossoms. "So when I put the hives out in the fields, they'll be a full-strength colony," he says.

Wild bumblebees generally look for a nest in the early Spring and would begin to reproduce later then the pollination requirements.

McNearney says he will have his own reared bumblebees this Spring, but notes, "I have lots of (bumble) bees at the end of the Summer from the ones that I bought."

His plans are to use virgin queens from his purchased bumblebees with captured bees for genetic diversity. With his captured bumblebees, McNearney says he will run through a couple of generations through the Winter and take the queens from that process for reproduction.

Initially, McNearney is just looking to produce 500 bumblebee colonies for his own pollination requirements. "The bulk of the business I bought will be consumed by my farm," he says and adds, "If I'm wildly successful, I'll have some for sale." BC

Makin' Honey

Kim Flottum

Adee Honey Farms is headquartered in tiny Bruce, South Dakota, down in the southeastern corner of the Mt. Rushmore state. During honey season they keep most of their 80,000 plus colonies spread out over South Dakota, North Dakota, Minnesota, and Nebraska.

These honey producing machines have traveled extensively in the last six months. They left the Midwest in October last year, heading for a county-sized holding yard in southern California. There they were carefully checked and the small, the weak and the sick were weeded out. The rest – the average and better are put on a gourmet diet of proteins and carbohydrates. This begins the fattening process in preparation for almond pollination that starts in only four months.

The protein diet is a scientific blend of materials from several sources – dairy, animal and plant products, plus those essential minerals and vitamins and trace elements, all put together in an industrial sized mixer/blender setup that can keep up with supplying the 70,000 hungry colonies that need feeding. The carbohydrates come from a variety of sources – corn, cane and other sugars. Combined it's a fairly complicated mix that takes colonies from their post-harvest depression to busters in 16 weeks.

After a month in the almonds these strong colonies are even stronger, and most head to Mississippi or Texas to be divided and requeened. 12-15,000 head from these southern California locations due north to pollination contracts in Washington. When completed there they head to the Nebraska beeyards, where the earliest flowers are beginning. 15-20,000 of the last colonies out of central California head directly back to Bruce, where it's still only early Spring. Here they are placed in protected locations – windbreaks and windward hillsides – and can take advantage of early pollen flows.

These first-back colonies have queens going into their second year, so all the management requirements of older queens kick in. They build faster because they haven't been split but get fed if needed, and supered early.

After splitting, 30-35,000 colonies leave Mississippi and head up to wind-breakless Roscoe, north and west of Bruce. Northwest South Dakota, too, is usually productive and this is where another 10-15,000 colonies from the Texas requeening operation go when ready.

North Dakota colonies are in the expanding canola and clover locations and can come from anywhere. It depends on how good – read measurable rainfall – every location seems to be. You go where it looks like the honey is going to be. Educated guesses, good data, and luck are all used to decide how many colonies go where.

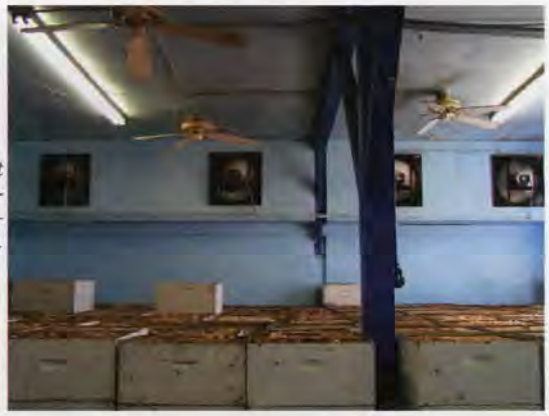
By the end of June the colonies have been placed, fed and supered anticipating the honey flow. Normal years – but what's normal anymore? – see colonies supered to accommodate local flows, or colonies move in, or out of areas to move away from or to better producing yards. In better areas beeyards can be doubled up – to over a hundred at a location – while whole states can be abandoned in any given year. Adees have access to and take advantage of sophisticated environmental monitoring equipment, along with weather predicting gear and long-range reports. Moving 10 – 20,000 colonies to or away from a location requires planning, resources, labor, and time.

Supers are added before they're needed, but not by much. Seasonal labor is added to the crew the same way. Adees work with a broker who is responsible for handling all of the labor/immigration regulations, for paying the workers, and for all of the other government payments (taxes, worker compensation and the rest). Many are seasonal regulars, working during harvest each year. Some are employed year round or nearly so, and some are random, moving from job to job as summer moves north and east. Housing is furnished by the company. In Bruce a small crew can all stay in one large house right in town. Down at the Mississippi location, there are several trailers and a large house, and in Roscoe, Adees own 10 houses for the mostly family people who work there. In California, hotels are the mainstay for housing.

Most years, average or better years, pulling honey begins in late July so prep work begins before that. Adees have two extraction facilities in South Dakota, Bruce and Roscoe, and one in Nebraska. The Roscoe facility is the newest, largest and most mechanized facility, handling more supers, more honey and has more people working there than the other two locations. Bruce, the original facility is next with most things motorized if not on pallets, and Nebraska is the smallest, and still handles some work by hand.

A two-ton truck with drip trays and cart. Every box has the same contents on every truck, and all ropes are tied the same.

Bruce loading dock. The bed of the truck is even with the hot room floor.



Bruce hot room showing circulating fans.

Like every commercial beekeeping operation standardization is king, and both Roscoe and Bruce are much more alike than different when it comes to how honey is harvested, extracted and stored.

Adees use two kinds of trucks for day to day operations. Their older trucks are two-ton, six wheelers with a 22-foot bed. These hold 128 colonies. They've begun using five-ton 10 wheelers with automatic transmissions, with a 25-foot bed that'll hold 216 colonies. Every truck has equipment boxes, rope rails and trailer hitches for pulling forklifts. Beds, boxes and the rest are custom-made by the Adee mechanics. The smaller trucks carry a crew of two, the fine-tonners carry four employees. Every truck carries the same equipment in the same box.

This standardization holds for pulling honey techniques, too, so that any employee can work in any crew, in either place. A crew is considered two employees and they are expected to pull 320 – 360 supers a day.

Field work is fundamental and is the same at both places. Working together, a two man crew moves through a beeyard following a typical pattern.

To begin, the tops of nine to 12 colonies are removed and loaded fume boards are put on. While the first batch is being cleared the next nine to 12 have tops removed and fume boards put on, but put on cockeyed, so a lower dose of repellant is given initially. By this time the first batch is about ready and the supers are removed by hand and stacked on pallets or drip trays next to the colonies. Stacks are six deeps high, (only deeps are used for honey and brood boxes). Motorized carts or forklifts get the honey from the ground to the back of the truck. The smaller trucks can hold 336 supers with room for the carts, the larger trucks hold many more, and don't need room for the carts since the forklifts are pulled on trailers.

When the trucks are full they return to the honey houses and again, the set-ups are essentially the same, only separated by scale.

In Bruce, the loading dock runs below grade so that when the truck backs into the space, the bed of the truck is level with the grade of the hot room and extracting area.

At the Bruce operation single stacks of supers six high on drip trays are moved into the hot room using hand trucks, and in Roscoe supers are moved in on pallets, 24 to the pallet.

The hot room in Bruce is kept right at 90°F, with efficient heaters and a recirculation system built into the walls and ceiling. Early in the season supers are left over night, but by season's end they may sit in the hot room for a day or more to warm. Supers are wheeled in the hand carts off the truck in stacks of six. If full, the hot room easily holds over 1000 supers.

The hot room in Roscoe is bigger, but the concept is the same. Pallets of supers are brought in from returning trucks. Here, the hot room holds 20,000 supers, leaving room for a path from the extracting room to outside to remove emptied supers.

Both extracting rooms are designed essentially the same, only Roscoe's is twice as large to accommodate forklifts.

Adees use Bogenschutz style uncappers. They run two concurrently in their extracting room. Each of these uncappers feeds three, 80 frame Hubbard radial extractors, each having Dadant variable speed controls and Granger motors. The extracting process is nearly identical at both places.

Warmed honey supers are brought from the hot room to a spot very close to the person running the uncapper. Frames are removed and fed into the top of the uncapper.

Moving supers into extraction room on hand cart.

Loading Bogenschutz extractor.

Scratching frames, and setting aside empty frames.

The super sits on top of a collection barrel for cleaning boxes.

Power washing boxes after extracting and sorting for repair.

Bruce has four 750 gallon tanks.

The rotating blades on both sides of the frame make quick work of the cappings as the frame, suspended on a moving chain that moves the frames down between the spinning shafts. Uncapped frames are checked by the uncapper-unloading, extractor-loading person who cleans tops and sides and checks for uncapped areas to scratch.

One uncapper runs three extractors. One extractor is being loaded, one is spinning and the third is being unloaded in a continuous process. One person loads, one unloads, and one moves full supers in and empty supers out of the area. Depending on man power and work load another person may be scraping empty supers to remove burr comb and propolis.

Frames are unloaded from the extractor back into supers and moved just outside the hot room to be re-viewed...this happens in both Bruce and Roscoe. Frames are checked and those that are broken, old, or too-dark are removed and recycled. Supers are first power washed, then evaluated and put into one of three groups – pitch as unusable, good but paint and repair, and needs no fixing. Supers are re-framed and those needing no repair moved to storage, paint or repair to a temporary location to work on later, and those to be destroyed are moved to the burn pile.

On a good day the Bruce operation can produce about 80, 60 gallon drums of honey (that's about 58,000 pounds). On that same day Roscoe can do about 120 drums because of the increased efficiency of everything being on pallets. All that honey goes into a two-inch pipe that has a one inch auger inside to keep things moving. Both sites handle honey the same way.

Honey, or the honey/wax/other mix that comes out of the uncapper/three extractor gang runs through a two-inch pipe, with a one inch auger inside, headed toward a sump. This baffled sump separates much of the wax and other debris from the liquid honey. From the sump the mostly-honey fluid moves through stainless pipe to the heat exchanger, a long cylinder made of aluminum that's filled with hot vegetable oil. From there through the filter and then this warmed honey heads to the wax spinner that spins the mix so the warmer, thinner honey flows out and to a storage tank, while the heavier wax is captured and eventually removed at the end of the day as fine wax-dust to be melted later. Roscoe has two, 2200 gallon tanks, Bruce has four, 750 gallon tanks.

When a tank is full it is barreled off and half way down they take a sample. They run their own moisture and color tests, then every barrel that comes out of that particular tank gets a label that tells what tank, color, moisture, date harvested, and location...that way they can identify them weeks, or months later without having to guess. This process works the same why at both Bruce and Roscoe relative to processing the barrels.

Similar to the Bruce operation, extracted supers are pressure washed after extraction, sorted for no repair, repair or discard and moved to different storage areas. Storage is expansive here, and several airplane-hanger

Kelvin checking color and moisture.

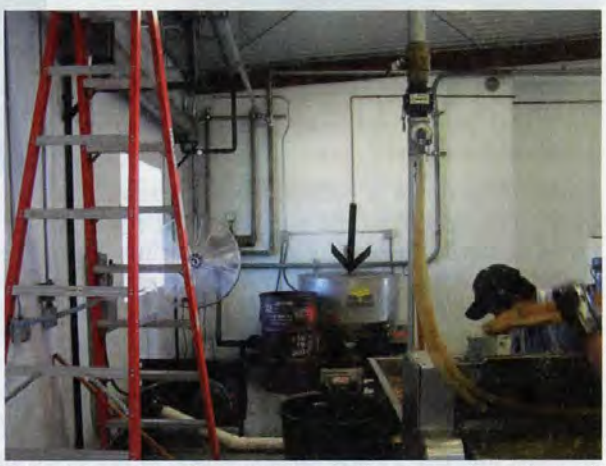
The Roscoe Facility.

Roscoe hot room.

Bringing full supers into extraction room in Roscoe.

Loading one of the Bogenschutz uncappers. Frames are scratched if not uncapped, and top and sides cleaned before going into the extractor.

Unloading extractor. Boxes are moved out on a hand cart.



Piping honey from the extractors to the wax spinner (arrow).

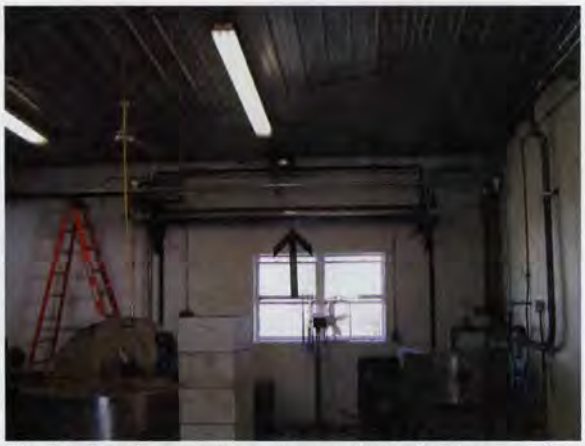
sized buildings are used for storing supers and honey until needed later. Everything is kept under cover except the tanks for the feeders.

Supers to be repainted are taken to the workshop building, where a variety of tasks are accomplished. Equipment is assembled here – boxes and frames, motorized equipment repaired – everything from forklifts to trucks. And new boxes, or cleaned and repaired boxes are preserved and painted here in a special room set aside just for that purpose.

Harvesting this much honey using a conventional uncapper produces a serious amount of beeswax each season. And beeswax is a valuable commodity that needs proper management.

Cappings wax is run through the wax spinners at both locations. These machines separate wax and honey without heating, thus not damaging either. The wax/honey slurry from the extracting process is pumped to the spinner from a sump. The slurry is spun in a perforated cylinder inside the spinner and the warm, liquid honey is thrown through the perforations of the inside cylinder, to the sides of the spinner, runs down to the bottom and collected there, much like in an extractor. Honey is pumped to a holding tank, and the dry, dust-like, honey-free wax is captured inside the spinning cylinder and falls below.

These dry cappings are shoveled into barrels and taken to the wax room in Roscoe. There barrels are put



The heat exchanger (arrow) is made of aluminum and filled with hot vegetable oil.

Roscoe's two 2200 gallon storage tanks. Each has a fill tube (inset).

Wax from the spinner is shoveled into barrels.

Machine (left) that grasps a wax barrel and turns it upside down to place it on the wax-melting table, so it rests on hot pipes.

upside down over a collection table, suspended on hot pipes. The heat from the pipes melts the wax which falls into the cavity below the pipes and runs into a heated tank in an adjacent room. There, the wax is kept liquid until it is ladled out and filtered and panned out for cooling. About 10 pounds of wax is produced for every 600 pound barrel of honey produced.

Old combs are handled in a similar fashion. The wax is melted off the plastic comb, collected in the basin and panned up. The plastic comb, which is distorted in the process is discarded. It is less expensive to handle old comb this way that of remove wax and keep the foundation in the original frame. Wax is sold to a variety of businesses, cappings to premium outlets and dark to others who are less concerned with color.

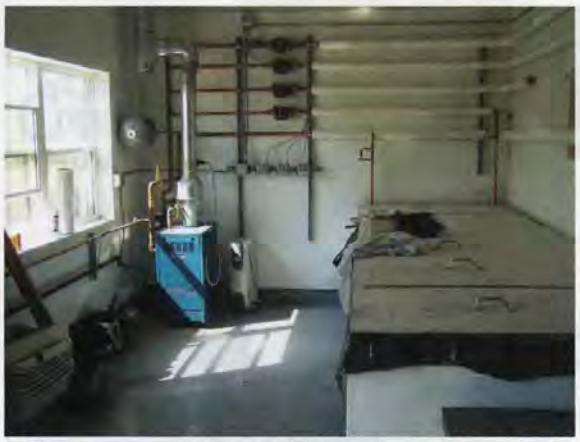
Once harvest is over, which can run into October during a good year, colonies are checked again for strength and health. The weakest are culled and held, and the rest are readied for the trip to California to begin the process all over again.

The drought of 2006 challenged beekeepers everywhere, and both South and North Dakota were no exception. The heat did help the expanding soybean acreage produce a fairly good crop (or, the change in varieties to include mostly RoundUp Ready beans may be the reason), but the CRP land did poorly early in the season, but did come back where alfalfa was abundant after the meager late rain.

Western South Dakota was dry, dry dry this year, and colonies were moved to the eastern part of the state midsummer. Yards in the Bruce area normally handle 48 – 56 colonies for a total of around 15 – 20,000, and those around Roscoe can hold 80 – 120 colonies, to hold over 30,000. This past year they held a lot more as western colonies moved east to try and make some honey.

Each yard's activities are tracked in an extensive record book. A 17 column ledger book tracks: Where the colonies came from (MS or CA or TX), the beeyard name, what county the beeyard is in, date the colonies are removed at the end of the season, the original setup number in the spring, the date they are set out, the crew that set them, first feed date, second feed date, how many are alive when first supered, first super date, crew that supered, second super crew and second super date, a ranking number, any additional feeding or treatment dates and what they were fed or treated with.

All this data, plus the other records that are kept paint a detailed and useable picture from a financial and planning aspect. On average, 75 pounds/colony honey production is expected, but more is certainly better. This helps pay for the average $67/colony operating expense incurred each year. Bookkeeping for tracking colonies in as many states as Adee's operate in can get complicated, so some general rules are that the income from California pays for anything that touches California ... as a rule anyway.



Adjacent room with heater (blue) and melted wax tank.

Filtering melted wax into pan.

Super storage room. This room has floor to ceiling doors, with enough room to put trucks in. In back, honey is stored.

The Paint room is located in the workshop building, where equipment is assembled, trucks repaired, boxes preserved, the crew meets, and some equipment is stored.

Crops include sweet clover and alfalfa on CRP land. Thistles on that land also help, until they are sprayed with a broadleaf herbicide. The clovers are a tad unpredictable, and alternate locations are required to make up for non-clover-blooming years. Soybeans, as noted are an added improvement the past couple of years. The drought that has lasted at least two years now in the upper Midwest has taken a toll. In 2004, before the drought really hit, the crop was about 12,000 drums or seven million pounds of honey. 2005, the first year of the drought the crop dropped to five million pounds and the predicted crop for 2006 was 2.5 million pounds.

Some of this honey goes to yard rent...and at this scale, yard rent adds up. Each yard rented costs 12, 5-pound jugs of honey. That comes to 3000 cases of honey a year and there's 20 cases in a drum of honey in case you needed to know. You can do the math for the rest.

By October colonies are heading to California, but some stay behind to be split into 5 frame nucs. These head to Mississippi to support the breeder colonies that will be down there, producing queens for next year's colonies brought from California.

And then, the cycle begins again.

Pollination is playing a bigger and bigger role in the Adee operation each year as honey prices continue to bounce up and down. Colony health plays a role in what they can do in the pollination business, as does the shear size of the operation. Continued technology gains have helped make up for escalating labor costs so far, as has increased business, and the ability to continue to purchase operations that are selling out. The question is, how big can one business be? And how big does this business want to be? And how long will either pollination or honey production play a major role in the operation? The current troubles with CCD seem to indicate that perhaps all beekeeping is pushing honey bees too far, too fast.

And when you produce as much honey as this operation does on even a bad year, does becoming a regional or national packer become an option? Is there a retail market for Adee Honey Farms honey? For Dakota honey? For U.S. honey in general? And what about the next generation... Kelvin's son, Kyle, is involved in the operation now, but what roads he will choose to travel remain to be seen, as with the others in his generation.

Adee Honey Farms has distinguished itself by its innovation, ambition, willingness to take chances, good luck and hard work. And being in the right place at the right time. Three generations of the family have contributed to this success, and perhaps more are going to. Moreover, they have chosen to become involved in and invest in local, state and national politics to persuade those who make decisions to make the decisions that favor the business of bees and honey.

We quoted Richard Adee once on these pages several years ago...."What's good for Adee Honey Farms is good for American Beekeeping". Some in the industry vehemently disagree with that philosophy. Others ignore the influence they have had, while some continue to play a wait and see game with choosing sides. Many, however, see the positive side of at least learning from a business that has become the biggest beekeeping operation in the Universe. BC

REPLACING THE COLONY'S QUEEN

A little philosophy and a lot of practice

James E. Tew

Seeing ourselves in our colonies

The beekeeping craft is filled with numerous instances of "humanized" bees. As humans, we just can't help it. Though they never asked for the attribute, we try to give human values to our bees. Beehives are painted white, historically, a common house paint color, to ostensibly reflect heat, but I have never been sure that heat needed reflecting. That white hive has a landing board comparable to our front porch. Our bees sting us when they are "angry" or they buzz "happily" during a spring nectar flow. Drones are the goofy boys of the hive, and we smirk when discussing the primary function drones serve. Worker bees are the conscientious laborers within the hive and we marvel at their "intelligence" and "skills." But above all, the queen is the most humanized – more often vilified – member of the colony. She is our colony's "president" – the leader of the group. We expect great things from our colony, so we demand that the queen provide the genetic stock to get the job done. Relating to our colonies, we tend to allocate all blame and all goodness of the colony to the queen. For her, it is ultimately a lost cause. Even the very best queen in the yard one day soon will be a bad queen. Her reign is short, controversial, and violent. It follows that human feelings and attributes will play a part in our decision to requeen our colonies.

Why requeen at all?

"Bees know what's best for them. I let them raise their own queen." That would be a true statement if our bees were not kept in artificial white domiciles. The beeyard is a very unnatural environment for our bees. Our white hives, sitting in neat, straight rows, contain combs that are too straight. None of this is how the bees would have done it themselves. The beeyard, and the frames of comb contained in the hives, are of human design. In this mostly unnatural world, it becomes somewhat unfair to expect bees to continue to act naturally. Regular requeening helps us continue to keep bees our way, year round. Yes, the bees can and will provide for their own queen, but it is frequently not to our human advantage to have them do so.

If your goal is productive, overwinterable colonies, you should requeen regularly – at least every other year. If your goal is watch biology in action, as an uninvolved bystander, you can let them raise their own. The recommendation to regularly requeen is a common one, but that does not make it an automatic process. The requeening process should be taken seriously and with preparation.

Obtaining queens

Numerous detailed books and articles have been written on the subject of raising, shipping, and introducing queens into colonies. My intent here is to discuss the reasons for requeening, including some suggestions and recommendations on the task.

Raising or buying?

Yes, you can somewhat easily raise your own queens if that is how you choose to obtain queens, but most of us will simply buy them (and then later complain about them). Prices for purchased queens are like gasoline prices, they are only going to go up. The selling price of a replacement queen has reached a level where requeening must be taken seriously.

From whom to buy?

Sorry, but that is your call. The bee journals are replete with advertisements for queens. Queens are given as door prizes at state bee meetings. Beekeepers talk amongst themselves about queen sources. Sometimes, local beekeepers grow a few local queens and offer them for sale. Spring is the season when most beekeepers want new queens so spring queens are the most difficult to get. Summer queens and fall queens are more readily available, but introduction will be a bit more difficult. Ultimately, you the beekeeper, will have to find a source for queens that is satisfactory for you.

What kind to buy?

I can't think of a single beekeeper who ever set out to buy a bad queen. We all want *good* queens, but the ques-

Contented worker bees on a queen cage.

Queen being released.

tion is – how good? Queens of various color and behavioral strains are there for you. Queens with varying claims for resistance to mites are now commonly offered. Most large-scale queen producers give their queens unique names that actually have little to do with the quality of the queen. Some of you like yellow queens while others are supporters of darker Carniolan queens. In years past, Caucasian queens were marketed, but that strain has fallen from grace and are not now readily available.

I normally try for the standard "good" queen, but there are plenty of you out there who want the very best queen available and are willing to pay for her. Certainly, no harm done there. When you make your decision on where to buy your queens, you will secondarily decide how much you are willing to pay.

When to complain?

Need I say that the queens must arrive alive? If they come to you dead, contact the producer immediately. But what if she comes in alive, but she dies while in the cage on your dining room table waiting for the rain to stop so you can release her? There is not as clear an answer to this question. Or, how about you pay $20 for her and then find her corpse in front of the hive the day after her release? Again, no clear answer. What if you successfully introduce the queen and she is a low producer? Not a lot of recourse there – buy from someone else the next time. In all areas of queen purchasing, be fair to the producer and to yourself. But before you call with a sad story, you should know that experienced queen producers have heard it all before.

When to requeen?

You need to requeen your colonies ***before*** they need it. In my idyllic beeyard, I order queens based on the calendar – without even opening the colony. In reality, I and many of you are already standing by the colony looking at a failing queen before we rush to our phone to call for a new queen. With luck, we get our new queens two weeks later. Valuable time has been lost. Alas, better this desperate way of ordering queens than not to requeen at all.

As indicated above, the Spring season is the easiest time to requeen. During a good nectar flow, the bees are more amenable to accepting a new queen. Having said that, autumn requeening is certainly possible and having said that so is Summer requeening. Winter requeening is obviously not an option. New queens are not available and breaking clusters to find and replace queens would no doubt cause great harm to the dormant colony.

How to requeen?

How to requeen? Let me count the ways. Techniques range from installing a complete nuc to rolling the replacement queen in sputum in your hand before dropping her in the colony are in the bee literature. That said, the most common techniques require the colony's reigning queen be removed and a caged queen put in the colony. Everything else is details. A discussion of some of those details follows.

Kill the old queen?

It matters little if you kill the reigning queen and leave her in the colony (humanism again). The bees don't pine in agony and eagerly accept the new queen in awareness that the old queen is dead. Apparently, and strange to us, a colony is nuts about avoiding parasitism and will kill a perfectly good queen – even when no other is available. Killing (or removing) the old queen and leaving the colony queenless for a day or so gives the colony the pheromonal opportunity to "realize" that they are without queen.

How to manage the caged queen?

Though techniques exist for direct introduction, those techniques were developed during beekeeping times when queens were plentiful and cheap. Not now. Unless you really know what you are doing and unless you have backup queens available, use the slow release procedure.

After the old queen is removed, the caged queen is put into the colony. The type of queen cage being used will dictate where the cage should go. In any case, the caged queen should be near the colony's brood nest. Just a few years ago, I would have confidently told you to expose the candy plug in order for the bees to slowly eat the candy plug; thereby slowly releasing the queen. Candy plug up or candy plug down? I don't care. That is a detail for beekeepers to argue at meetings. Just be sure that the nurse bees have access to the caged queen in order to feed her. Now, I more cautiously recommend that the queen cage candy plug stay plugged and you, the beekeeper, actually return to the colony for a second time to evaluate how well the introduction process is proceeding. For the past two to three years, I have been directly releasing the queen onto the brood comb.

What do with the attendant bees?

If you can, get them out. If you are uncomfortable doing that, leave them in. Caged attendants will undergo the same introduction process as the queen. If the caged queen is to be held outside the hive for a long time, be prepared to replace the attendants, with young nurse bees, as the older attendants die.

How to release the caged queen?

Historically, the recommendation was to allow about three days for the caged queen to become familiar to the

colony. I don't mind doubling that time now. Upon returning to the colony on a bright, sunny day when bees are readily flying, using minimal smoke, gently open the colony and observe the cage. No doubt it is covered with bees. Remove the cage and gently brush the bees away. In fact, did they gently brush away? If not, and if they cling to the cage while showing a sting response, do not release the queen[1]. The bees are treating the cage the same way they will treat the queen. If all looks well, release the queen onto a frame of open brood if available or capped brood if unavailable. If the bees readily show hostility, recage the queen and try again a few days later.

The actual releasing phase can be dicey. The queen has been in that cage now for weeks and will frequently be reticent about leaving it. When using wooden cages, pry the staple from one end and pull the screen wire back. It is imperative that you carefully watch the queen. She will occasionally abruptly fly away. Gently open the cage on the comb and entice the queen out. Again watch her. Even if she doesn't fly away, she will nearly always run upwardly. Once you get her turned around and headed into the brood nest, things should be okay. I can't lie. This is a tense moment in the queen introduction process.

Then what?

After releasing the queen and deciding that she is being properly accepted, leave her alone for a week or so. You will want to check the front of the hive each day per chance she is rejected. If nothing else in this article stays with you, it should be this: Queen introduction is not an exact procedure. Different colonies, different caged queens, different seasons and different beekeepers will all result in different outcomes. Sometimes bad things happen to good queens. Does this story end with the new queen producing a brood nest and becoming the reigning monarch (there's that human thing again)? Most of the time – yes – but sometimes the queen will be superceded long after she has established a brood nest. That is just one of the mysteries of the bees. Ultimately, they are the ones who must decide if the queen is right for them.

Requeening – a necessary but iffy task.

As with any other aspect of keeping bees, the beekeeper's ability to assist a colony in requeening itself is an acquired skill. However, you should know that even experienced beekeepers profit from having a high degree of good luck when undertaking this task. So much of our bee management could be made so much better if we consistently requeened. For a host of good reasons, most of us won't.

For related Archived *Bee Culture*[2] reading on the subject of queen introduction, look at:

- Tew, James E. 1996. *The Mysterious Case of the Disappearing Queen.* Bee Culture. August, 1996.
- Tew, James E. 1997. *101 Reasons a Queen Gets Replaced.* Bee Culture. February, 1997.
- Tew, James E. 2002. *Banking Queens.* Bee Culture. December, 2002.
- Tew, James E. 2002. *Queens, Queens, Queens.* July, 2002.
- Latshaw, Joseph. 2002. *Queen Introduction.* March, 2002.
- Tew. James E. 2003. *A Queen Cage Introduction Frame.* September, 2003. BC

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[1] Last Spring, upon returning to a package of bees that I had installed, the bees clung to the queen cage and were clearly aggressive. I gave them two more days, but the bees were still unhappy with the caged queen. Upon colony examination, I found a free-ranging queen already in place in the brood nest. The package producer had inadvertently shaken the colony queen in with the package bees.

[2] Archived articles available electronically at: http://www.beeculture.com/

Pass The Hive Tool

Last Christmas our six-year-old wanted just one thing for Christmas: a bee suit. How could we possibly deny that request? She was thrilled with her bee suit and has happily been suiting up to follow her father out to the bee yard ever since. Only time will tell whether this little beekeeper-in-training will choose to carry on the family beekeeping tradition, but we have taken the first step toward passing it on to her.

Just as a relay runner must hand the baton to the next runner, beekeepers must pass on their skills and knowledge to a new generation if the craft is to survive. My husband and I have been on both ends of the baton (or I should say the hive tool); both of us are second-generation beekeepers and are now training the third generation. We likely would not have become beekeepers ourselves had our parents not involved us in the process. It is never too early to start teaching kids about bees, and if you don't have any kids or grandkids of your own, there are plenty of other youth who would like to learn. 4-H clubs, schools, and community groups are good places to get involved.

Why bother?

Quite frankly, it is easier to work the bees without children around. It takes ages for them to put on the suit and they ask a zillion questions. Sometimes they get in the way. So why bother? Well, teaching a young person can be rewarding for both parties. It is hard to put a dollar value on the intangible rewards of time spent together, teaching, and relationship-building, but those are valuable benefits. Kids are good company – they look at things through fresh eyes, and their excitement is contagious. And while they probably can't schlep hives around, there are lots of little helpful jobs they can do, from putting frames together to helping extract honey. Besides, someday that six-year-old will be 16 and if we've caught her interest, she just might help with the heavy lifting too.

By tagging along with their dad, our kids are encountering science in a very hands-on way. There is no comparison between reading a textbook chapter about social insects and actually looking inside a hive. Perhaps this experience will lead to a lifelong hobby or career for one of our children. In addition, too many kids these days have no concept of where their food comes from. Not a problem here – ours will be happy to inform you exactly how that honey bear got to the table. Sometimes the adults even learn a few things too – we never learn so well as when we teach.

Other intangible benefits for youth include self-confidence and calmness around the bees. Experiencing success with bees can build up a child's self-esteem. Our six-year-old is quite proud of her bee suit, and enjoys regaling people with tales of her beekeeping experiences.

Educating people about bees and honey benefits all of us. People who understand bees, at least a little, are inclined to be less fearful and more friendly toward them. The neighbor child you teach today may grow up to be the farmer who is considerate of your bees when he sprays.

If beekeeping as we know it is to survive, it needs the next generation's enthusiasm, interest, research, and support. But beekeeping has a steep learning curve; it is difficult and expensive to start up. Growing up familiar with the process can greatly increase the likelihood of a person choosing to keep bees as an adult.

What can they do?

There are tons of beekeeping jobs that kids can help with, and a bit of cash motivation goes a long way. My father paid us a penny for each grommet we pounded in (25 years ago) and always had plenty of eager helpers. Here are some tasks that my husband and I either remember doing or have enlisted our kids to help with.

Pound grommets into frame; glue frames; wire; put frames in hive; paint hives; puff the smoker while you are working bees; be a "go-fer"; hand you frames when extracting; uncap honeycomb (older kids); load frames in extractor; remove empty frames from extractor; and fill containers.

Safety

There are common sense precautions you should take when involving a child in your beekeeping work. First, make sure there are no known allergies to bee stings. Whether or not you use a suit, provide one for the child. Nothing will deflate the child's interest faster than being stung.

Smokers and extracting knives can be dangerous; use good judgment as to whether a child can safely handle them or not. Hive tools can slip; boxes can land on toes. Watch fingers in the extractor as well. Small children should not be allowed near the machine when it is running. A little common sense goes a long way when it comes to keeping children safe and confident around bees.

Conclusion

Beekeeping is a skill and a tradition that is too wonderful to keep to ourselves. There are plenty of youth around who would benefit from learning this craft. Even the casual beekeeper has a great deal more knowledge than the average person when it comes to bees and honey, and most people are curious about bees. So don't hold too tightly to the hive tool – pass it on! BC

Resources: Good books and websites to teach children about bees

Learning about Bees from Mr. Krebs, Alice K. Flanagan

Hooray for Beekeeping!, Bobbie Kalman

A Beekeeper's Year, Sylvia A. Johnson

The Beeman by Laurie Krebs

Beekeeping links for kids: www.ncbeekeepers.org/kidlinks.htm; www.liberty4hbees.com/; www.42explore.com/bees.htm; eppserver.ag.utk.edu/Bees/test/kids.html; www.honey.com/consumers/kids/default.asp

QUIZ – QUIZ – QUIZ – QUIZ – QUIZ

How Much Do YOU Know About Raising Queens?

Quiz prepared by Larry Connor –

Sorry for the pun, but all the buzz lately seems to be about raising your own queens, "cause the stuff you get is dead on arrival, doesn't get accepted, or is superseded in a month." I've been trying to teach people how to raise queens for years now, and I know some beekeepers are a whole lot better at it than others. So, stone sober, I promise, I've prepared an almost serious self-exam for you to check your aptitude for raising queens, getting them mated, and getting them introduced into a hive and staying there for a season or longer.

1. **Magazine readership**: Select ONE description that *best* represents your reading habits:
a. Serious subscriber to this magazine for five years and have read every article (5 points)
b. Subscriber to his magazine but only read the cooking section (0 points)
c. Don't subscribe to any bee magazines (Deduct 5 points)
d. I've skimmed the queen rearing stuff, and only called a few of the authors idiots (1 point)
e. Read another bee magazine all the time, but not this one (2 points)

2. **Books read**: This section is additive, the more you have read, the more points you get:
a. Dewey Caron's *Honey Bee Biology and Beekeeping* (3 points)
b. Roger Morse's *Rearing Queen Honey Bees* (3 points)
c. Laidlaw & Page's *Queen Rearing & Bee Breeding* (5 points)
d. Steve Taber's *Breeding Super Bees* (3 points)
e. Brother Adam's *In Search of the Best Strains of Bees* (3 points)

3. **Experience**: One answer only. Queens introduced: How many queens have you introduced into colonies during your lifetime?
a. None (DEDUCT 5 points) b. 1 to 50 (1 point)
c. 51-500 (2 points) d. 500-2000 (3 points)
e. Over 2000 queens (4 points)

4. **Skills**: (Skip this question if you answered "a" in #3 – you've never introduced queens). Of the queens you introduced, what was the average level of acceptance?
a. 0% (DEDUCT 5 points)
b. Under 25% (DEDUCT 4 points) c. 26-50% (0 points)
d. 51-75% (3 points) e. 76–100% (5 points)

5. **Beekeeping skills**: This section is additive, but some of the values are negative! Sum the total of these management skills:
a. I always wear gloves while working bees (Deduct 5 points)
b. I work bare handed when handling queens and keep my hands clean as I work (5 points)
c. I medicate to eliminate symptoms of American foulbrood (DEDUCT 25 points)
d. I can clip and mark a queen without difficulty (5 points)
e. I clean my hands, hive tool, and smoker surfaces when I move apiary to apiary (5 points)

6.: Describe your **eye-hand coordination**. Select only one answer to describe your manual dexterity:

a. Like a WORLD CLASS surgeon's (10 points)
b. Like a seamstress or fly fisherman (5 points)
c. Like a good cook (3 points)
d. Like a good auto mechanic (2 points)
e. I sometimes miss my mouth with the spoon while eating cereal (DEDUCT 5 points)
f. Bonus: If you can catch WORKER bees returning to the hive with chopsticks, *and not hurt them*, ADD 5 points.

7. **Queen finding skills**: Select the **one statement** that **best** describes your ability in queen finding:
a. I find the queen if she is on the frame in five seconds or less (5 points)
b. I find the queen if she is on the frame in under a minute (2 points)
c. I rarely find the queen (DEDUCT 15 points)
d. I often spot the queen on the next frame—still in the hive – as I work the hive (10 points)
e. I find the queen when I pinch her when she crawls up my pant leg (DEDUCT 5 points)

8. **Brood finding skills**: Select the **one statement** that **best** describes your ability in brood identification:
a. I have trouble telling sealed brood from old honey (DEDUCT 10 points)
b. I can identify brood, but only when sealed (DEDUCT 5 points)
c. I can see older brood, but not young larvae (DEDUCT 2 points)
d. I can see eggs and larvae without difficulty (3 points)
e. I can spot an egg as it starts to lay down as a larva (10 points if you're telling the truth, – 100 if you're fibbing).

Add up your points, find the comment that applies to you, and follow the instructions carefully:

Your score was negative. Thank your Mom for reading this exam to you. It was nice that she added your score. Oh say, isn't there some honey you need to extract – left over from last year? You may want to finish that soon.

Your score was between zero and 14. Maybe you should find some teenager to mentor and have them read the queen rearing books and help you with queen production, but only if you split the profits 50:50. Both of you should enroll (you pay both registration fees) in a queen rearing class (offered by Marla Spivak, Sue Coby, the author and others) and have fun with trying to raise a few queens.

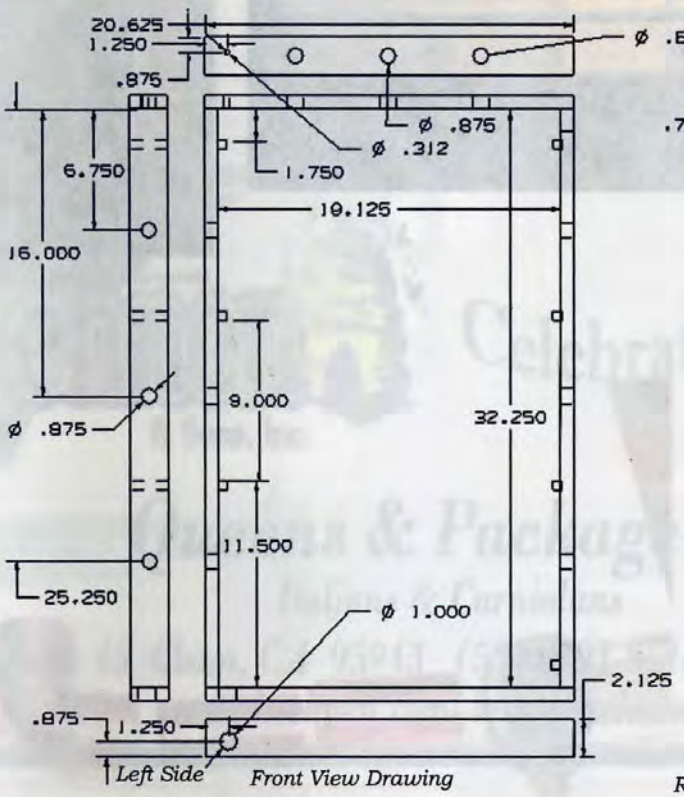
Your score was between 15 and 40. Okay. It is worthwhile for you to try to raise some queens this year. I recommend you start small and try producing some of your own queens within your own operation. Sign up for a queen rearing class and take a buddy, girlfriend, or a local teenager (maybe one of each?) to work with you.

Your score was over 40 points. I hereby grant unto you permission to receive the full blast of humility that queens and bees are about to bestow upon you as you walk into the apiary with all your bravado and confidence. You may think you have all the answers, but the bees have their own version of this exam, and they keep rewriting their exam! And you thought this was *so* easy . . .

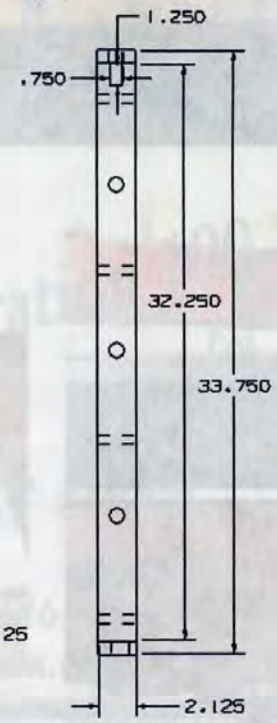
MY INDOOR HIVE

Patrick Driscoll

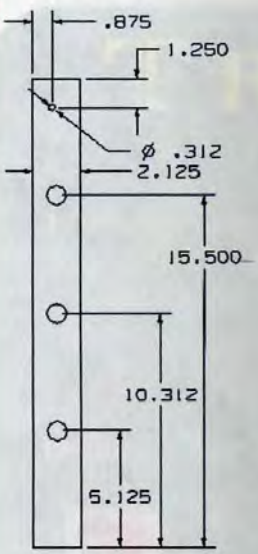
My indoor hive mounts to the wall next to a window in the family room, and can swing out to view the dark side whenever we want. I used three nine-inch full size frames that seem to be just right to take the bees thru Winter. I find they like to stay indoors in the heat in the Summer with occasional forays outdoors; it must be the air conditioning inside. This model is secure so that when little kids come over and pull on the parts, I do not feel my heart pulsate violently. This model even has a slot in the upper right side where I can requeen if needed, or if they swarm, without disassembling the hive. There is also a cleanout slot on the bottom to remove any debris that accumulates on the bottom board. I use two custom made storm windows on each side for the front and back that can be ordered from any hardware store. The breakthrough on this design was using the lower pivot point, the wall hinge so to speak, as being also the entrance tube from the outside. The pivot is a 3/4" copper tube assembly soldered together acting as a pivot. This allows the 180° swing for viewing



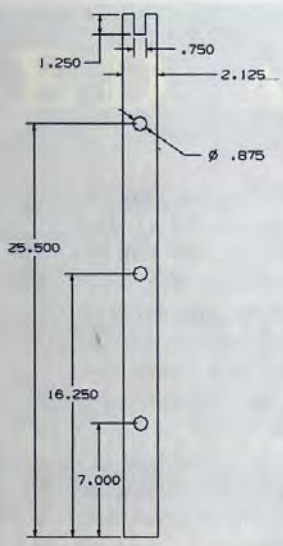
Front View Drawing



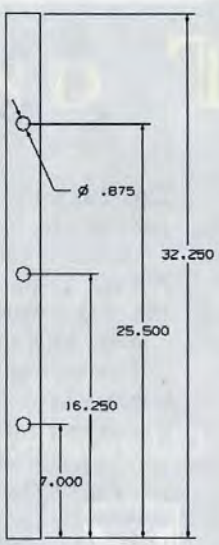
Right Side With Requeen Slot



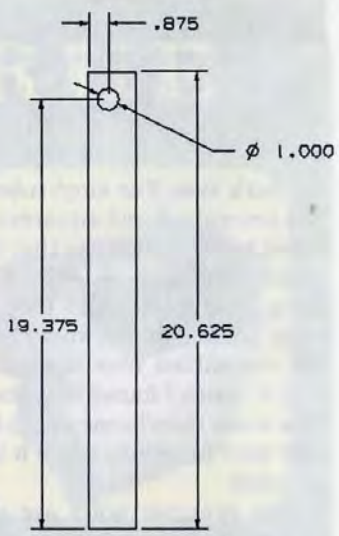
Top Frame Part



Right Side



Left Side



Bottom Frame Part With Hole for 3/4 Pipe

L,R sides with screens; top and bottom; upper and lower wall mounts; entrance pivot copper and vinyl tube, cleanout slide.

Generation three can swing out!

Top and bottom details.

Copper tube assembly.

the dark side. The vinyl tube for exit has several colored squares of paper taped to the bottom so that the bees make a relative sense of direction going in and out since they can see some color. The thickness (depth) of the assembled hive is slightly over 2-1/8" since I found that they like a little more than frame depth in an indoor hive especially when it becomes crowded.

All breather holes are screened and held with staples on the inside. The three holes on the top can be used to insert an upside down plastic bottle to feed them in the Fall or Winter as needed. When removing the hive to work on it outside, I insert a piece of aluminum flashing from the lower right front side below the window to stop any exit of bees thru the copper tube. BC

Patrick Driscoll is a 25-year product development engineer who now teaches high school math in Chicago.

The Honey Garden

Combining honey bee pollinated garden crops with honey recipes. The best of two worlds.

With most tree fruits, it can be many months between flowering and harvest. Not so with the flavorful, impatient cherries. Depending on the climate, early varieties of sweet cherries are ready within two to three months after blooming.

Sweet cherries have a chill requirement of around a thousand hours or so, making their southernmost limit about zone seven or eight. For the most part, sweet cherries are hardy to zone five with some varieties withstanding somewhat lower temperatures.

Though most kinds of sweet cherries are well suited to western states, gardeners in other areas should focus on hardy varieties, preferably ones with crack-resistant fruits.

Nurseries sell both dwarf and semi-dwarf trees. The former are preferred as shorter trees make harvest easier.

Growing Conditions

For sweet cherry trees, a cool, dry climate is most favorable. Choose a sunny spot where they will receive full sun for at least half of the day.

Tolerant of black walnut trees, cherries like a light, porous, well drained loam. Since they don't thrive in heavy, waterlogged soils, clay is the least suitable. A pH of around 6.5 to 7.5 is considered ideal.

Choose an elevated spot where spring frosts are less likely to occur. Because the trees are grafted, plant with the graft union several inches above the soil surface.

Tree Care

For optimal crops, give sweet cherry trees good care. Control weeds. Apply mulch around the plants to minimize weeds and limit mower and weed eater damage to the trunk.

Compared with other tree fruits, sweet cherry trees require minimal pruning once the tree is trained. Excessive trimming can reduce the yield. For that reason, remove only dead, damaged, or crossing branches. Avoid damaging the spurs. Fruit thinning isn't generally needed for sweet cherries.

Fertilize on a regular basis based on the recommendations given in your soil analysis report. If possible, use a complete fertilizer with trace elements, which are particularly needed in arid regions of the West.

The trees will likely need watering, particularly during dry Summers. However, don't go overboard as this can cause wet feet. Sweet cherry trees will need at least 30 inches of rainfall or water evenly distributed throughout the growing season. To minimize fruit cracking, avoid watering close to harvest.

Cherries are susceptible to a number of problems not the least of which is birds. Either place a bird net over the tree, or choose non-red varieties, which birds dislike.

Diseases include bacterial canker, which can cause branches to die, and powdery mildew. Brown rot can be

RECIPES

Ann Harman

The famous cherry trees surrounding the Tidal Basin in Washington, DC, bring tens of thousands of visitors each year. But all they are rewarded with are beautiful blossoms. Not a single cherry. That is disappointing because cherries, picked and eaten straight from the tree, are a superior treat.

The season for fresh sweet cherries is short, but even shorter for the tart cherries. That is why you will usually find frozen and canned tart cherries since most of the crop is processed. But that means you can enjoy making various dishes with tart cherries the year around.

If you are lucky and have a cherry tree I do hope you have found a way to rescue some of your crop. Cherries are a particular favorite of birds. Their visits to the trees can be very annoying, especially if they take only one or two pecks from a cherry before moving on to the next one.

Various recipes exist for Cherries Jubilee but this one seems to be a classic. It is very easy and is quite spectacular, good for a special occasion.

CHERRIES JUBILEE

1 pound can dark sweet cherries
1 tablespoon honey
1 tablespoon cornstarch or arrowroot
1/2 teaspoon almond extract
grated rind of one orange
grated rind of one lemon
1/4 cup Grand Marnier
1 tablespoon brandy
vanilla ice cream

Drain the cherries, reserving the juice. Set cherries aside in a bowl. Pour the reserved juice in a saucepan and stir in the honey and cornstarch. Stir over low heat until the liquid is clear and slightly thickened. Add the almond extract, cherries and grated rinds and heat until hot. In a separate pan heat the Grand Marnier and brandy until slightly warmed. Bring the cherries in their hot sauce to the table. Light the Grand Marnier and brandy with a match and pour the flames slowly over the hot cherries. Serve with vanilla ice cream. Serves four.

The Great Food Almanac
Irena Chalmers

You can do other things with cherries besides make pies. This is a refreshing fruit salad. You can buy a little gadget called a cherry pitter that makes removing the pits a quick and

a potentially serious problem for the fruits. In addition, this manifests itself as blossom blight if high humidity and wet conditions occur during the flowering period.

Insects that attack sweet cherry trees or cherries include apple maggots, black cherry aphid, cherry fruit fly, cherry sawfly, Oriental fruit moth, plum curculio, scale, and spider mites. In some instances, dormant oils serve as a good control for these pests.

Some cherry tree problems can be minimized with Fall clean-up around the trees. Remove all mummified fruits, diseased leaves, and damaged branches.

Sweet Cherry Varieties

Any number of sweet cherry tree varieties is available with the fruits varying widely in skin color. The flesh ranges from deep red to yellow, pink, or even white.

Bing Cherry

With dark red, luscious, sweet fruits, Bing has remained an All-American favorite for over a century. Firm and juicy, these ripen all at once. They're prone to cracking during rainy weather, making them most suitable for the Northwest. The trees bear heavy crops, which ripen mid-season. If not on dwarfing rootstock, the trees can be quite large.

BlackGold

Bred at the Geneva experiment station in upstate New York, this self-fertile variety was released several years ago. Especially suited to the Northeast, it is recommended for zones four through eight. A late bloomer, this avoids late Spring frosts. The deep red fruits, which resist cracking, ripen mid-season. They're tolerant of brown rot.

Bearing reliably year after year, the mature trees yield between 200 and 250 pounds of fruit.

Kristin

Considered the hardiest of the dark sweet cherries, this mid season variety is recommended to zone four. It blooms mid season. Kristin bears heavy crops of premium quality, glossy fruits. They're about an inch in diameter with firm, juicy flesh and a rich aroma. Though they're subject to fruit cracking, this is less so than for some other varieties.

Stella

In some respects, Stella sweet cherries are comparable in quality to that of Bing. The wine-red to almost black, firm fruits are sweet and juicy with a rich flavor. Their flesh is black. The vigorous, upright trees bear at an early age. They're self-fertile. A very productive variety, Stella bears abundant quantities of large, plump fruits. These ripen mid to late season.

Available as a dwarf tree, this is recommended for zones five through seven.

WhiteGold

Bred at the Geneva experiment station, this was released at the same time as BlackGold. This self-fertile variety is hardy to zone four. Recommended for the Northeast, it blooms mid to late season. A reliable variety, WhiteGold is tolerant of major diseases, including black knot, bacterial canker, and brown rot. The very productive

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easy job. Look for one in a kitchen supply shop.

CHERRY SALAD

2 cups fresh pitted cherries
1/2 cantaloupe, cut into bite-sized pieces
2 apricots, halved, pitted and skinned
1 banana, cut into 1/2-inch slices

HONEY LIME DRESSING

1/2 cup nonfat plain yogurt
2 tablespoons fresh lime juice
2 tablespoons honey
1/2 teaspoon grated lime peel

Mix dressing ingredients together and pour over Cherry Salad just before serving. Serves four to six.

A Honey Cookbook
A. I. Root Company

Cherries and apples make a good combination, too. Here's another salad for you to try.

CHERRY-APPLE SALAD MOLD

1 cup frozen unsweetened pitted dark sweet cherries
1-1/2 cups apple cider or apple juice
1 3-oz packet cherry-flavored gelatin
1/2 cup applesauce
1/4 cup chopped celery
1/4 cup chopped walnuts
apple cider or apple juice
1/2 cup soft-style cream cheese

Let cherries stand at room temperature while preparing gelatin mixture. In a saucepan bring the 1-1/2 cups apple cider to boiling; remove from heat. Add gelatin, stir until dissolved. Chill until partially set (consistency of unbeaten egg whites). Halve partially thawed cherries. Stir cherries, applesauce, celery and nuts into gelatin mixture. Pour into a three or 3-1/2 cup mold. Chill until firm. The salad can be unmolded onto a lettuce-lined plate if desired.

For the sauce, stir enough apple cider or apple juice (three to four tablespoons) into cream cheese to make a sauce of spooning consistency. Add sauce to the individual servings. Makes four to five servings.

Better Homes And Gardens New Cook Book

Here is a recipe for a quickly-made cherry sauce. It uses sour cherries. Sour cherries are not always available but you can buy them in season and freeze them. If you use sweet cherries you need to reduce the sweetening.

CHERRY SAUCE

2 cups fresh sour cherries, pitted
3 tablespoons honey
2 teaspoons cornstarch
dash of salt
1/4 cup water

Put cherries in blender and process at medium speed until chopped but not pureed or

trees bear about 200 to 250 pounds of fruits per year. These resist cracking. The skins are yellow with a red blush, while the flesh is yellow.

Flowering and Pollination

Most sweet cherry varieties require cross pollination. However, certain kinds will be self fertile. Most catalogs will list compatible varieties for pollination purposes. Larger home orchards will need one pollenizer for every nine cherry trees although fewer are sometimes used. For best results, use one to two beehives per acre. Honey bees are the main pollinators.

Appearing with the leaves, the white flowers open in small clusters. These occur on spurs that arise from older wood and at the base of one-year-old shoots. An individual spur can continue producing blossoms and fruits for a decade or more.

By blooming late in the Spring, sweet cherry trees experience less damage from late frosts than most tree fruits. The earliest blooms on a given tree will produce the best quality fruits. There are early, mid, and late blooming varieties.

In the West, there are sometimes enough sweet cherry trees for honey bees to produce surplus honey. Elsewhere, nectar and pollen from the blossoms stimulate early brood-rearing.

Harvest and Culinary Uses

Under ideal conditions, a mature cherry tree will typically yield anywhere from 50 to 175 pounds or more per tree, depending on the rootstock and the variety being grown.

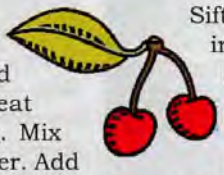
Very long lived, sweet cherry trees can bear for 25 years or more if they're grown on dwarf rootstock. Harvest begins during the second or third year after the dwarfs are planted. This will be slightly later for semi-dwarfs.

Sweet cherries need to be harvested in a timely manner after they've reached their mature size and changed color. Delaying harvest can make them susceptible to decay, cracking, and loss of quality.

Handle the fruit carefully to avoid bruising or squeezing it. Pick cherries with the stalks attached. Because they're highly perishable, store them in a cool place.

Sweet cherries are eaten fresh, pickled, frozen, dried, and as maraschino cherries. BC

chop in food processor. Place chopped cherries in small saucepan, add honey. Stir over low heat until just before boiling. Mix cornstarch, salt and water. Add to cherries. Cook slowly until thick and smooth. Cool. Place in jar, cover and store in refrigerator. Yield about two cups.



Naturally Delicious Desserts And Snacks
Faye Martin

The state of Michigan is famous for its sour cherries. When sour cherries are in season, try this shortcake. You can use the above Cherry Sauce recipe for this delicious dessert.

CHERRY SHORTCAKE

1 cup tart cherries
2 tablespoons sugar
1/4 teaspoon salt
1 egg
2 cups flour
2-1/4 teaspoons baking powder
1/2 cup butter or margarine
1/2 cup milk

Sift together the flour, sugar, baking powder and salt. Cut in the butter. Add the milk and mix quickly until moistened. Divide the dough in half, roll to an 8-inch circle and place in an 8-inch round cake pan. Top with cherries, sweetened to taste (use honey). Roll remaining dough to an 8-inch circle and place over the cherries. Sprinkle with two teaspoons sugar and bake at 400° for abut 25 minutes. Serve with cherry sauce.

Cherries can be used with meats, especially chicken and ham. Since this recipe uses canned cherries you can serve it anytime.

CHICKEN AND CHERRIES

1/3 cup flour
1/2 teaspoon paprika
1-1/2 teaspoons salt
1/4 teaspoon garlic salt
1 can black cherries
1/4 cup cooking oil
1 cup sauterne
6 skinned halves chicken breasts

Combine the flour, salt, paprika and garlic salt in a paper bag. Shake the chicken breasts, two at a time in the mixture. Heat oil in skillet and brown the chicken. Add cherries; pour the sauterne over the top. Simmer, covered, about 35 minutes.

101 Cherry Recipes
Carole Eberly

We have all read the legend of George Washington and the cherry tree. Of course it's false. Why cut down a tree that gives us such delicious fruit. He probably cut something else down. BC

Starting Over With Bees

Gwen Rosenberg

"I could say they swarmed to Heaven, or didn't listen to the Queen's infinite wisdom - and all died as a result."

After we moved to this area I really poured it on thick with my neighbors about how great beekeeping was and how as my neighbors they were in store for a lot of free honey. Recently, one of them took me up on my offer and asked if I had any honey "Uhhh...no." I said.

"That's alright," she said, "the bees should be flying soon and making you some more."

I really have these people well trained. "Well, we'll be seeing some activity out by the hives for sure once the snow melts," I cryptically uttered. She's a real animal lover so there's no tactful way to say that last Fall my bees were really light on Fall honey and I tried to feed, but then the holidays, and then the kids' birthday parties, and then mice, I think, or maybe bears, or maybe colony collapse, but anyhow they're all as good as dead. Ouch.

Gwen Rosenberg's dead bee farm just does not have a feel-good happy ring to it. I know the weather broke a month ago, for 15 minutes, and I should have gone out there to feed my little charges, but I was sick and cold – I could have died venturing all the way to the backyard with buckets of sugar syrup. I know my doctor would have insisted I stay inside, so I did . . .

Now the snow really is melting for good. I put my green plastic derby hat back on mothballs and the Easter bunny is going to be hopping across the plains of death out back if I don't take some action fast. Oh, what is this sick feeling in my stomach? Eggs and kegs? No, this is more of a dreadful, dark, morbid feeling with shades of "Telltale Heart", like the time I forgot to feed the neighbor's hamster for the two weeks they were on vacation when I was 10.

I could be wrong. Maybe the little gals pulled through. There could have been more honey in the hive than I thought. Bees can be very resourceful, you know. Stranger things have happened than a couple hives surviving on nothing more than mouse droppings and rock hard pollen nuggets. Is that 20,000 little tiny heartbeats I hear coming from the back yard? Uh, oh.

Alright, I've procrastinated enough, it's time to recite the eulogy, with a hive tool and a bucket. But first I need to make sure none of those "How are the bees?" friendly neighbor types are out snooping around. Is there anything more embarrassing than literally killing your entire hobby. Non-beekeepers just do not understand this possibility. They ask too many difficult questions. Sure, like cold weather and starvation coupled with rampant disease has never killed your champion golden retriever before- sheesh, give me a break.

The bees are dead. All dead. It looks unfortunately like it was a painful and sordid affair, like some of the bees formed a separate faction and split from the main cluster only to suffer the same fate. That's a lot of bee backsides staring at me. Requisite mouse damage? Check. Thank goodness I let my husband talk me into plastic foundation so at least the cleanup is easier. Luckily, my neighbor didn't seem too suspicious when I fed him that line about not needing a smoker on the vernal equinox.

After an afternoon confronting my limitations as a beekeeper and completing the mass burial of honey bees 2007, it's time for a plan. Springtime is for rebirth. Good thing there are beekeepers across the country that have managed to keep their hives alive long enough to squeeze some nucs out of them. I retire to my library for a little refresher course on beekeeping. It's disappointing to see that although I have "Backyard Beekeeping", "The Beekeepers Handbook" and "Starting Right with Bees" I have no "Starting Over with Bees." There are very few index references to "hive apocalypse" or "complete demise of a colony in three months." I need some bees and I need them quick before the suppliers sell out like they threaten to do every year, or my friends and neighbors discover the dirty little secret I've buried in a shallow grave in the backyard.

Oh, dear lord, I haven't even considered the children! No not baby bees, my own children and their brutally honest commentary on my beekeeping affairs. You know, you put one dog down in your life and all of the sudden you're Attila the Hun. Maybe I can pass this off as a lesson in nature, like the time I explained away the unpleasantness of burial rights by referring to internment of beloved family members as merely "composting." I could say that they swarmed to heaven or didn't listen to the queen's infinite wisdom and all died as a result.

There is probably some good mother out there who would use this as a learning opportunity, or worse, a science fair project. Well, seeing as she's not in my beeyard right now I'm sticking to what mothers for generations have done when faced with the potential for warranted criticism- dodge and run.

Now that the kiddies are otherwise occupied with their new toys, chocolate milkshakes and afternoon video

games, I'm free to explore the issue of new bees with some peace and quiet. The question of where to purchase new bees should be fairly easy, but alas, it's never easy, you see, I am the secretary of my county's bee club. It just wouldn't be prudent for all the club members to catch wind that I've wiped out an entire apiary. Sure you lose a hive or two, that just makes you experienced, but my track record is a little sagging in this regard. What would happen to my credibility if the "newbies" heard my sad news, or worse the old timers who have been keeping bees since the colonists brought them to this continent. Give me 60 or 70 years of beekeeping and then I'll pull out of a Winter with a thriving colony, but for now I'm shopping for bees.

Last year I bought my bees from the president of a neighboring county bee club. I swear he waved his hand in the air above his head and exactly three pounds of carniolans swarmed into a cage. When he asked me how I planned on installing "his" package of bees my textbook response just got me a big smile and a long slow shake of his head. Even his 12 year-old grandson, who was standing nearby seemed bemused. These seasoned beekeepers have minds like steel traps – nothing escapes them when it comes to beekeeping especially when it comes to beekeepers looking foolish. The fellows in our club can reminisce about a beekeeper, who 30 years ago committed some seemingly mild blunder. Sometimes I don't even get the joke. One might recall to uproarious laughter the beekeeper who nailed but didn't glud his frames. Another may nearly choke on coffee because someone installed a queen excluder upside down. There are times I think the joke is on me completely, like a test to see if I'll laugh along – I always do. Despite the feeling in my gut that has asked me not to venture into certain humiliation, I'm going to get my bees from the same beekeeper I did last year. Sure he'll want to know about the four packages I bought last spring, and I'm desperately hoping he'll forget all about my ill-fated attempt at requeening, but that's the price I have to pay for good advice for the future. Who knows, maybe I'll even get a frequent customer discount- I better not suggest that when he has a mouth full of coffee.

For now, the snow has turned to mud and the hives are all scraped clean of their dreary past, and I'm starting over with bees. BC

? DO YOU KNOW ?

Springtime In A Beehive

Clarence **Collison**
Mississippi State University

Spring has arrived throughout the United States and beekeepers are working hard to get their colonies in peak condition. In some southern areas, however, swarming is well underway and beekeepers are attempting to keep swarming at a minimum. Unfortunately, the two Spring objectives, getting hives in peak condition and swarm management work against each other. Like all forms of agriculture, there are numerous problems that the beekeeper has to contend with as well. Whenever, you are in your colonies, it is important to look for situations or conditions that do not appear normal. Added to our concerns is the newly reported "Colony Collapse Disorder." Please take a few minutes and answer the following questions to see how well you are doing in increasing your beekeeping knowledge.

Level 1 Beekeeping

Please indicate the likely problem, pest, disease or pathogen associated with the following characteristics:

1. ____ Tunnels lined with silken threads burrowed through the comb
2. ____ The front of the hive has muddy scratch marks on it
3. ____ Worker brood cells containing scale and pupal tongues
4. ____ Adult mid-gut and intestine swollen and chalky white in color
5. ____ Multiple eggs per cell
6. ____ Large number of dead bees in front of a colony
7. ____ Combs with fermenting honey bubbling out of the cells
8. ____ Hollowed out indentations in frames and the interior of hive bodies
9. ____ Comb that has contained only honey and never been used for brood rearing is not appealing to wax moth larvae. (True or False)
10. What is the basic advantage of using the powered sugar shake method over the ether roll technique in monitoring *Varroa* mite populations? (2 points)
11. ____ Worker bees routinely keep fully developed queens imprisoned in their queen cells for prolonged periods of time. (True or False)
12. ____ *Varroa* mites are able to modulate the honey bee's immune system. (True or False)

Advanced Beekeeping

13. ____ Heartsease or Smartweed and Japanese Knotweed or Japanese Bamboo are members of the buckwheat family. (True or False)
14. ____ Queens and workers have similar blends of compounds in their mandibular glands. (True or False)
15. ____ The compounds produced in the mandibular glands of workers appear to be involved in food preservation and larval nutrition. (True or False)
16. ____ Samples of honey with low invertase counts and high HMF numbers are an indication of spoilage by fermentation. (True or False)
17. Adult bees with wings that are somewhat opaque are likely suffering from _____:

A. Kashmir Bee Virus B. Bee Virus Y
C. Deformed Wing Virus D. Cloudy Wing Virus
E. Arkansas Bee Virus

18. ____ Deformed wing virus is known to infect both honey bees and *Varroa* mites. (True or False)
19. If you found a colony with the following characteristics, the colony is likely suffering from _____.
Varroa mites are present
Reduction of adult bee population
Spotty Brood Pattern
Symptoms of European Foulbrood, Sacbrood And American Foulbrood
20. ____ *Apis andreniformis* is a cavity nesting specie like *Apis cerana*. (True or False)
21. ____ *Paenibacillus larvae* produces a potent antibiotic that eliminates competition from other bacteria. (True or False)
22. ____ Russian and Italian honey bee colonies with laying workers can be requeened with queen cells successfully over 50% of the time. (True or False)
23. If you found a colony with the following characteristics, the colony is likely suffering from _____.
The complete absence of adult bees in colonies
The presence of capped brood in colonies
The presence of food stores, both honey and pollen
24. Name two behaviors of the queen's retinue indicating that they recognize her as the dominant reproductive queen. (2 points)

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. Greater wax moth
2. Skunks
3. American foulbrood
4. Nosema disease
5. Laying workers
6. Pesticide kill
7. Small hive beetle larval damage
8. Pupating greater wax moth larvae
9. **True** Comb that has contained only honey and never any brood is not appealing to wax moth larvae. They do not survive on wax and honey. They feed on cocoons, cast skins and pollen.
10. With powdered sugar the bees are unharmed and can be returned to the hive, whereas, the ether kills the bees.
11. **True** Worker bees routinely keep fully developed queens imprisoned in their queen cells for prolonged periods of time. There is some evidence that they are controlling the fate of those queens. They control the timing of queen emergence by adding or reducing wax deposits on the incision at the tip of the cell. There is also some evidence that bees will selectively confine half-sister queens over super-sister queens.
12. **True** It has been shown that *Varroa* mite parasitization suppresses the immunity of honey bees, both the humoral and cellular immune responses. *Varroa* mites immunosuppress honey bees by depressing the expression of immunity-related genes.
13. **True** Japanese bamboo or Japanese knotweed and smartweed or heartsease, are excellent floral sources for honey production, and they belong to the buckwheat family (*Polygonaceae*).
14. **False** Both female castes in Apis mellifera produce a unique blend of several compounds in their mandibular glands. The queen mandibular pheromone consists of 9-hydroxy and 9-keto-2(E)-deconic acids, methyl p-hydroxybenzoate and 4-hydroxy-3-methoxyphenylethanol. Workers have 10-hydroxy-2(E)-decenoic acid, 10-hydroxydecanoic acid, 2(E)-decenedioic and decanedioic acids. Both castes are able to produce the other caste's aliphatic compounds in small quantities.
15. **True** The compounds produced in the mandibular glands of workers appear to be involved in food preservation and larval nutrition. The w-hydroxy acids and the corresponding diacids are found in royal jelly where they may function as antiseptics. 10-hydroxy-2(E)-decenoic acid inhibits the germination of pollen, which is important for pollen storage and is an important larval nutrient that prevents larvae from pupating precociously.
16. **False** Honey is rich in biological agents and is easily damaged by heat. The active agents in honey are destroyed at short-term temperatures over 104°F. and also when kept at temperatures between 90-104° over numerous days. A sign for heat-damaged honey is low invertase counts and high HMF numbers.
17. D) Cloudy Wing Virus
18. **True** Deformed wing virus is known to infect both honey bees and *Varroa* mites.
19. Parasitic mite syndrome
20. **False** *Apis andreniformis* constructs a single comb suspended from a branch or rock and protect themselves with a dense curtain of workers around the comb, whereas, *Apis cerana* is a cavity-nesting species. They construct multiple parallel combs in cavities.
21. **True** *Paenibacillus larvae* produces a potent antibiotic that eliminates competition from other bacteria typically associated with honey bee larvae. For this reason, American foulbrood (AFB) and European foulbrood (EFB) are rarely found in the same colony, except in cases where AFB is just becoming established in colonies that already have EFB.
22. **True** Honey bee colonies that have become queenless and develop laying workers are normally considered lost by beekeepers since they can rarely be requeened by introducing an adult queen. Recent research has shown that such colonies can be successfully requeened with queen cells. Overall, both Russian and Italian colonies were successfully requeened in about 60% of the colonies, with equal success for Russian and Italian colonies.
23. Colony Collapse Disorder
24. Licking the queen
    Antennating behavior

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

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

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Greedy Industry

Dick Marron

If you reward a dog selectively you could probably teach one to play the piano. The question is: "Would that be progress for the dog?"

The idea of progress as a good thing isn't very old. A few hundreds of years ago people didn't worship it. They thought that the status quo was the way to go. (Forgive me for that.) Change was viewed as dangerous and attempts to promote it were looked at with suspicion. Think Socrates, Copernicus, Columbus etc. Think about the word "newfangled."

On the other hand: just a short time ago 90% of the people in the U.S. lived and worked on farms. They fed the other 10% and themselves. They worked so hard they may not have had time to wonder if there was a better way to do things. The good old days were tough but there are a number of people that look back to them when they want to conjure up a picture of a healthy, fulfilling life. I'm trying to imagine what life would be like if things had never changed. I can't do it. Thank heavens for progress.

In Aurora, Nebraska in the heart of some of the most fertile land in the U.S., there is a "Plainsmen's Museum." One of the attractions is an exhibit of antique farm equipment. Like an artifact from the Neanderthal is a single plow that the farmer walked behind and the horse plodded ahead of. I once plowed an acre of ground with this implement of torture. The horse didn't work as hard as I did.

I looked at machines that, in one pass, would cut corn stalks, separate the ears spit out the chaff; then the corn was shucked, shelled and bagged – all while the machine was moving. With wheat or hay the stalks were baled, first with wire and later with string. Putting a man on the moon began with the engineering that created a machine that would reliably tie a knot in a string and cut it.

Today the corn harvester costs between $200,000 and $300,000 dollars and takes a swath 32 feet wide. The operator sits in an air-conditioned cab watching the computer. A satellite stalks the computer, keeping track of what the harvest is in each part of the field. The "field" may be a square mile or more.

Mr. Operator will harvest that 640 acre "section" in a few days. An extra "head" for the machine, so he can use it for wheat as well, is another $100,000. It begins to run into money. The computer information, coupled with the GPS location of each piece of ground, is kept and analyzed. The poorer producing areas are noted and get an extra dollop of fertilizer when the next crop is planted.

I can't get over the feeling that the tail is wagging the dog. Next, they'll be factory-farming the bees!

It starts to seem a little greedy.

To a colony of honey bees the world is there to exploit. Given their industry and sufficient forage it is predictable that they will fill the hive with honey. When that is done it should be enough. We honey eaters are thankful though, that it is not enough because we want the extra. The bees continue to gather honey making (sometimes) four or five times what they could actually use. I'm shameless in attributing human motivations to my bees so I'm going to call this "greed." If we posit good health for the colony and good weather, all they need is storage space; the industry of the greedy bees will equal more honey than they can use. That's nice for us but I feel a little sorry for the bees. They work so desperately hard.

In a nectar dearth, when you'd think they'd be resting, you can see them pacing nervously on the landing board. They check out any thing that moves. They investigate my truck more thoroughly than I think is cute. It's as if they remember last year when they robbed out that super of honey just because I wasn't looking.

In fact, greed is such a predominate trait that they will frantically start robbing each other. This stealing from the poor (weaker colonies) and stashing the loot in the coffers of the rich (more powerful) colonies is normal. In nature, this Darwinian principle is "business as usual." As we humans say, "Money goes to money."

Whatever the bees do, they do with a single mindedness that is startling. It looks like they have some sort of obsessive-compulsive syndrome. When they raise brood, they really raise 1500 brats a day. They make wax like a factory. They really sock away the pollen when it's in season. The nectar flows into the hive like a river. What a going business a hive is unless, of course, it rains. Mess with them on a rainy day and you could find yourself in a cloud of them. They are single minded when defending home, too.

It's a good thing we domesticated them. Who are we kidding? They domesticated us. Ever watch a beekeeper work? Ever see how edgy he gets on a rainy day or when the nectar stops. Working 12 hours a day for the bees is natural for many 'keepers. All this is done in service to the bees. Even the hobbyists become monomaniacs. When someone casually mentions bees to me I warn them, "Don't push the bee button." I'm usually good for a half-hour on my favorite subject. I'm trying to cut down.

Does either of them (bees or keepers) ever wonder, "Is that all there is?" The bees seem depressingly like humankind. Work, work, work-long after one's needs are taken care of. Keep working as long as there is work to do. Get so involved in it that when not working get anxious, depressed and sometimes die. Sometimes become so obsessed with wanting more that the work "ethic" becomes the robbing ethic. Steal, take, amass more than one could possibly use.

I hoped the bees would do better. I'm thinking about how to teach them to stop and smell the flowers.

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