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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MARCH 2007 VOLUME 135 NUMBER 3

This honey bee found both food and shelter in the heart of this magnolia.
photo by Simona Tarakeviciute

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FEATURES

DEPARTMENTS & COLUMNS

Telling The Bees

I read Dick Marron's article in Bee Culture, Volume 135 No. 1 (January 2007) with great interest as I have long been fascinated by this cultural practice, both at home in England and also in other parts of the world. I am conscious that skeptics in our midst often greet stories of 'telling the bees' with a knowing smile, occasionally claiming that such tales are little more than fanciful folklore, and apocryphal at best. However, I became involved in one such event here in Devon, and can provide an insight into the happenings, both before and after the bees were 'told,' which adds a deeper significance to the evidence of this ancient tradition – because I was there.

For a number of years this ancient practice seemed to have quietly died out, as no new evidence of it taking place appeared to have been reported. But in recent times, evidence has come to light that the custom is still very much alive, particularly with those beekeepers who have developed a great love and genuine empathy with their bees.

On October 19, 1996, a quiet, dedicated and much loved beekeeper passed away in the seclusion of his East Devon home. Each day, for the three days prior to his passing, a lone bee flew quietly around the room where her master lay. She showed no inclination to leave at the end of the day, as is normal when a bee becomes isolated in an indoor location away from the safety of her hive, but more that she wished to stay to watch over her dying master. Indeed, she only left the room with some apparent reluctance at the end of the day as light was giving way to darkness, only to return at first light the following day.

The beekeeper, William Mawson, Bill to all who knew and loved him, died peacefully during the evening. Early the next morning, Bill's grieving widow, Annette, walked slowly and thoughtfully to the nearby apiary to tell the bees of his passing, thus keeping faith with the ancient tradition. She spoke slowly and softly as she said, "Poor master has passed away, but he is still with us in spirit."

Four days later, in the tranquility of the old Offwell Parish Church, his widow and family were joined by close friends and beekeepers to celebrate Bill's life, give thanks for his friendship, kindness and achievements, and pay their last respects to a gentle man.

As the funeral cortege entered the Nave of the church, it was followed silently and almost unnoticed by a host of bees, which settled quietly towards the rear of the building in the south aisle.

During the service, the Rector, Rev'd David Gunn-Johnson (now Archdeacon of Barnstaple) read the lesson from the third Chapter of Ecclesiastes.

To everything there is a season, and a time to every purpose under the heaven;
A time to be born and a time to die
...
... And God receives again that which is passed away.

As the Rector began his eulogy on the joyous memories of the deceased beekeeper's life and work, the gathered mourners became aware of what sounded like the distant sound of bees on the wing. The noise grew louder and louder. Within half a minute the crescendo reached its peak. The Rector paused, raising one finger towards the heavens and said quietly. "Listen!" For a minute or more the human gathering sat in thoughtful silence, awe and wonder as the bees hovered above their heads. And then, as spontaneously as it had arisen, the sound of flying bees declined before dying away in to the distance. This had not been the determined, purposeful commotion of a swarm, but more a respectful murmur, as if the bees were in a doleful, reflective humor, mourning the loss of a true friend.

The beekeeper's mortal remains were laid to rest in the graveyard of this lovely old church in the chilled sunshine of that late October day, where the spot is now marked by a granite gravestone bearing the emblem of a honey bee. Following the funeral service I returned to Bill's home apiary, walked amid his hives and carefully examined every one. Each colony was behaving normally with no apparent loss of bees.

Had the bees come to bid a final earthly farewell to their faithful departed master, before returning to the apiary to serve their new master with constancy?

No matter how long we ponder this question, what arguments are raised and theories debated, we may never find the precise answer, at least, not in this life. But of one thing we can all be certain, there are more things in heaven and earth than we poor mortals can fully appreciate, and perhaps only God and the bees know the true explanation of what happened on that late October day.

I have recorded the events of October 19, 1996 in my book In Pursuit of Liquid Gold, which is principally concerned with the archaeological remains of beekeeping in England's West Country, so that the accurate details of what actually took place on that day are not lost to posterity.

R.B. Ogden
Devon, England

Russian Bee Breeder's Unite

A group of beekeepers interested in forming a Russian Queen Breeders Association met in Phoenix during the American Honey Producers Association meeting.

Agenda items included: 1) A report on the status of the incorporation process. 2) A report on the constitution and by laws in the incorporation documents. 3) A discussion of categories of membership and other aspects of the association. 4) A discussion of the mechanics of the breeding and propagation of the stock and its lines that will include what resources members will need to have and what they will need to get from other members to do their share of

the breeding and propagation. 5) A discussion of the associations' budget. The costs of incorporation, the costs of membership, expected costs of the association.

The next step is to identify cooperators. With a list of cooperators, Dr. Rinderer and his staff can make a plan about stock distribution to cooperators and provide technical assistance concerning selection procedures and colony evaluations.

The Baton Rouge bee lab has assured us that they will advise us through the transition until we have a fully working program.

Charlie Harper
Carencro, LA

Bees & Tar

I'm sure you have had thousands of answers to the letter in the January issue.

Anyway, tar is very much like propolis – as far as the bees are concerned. Hard when cold, gummy when warm. Bees collect tar, caulking, partly-dried paint and other such sticky things. So those busy bees in a tar bucket thought they had found an easy source of propolis.

Ann Harman
Flint Hill, VA

Promiscuous Queens

Thank you for printing Larry Connor's article *Promiscuous Queens*, in your January 2007 issue. It confirmed our thinking.

We restarted beekeeping in 2001 with three Buckfast hives in an area with no other hives for at least 10 miles. Catching swarms increased our hives to five, but two hives failed to requeen. We bought readily available Italian queens to replace them. Spring 2004, after a bitter Winter, only two hives survived, one with every possible color of bee and one mostly gold. We again bought Italian replacements. Since then, we've caught swarms, both early and late and have started Spring with at least five healthy hives each year. We currently have seven lively hives, four multi-color or rainbows and three mostly gold, all with good stores and high hopes.

The gold hives have more and more serious *Varroa* mite infestations. They're also more likely to drop disgusting stuff on the bottom board inserts and send us running to the books to confirm the problem and how to treat it. They tend to swarm early. The rainbow hives have few mites any time of the year and need fewer treatments to clean them for over wintering and I'd have to search our journals to find when they were the first hive with a serious problem needing treatment. They tend to swarm late.

We've been told, multi-color hives tend to be more defensive and likely to sting. We haven't noticed a difference. We do visit our hives nearly every day and that may effect their attitude. They know us as the hands that open or close their vents, clip grass from their entrance, refresh their water supply, and give them food when they're needy. When a hive develops a bad attitude, and we haven't noted any indication of a problem, we do a serious hive check. So far, either we, or they, can do something that restores their comfort and good attitude within a week or so.

As Mr. Connor noted, gold hives' upside is they produce more honey than the multi-color hives. But, we keep bees, first, because they're joyous creatures, finding something to celebrate every day. They're like friends who make you smile every time you see them. Excess honey is a bonus.

An update on sumac smoke as described in your September 2004 edition by Jim Ovbey and DuRant Warwick. If it does not have enough moisture so you can feel it on your bare hand, it's too dry to be effective as a *Varroa* mite treatment. 2004 was a good year, 2005, late frost, then drought, it didn't work, 2006 it was again effective.

Rachel Kinkennon
Edward, MO

Friends of Free Beekeeping Everywhere! Legislative contact is needed NOW!

It appears likely that California Citrus Mutual will propose legislation which attempts to ban the placement of honey bee colonies within two miles of any mandarin planting of six acres or more. Even though no bill has been introduced as of late January, your letters are very important in order to help educate legislators about the importance of bees and the importance of bee locations for the maintenance of healthy colonies. Your letters may also dissuade legislators from introducing such a bill.

If a law is ever enacted banning bees from within two miles of mandarins, it will set a dangerous precedent that could lead to loss of locations anywhere in the country. **The ability to place bees on land with permission of the landowner is fundamental to the viability of the beekeeping industry.**

A two mile radius encompasses over 8,000 acres of land. If a mandarin grove is planted every four miles or less, vast areas could be established where no commercial honey bees would be allowed. With approximately 25,000 acres of mandarins in the ground and more scheduled for planting, most of the citrus belt of central California could be off limits to bees if this proposed law is enacted.

A minimum of a quarter million colonies of honey bees are placed within the citrus belt each year. In many years the number far exceeds 300,000. If some of these colonies are displaced, they will need to go somewhere else where they will in all likelihood be crowding other bees (perhaps yours).

Letters sent to: Assembly Member Parra, State Capitol, Room 5155, Sacramento, CA 95814

And,

Senator Maldonado, State Capitol, Room 4082, Sacramento, CA 95814

would be appreciated. Please convey this message to your almond growers or growers of any crop needing bees for pollination as their letters or other contact is important as well. Please contact me if you have any questions about this. Thank you for your prompt action.

Gene Brandi, Legislative Chairman
California State Beekeepers Assn.
Los Banos, CA
Gbrandi@sbcglobal.net

INNER COVER

Do The Math

One of the most common management activities beekeepers do every season is to make splits. That's why we cover that technique so often and in such depth. More than two out of every three beekeepers increase the number of colonies they have, or replace what they lost over winter each year by making splits (or divides, depending on where you come from). But I still don't think we do enough in the magazine. Here's why.

In this issue alone three authors discuss the process, from very different perspectives and for very different reasons. And they do what they do quite well, from where they sit.

Take so much sealed brood, so much open brood, so many bees, so much of this and that kind of food and put it all in some kind of box...large or small. Then feed, feed, feed, or not, depending on the time of year, add a queen, or let them raise their own, and use them for this, that or some other thing.

These general techniques all work for some beekeepers, somewhere, sometime. But these rules aren't universal, the timing isn't universal, the uses aren't universal, and the outcomes are always, always, just a bit different than you would suspect, given the ease with which it seems splits can be made.

There are some fundamental rules of biology that can't be broken, bent or debated however, and by being aware of these rules perhaps a better discussion of making splits, or maybe I should say a different discussion can be made. It's not that these authors neglect or ignore these rules. In fact, they probably know them better than most beekeepers. But when you've been taking care of bees for a long time you begin to take some things for granted. That's only dangerous when you are instructing someone on the technique and you leave out that ..."Oh, by the way...." comment.

One golden biological rule is that if we decide to push our bees, that is, provide a diet that is out of season for them ... feeding pollen or pollen supplement in late Winter for instance...they will respond. They will begin rearing brood earlier than the colony next to them does that didn't receive that extra boost. That's a given and that's a good thing. But think for a moment. Think of all the ramifications this may entail, and what you should consider before giving that extra portion of food to the colony.

First, are you ready to be pushed, because that's what is going to happen you know. By starting your bees early you have to start early, and you have to keep going. You can't just start then go on vacation, take a break, or let the weather interfere. You can't start and then quit because you ran out of time, out of money, or out of energy.

By hooking your bees on that artificial diet, and that's what you're doing, you've made them protein junkies...dependant on you for that next fix of gooey brown stuff (or fluffy tan powder) you so generously provide. And think of this...the first shot you provide, out there in the snow and the cold early this month, is enough to grow a finite number of new bees. But when those bees emerge in three weeks or so there will be more of them than when you started this drug abuse, and they'll be ready to be nurse bees to feed another generation, and to do that, they'll need the same fix. But now there's more bees to feed than the first time you fed, so don't get skimpy and feed just the same amount. If you limit that protein drug you provide to this second flush of brood, either in quantity or quality, or mess up the timing (they run out for a few days, say), it will come back to haunt you *all season long*.

Here's why: once the real stuff comes along...the maples, willows or mustards... the existing foragers will begin bringing in that real stuff, and the colony won't want your artificial drugs anymore. But because you messed up earlier there will be fewer existing foragers available to harvest the real stuff that's out there, thereby limiting what can be harvested and what can be provided to the next generation. This in turn limits even further the number of bees in the next flush...and all this will reduce your future honey crop because you got cheap, forgetful or lazy back in March.

So rule number one is...don't start if you can't finish, and if you plan to finish, finish with more than you started with so you don't limit the growth potential of that colony, their eventual health, and your potential honey crop. Waste a little protein feed early on to make a bigger honey crop later.

What else...well, when do you start? When do you give them their first grand and glorious protein fix? Early this month? Mid-month? Not until April? That question is easy if you already know the answer...when do the first, the second, the subse-

Continued on Page 70

All The News From The January AHPA Meeting

Research Results, New Products, Policies & Politics That Touch EVERY Beekeeper

Kim Flottum

In January the American Beekeeping Federation and the American Honey Producers hold their annual business and educational meetings. This year the Honey Producers met in Phoenix, along with the scientists from the American Association of Professional Apiculturists and the Apiary Inspectors of America. It was U.S. beekeeping in a nutshell – science, education, politics and regulation. Plus the press.

Following are summaries of some of the talks presented – there were concurrent presentations so attending them all was difficult – in no particular order or priority, mixed together or by themselves.

Marla Spivak, University of Minnesota, talked about her breeding program focusing on selecting for hygienic behavior. She summed up what is required of breeding for *Varroa* resistance overall as: bees having hygienic behavior, reduced mite reproduction success, grooming behavior, and very important – beekeepers willing to reduce chemical input and working *with* their bees. This has been Marla's message for quite some time and it is still refreshing to hear.


Marla Spivak

Tom Rinderer, Research Leader from the USDA Baton Rouge Lab discussed the progress of the Russian bee project that originated there. Russian lines were selected for a general response to *Varroa*, not specific mechanisms of resistance. Russians have excellent Tracheal mite resistance, good honey production in various areas of the U.S., produce lots of brood and have good hygienic behavior. He emphasized that Russian hybrids are less desirable, and less resistant than Russian: Russian offspring. Russians have fewer phoretic mites, perform dead brood removal, have fewer infested cells, uncap more infested cells, and defend their entrances more vigorously against small hive beetles. And in an ongoing, multi-year don't-treat experiment, only one of 40 Italian colonies remains alive, while 20 of 40 Russians colonies remain alive. They may not be perfect, but they have a lot going for them.

Steve Sheppard, one of *Bee Culture's* columnists, laid out the priorities he used when selecting bees that thrived in his home state of Washington. Categories he looked at and measured included good overwintering, temperament, honey production, disease resistance, hygienic behavior (using the 24 hour test, now more popular than the 48 hour test), and Spring buildup by measuring the rate of brood production. These qualities should be on every queen breeder's list.

On another topic Steve mentioned the results of two surveys his lab has taken. In 1994 he surveyed every U.S. production queen producer he could find. Of the 44 producers he found, they used 603 breeder queens, producing 900,000 queens for sale. Ten years later only 34 producers remain. They used only 473 breeder queens and produced only 869,000 queens for sale. Diversity is dissolving, suggests Steve.


Steve Sheppard

Jeff Harris and **Bob Danka** discussed their work in Baton Rouge with *Varroa* sensitive hygienic behavior. VSH bees uncap and remove brood infested with *Varroa*. First, they check cells for infestation by partially uncapping them. This was discovered when the researchers looked at the underside of the cell capping. When a larva spins its cocoon, it attaches it to the capping. When a cap is removed to check the contents by VSH house bees that silk connection is destroyed. If the larva is *Varroa* infested the house bees remove the larva, killing any immature mites and the male. If it's not infested they recap it. When a cap was removed by the researchers the patch can be seen on the underside of the cap.

VSH, Russian and controls were tested. 12%, 24% and 40% respectively needed treatment for *Varroa*. 8%, 2% and 17% had Tracheal mites, but comparable honey was produced by all three. The cautionary word here, shared by Bob Danka, was a phrase coined by Normal Borlang – *You can't eat potential.* Bees with the VSH trait have lots of potential – but beekeepers have to use them.

Gloria DeGrandi-Hoffman, Research Leader of the Tucson Bee Lab talked about the research on 2-Heptanone, a natural *Varroa* control discovered there. It works, but production and distribution is still being formulated. Oxalic acid, essential oils and other controls are being studied in Tucson, also, as well as AHB take over of EHB colonies. This is the most common form of Africanization. A small group of AHB and a queen

simply move in, kill the European queen and take over. Your colony is Africanized.

Wellmark (the Apistan people) has a new chemical for *Varroa* control almost ready. It's called Hiveastan®, a true acaracide and very effective on *Varroa*. The active ingredient is Fenpyroximate, one of the pyrazol chemicals. It kills by contact and works great in rotation with other *Varroa*cides.


Gloria DeGrandi-Hoffman

Hivestan® is applied in a colony as a viscous (gel-like) formulation used as a patty, placed on top bars of single deeps, or between doubles. It can be used Spring or Fall as an eight ounce patty/hive. It contains irradiated honey to attract bees, and as they remove the gel mites are contacted. It requires only a single dose/treatment that lasts about six weeks. It gives 85-95% control, averaging 90%. A three-gallon, 25-pound container has 50 doses. It is a white, creamy, good smelling compound. Price is comparable to other mite treatments.

Jeff Pettis, Research Leader, and his group at the Beltsville Bee Lab have identified nine viruses in U.S. bees: Kashmir, two kinds of bee paralysis, sacbrood, deformed wing, black queen cell, Alabama, Virus X and Virus Y. Viruses can be transferred from queens to eggs, and in a sample test more than 90% of queens had some number of these viruses – usually only one. But still, that's scary.

Working with other bee labs, available commercial protein feeds have been tested. Mann Lake's Bee Pro and the new liquid diet called Megabee developed (but not yet available) by the Tucson Lab, produced the greatest amount of brood of feeds tested.

The worst keep secret in beekeeping right now is that oxalic acid, applied as a trickle application late in the Fall when there's no brood in the colony, is an effective means of *Varroa* control. OA isn't registered for use in the U.S., but is in Europe and Canada, who have lots of experience with it. A precaution with this management technique is that there needs to be a low infestation earlier in the Summer, so that the bees that go into Winter haven't been directly compromised. A weakened bee, with or without mites, isn't going to make it through the Winter. OA isn't the silver bullet, but it's one in the arsenal.

The battle with small hive beetle looks better for two reasons. The Hood Trap was found effective when pollen substitute was used as a bait. That's good, but what's better is that researchers in Florida have discovered a beetle-made yeast that is a strong beetle attractant. When added to the trap with the supplement it worked even better than the pollen supplement alone, and far better than vinegar. Now, somebody needs to manufacture and distribute the stuff.

Jerry Probst, past Chairman of Sue Bee Honey and now a consultant in the honey industry, had a lot to say about the attempts being made to develop a government-sponsored definition for honey – there isn't one you know, and without one, you can't prove what honey is, let alone what honey isn't.

Working with the NHB and the European's Codex standards, a detailed definition has been developed. The next step is to have the FDA adopt the standard, giving it legal legs. But FDA isn't interested since it's not a public safety issue, (think Spinach) and FDA is grossly underfunded.

With 42% of U.S. consumers believing that honey contains other ingredients, and 14% believing honey already has added sugar (from a NHB study discussed here last year), additional scrutiny is needed, but seems far away. Labeling, too, is still an issue, with honey sauce and artificial honey still causing problems.

An ongoing controversy continues with discussion and research evaluating the value of the screened bottom board in *Varroa* population management. **Keith Delaplane** from Georgia, has been using screened bottom boards as part of an IPM program, along with resistant queens and chemical controls. Using resistant queens and screens he found a significant delay in reaching the economic threshold for *Varroa* populations in a hive. After two years of monitoring 71% of the control colonies were dead, 61% of the chemical-only colonies were dead, but only 39% of the IPM colonies were gone. Conclusion: in an IPM situation, screened bottom boards are important, at least in Georgia, under these conditions.


Keith Delaplane

Not according to **Nick Calderone**, from New York, who has consistently found that screened bottom boards do not contribute to significant *Varroa* control, at least in the North. Note that these are different studies, with differing conditions.

One talk that generated a lot discussion was the next generation of **Zachary Huang's** (Michigan State) Mite Zapper. This is now a plastic frame with drone comb foundation. Wires are embedded in the plastic that lead to the outside of the hive the frame is in. When the frame is nearly full of capped drone brood the external wires are attached to a battery, the wires inside heat to the point of killing the drone larvae and their accompanying mites (but not melting the wax) and *Varroa* control is accomplished. Without chemicals. Treatments take less than five minutes, and frames are supposed to last up to five years.

A company is now manufacturing these frames, and you should see ads in the journals shortly.

The AHPA meeting is attended by commercial beekeepers. They pretty much know how to keep bees because if they don't they're out of business. It's hard to come up with a management or how-to topic that this group will pay attention to. But any talk on nutrition worked its magic this time, and standing out was **Stuart Volby**, from Mann Lake, who gave a detailed and instructive discussion on feeding carbohydrates.

Feeding, if you didn't know, has taken on a whole new dimension since almonds have taken over as Job #1 in beekeeping. Bees need to be in prime condition by February 1, a real challenge no matter where bees are raised.

It used to be hand-mixed plain sugar syrup, but then HFCS and more recently sucrose (sugar syrup again, actually) can be bought by the tankerload. Now, blends are available of these two products, plus different types of HFCS-42, 55 & 75 can be had. Add to this the invert forms of sugar, where citric acid is added to sucrose to make a 50% sucrose,

plus 25% fructose, 25% dextrose blend, and fine tuning the mix is even better.

Further, its been found that if you want to hold bees, feed HFCS, but if you want to push them, feed sucrose, and add protein.

Advice: Type O Sucrose will granulate – it is 66-67% solids – so be sure to flush your pumping systems. Completely. Also, heating HFCS too much leads to toxic levels of HMF (a toxic byproduct of over heated syrup) – no more than 110°. And, sucrose syrup, with its high pH will easily promote growth of other organisms. It has only a 10-day shelf life in the tank. Be forewarned.

Perhaps the most interesting talk for me was one give by **Thomas Ferrari**, of Pollen Bank in California. Pollen Bank collects almond pollen from very early blooming varieties, tests it for viability, then puts it in a device that sits on the front entrance of a colony. Bees leaving that colony walk through that pollen, picking some up and taking it to an almond flower on another variety. Almonds, like apples, need to be pollinated with pollen from a different variety to set the nut.

Bees don't visit different varieties very much in orchard plantings, thus many bees are required to achieve adequate nut set. Covering bees with pollen *before* they leave the hive has been shown to improve yields significantly. From the paper presented: All 13 orchards exposed to enpollinated foragers had increased production. From an average of 525 lbs/acre extra seven cases when one/hive/acre was used to 988 lbs/acre extra after pollen was applied to the stronger of two colonies when two colonies/acre were used.

If I was a beekeeper pollinating almonds, I'd be real interested in adding value to my operation by using this technique.

Speaking of almonds, **Frank Eishen** and associates from Weslaco took a long look at how those Australian packages performed in almond pollination last year. In a phrase – not so good. Dumping a package in a colony and expecting it to perform as well as an eight-frame colony makes no sense. The population drops, less pollen is collected, and they just didn't do the same job as the larger colonies. But they didn't do too bad, all things considered. However, for the price being asked for a package compared to a full colony, the comparison gets tough. More needs to be learned about managing these bees to the benefit of almonds, and beekeepers.

Frank Eishen

Almond growers seem reluctant this year to take on brand new packages as pollination units – at least at full prices. Some growers still are though, and some beekeepers are looking at bringing packages in earlier and building them up. Something needs to be done as more almonds keep coming online, and colony numbers aren't growing as fast.

Coupled with ongoing losses, only moderate honey prices, viruses, fewer beekeepers, *Varroa*, AHB, strict entry regulations, and now this new malady – Colony Collapse Syndrome – almonds and honey bees seem destined to be of even greater importance in the next few years.

Relative to the ongoing saga of the National Honey Board, the next round appears to be a **Research and Promotion Board for U.S. Honey**. The basics of the new group are that the existing NHB will be terminated, but the collective information, staff and web page info will be divided up between this group and the yet-to-be formed Packer Honey Board, dealing exclusively with foreign honey.

The new U.S. Board will have seven producers serve, will charge 2¢/lb. on domestic honey, with increments of ½¢ at a time, up to 5¢ maximum. There will be an exemption for producers making less than 100,000 lbs. and some level of refunds will be available, as long as they don't exceed 10% of the total assessment for the year. The FSA will conduct nominations to avoid the costly annual program now in place, and no referendum to terminate the existing Honey Board and install the two new Boards is needed. Any existing funds remaining in the current Board's coffers will be prorated and refunded to producers and importers.

Some details are still to be worked out, or weren't available, but most of the basics seem covered.

On another domestic front, the U.S. Post Office and its outsourced carriers seem to have arrived at a mutual understanding on carrying queens and packages for this season. But insurance and regions delivered to are getting more scrutiny which means buyers need to pay attention to details. This also reinforces the concept of working with a local supplier that has bees and queens delivered.

Ron Phipps, a honey importer who has provided more insight into the global honey market on these pages than anyone ever, talked about honey being supplied by various countries to the U.S. Argentina had a good crop last year primarily because of all the new beekeepers in that country, and, the northern part of the country had excellent weather. This year they expect a 25% increase above that good crop.

China has tightened their quality standards, and are eating more of their own crop, which has reduced their supply to export. And, other countries have filled the gap left by far less Chinese honey imported (though *lots* is still coming in, in spite of the import loop hole being closed). Last year 276,000,000 pounds of honey were imported into the U.S. from all sources.

Another area of concern is the use of, or failure to use good science when it comes to measuring what's in honey. Honey, according to Mr. Phipps, is not ultrapure because bees are susceptible to diseases and pests and require treatments, as do all of our food plants and animals. But residues in honey need to be based on reasonable limits, just like other plant and animal food stuffs. Good advice, I think, but reasonable (like honey) is still in need of a definition.

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Next year's AHPA annual meeting will be held in conjunction with The American Beekeeping Federation's annual meeting in Sacramento, California. It will be the first joint meeting of these two groups, with common lectures and vendors, but separate business and social events.

Even so, it promises to be a historical event. Plan on being there if you can. BC

MARCH – REGIONAL HONEY PRICE REPORT

None of our reporters had experienced the Colony Collapse Disorder widely reported across the country. If you have, however, go to www.beesurvey.com and fill out the form. Every little bit helps.

How did the Winter treat your bees? And what will you do this Spring? In late January we took an early survey on Winter loss, Spring plans, and our standard – the cost of a five-frame Nuc. Numbers in () were 2006 figures.

Overall, 28%(24) of our reporters experienced lower than average Winter losses, 55%(52) were right at average loss, and only 17%(24) saw higher than average losses.

Interestingly, considering the significant and monumental losses experienced by some beekeepers in the U.S. this Winter, our reporters experienced only a 17%(20) Winter loss (but recall, this was late January).

50%(45) will make up losses to get back to where they were, 35%(29) want more this year than last, and 14% don't want to add colonies. How? 67%(64) make up losses with splits, 30%(32) with packages, and some will buy colonies.

The price of a five-frame nuc? Across all regions this year, it's $64.00 (unchanged at $64). Since a 3lb. package is going for at least $60 this Spring, this seems pretty low. The range if $45 to $75. Still low it seems.

Region 1
Average losses of 15%(7). Nucs for $66(71).

Region 2
Losses a bit high at 17%(11). Nucs at $58(75).

Region 3
Losses at only 10%(10), considered average. Nucs at $64(77).

Region 4
Average losses at 12%(16), which is average. Nucs at $62(57).

Region 5
22%(43) losses, about the same as usual. Nucs at $75(83).

Region 6
Low, low losses of only 7%(19) (so far). And this is about right, they say. A nuc goes for $68(55).

Region 7
23%(28) loss is right at averge. Five frames go for $69(66).

Region 8
Higher than average 18%(8) loss, and nucs for $72(55).

Region 9
30%(14) loss this Winter, so far, but nucs only $45(49).

Region 10
A modest 15%(7) loss is low they say. Nucs for $65(60).

Reigon 11
24%(24) loss this year is average, and nucs for $58(54).

Region 12
Only 16%(28) loss. Tha'll change by March. Nucs for $60(67).

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.03	1.19	1.03	1.11	1.08	1.18	0.96	1.03	0.95	0.92	1.10	1.15	0.92-1.19	1.06	1.03	0.93
55 Gal. Drum, Ambr	0.98	1.05	0.98	1.09	0.81	1.02	0.86	0.98	0.86	0.98	1.05	0.98	0.81-1.09	0.97	0.97	0.96
60# Light (retail)	144.42	115.50	120.00	100.00	105.00	108.33	98.13	90.00	160.00	144.42	140.00	111.67	90.00-160.00	119.79	108.25	99.37
60# Amber (retail)	105.00	105.00	120.00	97.33	105.00	95.00	91.50	95.00	150.00	124.87	40.25	117.33	40.25-150.00	103.86	102.76	101.40
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	44.64	49.95	40.80	40.44	47.38	48.00	38.89	47.38	47.38	35.96	30.00	55.00	30.00-55.00	43.82	42.54	42.78
1# 24/case	61.44	61.03	67.20	59.64	63.00	70.00	62.29	55.80	61.50	67.00	72.50	65.00	55.80-72.50	63.87	64.57	65.58
2# 12/case	61.68	59.58	61.80	55.73	58.50	55.50	56.58	66.64	46.50	57.84	49.00	75.00	46.50-75.00	58.70	57.62	54.20
12.oz. Plas. 24/cs	57.12	56.63	49.80	54.50	54.00	59.50	49.41	46.00	43.60	47.64	60.75	62.00	43.60-62.00	53.41	51.30	52.24
5# 6/case	67.52	63.98	71.25	58.48	66.57	72.00	60.03	60.00	57.00	56.43	58.00	67.00	56.43-72.00	63.19	60.46	60.70
Quarts 12/case	85.70	100.35	100.00	83.99	81.00	80.50	77.98	77.20	96.00	98.50	82.00	105.00	77.20-105.00	89.02	91.38	84.18
Pints 12/case	53.62	49.95	66.00	52.00	56.00	44.17	47.70	42.00	60.00	49.50	50.00	58.50	42.00-66.00	52.45	51.15	47.58
RETAIL SHELF PRICES																
1/2#	2.63	2.52	2.31	2.79	2.85	2.25	2.34	2.45	1.99	2.24	2.56	3.00	1.99-3.00	2.49	2.67	2.42
12 oz. Plastic	3.25	3.08	2.83	3.34	3.76	3.25	2.93	3.36	3.47	2.84	3.24	3.93	2.83-3.93	3.28	3.25	3.15
1# Glass/Plastic	3.81	3.49	4.47	4.26	3.75	3.94	3.45	4.14	3.66	3.66	4.12	4.96	3.45-4.96	3.97	3.97	3.90
2# Glass/Plastic	7.17	6.24	7.20	6.31	6.49	5.93	5.97	7.75	5.94	5.92	6.77	7.26	5.92-7.75	6.58	6.85	6.32
Pint	6.07	6.50	6.50	5.58	5.90	5.22	5.33	5.16	5.75	6.33	4.89	6.98	4.89-6.98	5.85	5.89	5.81
Quart	11.42	8.98	11.00	8.78	8.48	7.62	8.82	8.66	9.75	12.84	8.10	10.75	7.62-12.84	9.60	9.80	9.64
5# Glass/Plastic	12.00	13.20	15.65	13.17	15.00	14.50	13.50	16.50	15.00	13.22	14.18	15.50	12.00-16.50	14.28	14.61	13.39
1# Cream	7.50	5.37	4.89	4.82	7.50	4.00	5.36	4.23	7.50	5.14	4.99	5.10	4.00-7.50	5.53	5.09	4.73
1# Cut Comb	5.00	4.60	5.19	5.18	7.24	5.50	5.61	4.50	7.24	6.00	8.00	8.25	4.50-8.25	6.02	5.96	5.87
Ross Round	5.41	3.97	4.97	5.38	5.41	5.00	5.25	4.00	5.41	6.00	5.67	6.33	3.97-6.33	5.23	4.74	4.61
Wholesale Wax (Lt)	2.33	2.18	1.60	2.03	1.90	2.15	2.51	2.00	2.97	2.52	1.73	2.13	1.60-2.97	2.17	2.15	2.15
Wholesale Wax (Dk)	1.67	1.85	1.70	1.76	1.70	1.69	1.46	1.21	1.48	1.21	1.80	1.30	1.21-1.85	1.57	1.72	2.34
Pollination Fee/Col.	60.00	91.00	58.25	35.00	38.50	45.50	47.14	95.39	95.39	120.00	50.00	133.33	35.00-133.33	72.46	61.82	49.71

RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

"Side by side comparisons of Russian hybrids and Italians; and, Does size matter?"

The native homeland of our honey bee *Apis mellifera* includes Europe, Africa and much of western and central Asia. Over two dozen distinct honey bee subspecies are found across this vast geographic range, representing adaptation to a diverse set of climatic and ecological conditions. One might reasonably expect to find (and does find) behavioral differences among these subspecies that reflect adaptation to specific climatic conditions. For example, in choice experiments involving swarms, European honey bees derived from regions with cold, harsh Winters have been shown to prefer a larger cavity size in which to build their nests than European honey bees from Mediterranean climates. One presumption is that natural selection for this preference is most likely related to the requirement for northern bees to store more honey to survive Winter. Perhaps more obvious are differences in the frequency of reproductive swarming found between European and sub-Saharan honey bees. Most U.S. beekeepers are probably well-aware of the comparatively "high" rate of swarming found in tropical honey bee subspecies (compared to those of temperate Europe), based on even the most cursory reading of the biology of Africanized honey bees.

For these and many other honey bee behaviors both genetic and environmental factors have been shown to play a role. In recent research conducted in North Carolina, scientists compared the foraging behavior of two different honey bee stocks maintained in various locations in the state (Kreitlow and Tarpy, 2006). The experiment consisted of establishing 32 colonies of bees from packages, distributed in three locations (coastal, Piedmont and mountain) in the year prior to the study. At each site, equal numbers of colonies were headed by queens from "Russian" and "Italian" commercial strains of bees. By the start of the period of data collection, most of the Russian colonies had swarmed, so the researchers considered the actual comparison to be between "Italian" and "Russian hybrid" stocks. The researchers collected returning foragers from each colony to make nectar and pollen measurements and to measure the weight of bees. They also estimated colony sizes (number of adults and brood frames) and the level of adult bee infestation by *Varroa destructor* and tracheal mites. The researchers reported that there were a number of significant differences between the study sites for these various measures, but few differences between the two stocks. Thus, both the Italian and Russian hybrid strains yielded statistically indistinguishable levels of mites, adult bee population and brood area. The different stocks also collected similar amounts and concentrations of nectar and pollen load weight. The adult dry weight of bees was significantly different at the Piedmont sites, where Russian hybrid worker bees weighed significantly less than Italian bees. The researchers could not readily explain this difference, but suggested it was an area that warranted further study. Overall, the researchers found that the local environment at the different sites was more important in determining foraging choice and outcome than the genetic differences between the strains used in the study. They pointed out that, as they used Russian hybrid bees rather than "pure stock", it was "unclear if there would have been a greater influence of stock if genotype was more tightly controlled". One conclusion of the researchers was that studies of various honey bee strains in multiple environments in side-by-side comparisons "may provide a more complete picture of the factors that influence foraging behavior." As managed honey bee colony numbers in the U.S. decline and agricultural acreage and pollination requirements increase for some specific crops (such as almonds), there is a growing awareness that challenges are on the horizon for the pollination industry. The approach presented by Kreitman and Tarpy in their study may have ready application for direct field comparisons of pollinating stocks within agricultural settings.

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Does size matter? Apparently the answer is yes and no. In a recent paper by two scientists working in Ireland, the question of the effect of small cell size comb on the outcome (size of the resulting worker bees) was examined for their native subspecies of honey bee, *Apis mellifera mellifera* (McMullan and Brown, 2006). The researchers pointed out that until the late 1800s in Ireland and Britain

brood cells were around 5.0 mm in width. By the late 1920s commercial foundation was produced with a cell size of approximately 5.5 mm. The authors set up an experiment where they reared bees in small cell brood combs (4.9 - 5.0 mm) and in standard cell brood combs (5.5 mm) that were maintained in each of three colonies of local *Apis mellifera mellifera*. They sampled bees emerging from the two types of combs five months after the initial set up and again after 24 months. The bees were measured for a number of morphological characteristics including size, color, wing venation and the diameter of the prothoracic trachea (breathing tube). In addition, brood cells were analyzed for size and depth.

The researchers reported a significant overall reduction of 8% and 7% in the cell width with the small-cell foundation after five and 24 months, respectively, but no differences were found in the cell depths. Small cell size also reduced head width (approximately 1%), some wing venation measures and tracheal diameter (approximately 1%). There was a significant effect to reduce the body mass of bees reared in small cell combs (eight and 11%, respectively in the five and 24 month samples). No differences in color were detected. The authors concluded that, although small-cell brood combs resulted in smaller bees, the reduction in size was "clearly not in proportion to the reduction in cell size." So reductions of seven to 8% in the brood cell size resulted in reductions of some of the measurements in the bees of only 1%. They compared this result to findings from a number of other published studies, including those conducted on U.S. honey bee populations and found that their results were "in direct contrast to the changes in bee measurements resulting from changes in brood cell size in 'American' honey bee strains which show a proportional response." They noted that the thorax width of *A. m. mellifera* is about 1/3 larger than in other strains used in America (Italian strains, for example) and thus the "fill factor" (thorax width to cell width ratio) is much higher in the black bee (73-79%), compared to "American" strains (53-57%). The researchers suggested that this fill factor difference means that *A. m. mellifera* may face "a relatively restricted condition for the developing bee...further intensified with the change to small brood cells." They concluded that the results of their work may have implications for parasitism by *Varroa destructor*, as there would be "considerably less space for the developing bee in the small cell for the *A. m. mellifera* honey bees." The use of small-cell size foundation has become more common in the U.S. and has been promoted as a possible aid in reducing parasitic mite population growth. However, it was interesting to find out from these authors that the original honey bee subspecies introduced into North America, *A. m. mellifera*, were already using such cell sizes for their own reasons. Perhaps more study of the natural sizes of cells used by different honey bee subspecies may lend some insight into what those reasons were. BC

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Malcolm T. Sanford

A Global Bee Breeder Initiative

"The time has come to develop a global effort to exchange honey bee genetic material."

In my last column (*Bee Culture*, February 2007), I reported on a new nosema that has been detected in Europe and could be responsible in part for some of "disappearing disease" being reported there. This new variation of a traditional disease makes it more difficult for scientists to nail down specific causes of colony collapse. In the United States, for example, a spate of what was called "fall-dwindle disease,"[1] now renamed "colony collapse disorder," or CCD,[2] has investigators befuddled and is leading to some research initiatives that we should be hearing more about in the future.

One of the issues that might be lost in the cacophony surrounding these collapses is the inexorable decline in feral bee populations caused principally by *Varroa*, and subsequent loss of genetic variability. This brings into focus Dr. Larry Connor's article in the January 2007 *Bee Culture*, which discussed "curiously promiscuous" queens, and concluded that "Diversity, it seems, *is* all it's cracked up to be." In that article, he said "I was trained to develop large numbers of colonies of genetically uniform hives. I suspect they...had no tolerance against either the tracheal mite or *Varroa* mite. We have lost a lot of colonies, and while I have argued that while we lost a great deal of genetic diversity, we certainly lost a huge number of very uniform, highly susceptible stocks." He concluded with the hope that individual beekeepers, or some of the new bee breeding groups that are developing around the country, will be able to increase this diversity in the next decade or so.

I wrote about this same issue almost a decade ago and it is worth revisiting.[3] "Ever since introduction of the *Varroa* mite in 1987, the press has become sensitized to the fact that the bee population is being threatened by this parasite. As with most issues of this sort, reports range from the sublime to the ridiculous. Some have been justifiably criticized for their lack of investigative rigor and sensationalistic fervor. Although wild honey bees are being lost, commercial agriculture continues to prosper because treated, managed colonies are still available for pollination. The beekeeping industry should also be gratified that honey bees are at last getting some of the respect they have so long deserved as pollinators in helping to produce a bountiful food supply.

"Lost in most of these reports is a major effect the reduction of the feral bee population may have on genetic diversity of the managed honey bee population.[4]. Nature has built into honey bee behavior elaborate mechanisms to prevent a narrowing of the genetic base. Most significant is the fact that queens mate with 10 to 17 drones in the air.[5] Effectively controlling mating activity has been a goal of many queen breeders, but often is impossible unless some degree of isolation is established. This usually has been accomplished on islands.[6]

"The United States' production of honey bee queens and package bees like many crops is based on a few individuals. Because of this, genetic variation in the drone population provided by wild or feral nests has been considered beneficial. It keeps the genetic base in commercially available queens and bees from becoming too small. With less genetic material generally available, however, the probability of inbreeding increases. The consequences of this have been well described in other crop- and animal-breeding systems. They include susceptibility to diseases and pests, expression of harmful recessive traits, or a general lack of vigor. In humans, the possibility has led to prohibitions in most cultures of marriage within immediate families.

"In honey bees, there is also another risk when the genetic base narrows. It is known that as inbreeding occurs there is more chance for diploid drones to be produced. These individuals are homozygous (have the same gene form or allele) at the sex locus; only those with different alleles become females. All diploid drones are destroyed when in the larval stage by the colony and the queen is then obliged to lay another egg to replace each. Colonies suffering this condition, called "inbreeding depression," may have 50 percent less developing brood. As a consequence, they cannot build enough population to produce surpluses, and in some cases may not survive.[7]

"Dr. Marion Ellis estimates that the entire United States' commercial queen population is the result of five hundred individual breeder queens.[8] If this is so, there is the possibility that inbreeding depression may be reaching epidemic proportions, and some of the weaknesses seen in bee populations attributed to a variety of causes may in fact be due to this condition. Unfortunately, little is known about the genetic history of many queen mothers used in commercial operations. Nevertheless, it is important to know about the situation and its possible implications.

"As inbreeding becomes more probable, the concept of making the 1922 bee importation law more relevant to current conditions takes on greater significance.[9] The beekeeping industry may have to accept more risk in importing bee stock in exchange for widening the genetic base of commercially available queens and bees."[10] Since I wrote those words, the Canadians and Australians have cracked the U.S. market and are importing stock on a controlled basis.[11]

Recently, I visited Argentina and had some discussions about this issue with Mr. Martín Braunstein, an Argentine breeder. We are proposing that at the next Apimondia meeting in Australia (September 9-14, 2007) a Global Bee Breeders Initiative be established. At

the present time, it appears that this activity will be part of Sue Cobey's symposium on instrumental insemination and bee breeding. I have installed a web page on the issue, which in part states:[12]

"There continues to be promising research in *Varroa* tolerance and resistance through finding and selecting 'survivor' stocks, and also by looking at the biology of both the mite and the bee to understand interactions that reduce the virulence of *Varroa* in stocks. An example of the former is the introduction of Russian (Primorski) stock into the U.S., and the latter is the work on *Varroa*-sensitive hygiene (VSH), previously called suppressed mite reproduction (SMR). Some of these efforts are cataloged at the queen production, breeding and producer lens.[13]

"In the future, the above activity will also be enhanced by the presence of new technologies such as DNA analysis (the honey bee genome has been completed) and cryopreservation of sperm. These, coupled with new genetic knowledge about both honey bees and their pests and parasites, promise to revolutionize bee breeding.

"The effects of Africanized honey bees in the Americas, and the spread across the globe of *Varroa* and more recently small hive beetle reveal that moving bee stock is not without risk. In spite of this, however, the practice continues whether it be illegal movement (i.e. in a beekeeper's pocket) or legal through an elaborate process as was done with Russian stock, first introduced to a barrier island off Louisiana. A recent example of each has been found in Canada. A beekeeper who attempted to cross the Alberta border with a load of queens was intercepted. The country subsequently has opened its borders to U.S. queens on a limited basis.

"All this leads to the question of how do beekeepers, beekeeping organizations, breeders and others deal with the inevitable fact that the honey bee's genetic material is not only currently being distributed around the world, but also that this activity may be of vital importance for many regions of the globe ravaged by bee diseases or human activity like warfare. Therefore, it appears the time has come to develop a global effort in an attempt to get agreement on technologies to formally and officially exchange honey bee genetic material with a minimum of risk.

"The genesis of 'The Global Bee Breeder's Initiative: Increasing the Honey Bee's Genetic Variability With Minimal Risk' is a presentation made by Martín Braunstein, a queen breeder in Argentina during the recent Apimondia Congress on queen breeding in Bulgaria."[14]

According to Mr. Braunstein several things are coming into play that might contribute to the current situation. Specifically, much like most business activities around the world, beekeeping is a global enterprise, but with unique characteristics because it is tied to the seasons of the year. These are different yet complement each other. The queen-rearing season in the Northern hemisphere, for example, corresponding to March through September is reversed in the Southern hemisphere where it corresponds to September through March. Key players in the supply and demand chain exist in both hemispheres: Australia, New Zealand, Chile, Argentina in the south and Canada, U.S.A, and Europe in the north. Thus, there appear to be some interesting possibilities to exchange genetic material through importing/exporting queens counterseasonally.

General negotiations continue with reference to all kinds of trade that also affect beekeeping from the General Agreement on Tariffs and Trade (GATT), now the World Trade Organization (WTO) to deliberations by USDA Aphis in the U.S. and the European integrated approach to food safety and animal welfare.[15] A number of international standards setting organizations exist to tap into as well. One example is the OI.E. (World Organization for Animal Health).[16]

Globalization of honey bee diseases and pests over the last two decades is a reality and must be confronted by the world beekeeping community, including spread of tracheal and *Varroa* mites, small hive beetle, and now Nosema cerana. Several other situations exist that are causing some sleepless nights for regulators, scientists and beekeepers, including arrival of *Tropilaelaps clareae*[17] and *Apis mellifera capensis*.[18]

In an unregulated world, everyone loses, according to Mr. Braunstein, and this has certainly been the case with indiscriminant dispersal of mites and beetles. The same is true for what he calls a "reactive" policy, where regulators wait until some problem arises and then attempt to control it. By then it's usually too late. A more productive approach is "proactive," managing risk up front through the use of agreed-upon standards and inspections. The best chance of this happening is that it be championed by a breeders organization.

Setting up a global bee breeders initiative will not be easy because so many competing entities are involved, but it is worth a try. Mr. Braunstein counsels that the first few steps, specifically creating a vision and mission based on fundamental scientific and regulatory principles, will be extremely important. That will be the charge to those attending Apimondia 2007 in Australia. Your feedback is solicited. BC

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? DO YOU KNOW ?

Honey Bee Basics

Clarence **Collison**
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As Spring rapidly approaches in the more northern parts of the United States, many new individuals will become beekeepers for the first time in their lives. Even though they may have done a lot of reading in preparation, the new beekeeper will have to make many decisions in regards to equipment, sources of bees and equipment, and type of bees to get. For the experienced beekeeper, these same questions seem elementary and are given little thought until they have the opportunity to help a new beekeeper or asked to participate in a beginner's bee school.

Please take a few minutes and answer the following questions on numerous topics to see how you are progressing in your beekeeping knowledge.

Level 1 Beekeeping

1. ____ On average a female *Varroa* mite produces three reproductive cycles in her lifetime. (True or False)
2. ____ As a virgin queen ages in a hive, the workers become increasingly more aggressive towards her. (True or False)
3. A delicate envelope that surrounds the food in the intestine is known as the _____ membrane. (1 point)
4. ____ Honey bees (*Apis mellifera*) are native to the Old World. (True or False)
5. ____ *The honey bees sense of smell is associated with the last eight segments of the antennae and involve plate organs (sensilla placodea). (True or False)*
6. ____ When you install a two-pound package of bees in the Spring, how long will it be before the queen approaches maximum egg laying rate?
   A. 60 days
   B. 20 days
   C. 40 days
   D. 80 days
   E. 100 days
7. A three pound package will contain approximately ____ bees.
   A. 3,500
   B. 7,000
   C. 10,500
   D. 12,000
   E. 15,000
8. ____ Package bees will become established and build up more rapidly on drawn comb than on foundation. (True or False)
9. ____ Both adult and larval honey bees have Malpighian tubules. (True or False)
10. What are two advantages of purchasing nucleus colonies rather than packages? (2 points)
11. What are two disadvantages of starting a colony from a captured primary swarm rather than purchasing a package? (2 points)

Advanced Beekeeping

12. ____ *Apis cerana* and *Apis florea* queens produce queen substance that will attract *Apis mellifera* drones. (True or False)
13. Pantothenic acid, biopterin and neopterin are components of _____.
    A. honey
    B. pollen
    C. propolis
    D. bee venom
    E. royal jelly
14. Name three potential roles of *Varroa* mites in relation to virus diseases in honey bees. (3 points)
15. ____ *Apis nigrocincta* was recently rediscovered in:
    A. China
    B. Japan
    C. South Africa
    D. Indonesia
    E. Cuba
16. ____ *Apis cerana* drone brood have cappings entirely different than *Apis mellifera.* (True or False)
17. The host shift of *Varroa* mites from *Apis cerana* to *Apis mellifera* probably occurred in the 1940s in (the) _____ but the first reports of this event were published in the 1950s.
    A. USSR
    B. Germany
    C. Japan
    D. China
    E. India
18. ____ In Asia, the honey bee tracheal mite has shifted hosts moving from *Apis mellifera* to *Apis cerana.* (True or False)

In the genus *Apis*, there are three main lineages, A) the dwarf bees, B) the giant bees and C) the cavity nesting bees. Please indicate which species belong to which lineage. (1 point each)

19. ____ Apis florea
20. ____ Apis cerana
21. ____ Apis dorsata
22. ____ Apis andreniformis

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **True** A female *Varroa* mite may attempt to reproduce as many as seven times during her life, but the average is about three reproductive cycles per mite.
2. **True** Before virgin honey bee queens become sexually mature, the workers do not pay much attention to them. Workers' aggression increases with increasing age of the virgin queen. If a virgin queen does not get mated before the age of about 10 days, the workers might as well eliminate her. Workers' aggression is assumed to encourage the virgin queen to fly from the hive within the optimal time for mating.
3. Peritrophic
4. **True** Honey bees (*Apis mellifera*) are native to the Old World and all honey bees present in the Amercias are descendents of bees introduced from Europe, Africa, and the Middle East. Managed honey bee colonies in the Americas are derived from at least five introduced European subspecies.
5. **True** The honey bee's sense of smell is located in the antennae. Amputation of the last eight segments of the flagellum of both antennae prevents the bee from being able to distinguish between scents. If only seven segments are removed on one antenna and eight from the other, then the remaining single segment will provide the bee with good olfactory discrimination. The sensilla placodea, the sensory organs, occur only on the last eight segments of the flagellum.
6. A) 60 days
7. C) 10,500
8. **True** When package bees are installed on drawn comb rather than on foundation, they build up faster since the queen can begin laying eggs almost immediately. In order to use foundation, the bees must first draw out some comb for nectar storage and egg laying by the queen. The delay time in producing wax and building storage space will delay colony development.
9. **True** Both the adult and larval honey bees have Malpighian tubules which are the excretory organs. The larva has four Malpighian tubules and adults have a hundred or more.
10. The advantages of starting a hive with a nucleus colony rather than a package are: the faster rate of development due to the presence of brood and no break in the queen's laying cycle; ease of establishing the unit in your own equipment; and the chance of seeing the unit before purchasing it. A nuc usually expands rapidly into a strong colony and has a better chance of producing surplus honey during the first season.
11. Many beekeepers regularly go out, capture and hive a honey bee swarm. Disadvantages of starting a new colony with a captured swarm in comparison to a package are: 1) not all swarms are equal in strength; 2) primary swarms are normally headed by an old queen which is often replaced soon after installation; 3) many swarms are difficult to capture due to their clustering location; 4) potential of picking up some bee diseases and parasites would be greater with a swarm; 5) packages are available earlier in the season than a swarm; swarming tends to occur just prior to or during the beginning of the major nectar flows(s).

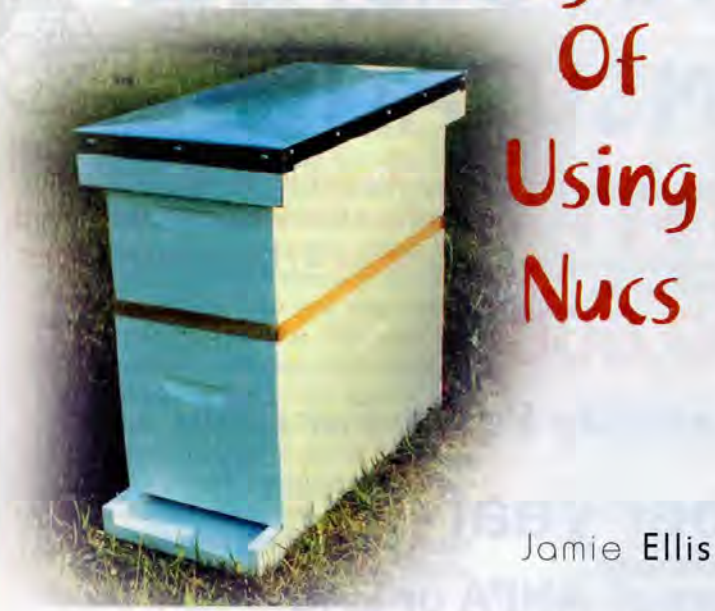
12. **True** Ethanol extracts of *Apis mellifera*, *Apis cerana* and *Apis florea* queens are effective in attracting *Apis mellifera* drones. Chemical analyses of the three extracts indicated that each queen species produces 9-oxodecenoic acid, the primary sex attractant of *Apis mellifera* queens. Most olfactory sex attractants are species specific, however, this implies that the sex attractant of several species of *Apis* are similar. In geographical areas that have multiple species of *Apis*, interspecific matings are unlikely because of disparity in size and anatomical differences between drones.
13. E) royal jelly
14. *Varroa* mites activate latent viral infections in honey bees
    Varroa mites vector honey bee viruses
    Varroa mites suppress the immunity of honey bees
15. D) Indonesia
16. **True** Drone brood cappings of *Apis cerana* are quite different than the cappings of *Apis mellifera*. *Apis cerana* drone brood cappings have a hard dome cocoon structure with a pore in the center. The function of the hard cap with a pore is still not known.
17. A) USSR
18. **True** The honey bee tracheal mite in Asia has made a host shift from *Apis mellifera* to *Apis cerana*.
19. A) the dwarf bees
20. C) the cavity nesting bees
21. B) the giant bees
22. A) the dwarf bees

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

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

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

The Advantages Of Using Nucs



A five-frame nuc. I prefer to use five-frame nucs because it is easier to find equipment for them. For example, notice the queen excluder and medium food super on this nuc. (Ellis photo)

Jamie Ellis

Have you ever needed a queen 'yesterday'? Have you ever had a colony swarm immediately before a major nectar flow? Ever had a weak colony that needed a boost to get it going? Are you looking for ways to increase profitability in your beekeeping operation? If you answered 'yes' to any of these questions then you need to consider using nucs in your operation.

Nucleus colonies (or nucs) are smaller versions of full-size Langstroth colonies. They usually have the same length and depth dimensions as full-size colonies, but nucs are not as wide. As such, nucs hold fewer frames (usually three to five frames) than full-size colonies (eight to 10 frames) and are referred to by the number of frames they accommodate. The most common sizes accommodate three-, four-, and five-frames. A second type of nuc, commonly called a 'baby nuc' or 'queen mating nuc', exists but it is smaller than full-size colonies in every dimension and is used primarily for queen bee production. I will not be discussing baby nucs here. Instead, let's look at five-frame nucs exclusively, although three- and four-frame nucs can be used and managed almost identically.

Creating a nuc

Before I try to convince you of the usefulness of nucs, I want to tell you how I create the nucs I use in my own operation. In general, I begin feeding my full-size colonies (parent colonies) 1:1 sugar water in mid-to-late February or when daytime temperatures consistently exceed 60°F. One also may feed pollen patties as a stimulant but I usually do not. Both sugar water and pollen patties stimulate colony build-up/brood production and make colonies 'prematurely' strong (stronger than they otherwise are this time of year). My goal is to split the colonies early enough so that I can 'rebuild' their population before the primary spring honey flow begins. In my area, the flow begins the last week of April. If I wait until April to make nucs, I weaken my colonies just when they need to be their strongest. Because of this, I aim for splitting my hives (making nucs) the third week of March. This allows me to feed the parent colonies an additional three to four weeks before the main flow, thus increasing their population to pre-split levels.

As you can imagine, weather plays an important role in determining when one should spilt colonies. If late Winter or early Spring is unusually cool, you must postpone your feeding/split dates. This is a judgment call you will have to make. One may decide to create nucs in Summer after the major nectar flows conclude. If done this way, one can forgo feeding the parent colony because colonies are strong enough to be split without being artificially stimulated.

You can create a nuc once the parent colony is strong enough to split. To create a nuc, take two frames of (mostly) eggs, one frame of (mostly) capped brood, and one frame of pollen/honey from the parent colony (leave the queen in the parent colony), all with bees, and place them into an empty five-frame nuc box. You then add one frame of foundation to the nuc. You can make a nuc with as little as one frame of eggs and one frame of capped brood from the parent colony with three additional frames of foundation. If you do this, you will have to feed the nuc a lot more than if you give them a frame of honey/pollen. If you choose the later method, you also will need to shake an additional frame or two of bees from the parent colony into the nuc.

For the parent colony which has the original queen, fill the newly-created void with four frames of foundation (drawn combs are even better) placed toward the outside of the brood box and not toward the center. You should continue to feed the parent colony 1:1 sugar water to build its population to the pre-split level (if done in Spring) and to pull out the foundation if you did not use pulled combs. I generally do not feed the parent colony longer than two to three additional weeks because the honey flow is approaching quickly and the bees will be able to pull out the foundation using incoming nectar. If you decide to make a nuc during Summer, you must feed the parent colony if you expect them to pull out the foundation. Here is where I leave my discussion of the parent colony.

If you have followed this so far you realize that the newly-created nuc is queenless. You may address this problem one of two ways: purchase and install a caged queen from a queen producer, or raise your own queen. I prefer the latter method and it is the method I will discuss further.

After you create a queenless nuc, you should move it to another beekeeper's apiary (preferably a 'good' beekeeper who manages diseases and maintains a good bee stock) or another one of your own apiaries. The location should be a couple miles from the original site. The bees will construct queen cells on the frame(s) of eggs in the nuc and when the queens emerge, they will mate with the beekeeper's drones (or your drones if you moved the nuc to a second apiary). This is, in fact, why I suggest that you do not leave the newly-created nucs in your own apiary, especially if you have fewer than 10 colonies. If you do,

Requeening a full-size colony with a nuc. The full-size colony had an underperforming queen so I decided to requeen it. I killed the queen in the full-size colony and removed five frames from the center of the nest. Next, I put the nuc's frames, queen and all, into the empty space in the full-size colony. If you worry about fighting, you can cage the queen for three days and then release her. I used the five frames from the now-queenless, full-size colony to start another nuc. (Ellis photo)

the new queens will have a high probability of mating with related drones thus resulting in inbreeding. You should move your nucs to another beekeeper's apiary so that when virgins emerge from the queen cells, there is an ample supply of unrelated drones with which to mate. In my own operation, I remove all but the two largest queen cells. The first queen that emerges will kill her competitor and become the reigning queen. If you leave three+ queen cells, you increase the likelihood that your nuc may issue swarms with multiple emerging virgins.

Three to five weeks may pass before the newly created nuc has a mated and laying queen. As such, the colony population will shrink until the new queen's brood begins to emerge. One should not worry about this as the population will grow rapidly once the queen begins laying. You should feed the nuc 1:1 sugar water until the spring nectar flow begins. Sugar water serves to stimulate the growing colony. I recommend clipping and marking your queen once she is mated and laying. This will save you a future headache as queens are easier to find in nucs than in full-size colonies.

So why nucs?

There are many, many reasons I believe nucs are invaluable beekeeping tools. Here are the seven primary reasons I would not keep bees without having nucs available in all of my apiaries.

1) Creating nucs is a good way to alleviate swarming tendencies in crowded colonies. Taking bees and brood from a colony to create a nuc is, in essence, a 'controlled swarm'. The creation of nucs four to six weeks before the primary nectar flow alleviates the stress of growing colony populations in crowded colonies. Nest congestion is a swarming stimulus. Whatever one does to remove this stimulus reduces the chance the colony will swarm. As you well know, it is impossible to eliminate the swarming tendency completely. However, splitting a colony four to six weeks before the primary flow greatly reduces the swarming tendency at a time when it is most needed.

2) Having nucs is a good way to keep your production colonies strong. What do I mean by this? I will illustrate using an example. For every two production colonies I operate, I have one 'support' nuc. The job of the support nuc is to keep my production colonies as strong as possible so they can make as much honey as possible. Remember, nucs are full-size bee populations housed in small-sized bee boxes. As such nucs have unusually high swarming tendencies. You can take advantage of this by removing brood and bees (not the queen) from the nuc and adding them to your production colonies weekly. Doing this weakens your nuc, which is not in production, and strengthens your production colonies.

To accomplish this, I remove empty frames or frames of honey/pollen from the brood nest of my production colonies and replace them with frames of bees and sealed brood from my nucs. I do this beginning three weeks prior to and during the primary spring nectar flow. If nucs have little brood to donate, I shake frames of bees, sometimes up to four, from the nuc into the supers of the production hives. One word of note: I keep my support nucs in the same yard as, often immediately beside, my production colonies. Therefore, some of the bees I shake from a nuc into a production colony return to the nuc. I do not consider this a problem. To avoid this dilemma however, one can take capped brood from the nuc and put it into the production colony. Newly-emerging bees do not know to go back to the parent colony; they think they are in their parent colony!

If nucs remain strong after removing bees/brood, you can purchase nuc queen excluders and nuc medium supers in order to manage the nuc as a regular colony. Incidentally, I prefer to use five-frame nucs because many companies carry equipment – excluders, supers, feeders, and the rest – for five frame nucs but not for either three- or four-frame nucs.

3) Having a nuc on hand allows you to deal with untimely queen problems encountered in production colonies. Let's face it, no matter what you do some of your production colonies are going to swarm or lose their queen during the nectar flow. In both instances, the colony is forced to make a new queen, thereby reducing your chance of making honey. If your colony pulls a surprise swarm, or you check and notice it no longer has a queen, you can requeen the colony with a nuc. Requeening with a nuc gives one the advantage of having a laying queen with brood and bees immediately, while not having to wait for a caged queen to arrive in the mail.

My method for requeening with a nuc is simple. If one of my parent colonies goes queenless, I remove five frames (at least one with queen cells) from the center of the nest. I then cut the queen cells from the frames remaining in the queenless colony. Next, I take the five frames from the support nuc and put them, queen and all, into the center of the parent colony. I know you are wondering about fighting bees and queen death but this method works 95% of the time with little fighting between bees from the full-size, queenless colony and the nuc. The frames from

the parent colony (at least one with queen cells) go into the now-empty nuc box to become the new support nuc. A queen will emerge from the cell, mate, and re-establish your support nuc. A second option is to purchase a queen to put into the now queenless nuc. In this instance, you must cut queen cells in the nuc. Regardless of whether you let the nuc requeen itself or you purchase a queen from a breeder, it is better for a nuc to wait two weeks for a queen than a production colony wait for a queen in the middle of a honey flow. *I let my nucs, not my production hives, deal with the problems!*

If you are worried that the parent colony will kill the new queen from the nuc, you can cage the queen, put her in the center of the nuc frames (which you have put into the parent colony), and release her three days later. This will *always* beat buying a caged queen, waiting for her arrival, introducing her, and waiting for her to begin laying! Further, this is *by far* better than letting a production colony requeen itself, a process that *always* results in lost honey profits!

Production colonies may also have failing queens that need to be replaced. Maybe the queen from the production colony has developed a spotty pattern or is producing less brood. My remedy for this: kill the queen. You cannot afford to pamper weak queens. When I kill a failing queen, I leave the colony queenless for two to three days. After this, I remove all of the queen cells and requeen the production colony with the nuc as before. I rarely kill a failing queen and requeen with a nuc immediately. I like to give the parent colony two to three days to recognize that they need a new queen.

Finally, nucs are great to have for those times of the year that queens are not available. For example, I lost two queens during December and January last Winter. Without my support nucs, my colonies would have been unable to requeen themselves and would have died!

4) Nucs help strengthen weak colonies. If you have a sick or weak colony, you can always strengthen it by giving it bees and brood from a nuc (but remedy the cause of the problem first). Likewise, if a colony is too weak to occupy a full-size box, you can put it into a nuc box where it is easier to feed and manage. This is especially pertinent because colonies too weak to occupy all the frames in a full-size colony are prone to takeover by wax moths and small hive beetles. Condensing the colony into the nuc allows you to solve the colony's problems easier.

5) Producing nucs is a great way to make colony increases. It is easy to take any nuc available in spring and put it into a full-sized hive body with five frames of foundation to create a new hive. This is a quick, easy, and cheap way to expand your operation. In one year, I turned three nucs into seven production colonies and four additional nucs. I could have gone further but I stopped due to equipment limitations. As you can see, making nucs is a good way to expand your operation using your own bees. Depending on your target size for your operation, this can save you thousands of dollars because you do not have to purchase package bees or nucs from another source. Based on simple calculations from my own experience, one can turn three nucs into 157 full-size colonies and 64 nucs in just five years. Remember, you will not be maximizing production until you hit a stable colony and nuc number. Making splits does cost in production. However, you can see that the 'do-it-yourself' approach has a huge advantage over buying bees.

6) Having nuc equipment on hand provides a place to hive all those swarms. Nuc boxes are smaller and cheaper than full-size boxes. As such, they are more convenient to have on hand when you get that phone call from someone who wants you to come collect a swarm. I know of some beekeepers who always travel with a nuc box in their vehicle. This is easier to do with nucs than with full-size colonies.

7) Making and selling nucs is as profitable as or more profitable than selling honey. To give you an example, this past season I created seven nucs from four production colonies. The four colonies made honey as usual and I could have sold the nucs for $75-100 each! This means I could have enjoyed all the profit from having four production colonies making honey while reaping the benefit of an additional $525-700 from selling nucs.

I want to emphasize that I never have more than one nuc for every two production colonies I own. Because of this, every nuc I make above the 1:2 ratio, I can sell for a profit. Remember, it is important to always have nucs on hand in your operation, but when you finally do accumulate excess nucs, all extra nucs you create can be sold for a profit.

Admittedly, nucs require more attention during the year than do full-size colonies. Their populations often expand beyond what is allowed by the equipment in which they reside. So, you will need to keep their populations low by taking bees and brood from the nuc and adding it to the production colonies periodically (or just create more nucs). Further, nucs can exhaust their food supplies rapidly, especially during Winter, if not watched closely. Despite this, nucs are easy to feed so starvation should not be a problem if you watch them closely. This is another reason I recommend using five-frame nucs because you can purchase medium supers for them. As such, you can maintain a nuc much like a regular colony, with a brood chamber, a queen excluder, and a 'Winter' super full of honey for their consumption.

I recognize that the usefulness of nucs may vary around the country and under different management practices. However, I have never visited a bee operation, whether large or small, that would not have benefited from the use of nucs. I also realize that some of my techniques will need to be modified to work under varying circumstances.

This has been a general guideline for people who want a better way to solve problems in most beekeeping situations. I think you will find that having nucs around is a very wise and profitable endeavor! Nucs have certainly proved their worth time and time again for me. BC

Jamie Ellis is an Assistant Professor of Entomology at the University of Florida, Gainesville.

Naked Combs & Empty Spaces

A week in the life of a hive – in Winter!

Larry Connor

Day 1

We are quiet. Only a few of the nurses are busy with the young ones developing in the center of the cluster we make to protect them and ourselves. The Winter has been long and lacking the protection of snow. The solstice passed many weeks ago and the days are getting longer, our mandate to begin brood rearing. But the equinox, where day and night are equal has not arrived and there are many cold and quiet days ahead of us before the noise returns. We think of the noise, the collection of food from the flowers, making beebread, processing nectar into honey and rearing comb after comb of young bees. But now we must remain quiet.

We are on rations. We hear the opening of the few remaining capped cells of honey within the confines of the cluster as a few bees fill their stomachs and offer the food to the nurse bees to care for the developing young. The rest wait their turn as tiny amounts of the intense sweetness is given to us to continue heating the cluster so the young ones will grow. When the rations become low the old bees, the ones who foraged in the Fall, refuse the food and hang on until slowly one by one they drop to the floor below. When the weather warms and we are able to break free from our quiet cluster, we will remove our dead sisters from the hive and carry them out into the world where they will return to earth. We cannot allow the dead to remain within the hive. Until now we have needed the older bees to help keep the cluster alive, but now we are at peril as the cold and dwindling supply of stored honey combine with too many flightless days. The quiet must continue.

We are the hedgerow hive on the north. We were made last Summer from the middle hive on the hive stand. The human found queen cells and announced to us that she would make a new hive with the cells, and formed us with a frame of brood on which the queen cells were found. And extra bees were shaken into the empty box. The queen cells were nearly ready, but we sensed that the first queen ready to emerge was too old when she was started, and we kept her locked in her cell until a queen produced from a younger larva was ready to emerge. We allowed the younger queen and she destroyed all the queens in queen cells, even a few the human had missed.

The young queen was enthusiastic and mated well; there are 18 fathers in our midst, all of us sharing the same mother. Several of the fathers gave us the ability to smell sick bees inside the nurse cells, and to remove them; the rest of us give aid if they request. They removed larvae that would become chalkbrood and foulbrood, and they removed the sly creatures the human calls damnedvarroa. Yet we are not free of the damnedvarroa, they hide in the folds of our bodies and in the cells of the young ones. We must be very fast to catch them and bite them, but they are so fast and hard to grasp. Our ancient stories did not include stories of damnedvarroa. Only a few seasons ago did they arrive.

Day 2

We were made from an over wintered colony kept by humans 35 miles away. That over-wintered colony was a swarm the other humans removed from an apple tree in an orchard. Before that we know earlier parts of our family were in both the south and the north. We come from hives that visited almond and blueberry flowers in the same year but huge distances apart. They endured stress, disease and chemical treatments while on the road. Now, we sit in our yard, along a row of hardwood trees growing along a rock wall that protects us from the winds of Winter. We know the almonds are blooming now, but we are here, next to our hedgerow, in a colder place many miles from the warmth of the almonds. We remain quiet until the weather warms and the first flowers open.

Last night and all morning it snowed, and now nearly 10 inches of lightly packed snow sits on our hive and gives a bit more protection from the cold – not enough to break cluster – but we do not have to consume as many cells of honey to feed the developing young ones and to keep alive ourselves. It has helped us remain quiet. There is nothing we can do but remain inactive, metabolizing heat from the honey to form the cluster

A Winter cluster. (Connor photo)

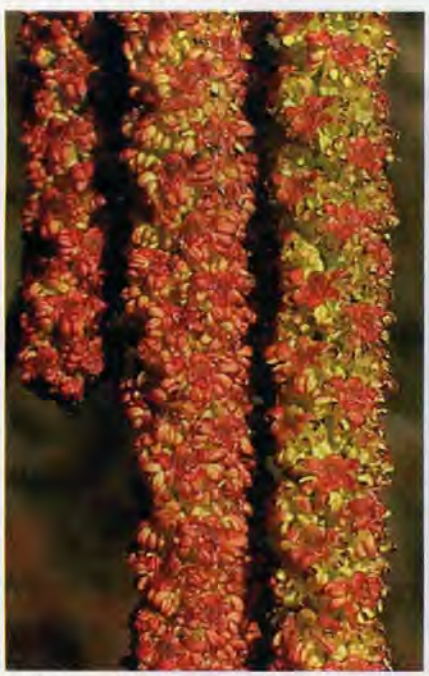
and keep the brood, and the cluster, at the right temperature.

Our future is the young ones, the eggs and larvae that are being fed by the young nurse bees that are rapidly depleting their reserves of energy as they feed. The nurse bees are starting to smell like forager bees, too old too early, and it is too soon for them to drain their nutritional reserves. But they were themselves produced during the Fall under poor conditions, when the food coming into the hive was poor in both quality and quantity. And now we see them struggling to keep the young ones fed the way we want. We know that if they cannot feed the developing young ones well enough we will be at risk.

Day 3

Naked combs surround us. The temperature outside has dropped and we are in tight cluster. The ovals of developing young ones holds us in our space, and we cannot expand to reach the food above and beside us because of the penetrating cold. The human visited us days ago and placed a frame of honey into the hive, but it is on the edge of the comb, and we cannot reach it. There are thousands of cells of honey essential to our colony's cluster heating, and the essential pollen for feeding our young ones in *that* frame. We smell it. But we cannot reach it. It is too far away.

During the night the queen was placed on light feeding, and is no longer producing eggs. Now the nurse bees have eaten the eggs that would have become young ones. This will set back our development, but there is no choice. We hope they can stop there, and will keep the young larvae fed well enough to survive. We eat the last few cells of remaining honey and kept the nest cluster warm as best we can during the cold night.



Alder amulets. (Connor photo)

Day 4

The sun warms our hive in the early morning, and the cluster is able to loosen. A few house bees break from the cluster and reach the frame of honey added by the human. They are able to move some of the food back to us before the sun disappears behind clouds and the temperature sharply drops. Some of the house bees are still at the honey frame and are most likely dead, but they moved just enough honey to keep us alive for awhile. The queen is kept on light feeding, and no more eggs are placed in the cells.

The clouds have brought in weather from the south. It rained, but the rain froze to everything it touched. A fine coating of ice forms on the snow around the hive, but we are able to get enough air through the loosely packed snow beneath the ice. The frozen rain hits the side of the hive and coats it with a silver layer of frozen water. It is a long night to remain quiet in the cluster. We wonder why the human didn't position the frame of honey adjacent to the cluster area, and why she put it on the edge of the comb. Just a few combs closer and we would be guaranteed survival, but now we are not sure if we will see the warmth of Spring.

Day 5

Finally, the weather from the south has brought warmer air. After the rain finished the temperature rose, and when the sun reached our hive along the hedgerow in the morning, we had a sudden temperature spike. The cluster is able first to loosen, and then actually breaks! Hundreds of workers are able to reach the frame of honey added by the human, and to reach the stores from the previous season. First, all bees are given a complete feeding, some for the first time in many weeks. Then the honey is systematically moved from the outside frame to the area around the cluster of young.

Some bees attempt flights, but are kept inside by the strong wind that came with the receding front. We wait for flight weather conditions to improve so we may start searching for food, and continue to move the food where we need it in the hive.

Day 6

The early sun is bright and the wind is calm. At first a few foragers leave the hive to search for food, and only a few return with negative reports. But they continue to search, and more join them as the daylight increases. Finally a scout bee returns covered with pollen from the cabbage plant growing in the wetlands to the west. She dances enthusiastically and shares her taste of honey and pollen as she tells the story of this amazing plant. When she arrived she was cold, too cold, she knew, to return to the hive. But the amazing cabbage flower was warm inside the inconspicuous scape, the center of the flower generating heat so brave pollinating insects would be able to return to their homes. Foragers are recruited to join in the search for cabbage flowers throughout the wetlands.

A few hours later other scout bees return with samples of pollen from the alder flowers, their amulets hanging low over the swamp water and ice and dusting the bees with the airborne pollen. The resulting pollen is immediately brought to the nest area where the young ones are growing, and the nurse bees consume it to make more food for the developing young. The queen is again put on full rations, and soon starts producing eggs to replace those eaten in the dark desperation of naked combs.

In the warmth, many bees are able to make cleansing flights. The entire hive seems to smell better now as waste products are finnalydeposited outside.

At the end of the day the temperature falls rapidly and we soon re-form our cluster, but the honey from the added frame has saved our colony, and the incoming pollen has insured that the young ones will be fed as they complete their growth. The nurse bees smell more like nurse bees now, with fresh pollen in their intestines being digested into brood food.

Day 7

The soft maples in the swamp are producing pollen and nectar, and we are able to collect from the bright red flowers for much of the day. The olive-green pollen is a welcome addition to our collection of food in the brood area. The strong winds keep the foragers working to get to the trees and collect food essential to our late Winter survival.

Are we out of danger? No. True, there is a ring of pollen around the developing brood, as well as a ring of honey. But most of the comb in the hive is empty, naked and a stark reminder of the delicate balance we have to increase our colony, and its death. Perhaps the beekeeper will bring us other food and give it to us in a way that we are able to use it. Perhaps the weather will continue to support foraging and we will gather abundant food needed for survival and increase our production.

The risk will continue if cold and unfavorable flight weather return. Not until some time in middle Spring will we be secure in our weather and until then we must carefully collect and store the resources we needed, the pollen and nectar, to grow and increase our colony, the hedgerow colony on the north. BC

When not thinking about what, if anything, bees think about, Dr. Larry Connor is thinking about sex, Bee Sex especially, his next book due out whenever he finishes it. Feel welcome to interfere his thoughts and writing by sending email at ebeebooks@aol.com.

Calvert Apiaries

251-829-6183

Honey - Queens - Supplies

Est. 1928

Kim Flottum

Andy Webb, owner and operator of Calvert Apiaries.

Late last Spring I and a couple of friends drove down to Calvert Apiaries in Alabama, just north of Mobile, to pick up 100 or so packages.

Though it was nearly too late in the season, Andy Webb, who runs the operation with his wife Donna, said they could get that many together, along with the queens needed. He showed us around while his crew got the packages ready and this is what we saw..

The main business office, extraction facility, storage buildings, workshop, the largest queen mating yard (of three) and family home are just off Rt. 43, on the outskirts of the small town of Calvert, Alabama.

We got there pretty early in the morning, and while we waited for Andy to return from a beeyard run, we watched his retired brother-in-law, Toney Cooper fill the JzBz plastic queen cage escape tube with invert sugar candy. This machine is produced by JzBz. Fondant is placed in the air-powered cylinder and is extruded out the heated nozzle to fill the tube. Toney prepares two or three days' worth at a time.

It was late in the package season, and Andy's colonies were filling fast with an early honey flow. Normally he runs two deeps for shaking, but these already had honey supers on, making queen finding a challenge. This particular yard was down in colonies due to a visiting bear. Normally they run 32 colonies (eight pallets of four which fit a one-ton truck perfectly) in each of their 35 or so beeyards. Six of his eight employees were helping out with this last shake.

Once the queen has been found and isolated in one box, frames are removed and bees are shaken into the funnel, and into the package. When the package is full it is weighed and an old feeder can placed in the hole to seal it. Packages are set on a template on the back of the truck and fastened together with wood strips separated for good ventillation.

Calverts only do packages during April, and only do them two days/week. They can make up 100-200/day.

Packages are returned to the workshop area and final assembly takes place. Queen cages are laid out, the used feeder can removed, queen cage and now full can added, covered and fastened in place. Packages to be held are kept in a cool basement room, with a fan and misted. Or, finished packages are loaded into the customer's trailer, ready to go.

Calverts produce between 24,000 and 30,000 queens in a season. You can see this is their strong suit. They use breeders from several sources or they produce their own. They have lines from Iowa producer Elmer Yadoff, VSH queens from the Baton Rouge Lab, a modified Buckfast line, and have tried Russians. For now, the Russians aren't working well for queen production in their part of Alabama, but they haven't quit yet. The VSH line is still being tested.

The queen production process starts with making up the bars that hold the cell cups that future queens will be raised in, prepared by Judy Walley.

Bars go to the outyard where the breeder colonies, the starters (called the swarm boxes) and finishers are maintained. Grafting is done in a small on-site building by both Andy and his wife, Donna. Each cell is first primed with a diluted mix of Royal Jelly and water. Though I haven't seen hundreds of people graft over the years, I've never seen anybody even come close to the speed Donna transfers larva from comb to cell. Larva are picked up from the comb with a grafting tool with a tiny hook on the end, then floated off the hook, right-side-up, into the pool of Royal Jelly in the plastic cell.

The 10-12 breeder colonies and the starter colonies are kept close by the grafting building, under a permanent shade. This is to allow work even in somewhat inclement Spring weather, and to provide, simply, shade to hard-worked colonies. A starter, or swarm box, is a queenless colony, that takes perfect care of 117 grafted cells for one day. The second day cell bars are checked and any cells on a bar not accepted are removed and replaced. The bars are then put into the finishers for nine days. There are 30-36 finishers, with five to six being used at any one time, on a nine-day rotation. The rest of the colonies in this yard are used to supplement bees for these two sets of colonies. Queens are produced on a five-day/week schedule, with an average of about 300/day harvested for about 24 weeks from late February when grafting starts, to the end of July when the last queen leaves.

When cells are ready, they are moved to mating yards and placed in mating nucs. There are three mating yards, widely separated, with each having its own drone colonies for as pure mating as is possible. Mating nucs are small, double nucs, each with an entrance.

Early in the season one of three frames in each half of a double nuc has an in-hive feeder, but when the honey flow begins the feeder is replaced with a drawn comb for extra room, honey storage, and laying room.

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Calvert Apiaries is a well run organization with the advantage of long experience and a good location. The changing world of agricultural crops, labor shortages, *Varroa* mites, small hive beetles and honey production challenges also exist, as they do for every queen production business, no matter where they are located.

Breeders carefully selected for desired traits, larvae raised in optimum conditions by nurse bees with adequate to exceptional food, and not stressed by pests or diseases are the keys to making good production queens. Andy and his crew make this happen, thousands of times a year. BC

Old Queens & Old Frames

Requeening & Reframing

James E. Tew

Simple questions don't always have easy answers

Question: *"Should I requeen every two years?"* Answer: *"Well, yes and no."* This common subject came up again during some short email interactions a few weeks ago. At first glance, and from the perspective of an established beekeeper, yep....you should requeen every two years. Next question? But wait. There's more to it than that.

Consider this question: "Should I requeen every year?"

Beekeeping life was simpler a few decades ago. Beekeepers were given clear instructions such as: requeen every two years, avoid pesticides, treat with Terramycin for American foulbrood prevention, don't let the moths take over, and get your supers on before the nectar flow begins – just pretty much traditional beekeeping. Well, as usual, things change – maybe due to mites and maybe not – but for whatever reason, some of the basic rules of beekeeping are changing. So, should you requeen every year? *Well, yes and no.*

Queens

As I have said before, I am unable to find a time in beekeeping's history when beekeepers were generally happy with their queen stock. We have always been, and continue to search for, the perfect queen stock. If the opinion of beekeepers today is an indication, we have not found it. Commercial queen production is tedious, weather-constrained, and imprecise. The current cadre of U.S. commercial queen producers is an industry treasure of experience and ability. Unfortunately they seem to be a non-renewable resource that is under siege. It takes years to become competent at routinely producing good queens; therefore, few new people are clamoring to become commercial queen producers. Driven by the high seasonal demand for replacement queens and the expense of producing them, I fear that some queens are sold that are inferior. By writing this, I suppose I am saying that I am one of the ones who is still looking for the perfect queen. For either the new or experienced beekeeper, when considering requeening, the first question must be, "Can I get good replacement queens at the time I need them?"

You, the beekeeper

In many instances, requeening is a serious hive management undertaking. While a replacement queen may look good in the cage, for whatever bee reason, the bees sometimes don't like her. She's killed and tossed out front – or maybe she dies naturally and is tossed out front. Large, colorful queens are not necessarily good queens, but such features are ready evaluation parameters. It is entirely possible for small queens to actually produce good stock and head a productive colony. Assuming no obvious anatomical problems, neither you, nor I, nor the queen producer, can look at a caged queen and predict her future performance. That's disconcerting.

The technical ability of a specific beekeeper to perform the requeening procedure is diverse. Normally, having several years of beekeeping experience would be an indicator that the beekeeper is adept enough to implement the procedure. But here's the rub...if the beekeeper is requeening, based on the calendar, a perfectly good queen could be replaced with a queen of lesser abilities and attributes. It happens. It is a fact that occasionally, while trying to help, we actually hurt.

But alternatively, if we never requeen, choosing instead to let the colony requeen itself, it can be surprising to see how long a colony will let a bad situation go before doing something. For example, I have a

A failed queen replacement project.

Beekeeping junk or beekeeping resources?

9-frame observation hive in my lab. Last season, it became apparent that the queen was failing. Increasing amounts of her brood were undersized drones and the laying pattern was spotty (shotgunned). The observation hive is hard to open and is intended for viewing purposes only, so I let the bees do their own thing. Well, their own thing was to let the colony run completely down, and allow wax moths to invade. The bees never made any effort to replace the bad queen. I don't know why. True, at times, we may cause unintentional hurt, but overall, requeening on a regular schedule is a good idea. We control the queen replacement process and we can do it on a timeframe that avoids disrupting the honey crop.

A person new to beekeeping may be reticent when attempting the requeening process the first time, but there is no other way to learn. I would suggest reading until you thoroughly understand the procedure, talk to others who have already done it, then give it a shot.

Requeen with what kind of queen?

This question is an example of why both chocolate and vanilla ice cream flavors are produced. Some of you insist on the very best queens while others of you accept any available queen. The bee journals are replete with advertisements for high quality and high dollar queens. In an ideal bee world, for which we are all striving, put in the best queen and expect the best results. Right? In the real world, I have had the "best" queens tossed right out front with the lesser queens. I can't say that high-dollar and specially bred queens are any more appealing to the colony than lesser bred queens. *(I will be hearing from some of you on that statement.)* Expect some successes, but you should also expect some setbacks.

Many factors affect the queen's performance. How much time do you have for your bee project? What is your skill level? Is the weather and nectar flow in your favor? For what level of random good luck should you wish? In my own bee life, I have grown to be comfortable replacing queens annually with good quality queens, but I don't necessarily try to find the best, most hygienic, most prolific queens that are available. They will only be in the colony for a year or so. While most things that happen within the hive can be traced back to the queen's function, ***every*** event in the colony cannot be the responsibility of the queen. Is my colony in a good area for nectar and pollen gathering and not near pesticide sources? Is there a dependable water supply? Was the colony stationary or was it moved to different locations several times? Did I make splits that prevented the colony from achieving a normal buildup? The weather is always a factor. No bees, from either exceptional or marginal stock, can fly on rainy or cold days. A great queen does not automatically ensure a great colony.

Is there a recommendation anywhere in this discussion?

Yes, there is – requeen regularly with the best queens available to you. Expect some rejects and failures, but overall and over time, the production and longevity of your total apiary will be improved by the procedure – just don't ask for guarantees.

Old Frames

While not directly related to queen replacement, a normal by-product of beekeeping is dead colonies (dead-outs), which result in the acquisition of vacant but previously-used equipment. I suspect that many of us have stacks of this kind of equipment sitting around waiting for that special day when we have time to do something with it. In the second paragraph above, I stated that things change. That is true of our beekeeping attitudes toward frames and used equipment, too.

Used, empty frames

It would be easy to hate these things. They take up space and they require tedious labor to repair. Most are wood, but increasingly, many are made of plastic. Essentially, each of these frames signifies a failed effort on both my and my bees' part. Maybe that is why the task is distasteful.

Unless you are of a personality who enjoys the frame repair process, I would recommend using plastic sheet foundation for the repair process[1]. Using wire-cutting pliers, strip out foundation wire – if that type of foundation was previously used – and make certain that the end bars are firmly attached to the top bar. If more than a little actual repair is required to make the frame usable again, I suggest relegating it to the kindling pile. The flat blade of a hive tool is handy for popping out the wood cleat that originally held the wired foundation in place. Using the same hive tool, knock off most, if not all, of the wax moth cocoons and discard the original comb. The old, thick, dark comb doesn't have a lot of value for anything other than starting winter fires. There's very little obtainable beeswax in them. Though broken cleats can be reused, I normally cut new cleats on my table saw that are just a bit short and a bit narrow. These slightly smaller cleats can be reinserted into the frame easier than the precisely-fitting original cleat.

A universal challenge that is encountered when repairing frames is refitting foundation into different styled frames. Some may have solid bottom bars, grooved bottom bars, two-piece bottom bars, cleated top bars or grooved top bars. If you were using replacement foundation intended for grooved or two-piece bottom bars, frames having solid bottom bars may require you to cut a small strip from the plastic foundation in order for it to fit. More kindling?

It is said by some that frame repair is not worth the time and effort, and Honestly, it probably isn't. Considering all time expenditures, assembling a new frame probably takes about as much time as cleaning

[1] For those of you intending to use wired foundation, refer to the previous issue of *Bee Culture* for a discussion on installing wired foundation in a wooden frame.

and repairing an old one. But there's the cost of the new frames to consider – plus it seems wasteful to discard a usable old frame. It's a close call. Don't spend a lot of repair time on a wobbly, old frame.

Plastic frame repair

There is essentially no repair that can or should be done to plastic frames, themselves. I suppose broken parts could be glued back together, but the accumulation of wax will hamper most glues from working properly. I would suggest that you recycle the plastic frame with your other plastic recyclables.

A more frequent problem with plastic frames are combs that are improperly built by the bees. Using a putty knife or hive tool, scrape the comb off back to the midrib of the frame. There's no need to get every smidgen of old comb off, even if wax moth damage was the problem; however, it is important to get all the remnants of the misshapen comb removed. Otherwise, the bees will probably use the improperly built comb base as a template and rebuild defective comb again. *I would like to hear from any of you having experience in revamping and reusing plastic frames.*

Is there a disease issue?

Bee equipment designers, now long past, intended combs to be used for years and years. Now chemical and disease residues are forcing us to rethink that age-old procedure. This very day, Editor Kim sent me yet another message citing a technical source saying that reusing old comb for a long time could be harboring not only chemical residues, but also viral infections. Now before you all go out and burn up perfectly good, old combs, I need to say that we are not firmly at that point....yet. I don't know any researcher who's been gamey enough to specifically say how many seasons comb should be used before it is retired. Also, I am unable to tell you, at this time, to what extent the wooden frame itself is contaminated. Should old frames be refitted and re-used? For the time being, I am guessing the answer to be "yes." Should I expect to grow old with my combs and be using them 10 – 15 – 20 years from now. Probably not.

Anytime.....anytime that you are rebuilding a frame, especially a frame having old comb, be watchful for signs of American foulbrood. Too often as we blame our colonies' maladies on exotic pests like viruses or mites, the real problems are old friends like American foulbrood or simple starvation. Don't spread American foulbrood.

Things will continue to change

To greater or lesser degrees, things have always been changing in beekeeping. Today, our queen stock is not perfect. It never has been. Our techniques for introducing new queens are not foolproof. They never were. When colonies seem to needlessly die, we are increasingly suspicious of our old comb and used equipment as a possible part of the problem. That may – or may not – be the solution.

But a clear, new answer has not yet made itself plain. Are you and I supposed to burn up woodenware that has a potential lifespan of a decade or more because it may have a virus contamination? I was taught that giving colonies frames of drawn comb was a good thing. It saved the bees from having to build expensive, new comb. Well maybe, maybe not. Our present recommendations seem better suited for a style of traditional beekeeping now long gone – a time when good queens were readily available at a cheap price and a time when high-quality woodenware could be used for 20 – 30 years. Stand by. We will work it out. Things are in flux, but when have they not been? BC

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A Spring Primer

All the management tricks you need to get from Winter, to honey flow.

Jennifer Berry

Standing outside the other day (back in February) I could smell Spring in the air. It was still cold and grey but a wind was blowing from the south and the air was filled with an aroma of greenery. Beekeepers can identify with the scent of Spring. During these past icy, Winter months (OK, not that icy in Georgia) I've been leafing through numerous seed, plant and beekeeping catalogs in anticipation of working with nature once again. And now it is just a few weeks away! Red maple is blooming, the bees are getting anxious, and so am I. Soon we will see clover, tupelo, blackberry, tulip poplar, and gallberry in full bloom, summoning our bees. But with my joyous anticipation also comes a sense of urgency. I didn't quite complete all my Winter projects and now Spring is almost here. I still have boxes and frames to construct and wax to melt and honey to sell and, and, and. But Mother Nature waits for no one and neither will the bees. They are ready to hit the sky in search of nectar, pollen and new home sites. So ready or not, get your veils on and let's get to work!

Successful overwintering is a result of proper Fall and Winter management. But that's neither here or there now. What we need to do is concentrate on problems at hand. Due to the above-average temperatures experienced by most of the United States in early Winter, food reserves may be below average. Not only were the bees more active over the Winter months but brood production is on the rise in anticipation of the upcoming nectar flow and swarming season. This is a critical time of year for your colonies so it is important not to make the mistake of assuming they're OK.

In the late Winter months, brood rearing has begun, but not without a price. Large quantities of the food reserves are consumed during this time. The colony has to keep the brood area at 35° C ± 1° (95°F). This takes energy, and energy ain't cheap. Thus, the proper placement and amount of food is critical if the colony is going to survive. It is crucial that you check your colonies this month for honey and pollen supplies and location. If it is still too cold to enter the colonies, lift them from the rear to determine the weight. If the colony feels light (that is, you can tip it forward easily with one hand) feed a 2:1 sugar syrup solution directly on top of the cluster with either an inverted bucket feeder or gallon baggy. Don't count on Boardman entrance feeders or hive top feeders in cold weather since the bees are unable to leave the cluster to feed. And don't be skimpy on syrup. Think in terms of gallons per colony, not quarts. (Actually, think in terms of pounds of sugar. Eight pounds is about the equivalent of one deep frame of honey, and you'll need *at least* that in the north.) During this time of year our lab gets numerous calls about colony death. Upon inspection we usually find that it was simply starvation. The worst case scenario is to find that a colony starved even with 30-40 pounds of honey still in the super just out of their reach. Sharp drops in temperatures or prolonged cold weather can separate the cluster from the honey supplies and they die. That is why it is necessary to put food right next to the cluster. Not only is honey being consumed, but pollen as well. If pollen loads were light last year (and they were in a lot of places), don't forget pollen patties. With brood rearing in full gear, pollen supplies are in high demand. It's probably safer to feed a pollen supplement patty and have the bees ignore it because they have plenty than to seriously curtail brood rearing due to a lack of protein.

Tulip Poplar is an early source of flavorful honey.

Now for the next hurdle and probably the most frustrating: swarm management. Here in the Piedmont region of Georgia we can experience swarms as early as February, but they usually begin at the commencement of the Spring nectar flow. I've seen too many of my bees hit the trees over the years, so I take this pretty seriously. Plus, with a queen breeding operation, you really don't want your breeder queens flying away with all the goods.

Once the temperatures allow, go through each of your colonies and assess their condition; food quantities, queen quality and overall strength of the colony. Keep records of each colony's condition.

If the colony is weak and the queen poorly performing, it is best to combine that colony with another, unless you have a queen in the mail, so to speak. If the queen is poor, replace her as soon as possible. Requeening is one method of swarm control even if the old queen is still doing well. A fresh new queen with her new aroma will sometimes confuse the bees into thinking they have swarmed. But remember, swarming

You can let the colony raise its own queen.

is the colony's way of reproducing. To swarm means to survive and all creatures big or small are inherently programmed for survival.

Another way to discourage swarming is to equalize colonies or produce splits. After your inspection, you'll know your colonies' conditions, especially since you kept records. Strong colonies are the first to hit the trees. Swarming cues like a large population, congestion, reduced laying space for the queen and a nectar flow are all they need. Take three to five frames of bees and brood (make sure you have enough bees covering the brood, and you don't take the queen) and add it to a weaker colony. Or, if you're ready to expand, put the frames into a nuc box or a single deep and move the bees to a new site; otherwise the forager-aged bees will fly right back to their original colony leaving only house bees to cover brood and do the work.

If queens are unavailable, let the colony re-queen itself. Sometimes a beekeeper finds himself with too many bees, so selling frames of bees and brood is a great way to reduce numbers. Since bees move up in the Winter months, hive body reversal or adding empty supers may alleviate some of the congestion. This is only a temporary solution and will not stop the urge to swarm.

OK, if you don't have extra boxes, don't want to expand, and don't know anyone else in the bee business, there is still hope. Cutting queen cells on a regular basis is probably your best strategy against swarming. Actually, here at the lab we cut queen cells in all of our breeder colonies once a week. However, we still lose bees to the trees.

One quick note, while making your assessments, this is a great time to cull out old combs and replace with new foundation. Put a date on your new frames so you can keep track of their age.

Let's see, you've tackled your colonies' needs and desires so now it is time to deal with diseases and pests. They come in all shapes and sizes, from all parts of the world, and depending on where you live, some or all need to be taken seriously. They can be a major obstacle, but with patience and good management you can win the battle.

With all the concern about *Varroa* mites we sometimes lose sight of other issues; one being the tracheal mite. We haven't seen the colony losses like in years past, but tracheal mites can still pose a threat to your colonies. If you haven't already done so, now is the time to treat with oil extender patties: two parts sugar to one part vegetable shortening or oil. If you have only a few colonies to treat, make up small patties about four inches in diameter and one inch thick. Place these on a piece of wax paper and put in the middle of a two-story colony, just to one side, or the top of a single story colony.

If there are large numbers of colonies to treat, it may be easier to fill a bucket with the mixture and purchase an ice cream scoop for just this purpose. Take wax paper and

Tracheal mites invade the breathing tubes and cause all manner of problems. Grease patties help.

pre-cut them into six-inch squares. Place one square on top of the frames in the brood chamber. Scoop out one large serving and place it onto the pre-cut wax paper.

While the bees consume the sugar, oil from the patty will adhere to their bodies. The oil acts like a shield, and the tracheal mites are unable to recognize suitable young hosts. Oil patties are acceptable for prolonged treatment since the oil will not contaminate honey supplies, but remove them during the warmest part of the Summer as they can get messy. Resistant stock has also helped ease the pressure of tracheal mites but don't rely on that solely.

Some recommend that you treat

A swarm with an expensive breeder queen leading the way is an expensive lesson.

with Terramycin (for AFB and EFB) and Fumagilin-B (for Nosema) this time of year. This is a practice that we avoid at the lab. We occasionally see European foulbrood (EFB) but usually refrain from treating with chemicals. We start by removing and destroying the infected frames and adding some healthy brood. If the queen is failing, out the door she goes and in with a new. As far as Nosema, I've never seen it here in Georgia. Not that it doesn't occur, it's just very rare to see outbreaks here in the south, but watch for it in the north.

However, rumors of that new strain of Nosema that was first identified in Europe, and now here, have us reexamining our attitude toward Fumigillin treatments. We'll have to see how it shakes out, but treatment is still not on our must-do list. Yet.

One thing we do have is small hive beetles. Our southern cohorts have a more difficult time with these pests than we do in the northern and central regions of Georgia. (Not to say we don't have the little vermin scurrying around in every colony.) At this point, we don't employ any kind of small hive beetle control, other than keeping our colonies healthy and queenright. There are several traps on the market which work well in reducing beetle numbers but will not completely eliminate them. This is OK. Colonies can withstand a certain number of beetles. At this time, there is only one chemical approved for use

Small hive beetles are a nuisance. Traps work pretty well, with the right bait.

in honey bee colonies for the control of small hive beetles. But remember, chemical controls are expensive, eliminate the problem only momentarily and can leave contamination behind for years.

Finally, let's review our Spring procedures for *Varroa* mites. For years, just like in disease control, it was recommended to treat your colonies in the Spring and Fall for mites. Understandably, you don't want to allow the overwintered mites to gain a foothold now that brood rearing has commenced. However, why waste time and money if the mite population hasn't reached the economic threshold (ET). Simply, the ET is a number which represents the population of mites that should trigger action from the beekeeper. The ET is the cornerstone for all Integrated Pest Management (IPM) practices. Sticky boards are placed into each colony for 24 hours to derive this number.

In the Southeast we consider the ET a 24-hour mite drop of 60-180 mites depending on the size of the colony – small to buster; this is the mite level that warrants a treatment. For now, no matter where you are, if you use that ET and treat if above it, you'll probably be OK. *Varroa* are tricky, watch those numbers. It's always advisable to use an ET derived as closely as possible for your particular region, if available.

There are chemical and non chemical methods for reducing mite populations. The most common non-chemical ones are bottom screens, drone trapping, powdered sugar, and resistant queens. These all help in reducing mite populations inside your colonies; however, resistant queens are likely the key. With the constant pressure of *Varroa*, honey bees have had to adapt in order to survive. This natural adaptation has been amplified with the help of queen breeders who select stock that's resistant to *Varroa*. This is a subject we could go into greater depth about, but let's leave it for now.

By April you should be experiencing either a top-notch nectar flow or be gearing up with your bees. To me, Spring is the best time to be a bee-

Varroa *mites fall off bees, and are captured below and can be counted on a sticky board, under a screened bottom*

keeper. Working outside, anticipation of the honey crop, challenges to face, warm breezes, flowers peeking out, exercising off our winter stores, gardens eager and ready, bees in a tizzy, landscapes coming to life, glorious sunshine. OK, I know, how many more clichés can I think of? It's been a long Winter, so let's get out and enjoy this 2007 Spring season. See ya! BC

Jennifer Berry is a Research Associate at the University of Georgia and is past president of EAS.

Splits Are A Sound Investment

Splits/nucs are practicable in more northerly locations, where the Spring and Fall flows nearly merge in mid-Summer. But it still has to do with Nectar Management.

Walt Wright

This submittal is not a "how-to." It's oriented to the advantages, and specifically the whys of improvement in honey production. Some beekeepers are aware that last year's starter colonies are this year's best producers. It doesn't matter whether last year's starter was a package, natural swarm, or split – typically, the starter out-performs more established colonies in its second season. The improved production is sometimes attributed to the younger queen in the second year buildup. While that may help, it is not the major reason for improved production. If you are only interested in the real reason, you can skip to the last paragraph. We are going the long road around Robin's barn to get there.

Just to insure that we are speaking the same language, a split to me is placing one to four frames of brood in a nuc (leous) box. Some beekeepers refer to equal division of colony assets as a split. I call each of those two units created a "divide." Other beekeepers use the words split and nuc interchangeably. In my way of looking at it the split refers to action at the donor colony and a nuc is the result of that action. I'm nit-picking again.

The general advantages to making splits are manifold. A few spin-off advantages will be mentioned first. Putting the split/nuc to work drawing comb provides new comb for other uses, such as comb replacement and increasing drawn comb inventory.

Splits (now a nuc) are beneficial in making up winter losses or increasing hive count. The whole concept of splitting/nucing is generating a new colony with available bees. You have but to supply a queen, feed, and equipment to generate a new colony. The resulting nuc has a head start over the purchased package of just bees. Not news.

For increasing my hive count, I prefer the post-harvest divide. If you look at the advantages overall, you may too.

Splits are the second most popular swarm prevention action – second only to hive body reversal. Based on the theory that "congestion causes swarming," we are led to believe that removing a couple frames of brood relieves congestion. Any relief is very temporary. Do the arithmetic. Let's assume a double deep brood chamber has the equivalent of eight frames of brood (more than eight makes it worse.) When two frames of brood are removed, you have reduced the potential population increase *for that brood cycle* by a mere 25 percent. The colony can cycle the whole worker brood volume in about 24 days (C.L. Farrar's number). Disregarding brood cycles before and after taking the split, and the extensive population created by those, you have reduced congestion very little. The colony can make up the two frames pilfered in less than a week (25 % of 24 days.) When the before and after brood cycles are factored in, the effects of removing two frames are outgrown in a few days.

But the taking of splits *IS* fairly reliable swarm prevention. Why is that? You knew I couldn't get by a discussion of swarming without putting in a plug for Nectar Management. The objective of NM is to open or remove the overhead honey reserve that limits brood nest expansion. When a split is taken from the top box, and substituted with empty comb, you have implemented the minimum requirements of NM. If you accuse the veteran beekeeper who practices splitting of applying the principles of NM expect an argument, at best, and don't overlook the possibility of personal attack.

Having identified some of the desirable features of splitting, I must admit I don't do it. My deeps divided in the middle to make two-way nucs are collecting mud dauber nests in the loft of the bee barn. Nucs are impractical in my area. I have not learned to enjoy feeding bees. In this area, with a short Spring flow, and two months of iffy field forage in mid Summer, feeding nucs is both expensive and time-consuming. They must be fed initially to get them up-

and-running. About the time they get rolling, field forage trails off. For the Summer doldrums, they must be fed more and more because they are building population and expanding comb for brood and storage.

Splitting/nucs are more practicable in more northerly locations where the Spring and Fall flows nearly merge in mid Summer. Packages and other starters, including splits, can be expected to produce some surplus in those areas. Feeding is restricted to getting them started in the early season. Different ball game.

For increase in hive count, I prefer the post-harvest divide. My harvest time for Spring honey is early Summer. When evenly divided at that time of the season the production colony has ample brood and stores to support them through the summer doldrums. Its a good way to use partial frames of honey that cause extracter imbalance during extracting. With a reasonable fall flow no feeding is required. My way may be as impractical in the north where harvest is later, as splitting/nucing is here. The divide needs some time to get organized.

Having rounded Robin's barn with miscellaneous notes, we can now close in on reasons why second year colonies out-perform more established colonies. It has to do with colony operations that change with colony age. In the first year colony motivation is establishment. To become established they must build enough comb to rear replacement bees and accumulate enough stores for wintering. Those objectives cause a separate mode of operations. Although modes of operation are not found in bee literature, you know what that means. Your laundry washing machine or dryer has several modes – selected by switch position. Depending on the objective of each use the machine can be switched to the appropriate mode to accomplish the objective for that laundry load.

The popular beekeeping literature has no reference to colony modes of operation (other than what you read in this Journal, I guess). From the literature you could conclude that the colony is just waiting for forage to show up on the horizon. When forage is available, they go after it in a big way. This impression is inaccurate. Sometimes forage is available that they do not work. It's not that the colony does not know it's out there, but they forage to support the colony "needs" at the time. Those needs change with operational modes.

Back to the establishment operational mode of the bee colony: When the first year colony is doing its best to meet requirements for wintering they have several top priority activities at the same time. Building comb, rearing replacement bees, feeding the colony, and accumulating stores are all equally important to survival. Meeting those survival requirements in parallel causes a unique operational mode. As an example of that mode, the urgency of making progress induces them to build cells while using them. They will put brood or stores in cells that are barely started and build cell walls around developing larva or stores accumulation. That characteristic is unique to establishment.

Colonies three years old or more are typically well established by having their residence cavity filled with functional comb. When fully established, each season is broken into different operational modes synchronized to the vegetative development of the area. In late Winter the colony is dedicated to reproductive swarming. They stay in that mode until Spring greenup, and change to a second mode to gear up to store Winter rations. The second (intermediate) mode is dedicated to rearing house bees to support main flow storing and lasts for a worker brood cycle. When the house bees are ready to support "main" flow storing, the colony switches to the third operational mode of the Spring season. In that storing mode, they are geared to store winter rations with maximum efficiency. Collection, curing and capping of available nectar is the main thrust of that mode.

The details of internal activities or colony operations are much too complex to report in this submittal. The generalities of the first and third year Spring modes are provided above to set the stage for a discussion of second year differences. The second year colony has more flexibility in their modes of operations. If the second year colony that survives the Winter perceives that full establishment was not accomplished in their first season, they can emerge from Winter in the establishment mode. They can have wax making capability a full month prior to the new wax making (main flow) of the third year colony. However, if establishment was completed in the first season, the second year colony behaves much like third year colonies and doesn't develop wax making capability until the main flow timing.

It's easy to see how the above difference supports colony long-term survival, but there are other second year differences where improved survival are not obvious. There are likely other differences that have not come to my attention. Subtle differences could easily escape detection by observation. The two observations below were prominent enough to justify reporting them.

Nectar management induces supersedure. The second year colony typically supersedes earlier than the established colonies. Second year colonies supersede promptly at reproductive cut off, about three weeks prior to main flow. Third and subsequent year colonies scatter supersedure through the period, (both before and after), of start of main flow.

Second year colonies will store nectar at the top during the three week period prior to the main flow. That's the period that overwintered colonies are rearing the nectar processors and wax makers for main flow storing. Third and subsequent year colonies add very little nectar at the top during that time. The forage collected is primarily used to feed the colony. It's sometimes referred to by beekeepers as the "dearth" before the main flow, but there is ample nectar in the field. The second year colony gets a head start on production by storing a couple supers of nectar overhead before established colonies get out of their storage lull. And that's the reason second year colonies are better honey producers than more established colonies.

Took a while to get there, but we made it. BC

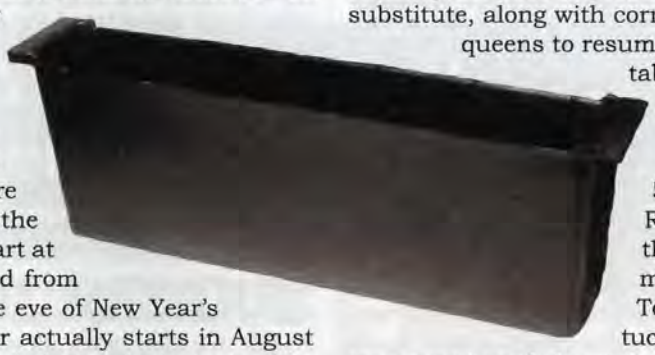
Walt Wright doesn't make splits, and lives in Elkton, Tennessee.

WEST KENTUCKY (and South Mississippi) BEEKEEPING

This is an intense, concentrated and well run operation that gets four colonies from one, and doesn't use chemicals.

Kent Williams

I would like to begin this short series by saying how honored I am to have been asked to contribute to *Bee Culture*. When I was young in my beekeeping career, one of my early mentors, Jay Covington, gave me several large stacks of *Bee Culture* magazines and told me to read them over the winter. I have read *Gleanings in Bee Culture* issues from the mid sixties to the present, and hold in very high esteem the many writers, scholars, and staff who have a part in producing and getting this publication out to the beekeeping public each month. Jay is now gone from this world, but I would like to think he would be – as we say here in west Kentucky - "tickled" to see an article from one of his proteges in *Bee Culture*.



Being a communicator and not a writer, (there is a bench at our local country store where "communicators" sit) the only approach I know is to start at the beginning and go forward from there. As I write this it is the eve of New Year's Eve, but our beekeeping year actually starts in August of the previous year. Feeding is begun in August, while there are still lots of foragers available for storing nectar. This allows the queens to continue laying eggs, ensuring a good supply of "young" bees going into Winter. The bees are fed using division board feeders in the hives in addition to open feeding from buckets. Pine needles are placed in both types of feeders to keep the foragers from drowning. The bees are fed high fructose corn syrup (or just corn syrup) 42 or 55, whichever we have on hand, thinned 33% with water. If we are "emergency feeding," where the hive is actually starving, we feed pure corn syrup, or fondant, depending on the temperature. I have found honey bees to be similar to any other livestock . . . what you get out of them is in proportion to what you put into them. We feed more than some beekeepers, but we have high expectations of our bees also.

For the past several years our group of six local beekeepers has operated in a cooperative fashion. There are a few principles we operate by, which when implemented remove the stress from decision making. One is that every attempt is made to keep the hives "even" in population. Keeping hives even in population goes a long way toward reducing the amount of robbing when open feeding.

The bees are fed until the beginning of November, by which time the queens have usually shut down egg production. The next two months are spent repairing and building equipment. During the first warm period in January the bees are fed a mixture of pollen and pollen substitute, along with corn syrup, to help stimulate the queens to resume egg laying. I know our timetables will seem unworkable for many, but we have our bees in the far western tip of KY. Most of our bees are within 50 miles of the Mississippi River, and within 10 miles of the Tennessee border. Our climate is nearer that of Memphis, Tennessee than Louisville, Kentucky. We also have bees set up in permanent yards in south Mississippi. We do not deviate our schedule for feeding from Kentucky to Mississippi, but start in Mississippi and work our way north, so there is a one-week lag between when the bees receive feed in Mississippi and in Kentucky.

Since the introduction of small hive beetles we are rethinking where the patties are placed. In south Mississippi the bees can fly most of the year, so the protein supplement can be fed outside the hives by putting the patties in five gallon buckets with the tops in place and strips cut out of the sides from top to bottom of the bucket. The buckets have chicken wire covering the cutouts to keep critters out of the buckets. These are hung from limbs in the bee yards to further discourage pests such as raccoons and fire ants.

Feeding begins in January and continues until a natural pollen source is available, or the bees stop taking

Frames of honey, pollen and brood are valuable.

the food. By kicking the queen into gear this early you are setting into motion a real swarm factory...so, as soon as there are mature drones flying from hives we begin "swarming" for the bees.

This is accomplished by using a double screen to divide our two-story hives. The method that works for us is to leave the old queen, one frame of mixed brood (all ages), one frame of pollen and honey, seven empty frames (preferably with drawn comb), and a feeder – which we fill with light syrup – in the bottom half. The entrance of the bottom hive remains in the direction it has always faced. Then we place a double screen directly above the bottom hive. The remainder of the brood, bees, and food, along with a feeder with light syrup is then put in the top hive. The top hive is sometimes allowed to raise their own queen, but usually a nine day old queen cell is installed. It is important to face the entrance to the top hive directly away from the bottom hive entrance to reduce the chance of the queen returning to the wrong hive from a mating flight.

This is done to each hive. In the hives where queen cells were installed we return in two weeks and check for laying queens. For hives that rear their own queen this check is made at 24 days. In south Mississippi this is usually done the second week of March, right now, in fact. In Kentucky it is done the first week of April. This is due primarily to the climate difference, the bees being unable to fly as early in Kentucky.

As soon as there are eight frames of brood between the two hives a three frame nuc is made using two frames of brood, a frame of honey with pollen, and the "old" queen from the bottom hive. The "new" queen from the top hive is moved down to the bottom, and is left with two frames of mixed brood, at least a couple of frames of drawn, but empty, comb, and at least two frames with honey and pollen. The top hive is then allowed to raise a new queen, either from a nine day cell or from young larvae. It should have at least four frames of mixed brood and a couple of frames with honey and pollen. The three frame nucs that were made are either used to fill empty equipment or sold. These two-queen hives are kept in this constant rotation until our nuc orders, and empty equipment are filled.

Frames of all pollen are used as much as possible.

The final split comes at the beginning of the honeyflow. Three frames of brood with bees, along with the "old" queen are removed from the bottom box and placed in a nuc. The double screen is then removed and all of the brood and bees are joined to take full advantage of the honeyflow. This is a version of a modified two-queen system used for years with much success by a Somerset, Kentucky beekeeper, G.D. Hieronymous – and taught by him to a generation of Kentucky beekeepers.

To summarize, we begin in August with hives of even population. Small amounts of light syrup are fed until November to both allow the bees to store an ample supply of food for the Winter and to keep the queen laying late into the Fall. (It is very rare when there is a Fall honeyflow in west Kentucky). The queens are stimulated into resumption of egg laying by feeding protein and small amounts of light syrup in January, making sure the hives are still even in population. The hives are checked regularly, and we begin dividing them using a double screen as soon as there are mature drones flying from the hives – usually the first or second week of March in Mississippi, one month later in Kentucky.

It is not our practice to treat for any diseases or pests, other than using traps for small hive beetles and bottom screens, or open bottoms, for *Varroa*. Do we lose hives during the course of the year? Yes, but it is our opinion that the pest problem is more a problem of not knowing how to make four hives from one than it is of knowing how to kill a mite . . . or beetle. The majority of the queens we use are reared from hives that have survived with no chemical treatment. New genetics are added each year to keep some amount of diversity in our bees, but these new lines are constantly being tested by nature itself. Those that survive will be used the following year to replenish losses. We also mark all of our queens, so when a new queen is introduced into a hive in the form of a queen cell, we can be sure the change was successful. Most of the mated queens introduced are joined to the queenless hive as part of a nuc by using the newspaper method. Occasionally a mated queen is introduced into a queenless hive using a queen cage with a candy plug in one end.

We are a small group of beekeepers who were not satisfied with the "status quo," and decided to try to find a better way of operating. Some of us have extensive contact with commercial beekeepers, and have adopted some of their methods – and adapted them to fit an operation our size. Over the past several years we have kept the methods that worked well for us and discarded those that looked good on paper but not in practice. We are constantly modifying our approach to keeping our bees, trying to keep changing with the times. What we do may not work at all for you . . . and it may not work for

us 10, or even five years from now. The thought here is to do the best you can with what you have, and if what worked for grand dad does not work for you anymore (many times it doesn't, by the way) by all means change what you are doing.

We expect a lot from our bees. They are expected to make a minimum of three hives from the parent hive that overwintered. The parent hive is expected to produce queens for the upcoming generation of bees, plus a honey crop. The splits are expected to be robust pollinators or honey producers. Of course, eventually we are forced to realize we are in west Kentucky, and our average honey crop per hive is paltry compared to the true honey producing areas of the country. You see, a toad can expect to jump the Grand Canyon . . . I think you see where I am going with this.

The reality is, every hive of ours does not produce a crop of honey. Some hives rented as pollinators have to be replaced mid-season. Some queens do not produce as we think they should. In other words, we are simply your everyday beekeepers.

Most of the problems that afflict other – maybe all – beekeepers also afflict us. The underlying theme by which we order our actions is to be very proactive in finding and correcting problems while they are small, using our own resources to do so. We are not afraid to take a chance, or to fail in small areas, as long as we are moving forward. The first three years of weaning the operation from chemical treatment seemed, at the time, disastrous. Our losses were very high, and it looked like a bad decision to try to go chemical-free. In subsequent years, however, our losses (gradually) leveled out in the neighborhood of 15% - 20%.

We demand a lot from our bees. We get a moderate return from them . . . and have learned to be content with the reward for our stewardship over the bees.

It is 65 degrees here and the bees are flying. I am going to go watch them awhile and see if they are bringing in any pollen. BC

Kent Williams keeps bees in several places, but lives near Murray, Kentucky.

Open Bottom Board

Assembly & Application Notes

John G. Hoffman

The OBB provides a simple means of measuring the mite level without intruding, disturbing or disrupting the colony and it's normal pattern of activity. The system includes a quick and easy way to secure the bees within the hive for either moving or shipping. There is an insert panel used for added protection during periods of extreme cold and/or wind.

I. OBB Materials & Assembly:

Screened Frame: Use Western Red Cedar, Pennsylvania Hemlock or Pine, and standard galvanized screen with ½ x ½ inch mesh. Use screws or nails (pre drill holes) and waterproof glue on all joints.

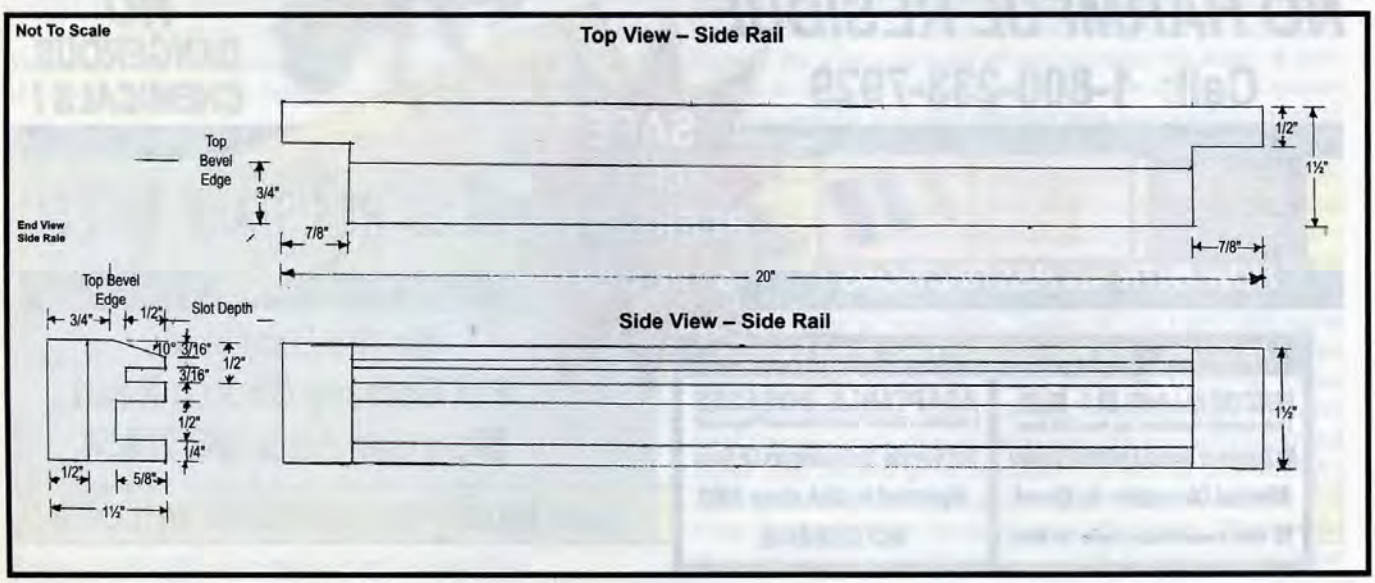
1. Assemble the front rail and two side rails. The side rails are installed with the beveled edge on top and facing inside. The beveled surface of the edge extends into the hive opening. The beveled surface reduces accumulation of moisture. The slots of the front rail must match the slots of the side rails.
2. Install the screen in the top slot being sure it is completely seated in the slots.
3. Install the back rail. It covers and secures the screen in place. The back rail appears symmetrical but it isn't; the space from the top surface of the rail to the top surface of the screen slot is a bit longer than the space between the bottom surface of the rail and the bottom surface of the screen slot. If you install the back rail upside down, it's slot won't match the side rail screen slots and will create difficulty when installing the screen. If used, the turnbuckle retains the shipping panel while the hive is in transit. Be sure the turnbuckle does not block the panel slot when the turnbuckle is in a horizontal position.

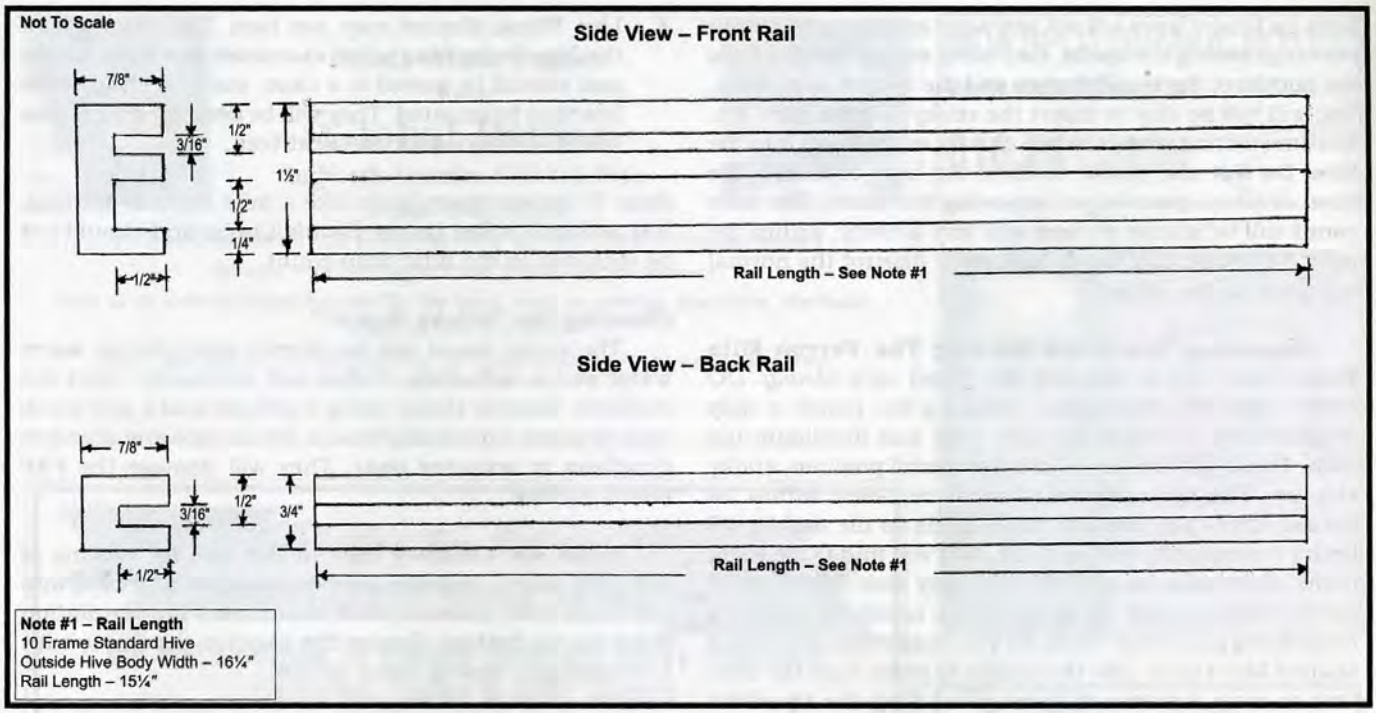
Insert #1 – "Sticky Board" insert Panel. The Fiberglass Reinforced Plastic (FRP) panel is the type commonly used as wall board in the bath and shower. The side rails are standard "J" type end/cap trim cut to length. Glue rails to the panel using exterior grade caulking compound. The entire length of the panel edge must be fully inserted into the J strip channel to assure proper width of the finished sticky board assembly.

Inserts #2 and #3 – Both panels are Exterior grade plywood. Paint with exterior latex primer followed by two coats of Exterior finish latex paint. The pull tabs are nylon strap. Glue them to the board and secure them in place with a rust-proof staple. The pieces of wire screen covering the ventilation holes are also held in place with rust-proof staples.

II. Application Methods:

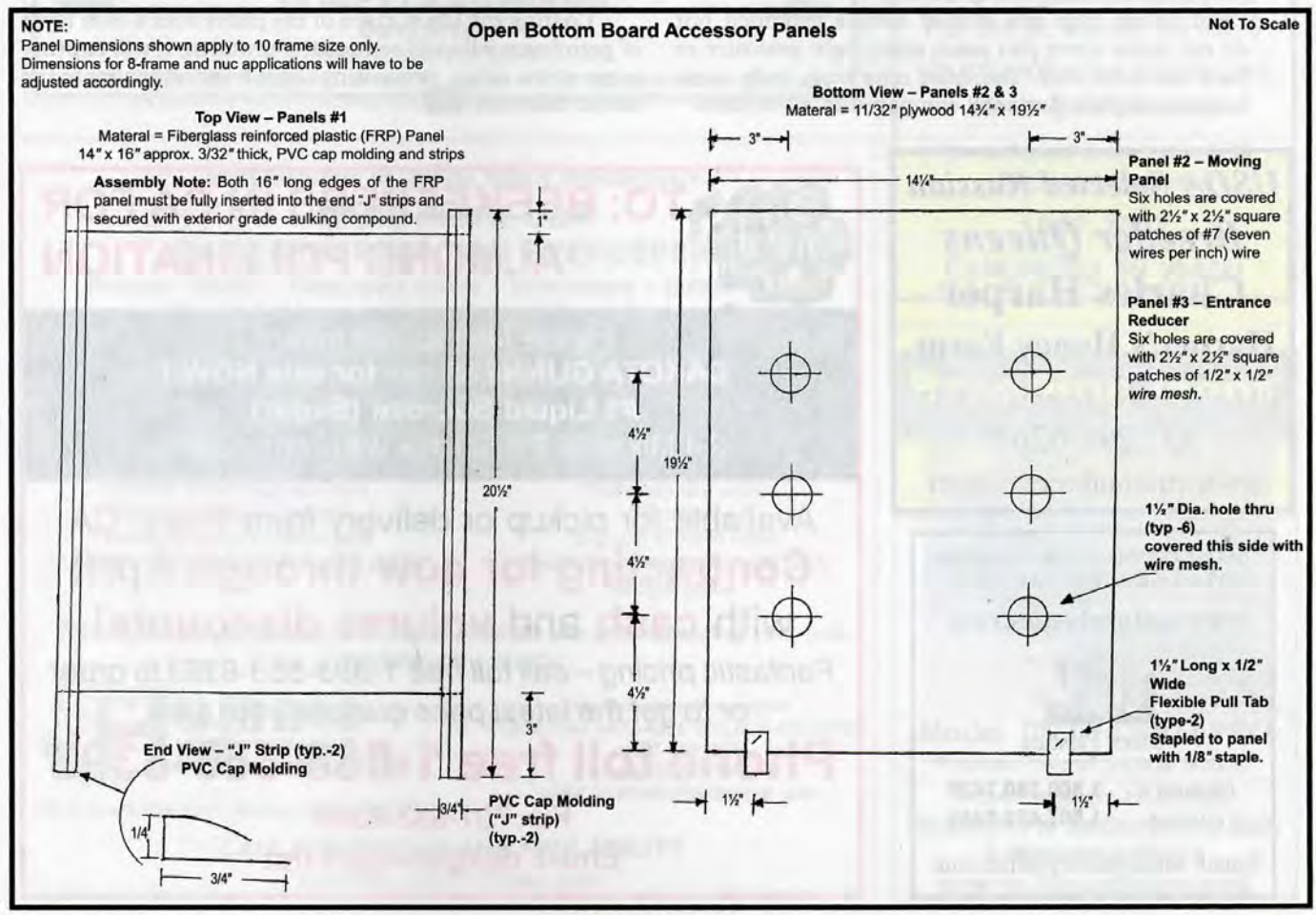
Screened Frame: Set the frame on supports high enough to prevent mites from crawling back into the brood chamber. I use an arbitrary clearance height of 10 to 12 inches. This may be a critical factor when using pallets. The screen frame is placed beveled sides of the side rails and the screen surface up (facing the brood chamber); the panel slot is on the bottom. Your hive minus the standard bottom board, is placed directly on top of the OBB. The hive no longer has to be tilted to drain condensation and rain/snow water. The preferred position is level. The open





panel slot side of the frame can face in any direction that suits your preference or apiary site requirements.

Panel #1: FRP Sticky board panel. Either side of this panel can be used to capture mites and hive debris. Coat one entire side with a thin layer of petroleum jelly. The side rails extend beyond the ends of the FRP panel. *Slowly*, insert the panel into the slot with the short extensions end first and the sticky side up. A portion of the long side rail ends will remain outside the OBB frame. They will act as pull tabs when inserting or removing the panel. You can also write or stick markings on these rails for identification purposes. Always insert or remove the panel slowly. Be careful during hot weather. Since the



bees no longer have a front entrance and ramp to gather enmasse during hot spells, they hang swarm fashion from the bottom of the brood frames and the ½-inch wire mesh. You will not be able to insert the sticky board if they are. Resume testing when the bee cluster retreats up into the hive. **Do Not** use smoke to force the bees back into the hive, or when inserting or removing the panel. The mite count will be invalid if there was any activity, within the prior 48 hours, that would agitate or disrupt the normal activities of the colony.

Removing Panel and Reading The *Varroa* Mite Drop: How I do it. Remove the panel *very slowly*. DO NOT smoke the bees when removing the panel; it may momentarily increase the mite drop and invalidate the data. Transport the panel in a horizontal position, sticky side up. The live mite count must be taken within 24 hours. After that, the live mites begin to die and by 48 hours the majority will be dead. You will find three main items of interest on the board: empty mite shells, dead mites with legs, and live mites. Use a needle probe and a magnifying glass that works for you to examine any object shaped like a mite. Use the needle to poke, turn the mite over or move it to one of three piles. Keep the tip of the needle sticky with petroleum jelly. The first pile is empty shells. The second pile, separate from the first contains dead mites. The third pile, live mites, is on a clear area of the panel, and must be sticky with petroleum jelly to prevent the live mites from wandering around.

Specimen Identification:

1. Empty mite shells: Easily identified.
2. Dead mites: Legs are almost always extended but do not move when you poke, apply light pressure or turn the mite over. The dead mite body (side view) appears slightly flattened compared to a live mite.
3. Live Mites: May or may not have legs extended. If the legs are moving when examined, the mite is alive and should be moved to a clear, sticky section of the board to be counted. They will be destroyed when the board is cleaned for the next test.

Note: If the specimen looks like a mite but has six legs, it is probably a Bee Louse (*Braula Coeca*) and should not be included in the mite drop count.

Cleaning the "Sticky Board:"

The sticky board can be cleaned using hot or warm water and a soft cloth. Pollen will eventually stain the surfaces. Remove stains using a soft pad and a soft scrub type cleanser containing bleach. Do not use any abrasive cleansers or scouring pads. They will damage the FRP board surface.

Panel #2: Confines bees in the hive for moving of shipping. Insert the panel (end opposite the pull tabs) into the frame with the wire mesh that covers the ventilation holes on the bottom. Secure the panel in the frame with a turnbuckle, tape or other device.

Panel #3: Baffle panel for added Winter protection. The ventilation holes in this panel are covered with ½-inch mesh to serve as critter guards. Insert the panel as described for panel #2. Note: This board obstructs the path of the mites falling to the ground. Therefore, only use the panel during periods of extreme cold or strong winds. Do not have the panel in the frame for the whole Winter season.

Coating the top surface of the panel with a thin layer of petroleum jelly will reduce the problem; it will capture some of the mites, preventing them from returning to the brood chamber. BC

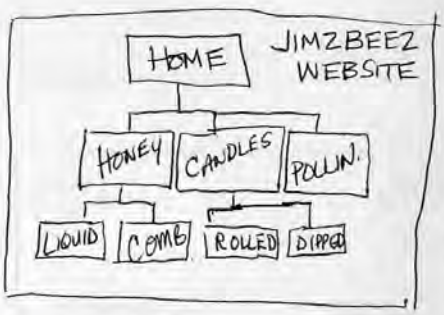
Internet Marketing

Jamie Morehead

How far along are you in starting up a website for yourself, your club or your business since last month? If you haven't started the process yet, get your February issue back out and read it again and take the beginning steps. The second part of this article is focused on the basic principles of website organization and design.

Blueprint

You can't build a solid home without a blueprint, nor can you build a home page without solid plans. You must first decide on the flow of your site and how users will navigate to easily find the information that you offer. This can be simple.



Your home page is your index. You must then create a menu of main categories. For example, you may offer A.) Honey B.) Beeswax Candles C.) Pollination. Once you have designed your main categories you can create supporting linked pages, for Honey 1.) Liquid Honey (different sizes/varieties) & 2.) Comb Honey (showing cut and/or rounds).

Home Page Design

The web presents an endless opportunity to showcase your club or products, as your site is open 24/7/365. Branding is often overlooked on websites. Be sure to display your club or business logo prominently in the upper left or centered at the top of your site, just as you would on business letterheads. The high-level main menu you established as you planned out your site "blueprint" should always be displayed to the left or centered towards the top (ideally, beneath your logo). You only have a few moments to grab your visitor's attention, before they decide to click out or search for something else. A nicely realized photograph or illustration, whether of you, your products or even a honey bee will give your visitors a good idea if there is something of interest inside. Now that your visitor has read across the page, the far right is a good place to list products for sale or a calendar of club events to invite your visitors to explore further.

Most computer monitors in use today only display a 4:3 aspect ratio – meaning much of a web page is hidden (see below) and the user must scroll down to view. Below this "line" is a good place to add secondary products and topics of interest. Be brief here; you will have the opportunity to expand on these in supporting linked pages.

Resources for Web Design

It is not possible to explain the principles of html coding, used to program web pages, in this article – there are volumes on the subject available at the library or bookstore. Local colleges and adult learning programs also offer courses on the subject. However, there are many programs available for purchase that are WYSIWG (what you see is what you get), such as Microsoft FrontPage for $199. Apple Computer offers a respectable web editing program called iWeb (bundled with iLife), which is provided with a PC purchase or available separately for $79. Many free web page templates are available on the internet. However, more advanced design templates are available for as little as $39 at templatesbox.com and elsewhere. By using templates, you are able to change the information to reflect the products or services you have to offer. Ideally, you will be able to work with a graphic designer, perhaps trading for honey?

Promoting Your Site

If you are prepared to publish a website, there are some considerations in regards to creating higher visibility for your efforts. 1) Give a descriptive and concise **Page Title** to each page. 2) The use of **META Tags** in your HTML code will allow search engines to better index *keywords*, which relate to your site and *descriptions*, which are one to two sentences of overview and are often the blurbs used in search results. 3) It may seem obvious – but, you should **submit your URL** to internet search engines, such as Google, Yahoo, MSN and Ask.com. The use of submission services is not recommended. 4) **Reciprocal links** are an excellent way to increase your exposure. For instance, if you know someone who sells tea and herbs, a "local honey" link to your page on their site and one to theirs from your site will get your information to a new audience. 5) You should **use your URL** on all letterheads, newsletters and correspondence in order to get the word out.

Make It Happen!

Mike Rossander, of Medina County Beekeepers, publishes a club site (medinabeekeepers.com) and states that he hasn't "gone for lots of bells and whistles – just good information, presented cleanly." You will find that once you create and publish your site, it will become easier to maintain. As Mike states, it will become "more stable and dynamic." If only all of our beehives could be . . . BC

Jamie Morehead is a graphic designer, and co-owner of LazyBee Studios.

The Honey Garden

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

Connie Krochmal

Arugula If you're eager to get going in the garden, start with cool season vegetables. As soon as the soil can be worked, you can plant these crops.

Arugula, one of my favorite early vegetables, acts like a Spring tonic. Its zesty flavor awakens one's taste buds after a long Winter. A member of the Mustard family (Cruciferae), this is related to radishes.

Easy to grow, arugula matures quickly. You can easily harvest baby arugula within three weeks. Medium to dark green, the smooth leaves range in shape from strap-like to deeply lobed.

Seeds of arugula were originally brought to America by the Pilgrims. Somewhere over the centuries, it fell out of favor. Later, this was re-introduced to American tables by Italian immigrants.

Native to the Mediterranean, this plant goes by a number of other names. These include rocket, garden rocket, rocket salad, roquette, rucola, and rugula.

Growing Conditions

Very hardy, arugula can be grown in a range of exposures from full sun to full shade. For cooler climates, choose a spot with full sun. It prefers partial to full shade in warm regions.

This fast growing crop thrives in a loose, moist, rich soil that is high in nitrogen. A pH of around 7.0 is ideal. Amend the soil with composted manure or compost for best results.

Planting Time

This is a cool season crop. So, avoid planting during hot weather. Depending on the climate, arugula can be planted at various times of the year. For the earliest harvest, plant from very early Spring to late Spring. When planting Fall crops in cold climates, either sow in a cold frame or use a cloche to protect this green from heavy frost. Those gardening in areas with mild Winters can also grow arugula as a Winter crop, and harvest through the Spring.

Planting Arugula

Gardeners living in cold climates can get a jump start on Spring planting by preparing the garden bed during the prior Fall. Then, as soon as the ground thaws, you can start planting.

Plant the seeds ¼ inch deep in rows one to 1½ feet apart. Once the seeds have sprouted, thin the seedlings. Allow about four to six inches between plants. For successive crops, sow some seeds about every two to three weeks.

Caring for Arugula

For the best flavored leaves, give this vegetable good care. Always keep the soil moist. Otherwise, arugula can develop a peppery flavor. Control weeds for the same reason.

Arugula needs a steady supply of nutrient. The easiest way to provide this is to mix organic matter into the

RECIPES

Ann Harman

Let's face it – along with the word "squash" the name "arugula" sounds as if it should belong to something other than a delicious vegetable. Let your imagination work on what arugula could describe. In the meantime you should try these recipes. Arugula lends a nice tangy flavor to many salads even when combined with other salad greens. And the leaves have a pretty shape to lend variety in appearance.

Since arugula leaves are a bit fragile, check the freshness of them when you buy. Treat them gently when your grocery purchases are being bagged so they are not crushed by something heavy. Then they will keep their appearance and freshness for quite a few days.

In general you will find recipes for various kinds of salads. But try this soup and you will be pleasantly surprised.

CHICKPEA SOUP WITH ARUGULA

1 large onion, finely chopped
2 medium carrots, thinly sliced crosswise
1 celery rib (from inner part of bunch), thinly sliced
3 garlic cloves, finely chopped
1/2 bay leaf
1 teaspoon salt
3 tablespoons olive oil
1 tablespoon tomato paste
2 cups (16 oz) chicken broth (use reduced-sodium)
2 cups water
1 (19 oz) can (2 cups) chickpeas, rinsed and drained
1/2 teaspoon black pepper
5 ounces baby arugula (8 cups loosely packed)

Cook onion, carrots, celery, garlic and bay leaf with 1/2 teaspoon salt in oil in a wide five- to six-quart heavy pot, over moderately high heat, stirring occasionally until vegetables are softened, about five minutes. Stir in tomato paste and cook, stirring, one minute. Add broth, water, chickpeas, 1/4 teaspoon pepper and remaining 1/2 teaspoon salt and simmer briskly, covered until vegetables are tender, about 15 minutes. Discard bay leaf. Transfer 1 cup soup to a blender and purée, then stir back into soup. Stir in arugula and remaining 1/4 teaspoon pepper and cook just until arugula is wilted, about 1 minute. When serving add a sprinkling of grated cheese if desired. Serves four to six.

Gourmet

bed when preparing the soil. You can also apply a slow release fertilizer at planting time. Another option is to add a soluble fertilizer every two weeks or so.

Generally, arugula tends to have few problems. Slugs can occur. For these, I apply a non-toxic slug bait, such as Sluggo, along the outer edges of the bed. Flea beetles can attack the plants and make small holes in the leaves. To prevent this, cover the plants with floating row covers.

Pollination

As a vegetable crop, this leafy green needs no pollination. However, pollination is required if you plan on saving seeds or growing the seeds to use as a spice or for sprouts.

Arugula flowers are similar to those of rape seed or canola, related plants. The four petals can be white, cream, or yellow. These have either reddish or purple veins. Though the blossoms are attractive to honey bees, no data is available on pollen or honey yields from arugula plants. However, these should be comparable to the others in the mustard family, which are excellent honey plants.

Days to Harvest

Days to harvest are based upon the stage at which you expect to eat the crop, and the variety being grown. For baby arugula and mesclun, it's about 21 days. Depending on the variety, the full-size leaves will be ready for regular salad in 30 to 42 days. Forty days is about average for most crops.

Harvesting

You can harvest arugula several different ways. Pinch off the larger, outer leaves, beginning when the plants are four to six inches tall. For cut-and-come-again crops, snip the leaves about two to three inches above the soil surface. It will usually grow back about three times before the leaves become tough and bitter. For baby salad, pick when the leaves are about two to three inches tall.

From a 10-foot-row you can expect to get about three pounds of arugula leaves. Harvest the crop on a regular basis. This encourages tender new growth, and helps to prevent bolting.

Culinary Uses

Salads – particularly baby salads and mesclun – are obviously one of the main uses for arugula. However, it can be prepared as a hot vegetable. This can be braised, sautéed in olive oil with garlic, or lightly steamed and mixed with other cooked greens. When the leaves become older and tougher, they can be steamed and added to stews. Arugula can also be cooked and pureed for adding to soups. The puree is the basis for arugula sauce – a much loved Italian dish.

Arugula is so versatile that it fits into so many types of salads. This one has a definite Mediterranean flavor. Serve it with wedges of pita bread.

CUCUMBER, OLIVE, RADISH, ARUGULA AND FETA SALAD

1 cucumber, quartered lengthwise, cut crosswise into 1/2 inch wide pieces
1 bunch radishes, quartered
1/2 pound Kalamata olives (black, brine-cured olives)
1 bunch arugula, chopped
2 tablespoons olive oil
1 tablespoon fresh lemon juice
salt and pepper to taste
1/3 pound feta cheese, crumbled

Combine cucumber, radishes, olives and arugula in medium bowl (Can be mixed six hours ahead. Cover. Chill.) When ready to serve add oil and lemon juice. Toss to coat. Season with salt and pepper. Mix in cheese. Serves six.

Tastes Of The World
Bon Appétit

This next recipe has a great advantage – you can make the separate parts one and two days ahead and just assemble the whole salad when ready to serve. This recipe makes a large quantity so it is suitable for a picnic or potluck.

ARUGULA SALAD WITH PEARS, OVEN-DRIED GRAPES, AND ROASTED-SHALLOT VINAIGRETTE

1-1/2 pounds seedless red grapes, stemmed
4 teaspoons plus 3/4 cup extra-virgin olive oil
4 shallots (about 4 ounces), peeled
1/4 cup Sherry wine vinegar
2 tablespoons honey
12 ounces arugula (about 16 cups)
3 ripe pears quartered, thinly sliced

Preheat oven to 250°. Line rimmed baking sheet with baking parchment. Arrange grapes in single layer on baking sheet. Drizzle with three teaspoons olive oil, toss to coat. Place shallots on sheet of heavy duty foil, drizzle with one teaspoon oil. Enclose in foil, place in small baking dish. Bake until shallots are very soft, about 1-1/2 hours. Bake the grapes until shriveled and lightly caramelized, about 2-1/2 hours. Cool. *These can be made two days ahead. Cover separately; chill. Bring to room temperature before using.*

Combine shallots, accumulated juices, vinegar and honey in blender and purée. Season with salt and pepper. With blender running, gradually blend in remaining 3/4 cup oil. *This mixture can be made one day ahead. Cover and chill. Bring to room temperature before using.*

Toss arugula in large bowl with the above dressing to coat. Divide among 12 plates. Top with pears and grapes. Sprinkle with cracked pepper and serve. Makes 12 servings.

Bon Appetit

SPRING GREENS (ARUGULA) WITH ORANGE-FENNEL VINAIGRETTE

You can, of course, use a mixture of greens but be sure to include arugula.

1/4 cup fresh orange juice
2 tablespoons minced shallots

The smooth, flat seeds have long been used as a spice in much the same way as mustard seed. Short and thick, the pods resemble those of mustard and radish, which are both relatives. Harvest when the pods turn brown and dry. The seeds come in a range of colors, depending on the variety. Oil from the seeds is used just like rape seed or canola oil.

The Flavor of Arugula

This plant has a distinctive, robust, tangy, zesty flavor and an appealing nutty aroma. The youngest leaves are the mildest and tenderest. As the plants get older, the flavor can become sharp, pungent, hot, peppery, and even bitter.

Varieties of Arugula

Quite a few varieties of arugula are available, including the following.

Astro

Noted for its particularly high yield, this matures a few days earlier than most varieties. Astro arugula can be picked in about 38 days. Very vigorous, the semi-open plants are quite heat tolerant and slow to bolt. The medium green leaves have a mild, nutty flavor. But, this can get stronger during hot weather. The overall shape of the leaves is strap-like and less lobed than most other kinds of arugula.

Greek

This variety originated in Greece. Early maturing, Greek arugula is ready in about 30 days. The leaves have a spicy, nutty flavor.

Runway

Also known as serrated arugula, Runway has oak-like leaves that are deeply lobed. This tangy variety is both attractive and delicious.

Selvatica

Slow to bolt, Selvetica arugula is especially heat tolerant. The very tasty, deeply lobed leaves mature rather late, about 50 days. The plants tend to be smaller and shorter than most arugula. Introduced from Italy, this is considered to be a wilder form of arugula.

Sputnik

This vigorous variety retains its mild flavor even during hot weather. The leaves vary in shape and size, ranging from strap shaped to deeply lobed.

Surrey

Ready in about 40 days, Surrey arugula holds up well in the heat, and bolts slowly. Its spicy flavor is rich without being hot.

Arugula and other cool season vegetables get the garden off to a good start in the Spring. BC

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1 tablespoon fresh thyme leaves
2 teaspoons (packed) grated orange peel
1 teaspoon honey
1/2 cup extra-virgin olive oil
1/4 cup finely chopped fresh fennel bulb
2 tablespoons chopped fennel fronds
3 seedless oranges
12 cups torn arugula or assorted salad greens
1 cup chopped green onions
2/3 cup walnuts toasted

Whisk orange juice, shallots, thyme, orange peel and honey in medium bowl to blend.

Gradually whisk in oil, then fennel bulb and fronds. Season dressing to taste with salt and pepper. *Can be made one day ahead. Cover and chill. Whisk before using.*

Cut peel and pith from oranges. Cut between membranes to release segments. Combine greens, green onions, and toasted walnuts in large bowl. Drain orange segments and add to salad. Toss salad with enough dressing to coat evenly. Season to taste with salt and pepper. Serves eight.

Bon Appetit

In this next recipe you can substitute packaged croutons but they will not be as good as the ones in the recipe. If you do not have baby beets you can substitute regular beets, but cut them lengthwise into quarters before roasting. Use a mild domestic Gorgonzola for best flavor,

ROASTED BABY BEETS AND ARUGULA SALAD WITH LEMON-GORGONZOLA VINAIGRETTE

1/4 cup fresh lemon juice
1 tablespoon red wine vinegar
1/2 cup plus 1/3 cup extra-virgin olive oil
1/2 cup (about 4 ounces) crumbled domestic Gorgonzola cheese
2 cups roughly torn bite-sized pieces French bread
1/4 cup assorted chopped fresh herbs (parsley, basil, rosemary, etc.)
1 garlic clove minced
24 baby beets, trimmed, scrubbed
8 ounces baby arugula (about 12 cups)

Place lemon juice and vinegar in small bowl. Gradually whisk in 1/2 cup olive oil. Stir in cheese. Season with salt and pepper. *This dressing can be made one day ahead. Cover and chill.)*

Preheat oven to 375°. Heat remaining 1/3 cup olive oil in medium ovenproof skillet over medium heat. Add bread pieces, toss to coat. Add herbs and garlic. Toss to coat. Sauté until bread is crisp, about 4 minutes. Using slotted spoon transfer bread to plate in single layer. Cool. Add beets to same skillet tossing to coat with any remaining herbs and oil. Cover skillet with foil and transfer to oven. Roast until beets are tender, about 45 minutes. Cool beets. Peel, if desired. If using baby beets, cut in half lengthwise. Toss arugula with dressing to taste in large bowl. Season with salt and pepper. Top with roasted beets and croutons and serve. Serves six.

Bon Appetit

Enjoy your arugula. It tastes much, better than it sounds! BC

GLEANINGS

MARCH, 2007 • ALL THE NEWS THAT FITS

REMEMBER HONEY CANDY?

Peerless Confection Company, manufacturer of quality hard candies in Chicago, Illinois, since 1914, will cease operations effective April 30, 2007. Declining consumption of hard candy and the increasing prevalence of imports and offshore production are two major factors influencing the decision. To remain competitive in this environment would require them to move their facility offshore, which is not an option they are willing to consider. To do so would betray their tradition of quality and commitment to their family of workers.

For 93 years Peerless has been proud to offer customers the finest quality hard candies made in America. That tradition will continue until the last piece of candy is produced. The Board of Directors made the decision to cease operations at a time when the financial position enabled them to offer each employee a generous severance package.

BUMBLEBEES TO CALIFORNIA?

A plan that would import bumblebees to help pollinate California crops won't fly with environmentalists, who fear the bees could bring exotic diseases that will threaten native species.

In a recent study, the state Department of Food and Agriculture found no danger in importing the bumblebees from Michigan as long as certain precautions are taken.

The bees are badly needed, the state says. Disease has restricted the number of available honey bees nationwide that have traditionally pollinated fruits, vegetables and nuts.

As a result, farmers have paid high prices for hives.

Importing the non-native bumblebees could cause unforeseen problems, said Ileene Anderson, a staff biologist with the Center for Biological Diversity in Los Angeles.

The bumblebees would overrun native species, she said. At least five species of pollinators are unofficially considered threatened in California, and one of those lives in the area where the new bumblebees might be used.

Indeed, the proposed bumblebee, *Bombus impatiens*, is considered a pest in California and requires a state permit for import. The Department of Food and Agriculture is considering public comments on the topic and later will decide whether such permits should be issued, spokesman Steve Lyle said.

But so far, efforts to breed native bumblebees for pollination in California have been unsuccessful due to outbreaks of disease, said Eric Mussen, an apiculturist for the University of CA Cooperative Extension. The imported bumblebees likely would not be susceptible to the same mites that have overwhelmed honey bee hives and contributed to the state's pollination problems, he said.

KEEPER OF THE BEES WINS AWARD

Honey bee expert Eric Mussen, an extension apiculturist with the UC Davis department of entomology, was awarded the American Association of Professional Apiculturists' Award for Apicultural Excellence at the organization's January conference in Phoenix, Ariz. The award has only been presented four times in the last 20 years.

Mussen, who has served in his UC Davis position for 30 years, said the honor was "gratifying."

A committee of his peers from research institutions across the United

Continued on Next Page

COLONY COLLAPSE DISORDER ALARMS EVERYBODY!

Die offs found in these states as of February, 2007.

An alarming die-off of honey bees has beekeepers fighting for commercial survival and crop growers wondering whether bees will be available to pollinate their crops this Spring and Summer.

Researchers are scrambling to find answers to what's causing 'Colony Collapse Disorder,' which has decimated commercial beekeeping operations in more than 20 states.

"During the last three months of 2006, reports of an alarming number of honey bee colonies belonging to commercial beekeepers in the Eastern U.S. began filtering in," says Maryann Frazier, Apiculture Extension Associate in Penn State's College of Agricultural Sciences. "Since the beginning of the year, beekeepers from all over the country have been reporting unprecedented losses."

"It sounds like it's more widespread than we thought. It's a very serious situation," said Troy Fore, executive director of the American Beekeeping Federation in Jessup, GA. "Some of the numbers are just horrifying."

"Almonds are completely dependent on honey bees; apples and blueberries less so," Dr. Tom Rinderer,

Continued on Next Page

A Honey Bee Research Foundation

PROJECT APIS m.

Project Apis m. (PAm) was established by beekeepers and orchardists in December 2006, as a *'New Vision'* to fund honey bee research on managed colonies. The organization's goal is to fund and direct research to improve the health and vitality of honey bee colonies while improving crop production. Emphasis will be on research studies that will have realistic and practical usefulness for beekeeping businesses.

PAm brings together representatives of the American Honey Producers Association (AHPA), the American Beekeeping Federation (ABF), the National Honey Board (NHB), California State Beekeepers Association (CSBA) and California almond farmers. While still under formation, ***PAm*** includes representatives from both the pollinaton and crop production enterprises.

Beekeepers and representatives of pollination-dependent crops are ready and willing to invest in their future. Early planning within ***PAm*** has demonstrated interest in a well-

Continued on Next Page

COLONY COLLAPSE ... Cont. From Page 63

USDA Bee Lab in Baton Rouge, LA said. "There is no substitute, and wild bees can be unreliable."

A working group of university faculty researchers, state regulatory officials, cooperative extension educators and industry representatives is working to identify the cause or causes of Colony Collapse Disorder and to develop management strategies and recommendations for beekeepers. Participating organizations include Penn State, the U.S. Department of Agriculture, the agriculture departments in Pennsylvania and Florida, and Bee Alert Technology Inc., a technology transfer company affiliated with the University of MT.

"Preliminary work has identified several likely factors that could be causing or contributing to CCD," says Dennis vanEngelsdorp, acting state apiarist with the PA Department of Agriculture. "Among them are mites and associated diseases, some unknown pathogenic disease and pesticide contamination or poisoning."

Initial studies of dying colonies revealed a large number of disease organisms present, with no one disease being identified as the culprit. Detailed on-going case studies and surveys of beekeepers experiencing CCD have found a few common management factors, but no common environmental agents or chemicals have been identified to date.

The beekeeping industry has been quick to respond to the crisis. The National Honey Board has pledged $13,000 of emergency funding to the CCD working group. Other groups such as the Florida State Beekeepers Association are working with their membership to commit additional funds. The Eastern Apicultural Society has also committed funds.

This latest loss of colonies could seriously affect the production of several important crops that rely on pollination services provided by commercial beekeepers.

Beekeepers suffering losses are being surveyed online, and if you, or a beekeeper you know has suffered large losses this Winter or Spring, go to **www.beesurvey.com** and complete the form. Everything helps.

PROJECT APIS m ... Cont. From Page 63

coordinated project-driven pursuit of realistic solutions to immediate beekeeping challenges.

PAm, currently attaining nonprofit status, will be a mechanism for beekeepers nationwide to fund and direct research activities on behalf of beekeepers. Where some current research programs are funding longer-range studies on pollination, ***PAm*** will also look to fund studies that result in nearer-term solutions and will work toward efficient and immediate transfer of results to field practice for all beekeepers.

Research will be aimed at improving and maintaining honey bee health and likewise improving and maintaining economic viability for beekeepers *Apis m.* is a 501C5 nonprofit trade organization.

Suggested contributions should be made payable to Project Apis m. or PAm $1/hive, beekeeper or grower and mail to: Project Apis m., 1750 Dayton Road, Chico, CA 95928. Please include your name, address, telephone and email address.

For more information contact Dan Cummings, dcummings@cvinc.ws; Lyle Johnston, johnstonhoney@aim.com; Steve Park, stevepark@fontiernet.net; Joe Traynor, jotraynor@aol.com or Joe MacIlvaine, joemac@paramountfarming.com.

POWDERED SUGAR VARROA CONTROL

Any kind of dust, such as powdered sugar, wheat or rice flour, will work to cause the mites to lose their foot grip on the bees. Powdered sugar is clean, easy to obtain, and healthy for the bees and beekeeper. The bees actually use it and it won't harm them.

The hive should be on a screened bottom board. Some beekeepers use plain powdered sugar; others mix powdered sugar and garlic powder (1 lb. powdered garlic to 4 lbs. Powdered sugar to treat 10 brood boxes with ½ cup per brood box.)

Procedure:

1. Insert cardboard or poster board into front entrance to cover screened bottom board to catch sugar and mites to determine the mite level.

2. If the hive has two brood boxes, break down hive to the lowest box. Sift ½ cup of sugar (either with your fingers or with a flour sifter) over the brood frames. No need to take out the frames.

3. Brush sugar off top bars to fall down on the bees.

4. Replace the next brood box and distribute the sugar in the same way.

5. Wait five minutes or longer, then pull the bottom insert out and look for mites.

6. If you have mites, you should treat a second time in about one to two weeks to get the mites that were in the sealed brood and have emerged. You can treat any time you have mites. Treat in early Spring and again in August after harvest.

7. Do not leave insert in hive, pull it out once you determine the mite level and use it on the next hive to be sugared

HONEY BOARD NEWS

Funding Four Production Research Proposals The National Honey Board (NHB) will fund four production research projects in 2007 to study a variety of colony health issues. Funding for the projects totals $108,748.

The increase in production research funding this year is a result of an increase in assessments received.

The 2007 projects – "Treatment and Monitoring Regimes to Ensure Colony Vigor and Prevent Fall Dwindle Disease," Dennis vanEngelsdorp, Penn State; "Cyclodextrins as Carriers of Essential Oils for *Varroa* Control in honey bees," Blaise LeBlanc, USDA Tucson; "Contaminants in High Fructose Corn Syrup and Their Possible Effects on Bees," Blaise LeBlanc, USDA Tucson; "The Benefits of Propolis to Honey Bees," Marla Spivak, Univ. of MN.

NHB Celebrates 20 Years Of Service To The Honey Industry The National Board will celebrate its 20th anniversary throughout 2007, commemorating when NHB first opened its offices in 1987.

NHB was created by the U.S. Department of Agriculture to administer the Honey Research, Promotion and Consumer Information Order, which was approved in a referendum of honey producers and importers in 1986.

NHB has funded many research porjects to find new an dimproved uses for honey in foods and other products, and in recent years has provided funds for colony promotional materials for beekeepers and other industry members.

WHY DO QUEENS LIVE SO LONG?

Queen honey bees might hold the key to a longer life for humans. The common worker bee lives just six weeks, but if the same egg was raised as a queen bee, the queen can live for up to six years.

La Trobe University's David Vaux is a specialist in apoptosis, the science of how cells die. His research aims to unlock the answers to the queen bee's 50-fold increased lifespan.

"I'm looking at the bees as a model, looking at how lifespan is determined," he said.

A queen bee will lay up to 2000 eggs a day in the hive. The egg hatches after three days, the larva eats, grows, spins a cocoon, undergoes metamorphosis and turns into anadult bee.

Professor Vaux said: "The interesting thing is, if you take one of those eggs and put it into a queen cell, then the developing larva will emerge as an adult queen.

"So the same egg, the same genes, the same everything can turn into a worker bee, or it can turn into a queen bee and it can live 50 times longer."

To find an explanation, professor Vaux and a fellow researcher, Sam Dyer, injected the queen bees with a genetic marker that is incorporated into the cells only when they divide.

Professor Vaux discovered the only actively dividing or replicating cells in queen bees were the ovaries, suggesting that ll the other cells in the queen were long-lived. The finding suggested that queen bees possess a cellular maintenance system that is not switched on in the worker bees. "So it raises a number of questions . . . Is there anything in common with aging in bees to aging with humans? Is our lifespan genetically predetermined, or is it determined by the environment?

Vaux said that finding similar systems in humans was a long way off.

"We don't know whether humans are going to be similar to the queens or similar to the workers."

AWARD ... Cont. From Pg 63

States nominated Mussen, citing his excellent leadership in the world of beekeeping and his assistance to his colleagues in the state.

"When issues arise with bees and pollination, Eric is one that everyone turns to for insight," the committee wrote in a nomination. "His leadership and service to professional organizations has been exemplary, and he has held a leadership position in AAPA since its inception."

His next project will be comparing effects of feeding different sugar syrups to bees, in the Spring.

For information about Mussen's honey bee papers, visit entomology.ucdavis.edu/faculty/facpage.cfm?id=mussen.

HE OR SHE?

Three years ago, scientists pinpointed a gene called csd that determines gender in honey bees, and now a research team led by University of Michigan evolutionary biologist Jianzhi "George" Zhang has unraveled details of how the gene evolved. The new insights could prove useful in designing strategies for breeding honey bees.

The findings of Zhang and collaborators appeared in a special issue of Genome Research devoted to the biology of the honey bee. Published in October 26, coinciding with the publication of the honey bee genome sequence in the journal Nature.

Scientists have long known that in bees – as well as wasps, ants, ticks, mites and some 20 percent of all animals – -unfertilized eggs develop into males, while females typically result from fertilized eggs. But that's not the whole story, and the discovery in 2003 of csd (the complementary sex determination gene) helped fill in the blanks. The gene has many versions, or alleles. Males inherit a single copy of the gene; bees that inherit two copies, each a different version, become female. Bees that have the misfortune of inheriting two identical copies of csd develop into sterile males but are quickly eaten at the larval stage by female worker bees.

The system works fine in nature, where it prevents the colony from wasting precious energy and resources on abnormal males incapable of carrying out the all-important role of mating. But in bees raised for honey or for pollinating crops, the sex-determination system can cause problems. Beekeepers inbreed bees to select desirable traits, but inbreeding raises the odds of producing fertilized eggs with two copies of the same csd allele. If too many sterile males result, the colony may die out.
around.

For more information: Jianzhi Zhang, http://www.lsa.umich.edu/eeb/people/jianzhi/
Genome Research http://www.genome.org/

FRENCH BEES IN TROUBLE

After surviving the ice age, parasites and insecticides, French honey bees are now under threat from placid foreigners.

Apis mellifera mellifera, the native subspecies also known as the dark bee, is losing out to central and eastern European breeds because beekeepers find them easier to handle and less likely to sting.

Lionel Garnery, a bee specialist at the University of Versailles and a champion of Gallic bees, estimates the dark bee makes up around 75 percent of stocks in France after being totally dominant in the late 1980s.

Successive beekeeping crises, caused by parasites and insecticides, decimated dark bee stocks and apiculturists seized the chance to bring in overseas competition.

The foreign bees are also tougher, making them doubly seductive when the beekeeping business is in a phase of consolidation as cheaper imported honey weighs on the domestic market.

"Professionals have always preferred more prolific breeds compared to the dark bee, which has several vulnerabilities," said Thierry Fedon, one of France's largest bee breeders.

DOWN UNDER DROUGHT

The worsening Australian drought has left the central west New South Wales so dry beekeepers are finding many of the hardy and usual reliable eucalypt trees are not flowering.

Dubbo apiarist Kieran Sunderland told the Australian Broadcasting Corp. the eucalpyts usually provide about 80% of the food source and breeding grounds for bees but this Spring they're not doing what they should.

"With the lack of moisture, the eucalypts, because they're so well at conserving moisture through the dry times that they won't do anything to benefit bees, that is flowering," he said. "They're just conserving moisture and seeing what happens."

He said honey producers in the region are looking to other sources of income, including live exports of bees to cope with what is predicted to be another dry southern spring.

Sunderland said the last few years of the drought have been so tough he has had to reduce his hives from about 800 to 250.

Some New South Wales beekeepers have obtained work with the pollination of almond tree plantations on the Victorian border, he said, while others are gearing up for live exports to the U.S. next year.

He warned that the dry Spring could spell a honey shortage.

Alan Harman

CANADIAN HONEY COUNCIL

Canadian honey promotion just got sweeter, thanks to a $440,000 grant from the federal government.

"Canada's new government is committed to assisting the Canadian Honey Council by strengthening its viability in the global marketplace," said federal ag. minister Chuck Strahl. "This funding will help with the international promotion of the Canadian honey industry so it can seize on new opportunities to grow and prosper."

The CHC will deliver on a suite of activities including developing a communications plan, launching awareness projects, preparing a background paper for emerging issues, policy development and research, creating and implementing an action plan for the future direction of the CHC, reporting progress at the 2008 National Convention, and planning for a future international conference.

"We are committed to strengthening our organization and with the support of ACAAF, will be able to build a more dynamic and sustainable Canadian honeybee industry," said Heather Clay, National Coordinator of the Canadian Honey Council.

OLD BEES DISCOVERED

The recently described giant fossil honey bee, *Apis lithohermaea* Engel, was recovered from middle Miocene deposits of Iki Island, Japan. *Apis lithohermaea* is the largest fossil honey bee discovered, rivaling in size the modern giant honey bee, *A. dorsata* Fabriclus, and is the first recorded fossil of the *dorsata* species group. Although the dorsata group does not occur further north than Tibet and southern China and the Philippines, this lineage occurred near what is today southern Korea and Japan during the Miocene.

from the Honey Bee Science
Tamagau Univ., Tokyo

Researchers at OR State Univ. discovered the oldest bee ever known, a 100-million-year-old specimen preserved in almost lifelike form in amber and an important link to help explain the rapid expansion of flowering plants during that period.

The specimen, at least 35-45 million years older than any other known bee fossil, has given rise to a newly-named family called *Melittosphecidae* – insects that share some features of both bees and wasps. It supports the theory pollen-dependent bees evolved from their meat-eating predecessors, wasps.

"This is the oldest known bee we've ever been able to identify, and it shares some of the features of wasps," said George Poinar, a professor of zoology at OSU and international expert in the study of life forms preserved in ancient amber. "But overall it's more bee than wasp, and gives us a pretty good idea of when these two types of insects were separating on their evolutionary paths."

Just as important, Poinar said, the discovery points to the mechanism that could have allowed for the rapid expansion and diversity of flowering plants around that time – the "angiosperms" that depend on some mechanism other than wind to spread their seeds. Prior to that, the world was dominated by "gymnosperms," largely conifer trees, which used wind for pollination and re-seeding.

photo courtesy of National

INNER ... Cont. From Page 10

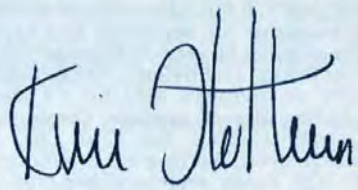
quent, and the main honey flows start where your bees are? Lots of beekeepers will tell you that you can feed protein before, and maybe through the first protein flow, if you're lucky, (or maybe two if they are light, small and there's lousy weather – you gotta bet on having lousy weather, you know). But the first big spring protein flow usually shuts them down on the in-house stuff, and they'll only take the good stuff that's outside.

So you want as many bees as possible to take advantage of that *first* major pollen flow....not the major honey flow, the major pollen flow. (well, you want even more bees for that honey flow, but the only way you can get there is to have as many bees as possible for the first pollen flow). And that major honey flow is... when?

So, do the math...back everything up so you have at least four flushes of brood before that honey flow...three anyway. That's eight to nine weeks minimum before the main honey flow...not, I repeat not the main pollen flow. Get a calculator. Otherwise, your bees will build on the main honey flow, not before it begins. And then you have welfare bees, don't you know...eating all your profits.

•

It's Spring, almost everywhere, and it's time to sharpen your hive tools and get that smoker going... it's going to be a long and wonderful season. Honest.



CORRECTION

In the February issue in the article "Georgia's Bee Lab" we inadvertantly referred to Karl von Frisch as infamous. Dr. Dietz, who was impersonating Dr. von Frish was doing so because he was famous. We apologize for this slight.

Bee Culture

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It's easier to care for an exotic pet than a grumpy old beekeeper. You try to keep him in a safe, climate controlled environment, but if you're not diligent he'll escape and drive his battered pickup over seasonal dirt roads, crawl under electric fences to check his bees, or climb a forty foot extension ladder to capture a swarm.

A grumpy old beekeeper makes his own equipment because factory made woodenware costs too much. He'll spend four hours and five dollars worth of gas driving from one store to another, trying to save $2.00 on a $7.95 circular saw blade. "I remember when you could get one of these for $3.95," he complains, as if it were you and your generation's fault.

It's hard to compete with old beekeepers. Shortly after Roger Tuttle died, his daughter started to refer his customers to me. When I tell them my price, they complain, "But Roger was selling his honey for seventy-five cents a pound!"

"Roger's been selling his honey for seventy-five cents a pound since 1969," I explain. "The jars cost more than that now."

Grumpy old beekeepers aren't all bad. Properly trained, they have many uses both inside and outside the beeyard. When harvesting honey, old beekeepers spend five extra minutes on each frame, scratching open every last cell in the corners. By harvest's end, you'll have an extra half pound of honey.

He can tell you the best car to buy (a 1953 Desoto). Get a riding mower and you'll never have to mow your own lawn again. "Kids these days are too lazy to use push mowers," he grumbles as he settles into the seat and adjusts the blade height.

Old men will make one identical bookcase for each child, then one for each grandchild. "I ought to charge for the lumber, but kids want everything for free," he complains. Once everyone has a bookcase, he'll turn out grandfather clocks. "It's time your kids learned to read a real clock instead of those electronic things," he mutters. He will paint your house, fix your car (when did they start putting engines in sideways?), and sharpen your knives, all the while telling you how lazy his children and grandchildren are (his dad taught him to sharpen tools at age six). Watch out if your grumpy old beekeeper has his own chainsaw (a forty pound 1962 model). He'll want to borrow your 40 oz. "plastic toy saw" to cut down all your yard trees. "See that moss growing on your shingles? Too much shade," he warns.

Grumpy old beekeepers are full of stories, as long as you don't mind frequent reruns. "I seen a fella settin' in his truck with the winders open eating his lunch. A swarm comes along, thinks that's a fine spot to move into. They go in through the passenger window and that fella comes out the driver side like a bat outa H-e-double toothpicks!"

Grumpy old beekeepers age about seven years for every one of your own. You are lucky to have one for more than twelve or fourteen years. My own dad died when I was a teenager so I never got the chance to raise my own grumpy old beekeeper, but I've compensated by meeting older beekeepers at meetings and hanging out in their bee yards, holding the smoker and lifting supers for them.

When middle aged men come to buy honey, they sometimes bring their elderly fathers with them. A customer opens the door.

"Hey Bob. You leave your hair at home today?" I ask.

"Ha ha, Pete. Yours looks fuller and thicker than last time. What's your secret?"

"Titebond III."

Bob is still holding the door open. "Watch your step, Dad."

Behind him shuffles a wrinkled old man with eyes sparkling behind thick trifocals. His pants are pulled up to his ribcage with suspenders. Bob buys what he needs and we carry it out to the car. Dad tries to help. I worry he'll trip or slip on the ice outside and hurt himself.

The old man turns to me. "I had 26 colonies in 47. Forty-seven to 72. No wait...46 to 74...shucks, don't make no difference. You ever try a double queen colony? I did that once – couldn't pile the supers on fast enough. Then a bear got it. I'd try it again, but..." He thumps his heart with his fist, "stupid ticker's going on me." He jerks his head toward his son. "Bob's into computers." He sounds disappointed. "I read about the mites. You have any problem with them?"

"Sure do," I nod.

"You know the two happiest days in the life of a beekeeper? The day he gets his first hive of bees and the day he sells his last hive." He laughs.

"Come on, Dad." Bob beckons Dad into the car and drives away. I think to myself, "That looks like fun, having an old man to tote around." Then I go and pet my dog.

Peter Sieling

Grumpy Old Beekeepers