★ PULL OUT SECTION ★

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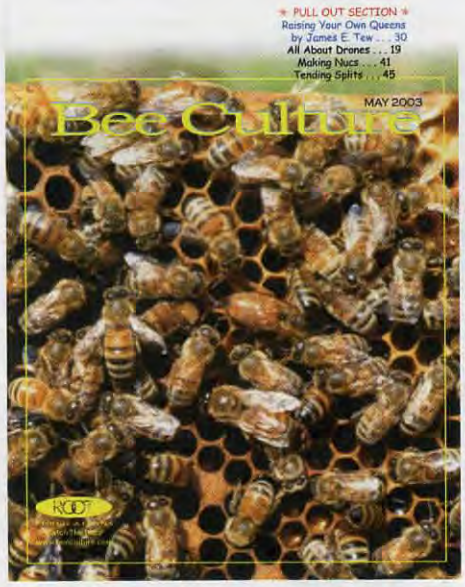
MAY 2003

Bee Culture

ROOT
PUBLICATIONS
Catch The Buzz
www.beeculture.com

Bee Culture
THE MAGAZINE OF AMERICAN BEEKEEPING
MAY 2003 VOLUME 131 NUMBER 5



Raising Queens, tending splits, making nucs and all about drones – something for every beekeeper inside, in May.
photo by Kim Flottum

FEATURES

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Subscription Information
U.S., one year, $21.50; two years, $41. Newsstand price: $3.50. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), May 2003, Volume 131, Issue 5, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

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

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

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MAILBOX

Kids & Bees

In the March 2003 Mailbox Don Cranston of East Meredith, NY laments the decrease in the number of backyard beekeepers and the lack of interest from the younger generations. He is correct in noting that hands on experience is required to learn – and that experience is best passed on by current beekeepers.

Here in Western ME we are fortunate that several hobby beekeepers decided 10 years ago to share their knowledge with others who wanted to learn. Clint Savage, Nick Kelley and Bruce Clark were instrumental in establishing an annual Bee School to assure the perpetuation of beekeeping in this area. I was fortunate to take the class last year and have joined with others from the "class of 2002" in helping with this year's sessions. We have 21 "students" of various ages and backgrounds this year.

Our classes include lectures, videos and hands-on experience in the form of Open Hive demonstrations. Several of us frequently use the internet to research our presentations, keep up on current management techniques and answer questions for the class. New technology can complement the tried and true methods that have been used over the years. Mentoring by the "older generation" can help newcomers learn as they establish their first hives.

Beekeeping is not for everyone – but those who want to learn need an avenue to acquire the necessary skills. Mr. Cranston, not all members of the younger generation are cold, hard and uncaring – just as not all old-timers are unwilling to give new technologies a try.

Carol Cottrill
Rumford, ME

•

It could be discouraging to read Don Cranston's letter in the March issue of BC, but that would be a mistake. Granted, the world is changing, and not many children today get to help a parent or grandparent work with bees, but it is not true that "young people of today are cold, hard and uncaring " It's true that kids are not interested in stories about "when I was a boy ," but they are very interested in bees. I have hundreds of notes (with hand drawn pictures) to prove it. Many kids state clearly that they want to be a beekeeper someday. Some of us started out that way; we may have waited many years to begin doing it, but hey – it's not too late if we can still light a smoker. There are hundreds of us who visit classrooms each year to "show and tell" about honey bees. Those of us who do it know that the enthusiasm is there and, with a little bit of guidance, we'll have plenty of young beekeepers in the future. Don writes that the "warmth, respect and interest to learn about basic knowledge concerning honey bees is waning with our internet world and computer mania." As one of my favorite radio talk show hosts likes to say, "Let not your heart be troubled"; the internet is a friend. When you go to a school with your bag of tricks, take along a short list of beekeeping web sites for kids; many are well done, colorful, lively and full of information. You can e-mail me for a list.

Suggestion: Enlist a young, middle-aged or older beekeeper who likes kids, support him or her with the wherewithal, and call your local schools. Make them an offer. Pack up your gear, hive tools, smoker, an old hive body with various frames – foundation – brood, and jars of honey. For the fun of it, when you open up the hive pull out a cat's toy mouse and toss it into their midst. Buy a few charts from a supply house, bring some frozen bees picked up off the snow in your apiary and make plans for an observation hive next year. Let them touch and smell a block of beeswax, candles, pollen and propolis, some queen cages, etc. I have found, after 10 years at this, kids from kindergarten to high school are receptive; I find the most effective to be 4th, 5th, 6th or 7th grade students, but also go to younger classes, including kindergarten. In that case, take along props such as plastic tools for the comb builders, a paper queen's crown, fans for the attendants, straws for foragers, boxing gloves (socks) for guards, pillows for the drones, etc.

Ray Lackey has excellent information you can use (Long Island Beekeepers' Club web site: www.tianca.com/tianca3.html). Ask him for a copy of his "Honey Bees Presentation." Dewey Caron & Tom Webster have written a great guide to keeping an observation hive. Home schooled families come to my house; they get to see the apiary and the honey house, they sample cut comb, and then they call and tell another group of parents. One more thing: if you're over the hill, like me, get younger beekeepers to go with you so they can learn how. I have a different sidekick for each school in our county; some of them know more than I do, but they just need to learn how to talk to a group of kids. It may take some doing at first, but once you get into a school, and make it educationally worthwhile, they'll be eager to have you return each year. I hear repeatedly that it's the students' favorite special program. There's no need to be afraid of kids; they're no different than honey bees bred for gentleness. Just make sure that the teacher remains in the room; something could go wrong in a queenless colony. Although I have never charged a fee because I enjoy it too much, I now accept contributions for our association scholarship fund, which is used to help kids get started as beekeepers. I may not get all my frames put together by spring, but I wouldn't trade those February & March

Continued on Next Page

MAILBOX

school visits for anything. Try it. You'll go home with a smile.

Dick Chapin, EAS Master Bkpr. & Historian, bkeep@epix.net

Catching Swarms

I've read Richard Taylor's good articles on swarms. It seems to me he has omitted one important thing, the sun. I've captured many swarms the past years, large and small. Even the best beekeeper will have some swarming, so why not catch them? Having placed swarm boxes in many different locations, never have I captured a swarm when the box was in full sun. My boxes are built of salvage plywood, large enough for eight deep frames, two with drawn wax, the rest foundation. A cleat is nailed on each end to act as a frame rest. Cover is nailed down lightly. About a 1½-inch hole is drilled in the center of one end, and a landing board looks nice. An old oil drum makes a nice stand placed under the shade of a tree or hang it to a tree trunk with a wire or rope for easy removal. Last year I caught four for four.

John D. Bacon
Auburn, MI

Apiary Programs Go

Many apiary programs around the country have been down-sized or eliminated due to state budget problems the last few years. The reason apiary programs are the first to go is because of the way these programs are funded. Most Dept. of Ag. programs are partially funded through federal funds, while apiary is funded entirely through the state general fund. Programs that have matching funds are less likely to be touched because federal funds will be lost, not because they are more important than apiary. I believe lobbying efforts may be better directed to each state's congressman to save their state programs. Please pass this along to any beekeeping organization that may benefit from it.

George Clutter
State Apiarist WVDA

Using The Government

In March several farmers and myself went to Washington DC. We went as a group who wanted to see what we could do to help with our problems. Those being trade and the lack of what we see as help for Agriculture as a whole. We met with the ITC (International Trade Commission), The Office of the U.S. Trade Director for Agricultural Affairs, and some Congress People. One very distinct subject was learned – that was unanimous amongst all commodities –our National organizations on almost all crops *don't represent us at these offices.*

Did you know at this time no less than six trade negotiations are going on? Did you know at not one of the hearings were beekeepers interest represented by any of our groups? Why are our groups not in WA spending thousands to testify at those hearing rather than us spending millions to stop honey from coming in that could have been prevented possibly by showing how it would have affected us to start with. Are we to be always putting the fire out rather than preventing it first?

Offices across Capital Hill were eager to hear what we had to say also. Apparently our groups also do not talk to the Chairs on at least the house side about us either. The Sub Chair on Honey bees was overwhelmed that a beekeeper came to see his office. His office did not know about the honey bee issues. WHY? Do we not want help with our problems? Do our groups even care? Or are we too busy fighting over whether there should be a honey board to spend time working on the real issues? I didn't meet one office that was not interested in our problems and how could they help?

If we do not speak, others will for us. The Chinese, Australians, and the rest of the world all want what we have and are not afraid to say so. I do not think our organization's leaders are idiots, they just aren't as politically astute as the rest of the world. But they better get up to speed, and quick, before the rest of the world gets here. I know it takes a lot to go to DC, but what about a phone call or Email. Beekeepers by nature are not political but believe me when I say you better get political or get out of business because those are the options. Sitting on the side lines will not work any more. The squeaky wheel in DC does get the grease and the horse to pull the wagon too! And let our leaders know we are tired of the same old bull. If our leaders don't want to become political then we need to find people who will. It is our businesses at stake.

James Doan
Hamlin, NY

Evaluating Queens

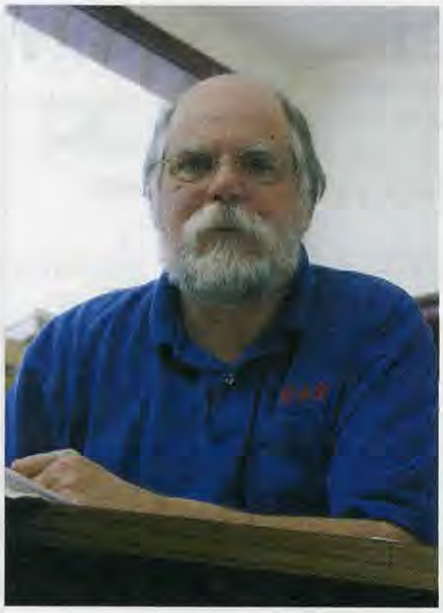
I enjoy *Bee Culture* and the valuable information given, but am confused by the article, Evaluating Queen Stock by Joe Latsaw. I was looking for some pointers on how to select a queen. As a self proclaimed "expert" in this, all I found here was discredit of researchers and queen breeders working on stock improvement.

As Dr. Spivak explained at the U.S./Canada meeting in NY, a variety of traits for resistance have been identified, selected and made available to beekeepers. I think Joe missed the point. Hygienic behavior, SMR, etc. are specific traits, not stocks or lines of bees. These are traits to "seed' into our stocks of bees. They are not "pure stocks" that stand alone, as he referred to them.

Talking about probability and not achieving expectations, Joe says the outcomes are unpredictable, though he has not tested this. What was the point? He says "he stands behind his Program." But what does that mean? It makes me question self promotion without substance, wasn't that what he warned us about in the ads? Yet he advertises and has also benefited from using SMR in his beekeeping.

In our small industry word of mouth and experience are it. Truth in the quality provided is the best advertiser, not the one crying wolf. Lets give credit to our researchers and those doing the work to help our bees, instead of criticizing them.

Seth Baldwin, Nebraska



INNER COVER

There's an old saying I just made up that goes something like this: Even a bad day with the bees is better'n a good day almost anywhere else.

At the very end of March my friend Buzz returned from vacation and needed to check some of his 80 or so colonies. At my suggestion he'd tried pollen sub patties on a few colonies before he left and we both wanted to see how they were doing.

It was an almost perfect day – mostly sunny, mid-60s with a little breeze – and we set out right after lunch. Maples were in full bloom and early shrub willows were showing lots of fuzzy. The large, later willow trees were doing that iridescent gold/green thing they do just before flushing out. Free food was finally in the warm-enough air and the bees were cookin' After the 13 month Winter just past, this was close enough to perfect.

A quick stop to check another friend's hive and on to the long, long field road. As we got nearer, Buzz said that this was a half mile tire track between two 40-acre bean fields, leading to a creek down and in the back, and past that were more beans.

From the main road, the field road had a 3-4% incline for about 2000 feet. At the crest you could look down on the creek about 500 feet away, and on to the rest of the beans. Buzz had seven colonies on either side of the creek along one side of the road. A crushed clay culvert pipe was where you had to cross, and we'd have to, he said, to get to a place to turn around and get a running start up the twice-as-steep incline back to the crest, then an easy coast back to the main road. That was the plan anyway, said Buzz.

My experience with Spring roads in this part of Ohio wasn't all that encouraging, but Buzz said he thought it'd be O.K. Besides, it was supposed to rain for the next few days, so it was now, or way too late to do any good. And it looked dry enough. So we took off in the one-ton flat and headed toward the crest, about 700 yards away.

It started O.K., but in 50 yards it was obvious it wasn't. We started shouting at each other Turn around, are you nuts? Stop? Don't be crazy – AAA doesn't make bean field calls, keep going, there, head toward the edge where the grass is, now, quick, over to the middle, stay out of the ruts, more gas, more, wait, the whole rear-end is going the wrong way, now slow down, not too much, let it stop spinning, now, back on the trail, how's the edge, too deep? Quick, give it gas, keep going straight, stay out of the ruts and out of those puddles, how's the field there, dry enough? Quick, back in the ruts, give it gas, more gas, more, there, whoa, stop.

At the crest we breathed again, paused a moment, then headed down. Gravity helps a lot, and we crossed the creek, up on the grass, turned around and stopped to check the bees.

Change bottom boards, reverse if needed, check a couple of brood frames quick, plop a patty and move on. Last one done, close 'em up and head back up.

O.K. A running start. "This is a four-wheel road," said Buzz. And all we got is a two-wheel drive. Bump on the culvert and plow up the hill, in the ruts, in the middle, veer off quick to the left, rear end going right, back to the middle, straighten it out, going slower, slower, mud 20 feet in the air, going slow, slower, engine going faster, faster, louder, louder, mud going higher, and thicker, slower, give more gas, more, more, don't down shift, let up on the gas a little, now, going faster, faster, straighter, closer to the top, faster, straight Daylight! Thirty white-knuckle seconds was all it took. It was great. We'd won.

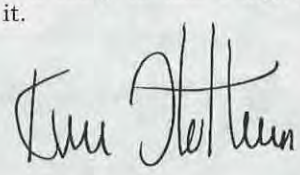
At the top, sun again, breeze in the air. Head back to the main road, slippin' and slidin' and smearing down that greasy path with ruts to miss, puddles to miss, and that edgy furrow ditch to miss, bouncing down, slowing down, back on solid ground. Made it.

Buzz left some major ruts in that road. But they were his ruts. We'd made it back. All the way in all that mud. Miller time, almost.

Oh, remember that bounce on the culvert? That's where that deep bounced off. All the way back. Take the truck? Are you crazy? Leave it there? The coons'll get it.

The walk back wasn't much easier than the drive as far as slippin' and slidin' was concerned. And it took longer. And it seemed all up hill. But it was still warm, late afternoon, the sun shinin', a breeze that brought the smell of growing things and fresh earth was all around. And we made it. Mud and all.

Yup, even a not-too-bad day with the bees and a friend is bettern' a good day almost anywhere else. It's good for the soul, and a story to tell. I highly recommend it.



A Good Day

Commentary

There's A High Price To Be Paid For Sprawl.

Tom Theobald

As I usually do, I walked out into the cold and dark of early morning to retrieve the paper from the leaves along the roadside, and back in the house a front page story caught my eye. My first thought was to write a letter to the editor, but as it unfolded it was clear that it had little likelihood of ever appearing because of its length. The next item on the agenda was this commentary though, and since the subject is one that touches the lives of many of us, I just changed horses in mid-stream, so here's the letter to the editor as it might have appeared.

Editor,

In this morning's Longmont Times-Call (Longmont, CO), the headline of one front page story reads *"Council moves to increase acreage City's future may include land north of Colo. 66."*

This probably comes as no surprise to anyone who has paid even passing attention to the city's growth over the past 20 years or more. Longmont is a classic example of flawed practices that fuel the explosion of urban sprawl we see all around us, a ponzi scheme where investment interests take their cut up front while leaving a legacy of debt for the general population.

We get leap-frogged along in this devil's dance with growth; first by over-committing on housing developments. This leads to other decisions which become inevitable, as once the population is in place we can hardly debate the need for new schools, utilities, police and fire service or the painful decisions to turn peaceful country roads into vehicular drainage ditches that flush thousands of cars through every hour. All these things become foregone conclusions, dictated by the circumstances we create.

Of course, now that the people are here they need things like stores, and oh, by the way, we neglected to tell you that all this residential growth doesn't really pay for itself and in addition to increased taxes and bond issues, now we need to "strengthen the tax base," as mentioned in the story. Translated, that means commercial development. Great for those developers who bought up all that farmland on the edge of town, even great for some of the farmers, if they are psychologically prepared to see their farms paved over.

We have been using "broadening the tax base" both as an excuse and as a remedy for growth for 140 years here in Colorado and where has it gotten us? How broad do we really want to be anyway? One hundred and forty years of broadening has only meant that the taxes are higher and take a larger percentage of your assets than they ever have. "Sixteen tons and whadaya get? Another day older and deeper in debt."

While commercial development does help to pay some of the bills, what it also does is ratchet the expansion up another notch and off we go – one more round of houses/roads/schools/commercial development. Those stores need customers, and just like houses, we overbuild the stores.

In pro-growth cities like Longmont some of these adverse consequences are masked by covering yesterday's bills with today's front-end fees. This also helps, as long as the growth continues to *expand* – you need at least as much money coming in today as the immediate bills coming due from *yesterday's* growth or you start going in the hole real quick and you don't want to do this because it makes the natives restless.

Everything holds together financially as long as the balloon keeps taking on more and more air. If something goes wrong though, if for example you start to run out of land, as Longmont is even though it has grown many-fold in the past 30 years, then you have to do some quick scurrying to keep the whole thing going. Otherwise the bills start coming due and people begin to catch on to the house of cards that has been created, and we can't have that. If they start to think too much about what a bad deal all this growth has been, they may not be as easy to manipulate in the future. And we need to be able to manipulate them, for after all, all the money ultimately comes from them.

Before you know it they will be questioning such newly minted sacred cows as Smart Growth, and already you can hear grumbling that concepts like "Smart Growth" and "Comprehensive Planning" are just oxymorons which are little more than the municipal/governmental version of cooking the books on a grand demographic scale.

The latest crisis in our area has been the school district budget. While most of the facts have yet to be unearthed, it seems clear that the budget shortfall will total about 22 million dollars when all is said and done. The public is understandably outraged, as this figure represents nearly 20 per cent of the total budget and it's hard for anyone to comprehend how such a huge misjudgment could be made. In part at least it seems that the cause was spending money the district didn't have but *hoped* to get – there was a belief that since budgets had been overstated in the past, that as time passed a surplus would grow when spending was less than what had been projected.

In gamblers parlance that is called "betting on the come", and while it may seem outrageous for a school district, it is epidemic in the growth business, in fact is the foundation of the whole scheme pay yesterday's bills with tomorrow's income (growth) and pin your hopes in future winnings.

But what if tomorrow's growth doesn't come? Well,

Continued on Page 11

MAY – REGIONAL HONEY PRICE REPORT

Annual Store Survey

Once again we asked our reporters to visit local grocery stores and report back to us what they found on the honey shelf. This is the 4th year we've done this, and, it's by far the most interesting.

We started asking how many facings (or fronts, or rows, depending on your terminology) each store had. The average was 13/store. This compares to 15.6, 13.5 and 12.7 for the previous three years.

There were, on average three brands in each store (local, regional and national), compared to 4.6 last year. This gives about three facings/brand in each store on average.

Next, we asked how many of these were local or regional brands. Only 1.4/store this year, (about half) last year there were 2.3/store (again, half). This compares to 1.7 and 3.8 the previous two years. The decline, though bumpy, has been steady.

National brands are everywhere, but their decline, too has been steady. On average, there were 1.4 national brands/store. Last year 2.1, then 2.9 and 5.2 before that.

Store brands, those with the name of the store on the label, but produced and bottled somewhere else, amounted to just 1/store. Well, that makes sense I guess.

Any and all brands that actually said they contained foreign honey (and we all know they all don't) totaled just .8 brands/store. This is way, way down from last year at 3.5/store. If correct, this certainly reflects the unavailability of foreign honey. For some reason, though, I suspect it's actually higher, but mislabeling makes that difficult to confirm.

Then, we looked at all this a slightly different way. We broke down the brands to store brands, local, regional and National brands, whether they had foreign honey or not, and then counted containers of each at all locations (1/2#, 1#, 2#, etc.). Here's what that showed, for all sizes across all brands in all stores. This reflects the shelf space allocated to each size over all stores. Obviously, not every store carries every size. But across America, 20.4% of all retail shelf space for honey is dedicated to 12 oz. plastic.

6 oz. plastic	2%
1/2# glass/plastic	8.3%
12 oz. plastic	20.4%
1# glass/plastic	19.9%
2# glass/plastic	12.2%
Pint	6.3%
Quart	5.6%
4# glass/plastic	2%
5# glass/plastic	4%
Creamed	9.1%
Comb	2.2%
Other Containers	7.6%

Obviously 12 oz. plastic and 1 lb. are the most popular by a long shot. interestingly, creamed honey is increasing at a slow, but steady rate.

Thanks to all our reporters who did the leg work for this.

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last	Last
Extracted honey sold bulk to Packers or Processors													**Range**	**Avg.**	**Month**	**Yr.**
Wholesale Bulk																
55 gal. Light	1.15	1.50	1.26	1.25	1.48	1.48	1.33	1.26	1.26	1.50	1.30	1.38	1.15-1.50	1.34	1.36	0.74
55 gal. Amber	1.08	0.95	1.15	1.10	1.28	1.36	1.14	1.15	1.15	1.15	1.32	1.22	0.95-1.36	1.17	1.23	0.69
60# Light (retail)	97.75	101.32	75.00	83.58	85.00	94.00	94.29	80.00	95.84	86.75	120.00	96.50	75.00-120.00	92.50	94.51	74.30
60# Amber (retail)	92.40	88.32	70.00	80.28	75.00	85.50	95.60	80.00	70.00	80.00	115.00	83.33	70.00-115.00	84.62	89.96	73.20
Wholesale Case Lots																
1/2# 24's	37.06	33.78	37.72	33.87	37.72	25.47	36.47	37.72	37.72	35.75	25.00	38.94	25.00-38.94	34.77	35.40	28.74
1# 24's	50.43	50.58	48.00	46.57	54.30	54.33	50.33	52.80	54.30	60.72	59.50	65.22	46.57-65.22	53.92	52.90	45.66
2# 12's	47.64	43.50	48.00	45.94	47.93	41.00	44.02	45.00	45.00	57.84	47.00	58.52	41.00-58.52	47.62	48.99	40.64
12 oz. Plas. 24's	47.14	45.48	44.25	37.05	41.75	45.00	42.22	41.68	41.75	50.88	47.38	49.23	36.00-50.88	44.48	51.35	38.96
5# 6's	51.42	53.61	58.50	48.20	54.30	50.50	53.79	50.00	54.30	61.86	54.00	61.27	48.20-61.86	54.31	55.19	45.04
Quarts 12's (**NEW**)	61.00	72.12	72.00	57.61	64.83	56.75	61.83	68.60	78.00	79.20	80.70	77.50	56.75-80.70	69.18	72.00	
Pints 12's (**NEW**)	43.50	37.35	53.58	43.63	53.58	54.38	40.81	38.24	42.00	55.44	48.00	54.00	39.50-55.44	47.04	43.96	
Retail Honey Prices																
1/2#	1.95	2.53	2.59	2.20	1.69	2.17	2.08	2.29	3.40	2.29	3.16	2.42	1.69-3.40	2.40	2.78	1.95
12 oz. Plastic	2.75	2.89	2.95	2.44	3.19	2.93	2.79	3.31	3.59	3.20	3.47	3.35	2.44-3.59	3.07	2.94	2.38
1 lb. Glass	3.16	3.55	3.25	3.19	3.20	3.55	3.44	4.23	4.49	3.70	4.05	4.36	3.16-4.49	3.68	3.47	2.87
2 lb. Glass	5.54	5.34	4.75	5.28	5.69	5.59	5.14	5.70	5.87	6.50	5.91	7.85	4.75-7.85	5.76	5.90	4.73
Pint (**NEW**)	5.13	4.63	4.99	4.21	5.74	5.16	6.08	5.63	4.64	6.55	5.71	6.24	4.21-6.55	5.39	4.98	
Quart (**NEW**)	6.69	6.63	10.41	6.50	8.15	9.00	8.63	8.08	7.99	10.95	7.56	8.89	6.50-10.95	8.29	8.10	
5 lb. Glass	10.75	11.80	10.75	11.25	11.18	11.00	10.75	15.99	11.18	11.99	12.28	15.69	10.75-15.99	12.05	12.21	9.69
1# Cream	3.94	4.13	7.77	3.90	7.77	3.80	3.66	5.01	5.79	4.22	4.63	4.26	3.66-7.79	4.91	4.28	3.58
1# Comb	4.48	4.20	3.95	4.75	5.00	4.25	4.16	5.00	3.55	4.50	6.19	5.08	3.55-6.19	4.59	4.73	4.65
Ross Round	4.19	3.43	3.93	4.85	4.45	3.75	3.73	4.49	4.40	5.00	5.25	4.25	3.43-5.25	4.31	4.27	4.10
Wax (Light)	1.79	1.13	2.00	2.58	2.20	2.06	1.92	2.50	2.00	2.16	2.45	2.41	1.19-2.58	1.75	1.75	2.94
Wax (Dark)	1.21	1.35	1.95	1.45	1.10	1.86	1.23	2.07	1.00	2.07	1.93	1.90	0.99-2.07	1.25	1.55	2.82
Poll. Fee/Col.	43.40	47.50	40.00	39.00	30.00	45.00	40.75	43.05	43.05	43.05	50.00	42.00	30.00-50.00	42.23	40.85	37.40

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it has to come, or it's going to get very expensive for all of us who are here to pay when the bills come due, and we aren't going to be very happy with the people who got us in this mess anymore than we are with the School Board and the top administrators in the school system.

So of course Longmont will extend northward, capture another 2000 acres and add another five or ten thousand people. Or maybe the city will opt to skim the real cream from this land – high end development – multi-acre parcels with multi-million dollar houses. In any event those people are naturally going to need more stores, wider roads, more schools Of Course Longmont will grow, because it has little choice. Given the mentality and the economics we operate under, the only limit to the northward expansion of cities like Longmont is the Canadian Border.

But before any of us get too smug, we should recognize that at its heart much of this explosive growth is fueled by each of us, individually and collectively. Our children deserve a place to learn, work and live, just as we did, and as long as they keep coming along we need to provide those opportunities. It doesn't mean though that the entire Front Range corridor has to become an urban sacrifice area, but it will unless we confront such basic issues as our fertility as a species and our uncontrolled consumption.

And you readers out there in the small towns, don't think that you are going to get off scott free. If you are anywhere within commuting distance of the jobs, the growth monster is going to be knocking on your door next. Maybe you can profit from the experience of your neighbors though and avoid the spiral – growth today at the risk of either crushing debt or more growth tomorrow. Brace yourselves though. It's headed your way and you *are* going to have to deal with it. Hopefully you will do better than we have.

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"These findings strongly support the common sense wisdom that beekeepers should strive for prudent and minimal use of pesticides inside honey bee colonies."

With the introduction of *Varroa destructor* to the U.S. beekeeping scene, life in the apiary as we knew it changed dramatically. No longer was it possible for a few colonies out in the backyard to produce annual honey yields for the *lassez faire* beekeeper and then, "take care of themselves." Shockingly high numbers of colony losses greeted the inattentive beekeeper of the last decade. After a steep learning curve, beekeepers surviving from the pre-*Varroa* days or those that started anew found it critical to manage mite populations to maintain viable honey bee colonies.

The most popular method of *V. destructor* control in the U.S. has been the use of fluvalinate or coumaphos impregnated plastic strips (Apistan® and Checkmite+®, respectively) placed inside the beehive. For many beekeepers, the ease of use and effectiveness of these plastic strip formulations reduced any interest to monitor mite populations or to consider Integrated Pest Management (IPM) approaches. With an IPM approach, a beekeeper monitors the mite population and then treats only when the population reaches an economically damaging level.

The development of *V. destructor* resistance, first to fluvalinate and then to coumaphos, means that the future of mite management will, of necessity, move toward IPM. However, that is the topic for another column.

In this month's column we consider a research publication that demonstrates the negative effects of both fluvalinate and coumaphos on queen honey bees (Haarmann et al. 2002). Dr. Haarmaan and colleagues conducted a number of experiments in California and Texas queen breeding operations designed to evaluate the effects of fluvalinate and coumaphos on developing and mature queens. I outline a few of these experiments below.

The researchers set up three strong queenless colonies in California (as starter/finisher colonies) and used them to raise daughter queens. The colonies contained either a high dose (eight fluvalinate strips attached or around the grafting frame), low dose (two fluvalinate strips attached) or no fluvalinate (plastic control strip). Each colony received a frame of grafted larvae (48) in plastic cell cups. After 10 days, the resulting queen cells were moved to individual nucleus colonies (nucs) also containing differing amounts of fluvalinate (high dose nucs = One fluvalinate strip, low dose = 1/4 fluvalinate strip, control = no fluvalinate). The researchers also collected wax and bee samples at the beginning and end of the nuc experiment and queen cell wax samples at the end. After eight weeks, eight queens from each treatment group were collected and analyzed for weight, ovarian weight, number of sperm in the spermatheca and *Nosema* spore levels.

The researchers conducted a similar experiment using coumaphos (high dose = four coumaphos strips, low dose = one coumaphos strip, control = plastic strip – no coumaphos). However, after six days they noticed that the queen cells were being torn down or contained dead or abnormally developing queens. They were unable to rear viable queens in either the high dose or low dose conditions! They then repeated the experiment at a lower dose and with some other changes, but were able to get only eight viable cells (out of 160). A queen emerged from this group but had severe physical abnormalities and uncoordinated movements. The third repetition of the experiment – with the high dose now consisting of a single coumaphos strip placed five cm away from the queen cells and with only 24 hour exposure, at last resulted in viable cells. These were then moved to nucs and queens analyzed as in the fluvalinate experiments. Additional sets of experiments tested coumaphos in a Texas queen rearing operation in a manner similar to the above.

Queen effects were noticeable in the fluvalinate experiments. The queens from the high dose group had significantly reduced mean weights compared to the queens produced with low fluvalinate dose or control. (As an aside: In a number of insect studies, the mean weight of a female has been shown to be related to her overall fecundity (reproductive output) Thus, more weight = greater fecundity.) No measurable effects were seen on mean sperm count or ovary weight. The wax levels of fluvalinate were variable and did not correspond to the doses used. *Nosema* spores were absent from any of the experimental samples in all groups.

The results of the coumaphos experiments were even more striking. Recall that the researchers

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were unable to produce queens at the initial levels of coumaphos dosages tested. When queens were finally reared using reduced dosages of coumaphos, they were significantly lower in weight, in mean ovary weight and in the number of sperm contained in their spermatheca than queens reared in the control colonies. The coumaphos levels detected in wax and bee samples were highest in the colonies that received the highest dose (in both California and Texas experiments). The Texas experiments also demonstrated a significant reduction in queen weight and ovary weight in queens reared with coumaphos, but did not find a reduction in sperm levels in the spermatheca.

The research by Haarmaan et al. provides a practical demonstration of the sublethal effects of fluvalinate and coumaphos in honey bee colonies. Developing honey bee queens had a higher tolerance for fluvalinate than coumaphos in these experiments, although the negative effects of both compounds need to be considered in a queen production operation. While the potentially damaging effects of coumaphos to queen-rearing colonies were obvious, the researchers pointed out that the impact of coumaphos on worker brood needs to be more fully explored. They conclude, "It is probable that (worker) larvae in the cells near coumaphos strips would be negatively impacted by ... coumaphos. Additionally, residue accumulation in comb will probably be quite high..."

This research assessed the interaction between developing queens and the two compounds most widely used to control *Varroa* mites in the U.S., using a field-based experimental design with clear practical applications. The mechanisms of the negative interaction between fluvalinate, coumaphos and developing queens remain unclear, but similar experiments of this type should prove useful to assess sublethal effects of other mite control compounds currently being used or proposed.

As to the question of what does this research mean to everyday beekeeping? To me, these findings strongly support the common sense wisdom that beekeepers should strive for prudent and minimal use of pesticides inside honey bee colonies. BC

Reference:

Haarmaan, T., M. Spivak, D. Weaver, B. Weaver and T Glenn. 2002. *Effect of fluvalinate and coumaphos on queen honey bees* (Hymenoptera: Apidae) *in two commercial queen rearing operations.* Journal of Economic Entomology 95:28-35.

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Mark Winston

Conversations With The Bees

"What the heck happens to us when we keep company with honey bees?"

I have embarked on a new academic adventure, one that has nothing, and everything, to do with bees. My new enterprise involves starting a novel undergraduate teaching program at Simon Fraser University's Centre for Dialogue, in downtown Vancouver. My new office is physically distant from our closest beeyard, but conceptually even further removed from teaching or research about bees, insects, or even biology.

For those of you not familiar with universities, this change in function would be similar to an executive in a software company deciding to open an antique shop, or a gardener changing professions to become an auto mechanic. Universities tend to be rigid institutions where a biologist remains in the Biology Department and an English professor stays within English. "Interdisciplinary" means that a biologist and chemist might work together, but for a Biology professor to teach a course in urban studies

well, things usually just don't work that way.

Except, once in a while an unusual administrative distortion occurs, leading to opportunities that transcend traditional disciplinary boundaries. At my university, the opening of the Morris J. Wosk Centre for Dialogue created such an opportunity, and led to my initiating the Undergraduate Semester in Dialogue at this new hub for discussion, conversation and study involving difficult societal issues.

The Centre provides facilities and expertise for citizens to meet in a physically and mentally safe environment to explore tough public problems. My role has been to create that experience for undergraduate students. While our research on bees continues at the main campus just outside of Vancouver, all of my teaching and administrative responsibilities have been moved downtown to the Centre for Dialogue and this program.

The Undergraduate Semester uses dialogue-based learning to focus student education on public topics, with the objective of inspiring students with a sense of civic responsibility, encouraging their passion to improve society, and developing effective communication and analytical tools for problem solving. Students come from diverse departments within the university, and spend a full semester engaged in the program. The first course concerned "Nature, Environment, and Society," and the next semester will involve "The Urban Experience," focused on tough city issues such as social housing and transportation.

This new world I have immersed myself in reminds me of the Starship Enterprise crew encountering alien civilizations. They speak a different language downtown, wear distinctive clothing, and rarely go outside. Some days I move between the beekeeping planet and Planet Dialogue at warp speed, and the culture shock can be disorienting.

Except, I had a conversation the other day on my new planet that surprised me, and made me aware of how profoundly bees are influencing my approach to this new phase of my career. A journalist friend I have known for many years was interviewing me about the Undergraduate Semester program, and knowing my background she asked whether my other life with bees had any relevance to why and how I was participating in the Centre for Dialogue.

My initial reaction was no, of course not. What do bees have to do with dialogue? They don't, after all, talk. I can't remember the last time I had a conversation with bees about global warming, social housing, or anything else. I may be a bit wacky, but I'm not so far off the deep end that I converse with insects, or at least they haven't yet talked back.

Still, her question nagged at me, and I began to realize that all those years I spent immersed in hives, bees walking all over my hands, hanging on to my bee suit, and buzzing in the air all around me, may have had more impact on my perspective than I realized. She got me thinking about a deeper question for all of us who have spent a good part of our lives out in the apiary: What the heck happens to us when we keep company with honey bees?

I've never been one to humanize bees, and as a card-carrying biologist I'm not prone to attribute human intentions to other animals. Yet, there is much to learn from opening our minds to the persona of other species, particularly those that are social like ourselves.

For bees, their colony/society has one attribute that is intensely similar to our human culture, the

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"Being open to the ideas available when we truly listen to others is a hallmark of effective dialogue, and is the mortar that holds the bricks of democratic, well-functioning societies together."

dynamic between cooperation and conflict. Hives have leaders, the queen, and followers, the workers, but the boundaries between them are fluid, and good communication is essential to maintain the public balance. Lack of communication, chemical for the bees and verbal for humans, results in increased aggression and eventually chaos for both societies.

Our Dialogue programs recognize that underlying conflicts between people can be positive forces for social change if mediated through the tools of conversation conducted from perspectives that accept the validity of diverse viewpoints. My time with the bees has provided me with an intuitive sensitivity for this healthy balance between cooperation and conflict, and a deep respect for the role of communication as the glue that can hold a society together or drive its individual components apart. In that way, bees are at the core of whatever contributions I am able to render at the Centre for Dialogue.

My time with bees also has provided me with a deep respect for interdisciplinary endeavors, especially because so much of my laboratory's research has focused on division of labor in honey bee colonies. Who could not respect the myriad, diversified human professions that foster harmonious societies after watching bees take on their many tasks in their well-organized and economic social structure?

I value the janitorial tasks of young worker bees as much as the pheromone production of the queen, the gritty defence job of the guard bees equally to the nurturing role of the nurse bees, the shopping tasks of foragers as significantly as the queen's egg-laying job.

Thus, I am predisposed to welcome the input of the Humanities with the same value as the Sciences, the comments of a bus driver with equal respect as I would the pronouncements of a professor. Perhaps I would have come to that equanimity with age and maturity anyway, but I'd prefer to believe that my visits to the bee yard have accelerated and intensified my own interdisciplinary bent.

My laboratory also has conducted considerable research on pollination, a field of study that provides deep lessons from the bees that can inform our human interactions. One key element for me that resonates both in bee biology and dialogue has been recognition of how important diversity is for both endeavors. Healthy pollination systems rely on diverse and abundant bee populations, both managed and feral, while dialogue thrives in an atmosphere of tolerance for varied points of view. In that way the biologic and the dialogic open windows into each other's disciplines.

Pollination also has taught me the importance of seemingly tiny, inconsequential bits of hard work in building the edifice of healthy ecosystems as well as societies. Consider the short visit of a single bee to a flower, only seconds in duration and only one of sometimes hundreds of floral visits a bee might make on a single trip.

Yet, each visit can set a fruit on the path to our dinner table, a seed on its way to creating the next generation of plants. Alone, one visit seems trivial, yet the tapestry of such single acts woven together creates ecological stability and agricultural abundance.

So it is with dialogue and conversation, where a chance phrase or comment may lead to profound truths and insights. Being open to the ideas available when we truly listen to others is a hallmark of effective dialogue, and is the mortar that holds the bricks of democratic, well-functioning societies together. Being receptive to such "pollination" is another valued lesson I have learned from the bees.

People in my new world often ask me whether I miss spending time with my bees, and it is a question I find difficult to answer. Yes, I miss the smells and sounds of the apiary, the sore muscles after a good day's work, the feel of bees on my hands, and even the wake-up call from a sharp sting.

Yet, my bees are always with me, even in the downtown world in which I spend most of my time these days. While my new urban colleagues may find that difficult to imagine, I think all beekeepers will understand how much of our bees we take with us when we leave the apiary behind.

If you would like to find out more about the Centre for Dialogue and the Undergraduate Semester, visit our Web site **www.sfu.ca/dialogue/undergrad**. If you would like to know more about bees, well visit your local beeyard, alone, and begin the dialogue. BC

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THE DRONE

Larry Connor

As important in a breeding program as the queen, drones are too often under-rated. But understanding drone biology is important for every beekeeper.

Introduction

I was engaged in the large-scale production of drone and virgin queen honey bees as part of a for-profit enterprise established to mass-produce instrumentally inseminated honey bee queens from 1976 to 1980. Located in Labelle, Florida, this business was called Genetic Systems, Inc., and was owned by Dadant and Sons, York Bee Company, and a number of key Starline and Midnite hybrid queen cooperators. While we failed to earn the *for profit* part of our mission statement, we learned a tremendous amount of valuable information about virgin queen and drone management. During this period I developed a tremendous appreciation for the role of drones in colony life. Since then, researchers have increased our knowledge of drones with studies in mating behavior, hormone physiology, parasite management, and related areas.

Generally, most beekeepers *under*-appreciate the role of drones as much as they tend to *over*estimate their numbers. While I have lectured about drones around the country and overseas, my personal reptilian slumber was abruptly aroused when commercial beekeeper Andy Card (Otto, New York) begged me to write down and publish what I know about drones. As a migratory commercial beekeeper who produces thousands of queens each Spring in a very short time period, he appreciates the importance of abundant, sexually mature drones as sexual partners for his hundreds of virgin queens. Thanks to Mr. Card, I've dusted off a few notes, re-caffeinated some brain cells, and launched into these subjects, set to appear as a series of articles.

Determination of sex in bees

Many beekeepers have trouble understanding sex determination in bees, so I start with the difficult part and hope the rest will seem easy. Sex determination in bees is controlled by a group of **sex alleles** found within the mating population. When an egg is fertilized and has two different sex alleles, a female bee (worker or queen) results. But if an egg is fertilized and the sex alleles are the same, a diploid male (drone) results.

The number of sex alleles differs from bee population to bee population. If the eggs of a queen are mated to unrelated drones all possessing different sex alleles, all the resulting bees will be viable females with 100% survival. But if the eggs of a queen are all fertilized by drone sperm carrying one of the same sex alleles as the queen, there will be two kinds of fertilized eggs. The first will have different alleles, and will produce female bees; these are **heterozygous** for the sex alleles. The second will have the same alleles, and will produce **diploid drones**, which are eaten by the worker bees within six hours of hatching. These are **homozygous** for the sex alleles. Overall, there will be 50% brood survival, which is usually not enough to support colony development.

Let me state this another way: Female bees- – workers and queens – possess two sets of chromosomes each carrying different sex determination alleles. Individuals with the same sex alleles are diploid male bees – diploid drones. They do not appear in your hive, at least not for very long. These diploid drones produce a **cannibalism substance**, a pheromone which worker honey bees recognize and respond to by eating the newly hatched diploid drone larvae.

This is why even the best queens in the world have missing cells when the worker brood is sealed. These were eggs that were fertilized by sperm carrying the same sex determination allele as found in the egg. Instead of developing as diploid drones, the nurse bees ate the evidence. (Diploid drones have been reared under special conditions and extensively studied.)

The percentage of brood survival gives us a crude estimate of the number of sex alleles in a population.

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Capped Drone brood has the tell-tale bullet shaped cappings.

A typical frame of brood, with a few missing cells where diploid drones have been removed.

This simple chart shows you the percentage of survival of brood as determined by the number of sex alleles in a population:

Number of sex alleles	Percentage of Survival of Brood[1]
2	50
3	66.7
4	75
5	80
6	83.3
7	85.7
8	87.5
9	88.9
10	90
11	90.9
12	91.5

How many sex alleles do we have in most of our bee populations? Some estimates run as low as 11, while others run from 16 to19.

How important is the sex allele issue? In healthy, genetically diverse populations of bees, it is not an issue at all. Since queens mate with many drones, the chance of same-allele problems is reduced. Also, queens will relay fresh eggs into cells where diploid drones were eaten, recovering part of the colony's overall productivity.

But it is something to keep in the back of your mind when you set out to do something genetic with bees. Traditionally, in areas of intensive inbreeding (using the same genetic source for queens and drones), it has become a concern. Commercial beekeepers who year-after-year always bred from their *best queens* have been shown to develop problems with sex-allele inbreeding when they mated queens in relatively isolated areas and never introduced new genetic material into their breeding program.

For me, it was a daily headache. True hybrid bees, such as the ones we produced from 1976 to 1980 under the names of Cale 876, Starline and Midnite bees, required highly inbred lines to maintain the genetic material used to create the hybrid. The high cost of maintaining inbred lines was a major part of the end of Genetic Systems, Inc. These bees did not exhibit vigor and were plagued by problems with sex alleles. Current breeding programs built on closed populations of bees now work more effectively as a stock maintenance system by minimizing sex allele issues for many generations.

[A note, since nothing is 100 percent in the bee colony: Some of the missing cells undoubtedly result from lethal genetic combinations that prevent development of the larva. The mechanics are very similar to the sex allele scenario, but at a different loci on the chromosomes; in other words, these are individuals with homozygous lethal genes.]

Fertilization

This has been a long and somewhat tedious way to tell you that the drone bees you see in your colony are haploid, that is, they developed without fertilization by a sperm, and contain one set of chromosomes while queens and worker bees contain two sets. Let's look at the process of egg fertilization.

Worker bees, queen bees and drone bees all start life as identical eggs. The functional sexual determination process in honey bees starts as the mature egg departs one of the queen's two median ovaries (each containing hundreds of ovarioles) and passes down the median oviduct. As this happens the micropore (a small opening in the 'shell', or chorian) of the egg aligns with the opening of a tiny tube of the queen – the spermathecal duct. This duct and a controlling valve are connected to the round spermatheca, where potentially five million sperm from many drones may be stored. As the egg passes this point, a volume of fluid containing sperm is released if a female bee is to result. This happen at the moment the queen deposits the egg into a cell. After a sperm successfully fertilizes the egg, a female bee results (worker or queen), possessing two sets of chromosomes, one from the egg and one from the sperm (from the drone the queen mated with on her mating flight). These are normal diploid females.

When a queen lays an egg into a drone cell, the queen senses[2] the larger cell size and as the egg passes down the median duct, the queen does not release seminal fluid. This egg will develop as a male bee, or drone. These bees are haploid drones, containing one set of chromosomes, only from the queen, since no chromosomes were donated from sperm, from one of the drones the queen mated with.

[1] From Woyke, J., 1986, Sex Determination *In* Bee Genetics and Breeding, Thomas Rinderer, Editor, Academic Press, Orlando.

[2] It has long been thought that the queen actually measures the size of the cell with her forlegs and antennae. I suspect there may also be a pheromone deposited by the worker bees as they polish each cell.

A queen, drone and workers – all necessary in a healthy colony.

As part of *Varroa* mite control, beekeepers are advised to remove drone brood from their colony (or cut out drone parts of combs and destroy it), since *Varroa* mites find drone brood highly attractive. Because drones take longer to develop, and because the brood emits a special pheromone, more *Varroa* mites are attracted to drone brood and are produced there than in worker cells.

The queen deposits fertilized eggs into polished worker cells. During swarming season, the queen may lay eggs into queen cups, and these eggs will become future virgin queens. The queen deposits unfertilized eggs into polished drone cells. If no drone cells are available, queens will deposit unfertilized eggs in worker cells, and **worker-sized drones** result. This most commonly happens when beekeepers remove all drone comb – perhaps as part of their *Varroa* control just mentioned – yet the colony has a biological need for drones, and the queen uses the worker cells. These smaller drones produce viable sperm (I used them in instrumental insemination of queens).

In the Fall, when it is not time for drone production, queens confined to drone cells will lay worker eggs, ignoring the difference in size. The worker brood in drone cells will have flat cappings, as compared to the rounded, bullet-like cappings of drone brood.

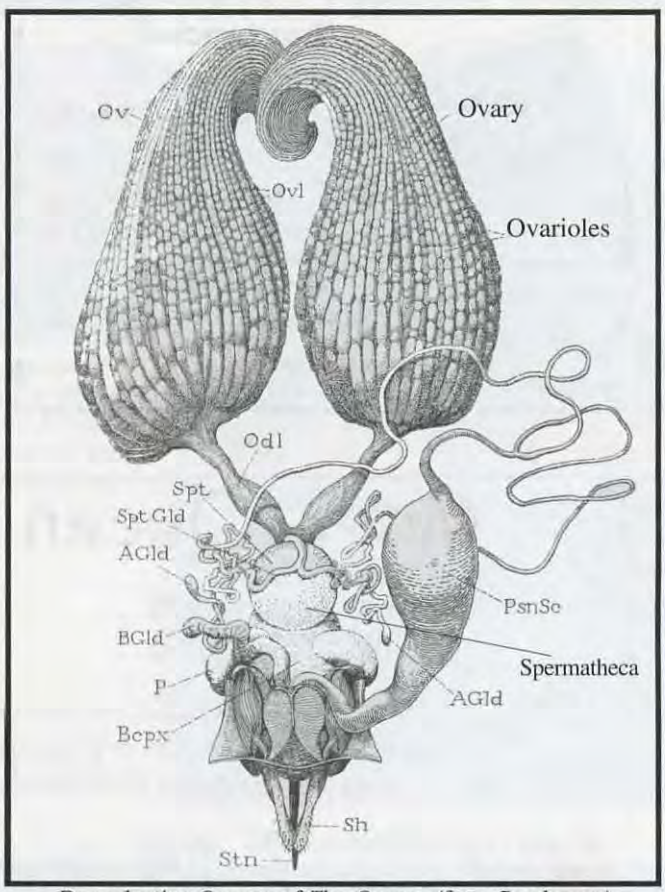
The life of the drone

Vigorous queens lay unfertilized eggs in drone cells measuring roughly four cells per inch, or 16 cells per square inch. Drone production normally occurs during periods of buildup, such as spring in the North, and during the nectar flow in subtropical and tropical environs. Drones are also produced when the queen is failing and the colony is engaged with supersedure, and when an otherwise healthy queen has inadequate sperm stored in her spermatheca, Queens of all ages produce drones, even newly mated queens. Older queens approaching supersedure often enter a final flush of drone production before declining and being replaced by a daughter queen.

During the season, colonies normally maintain a few hundred adult drones, constantly producing more to maintain this number. It is possible to stimulate a colony to produce two or three frames of drones using drone comb foundation, but every colony has an upper limit on the number of drones it will maintain. I will discuss some of the methods we developed at Genetic Systems to manipulate and stimulate additional drone production from colonies in a future article. Drone brood takes longer to develop than either worker bees or queen bees, taking a full 24 days from egg laying to emergence. Queen bees require up to 16 days, and worker bees require up to 21 days from egg to emergence.

Drone eggs and brood are tolerated in colonies as long as forage conditions are good, especially pollen. Immature drones frequently disappear during periods of poor pollen forage. The missing eggs and larvae were eaten by normally vegetarian worker bees, undoubtedly as a means of conserving protein. Nurse bees continue to feed worker and queen brood at the same time they consume drone eggs. You probably knew that worker bees reject drones at the end of the nectar flow, but it may be new information to you that workers actually eat their brothers during the season. That makes them both sexist and cannibalistic.

They have a pattern to do this. First the eggs and then the younger larvae are eaten, especially on the fringe of the brood nest. It is not uncommon to see eggs and newly hatched larvae in drone comb (frames of cells milled specifically for drone production) and return after a cold front to find all the eggs and young brood are missing; the combs may have old larvae and a few cells filled with a little nectar. Only carefully recorded notes and witnessing co-workers kept me from



Reproductive Organs of The Queen. (from Snodgrass)

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thinking I had gone crazy when I first saw this. During prolonged cool, rainy weather, all drone larvae may be consumed, with partially eaten bodies seen in the cells, and shrunken carcasses are seen being carried out the entrance of the hive. It is less likely to see sealed drone brood cannibalized, but I have seen it happen when the pollen supply is non-existent.

Drones and drone brood may be seen as an indicator of colony nutrition, especially pollen (protein) levels in a colony. Use this handy set of observations[3] to help you understand the nutritional levels in your colony:

Observed drone stages in the colony	Conclusions drawn about the pollen (nutrition) supplied to the colony
Adults-pupa-larva-egg	Pollen is abundant
Adults-pupa-larva	A shortage of pollen available to bees occurred in last 48 hours
Adults only	Pollen available to bees has been short for at least 7 days
No Drones	A severe shortage of pollen has existed from two weeks to a month.

[3] This handy table is from Steve Taber's 1987 book *Breeding Super Bees*, A.I. Root Co, Medina.

"Worker bees, queen bees and drone bees all start life as identical eggs."

I am not sure the nurse bees always get this right, for there are times, especially in the early season, when a larger percentage of drones seem to be sterile, producing no semen. This may reflect a lack of proper nutrition during late larval development and/or during early adult maturation. Like queen bee development, there are many events that must happen correctly, or the resulting drone/queen is not fully functional.

Next Time

Since drones exist to mate with virgin queens, their role is essentially sexual. Drones mate with virgin queens before she lays any eggs, and queens almost never return to the skies for additional mating once they have started depositing eggs. Next I will discuss adult drone development and their mating with the queen. BC

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BUILD A HONEY HOUSE

Gerald Burchett

Are you thinking about building a honey house where you would process honey for sale. If so, the following items are suggested so that you will not be exposed to an excessive amount of expense.

Plan (BEFORE you build)

Good planning in the beginning, with as much detail as possible, can save you a lot of money and trouble down the road. Following are several important considerations:

Size of operation

Are you a **Hobbyist** maintaining a few hives for the purpose of fun, education and honey for home use? Perhaps becoming a **Sideliner** with several hives to produce honey and other hive products to sell to the public on a small scale is more of interest to you. Maybe you have decided to become a **Commercial** beekeeper with hundreds of hives to produce large quantities (1000's of lbs) of honey for the commercial market.

Your objectives in the size of the operation greatly affect facility, space and equipment requirements and should be given careful consideration. If you plan to start small and increase in the future, **expansion** should be considered. In most cases, it is easier and less costly to build with capability to expand than having to tear down and start over.

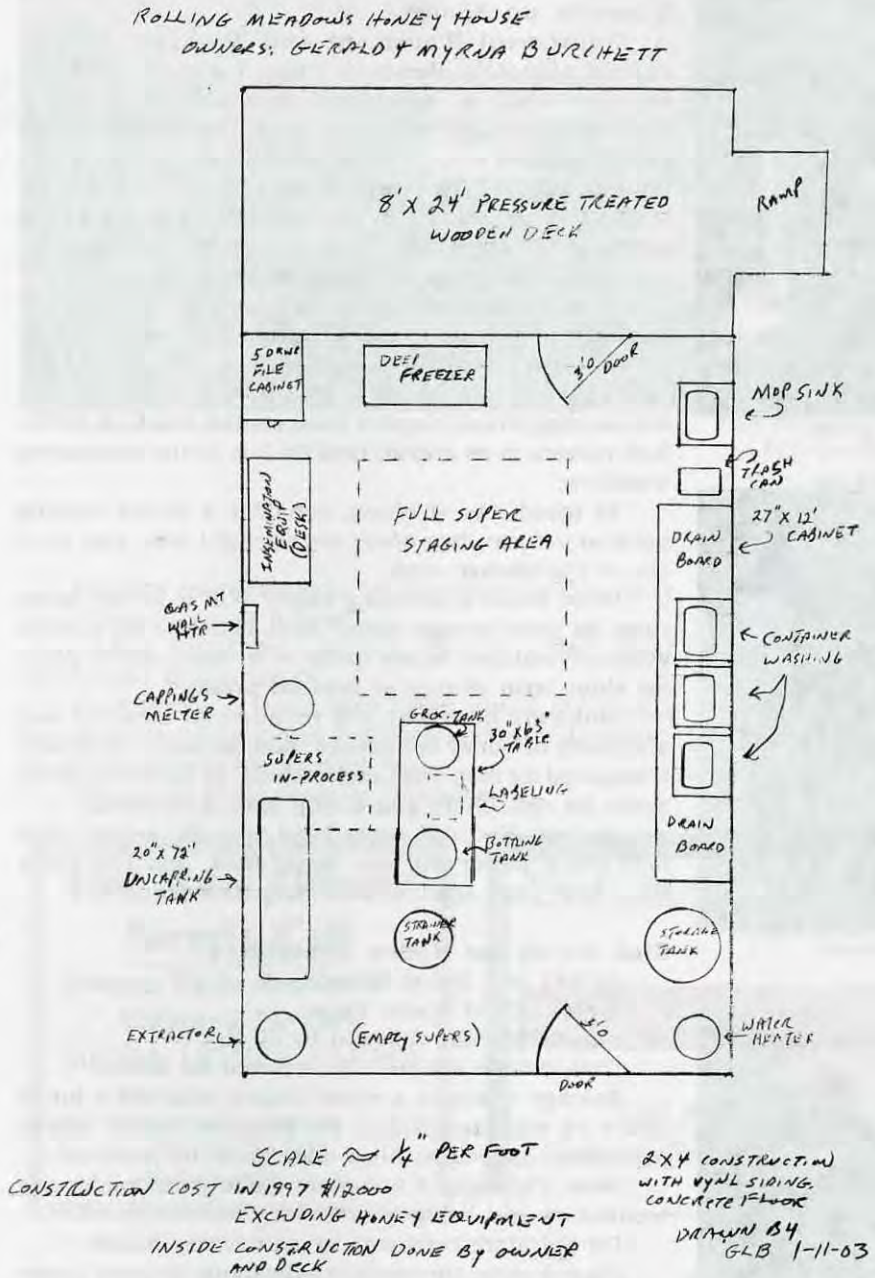
Equipment must fit the operation. Maybe an extractor and uncapping tank and a storage tank is all you need in a hobbyist's operation. Sideliner and Commercial operations require bigger, different and more equipment varying from basic to very sophistidated in design and operation. Decide what is required to fit your needs.

Of course a building must be of sufficient size to permit placement of equipment with room to work efficiently, handle supers and containers. I have built two honey houses, both of which are too small and probably yours will be also. Allow for as much space as possible.

Consider Options available to you

Do you really need a honey house? If you are a large operator more than likely the answer is yes. If you have a hobbyist operation, a careful survey of other beekeepers in the area may present an opportunity for you to utilize an existing honey house. Of course agreements should be made with the owner regarding the time of use, cleaning responsibilities and sharing of equipment/accessory expense.

Production of honey, for home use, probably would not *require* a honey house but may be justified by personal desire and feeling of accomplishment. I held



The mop sink in the corner.

interest in an airplane several years ago and was asked by a non-flying relative how I could justify an airplane. I said, the same way you justified your boat. So it is in the beekeeping field, sometimes we do things for personal satisfaction rather than need.

In most cases if you plan to sell honey or hive products, a certified honey house is required by state and local laws and/or regulations.

Consult with local and state authorities, especially the Health Dept. Establish a good working relationship with them. Go to them and explain what you want to do and ask what is required. Be up front with them by providing as much detail as possible. Don't ever try to hide anything from them. It will cost you if you do! They will usually want to see a rough sketch of the facility layout. This doesn't have to be drawn by a professional but should be reasonably accurate and representative of your planned building and equipment placement.

Building and zoning permits are required almost everywhere. Consider: Building Construction, Plumbing, Electrical and Food Manufacturing. Are you a "do it yourselfer?" Many of us like to do our own work and that is fine provided it is ok with the authorities. *Do Not* do the work and consult the authorities later!

What Products will be produced? Chunk Honey, Cut Comb, Extracted, Pollen or all of the above? ***Products*** *determine types* of equipment needed.

Amounts *of products determine* ***size*** *and* ***space*** *requirements.* Chunk and Cut Comb Honey require only a knife, cutting board or rack and drain pan. Extracted Honey requires an uncapping knife or machine, uncapping tank, extractor, filtering devices, storage/bottling tanks. Other optional equipment may include: cappings melter, dehumidifier, clarifying tank, honey pump, honey heaters, water jacketed tanks, heated room, and more.

Give a lot of thought to Space Requirements. Full honey supers, empty honey supers, honey processing equipment, empty bottles/jars, filled bottles/jars, cabinets, sinks etc. all require

Continued on Next Page

A three-sink, two drainboard sink, required.

Wax melter, and desk, with I.I. equipment.

Bottling tanks on the left, extractor, tray and uncapper in the corner.

space and must be a part of the plan. **Do Not Shortcut on Space!**

Equipment Placement and Workflow require careful planning. Remember that honey is heavy so lifting should be minimized as much as possible. Equipment should be located such that honey supers can be worked with a minimum of lost motion. If you have to take a step everytime you remove a frame for uncapping or placing in an extractor, you are losing time and gaining fatigue. Arrange equipment for smooth and logical flow of product and work efficiency.

When considering workflow, don't overlook unloading full honey supers, storing them, and moving those supers into the work area. At the same time you'll have empty honey supers, empty super storage and loading empty supers back on the truck. A traffic flow pattern is as critical here as it is in the processing workflow.

To avoid lots of lifting, consider a raised loading dock so you can two-wheel supers right into, and back out of the storage area.

What about a warming room? Will it be the same room as your storage room? Also, consider an area to warm crystallized honey (pails or drums), and a place for short term storage of finished product.

Sinks are necessary and required for cleaning and sterilizing of honey containers. Additionally a mop sink is required for mop and handwashing. In Kentucky three sinks for containers and a mop sink is required.

Outlets. You will never have enough outlets. And how much power will you need? Now, and five years from now. Look again at your long term plan.

Sink Setup for Honey Containers:

Sink#1 Hot Soapy Water

Sink#2 Clear Water Rinse

Sink#3 Sterilize followed by air dry

Drainboards are usually required for sinks.

Storage space is a must. Boxes take up a lot of space so adequate space for boxes of empty honey containers as well as filled ones must be provided.

Note: Corrugated materials make great cockroach incubators and living quarters!

Do not store corrugate in your honey house.

Do not store chemicals/medications in your honey house

Bottling tanks occupy the center of the room. AC on the wall.

Radial extractor, uncapping tank, Maxant uncapper and bottling tanks.

Facility requirements in Kentucky (yours may be different) are as follows:

Lights must be covered. Plastic tubes over flourescent lamps are ok.

Floor Drain – Don't even think about building a honey house without one. Spills will occur, and cleanup is nearly impossible without one.

Walls and Floor must be washable.

Windows must be screened to keep insects, including honey bees, out.

Bee Escapes are needed to allow honey bees brought in with honey supers to exit.

The honeyhouse must be bee proof. If bees have an entrance they will be attracted and enter which will make life very difficult for personnel working in the honeyhouse.

Make every effort to build so that insects and vermin cannot enter.

Common Sense is the key to a well designed and functioning honey house. It must be clean and easily cleaned.

Prior to building perform a very detailed cost analysis. Finalize plans and consider all expected expenditures then add a fudge factor of 10 to 20%.

Is it worth it? If, after careful evaluation you believe it is **go for it!**

If there is a question — Give it more thought. Thinking and planning is cheaper than building. It's the old measure twice, cut once philosophy.

A good, well planned honey house can make life easier and more enjoyable for the beekeeper than one that is poorly planned. BC

Gerald Burchett is an EAS Certified Master Beekeeper and Vice-President of KY State Beekeepers Assoc. He and his wife Myrna, who is KY State Beekeepers Assoc, Treasurer, own and operate Rolling Meadows Honey Farm near Grand Rivers, KY.

Getting Ready For COMB HONEY

Lloyd Spear

In the last article we explained how to start a hive to produce comb honey during the current year. This hive should be headed by a young queen purchased this year. Such queens are far less likely to swarm than are queens that have over wintered.

In this article I will go into detail on feeding to achieve a maximum population of strong foragers, talk about expanding the brood nest, and explain how to setup your supers for comb honey production.

If hives are being used to make splits, to increase the number of hives or to sell as nucs, it is best to start feeding three to four weeks before the maples bloom in your area. If you don't know when this is, ask another beekeeper or call your local county extension service. Like dandelion bloom, maple bloom is very reliable and will not vary by more than 7-10 days from year to year. However, for production of comb honey, feeding can be delayed until the new hives are established, which should be just after maple bloom or 3-4 weeks before dandelion bloom in your area.

The reason that feeding at this time is so important is that the nectar and pollen from maple caused the hives to substantially expand their brood nest, and brood requires tremendous amounts of honey and pollen in order to properly develop. Cold spring weather can prevent the bees from flying to get the small amounts of nectar and pollen being produced, and even if they can fly the pickings are pretty slim. Because the beekeeper wants very strong hives for comb honey production, it is best to feed during this time. Moreover, most hive failures due to lack of food occur at this time, rather than during the depths of Winter.

Feeding pollen or pollen substitutes is easy. If you have your own pollen or can get some from a source you trust to be disease free, use that. If you can get some, but not enough, mix what you can get with the pollen substitute. As little as 20% (by volume or weight) will be very beneficial. If you have a source of 55 weight corn syrup, you can use that and not make sugar syrup. If you have to make sugar syrup, boil water and gradually add sugar equal to approximately *twice* the weight or volume of the water. The measurements are not critical, but a 5-pound bag of sugar dissolved in 1-½ quarts of water would be about right. Add the sugar gradually while stirring with a wooden spoon. If the water stops boiling, do not add more sugar until it resumes.

Let the syrup cool to room temperature. Take any given amount of pollen or pollen substitute and add a very little syrup. Use a mixer if possible, and mix thoroughly. Keep adding syrup until the mixture is about the consistency of pizza dough. Too stiff is far better than too runny. When mixed with syrup, the result is termed a pollen cake. Make each cake so it weighs about eight ounces. Flatten and put wax paper on both sides. Freeze until needed. My nucs will generally consume 1-2 pollen cakes between maple and dandelion flow.

When ready to feed, put the entire cake on the top bars, with the wax paper on top and bottom. The bees will quickly go through the wax paper.

When feeding syrup, it is best to use one of the feeders that are internal to the hive. Avoid both 'barrel' (community) feeding and the Boardman feeder. Nearby strong colonies (your own, a neighbor's, or wild) will get most of the syrup in the barrel and your own still relatively weak nucs will get little. The Boardman feeders only hold a pint to a quart so need to be refilled too frequently to be practical. Finally, both of these 'external' methods mean the bees have to leave their cluster to get the syrup. During the early Spring that can be impossible, meaning that some or all brood may starve.

Far superior are the methods that let the syrup be inside the hive. There are several choices:

1. A sturdy leak-proof plastic bag full of syrup

Ross Round or round section frames with rings inserted and ready to insert.

Completed Ross Round or round section frame with foundation and rings. Ready to go into super.

placed on the top bars with a few pinholes or slits. This is one of the best methods. Use a bag that holds at least a gallon. The bees will find the pinholes or slits.

2. A frame feeder. Called a 'frame' feeder because these originally took the place of one frame, many of the plastic ones sold today require the space of two frames. Better than an external feeder, but not really desirable because they take too much room from the brood nest and are hard to get to in cold weather.

3. A wood Miller-type or hive-top feeder. Goes on just like a super and syrup goes into a container that the bees can't get into to drown. This is my #2 preference. Only a few dealers carry these, and none that I know of carry one that is preassembled. Takes some skill to assemble so it does not leak. Will hold two to four gallons.

4. A Styrofoam Miller-type feeder. In my opinion, this is the best feeder available. As far as I know, these are only offered by Betterbee (800-632-3379) and Dadant (888-922-1293). While the directions fail to say so, these will last indefinitely *if* you paint them, *inside and out.* Otherwise, expect a life of about five years before they leak through the pores. Holds about four gallons and every beekeeper should own at least one.

5. A gallon jar or pail feeder inverted over the top bars with small holes in the lid or a fine screen. These work well. The only disadvantages are the necessity to keep them clean and the difficulty seeing the syrup level unless the containers are clear. Be certain that they are absolutely full before inverting, and put small pieces of wood under them so they don't seal to the top bars.

Feed both pollen cakes and syrup until any foundation is fully drawn or the bees refuse to take more.

When dandelion blooms you will probably have to add one or more additional boxes to give the bees enough room to expand their brood nest and store nectar. If you have fully drawn frames, err on the side of giving them too much room and add another box (deep or medium) when you see the first dandelions. If you use mediums and have enough fully drawn frames, give them two boxes at this time. If you don't have extra drawn frames, when dandelion blooms add a deep of foundation *and continue feeding* until the foundation is fully drawn.

If you have not all ready done so, dandelion bloom is when you should get serious about getting your comb honey supers ready. If you are just starting I suggest you start with supers to produce Ross Rounds. You should buy at least one fully assembled. You can save some money by assembling your own, but having one fully assembled to use as a guide will be very helpful. The components of a Ross Round super are:

1. Spacer boards that serve to create an artificial wall so bees will quickly draw and fill comb on the outside of the super.

2. Eight frames, each holding eight rings. Therefore, 64 rings are necessary for the full super.

3. Eight pieces of special very-thin foundation that go inside the frames and in between the rings.

4. Three springs that hold the final spacer board in place.

Slotted top bar frame, resting on top bar. Ready to have foundation inserted.

Wedge top bar frame resting on top bar. Ready to have foundation inserted and wedge nailed in place.

Foundation that came loose from wedge. Note that nails failed to make proper contact with foundation. If the foundation had dropped after the super was put on the hive, the bees would have fastened it to the foundation in the adjacent frame, and ruined two frames for sale as comb honey.

After the super and the spacer boards are assembled, each frame is filled with eight rings and a piece of foundation and put into the super. When all eight frames are in the super, the last spacer board is placed against the last frame, and held in place (against the wall of the super) by the springs. Assembling a super with frames, rings, and foundation should take about 10 minutes.

A beginner is faced with a real dilemma if they wish to produce cut comb honey. They can either produce it in 'normal' cut comb frames, that measure 5-3/8" wide or they can use 6-¼" frames. The dilemma is because the 6-¼" frames are also used in medium (also called Illinois) supers which are very popular, while the 5-3/8" supers are also used in shallow supers, which are

Contined on Page 54

Raising Your Own QUEENS

James E. Tew

"Guidelines For The Backyard Beekeeper"

Is queen production for you?

There are innumerable ways to raise queens. The needs, interest, and skill of individual beekeepers varies widely. Therefore, one beekeeper may use a simple procedure and only "grow" a few queens while another beekeeper may choose to specialize in queen production and produce hundreds or even thousands of queens. Producing queens is a logical progression in your beekeeping development. It can give a sense of freshness and competency to the traditional procedures of colony management and honey production.

A Honey Bee Queen and her retinue.

Why colonies produce queens

A colony will produce a new queen under three stimuli: supersedure, swarming, or emergency. Most, but not all beekeeper-produced queens are grown using the emergency stimulus. A queen emergency occurs when a colony abruptly has no queen – for whatever reason. Nurse bees will select young worker larvae and feed them an enriched diet that allows them to develop into queens. So, in many instances, the beekeeper can put a specified colony in the mood for queen production by simply removing the reigning queen – thereby creating a queen emergency. But as a backyard queen producer it may very well be that you only need a few queens, so the occasional swarm or supersedure cell may be all you need. Any of these cell types, swarming, supersedure, or emergency, *can* result in a good queen.

The basics required of you – the beekeeper

First, you must be able to see eggs and very young larvae in the comb. Use a magnifying glass, supplemental lighting – whatever it takes for you to routinely and dependably see eggs and young larvae.

Second, you must be able to identify a queen and be able to find her when you really need to. To raise and manipulate queens, you must be able to recognize them at a glance.

Third, you should be able to recognize queen cells in all stages. Older cells are obvious, but younger cells may be more difficult for the novice to identify.

Non-grafting vs. grafting procedure

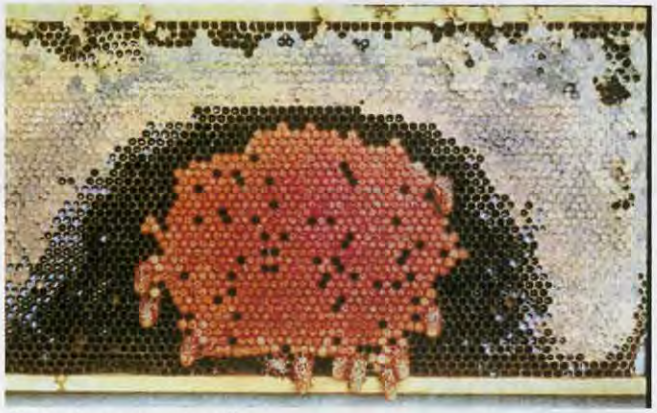
Most advanced queen production capable of producing many queens requires you to "graft" or transfer larvae to cell cups. Grafting larvae is tedious for most of us and is the primary restriction that prevents many

To raise queens, you must have . . .

- Warm weather
- Drones
- Worker eggs or young larvae
- Abundance of young worker bees

Replacement Schedule for *Emergency Queen Production*

Day 0 *Reigning queen dies*
Day 1-3 *Nurse bees select larvae for future queens*
Day 13 *New queens emerge*
Day 19 *First mating flight*
Day 22 *First eggs laid by new queen*
Day 43-45 *First new brood emerges*



Natural emergency cells.

beekeepers from producing queens. However, there are simpler procedures for producing a few queens that do not require moving individual larvae or eggs.

Allowing colonies to replace their queens naturally

Ironically, simple procedures for requeening normally specify that the colony produce natural queen cells and the new queen be allowed to undergo natural

Emergency cells.

mating and replacement procedures. It's true that this process is natural, simple, and economical in price, but it may not be so economical in time. The estimated schedule presented on page 30 shows that approximately 45 days are required for a colony to completely requeen itself. As an example, a colony that started its requeening process on June 1 would theoretically have a new queen in place by July 15. A lot can change in 45 days – the nectar flow, the weather, the colony' population. Be prepared to help a small colony develop once the new queen is in place.

"Transferring a Selected Brood Frame"
The procedure

I. Select the colony from which you want to produce queens (your good queen). At this point, just know which colony it is.
II. Remove the queen from the colony you wish to requeen (your bad colony).
    a. Remove the queen from the bad colony.
    b. What you do with her is up to you, but get her out of the colony.
III. Remove a brood frame from the colony (the bad colony) that is being requeened.
    a. Shake or brush the adult bees from this frame.
    b. It doesn't matter what is on this frame.
IV Return to your good colony (your "breeder colony") that was selected earlier.
    a. Find the good queen and set her aside.
    b. Select a brood frame having eggs and young larvae (*breeder frame*)
        i. Brush the bees from this frame.
        ii. Do not shake the bees from this frame.
    c. Put the frame you removed from the bad colony (Section III above) in the space left by removing the brood frame.
    d. If confined, release your good queen back into the good colony.
V. Put the breeder frame in the slot left when you removed the frame from the bad colony.
    a. In this way, the bad colony has a frame of eggs and young larvae from your good colony.
    b. Plainly mark this frame in some way.
        i. Colored marker.
        ii. Thumb tack.
        iii. A distinctive scratch.
VI. Three days later return to the bad colony. Destroy ALL queen cells that are not on the breeder frame (the frame from your good colony).
    a. Now, the only queen cells in the bad colony are on the frame acquired from the good colony.
VII. Two- three weeks later, begin to look for eggs in the requeened colony.
    a. The presence of eggs means the new queen is present.
    b. There is no need to actually see the new queen during this inspection.
VIII. Obviously, this procedure could be used to requeen more than one colony – depending on the number of breeder frames you could remove from your good colony.

The problems

First, your requeened colony (the bad colony) will be set back several weeks due to lost brood production while you were waiting for the new queen to develop and mate.

Second, you have no control over the drones with which your new queen will mate. So, your new queen will not be a clone of the original queen, but your new queen will have many of the attributes that you found desirable within your original good colony.

Third, you have no idea how many queen cells your de-queened colony (the bad colony) will produce. Natural queen cell production can range from no cells to many cells. With this system, you have no way of knowing how many cells will be produced.

Fourth, all this activity and removing brood will disrupt the development and production of your good colony. But, in theory, the requeened hive should have improved queen stock.

Using natural swarm or supersedure cells

Frequently, beekeepers see swarm cells or supersedure cells in their colonies. After these cells are capped, they can be used to requeen other colonies.

"Requeening with Natural Cells"
The Procedure

I. Note the presence of queen cells (swarm, super-

Continued on Next Page

sedure, or emergency) cells in one of your colonies.
a. Number of cells will vary.
b. Location and quality will vary.
c. Older capped cells are best for transferring.

II. Uses for extra natural cells
a. Requeening established colonies
b. Making splits

III. Colonies receiving the cells
a. must be queenless
b. Ideally have no eggs or young larvae

IV Cutting the cells from the comb
a. Cells will be in different locations and positions on the comb.
b. Be generous when cutting the comb, don't try to trim the comb or be neat. Cut out a chunk so you don't damage the cell.
ii. Don't crush or damage the cell in any way.
i. Bees receiving the cells are particular about them and will quickly reject a damaged cell.

V. Positioning the natural cell.
a. Marking the frames receiving the cells is a good idea.
b. In the receiving brood nest, position the cell between brood frame top bars.
c. Alternatively, cut a chunk of comb from the brood frame comb and insert the cell in the hole.
d. Alternatively (and the poorest choice), press the base of the queen cell into the brood comb. This is the fastest procedure but frequently results in damaged cells.

VI. Return to the colony a day or two later to check for cells other than the ones you installed.
a. Determine that your installed cells are accepted.
b. Natural cells started by the receiving colony can be either ignored or destroyed. I would destroy them.

VII. Return about ten days later to check for the presence of a new queen.

The Problems

First, you will need to depend on good luck to get cells. The timing of the appearance of cells may not be the best.

Second, you have absolutely no control over how many cells are produced.

Third, by using swarm cells, you will be propagating the swarming tendency in your colonies.

The Alley System of Queen Production

This queen producing procedure, described in 1917 is a practical technique for producing queen cells without grafting larvae. As you might expect, the farther one gets away from the very basic procedures, the more effort required of the beekeeper. However, in this system, you have some control over how many cells will be produced and are not dependant on natural queen cells.

"Henry Alley System of Queen Production"
The Procedure

I. Select the colony from which you wish to breed queens.

II. Put an empty comb (breeder comb) in the middle of the brood nest of the chosen colony.
a. Mark this frame.
b. Three-four days later check to be sure the queen has laid eggs in this newly inserted frame.

III. Four days later, locate the queen and temporarily store her somewhere else other than the colony. For instance, you could:
a. Store her in a nucleus hive.
b. Hold her in a cage.

IV Remove all the uncapped brood and eggs from the colony and store it in another colony or just give it to another colony.
a. EXCEPT the single frame you installed in Section II above. This will be your breeder frame.
b. Brush the adult bees back into the now mostly empty hive body.
c. Reduce the hive equipment to a small unit probably only a single deep, but give two deeps if there are lots of adult bees.
d. Give the bees about ten hours in this queenless condition.

V. Return for the marked frame (your breeder frame) you put into the colony four days earlier.

VI. Cut a section of comb leaving a center row of cells containing eggs or larvae.
a. It can be any length but usually about 4-8 inches is enough.
b. Larvae are destroyed with a twig in all top and bottom cells and every other cell within the centerline. See Diagram A.
c. Lay the comb strip on its side and cut the cell

Diagram A. A row of selected larvae for queen production.

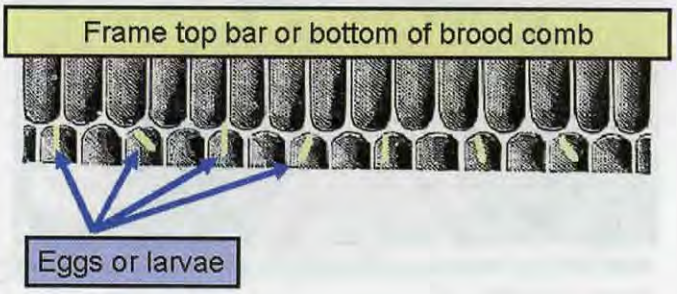
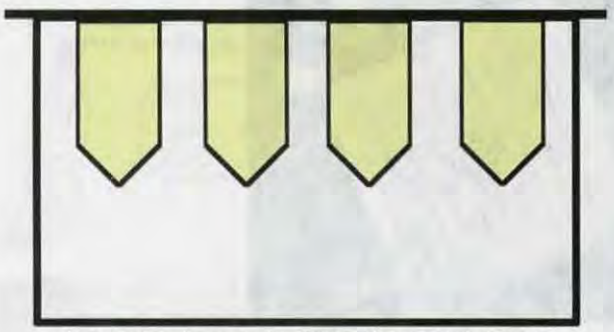


Diagram B. An Alley Queen Cell Strip.

An Alley frame completed.



Foundation layout of a Miller Queen Cell Frame.

wall down to about 1/3 to ½ of the original length. The cells on the opposite side are irrelevant.

d. Use a sharp knife and keep it warm while cutting.

e. Clip foundation wire with snips.

f. Comb on plastic foundation cannot be used.

g. Turn the prepared comb strip downward and attach it to the top bar or to the bottom edge of a empty brood comb. Hot wax is commonly used, but don't over heat the larvae.

h. See diagram B:

VII. Observe in diagram B:

a. The bottom row of cells have been cut down by approximately 2/3s of the cell depth.

b. The top cells are glued, with hot beeswax, to a wooden bar or to the bottom of a brood comb and placed in the center of the brood nest.

c. In this downward position, eggs and larvae grow into adult queens.

d. It is a good idea to feed the colony sugar syrup while it is building cells.

VIII. In the photo, the comb and cells from an Alley frame (Pellett, 1917).[1]

a. The cells are cut from the bar and are used to requeen as needed.

b. Cells should be taken from the colony within ten days to prevent virgin queens emerging and killing each other.

c. Even though the procedure suggests destroying every other cell, it would be better if an inch was left on either side of the larvae. The wax webbing shown in the photo above portends a problem cutting and removing the cells.

The Problems

First, though a simple procedure, it does require significant manipulation of the breeder colony and a time commitment from the beekeeper.

Second, a frame and comb must be cut and manipulated.

Third, the breeder queen must be frequently found and handled so this colony will be set back by undergoing this procedure.

Natural cells built by the Miller plan

"The Miller Plan for Raising Natural Cells"

The Procedure

I. Select your breeder colony (your good colony).

[1] Pellett, Frank C. 1917. *Practical Queen Rearing.* The American Bee Journal. Hamilton, IL 103pp

A Miller Queen Frame.

II. Remove all the brood except for two frames

a. Leave them in the center of the brood nest area.

b. Fill the extra space with broodless comb.

c. Leave the queen in the colony.

III. Devise a "Miller" frame.

a. Into an empty frame attach four strips of foundation 2" wide and about 6" long.

b. Position these strips nearly equidistance from the top bar and end bars.

c. The Miller frame is diagrammatically shown in the photo.

d. Position this specialized frame between the two brood combs that remained in the breeder colony.

e. Allow the Miller frame to stay between these two brood frames for a week.

IV Remove the Miller frame after a week.

a. It should be virgin comb containing larvae and eggs.

b. With a sharp knife, trim the edges of the new comb back to cells containing eggs and very young larvae. This is not an exact procedure.

V. Select a strong colony to raise your Miller queens (a cell building colony).

a. Remove the queen from the cell building colony and leave it queenless for a day. Store the queen.

b. Put the Miller frame in the middle of the brood nest and remove it ten days later. Queen cells should be around the edges.

c. Apparently, it is not necessary to remove any other brood from the cell building colony.

VI. Cut cells from the Miller frame and use them to requeen other colonies.

a. Cut a liberal amount of comb attached to the queen cell. Don't try to be conservative or needlessly neat.

b. Position these new cells in the brood nest of the colony to be requeened.

The Problems

First, the beekeeper must find queens and construct a simple Miller frame. This should not be a major problem.

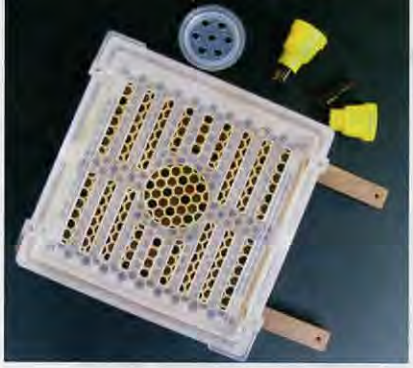
Second, as in other described procedures, the beekeeper will need to cut and handle ripe queen cells having no firm base. It is easy to pinch or otherwise damage ripe cells.

Overall, this is not a bad procedure for the beginner queen producer.

Continued on Next Page

Producing Queens using Modern Plastic Devices

In recent years, various queen production systems have become available that streamline queen production for the backyard beekeeper. In most procedures, the queen is confined in a cage measuring 4 ½" square for a few hours to a few days. She lays eggs in a hybrid plastic/natural wax cell the base of which can be removed from the back of the cage. This allows eggs/young larvae to be transferred without having to be picked up with a grafting needle. This modern-day system strikes me as a hybrid between the old non-grafting procedures described in procedure 1-4 above and the commercially accepted Doolittle system. Whereas procedures 1-4 above are essentially free of costs, these new plastic systems cost as much as $60.00 $155 but innumerable queens can be produced using this equipment. So if you use it, it will pay for itself. A warning: The procedure described below reads much worse than it really is. Once you see the device, its operation becomes obvious and the included instructions are clear. Don't be turned off.



A modern queen cell producing device.

The Procedure

I. The general procedure, from brand to brand, for these devices is similar.
   a. Select a well-used drawn comb.
   b. In the center, cut a hole through the comb large enough for the plastic queen cage to fit snuggly (or otherwise follow included instructions).

II. Removable cell bases are prepared and inserted from the back of the cage.
   a. Both front cage and back covers are removable.
   b. About 90 removable cells will be inserted.

III. After removable cell bases are installed in the cage, replace both front and back covers and put the frame into a strong colony.
   a. Leave for about two days.
   b. Feed the colony thick sugar syrup during the two days.
   c. Until now, no queen has had access to the cage.
   d. By now, comb should be under construction with cells and honey in place.

IV Select the colony from which you wish to produce queens.
   a. Catch the queen and put her in the cage through the opening.
   b. Within 10 – 24 hours, the queen should have eggs in the cage cells.
   c. Release the queen back into the colony.

V. Transfer larvae:
   a. Four days after eggs were laid in the cage (the larvae will be one day old)
   b. Remove the cells from the back and add the cup component to the cell base to complete the plastic queen cell.
   c. The completed cells, attached with a cell base, are put on a bar, frequently one designed for the particular brand of equipment you are using.

VI. The bar of queen cell larvae should be moved to a cell building colony. The designs of these colonies vary but one common design stipulates:
   a. Confine the cell building colony's queen in the bottom deep with a queen excluder.
   b. A second deep hive body:
      i. Is positioned above the queen excluder.
      ii. Put 2-3 frames of older uncapped and capped brood in this second deep.
      iii. Insert the frame containing the bar of queen cells between the two brood frames.
      iv. Even better would be to separate the top deep from the bottom deep by a super so the two deeps are separated by more than just a queen excluder.
      v. Include several frames of honey and pollen with adhering bees.
      vi. Shake several additional frames of bees – being very careful not to include the queen – into the top deep.
      vii. On the tenth day, remove the capped cells and use them as you wish.

Drones

In years past, abundant drone populations were never a problem. Indeed, specific recommendations were commonly given to control drone populations justified by the principle, "drones don't produce honey." Well, without a good population of sexually mature adult drones, there is no reason for anyone to attempt queen production. Queens may mate with as many as 12-20 drones to acquire the semen needed for a lifetime of producing new bees. And they don't come from the same beeyard as your virgin queen. Remember that.

Having advised you of the need for abundant populations of drones, I must now tell you there is not a lot you can do at the hobby level to encourage drone populations. Don't needlessly kill or otherwise destroy drone comb and drone brood. Possibly, you could go to the effort to actually install some drone foundation to encourage drone production, but this is usually only done by commercial producers. For the most part, as a smalltime beekeeper, you will have to depend on the luck of having an adequate drone population in the area. It may be that such populations of drones will not be available in your area until later in spring or even early summer. If you are going to produce queens, you will need drones – lots of them. BC

For Further Reading

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Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684, Tew.1@osu.edu; www.oardc.ohio-state.edu/agnic/bee/; www.oardc.ohio-state.edu/beelab/

SWARM PREPERATION

Walt Wright

"The fact that you will find none of this information in your favorite reference book does not make it any less true."

In this edition of survival characteristics, the operational changes of the colony during the swarm season are described. There are discrete steps in the swarm preparation process. Satisfaction of each step prompts a change in operations to reach the next step in the process. The progression through the steps in order protects survival of the parent colony. You will see how this works as we wade through the description.

The fact that you will find none of this information in your favorite reference book does not make it any less true. If you look for the effects in your hive, you can confirm that the concepts are valid. Of course, it is easier to just reject the concepts because they are new to you.

Species survival by generation of the reproductive swarm is the basic objective of every over-wintered colony. The whole build-up period is dedicated to increasing the population to support division by the reproductive swarm. Division needs to occur in time for the offspring swarm to have a chance at getting itself established that season. The target issue period is about hardwood green-up or leaf-out. There is substantial forage availability after that point in the season. Most trees bloom in the period of leaf-out, and the smorgasbord of forage sources helps the fledgling swarm to establish itself in its new location.

If you think about the build-up being dedicated to reproduction, you will know that it is true. Re-supply of the existing colony could easily be accomplished with half the build up population. That is exactly what happens in the swarmed parent colony. They have no problem re-supplying Winter rations with half the work force; even less in the case of after swarms.

The first activity of the colony in quest of reproduction is brood nest expansion. In the early expansion period, the emphasis is on honey consumption to free up cells for more brood. Early foraging is primarily for brood-pollen and water. Water is preferred to thin honey for feed consistency. If water is not readily available they can use nectar. Those forage sources that they work for brood-pollen generally have ample nectar also. In my area, American elm and maple both have good nectar that the bees will gather if they have empty cells in the cluster. The well-provisioned colony has no need for the nectar from these sources under normal circumstances.

The starting of drone rearing about mid build up was mentioned as an operational change on the summary of year-long changes. However, drone rearing does not seem to be a prerequisite for completion of the swarm preparation requirements.

FIRST OPERATIONAL CHANGE – REDUCE BROOD VOLUME

The colony does not use all the over-Wintered, capped honey for brood nest expansion if they have a choice. In northern latitudes where bee literature originates, and they leave marginal stores for wintering, this survival trait is less conspicuous. In the Southeast, it is obvious. The colony saves a reserve to offset extended periods of non-flying weather or a forage dearth. They feed on incoming nectar and maintain the reserve through the swarm preparation season. In my area, the reserve is equivalent to somewhat less than a shallow super of capped honey. However, if the top box *is* a shallow of honey, the reserve will be more. The colony generally will open no honey in the shallow at the top, and have the additional honey in the outside frames of the brood chamber(s).

The colony decision to stop brood nest expansion at the reserve limit initiates a change in operations. They have generated the maximum population possible for stores available. They can now safely move into swarm preparations. The first action of swarm preparation is the reduction of brood nest size. They must reduce the brood nest size to a level that can be managed by half the population after swarm departure. They start at the top of the brood nest, filling brood cells with nectar as brood emerges. With brood of all ages in the expansion dome at the top, the brood nest reduction may take three weeks or more.

Though the population continues to increase, the population/stores balance is roughly maintained by adding nectar all the way. They are also maintaining the capped honey reserve through the brood nest reduction period.

You were told up front that the steps to swarm commit protected survival of the parent colony. The brood nest reduction, by accumulation of additional stores, is a major part of that picture. Protection of the capped honey reserve until woodland nectar approaches peak is also significant.

There is considerable variation between colonies in their judgment of how much brood nest reduction is enough. It will usually fall between a third and a half of the maximum brood nest size. A little 5th grade arithmetic might help make the point. A colony with ample overhead space will generally have a cluster that is 50% greater than the brood volume. Although not normally seen in a colony restricted to a double deep, it is easily seen

when space above is provided. The total cluster then is 150% of the brood volume. If the brood volume is reduced by a third, to 66%, and half the bees leave with the prime swarm, the remaining bees can easily protect the brood. Seventy-five percent of the bees left, and 75% stayed. The safety margin is the difference between the 75% *bee* volume and the 66% *brood* volume. The bees have a safety margin built into nearly all survival characteristics.

This nectar congestion (pollen when nectar is scarce) is advance notice of swarm intent. For the beekeeper to monitor for swarm cells puts him at a disadvantage. When swarm cells are started, the colony is committed to swarm, and changing their mind is more difficult. If you intend to head off swarming, it would make better sense to monitor for brood nest reduction. You would have three weeks lead time on colony commitment to swarm.

SECOND OPERATIONAL CHANGE – START SWARM CELLS

When the brood nest is sufficiently reduced, swarm queen cells are started. Swarm cell generation is normally about a two-week effort. The earliest cells are populated with eggs on cups already in place for some time. Those primary cells are given the best care and produce quality queens. Back up cells are generated into the brood nest interior and are not generally as large or as well cared for.

Both the brood nest reduction and the starting of queen swarm cells must precede the seasonal operational change timing of reproductive swarm *cut off*, which is fixed with the vegetative season advancement. The colony development is dependent on a multitude of variables; colony strength, forage availability, flight weather, etc. The colony that has not started swarm cells *before* the season cut off date cancels reproductive swarm ambition. The cancellation is sudden and total, no matter how close they are to populating a swarm cell. They may have already started adding additional cups for back up swarm cells. Close is not good enough. Other operational changes associated with reproductive cut off are discussed in the seasonal operations summary.

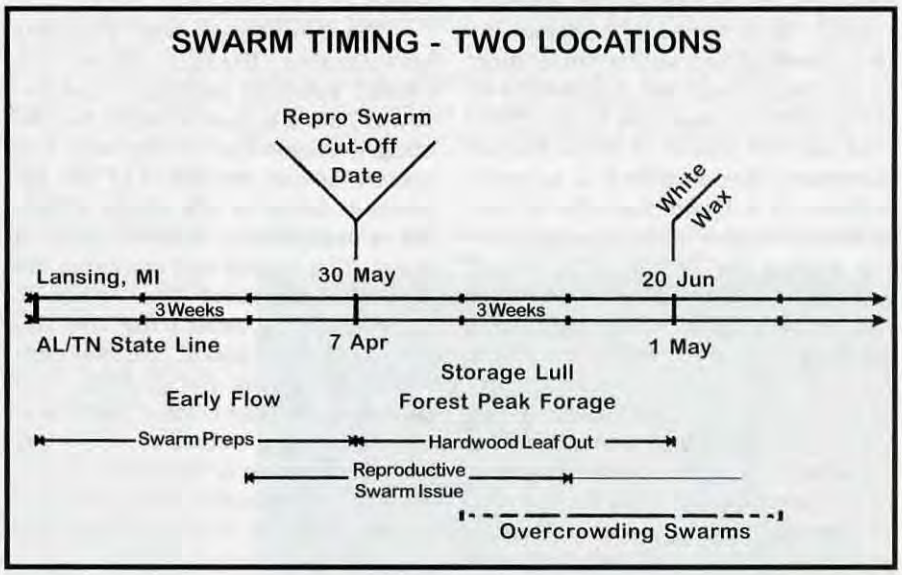
"If you intend to head off swarming, it would make better sense to monitor for brood nest reduction. You would have three weeks lead time on colony commitment to swarm."

SWARM ISSUE

There are several factors that influence the colony decision to put the swarm in the air. They must have replacement queens nearing emergence and backup queens for later in case the primary virgin is lost for any reason. In addition, they must assess weather conditions, and adjust the issue date to protect the swarm that is exposed after leaving. They have techniques for delaying the emergence of potential replacement queens, but those are only effective for a few days. The colony would rather not, but if forced to by conditions, they will issue the swarm in less than optimum weather.

Reproductive swarms can be issued either before or after reproductive swarm cut off timing. Reproductive cut off produces major operational changes in colony activities, but swarm issuance has minimal effect on operations. Wax makers generated during swarm preparation that do not leave with the swarm will deposit their wax holding in the first few days after swarm departure. Those wax makers will normally deposit their wax as bridging or burr comb in the brood nest. They purge their wax holdings to prepare for foraging. The colony will generate a new wave of wax makers for the main flow.

Some of these same words were used to describe wax maker purging at reproductive cut off. Although both groups of wax makers were generated to support comb building of the swarm after relocation, their purging is triggered by a different reason. They are two distinct, separate groups of wax makers whose timing is different, dependant on whether the colony abandons swarming at reproductive cut off or issues a swarm. The next time you see swarm cells in tear down, note the new wax deposits in the brood nest. It may not be white, but it is definitely new.



An abbreviated summary chart of Spring operations for two locations for which I have data is included, plotted against the calendar. The dates for these changes will vary with latitudes as we move north or south of the two locations. The spread between my location and Michigan is about seven weeks. To establish when reproductive swarm cut-off timing occurs at your location, count backward on your calendar a full worker brood cycle *preceding* the main flow. If we use Dr. Farrar's brood cycle of 24 days, that's

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SWARM ... Cont. From Pg. 39

a strong three weeks prior to the appearance of white wax at the start of the main flow.

The dates are approximations for both locations. Seasonal variations can move the key milestones either way by a week, or slightly more. The primary timing judgment is reproductive cut off. Other milestones on the chart slide forward or backward on the calendar with reproductive cut off. But, ***your best indication of seasonal timing is the appearance of white wax at the beginning of the main flow***. After a few seasons of logging white wax appearance dates, you can fairly well predict the date of reproductive cut off.

The reproductive swarm game plan is an orderly progression through steps to reproduction that protects survival of the parent colony. Both types of congestion, bee crowding and nectar congestion of the brood nest are *byproducts* of the process. *Congestion is an effect, and not the cause of reproductive swarming.* Bee crowding to support division is a basic objective of the process. Overcrowding does not occur during the swarm prep period because a limited number of bees can be generated from the honey used by the brood nest expansion for feed. The extra space in the reserve honey can easily absorb the build up population. And when the brood nest reduction is in progress, more space is generated each week. The space between combs is greater in brood combs because the cells are not as deep as capped honey. The space generated by brood nest reduction (nectar in brood cells) will absorb much more of the increasing population. And the number of new bees emerging is decreasing by virtue of brood nest reduction in size. If permitted to do it their way, overcrowding is not a problem in the swarm prep period.

The concentration of bees at the top of the cavity is actually an asset to the colony anticipating swarm. The swarm needs to leave the parent colony with substantial number of wax makers. We are told that wax makers need at least 100°F to have the wax glands secrete wax. The concentrated bees above the brood nest 90+° area can elevate temperature to the wax making range. (Bees can stand temperatures much higher than you might guess.)

The beekeeper who reverses hive bodies, literally turns the colony process controls upside-down. That's a good formula for creating overcrowded conditions. The reserve at the shoulders of the expansion dome of the upper chamber is sandwiched between areas of brood. The colony will consume the reserve and convert that space to brood volume, producing two full hive bodies of brood. Subsequent reversals amplify the problem. For each reversal, the colony starts over with brood nest reduction at the top. Periodic reversal is beneficial in preventing reproductive swarms but is contributing to overcrowding. The beekeeper who does not start adding space for the additional population with the first reversal is begging for overcrowding swarms.

The chart entry on overcrowding swarms is arbitrary. Overcrowding is the result of beekeeper management technique, and we would not presume to guess what that might be. If you have large swarms in the period of the start of the main flow, or later, you can bet that they are overcrowding swarms. Although increasing population of the colony is an advantage to the beekeeper from the honey production standpoint, it can be carried too far. When the colony is crowded to the point of affecting internal operations, and creating an overcrowding swarm, it becomes counter productive.

Overcrowding swarms are the result of another survival trait of honey bees. To protect survival of the existing colony (priority one) a swarm is generated to reduce an out-of-balance condition of excess population. That swarm is generated later in the growing season than the reproductive swarm and is expendable.

This abbreviated chart is included to show the relationship between the swarm season and the woodland seasonal development for two locations. A more complete chart of Spring colony internal operations will be provided in a later article. BC

Walt Wright is a sideline beekeeper and enthusiastic experimenter, who lives in Elkton, Tennessee.

NUCING In Canada

Terry Fehr

Nucing: to create nucleus bee colonies. This term I have always associated with spring management in the deep South, not Canada. But it is in south-central Manitoba from which I write to describe a method of Spring management that overcomes some of our most difficult management issues of the parkland belt of western Canada.

Nucleus colonies can take any number of forms, from "baby nucs" for simply mating queens to much larger units. Each has a situation best suited to its use. Both large and small operations can benefit from this management practice. My specific definition of a nucleus colony is one frame of brood (rarely two) and enough bees to cover the brood plus one additional frame. These bees are placed in a full depth Langstroth super with 10 frames and a queen cell. Each of these units has a restricted entrance and a mat over the top bars with a telescoping lid. Perhaps a large unit to be considered a "nuc" by some beekeepers, but a nucleus hive nonetheless.

Why make up these hives? It is considerable work that needs to be done in a timely manner, when other things must be done as well. There are sound economic reasons to make small colonies of bees when running a commercial honey production business. The first and most profound reason is brought to my attention each Winter when my colleagues ask me why I am selling bees. How am I able to have surplus colonies when they are having trouble maintaining their hive count? In a business that runs over 1000 colonies, a full one third of those are nucleus colonies made up each Spring. That gives me a 50% increase in hive count in June. Annual losses never come close to that, at least never thus far. I have surplus colonies each year to dispose of in some manner while still maintaining a hive count most profitable to the business. All losses have been replaced plus some.

Our goal as honey producers should be to replace queens at least every second year. Young queens lay more eggs, begin laying sooner in the Spring, and generally have stronger, healthier colonies. By having over one third of my colonies new each year and at least a few supercedures among the one and two year old queens my goal of 50% new queens is approached. I need never requeen hives to accomplish this goal or have to deal with looking for queens or have new queens rejected by a colony. The act of making nucs is all that is required to keep a high percentage of young queens in the business.

Creating larger numbers of nucleus colonies makes over wintering more successful. Young queens reduce Winter losses as fewer queens die during the Winter. Early Spring management is made easier with fewer "deadouts" to bring home and clean. A live wintered colony keeps our equipment in better condition than having dead bees and allowing mould to grow on our wax. Wintering success is more predictable and budgeting made easier now that a higher percentage of hives have younger queens. Generally a more efficient business is the result when running younger queens.

We are repeatedly told to replace brood comb as often as every three years. With bees continually occupying equipment, replacing comb is difficult. Moving centre combs to the outside and removing outside combs while placing new comb in the centre, can be done but involves considerable work. (I don't like extra work, unless it pays well) I find it easiest to cull comb

Old supers, now reconditioned. We are able to do this with a large hive rotation program.

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Brood chambers, cleaned, sorted, culled. Ready for bees.

Screened box to collect bees and brood in when nucing. Six frames of brood will fit in positions 1,3,4,6,7,9.

without bees to hinder my work. Each Autumn surplus bees are disposed of and the equipment brought home to be repaired, culled, and made ready for next Spring. Most centre frames of each new brood chamber are white comb or at least lighter wax. Lighter wax in the brood chamber reduces disease spores and viruses, while allowing larger cells for bee development. New comb is generally straighter, mostly drone free and efficiently used by our bees. A high turnover of brood chambers made possible by having surplus bees allows equipment to stay in top condition.

What type of system can a large number of nucs be integrated into to realize the benefits mentioned? Briefly, the first Summer the nucleus colonies are run as singles with a queen excluder and honey supers on top. These units are wintered indoors as singles for the first Winter then given a second brood chamber during the Spring. Their second Summer is a highly productive Summer as they are run without an excluder and allowed to produce maximum brood. This double brood chamber hive is left outside and wrapped for protection during their second Winter. Most colonies are eliminated at the end of their third Summer and the supers are brought into the honey house for inspection. The details of this system will be explored more closely but I want to point out how much time can be saved by working with nothing but clean equipment. When working doubles, no super will have been out more than three Summers and many only two Summers. Checking doubles is made quicker not having to wrestle with propolised frames and brace comb. All work in my yards is made more efficient by being able to rotate equipment into then out of the scrapping/inspection room.

Managing honey bees in the North brings different challenges than other areas of North America. One problem we continue to deal with is tracheal mite. Considerable anecdotal evidence suggests young queens have fewer tracheal mites. I have many years of sampling records to prove that point. Not until hives are one and a half years old do they have recordable levels of tracheal mites. Bee populations seem to be able to "outrun" mite populations for a while at least. Once colonies enter their second Autumn some hives begin to show low levels of mites but I generally have avoided treatment while others running conventional operations regularly treat for tracheal mites. It is also being observed that operations practicing a high level of nucing, in the North, may have fewer *Varroa* present. Brood cycles are being disrupted, and hygienic bees selected, perhaps another element in an integrated pest management strategy. We need to look closer at these observations to better determine how to use these techniques.

Now that the advantages have been established, how can large numbers of nucs be made with minimal

Metal queen excluders, cleaned, ready for nucs.

effort? Although considerable work, 60 new hives can comfortably be created per day taking a full week to make over 400 colonies (single beekeeper). Prior to actually starting set up of new hives, I raise cells for nine days. Time is at a premium on nucing days. By grafting for nine consecutive days, I eliminate having to graft and nuc on the same day. Most cells are in builders with the last graft in the starter before nucing commences. Grafting on consecutive days has the disadvantage of having all queens ready to mate in one nine day period. Great if the weather is good but awful should the skies close in, making queen flight impossible. That is a risk taken, usually it works out but not always.

Some preliminary work needs to be done before brood can be pulled from strong colonies. Honey bee eggs hatch in three days. If a laying queen is removed from comb, all eggs will have hatched and only larva present on the fourth day. Removing brood from a queenless brood chamber eliminates the job of finding queens. Placing a queen excluder between supers of double brood chamber colonies will isolate a queen to one super. If we place this excluder in a hive four days before brood is required, brood can be safely taken from the "eggless" super without interfering with the queen. This technique necessitates an additional trip into each beeyard to place excluders but saves enormous amounts of time overall. As I am only able to make a specific number of hives each day, placement of excluders is spaced out over a period of several days. Taking brood from hives with fourth day excluders is excellent as is working with fifth day excluders but beyond that becomes difficult. Hives with excluders placed in them six days and longer tend to have a super full of young brood with the "eggless" super only containing partial frames of emerging brood. Queens seem to move between supers slowly. Generally it is best to leave the excluder in only four or five days if possible, to make brood removal most efficient.

The tenth day after grafting commences is the first day of making new colonies. Brood collection boxes are simply a standard super with a fully screened bottom and two wooden runners under to provide air space under the screen. Rectangular sections are removed and screened on each end of these supers and nine frame spacers are nailed in each super. Spacers keep frames from sliding together Each super is painted white and a telescoping lid also white is used on top with a mat. Each holding box will hold only six frames of brood (positions 1,3,4,6,7,9 in the super), giving each of the six frames an open space beside to hold large amounts of bees. White is important as bees and brood in these boxes are crowded. Dark colours will promote overheating and potential bee losses. For the same reason, I carry a bottle of water to mist these bees and also keep full boxes of brood out of direct sunlight. A little more work but absolutely necessary.

Removing brood from large colonies with queen excluders placed in them four days earlier is easy. Split the double brood chamber colony in half, exposing the bottom super. Remove a frame from each super and look for eggs. Where there are no eggs, there is no queen. Remove frames of capped brood (one or two depending on strength) from the eggless super and shake several other frames of bees from the same super All of these bees go into our screened holding boxes. The colonies from which bees are taken must be left strong enough to produce a maximum crop. One full super of bees and brood with the queen will be left as well as part of a second super. The super having bees removed should be left on top and will have one or two new, empty combs, replacing brood frames just removed. This unit should have plenty of feed as we have just stolen a significant percentage of their field force. If done properly, the parent hive will never miss the bees removed and swarms will all but be eliminated. At the same time a large number of new hives can be started.

Boxes of brood are removed from the parent yard to a cool dark honey house to await cooler evening temperatures. My nucs must be set up during the last two hours of daylight at least two miles from their parent yard. I choose to use areas close to outdoor wintered colonies to set up new colonies. By doing this drones are close by and come from the outdoor wintered colonies. These have had at least two Winters to have Nature select the hardiest.

The rest of set-up is much like an assembly line. All lids, bottoms, brood chambers, etc... are loaded on my trailer with the bees and taken to a new yard. Bottoms are arranged in circles of six with entrances facing outward, then brood chambers are placed on these, entrances reduced, and lids scattered among the array of equipment. One box of bees is placed in the centre of each circle of brood chambers. These boxes of bees should be placed on top of a lid to make sure adequate air is available to the bees. Setting them on tall grass will effectively reduce air circulation through the bees. When I open the box, a little smoke, and a light mist of water over the entire box of bees calms them quickly, making transfer of the brood efficient.

To save time, I almost always have queen cells with me so that I need not return to this location until queens are mated and laying. Once all brood is placed into brood chambers, cells are placed on the side of the brood frame, one to a nuc. A mat is placed over and a telescoping lid on top. One person, well organized, can set up 60 of these nucs using this method in two hours, including setting out of all equipment. It does make a long day but given the potential rewards, absolutely necessary to maintain a healthy business.

Equipment in good repair, a high percentage of young queens, and an optimum number of productive hives, are but a few of the advantages of having an efficient hive replacement regime. There are many hive replacement methods depending on geography and climate but this particular routine has served me well for 12 years. Surprisingly there have been few changes in that time. A unique type of colony requires a unique style of management; my next article. BC

Terry Fehr operates about 1,000 colonies in Gladstone, Manitoba. He started with 14 colonies 20 years ago. Nucs are a profitable part of his business, and he's very good at it.

Tending Splits

By May splits have been made and getting those splits to full strength is a priority.

Jeff Ott

Springtime is always challenging for the Colorado beekeeper. One day the weather will be sunny and warm; the next, we'll get clobbered with snow with the temperature somewhere below freezing. This year was no exception. Over the weekend of March 15th, we had 60° days. The bees were flying. (In fact they flew at least once every week this winter I was finding drones during a quick inspection this past January!) Then the following Tuesday, it started to rain and Wednesday and Thursday it snowed... and snowed and snowed. We had more snow than in any one storm since 1913.

Why is this important now and what does it mean to you? Spring is arguably the most important time of year for the beekeeper. We need our colonies strong to maximize their ability to gather nectar to convert into honey, and pollen to feed the growing number of young bees. By May splits should have been made and nursing those splits to full strength in order to make a honey crop this season is a priority. How we get our colonies to this point is strongly impacted by the weather and these dynamic days of Spring.

For most of us, the last chance of a killing freeze is over by Mother's Day, and the serious business of building colonies really begins. First, let's review what you may have done up to this point and then we'll get you set up to make honey on those splits this Fall. Remember, there are as many right ways to do this as there are beekeepers. The methods I use work for me on the prairies of Colorado. They will work for you too, even if you have to make adjustments due to your local conditions.

A marked queen makes her easy to find and helps you determine her age. When you find her, make sure she looks healthy and strong. Is she laying? Does she look bigger than the other bees? All of these are important signs of a viable queen who will help you to a crop her first year in your beeyard.

Making Splits

We make splits in the Spring for several reasons. First, it is a way to increase your number of colonies without having to buy package bees. Second, it helps to reduce overcrowding of the donating colony thereby mitigating the risk of swarming later in the Spring, just as we are working to maximize colony strength.

To make splits, you need to have an empty hive body or a 5-frame nuc. If you use a hive body, you may want to use a follower board to help minimize colony heat loss on the cold nights. I prefer to use the 5-frame nuc as it is easier to handle, easier to move and provides a viable space for the new colony to maintain.

On a warm day, with only a little breeze or no wind at all take your nuc to the beeyard and open the donor colony. Since making splits is a very invasive procedure, many beekeepers will locate the queen and either put her in a queen-holder or place her in another section of her hive, such as the body the donor frames will not come from. This will help prevent her from getting harmed or killed, just as you need her to keep laying eggs.

Typically, a split is made from taking two to three frames of sealed brood and two to three frames of honey and pollen from the donor colony or colonies. The splits

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When you look at your nuc, make sure the hive looks healthy from the outside, even before you open it. Are the bees flying? Is the face of the nuc clean or is it spotted? Are bees bringing in pollen? While not definitive, these observations will give you insight to your colony's health even before you open it.

are then left queenless for two to three days. This is done to help insure the acceptance of the new queen. On the third day after the split is made, a new, young queen is introduced to the split in her queen cage. Several days after that, the new queen should have been released by the split and the young colony should be starting to equalize and grow.

I've heard beekeepers refer to a split as an artificial swarm. This is true in that the split parallels a reproduction swarm because you are reducing the number of bees in the donor colonies, but it lacks a fundamental element; the honey bee's willing preparation and participation.

A reproduction swarm is all geared up, ready to start a new colony and quickly build new comb. A swarm, having left just at the start of the major early Summer bloom has plenty of flowers available to fuel its growth. Your split on the other hand, was forced. The bees where not ready to rebuild and the process of making the split stressed them tremendously. You must make some effort if you want to make a crop from the split this Fall.

Use of a feeder with a nuc is very important while it establishes itself. Make sure that the sugar water does not sit too long and ferment. This will make the bees sick and stress them at a time you want them to be healthy and growing strong daily.

Monitoring Progress

I like splits and often take them to my home apiary where I can monitor their progress without having to make a journey to a beeyard. Generally, the splits are by definition small and non-aggressive. You can open them up without fearing a major uproar. Even if you live with nearby neighbors, they won't even be aware of your splits until you are ready to move them out.

By this time in May, your splits have accepted their adopted queens and she's been laying for nearly a full month. With that in mind, you should inspect the colony, and determine just how well the queen is laying and how well the colony is growing.

At this time of year the queen should be nearing her peak laying abilities. Conservatively and with the right conditions, such as available food, space, climate and general health, a queen will lay between 1,000 and 1,200 eggs a day. In the 30 days that have passed since the split was made and the queen released, she *could* have laid anywhere between 30,000 and 36,000 eggs. However considering she is just starting out, in less than ideal circumstances, don't expect to see that kind of growth!

In preparation for writing this article, I was considering counting the number of cells embedded into a sheet of wax foundation, then figuring how many cells in a typical brood frame. After a few moments, I decided there wasn't enough tequila in the house to help me through the task. Actually, knowing that number is really just trivia because it does not really reflect the real circumstances of a typical frame of brood. A frame is rarely full from sidebar to sidebar with perfect worker cells. Bees will gnaw away the bottom edge of the foundation, if not totally, then in part. Sometimes, the bees will make drone cells despite the foundation size. Plus, most brood frames are not packed with brood, but have the customary arrangement of honey and pollen packed along the edges and up in the corners of the frame.

When I am gauging the progress of the split, I know that the queen should have nearly a month of laying. So when I open the split, I should see fresh eggs, brood and capped brood. I should also see young bees crawling about; their downy coats easily identifying them. If I see a split that is missing these indicators, I immediately look for the queen. In a split, this should take all of a few seconds. If I cannot find her, I immediately know I have serious issues to overcome. If I do find her, I look to try to determine her health. Does she look clean? Is she larger, looking like a 'text book queen?' Is she active? If I suspect anything is wrong with her or if she is missing completely, I plan to take corrective action.

In most parts of the country, it would be difficult to try and requeen at this point and still get a crop of honey from the hive, unless you have queens immediately available to you. In most cases, in order to get that crop of honey and have the colony make it through the coming Winter, it is best to remove the failing queen and combine the split with another split or another colony.

I also look at the split's food supply. The queen

will not lay as much if food stores are in short supply. So I try and determine if the split is able to feed its young. If I have five frames in the split, I hope to see that there are at least two frames of honey and pollen. If the frames are empty of honey or look like it may be a possibility in the near future, I'll feed them. In addition to a sugar water mix, I'll even feed a pollen substitute.

I go through this process of inspections regularly to ensure the split's success. Next month, I'll be looking at adding frames to the split either by moving the follower board and adding frames or moving the nuc into a single deep hive. By then the evenings are not so cool as to threaten the growing colony.

What Else?

During these days, I also closely monitor my existing colonies for swarm preparations. I want to minimize the possibility of a colony's swarming by making sure they have room. On occasion I've even removed brood frames from a strong colony and replaced them with new frames of foundation. I'll also start to place empty supers on the colonies to give them space to expand. On the strong colonies that seem to bursting with bees even despite the splits I made, I'll make sure the honey supers have more frames of foundation than full frames.

I moved to Colorado from Ohio. Where I lived and kept bees, I never had to worry about aerial spraying of fields near my colonies. In Colorado, that is now a concern as many of the farmers spray their alfalfa and corn at various stages as it grows. This time of year, I contact the farmers near my yards to let them know I have bees near their fields. Most of the farmers know me from previous years, but I make sure they know I am still in business. It is a courtesy call with a jar of honey in hand. If I have a yard in a new location, it is important to scope out the surrounding fields to see what has been planted. I've worked way too hard to lose a bee yard to insecticide.

"By this time in May, your splits have accepted their adopted queens and she's been laying for nearly a full month."

In the past few years I've provided applicators even more information. I try and make their jobs easier by providing the farmer and the aerial applicator GPS coordinates of my beeyards. Many farmers in these parts farm with sophisticated GPS enabled software as do the applicators. This way, both the farmer and the aerial applicator have no confusion as to which corner of what field the yard is in. It eliminates any guessing on their behalf. They know the exact location of my bee yards and my cell phone number so they can contact me before they spray.

May is an exciting time. The flowers are coming on strong and colonies are building quickly to make the most of the coming June. The best we can do for established colonies is keep out of their way and give them the space to grow. They'll do the rest. It is a different story for the splits. They've been stressed by the operation and need our attention and care if they are to grow and provide a first year's crop of honey. BC

Jeff Ott is a sideline beekeeper and photographer living in Berthoud, CO.

UNCAPPING Honey Frames

In The South, It's Almost Time

Ann Harman

Every profession or hobby has its own vocabulary, jargon, if you will. Boat owners have "port" and "starboard," which mean "left" and "right." Golfers shout "fore" which means you are about to be bounced on the head by someone's errant golf ball. Beekeeping is no exception. We talk about "supers" which have nothing to do with comments on excellence or pleasure. Our "foundation" is not made of cement blocks.

We talk about the bees "capping" honey. Well, this makes some sense. Caps go on top of something – bottles and heads, for example. Then it comes time for those "cappings" to be removed. So what do we say? We "uncap" the honey with some sort of "uncapping tool." Well, I don't think Marie Antoinette's executioner said she was "uncapitated." "Decapitated" would have been the word of choice. But beekeepers do not decap honey.

Nevertheless, let's get down to the business of uncapping honey to get it ready for the extractor. No, it is not too early to look around for whatever tool you want to use. Remember your frantic search for a hive tool on that first warm day of Spring? Besides, this year you may wish to try out something new, either in an uncapping tool or in uncapping tanks.

Let's look through our collection of beekeeping equipment catalogs and see what is available. What? You prefer that old bread knife you used last year? The one your wife said was useless as a bread knife? I think you broke the knife blade on that sometime during the winter when you tried to dig out some drill bits you spilled behind your workbench.

It is true that you can use a long kitchen knife of some sort. But just using one knife is not going to be efficient. One problem is that you want to uncap warm honey, straight from the hive or a warm room, and the knife is cold. A cold knife drags its way through the cappings and honey, putting extra stress on your arm and wrist. Besides, the handle and blade are in a straight line. You will end up banging your knuckles on the frame or getting them awfully sticky as they plow through the honey that is being uncapped. Cold knife? Here you must make a decision – find a second knife in the kitchen drawer so one can be kept warm in a pot of hot water while the second, warmed knife is doing the uncapping. This venture has a built-in hazard – the moment when the chef finds TWO knives gone from the kitchen.

Look, the equipment catalogs have uncapping knives with nice offset handles and long enough to do the job with less strain on arm and wrist. Here we have some choices. You can indeed buy an unheated knife, but now we are back to the dilemma of a cold knife. You will need two unheated knives unless you wish to warm a single knife in a pot of hot water, uncap, then wait while you warm it up again. Now add up the price of two unheated knives and compare that price with that of an electrically-heated knife.

I agree that a thermostatically-controlled heated knife is expensive. And I agree that it has some inherent problems. One definite problem is that if you are a slow uncapper you will scorch honey. And scorched honey not only tastes terrible (much worse than burned toast) but you cannot remove that scorched taste. Honey that remains on the knife while you are putting the uncapped frame in the extractor and getting the next capped one out of the super will scorch and impart that flavor to the new capped frame. If you are delayed between frames, give the blade a quick wipe to remove the adhering honey.

Here is perhaps the biggest mistake beekeepers make with an electrically-heated knife: knocking the honey and cappings off the knife on the side of the bucket or uncapping tank. So many people uncap one side of a frame and "bang, bang," uncap and "bang, bang." After not too many "bang, bangs" the knife goes cold: The equipment supplier is blamed for a defective knife. A hot filament is very fragile and will break with too much of a shock. That is one reason why you

Three types of uncapping knives.

An uncapping plane.

Two buckets with a support stick.

A plastic uncapping tank with screen, valve and cover. Just add the stick.

can buy special light bulbs for drop lights. They are made with an especially strong filament inside. Treat your electrically-heated uncapping knife gently and it will last many years.

You can buy a steam-heated uncapping knife but you will have to have that equipment needed to produce steam and keep it controlled. A new version of the thermostatically-controlled electrically-heated knife is on the market. The regulator is very handy in the electrical cord that makes it much easier to adjust the temperature of the knife. If you are buying a heated knife this year, try one of these.

One simple way out of the problem of heated knives is to use a capping scratcher. Some beekeepers prefer this method of uncapping. It really is quick and easy, and keeps the honey cool – no chance of a scorched flavor. In fact, if you use a heated knife you will need to have a capping scratcher handy for any low places on the comb. You will have to learn just how deep to scratch so that you do not damage foundation if you are using wax. Scratching can indeed be faster than when using a knife. By the way, you can buy cheap, flimsy scratchers that break entirely too easily or you can buy a wonderful scratcher that won't break even if you stomp on it. Get the best.

Some of the equipment catalogs feature an uncapping plane. This is similar to a heated knife but is used with a slightly different action which some find easier on the arm and wrist. Before you purchase one, and they are expensive, try one out. Call around to your beekeeping friends and see who has a plane that you can try. It may be the perfect uncapping tool for you. If you use shallows for honey, the plane will uncap one side completely. If you are using mediums (Illinois) or deeps for honey then you will have to make more passes with the plane. See if you really want to do this.

Are you ready to move up to a mechanical uncapper because you now have many hives and many, many supers, or wrist and arm trouble, or maybe even lots of money from last year's harvest? Here again you have choices. Basically there is the chain uncapper which has very loose, flexible chains that flail the cappings off. This is a popular type. But then there are those beekeepers who prefer the vibrating knife blade type. Since a mechanical uncapper represents quite an investment, you need to do a bit of research into which type suits your particular operation. Search out owners of each type. Look at them; see them in operation; ask questions of the beekeeper owner. Only then make your decision. Right now you have some time to investigate before harvest.

Suppose this is your first year of honey harvest. How do you want to uncap? Go visit several beekeepers and try out whatever tool they are using. Listen to their comments but base your decision on what feels comfortable for you. After all beginners start with a hive or two then progress to more and more. You will want to start with something easy and simple before you progress to fancy equipment.

Uncapping is a technique that must be practiced whether you are using just any old kitchen knife or the latest automatic, mechanical uncapper. One decision you will have to make, if you are using a knife, is whether you will be an "upcutter" or a "downcutter." This refers to the direction you are going to uncap when you are using a knife. Each has its staunch supporters. Actually since the frame should be tilted so that the cappings fall into the uncapping tank, the answer to the question just depends on what seems the most comfortable to you. And listen politely to those who cut the opposite direction from what you have chosen.

Now that your uncapping tool has been selected, what are you going to uncap into? Keep in mind that you are cutting off a mixture of perfectly good honey and some quantity of beautiful wax. Some of the honey is going to drain out of the wax and will have to be removed, strained and put into containers.

Continued on Next Page

UNCAPPING ... Cont. From Pg. 49

Since we have been talking about comfort for this uncapping task, if you do not use a mechanical uncapper, you will want your uncapping tank to be at a suitable height for you. Take a little time to do that and your honey harvest will be pleasant instead of backbreaking.

For those of you with just a few hives, a simple uncapping container is a 5-gallon plastic bucket with a gate. Now you need to make a support for the frame. Simple. All you need are four 8-penny nails and one 12-penny nail, all galvanized, plus a stout, clean piece of wood. This piece of wood has to be long enough to sit across the top of the bucket. A piece of clean pine about 1-1/2 by 1-1/2 inch will do fine. Sit the stick about 1/3 of the way across the top of the bucket. Two 8-penny nails will be pounded into one end of the stick so that they straddle the side of the bucket. The other two will be put near the other end in the same manner. Thus the stick now cannot move. The bigger nail will be pounded in the stick in the opposite direction, sticking up, in the middle of the distance between the sides of the bucket. It takes much longer to explain than to make. The bigger nail is the support for the end bar of the frame. The cappings can fall into a coarse strainer made of netting set across the top of your pail and will drain fairly clean honey into the bucket. The wet cappings can be gathered and cleaned further and the honey in the bucket can now be strained through some fine nylon cloth.

The equipment catalogs have some wonderful sturdy, plastic uncapping tanks suitable for the hobbyist beekeeper. There is a support for the frame and two tanks, one above the other, with strainer so the cappings can drain honey into the bottom tank. These tanks are definitely worth the price in convenience. You will need to construct a stand for this type of tank but that is easy for a beekeeper to do. Larger, stainless steel uncapping tanks are available for those with many hives.

Now we enter the area of some specialized equipment, such as a cappings spinner. This is basically a frame sized basket unit that fits into a small extractor. Cappings are dumped in the basket and honey is spun out and strained. Cappings then can be cleaned further A capping melter is handy for those with a larger number of colonies. Cappings can also be put into a solar wax melter. With any of the melters care must be taken not to overheat the honey. In any case, overheated honey can be fed back to the bees if it is not from a diseased colony.

Now is the time to get out your collection of equipment catalogs and decide just how you are going to open up those cells full of honey for your sweet harvest. BC

Ann teaches how to take it all off, and more, from her home in Flint Hill, VA.

?DO YOU KNOW?

Weather Patterns

Clarence Collison
Mississippi State University

Colony development and productivity are indirectly related to local weather patterns as well as major and minor floral sources in the immediate area of the apiary. Major honey flows depend on a few plant species which yield nectar abundantly and are readily available. Large acreages of flowers are needed to produce surplus honey. Besides the two or three main annual floral sources, there should be a great variety of minor plants yielding both nectar and pollen throughout the season to support the colonies between the main flows.

Please take a few minutes and answer the following questions to determine how well you understand the factors that impact floral sources, nectar and pollen supplies, and the bees behavior in collecting available nectar and pollen.

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

1. ____ The general chronological order for pollen availability in plants of north temperate regions is: trees in early Spring, shrubs in late Spring and herbaceous species in the Summer.
2. ____ Nectar guides are normally associated with flower petals.
3. ____ Many nectaries are able to reabsorb nectar supplies not collected by pollinators.
4. ____ Both male and female flowers produce nectar and pollen.
5. ____ Pollen grains carry the female reproductive cells of plants.
6. ____ Nectar guides occur in most floral sources.
7. ____ Nectaries are centers of intense metabolic activity.
8. ____ Nectar secretion is affected by soil conditions such as fertility, moisture, and acidity.
9. ____ Fresh pollen has a greater nutritional value than stored or dried pollen.

(Multiple Choice Questions, 1 point each)

10. ____ Enzyme associated with the ripening of nectar.
    A. Glucase
    B. Sucrase (Invertase)
    C. Fructase
    D. Maltase
    E. Ribase
11. ____ The environmental factor that has the greatest impact on nectar secretion is:
    A. Temperature
    B. Wind Speed
    C. Soil Moisture
    D. Relative Humidity
    E. Solar Radiation or Sunlight
12. ____ Pollen pellets collected from the floral source fireweed are:
    A. Yellow
    B. Purple
    C. Pink
    D. Tan
    E. White
13. ____ The environmental factor that has the greatest effect on the sugar concentration of nectar after it is secreted.
    A. Temperature
    B. Solar Radiation or Sunlight
    C. Soil Moisture
    D. Relative Humidity
    E. Wind Speed
14. Describe the effect pollination and fertilization has on nectar secretion. (1 point).

Listed below are several floral sources visited by honey bees. Please indicate whether these floral sources provide honey bees with nectar, pollen or both. (5 points)

A) Nectar source only
B) Pollen source only
C) Source of nectar and pollen

15. ____ Skunk Cabbage (*Symplocarpus foetidus*)
16. ____ Oak (*Quercus* spp.)
17. ____ Apple (*Malus* spp.)
18. ____ Elm (*Ulmus* spp.)
19. ____ Blackberry (*Rubus* spp.)

20. Minor components of nectar are responsible for giving honey from a particular floral source a distinctive aroma and flavor. Name two of these minor components (2 points)
21. Give two sources of non-floral honeys. (2 points)
22. Sucrose, the predominant sugar found in many nectar sources, is a disaccharide or 12 carbon sugar, that becomes _____ and _____ during the ripening of nectar into honey. (2 points)

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **True** Pollen availability in plants of the north temperate regions follows the general chronological order of: trees in early Spring, shrubs in late Spring and herbaceous species in the Summer.
2. **True** Nectar guides are lines or spots on the petals of flowers which are used by honey bees and other flower-visiting insects. The purpose of these guides is to lead the visitor to the entrance of the nectary or pool of nectar. Nectar guides may be in the form of lines converging on the center of the flower, where the nectar is usually to be found, or spots or blotches around the center or a combination of the two.
3. **True** All living processes that occur in plants i.e., growth, respiration, flowering, reproduction, etc. depend on the sugars produced through photosynthesis for energy. Uncollected nectar is usually reabsorbed by the nectary tissue and distributed primarily to growing parts of the plant, such as leaves, flowers, pollen, roots, or flowers that develop at a later time.
4. **False** While both male and female flowers usually produce nectar, only male flowers produce pollen.
5. **False** Pollen is the male germplasm of plants. Each pollen grain contains a vegetative nucleus which controls the growth of the pollen tube and two nuclei which are the male sex cells. One of these sex cells will join with and fertilize the egg nucleus in the ovary of the flower.
6. **True** Nectar guides occur in most flowers. In many flowers these guides are invisible to the human eye, but can be seen by the bees as the lines reflect ultraviolet light, which is visible to bees. Not only are these lines visible, but in many, probably the majority of, the guides are composed of lines or patches of tissue which has a different scent from that of the tissue of the rest of the corolla, and bees can use their antennae to follow these guides.
7. **True** Early scientists believed that nectar was simply an 'excretion' of the plant and the nectary was often described as a valve for the release of excess pressure. Nectar secretion, however, appears from the evidence of several studies to be an "active" process, requiring energy built up in respiration and released by the hydrolysis of ATP. Thus nectar secretion is dependent upon the metabolism of the nectary.
8. **True** Soil characteristics such as fertility, moisture, and acidity affect nectar secretion by regulating the growth of the plant. The influence of soil fertility and pH is complex. Excessive vegetative growth promoted by an overabundance of nitrogen is detrimental to nectar production. The effects of potassium and phosphorus are more difficult to interpret. Adequate soil moisture for plant growth is also a necessity.
9. **True** Several researchers have shown that the nutritional value of pollen decreases upon storage. Fresh pollen is 100% effective in stimulating the development of hypopharyngeal glands in worker bees. In comparison, one-year-old pollen had a 76% decrease in effectiveness and two-year-old pollen did not cause initiation of brood food gland development. Growth and increase in nitrogen content of bees fed fresh pollen is superior to that of stored pollen.
10. B) Sucrase (Invertase)
11. E) Solar Radiation or Sunlight
12. B) Purple
13. D) Relative Humidity or possibly E) Wind Speed
14. In the context of plant reproduction, nectar secretion ceases to be of any consequence once pollination and fertilization has been achieved and the energy and carbohydrates associated with nectar secretion are directed to other uses. Unvisited flowers secrete nectar longer and produce more nectar than those being visited and pollinated.
15. B) Pollen source only
16. B) Pollen source only
17. C) Source of nectar and pollen
18. C) Source of nectar and pollen
19. C) Source of nectar and pollen
20. Organic Acids, Mineral Salts, Volatile Oils, Proteins, Enzymes, Pigments, Alkaloids, Pollen, Amino Acids
21. Non-floral honeys are derived from extra-floral nectaries and honeydew.
22. Glucose, Fructose

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

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

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

Look for Clarence's book, What Do You Know? *Thousands of questions, and answers, due out this Fall.*

My Honey Stand

Richard Taylor

The Summer draws to an end, and with it, one of my great joys – operating my honey stand. It's been going, every Summer, for over 30 years. Arthritis forced me to give up my bees a couple of years ago, so now my stand is supplied by a couple of first rate beekeepers. So at least I still have the joy of having the honey stand which has, over the years, gained a certain fame.

There's very little work to it. My strong sons, 14 and 16, help me put up the road signs, lots of them, up and down the highway, in the Spring, and then it is just a matter of having people patronize it until the signs come down in the Fall.

The stand is run on the honor system. I seldom meet the people who stop. And this is a large part of the satisfaction I get from it – trusting my fellow human beings, and finding them honoring the trust. There is almost never a discrepancy between what should be on the shelves and what should be in the cash box, labeled "HONOR BOX." Sometimes I go out and find $30 or $40 in the box, and precisely that amount of honey gone from the shelves.

How come that works so well? It is because I learned, long ago, that what is most precious to everyone is the sense of self worth, and that is what I appeal to. A fairly large sign there reads "Thou shalt not steal." There is a notice, at eye level, which reads:

Last year, of the hundreds of people who visited my stand, only two were thieves, who took advantage of my trust in them to steal from me, my wife, and my children. Thank God that you are not that kind of person.

And this year there has been only one significant discrepancy, which might have been a simple error. Sometimes, indeed, perfect strangers leave extra payment, in appreciation.

I leave note paper there, originally so that customers could do their addition, but instead, the inside of the stand quickly becomes plastered with nice notes. (I supply a box of thumb tacks.) Here are a couple recently added:

We didn't believe our eyes when we saw your stand! You are so rare, in this crazy world! Thank you for making us feel better about our fellow man. – Toronto

Thank God I found this stand again! I am a singer and your honey is such a life saver.

Continued on Next Page

The Thief

He turned off his motor and got out quietly at the unattended honey stand, then took a long time deciding what to purchase. Reassured that no one was watching, he opened his car trunk, silently, and put in several jars of honey. Still apparently safe from detection, he got out his wallet and appeared to put payment into the cash box – and that is when I appeared before him. The discrepancy between the contents of the box and that of the shelves was instantly apparent. I said nothing as sweat appeared on his face and he nervouslyand clumsily got into his car and drove off. I had neither challended nor reproved him, nor did I call the State Police. My feeling was less of resentment than pity.

I lost a few dollars. The thief lost his basic sense of human decency. This happened in 1972, and I remember it still. SO DOES HE, and he will carry that memory to his grave.

So has he been punished? Yes, overwhelmingly. His punishment is to be, and forever know that he is, that kind of human being. Thank God, that you are not.

HONEY ... Cont. From Pg. 53

Those are fairly typical, especially from people from large cities driving through. But one note I found recently said that the bright spot of every Summer is finding my stand open again.

There's a little rack off to the side, labeled "TAKE ONE," in which are supplied copies of a little true story I wrote a few years ago. The story is entitlted "The Thief," and appears on the previous page.

My little honey stand obviously makes people feel very good, and I am rewarded with an abundance of pleasant memories.

Decades ago I was driving along and noticed a little well-made shelter that a father had made for his children, to protect them from cold and rain while they waited for the school bus. The children, I learned, had grown up, and there sat the shelter, no longer of any use. I asked the owner if he wanted to sell it. "How much?" he asked. "Oh, five or 10 dollars," I replied. "Give me 10 bucks," he said, and I loaded the little structure onto my pickup then and there and drove it home. All it needed was a coat of paint and a couple of shelves. That has got to be about the best purchase I ever made.

It had not occurred to me until a year or two earlier that a roadside stand would be a good outlet. A kid across the street put out a card table to sell the extra produce from their garden, and I give him a couple of comb honey sections to sell. They were gone in no time, and the next Summer some people came to my house looking for honey. That's when it dawned on me. A very crude stand, resting on saw horses, served me for a couple of years, until I ran across that little bus shelter.

I guess my stand has a charm of its own. I love it, and others obviously do to. By August it is covered with morning glories while the inside gets covered with little notes.

The day will come, of course, when I'll have to give it up. I'm 83 years old. But I've been showered with blessings, and I don't think I'll run out of them for awhile. **BC**

COMB ... Cont. From Pg. 29

not nearly as popular. Assuming the beginner also uses deeps, adding shallow supers and the related frames may mean having three sizes on hand, rather than two. However, using the 6-¼" frames for comb honey will result in considerable waste because the standard containers are only 4" square. All things considered, my recommendation is that cut comb honey be produced in the 5-3/8" frames designed for this purpose. These fit into 5-¾" supers.

The 5-3/8" frames can be purchased with either regular wedge top bars, or with a slotted top bar. Unfortunately, I believe the slotted top bar frames are only available from two companies, Kelley (800.233.2899) or Rossman (800.333.7677). However, they are far superior to the wedge top frames when producing cut comb honey and I suggest they be used if at all possible. Regardless of their level of expertise, one of the beekeeper's greatest challenges in producing cut comb honey is to fasten the foundation in the frame so it will not sag or otherwise come loose before it is drawn. If wedge top frames are used, the beekeeper must hammer several nails through the slim wedge and into the frame proper without damaging the foundation. This is no easy task. Then, seemingly regardless of how many nails are used, some foundation will still drop out of the wedge. Usually the bees still draw this, but fasten it to adjacent combs as if it were brace comb. The result is that two potential frames of comb honey are ruined.

Nonetheless, if you decide to use wedge top frames be certain to use at least five nails in the wedge with one nail no more than one inch from each end. Moreover, if you are using wedges that have been used before be certain to not use the same nail holes, as nails in such holes have far lower holding ability than nails in new holes.

If slotted top bar frames are used, push the foundation through and at least ¼" above the slot, and then fold the excess over so it lies on top of the bar. Do not worry if this results in the foundation not extending to the bottom bar. I fold over 3/8" to ½" of foundation so it never reaches the bottom bar, but the bees invariably make cells all the way to the bottom bar and fasten them securely. It is a little tricky to get the foundation into slotted top bar frames, but a simple jig is easy to make, and is illustrated in the accompanying photo. Be certain you ask your frame supplier to send you directions to make this jig, or contact me at Lloyd@RossRounds.com.

Once your frames are assembled, they can be reused almost indefinitely so it is not fair to count that time for comparison with the time required for round sections. However, the wood frames need to be annually cleaned which is a tedious job. We produce a great deal of cut-comb honey and it takes us about 20 minutes a super to clean the frames and insert new foundation.

If you follow this advice, after dandelion flow you will have hives with brood in at least two and perhaps three boxes. This helps immeasurably in swarm control, but to produce comb honey easily the ideal brood nest will be confined to a deep and needs to not exceed a deep plus a medium. The next article will discuss how to easily reduce the size of the brood nest, how to avoid having the queen ruin your comb honey by laying eggs in the supers, and manipulation to get full supers of perfect white combs. Finally, we will discuss how to package your final product so it shows to its best advantage.

Lloyd Spear owns and operates Ross Rounds Equipment Company, and is a sideline beekeeper

Past Pieces

Smoking Bees With Bellows

Wyatt Mangum

Once an old beekeeper told me how he helped his father rob their bees when he was a boy. While his father lifted the heavy supers, he blew smoke on them from smoldering corncobs. What an unenviable, hyperventilating job. Surrounded by a cloud of smoke and bees, and with all the blowing, he soon became dizzy and probably nauseated too. Although it wasn't a pleasant introduction to beekeeping, that experience is now remembered fondly and with humor. Since his father didn't have a regular smoker, the son became the smoker, a kind of human smoker, bellows and all. Well, as long as he could stand it.

Using bellows to avoid the anguish of blowing smoke with mere lungpower was a good idea, but early designs were not very practical. In 1861 J. S. Harbison, a then prominent California beekeeper published the now exceptionally rare book, *The Bee-keeper's Directory*. It's an extensive text, 438 pages in all, with everything from bee management, a topic we would expect, to the most unexpected. Harbison even included a detailed account of how he moved colonies from New York to California by steamship, even naming the ships and their captains. The book also shows a kind of smoker (see Figure 1). The end of a metal tube was attached to one side (the wooden board) of a set of bellows. The tube, loaded with smoldering cotton, supplied the smoke. Upon pumping the bellows, smoke left the tube and actually went inside the bellows, then out its nozzle. By today's standards, it's quite a strange contraption. Also to find that picture in the book, one must be careful and not be misled by modern terminology. Merely searching Harbison's index under smoker, or even bee smoker, is useless, because back then he called his device a fumigator.

From the old European bee literature, we also find pictures of beekeepers using a large set of bellows to provide the draft for smoking bees. (For examples see the book *The World History of Beekeeping and Honey Hunting*, by Eva Crane.) The nozzle of the bellows was attached to a cylindrical can that held the fire. It took two hands to operate the device, and thus slowed the bee work.

Interestingly at antique shows, I have had several chances to buy similar looking devices. The owners claimed they must have been used for smoking bees, but that's not necessarily true. In America, such devices were also used to smoke animals out of holes. One even had the emblem of a fur company on it. While they could be used to smoke bees, the evidence suggests they were essentially designed for other uses. In my antique buying experience, it pays to be wary of not only outright duplicity, but also wishful thinking and faulty logic.

The pivotal year in the evolution of the smoker came in 1873,

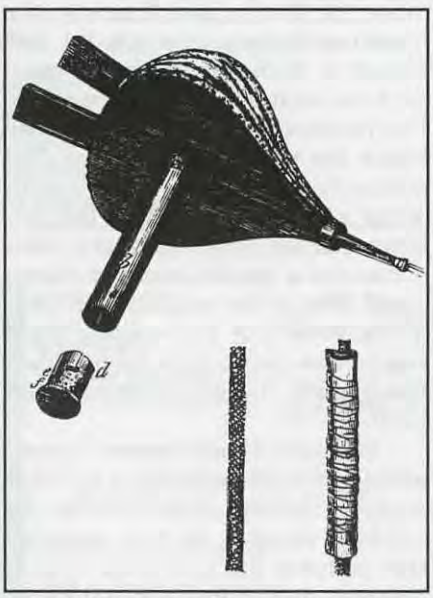

Figure 1: A smoker used by J.S. Harbison. At the lower right is a coil of wire with cotton around it that is used for fuel.

Figure 2: Two Quinby smokers (in the foreground). The left one is an original as sold by Quinby. The right one is the version sold by Quinby's son-in-law, L.C. Root. Note how the funnels point straight up. Surrounding them are copycat smokers, though some improved on the Quinby's original design.

Figure 3: Bingham smokers in various styles and sizes. Note the deflectors on the ends of some of the funnels to redirect the smoke.

Figure 4: A Clark cold-blast smoker. The fire resided in the wide part of the cone. Fuel was added through a sliding door at the rear (the base of the cone), and the smoke left from the small end of the cone. Near the small end, note the air tube and its curved angle between the bellows and the firebox. The tube let the air flow around the fire.

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when Moses Quinby of St. Johnsville, New York turned his attention to making a better device for smoking bees. He attached a small set of bellows to the side of a small cylindrical can that held the fire, usually called the firebox. His smoker began to resemble the modern form, though the funnel pointed straight up. To me, this placement of the bellows was simple yet highly innovative, a practical and profound idea destined to change beekeeping forever. Furthermore his smoker, light in weight, could be picked up and operated with one hand, and the funnel directed the smoke right where it was needed. Yet particularly among Quinby's earliest smokers (like the left one in the Figure 2 photo), the fire died prematurely. Always inventive in his long beekeeping experience, Quinby would have made improvements to his smoker, but in the spring of 1875, he died suddenly. So it was left to others to make further improvements and refinements on Quinby's original design.

Mr. Quinby's son-in-law Lyman C. Root of Mohawk, New York, modified the smoker and sold it for several years. (L. C. Root had no family relations to the Roots of Medina, Ohio). The smoker on the right in Figure 2 shows a version sold by L. C. Root, a smoker still bearing the Quinby name. By the way, when it comes to collecting smokers, some people believe that if the funnel points straight up, it must be a Quinby smoker. Figure 2 shows that's not true, because other people copied his design. In future articles, we will study Quinby smokers in detail, learning how to distinguish them from other smokers.

Among the early smoker manufacturers, Tracy F Bingham of Abronia, Michigan sold thousands of his famous Bingham smokers. He dominated the smoker market for many years, and made additional improvements along the way. Some of the Bingham smokers even had a small piece of metal on the funnel to deflect the smoke to the side for more convenient use (see Figure 3). Bingham smokers and, for the most part, Quinby smokers were constructed like modern smokers where the bellows forced the air through

Figure 5: A sample of hard-to-find smokers. The left one that looks like it has no funnel is a Danzenbaker smoker. The middle one with the odd crook in the funnel is a Corniel smoker. The smoker with the funnel pointing up is a Kretchmer smoker.

the fire. The resulting hot smoke earned them the name hot-blast smokers.

Some beekeepers felt a hot blast of smoke irritated the bees. So a few years after Quinby's invention, another type of smoker appeared based on the cold-blast principle. In 1879 the cold-blast principle was invented by Norman Clark of Sterling, Illinois and J. G. Corey of Santa Paula, California, both working independently of each other. Among the cold-blast smokers (there were a few others in addition to Clark's and Corey's), the most popular one was Clark's (see Figure 4). With this smoker, a small air tube went from the bellows, into the firebox, and ended close to where the smoke left the cone. The critical feature here is that the path of the air was not through the fire. When the air blew out of the tube, it created a partial vacuum in the small end of the smoker and passively drew out the smoke. That smoke was cooler than its hot-blast counterpart, hence the name cold-blast.

While the Clark smoker enjoyed widespread use, starting a fire in it could be difficult. Since the air did not blow through the fire, pumping the bellows did not help much. Though I don't date back to the time of the Clark smoker's heyday, I have used them on several occasions, and I definitely agree with the difficulty in getting the fire started. However once the fire is going, it works quite well. In a future article, we'll take a closer look at the Clark smoker, and even fire one up and use it. In another upcoming article, we'll also see how a smoker can be both a hot-blast for lighting and a cold-blast for smoking the bees. It's a clever piece of bee-smoker engineering.

In later years other smokers appeared on the market. Some smokers, produced in large numbers, were available for a considerable amount of time, perhaps 10 years or so. Other models were not so fortunate and had a limited production for just a few years (see Figure 5). Yet eventually time caught up with all of them. Their production stopped as interest turned to other designs resembling the modern smoker we use today.

Although bee supply companies offered many types of smokers over the years, some beekeepers preferred making their own. Since a particular beekeeper made one or perhaps a few of these smokers, almost by definition, they are unique pieces of beekeeping history. Homemade smokers sometimes yield intriguing surprises, reflecting the ways their owners wanted to control the bees. One early smoker in my collection even has the firebox and funnel made entirely of wood. Yikes! Isn't that a bad mistake? Or did that beekeeper have a reasonable plan? In another upcoming article on homemade smokers, we will learn more about this curious device and others.

In this article we've just seen a brief synopsis, a mere snapshot, of the smoker's history. Yet we've set the stage for a more extensive journey deep into a far richer history of the smoker, a history more compelling than most people imagine. We have also seen, scattered about in this article, engaging comments and questions, that will be made clear in the coming months. It took me years to find some of those answers as I patiently read countless pages in beekeeping books, journals, and supply catalogs, and compared that information with the smokers in my collection.

In the next article, our extensive journey begins, as it should, with Moses Quinby, inventor of the bee smoker. BC

Acknowledgments

The author thanks Suzanne Sumner for her comments on the manuscript.

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GLEANINGS

MAY, 2003 • ALL THE NEWS THAT FITS

Obituary

HOMER PARK

Homer E. Park was born January 15, 1915 in Palo Cedro and died March 5, 2003, at the age of 88. In passing he leaves his wife, Lois, of 62 years, daughters Reimer of McKague, Saskatchewan; Cleta Dieken of Vegreville, Alberta; and Glenda Wooten of Palo Cedro; son, Steve Park of Palo Cedro sister, Bernice Asher of Shingletown; brother, Don of Stevensville, MT, 10 grandchildren and four great-grandchildren.

Homer started commercial beekeeping in 1942, bought a honey production outfit in Dawson Creek, British Columbia, Canada in 1955 running 4,000 hives. In 1956, he and nephew, Bob Asher, bought a 1,000 hive business in Brooks, Alberta, Canada selling it in 1973. Homer sold the Dawson Creek business in 1988. Homer sold his Palo Cedro business in 1998.

One of Homer's goals was to streamline things to produce more, in a given period of time. Homer's first innovation was in the transportation of bees. When, as a young boy, he would try to haul swarms in a gunny sack by horseback, the bees buzzing made the old white mare nervous and Homer would get bucked off. Problem solved, putting cotton in the horse's ears.

Homer was instrumental in getting people started in the bee business. J. Park Bee Farms, Tollett Apiaries, Steve Park Apiaries, Wooten's Golden Queens, Woolf Apiaries, Joe Wright Apiaries, Stayer Quality Queens and many more were influenced. Besides shipping queens throughout the U.S. and Canada, Homer has shipped queens to Europe, Brazil, Argentina, Israel, Venezuela, Iran, New Zealand, and Australia. His biggest thrill was the year he shipped out 94,000 queen bees.

Homer was a real teacher. He loved to talk bees with beekeepers as much as with people who wanted to know about bees. Homer could remove the hive lid, look and listen and tell if there was something wrong with the bees. He was in his own right a Honey Bee Whisperer.

MANUKA HONEY HARVEST

Natural health products producer Comvita collected about 12 tons of manuka honey through a sharecropping deal with a North island Maori group.

Comvita collected the honey from 300 hives supplied to native New Zealanders at no cost to gain access to manuka honey from thousands of acres of bush on the east coast of the North Island.

Comvita operations manager Chris Elmsly said the yield of about 40 kilograms of honey from each hive was a good start. He said tests would be conducted to determine if the honey contained the "unique manuka factor" the special antibacterial property unique to some manuka honey.

The company said the good start to the project meant the company might be able to duplicate the sharecropping arrangement with Maori groups in other Manuka areas.

USDA NEWS

ARS SCIENTIST AWARDED – Research entomologist Jay D. Evans' studies of genes that influence honey bee development, pest resistance, and other traits have led to his being named an "Outstanding Early Career Scientist of 2002" by the Agricultural Research Service (ARS), the chief scientific research agency of the U.S. Department of Agriculture.

Evans joined ARS' Bee Research Laboratory at Beltsville in September 1998, and promptly assembled a state-of-the-art molecular research facility.

Evans quickly authored or co-authored 12 manuscripts, including a paper in the Proceedings of the National Academy of Sciences that examined the interplay of the hive environment and genes in determining whether honey bee larvae become queens or workers.

Using molecular phylogenetics, Evans and colleagues established South Africa as the original source of U.S. introductions of the small hive beetle.

Evans also devised new DNA sequencing techniques to identify markers tied to antibiotic resistance in the bacterium Paenibaccillus larvae, which causes American foulbrood disease. Use of such markers suggests the bee pathogen's antibiotic resistance didn't happen at one geographic location, but independently at different apiaries across the country.

Evans' lab also is finishing up work to sequence DNA in the *Varroa* mite so that the *Varroa's* taxonomic status can be clarified. and, to develop genetic markers that could be used to track the *Varroa's* migration patterns, check for re-introductions of the parasite, or screen mite populations for pesticide resistance.

Evans earned his B.A. at Princeton and his Ph.D. in biology at the University of Utah in 1995. He was a postdoctoral fellow at the University of Georgia's Department of Entomology from 1996 to 1997, and a postdoctoral research associate at the University of Arizona.

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BETTER DIET – A new, improved honey bee diet developed by Agricultural Research Service scientists could provide bees with an early spring jump start as they prepare to pollinate the annual $1-billion California almond crop, with over a million colonies.

To stimulate colonies and prepare them for almond pollination, beekeepers now use patties made of corn syrup, soy flour and brewer's yeast (and other nutrients). But placement of the patties is labor intensive and costly.

Entomologist Gloria DeGrandi-Hoffman, a specialist in honey bee research at the Tucson Bee Lab and Allen C. Cohen, a pioneer in developing artificial diets for insects, worked with California orchardists last year to develop an improved honey bee diet.

The two scientists developed a recipe for an artificial diet that would give honey bees the whole package of nutrients that they need in an easy-to-feed liquid. It combines the sweetness of nectar and the nutritional punch of pollen in a formula that honey bees can digest. Nectar is rich in carbohydrates, and pollen is packed with protein, vitamins, minerals and fats—all essential for bees' development and survival. A machine already used by beekeepers could easily pump the bee food into the hives.

Display Advertisers

I sleep like the dead, but Linda hears everything. She doesn't actually sleep. Mostly she just lies there, worrying and planning.

Sometimes she relays important information. When a train whistle pierced the night she said, "Ed, that's the Amtrak! He's way late."

At 3 the other morning, she was wide-awake, and she thought I should be, too. "Ed, listen!" she said.

She threw back the covers and walked into the sunroom. "Ed, get in here. The bees are making eerie noises," she said.

The sound came from a box of queens and attendants. The bees emitted a steady buzz, punctuated periodically by repeated high cries that descended successively in pitch. A musician by profession, Linda finds variations on a repeated theme fascinating in a way that I cannot comprehend. She tried to bring it down to my level. "It sounds just like that bird in the Grand Canyon," she said.

I agreed that this was an intriguing and mysterious sound, and went back to sleep. Linda listened all night long.

I had to meet Paul at 8:00 a.m., and although Linda is usually "too busy" to come along, this time she opened our gate. Paul met us in his driveway. Linda launched into the story I just told you, and Paul and I both stood back, because her arms flew through the air the way they do when she talks. You could lose an eye.

Paul's knowledge of bees is encyclopedic. A second-generation beekeeper, he runs 2,500 colonies. He has a degree in entomology. His style is casual and understated, and he never throws his arms around when he talks. I always listen very carefully. Personally, I've never stumped him with a bee question.

He smiled. "Queen piping," he said. "It's a noise the queen makes."

"Why do they do that?" Linda asked.

"I don't know," Paul said.

Linda and I look at bees from somewhat distinct perspectives. I concern myself more with the well being of the hive than with than with the health and welfare of this bee or that bee. Other than the queen, individual bees don't much matter. Insect life is so prolific and so cheap. Why would you worry about particular bees?

Linda grasps this intellectually, but it doesn't jibe with her animal caregiver instincts. On cool evenings she brings in bees she finds lying hypothermic in the grass. She puts them on the warm kitchen counter, with a kitchen strainer over them.

At a trendy outdoor restaurant, an alarmed waitress asked Linda if she would like the bees on her plate removed. Linda responded, "It's all right. I'm feeding them sugar water."

Poor darling, Linda has no concept of the carnage inherent in harvesting honey. She never watches workers drag drones out of the hive in the fall. She never sees the little heads of workers sticking out from between the supers when I finish working a hive. She never sees *Varroa* sucking the life out of the brood. Linda is far too delicate for this.

She does know all the Sherlock Holmes stories by heart, and she would be pleased to inform you that Mr. Holmes retired to keep bees.

With Linda it's more than bees. It's the whole animal thing. Linda never met a dog that didn't need rescuing, never saw a horse that wasn't tangled in barbed wire, never found a stray cat that didn't need to be petted or nursed back to health.

If a goat or a cow comes trotting down a country road, a simple drive in the car can turn into a roundup and search for the owner.

Petting stray cats backfired when a friendly tabby gave Linda a little love bite and then ran away. When we finally located him, the owner said, "Sluggo's had all his shots except for rabies. The vet said there's no rabies in Garfield County." This got a little complicated, but nobody died or had to undergo a rabies series. The veterinarian and I had an interesting conversation.

Ever since our big cat Wahnu spent a few nights way up in a cottonwood tree, and ever since a fox got the last of our chickens, Wahnu doesn't run free in the tall grass any more. He's either indoors or in the kitty korral, a chicken-wire enclosure that opens to the barn.

The kitty korral isn't bad duty. There are of course mice in the barn, and occasionally an unfortunate bird finds itself inside on the wrong side of the wire. Our other cat, Sneezy, thinks the korral is stupid, but Wahnu loves it.

The beeyard sits 25 yards away from the kitty korral. When for a while Linda stopped taking Wahnu up to the korral, I asked why.

"Bees could sting him, Linda said.

"Why would they do that?" I asked.

"They might," Linda said.

"Not in a million years," I retorted.

"You don't know that," she said.

I always get in trouble for "mistreating" animals. A few minutes ago I trapped one of those black jumping spiders in our kitchen. I held it in my cupped hands and called to Linda to get the door, please.

"I'm busy," she said.

"I have a spider in my hands, and I can't get the door," I said.

"I'll be right there," she said.

When I flipped the little darling out onto the grass, Linda said, "It's too cold out there for spiders. Why didn't you put him in the philodendron plant? That's what I always do."

"Linda," I said, "You just held the door for me. Why didn't you recommend I put the spider in the philodendron then? I could have done it."

"It's too cold outside for spiders," she said.

While Linda doesn't actually participate in beeyard activities, she is an active cheerleader and salesperson for our little honey operation. Although not a big honey consumer herself, she finds our honey superior to all others. I appreciate this. When she tasted some honey that she thought came from a local monastery, she said, "Our honey is way better than this."

I said, "That is our honey, Linda. I just put it in the monastery jar."

"Well," she said, "the flavor is a little off."

I was happy to get those piping queens out of the house and into "production." The bees rejected four of them, but I never mentioned this to Linda.

Now that the queens are gone, we both sleep better, but Linda insists she misses their plaintive piping.

Ed Colby

Piping Queens