

In response to dialogue created by my article in the April issue, here I answer several questions and explain areas for improvement:

## **“Outbreeding Mites and Overwintering Honeybee Nucs” part 2**

*A Chemical-Free Approach to Interrupting the Mites Breeding Cycle*

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Edited and Illustrated by Lynn Quinn

### **Background**

Information and management techniques here are based on G.M. Doolittle’s book, *A Year’s Work In An Out-Apiary*, which was originally published in 1908 by the A. I. Root Company of Medina, Ohio. It was reprinted in 2005 by Dr. Lawrence J. Connor and is currently available from Wicwas Press. This book is about section comb honey production but the important information in the book pertains to bee behavior and bee management. If you read between the lines, it is even a great guide for novice beekeepers.

### **Best practices for nuc nutrition over the winter**

On page 49 of Doolittle’s book, he discusses how he made nucs with six frames of brood and 4 frames of honey on September 1 and later overwintered them in a cellar. There was little or no brood rearing until he took them out of the cellar on April 14 at which point the bees could get maple pollen for buildup so he didn’t need pollen reserves. That is why he didn’t have 8 frames of brood until May 20. I can have 8 frames of brood in an outdoor, overwintered, healthy hive with adequate pollen reserves by May 1. Doolittle basically overwintered a package that didn’t need pollen or honey reserves until it was removed from the cellar and placed outdoors on April 14. Everyone is expected to feed a package in the spring. Doolittle targeted his feeding by waiting until April 14 when natural pollen was available to take them out of the cellar. He then dropped down into the hive the honey reserve combs that he had stored in the apiary all winter. We can overwinter our nucs outside instead of in the cellar by positioning a candy board with pollen over the top of the hive so that we can have brood in March here in Michigan on the 43<sup>rd</sup> parallel. This will put us 3 weeks ahead of Doolittle’s schedule and provide us with 8 frames of brood by May 1 instead of May 20.

Last year (spring 2007) we had a late April snowfall along with a deep freeze and some nucs starved as a result. From this experience I learned that by overwintering July nucs outdoors it is unreasonable to assume that they can build up and maintain a honey reserve, and this is what initially prompted me to use a candy board. Doolittle knew this about nucs because he was in the business of producing section comb honey so he didn’t have enough honey reserves to overwinter his nucs outside. He overwintered his nucs in a cellar where the temperature remained at around 45°F all winter long. At this temperature, and with little or no brood rearing, bees do not require a lot of honey so Doolittle’s 4 frames of honey

were sufficient to keep his nucs alive until spring. Overwintering bees in cellars is a practice that was studied in depth by Dr. C.C. Miller and is explained in his book, *Fifty Years Among the Bees*, that was published in 1915 by the A.I. Root Company of Medina, OH. On page 291 he points out that, "Theoretically, the right time to cellar bees is the next day after they have their last flight for the season". He also discusses other requirements in bee behaviors.

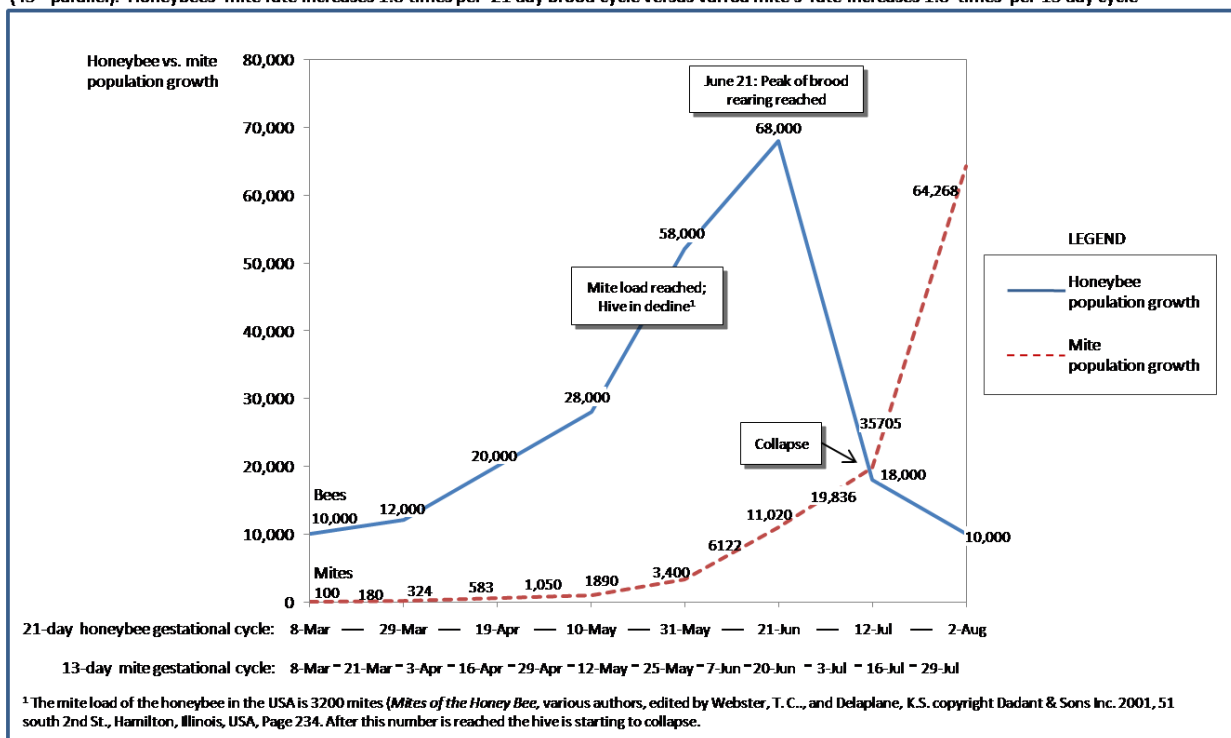
This spring we didn't experience any problems with starvation as a result of using the candy boards but we did experience a shortage of pollen in some of the hives due to the extended winter weather which set back the brood rearing in those hives by a couple of weeks. This past long winter taught me that it is also unreasonable to assume that these outdoor July nucs can build up and maintain a pollen reserve. Doolittle also knew this which is why he removed his nucs from the cellar on April 14 in time for the first pollen flow. Another reason that many nucs don't have enough pollen reserves to endure a long winter stems from the fact that when the nuc is created in July, the bees don't have enough time to buildup a pollen reserve because all of the pollen is being rapidly used for intensive brood rearing (which we leverage to outbreed the mite). In fact, the bees are using up the pollen as fast as they are bringing it in during the three remaining brood cycles before winter sets in.

During mild Michigan winters nucs can overwinter very well without candy boards or extra reserves of pollen but one never knows whether the winter will be mild or harsh or whether it will be short or long. I am currently exploring the best way by which to integrate a pollen patty with a candy board to provide the maximum nutritional safety valve for winter buildup. I prefer real pollen because it is a more natural product than pollen substitutes. If we can have the appropriate nutrition available within these nucs to bolster them through unpredictable winter weather patterns, we will no doubt see positive results that more than compensate for the small effort and investment. Some of our prize nucs that did phenomenally well this year went into winter with more pollen reserves than other nucs. They are now flourishing comparatively and are right on target with the ideal number of frames of brood.

#### **Further explanation about mite loads**

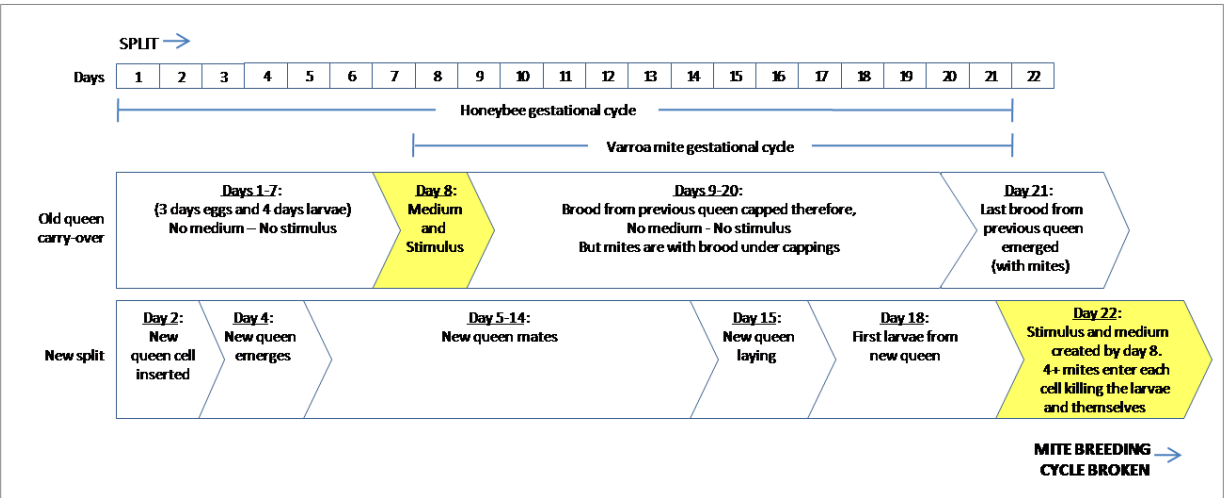
You may question the mathematics . . . If on July 20, and assuming that you have already made your first spring splits on May 1, you take a hive with a mite load of 3200 mites and split it into 4 nucs, each nuc will have a mite load of 800. Then with 3 brood cycles, or 63 days, the mites will continue to increase into the winter. You might ask, how can you have a hypothetical mite load of 100 in March as presented in Graph 1?

Graph 1: Hypothetical projection of honeybee and mite reproduction starting with 100 mites and 10,000 bees on March 1 in the Grand Rapids, MI area (43<sup>rd</sup> parallel). Honeybees' mite rate increases 1.8 times per 21 day brood cycle versus varroa mite s' rate increases 1.8 times per 13 day cycle



The reason is that there is an interruption in the honeybee larvae after creating the nucs in July when the old queen is removed and new queen cells are inserted so that the mites can't reproduce (see Graph 2). On day 22, or when there is breeding medium again for the mite, all the fertile mites will enter the medium. This is an unsustainable load and the bee larvae and mites will both die. The only mites that will survive are the ones that entered the periphery larvae with 1 or 2 mites in each cell. These few remaining mites will slowly increase through the winter and will amount to around 100 by March (see Graph 2). Then in the following season, you will need to make splits again in May and July to continue to outbreed those 100 mites that you had in March or the hives will eventually collapse as detailed in Graph 1.

Graph 2: A fertile mite must have a *medium* to lay her eggs and a *stimulus* to start reproducing. The medium and stimulus are always on the 5th day of the larvae, day 8, one day before capping the cell. When you split a hive you break the normal breeding cycle of the mite by interrupting both the medium and the stimulus. . .



**Addressing queen mating issues in newly-created nucs**

In August, if you see that one of the queens did not mate, you can unite this nuc with a mated queen in another nuc *before day 22*. After day 22, you must destroy the nuc that didn't mate because uniting it would only infest the good nuc with mites since the failed mating didn't break the mites breeding cycle. Good beekeepers always take their losses in the fall. There is no reason to let a failed nuc eat honey and dysentery the hive when you can store this honey and use it later for spring buildup.

Never introduce a mated queen to a nuc when making splits in July. You must always give a queen cell in July to break the mites breeding cycle and then have the emerging new queen outbreed the mites. You can only introduce mated queens in the spring.

**Experimental windshield results**

The comparison between experimental, wide-open, windshilded nucs and packed, windshilded nucs for winter 2007-2008, on Michigan's 43<sup>rd</sup> parallel, was significant. The experimental, unpacked but windshilded nucs overwintered well under 50% and the packed, windshilded nucs overwintered well over 50% (10 nucs out of 14 for 71%). This past extended winter with consistently low temperatures and high winds also had the second worst snowfall on record in Michigan. These weather conditions gave us the chance to truly test nuc overwintering practices and exposed various areas for improvement. For example, some of the difference in outcomes had to do with location as the packed, windshilded nucs were wintered within a large woods with good air drainage and the wide-open, windshilded nucs were overwintered in a wide-open, very windy beeyard that had virtually no protection at all. Wide open apiaries are great locations for honey production in the summer but when you make the July splits for overwintering you want a well protected yard with good air drainage. An example of a well protected yard would be halfway down an eastern slope. This type of location would protect the apiary from the bitter westerly winds coming off of Lake Michigan and would also harness warmth from direct sunshine on clear days.

**Experimental, windshilded nucs  
in wide-open apiary**



**Windshilded, packed nucs  
in protected apiary**



**Interlocking galvanized panels wrap around bottom hive body to shield the brood nest from wind. Candy board with insulation fits snugly over the top of the brood nest. An empty super sits atop the candy board to hold extra honey stores to drop into the nest in the spring**

### **Gentle, time-tested treatments after overwintering nucs in high-stress weather**

During a brief winter thaw when conditions permitted the bees to fly, I noticed symptoms of Nosema, a condition aggravated by stress. Now there are two different strains of Nosema, *Nosema Apis* and *Nosema Ceranae*. Both of these Nosemas will affect the hive and its health and all nucs will be treated with Fumagilin-B in the future. It has been a proven management procedure and you can treat at a cost of two dollars per hive or one dollar per nuc. In the past, Foulbrood has also affected healthy bees. I use Terramycin as a preventative treatment for Foulbrood and I also replace combs every five years to keep any accumulation of spores at a minimum. These two drugs, Fumagilin-B and Terramycin, have been around for over 40 years and have no side effects when used properly and in the appropriate dosages. These treatments have nothing to do with the mites and are completely acceptable. Now this brings up a huge issue that I won't go into at this point and that is the issue of side effects. Most drugs have side effects. Is CCD a side effect? Have any studies been done?

### **Looking forward: tailored beekeeping via targeted nuc production**

The fact that we were successful in overwintering our nucs despite such harsh winter weather conditions is yet another confirmation to me that Doolittle's approaches to bee management are highly effective and can provide us with ways to reverse the current tide of hive losses. For example, you might consider that if 10 out of 14 packed nucs survived this harsh, extended winter, and these nucs were created from 4 hives last July, that yields a 250% increase within one year. And there are beekeepers in many other states using this method that are experiencing similar success. One particular beekeeper in Indiana had virtually the same results in his protected apiary as we did in ours and he also experienced the pollen shortage due to the extended winter. This consistency provides further evidence that Doolittle had it right. Imagine the possibilities for our beekeeping industry. With this method, we would be able to make a two-brood-frame split and target any pollination crop 12-15 weeks later much

the same way as greenhouses target lilies for Easter. These July nucs can be brought to a warmer climate and built up for a target crop (i.e. almonds) in February.

### **Packages**

For those beekeepers who want early packages in the spring (April), please take a close look at the gestational cycles in Graph 2. On day 22, you have no sealed brood in the hive which is virtually the same thing as a strong 5 lb package hived 8 days earlier. This package will produce 3 brood cycles before winter, and will come out real strong in the spring. So if you really want early spring packages, make July nucs or buy them in the fall.

### **Conclusions**

We are finding out that methods used one hundred years ago by Doolittle in producing section comb honey can be used by today's beekeepers to raise chemical-free bees for various purposes whether it be for pollination, honey production, or simply just raising the bees themselves. And beekeepers in northern states will have neither need nor expense to venture south with their bees for the winter if they overwinter their nucs properly by providing the right nutrition and protection. In fact, northern beekeepers even have the option to overwinter their nucs in cellars as did the old masters which would bypass the need to provide annual winter outdoor safety valves and protection for those nucs while still keeping the bees chemical-free. Finally, creating nucs with mated queens or queen cells in May and queen cells in July not only enables us to keep bees chemical-free, but produces tremendous increases in bee population. We have here the opportunity to replace a lot of honey bees being lost currently and in past years which will help us protect our industry from the import of bees from other nations.

In the past I have learned that even if I agreed with and understood someone else's methods, I still would not try them. And it seems to me that most people will try things that they perceive as good *if they give themselves permission to do so.*

In 1908, Mr. G.M. Doolittle gave you and I permission to use his methods. Several years ago, I gave myself permission to use his methods. Now you must give yourself permission to use his methods . . .

Mel welcomes your questions, feedback, or suggestions: [mdasplitter@sbcglobal.net](mailto:mdasplitter@sbcglobal.net)