Letters to the Editor

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COLONY COLLAPSE 20 YEARS AGO

During rainy days this summer, I've been sorting through 31 years of files, reports and correspondence in order to recycle the paper and/or save and scan documents for historical records. Much of the content in the file cabinets consists of letters and reports that were written before the computer age. In one of the drawers I found a forgotten and significant letter written to Dr. Hachiro Shimanuki, Lab Leader at the USDA-ARS Beltsville Bee Lab.

The letter was written in part to thank both him and Dave Knox, Bee Lab entomologist for processing brood and adult bee samples for viral analysis. The letter also described a phenomenon that I had never seen before among beekeeping operations and a situation update regarding the operation the samples originated from. Unrelated to the issue, the correspondence also included data comparing tracheal mite infestations of Yugo, Buckfast and Italian honey bee stocks.

Following are excerpts from the letter to Shim written on Oct. 17, 1994:

"September 14, 1994 - 2 apiary locations (40 and 24 hives) with 1,000's of bees on the ground resembling a pesticide kill, however, not all of the colonies were affected (approximately ¼). Many young "hive bees" observed walking from affected colonies unable to fly…The affected hives were still actively foraging with field bees bringing in pollen from goldenrod and aster. The young bees walking from the hives had 'tremors' or a 'shaky', 'shivering' behavior. In general, the majority of the bees died just in front or within 10 feet of hives. The crawling bees often weakly fluttered their wings resembling symptoms of what was observed during the late 1980's when many tracheal mite infested hives were dying off during winter and early spring in Maine. The hives had large populations with 6 plus frames of brood and a super of honey when this behavior began. Varroa was found within worker and drone cells. When this 'colony collapse' was first observed, about 6 of 40 apiary locations were affected."

"October 14, 1994- Revisited apiaries with die-off. The crawling behavior nearly stopped…Live colonies are now down to about 2-3 frames of bees and brood, lots of honey and frames of dead brood (chilled or otherwise)…During the last month, 20 additional colonies died out in the two apiary locations….About four apiaries were moved to a staging yard during the last month. These hives have dwindled far worse than the hives not moved. Of the 200 colonies staged, I think mortality will exceed 50% by the time they reach Georgia (Thanksgiving)….Things look pretty grim….Since our initial conversation concerning this matter, Roy has reported a similar situation with his last load in northern Maine….During the week of October 3rd I visited a southern Maine operation of 100+/- colonies. Colony collapse was evident (i.e. empty hives, spotty brood, lots of honey) but no dead or dying adults in front of hives. These hives appeared to have absconded."

Within the letter to Dr. Shimanuki, I used the term "colony collapse", first in parenthesis since I had no other way to describe what I was observing. We now know that the symptoms described in the September 14th and October 14th narratives concerning Norm and Roy's operations were due to acute paralysis virus and Kashmir bee virus activated and vectored by Varroa (ABJ-May & Oct issues 1995). However, the symptoms concerning the colony collapse within the southern Maine apiary checked on October 3rd were very different. No bees (dead or alive) were present. Sound familiar?

For the record, the neonicotinoid Admire (imidacloprid) was registered in Maine for use on potatoes in 1994 in lieu of GMO (Bt) potatoes due to market pressure. It was applied to potato acreage in 1995. The letter to Dr. Shimanuki in 1994 accurately describes the existence of the CCD syndrome formerly called parasitic mite syndrome (PMS) before wide-spread use of the neonic insecticide class.

Tony Jadczak,
Maine State Apiarist

ABOUT CELL SIZE, VARROA CONTROL AND A "FATAL ERROR"

More than 20 years ago, Erickson et al.[1,2] suggested that reducing the size of the brood cells of the European honey bee could help in controlling the development of varroa mite populations. This claim was developed and discussed among beekeepers, including in the *American Bee Journal*.[3,4,5] As cornerstones of their approach, the proponents invoke two major arguments. Firstly they postulate that cell size was smaller before the general use of wax foundation and, secondly, that a "fatal" error occurred around 1930 when a new method (the square approach used by Baudoux, a Belgian researcher) replaced the traditional "rhombus" approach for estimating comb cell density. As a consequence, they suggest that beekeepers should undertake "regression" programs in order to keep their bees under, according to them, more natural conditions. They embed their ideas in the tempting view that honeybee colonies become more efficient at detecting mites, more rigorous in their hygienic behavior and, if not resistant, at least tolerant to varroa infestations. Their arguments were convincing enough to persuade the beekeeping equipment industry to produce and market wax foundation and artificial comb with a smaller cell size, as well as to convince scientists to conduct their own controlled studies in order to assess the effectiveness of cell size in mite control programs.

When I first heard of this theory in the fall of 2012, I was also taken in by it and rapidly became convinced that I had found a way to overcome colony losses. I then contacted our beekeeping authorities (who are deeply involved in developing organic control methods) and asked them why they were not supporting the small cell approach. They answered that the scientific evidence was not yet convincing enough to steer beekeepers in that direction. They also shared their collection of publications on the subject. I there-

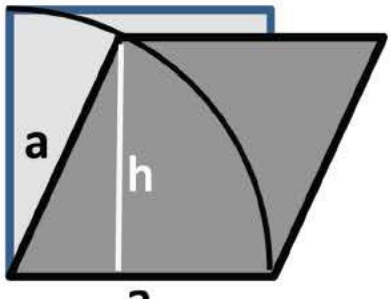

Figure 1: The "fatal error" explained While a square of sides a has an area of a^2 (i.e. 1 dm^2 if a=1dm), a rhombus of sides *a* and height *h* has an area of *a*h*, obviously smaller than the area of the square (i.e. 0.866 dm^2 if a=1dm). Erroneously considering that the area of both geometrical figures are identical (e.g. 1 dm^2), D. Lusby[9] incorrectly transformed cell measurements reported from the 17th, 18th and 19th centuries. This results in average cell widths reduced by approximately 0.4mm. For instance, a cell width of 5.3 mm, which corresponds to a cell density of 830 cells/dm^2, would erroneously result in an cell density of 962 cells/dm^2 and a cell width of 4.9 mm.

fore read in detail the methods developed by the proponents of small cells, as well as the publications of the scientific community on the topic. At the same time, I prepared to undertake my own "regression" program for the following spring.

But over and over again, I came up against the "fatal error" argument. I could not understand how two measuring methods based on plane geometrical figures could yield different cell densities. I then started to make my own measurements: as theory predicts, I found identical results with either the square or the rhombus approach! In the meantime, I also discovered that some authors[6,7] challenged the view that cell sizes had been smaller in the past. In addition, evidence from scientific studies was far from sustaining the small cell theory.[8]

Finally, I understood that the "fatal error" was an act of the proponents of the small cell theory themselves: when they transformed cell densities, allegedly measured using the rhombic approach, into modern figures using the square method, they considered that a rhombus of basis 1dm had the same area as a square of basis 1dm (cf. Figure 1). I also found that the rhombus approach has never been used as a standard in the past and that most historical data were reported as cell widths and not as cell densities. There was therefore no need to transform historical data in order to compare them with modern cell width measurements. In addition, an extensive review of historical data clearly confirms that cell densities were not smaller before the introduction of wax foundation.

Ironically, an opposite controversy on cell size arose around 1935, with the claim that bees became smaller following the introduction of wax foundation! According to Honegger[10], Mehring, who invented wax foundation around 1857, designed his first wax mill on the basis of his own measurement, namely 18 cells/dm, i.e. a cell size of 5.55 mm and a density of 750 cells/dm^2. Later on, some European producers of wax foundation turned to smaller cells and much higher cell densities (e.g. 920 cells/dm^2, corresponding to a cell width of 5.0 mm, in Belgium before Baudoux's work). This might explain why wax mills from the beginning of the 20th century correspond to small cell sizes.

In conclusion, the findings of this study, published in greater detail in a recent issue of the *Journal of Apicultural Research*[11], clearly show that two major arguments of the proponents of the small cell approach are not supported by the facts. Firstly, historical data indicate that cells were not smaller before the introduction of wax foundation. Secondly, if any "fatal error" occurred, it was rather at the end of the 1900's than around the 1930's. As a consequence, the use of the expression "retrogression to natural cell size" is clearly inappropriate, as are the programs conducted on the basis of such arguments.

[1] **ERICKSON, E H; LUSBY, D A; HOFFMANN, G D; LUSBY, E W (1990a).** On the size of the cells. Speculations on foundation asa colony management tool. *Gleaning in Bee Culture*, 118(2): 98-101.

[2] **ERICKSON, E H; LUSBY, D A; HOFFMANN, G D; LUSBY, E W (1990b).** On the size of cells. Speculations on foundation as a colony management tool. *Gleanings in Bee Culture*, 118(3): 173-174.

[3] **LUSBY, D A (1996a).** Small size foundation for mite control. *American Bee Journal*, 136(7): 468-470.

[4] **LUSBY, D A (1997a).** More on small cell foundation for mite control. *American Bee Journal*, 137(6): 411-412.

[5] **LUSBY, D A (1996b).** Small size foundation for mite control. *American Bee Journal*, 136 (11): 758-759.

[6] **ZEISSLOFF, E (2007).** Natürliche Zellgröße. *Journal Apicole Luxembourgeois*, (3): 73-78.

[7] **HEAF, D (2012).** Natural cell size. Downloadable at: **http://www.dheaf.plus.com/warrebeekeeping/cell_size.htm**

[8] **HEAF, D (2011).** Do small cells help bees cope with varroa. A review. *The Beekeepers Quarterly*, 104, 39-45.

[9] **LUSBY, D A (1997b).** The "Square Decimeter Measurement Conversion Chart". Downloadable at: **http://www.beesource.com/point-of-view/ed-dee-lusby/historical-data-on-the-influence-of-cell-size/square-decimetermeasurement-conversion-chart/**

[10] **HONEGGER, A (1937).** Großzellen ja oder nein? *Schweizerische Bienenzeitung*, 60(3): 149-152.

[11] **SAUCY, F (2014).** On the natural cell size of European honey bees: a "fatal error" or distortion of historical data? *Journal of Apicultural Research* 53(3): 327-336. Downloadable at: **http://www.ibra.org.uk/articles/natural-cell-size-fatal-error**

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MONSANTO

I read Jerry Hayes' article about Monsanto. I think it is a noble effort to help the honey bees, but not from this or any chemical company. How can you say that you are concerned about insects when you are helping them on one side of the building, and finding more ways or chemicals to kill them on the other side of the building?

I will tell you why I am so opposed and skeptical about chemical companies. I am a Viet Nam vet and now have diabetes because a chemical company told the government that the chemical known as agent orange would not harm people in any way. It is a herbicide and can't hurt people they said. People are not plants. Well tell the thousands of vets who have cancers, diabetes and even ailments that are passed down to their children how SAFE the chemicals are.

I don't trust any of the people at chemical companies because they lie right to your face, and when they are caught they don't even own up to their lies, and make the government (V.A.) pay for the ailments instead of paying for it themselves. And who is the government? We all are. So I am paying to treat the disease I have because of a chemical company and the big shots in the company laugh all the way to the bank!!!

I really hope that Monsanto is serious about helping honey bees, but I don't see how they can unless they STOP making chemicals that KILL insects. I doubt that will happen in my grandchildren's lifetimes.

David Springer
Wisconsin

NORTH CENTRAL FLORIDA BEEKEEPERS CELEBRATE NATIONAL HONEY BEE DAY 2014

The participating clubs of the North Central Florida Beekeepers Association (NCFBA) held their annual fundraising/educational event at the Southeastern Livestock Pavilion in Ocala, Florida August 16th. This year's special guest was the 2014 American Honey Princess Elena Hoffman from Pennsylvania who promoted the event on WCJB-TV 20. She delighted the crowd with her great sense of humor and knowledge of honey bees.

Ocala, Florida Mayor Kent Guinn opened the day's event by reading a proclamation proclaiming National Honey Bee Day in Ocala, Florida on August 16th, 2014.

Public education is in the forefront for this association as they strive to involve the entire community in their efforts to save honey bees and other pollinators from the devastating losses that have occurred recently with colony collapse disorder (CCD). There are so many different causes for honey bee loss that learning about them and seeking cures is a part of our public education endeavors. We are trying to cover all aspects of what can be done to turn the tide and save more or these

On the left being interviewed is the 2014 American Honey Princess Elena Hoffman.