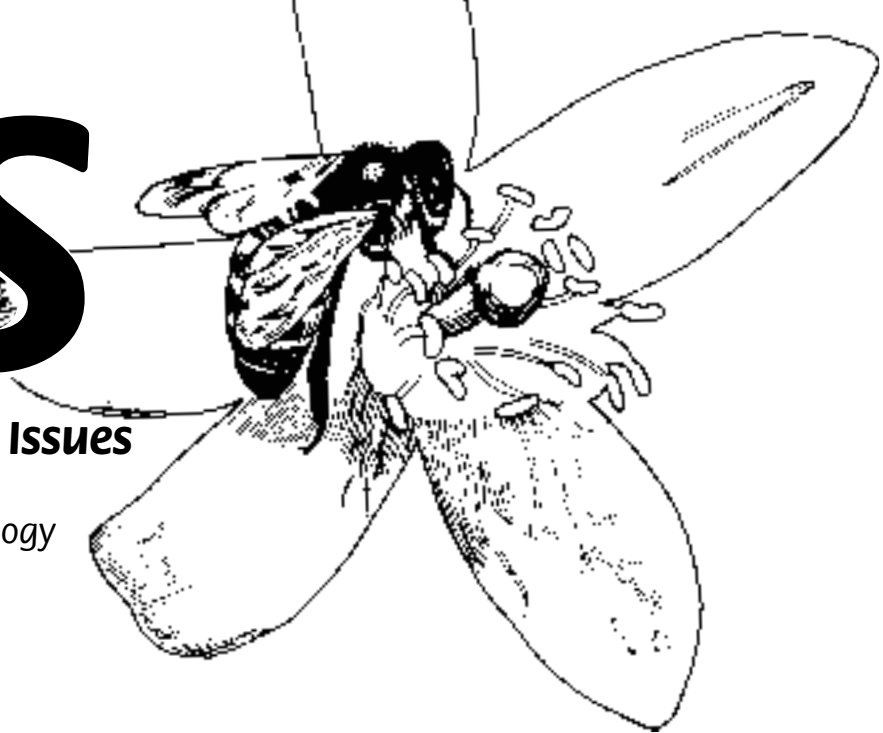


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More on American Foulbrood: Changes, Historical Perspective and Management Strategies

I REPORTED on the increase of antibiotic-resistant American foulbrood (AFB) last month as described by Mr. Laurence Cutts, Florida’s chief bee inspector¹. My remarks elicited comments from Mr. Martin Braunstein of Argentina. He objected to what Mr. Cutts said about drums from that country being a source of the disease, and my employment of the term “purposeful misuse” of oxytetracycline as a reason for Terramycin®-resistant bacteria appearing there. In retrospect, I agree that my characterization was misleading. Thus, I have changed the wording to “inappropriate use” of oxytetracycline in the permanent version found on the World Wide Web. This better describes what I referenced based on *Proceedings of the Fifth Ibero-Latin American Apicultural Congress*, Mercedes, Uruguay, June 1996, where resistance to oxytetracycline in Argentina was confirmed in a study reported by A. Alippi and M. Aguilar, who used biochemical techniques to analyze DNA (PCR)². Dr. Alippi reconfirmed her conclusions in “Terramycin®: Is It Losing Its Effectiveness Against AFB?” *Proceedings of the 36th Apimondia Congress*, pp. 45–46, September, 1999. Of 58 Argentinian strains of *Paenibacillus larvae* subspecies *larvae* tested for oxytetracycline susceptibility, 23 (40 percent) were found to be resistant. According to Dr. Alippi, this could be the result of irrational use of antibiotics for the prevention and control of AFB and EFB. Although in most cases beekeepers treat colonies according to recommendations, she said, others use incorrect feeding methods, wrong dosages or formulations beyond expiration dates, and product obtained from nonregistered suppliers.

I concur with Mr. Braunstein that the practices listed by Dr. Alippi are not limited to Argentina, and could also be responsible for resistance she and others have reported from elsewhere in the world. Mr. Cutts has replied that he did not mean to single out Argentina as the only source of resistant bacteria. His objective was to emphasize that the practice of washing all dregs of honey from drums, no matter their source, before adding syrup or exposing them to foraging bees is prudent beekeeping practice.

The use of the term *Paenibacillus* also raised questions. This nomenclature shift is just one of the many changes that have characterized research on AFB over the years. According to a document written by H.L. Foote on the history of the disease (California Dept. of Agriculture, mimeo, January 1959), Aristotle, the Greek philosopher (384-322 BC) is given credit for being the first to write a scientific treatise on honey bee natural

¹ <http://www.ifas.ufl.edu/~mts/apishtm/apis99/apoct99.htm#2>

² <http://www.ifas.ufl.edu/~mts/apishtm/papers/FIFTH.HTM#5>

history. In that volume, he described a brood disease, which he called “rust,” that had a foul odor. The term foulbrood may have come from the German, *die foule Brut*, thought to be coined by Nickel Jacob, the father of German beekeeping, as far back as 1568. Later both a noninfectious and virulent-infectious foulbrood were described. Dzierzon in his 1882 book *Rational Beekeeping* called them benign and pernicious. Moses Quinby was the first to write about brood disease in the Americas in his landmark 1853 book *Mysteries of Beekeeping Explained*. In the 1880s, F. Cheshire studied *Bacillus* (now *Paenibacillus*) *alvei*, a nonpathogenic organism known to be associated with European foulbrood. He published in the *British Bee Journal*³, and began a line of research leading to the idea that there was only one foulbrood.

It was G.F. White, New York Department of Agriculture, who determined that conclusions reached by Cheshire and his followers were incorrect and that European and American foulbroods were separate diseases. AFB is called “American” because that’s where most of the research was conducted on the organism. By contrast, the lion’s share of the work on “European” foulbrood was done on the Continent. White discovered AFB’s true causative organism to be *Bacillus larvae* in 1906. According to Dr. H. Shimanuki of the Beltsville Bee Laboratory, bacteriologists using DNA analysis have recently divided *Bacillus* into several new names. As a consequence, *Paenibacillus* is now recognized as the correct genus for the bacterium causing AFB. To make matters more complex, the genus has been split into two subspecies. Thus, the organism previously called *Bacillus larvae* is now officially known as *Paenibacillus larvae* subspecies *larvae*.

Dr. H. Shimanuki, in “American Foulbrood: Comparative Management Strategies,” *Proceedings of the 36th Apimondia Congress*, p. 45, September, 1999, confirmed detection of antibiotic-resistant AFB in Canada, Argentina and the United States. He concluded that in the new millennium we can expect to see advances made in the materials and methods available for prevention and control of AFB. In addition, he expects to see new methods to detect the causative bacterium and better ways to determine risks of transmitting AFB via bees and/or hive products.

In contrast to both United States’ and Canadian beekeeping practice, the use of chemotherapy is not registered in Scandinavia and Germany. Drs. C. Brodsgaard and H. Hansen of Denmark reported this in “Prevention And Control of American Foulbrood Without Use of Antibiotics,” *Proceedings of the 36th Apimondia Congress*, pp. 47–48, September, 1999. They employed a controlled experiment to determine the effectiveness of shaking bees from symptomatic colonies onto frames fitted with wax strips, and two days later installing them on foundation. Results showed that the shaking method reduced the number of spores to a point where no further symptoms appeared. Other results showed that even though all colonies were fed an equal number of spores, 20 percent never developed clinical symptoms. The authors concluded that even though the bees were closely related, major differences exist in their innate ability to control the disease.

In Germany, a variation of the Danish method was described by Dr. C. Otten, “Epidemiology Of The American Foulbrood In Germany,” *Proceedings of the 36th Apimondia Congress*, pp. 52, September, 1999. Severely affected colonies are killed, but those that are still strong are treated by making “artificial swarms.” These are then installed in other hives or on foundation, and the number of spores are, therefore, greatly reduced. This kind of treatment, according to the author, resulted in no new symptoms appearing in 95 percent of treated colonies.

Both Australia and New Zealand also eschew antibiotics. M. Hornitsky described the situation “down under” in “Controlling American Foulbrood in Australia,” *Proceedings of the 36th Apimondia Congress*, pp. 49–50, September, 1999. According to Mr. Hornitsky, gamma radiation is a primary method used to decontaminate AFB-affected equipment. If equipment is not irradiated, it is destroyed by fire. He con-

“
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cluded that the Australian Honeybee Beekeeping Industry Council, in consultation with state and federal governments, is developing a national strategy for AFB control. The main features are developing a code of practice, a training program to accredit beekeepers, and a quality assurance program for honey. Standards for the queen bee and other industry sectors, and a vendor declaration and regulatory program are also part of the strategy. A major honey bee research and extension effort by Australian Rural Industries Research & Development Corporation includes an AFB control component as well⁴.

Mr. Cliff Van Eaton discussed the kiwi approach to AFB management in “Control of American Foulbrood in New Zealand Without the Uses of Drugs,” *Proceedings of the 36th Apimondia Congress*, pp. 51–52, September, 1999. It includes use of quarantine and sterilization by immersion in hot paraffin wax (10 minutes at 160 degrees C). In 1991 a concentrated program was implemented to reduce AFB paid for and directed by the National Beekeepers’ Association (NBA), and carried out by contracted government personnel. By 1998, Mr. Van Eaton concluded, existing AFB control legislation with a Pest Management Strategy (PMS) was given over entirely to the NBA⁵. The goal is to eliminate AFB in managed colonies by reducing the incidence on average 10 percent per year to no greater than 0.1 percent by the end of 2008. ■

³ <http://www.ifas.ufl.edu/~mts/apishtm/apis99/apjul99.htm#4>

⁴ <http://www.rirdc.gov.au/pub/honeybee.html>

⁵ www.nba.org.nz/

⁶ <http://bee.airoot.com/beeculture/digital/1999/column10.htm>

⁷ <http://www.ams.usda.gov/fv/rphoney.html>

⁸ <http://www.ifas.ufl.edu/~mts/apishtm/letters/aixindex.htm>

⁹ <http://www.ifas.ufl.edu/~mts/apishtm/papers/FRENCH.HTM#13>

¹⁰ <http://www.ifas.ufl.edu/~mts/apishtm/apis99/apoct99.htm#3>

¹¹ <http://www4.wave.co.nz/~bennett/index.html>

¹² jjones@agen.ufl.edu

¹³ http://www.coaps.fsu.edu/lib/Florida_Consortium/

¹⁴ <http://www.ent.agri.umn.edu/AAPA/aapapubs.htm>

Honey: Is It Special Enough?

AT THE RECENT MEETING of the Florida State Beekeepers Association in Haines City, there was an active discussion concerning the proposed referendum to continue assessing the beekeeping industry through the Honey Research, Promotion and Consumer Information Act. This legislation funds the National Honey Board⁶. Those voting will have the opportunity to include, along with generic promotion, both bee research and honey quality assurance as part of the new legislation⁷. Most controversial is the latter category, which many see as intrusive and expensive with little perceived payoff.

The debate got me thinking about the difference between the European and the United States beekeeping industries that I observed while on sabbatical in France in 1997⁸. Both the beekeeper and consumer on the Continent have been imbued with the concept that honey is a very special commodity. As a consequence, the consumer demands and the beekeeper provides a high quality product, often backed up by extensive testing⁹. This is also true in the importing arena. If the product does not pass certain criteria, it is rejected. Testing by European buyers in some cases may be perceived as excessive and questionable by some who are marketing honey, but this is what maintains the product's consumer appeal.

THE ATTENTION to detail in characterizing, producing and packing honey in Europe is often not mirrored in the United States. Extremely telling was the statement by a prominent exporter attending the recent Florida State Beekeepers Association meeting that much of the honey not passing muster in Europe is currently being redirected to the United States. The conclusion is that relatively speaking, honey is just not as special in this country as it is on the Continent. Besides the import situation, this may also be behind the increased marketing and consumption of adulterated product in much of the United States. Many people simply don't know and can't tell the difference between adulterated product and the real thing¹⁰. This is also reflected in the industrial use of the sweet. Although many products conspicuously display the word "HONEY" on the label, the vast majority have little if any as an ingredient. That's

because it's relatively cheap to advertise, but when it comes to incorporating product, price is king. Other sweeteners generally cost less, and the risk that honey's miniscule contribution and/or absence will be noticed by most consumers is minimal.

A knowledgeable consumer may ask why questionable labeling practices described above are condoned. With only a small minority of potential customers educated about honey, it is relatively easy to pull the wool over the eyes of the buying public with little risk of being compromised. Food quality inspectors meanwhile often ignore issues surrounding honey marketing in favor of those that are considered potential health risks like selling more-perishable meat, milk, eggs and other products. Again, it boils down to the fact that honey, although it generally enjoys a

relatively solid reputation, is simply not special enough and has not adequately seized the customer's attention. If this were not so, then consumers might demand more strongly the real thing, which would be reflected in a decreased amount of adulterated and mislabeled product reaching the market. An excellent example of customer awareness is the current situation surrounding manuka honey in New Zealand. Many view that honey as an extraordinary product and, as such, will buy it for a premium price¹¹. Thus, there is evidence suggesting the best way to increase honey consumption is to make it more special, and the only way to prove to potential consumers that this is so is through rigorous testing. That is the vision of those who would make quality assurance part of the National Honey Board's new mandate. ■

El Niño or La Niña?

A CATEGORY-FOUR HURRICANE in November and a warm, dry fall in north Florida suggests another La Niña winter for the Sunshine State. Fortunately, it is now possible to forecast El Niño and La Niña months in advance so that agriculturalists can make better preparations. These phenomena affect Florida weather in several ways. Generally, El Niño is characterized by wetter, perhaps cooler winters with fewer hurricanes in the previous season and fewer forest fires. La Niña is the opposite, with drier winters and springs and more hurricanes the preceding season. These climate phenomena can influence yields of winter vegetables, some citrus species, sugarcane and field corn in Florida. As a consequence, strawberry growers have learned to plant more drought-tolerant varieties during La Niña years and some potato

farmers put more crown on their fields in anticipation of El Niño rains. A publication titled *El Niño, La Niña and Florida's Climate: Effects on Agriculture and Forestry* has recently been published by the Florida Consortium, made up of the Universities of Florida, Miami and Florida State. It is filled with charts and graphs of rainfall and temperature characterizing both events, and discusses how they affect everything from hurricanes to forest fires to agriculture. The information, according to the authors, does not constitute either a prediction of future weather observations or specific recommendations to modify agricultural practices. Copies are available from Dr. James Jones¹², PO Box 110570, Gainesville, FL 32611. Up-to-date information can be found on the Consortium's web site¹³. ■

Pollinators Pamphlet

THE AMERICAN ASSOCIATION OF PROFESSIONAL APICULTURISTS (AAPA) has just released a full-color 18-page booklet, *Bee Pollinators in Your Garden*. Although honey bees are emphasized, there is treatment of alternative pollinators, including bumble bees, burrowing and mining bees, leafcutting and mason bees, and digger and carpenter bees. The booklet describes how to attract and house bees, and provides warnings about the danger of using insecticides in the garden. Copies can be ordered for \$3.50, which includes shipping and handling, from Dr. Marla Spivak, Entomology Dept., 219 Hudson Hall, University of Minnesota, 1980 Fowell Avenue, St. Paul, MN 55108, ph 612-624-4798. This and previous AAPA publications continue to be available, including a diseases and pests booklet published by the Canadian Association of Professional Apiculturists and a full-color pamphlet on Varroa biology and control, from the AAPA web site.¹⁴

The Varroa Virus Connection

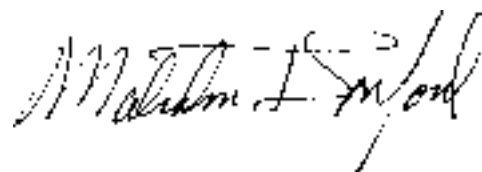
IN THE LAST ISSUE of *APIS*, I discussed research that provides evidence for the existence several types of Varroa, some more virulent than others¹⁵. If that isn't complicated enough, take a look at the relationship between Varroa and honey bee viruses. "The Virus, Mite And Model: A Useful Approach Towards Varroa Control," is the

title of a provocative paper delivered in Vancouver (*Proceedings of the 36th Apimondia Congress*, pp. 141-142, September, 1999) by Dr. S.J. Martin. He says that in spite of treatments, many colonies continue to be lost to Varroa for two reasons. One is that controls are implemented "blind," without being based on any kind

of monitoring for either threshold levels and/or treatment effectiveness. Another is that the mechanism by which colonies perish is not understood. For despite information to the contrary, according to Dr. Martin, the presence of the mite alone often does not cause colony death. As an example, he cites information from South Africa that colonies may be supporting as many as 60,000 mites without collapsing.

There appears to be a link between certain bee viruses that really are responsible for colony loss, according to Dr. Martin. These are delivered (vectored) by Varroa. Some of them may not be immediately fatal, but can affect bee longevity or cause the insects to emerge with deformed wings or other abnormalities. Dr. Martin, who works for the UK's Central Science Laboratory, and researchers at Rothamsted bee laboratory¹⁶ are actively working on a model that takes into account both mite population dynamics and viral effects¹⁷. More information on this topic is found on the Rothamsted web site, authored by Mr. Colin Denholm as published in *Bee Craft*¹⁸. ■

Sincerely,



Y2K 4-H Essay Contest

Bees and Humans Through the Centuries

IT'S TIME AGAIN to get 4-Hers ready for the American Beekeeping Federation's Beekeeping Essay Contest. The topic is "Honey Bees and Humans Through the Centuries." Essayists are asked to explore a variety of ways humans have used honey bees and their products. According to the organizers, "The essay can touch on the 'laundry list' of ways of utilization — or can focus on one area of utilization and explore it more fully.

From my perspective, I would suggest the latter as the best strategy. In general, the more focused a piece of writing, the easier it is to organize and better it will be in the long run. Good leads, according to the organizers, include schools, libraries, local beekeepers, and county extension agents. The Federation's web site will also have links, and the winning essay will be

published there as well. The scope of research is an essential judging criterion, accounting for 40 percent of the score. The number and variety of sources consulted and the authority behind them are also heavily evaluated. Personal interviews with beekeepers and others familiar with bees and beekeeping activities should be documented. Sources not listed in the endnotes should be listed in a "resources" or "bibliography" list. Honey bee is properly spelled with two words, even though many other authorities may spell it as one.

Full contest rules are available at several places on the Internet¹⁹. Florida entries must be officially submitted by 4-H faculty to Essay Contest, Dr. M.T. Sanford, extension specialist in apiculture, Box 110620, University of Florida, Gainesville, FL 32611-0620. They **must** be received by Tuesday, February 15, 2000. ■

¹⁵ <http://www.ifas.ufl.edu/~mts/apishtm/apis99/apsep99.htm#2>

¹⁶ <http://www.csl.gov.uk/environment/level3/nbu.htm>

¹⁷ <http://bee.airoot.com/beeeculture/digital/1999/column7.htm>

¹⁸ <http://www.iacr.bbsrc.ac.uk/res/depts/entnem/research/briangrp/cdenholm/beeecraft/tbeecraft.htm>

¹⁹ <http://www.ifas.ufl.edu/~mts/apishtm/4-h-essay.htm>

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