

# Best Laid Plans

Larry Connor

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## More Queen Problems, And Other Things

It's easy to blame the weather for a rash of queen problems that have been reported again this Summer. The biggest problem seems to be inside the mating nucleus, where reports say the queen cells are being torn down and the queen killed. Even queen cells in cell protectors have experienced rejection. Sometimes the bees raise their own queen, and other times they don't. The latter is a serious problem for the future of the mating colony.

So let's blame the weather. Parts of the country should put in for a change in their climate status. Some should become temperate rain forests (like much of the Northeast), and other parts apply for desert status (much of the west and parts of the plains). Such change, such great extremes, undoubtedly affects the success of queen cell production, and success in the mating colony.

In the moist parts of the country where I am getting queen cell complaints, we can speculate (and that is all this is) that there may be some factor affecting the queen pheromone/queen replacement behaviors of the hive, even in mating nuclei. Just what this is, or how it may work, remains a mystery. Somehow the bees are tearing down queen cells that are added to new nuclei from one to three days after they were established. Northern queen producers are reporting only 50% maximum acceptance in their cells during June and July this year.

Maybe this will correct itself and the cell acceptance will improve. For the record, these are experienced queen producers who know when a cell has been destroyed and a "side comb virgin" is in production – virgin queens that are produced from brood and may or may not end up as desirable queens. But if you are desperate for queens in your own operation, you will often accept these queens, especially when there is nothing else available.

This reminds me of many commercial queen producers who wear a quiet smile on their face whenever they hear beekeepers who boast that they will raise all their own queens. "Just wait until you try and you will see how difficult it can be," they are thinking. Queen rearing can be exciting, rewarding, frustrating and mysterious all at the same time. That should not discourage any experienced beekeeper from trying his or her hand at queen rearing, but remember: those larvae are not laying queens yet. You know what they say about counting chickens when dealing with unhatched eggs.

### *Role of a queen's chemical fingerprint*

Several of the beekeepers reporting queen cell acceptance problems have indicated that they are producing queen cells using a different stock to graft from than

found in their bees. So I feel it important to repeat my warning about using different bee stocks in your apiary – the bees are remarkably skillful at picking out unrelated queen bees and destroying them. And this can happen at any stage of a queen's existence – as a larva, a queen cell, as a virgin, in the mating nuc, and in the colony in acceptance and as early supercedure.

I wonder if bees respond to queen pheromone as a type of *chemical fingerprint*. The queen substance is actually a complicated mixture of nearly three-dozen molecules, of which five or six have known biological roles. If these major and minor molecules appear in a set pattern for certain genetic types, then is not too hard to speculate that the worker bees, with their enormously sensitive and receptive antennae, are able to immediately recognize a queen larvae, pupae or adult that is producing a *different* chemical fingerprint. And perhaps, just perhaps, there is one molecule in the pheromones of some queens that triggers a destroy response. This would explain why some queens of some bloodlines are widely rejected by another unrelated group of bees.

Or, the queen pheromones may be out of balance. Or, there may be a molecule missing from the chemical perfume that helps bees in the cell replacement behavior.

What else would identify a queen in all stages as being different other than her pheromone? If a virgin queen demonstrates a different behavior, this might be a factor, but how does a queen cell have a behavior? Is the pupa within producing something other than pheromone (vibration, sound) that we do not know about? Has anyone tested for this?

### *The sensitivity of bees*

Dr. Bob Danka spoke in early July at the Heartland Apicultural Society meeting in Vincennes, Indiana, about the "former" SMR strain of bees developed by Drs. John Harbo and Jeff Harris (USDA/ARS Baton Rouge) in cooperation with Dr. Roger Hoopingarner (Michigan State University). The SMR moniker came about when researchers noticed that there were *Varroa* mites in worker cells that did not reproduce. This led to the name of Suppressed Mite Reproduction. But the researchers could not explain how this was happening.

Recently Dr. Marla Spivik and others (University of Minnesota) showed that SMR bees were actually demonstrating a form of hygienic behavior – the worker bees detected those worker larvae where *Varroa* mites *were* reproducing – and opened the cells and cleaned out the contents. This form of hygienic behavior has been *renamed*

*Varroa* Sensitive Hygienic (VSH, not to be confused with the cassette tape you put into your old VHS player).

Now we have a tricky situation. If we give an established VSH colony of bees a frame of emerging brood loaded with *Varroa* mites in the worker brood cells, and return in a few days, we might expect to see a nice brood pattern. But because we have a hygienic VSH queen and bees, instead we see a very spotty pattern where many cells have been emptied and the queen may have returned to lay again. Ordinarily this would condemn a queen to replacement. With the VSH bees everyone is doing their job, and we want the queen and the bees to continue this hygienic housekeeping. The adult *Varroa* mite population continues to infect the worker brood, but the VSH bees are killing the worker pupae and their co-habiting mites when they open the cells and clean out the contents. This does not help the brood buildup of the colony, of course, at least not in the short period (but then neither does a mite infestation). But in a few brood cycles the VSH bees should have eliminated a large percentage of the *Varroa* mites and the brood pattern should appear more normal.

Such a hygienic approach to mite population management is what we need in this industry, from the hobby beekeeper to the largest commercial operators. Yet both Drs. Harbo and Hoopingarner are retired, leaving a smaller group of scientists to carry out this research. I certainly hope all the scientists working on SMR/VSH stocks of bees get more than enough funding and industry support to keep this line of investigation growing and expanding.

#### *Two thoughts*

Many beekeepers who produce queens should be looking at SMR/VSH hygienic bees as potential grafting stock and/or as part of their drone supply. These genetic tools may fit into an overall mite integrated pest management scheme.

Second, this may explain what we were discussing at the top of this article – the rejection of queen cells by bees this Summer. If beekeepers are using grafting mothers containing some very different genetic materials not found within their own operation, then queen cell rejection may be just one of many difficulties they will experience. [Note: queen cells do not contain *Varroa* because of their short developmental time]. I would predict that they will have difficulty introducing these bees into colonies, and may experience a higher rate of supercedure when and if the cells are accepted. My suggestion, then, is to try introducing cells and queens into smaller groups of bees, or trying

bees of different genetic backgrounds, or both. Eventually they will have bees with the desired genetic information in their own operation and this problem will abate.

#### *Such sensitivity!*

Back up a minute. These VSH-endowed workers are able to tell that a worker bee has *Varroa* mites feeding on it inside a sealed cell, and they respond to this by cleaning out the cell contents, destroying both pupa and parasitic mites. In the beehive the workers only have contact with the wax capping they placed over the larva just before pupation. Inside the cell the larva spins a silk cocoon (like a moth, but thinner), and goes into a “quiet on the outside, busy on the inside” pupal stage.

Do you find this as remarkable as I do? It amazes me that worker bees can touch their antennae to the top of the capping of a cell and “read” what is going on inside. Or maybe the *Varroa* mites are creating feeding vibrations that set off the workers. Then does this stimulus result in cell cleaning behavior?

Is something missing? Is the absence of a key chemical initiating the behavior? Or is something present that should not be there (some odor or vibration) that triggers this response. There is no doubt this work must continue.

I have put many miles on the car again this Summer. My self-imposed wanderlust to see the country has taken me nearly coast to coast this year, and I have at least one more huge drive planned for Ohio, Kentucky, Missouri and Texas. Not knowing how high gasoline prices are going (but I was amazed at the corn alcohol plant I passed in Nebraska – one of many in production and under construction) I continue to drive as I am able. I have long felt that this country would be so much stronger if it had complete energy Independence from all other countries.

The travel takes me to remarkable places. My brother Jim took the photo of me posed with an ancient tree growing into a huge boulder in the mountains of Idaho. This tree answers the question: How does a tree split a huge rock? With a tiny seed, a bit of soil and moisture, and an enormous amount of time.

And I travel to see the country before it changes even more. I fail to see Wal-Mart box stores as progress at the expense of small communities. The sprawl is scary in parts of the country, as farmland becomes residential. As a society I feel we should stop this suburbanization of the countryside and start building local communities again. It is nice to drive into bustling towns in Vermont and not see the sprawl I observe of other states. But this takes energy and alas Vermont is growing too, and it has box stores of its own. Yet in my western most reach of my trip

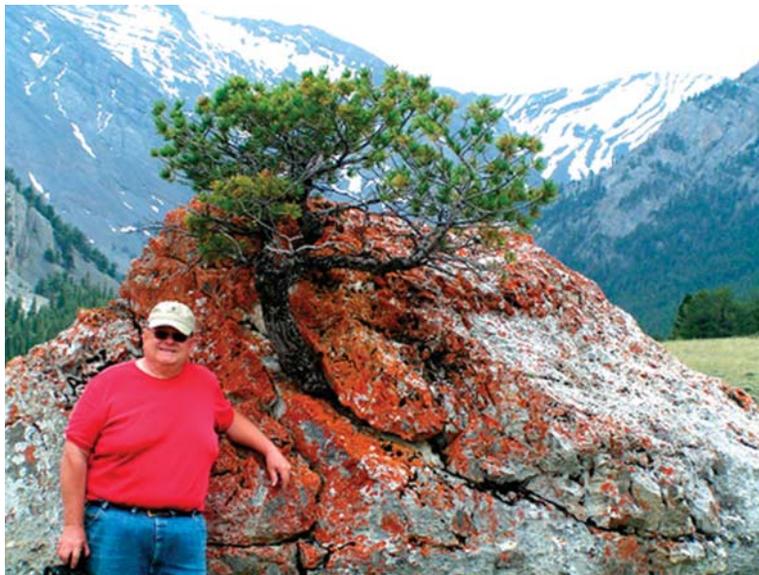


photo by Jim Connor

this Summer and last, Challis, Idaho, along the Salmon river and 90 miles from Sun Valley, the only strong deterrent to that small town's rapid urbanization is the lack of immediate critical care medical treatment.

Okay, I am on a rant again, but has our country's planning become a function of box stores and the availability of medical care?

My travel is predicated by invitations to speak from beekeeper groups, a fact I appreciate and find necessary for my personal economics. Whenever I can, I link various groups together to make the trip a bit more profitable. So I strive for future invitations and good coordination so I can visit both local and regional groups as I move from one part of the country to another.

As I reported in a prior issue, in June I went with Cecil Sweeney to a bee yard in Kansas where the queens in spring splits had all superceded and the farmer had plowed under the sweetcover. Later that month Cecil reported that the bees had pulled it together, and he hoped to get 60 pounds of honey from each hive, and things were not as dismal as I suggested. Perhaps that is why beekeepers are such optimists about the future – we are like rats in a lab and we work hardest when the rewards are randomly given for the hard work we do. Beekeepers seem to get the greatest satisfaction from chasing a honey crop, rather than actually getting one.

As a publisher, my "crop" was late too – but *Increase Essentials* is finally printed and is ready to send out to loyal readers everywhere. The book contains the basics on making new bee colonies, including some of the work

I have presented in these columns on making Summer increase and wintering nuclei. I continue to see this as the future direction of northern beekeeping. Huge thanks go out to Kim, Kathy and Sharon at *Bee Culture* who helped in the technical production aspects of getting the book to the same printer that prints this magazine. **BC**

*Increase Essentials* is Dr. Connor's new book on starting and maintaining beehives. The price is \$15 plus \$3.95 postage. Order from Wicwas Press, 175 Alden Ave, New Haven, CT 06515 or [ebeebooks@aol.com](mailto:ebeebooks@aol.com).

### **SNEBA November 18 Meeting**

Back at home in Connecticut, I have been working with the Connecticut Beekeepers Association and the Back Yard Beekeepers Association to organize a one-day program we call the Southern New England Beekeepers Assembly (SNEBA). This is a one-day seminar-type event featuring four noted speakers discussing queens, drones, mites and the fate of beekeeping. The speakers are Dr. David Tarpy of North Carolina State University, Dr. Diana Sammataro of USDA/ARS, Tucson, commercial beekeeper Mike Palmer of St. Albans, Vermont and myself.

We are meeting at the Unitarian Society of New Haven located in Hamden, CT, and convenient to the interstates and the Parkway. There is a registration fee of \$35 to cover speaker travel costs and refreshments and other costs. For information and a registration form go on line to [www.sneba.com](http://www.sneba.com), or contact me at [ebeebooks@aol.com](mailto:ebeebooks@aol.com) or 203 397 5091. Email is better – remember my travel schedule? Please register by November 1<sup>st</sup> to allow our volunteers to plan the event.