APIS

Apicultural Information and Issues

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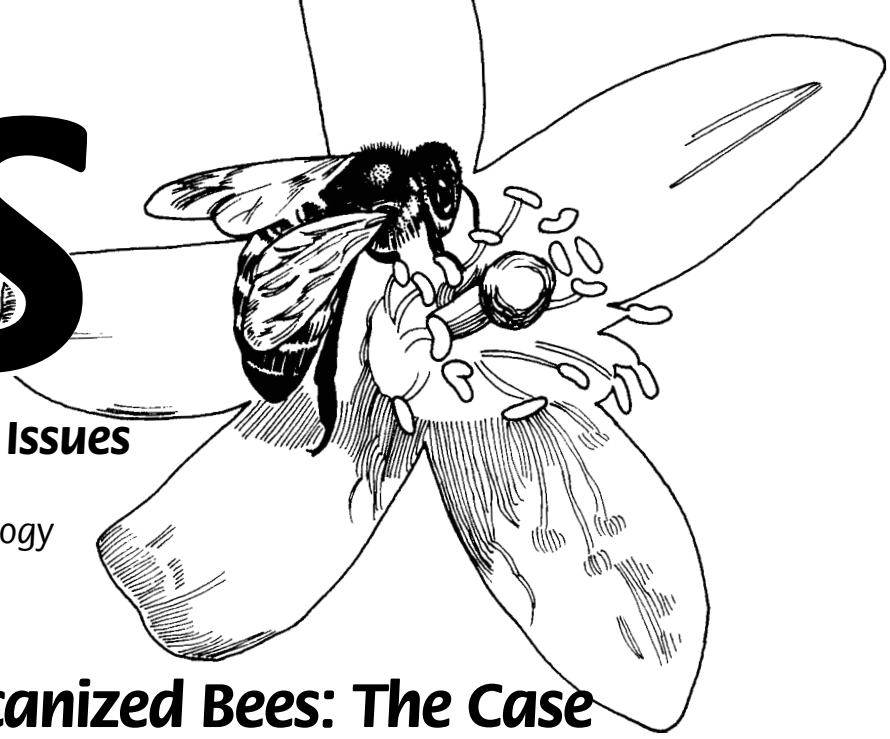

Inside APIS:

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Africanized Bees: The Case for Thelytokous Pathenogenesis

ACCORDING TO *BEE CULTURE* editor Kim Flottum in his May 23, 2000, *Catch The Buzz* article[1], the news about African bees from the Second International Conference on Africanized Honey Bees (AHB) and Bee Mites, which took place in Tucson, Ariz., is exciting. It seems that preliminary findings by Drs. Gloria DeGrandi-Hoffman of the ARS Carl Hayden Bee Research Center, Tucson, Ariz., and Stanley S. Schneider of the University of North Carolina at Charlotte show that these insects exhibit a greater degree of thelytokous parthenogenesis than do European honey bees.

In general, there are two kinds of parthenogenesis — the development of an individual from an unfertilized egg — found in insects. The most common for honey bees is arrhenotokous parthenogenesis, where females arise from fertilized eggs and males from those that are not fertilized. This is the case for the majority of races or subspecies (ecotypes) of *Apis mellifera*. However, it is known that at least one ecotype, *Apis mellifera capensis*, shows a high degree of thelytokous parthenogenesis, where males are relegated to the sidelines, as females (workers) can produce fully functional sisters without ever having been mated. Although ensuring the continuance of the Cape honey bee subspecies, the effect of this behavior when it comes into contact with that of other honey bees in Africa has been catastrophic[2].

Mr. Flottum suggests that experience shows that Africanized honey bees in the Americas are notoriously difficult to requeen. A reason for this, according to the study, is that very quickly (within a week) after the queen is removed, Africanized worker bees are capable of activating their ovaries to produce viable female eggs. European worker bees' ovaries, on the other hand, don't start producing eggs until the queen has been missing for at least three weeks. And these eggs typically produce male offspring (arrhenotokous parthenogenesis). The Africanized workers' faster, one-week response to queenlessness, however, combined with the ability to produce females (thelytokous parthenogenesis), works against what most beekeepers know about requeening European honey bee colonies. They face the situation of having to introduce a queen into a colony of Africanized laying workers much sooner than would be expected for European honey bees, something that is doomed to failure no matter what kind of parthenogenesis is involved.

If these findings hold up under scrutiny, they explain some things, but like so much else in scientific investigation, produce more questions. Is there in fact a gradient between the two kinds of parthenogenesis, rather than a complete separation as previously thought? If so, how will beekeepers be able to detect which bees are less likely to be requeened successfully? How does this information relate to Africa with its numerous subspecies, and why has the Cape bee problem proven to be so severe? ■

[1]http://bee.airoot.com/beeculture/buzz/index.html
[2]http://www.ifas.ufl.edu/~mts/apishtm/Apis98/apoct98.htm#3

Beekeeper Sanitation: The Other Side of the Hygienic Behavior Coin

MUCH HAS BEEN ARTICULATED in recent years concerning hygienic behavior in honey bees. Although this trait was identified early on, it only recently has gained prominence as a valuable trait in honey bee breeding[3]. The other side of the cleanliness coin is the beekeeper. Carl Wenning discusses this in the May 2000 *American Bee Journal* ("The Hygienic Behaviors of Beekeepers — Part 1," Vol. 140, No. 5, pp. 371–4). Mr. Wenning describes his first encounter with another beekeeper's lack of hygienic behavior when he became the recipient of a jar of honey brimming with foam and swimming with particulates. The first time he found his own behavior at fault was in the fall, when his bees became "propolis bound," and he couldn't physically dismantle colonies to inspect them.

APPROPRIATE beekeeper hygienic behavior, according to Mr. Wenning, includes maintaining clean colonies, clean hives, clean apiaries and clean honey. Clean colonies are those free of bacteria (causing American and European foulbrood), fungi (causing chalkbrood), protozoans (causing nosema), parasites (mites), and other insects (wax moths and small hive beetle). The best way to do this is by continual inspection, particularly examining the outside of the hive, as well as adults and brood. This includes numerous observations, looking for aberrant flight behavior, dead bees near the entrance, fecal spotting, sunken and discolored brood cappings, and a "pepper box" mix of capped and uncapped cells associated with a sour odor.

One way to keep colonies clean is by routinely replacing old brood comb. This has been proposed a number of times, Mr. Wenning states. Old combs are sinks for everything from bacterial spores to heavy metals. They also can become contaminated with the pesticides used in controlling Varroa mites. Thus, he suggests beekeepers should consider marking brood frames with the date they first are used by bees for brood rearing. Mr. Wenning also recommends a five-year rotation program, introducing new foundation into the center the nest and gradually moving the older brood comb to the outside of the colony, where it finally is removed and recycled.

This concept of recycling comb wax brings up a point not mentioned by Mr. Wenning. What is the status of the foundation that will be used to renovate combs? The continued use of pesticides, and their accumulation in wax by recycling contaminated foundation, might affect future generations of honey bees in unknown ways. Wax contamination has become a serious problem in Europe, but there are no studies on this phenomenon in the United States to my knowledge[4]. Nevertheless, there is continuing information that sublethal doses of pesticides in colonies may have long-term adverse consequences[5].

Clean hives, Mr. Wenning says, as opposed to clean colonies, refer to the physical state of the boxes bees are kept in. Thus, he says beekeepers should routinely clean their colonies of accumulated detritus, brace comb and propolis.

The physical cleaning of hives is something that is routinely carried out by queen and package bee producers in the South. It is a prelude to getting ready for the next active season's activities, as colonies clogged up with brace comb and propolis are simply too difficult to be dismantled to search for queens and to shake package bees.

Two other areas of importance, Mr. Wenning concludes, are to keep colonies free of mold and mildew and to exercise great care in using the smoker so as to avoid contamination of comb from smoke itself, cinders and ash. His next article will touch on cleanliness in the honey house and processing the crop. The former is extremely important to beekeepers in danger of being infested by the apiculturist's newest pest, *Aethina tumida*, the small hive beetle[6]. ■

Year 2000 *APIS* Challenge Update

THE CHALLENGE CONTINUES with the following objectives:

1. The goal is to have confirmed names of 50 (fifty) beekeepers who have presented 2 (two) presentations to schools on the joys of beekeeping.
2. The original deadline was July 1, 2000, for receiving this information. However, I am extending it to July 15 as this newsletter is delayed due to my being in South America.

To see the results so far, look on the Web[7]. ■

Roger Morse Dies — A Giant Has Fallen

THE LOS ANGELES TIMES Sunday, May 28, 2000, carried the sad news that the man who many considered the dean of American beekeeping has fallen. According to the article: "Roger Alfred Morse, 72, turned a childhood interest in beekeeping into an encyclopedic knowledge that made him a highly regarded apiculturist. An entomology professor at Cornell University for more than 40 years, Morse was also a prolific author. His *The Complete Guide to Beekeeping* is one of the definitive works on the subject. He was born in Saugerties, N.Y. Morse's father, a superintendent of schools, kept bees as a hobby and instilled an interest in his son, who began keeping hives at age 10. Morse enrolled at Cornell University after serving in the Army during and after World War II. He received his bachelor's degree and doctorate from the school before joining the faculty. He became chairman of the entomology department in 1986. Morse also traveled extensively, often under the sponsorship of the U.S. Department of Agriculture, teaching beekeepers in Africa, South America and the Philippines how to improve their craft. In reporting his death, *The New York Times* noted that Morse was not impervious to bee stings. His daughter Susan said that four days before his death, Morse returned home sporting the evidence of another encounter with a bee. 'He died with a little bee sting on his eye,' she said, on May 12 at his home in Ithaca, N.Y."

Roger will be greatly missed by the beekeeping community. He was perhaps the quintessential professor-beekeeper, able to assume both roles and speak clearly about his passion to both communities. He contributed much more to apiculture than his guide mentioned above. Among his most recent achievements was editing the latest edition of *ABC XYZ of Beekeeping* and contributing to authoring the latest information on the value of the honey bee's pollination activities in the United States[8]. He was also instrumental in developing the Archbold Biological Station snowbird beekeepers' meeting in Florida[9]. ■

Commercial Queens
Selecting Tracheal Mite-Resistant Stock

THERE SEEMS TO BE MORE CONCERN about commercially reared queens since the major symposium on the subject at the 1998 American Beekeeping Federation convention in Colorado Springs, Colo.[10] Subsequent to that meeting, Dr. Scott Camazine and colleagues published "How Healthy are Commercially Produced U.S. Honey Bee Queens?" in *American Bee Journal* (Vol. 138, No. 9, pp. 677–680). In that study 325 commercially reared queens were examined for a number of variables.

Ovary Development: Twelve percent of queens surveyed had underdeveloped ovaries, which contained five or fewer developed eggs. This is fewer than in a 1962 study, where 17 percent had undeveloped ovaries.

Sperm Counts and Mating: One-fifth (19 percent) of queens in the study had fewer than three million sperm, and half contained fewer than five million. Good quality queens generally should have more than that number.

Nosema: Nosema was not common, affecting only 7 percent of queens examined. This incidence was about the same as that of previous studies.

Tracheal Mites: Twenty percent of queens examined were infested with tracheal mites. It was common for a third to a half of the queens per breeder to be infested, especially early in the season.

A table provided by the authors shows that, aside from tracheal mites, their results compared favorably with earlier studies, and their numbers often were lower. However, tracheal mites, not present in previous studies, bring another factor to the table that could prove to be formidable for queen survival and performance. The authors discuss various hypotheses concerning queens infested with tracheal mites, including the fact that infested queens weighing less and having fewer sperm (almost a million less) than noninfested ones might lead to increased supersedure. They conclude that the beekeeping industry may be able to minimize these problems by aggressively treating bees in their mating nuclei in order to produce healthy queens. In addition, they said that poor mating might be minimized by assuring there are sufficient numbers of healthy drones available in mating yards.

Drs. R. Danka and J. Villa at the Baton Rouge Bee Lab suggest that another way to minimize tracheal mite problems would be by using resistant stock. Thus, their study, "A Survey of Tracheal Mite Resistance Levels in U.S. Commercial Queen Breeder Colonies," *American Bee Journal* (Vol. 140, No. 5, pp. 405–407, May 2000).

They report a large variability in resistance levels in commercial queens, which could have "profound consequences in beekeeping operations." Such variability could yield propagated queens, some of which would be useful in improving stock, while others might predispose their colonies to damaging mite infestations. In the absence of knowledge about the resistance levels of individual breeder colonies, the performance of *Continued next page*

> "Twenty percent of queens examined were infested with tracheal mites. It was common for a third to a half of the queens per breeder to be infested."

Human Bees in China
Hand Pollination of Apples

AN ARTICLE IN THE MARCH 2000 issue of *Beekeeping & Development* (No. 54, pp. 6–7) reveals that although honey bees are more efficient pollinators, farmers prefer to have apples hand pollinated in Maoxian County (Sichuan Province) of southern China. Uma and Jet Partap of ICIMOD of Nepal surveyed the area using questionnaires and interviews to determine if apple pollination was adequate in the county, which has 2,830 hectares in production, producing around 30,000 tons of apples, worth 33.9 million yuan (US $4.2 million).

The following points emerged from the study:

1. Average land holdings are very small, around 0.2 hectares. Farmers have little land to plant pollenizer varieties, which average only 5 to 7 percent of trees. Sources of pollen, therefore, are scarce.
2. Because apples are the main cash crop, farmers are willing to pay to ensure each flower is properly pollinated.
3. Farmers believe hand pollination is the best method under adverse climatic conditions. It is possible to hand pollinate in low temperatures and bad weather when honey bees don't fly.
4. Although migratory beekeeping is common in the area, beekeepers are not willing to rent their bees because there is a high use of pesticides in apple growing.
5. Hand pollination of apples is a community effort. Apple flowering begins in the lower elevations and so farmers from higher up are free to engage in pollination at lower altitudes and vice versa.
6. Hand pollination is carried out three times each season to ensure pollination of late flowers.
7. Governmental extension services have spread the technology of hand pollination, such that human "bees" now pollinate all 2,000 hectares in the region. ■

[3]http://www.ifas.ufl.edu/~mts/apishtm/apis98/apsep98.htm#1
[4]http://www.ifas.ufl.edu/~mts/apishtm/apis96/apaug96.htm#1
[5]http://www.ifas.ufl.edu/~mts/apishtm/apis_2000/apjan_2000.htm#2
[6]http://www.ifas.ufl.edu/~mts/apishtm/apis99/apjun99.htm#1
[7]http://www.ifas.ufl.edu/~mts/apishtm/apis_2000/communicating_the_joy_of_keeping.htm
[8]http://www.ifas.ufl.edu/~mts/apishtm/Apis_2000/apapr_2000.htm#2
[9]http://www.ifas.ufl.edu/~mts/apishtm/apis99/apdec99.htm#5
[10]http://www.ifas.ufl.edu/~mts/apishtm/apis98/apfeb98.htm#4

New Zealand and Varroa Mites

UNFORTUNATELY, my last newsletter describing the Varroa mite situation in New Zealand contained inaccuracies in several areas[11]. I received e-mails providing me with updates on what was actually happening, but they were too late to make the May issue. The report from *HiveLights* (Vol. 13, No. 2, pp. 6–7), the official magazine of the Canadian Honey Council[12] I referenced, for example, was out of date and no longer valid. My reporting of Mr. Peter Kerr's observations was also criticized, even though he took pains to say his was not an official account, but only what one beekeeper saw and heard.

Fortunately, I did give World Wide Web URLs, which could be accessed for updated information. Thus, interested folks could have consulted official information from both the Ministry of Agriculture[13] and the New Zealand Beekeepers Association[14]. Nevertheless, I do apologize to both New Zealand and Canadian beekeepers for any harm that might have come to them based on information appearing in the pages of this newsletter.

Meanwhile, deliberations continue in New Zealand concerning the Varroa crisis. Again, for the best and most up-to-date information, use the official web sites mentioned above. ■

Queens Continued production colonies headed by commercially reared queens becomes largely a matter of chance associated with random selection. Fortunately, the majority of colonies tested showed resistance, according to the authors, but some did not. Queens reared from susceptible stock, they say, may contribute to "lingering problems associated with tracheal mites across the country."

The authors hypothesize that perhaps tracheal mite susceptibility continues to be found in some stocks because breeder colonies in the South are not as affected by these parasites as production colonies in the North. They conclude that the survey results emphasize the importance of testing for resistance. This would provide breeders the opportunity to wean less-resistant stock from their operations. This technology has yielded results in other venues. In Canada, the Ontario Bee Breeders' Association has increased resistance levels to the point that annual tests show an average reduction of mites in bees from 13 to 1.5. ■

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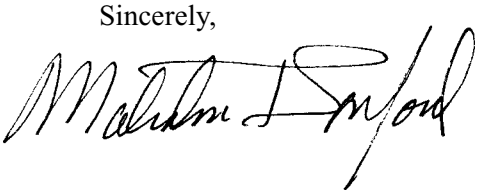
[11]http://www.ifas.ufl.edu/~mts/apishtm/apis-2000/apmay2000.htm#3
[12]http://www.honeycouncil.ca
[13]http://www.maf.govt.nz/MAFnet/index/Varroa.html
[14]http://www.nba.org.nz/news.html

Extension Apiculturist in Ecuador

MY FULBRIGHT GRANT runs until October 4. I hope to be able to report on educational events concerning Ecuadorian beekeeping in the near future. For now, my address is Apt. 10A, Edif. Ivsemon Park, Belgica #392 y Shyris, Quito, Tel. 593-2-250-648. Alternatively, contact the Fulbright Commission, Almagro #25-41 y Colon, Quito, P.O. Box 17-07-9081, Tel. 593-2-222-103/104 or 593-2-509-523. My e-mail remains the same: mts@gnv.ifas.ufl.edu. ■

Sincerely,



APIS, a monthly newsletter, is celebrating its 18th year of service to beekeepers. For subscription or other information, please write, phone, fax or e-mail.

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