How One Small Beekeeping Operation Developed Its Own Strain of Mite-Resistant Bees and How It Hopes to Continue

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In a July, 2007 ABJ article about chemical-free beekeeping, Peter Borst included a photo of me as an example of someone who was raising mite-resistant bees. The article did not explain how I had come to possess mite-resistant bees, so I thought that a follow-up article would be in order.

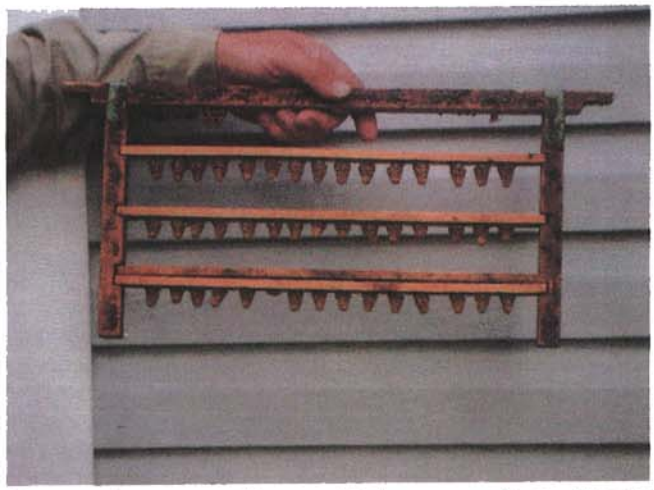
First-off, I would like to speculate that probably all of us have bees that are somewhat more resistant to mites than when varroa mites first appeared in the United States 20 years ago. For the most part, bees that were very susceptible to mites have already died. In upstate New York, varroa mites first appeared widespread in 1992. I remember being at the State Fair in the summer of 1993. I spoke with one beekeeper who seemed to do everything right with his bees: He got his honey off early and put the correct amount of Apistan strips in his hives by October. The result was that all of his hives died during the subsequent winter. In contrast, I got my honey off the bees as time allowed and finished extracting in November; each hive got a single Apistan strip in December. Thirty percent of my 100 hives made it through the winter. My guess is that my bees had a higher survival rate because I was using a Carniolian hybrid rather than a pure Italian. It took all summer, but I managed to restock all of my dead hives by stealing brood and raising queens from the survivors. I did not make a lot of honey that summer of '93 and I had to cut back on apple pollination in May, but this was the start of producing mite-resistant queens.

I carried on this way for a number of years. Fortunately, during the following years, I suffered winter losses of only 25 to 40%. During the winter of 1998-'99, I wasn't able to put Apistan strips on 12 of my hives. Of these 12, only one hive survived the winter, but it did come through as a good strong hive. This hive became my sole breeder queen for the 1999 growing season. Not all of my stock is descended from this queen since I do not requeen all of my hives every year. In subsequent years, I continued my program of giving each cluster a single Apistan strip in December since I did not believe that my bees could survive the winter without them. Then, in the winter of 2003-2204, a near-disaster struck; I was only able to get Apistan strips on one beeyard before early deep snows came to Central New York and

The author sitting on his Terramycin bucket. Peter Borst took this picture when he came to visit on May 5, 2007

A mite-resistant queen. Note the queen's black tip and the color of the worker bees. This queen has a lot of Italian and Carniolian genes.

Queen cells just out of cell builder.



Frame of queen cells, good take on grafting, 44 out of 45 cells.

buried my bee hives. I remember going to church, lighting a candle and asking for a good January or February thaw, so I could get out and put the Apistan strips on the bees. As the country-western song goes, some of God's greatest gifts are unanswered prayers. No winter thaw came and by the time the snow melted away in April, the bees were still alive. In fact, some of my very best bees were in yards that hadn't been treated, but had young queens raised during the 2003 season. After this experience, I really had very little inclination to continue putting miticides into my hives.

Susequently, I did get into a SARE experiment with Maryann Frazier of Penn State. As part of the experiment, I agreed to treat some hives with formic acid during the 2006 growing season and then obtain mite counts on the hives. When I found out about all of the safety precautions needed for using formic acid, I backed out on that part of the experiment. We did do mite counts with the use of sticky boards early in the growing season. In late August, Lynn Barton, our local New York State bee inspector, did mite counts using an ether roll on 150 bee samples on almost all of the hives in the experiment. Though I didn't get hive-by-hive results from the sticky boards, the mite counts obtained by Lynn Barton were at levels similar to beekeepers who treated their hives: on average 5 to 10 mites per 150 bee sample. One hive with a queen from 2005 had 0 mites in the sample and this hive went on to become a breeder queen in 2007. Though my Penn State experiment was over in 2007, Lynn Barton was kind enough to come and sample my bees again in September. Once again, my bees produced results similar to other beekeepers who use miticides in their hives. Most hives were in the 5 to 10 mites per 150 bee sample range, though some hives did come in as high as 15 mites per 150 bee sample. Lynn and I discussed the pros and cons of treating for mites, but truthfully, if some of the bees don't make it through the winter because of their susceptibility to mites, I really didn't want to keep that genetic stock in my operation. Admittedly, 5 to 10 mites per 150 bee sample does not sound that impressive to me and there is room for improvement. On the other hand, I have been experiencing near-100% winter survival of clusters with young queens in recent years.

In the next season, I intend to use the following parameters for choosing breeder queens:

- Mite Levels: using a simplified method for assessing mite levels
- Longevity: queens that have made it through two winters
- Hive Strength
- Color: a good percentage of fairly dark worker bees
- Gentleness: queens heading mean hives get squished

While working for Clarence Wenner in California, I saw queens that would produce a daughter queen that co-existed with the mother queen, in effect producing a two-queen hive that had a young queen going into the next winter. In my opinion, this would be the ultimate quality to find in a queen. Unfortunately, the last time I ran across a queen with this quality was 1981.

Lynn Barton also took samples for tracheal mite and nosema. These samples were sent off to Beltsville and the results came back negative for tracheal mite and zero for nosema spores. At first I thought that these results must be the result of someone not doing their job, but Lynn assured me that the results were something to be happy about. I'm not surprised that my bees don't have tracheal mites since the tracheal mite epidemic came through even before varroa mites. Apparently, the zero count for nosema spores indicates that I have not yet been infected with *nosema ceranae*—a great relief.

So, I wish that this article could be my way of declaring victory over a great foe and that everything was going be O.K. after this. Unfortunately, new diseases are in the very near future. I still don't have *small hive beetle in my hives. I did see* these beetles for the first time this past

Author holding frame of queen cells.

December while visiting a beekeeper located 20 miles from here. *Nosema ceranae* is an even greater concern and could be more devastating than varroa was. With varroa, when your hive dies over the winter, the mites die with it. When a hive dies of nosema, your equipment is infected; any bees that you use to restock the hives will have to clean up any mess that's left behind and will become exposed to the disease in the process. In addition, to treat for this new menace, we'll need to feed sugar syrup containing fumagillin. For northern beekeepers, feeding sugar syrup during the winter months or late fall is not an easy proposition. With my bee breeding program, I was admittedly able to benefit from some opportunities that resulted from my own sometimes sloppy beekeeping. In the next few years, northern beekeepers will need to sharpen their beekeeping skills if they hope to continue. While bee breeding for resistance to *nosema ceranae* may ultimately be the answer, it may initially be an uphill battle to have live bees from which to breed queens.

I really can not say that I practice chemical-free beekeeping or even advocate it. I use lots of Terramycin on my bees every spring well before the honey flow. At that

time of year, I use a 5 gallon bucket filled with Terramycin mix as a seat while examining hives. My theory is: don't let foulbrood get started in your hives and you probably won't have to worry about an antibiotic resistant strain of foulbrood. I think that would qualify as basic epidemiology. It looks like we'll also need to use lots of fumagillin in order to deal with *nosema ceranae*. Hopefully, this won't be a permanent situation and that we can develop bees that have an immune system that deals with the disease naturally. As each disease comes along, we'll probably need to stay flexible. I would like to keep my bees as chemical free as possible but, of course, bees with chemicals used judiciously are better than no bees at all!