WAS 97

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The temperature was below average and the summer monsoon thunderstorms brought nothing but spectacular lightning shows to the horizon when we met in Tucson for our Nineteenth Annual WAS Con-ference. My only concerns were resolved when the boxes of door prizes, auction items, and WAS Journals showed up at the last second. The boxes were in the US mail 19 and 10 days, respectively. Exhibitors filled the hall with merchandise and vendors were very liberal with door prizes and auction items.

Parasitic mites were the focus of the first day's presentations. Dr. Diane Sammataro discussed in detail the effect that vegetable oil has on tracheal mite behavior. On a new host mites usually participate in habitat seeking, in which they move to the groves in the host bee's exoskeleton and follow them to tracheal openings. When leaving an old host, the mite climbs to the end of the bee's hair, hangs on by a hind leg and reaches out for a new bee. This is called questing.

When extra lipid coats the exterior of a bee, the mites simply crawl up onto the nearest hairs and continue questing. Even when placed right on the edge of the main thoracic spiracle, they left and began questing. Obviously, having extra lipid in the hive interferes with the normal behavior of tracheal mites.

On the negative side of the lipid story, if oil is sprayed directly on adult bees, they are susceptible to death by exposure to either high or low temperature extremes. Additionally, sprays like non-stick cooking products form microdroplets that later can be found in extracted honey. The lipid is not harmful on con-sumption, but the honey is con-taminated.

Dr. Robert Danka described results of studies on tracheal mite resistance of Buckfast bees, Yugo bees, commercial stocks, and crosses between them. Buckfast bees do have tracheal mites, but at persistently low levels. It appears as though the bees actually feel and attempt to groom the mites off with their legs.

Breeding for susceptible and

resistant lines of bees, the researchers were able to develop lines significantly better and worse than normal commercial stocks. Fortunately, resistance to mites seems to be dominant. It has a heritability rating of over 70, meaning that less than 30% of the effect is due to non-genetic factors.

Two potential sources of Varroa resistant stock are being studied. Bees from Russia, where they have been associated with Varroa for 80-90 years, have been imported to the USDA quarantine island off the coast of Louisiana. The stocks look promising, but data is scarce. The bees are very winter tolerant, since they come from an environment with a four month honey production season. Bees from Bari, Italy, are also being studied in their homeland. After 17 years of Varroa exposure, the Bari feral bees are doing much better, now.

Dr. Danka suggested that four traits might be of importance in Varroa mite resistance: 1. decreased length of capped stage, 2. grooming and biting mites, 3. hygienic behavior (removing infested brood), and 4. failure of mites to reproduce in host cells. Actually, the fourth trait is the most influential in these studies.

Dr. Danka still wishes to collect and compare the “survivor stocks” from your area. If you are aware of a colony that has survived, without treatment, for over a year, please make arrangements to send the queen to Bob at:
USDA Honey Bee Research Laboratory 1157 Ben Hur Road, Baton Rouge, LA 70820 [(504)767-9294].

Gordy Wardell has spent a significant amount of time in

Indonesia and S.E. Asia observing the use of spices and essential oils in preserving foods and in medicine. Some products are used in beekeeping. In Sumatra, colonies of Apis cerana or A. dorsata abscond if Varroa levels get too high. Beekeepers in Sumatra use the smoke of clove cigarettes to knock down Varroa. Clove oil (eugenol) alone is not effective without concurrent nicotine.

In Bali, some honey robbing persons burn special bark, wrapped in the hollow stalk of fresh banana, to drive A. dorsata off its nest. All the bees leave the comb and cluster nearby. Another beekeeper prepared a smudge of pine resin, pepper, coconut oil, fibers, and "a dozen spices." In this case, A. dorsata simply walked off the portion of the comb directly in the stream of the smoke, and the honey section was cut out and lowered to the ground in a basket.

Dr. Wardell is just beginning to conduct cooperative studies with Diana Sammataro and Gloria DeGrandi-Hoffman on uses of essential oils in hives for mite control. Preliminary studies with cinnamon oil, an emulsifier, and sugar syrup at the hive entrance showed that the solution would turn off colony defense and robbing was horrific. Also, a number of the oils are quite potent to the bees - don't try limonene in a hive!

A report on chalkbrood disease, by Dr. Martha Gilliam, reviewed the history of the disease and approaches to control-none of which are really effective. The causative fungus, Ascosphaera apis, is one of about 20 related species, all of which are associated with bees. Only the fungi associated with honey bees and alfalfa leaf-cutting bees cause diseases.

Time honored suggestions for controlling chalkbrood in honey bees include: 1. mummy removal, 2. new combs, 3. good ventilation, 4. add bees, 5. supplemental feed and 6. requeening, which usually helps the most.

Quite a bit of study has been conducted on hygienic bee stocks. About 10% of our "normal" colonies actually have good hygienic behavior: will uncap and remove frozen brood in 24 hours. It only takes about 50% hygienic bees in a colony population to get good results. In Denmark, where chalk-brood was estimated to be seriously reducing honey production in 74% of the colonies, a nationwide effort to find, breed, and distribute resistant (hygienic) stocks has reduced the problem to about 10%. Similar results could be attained in the US, if queen breeders included lack of chalkbrood as a criterion in their breeder queen selections.

Interestingly, there are molds and bacteria associated with honey bees that are "antagonistic" to chalkbrood. They produce anti-fungal extracts. Surprisingly, more antagonists are found in colonies of hygienic bees than in normal colonies. Bees from Santa Cruz Island have some antagonists of real interest, even though the bees have been on the island, unaltered for over 100 years and chalkbrood was "found" in the US in 1968 "for the first time."

The second day of programming was devoted to Africanized honey bees (AHBs). The first speaker, Dr. Steven Thoenes of Bee Master, shared his observations about AHBs around Tucson. In a period of three

years, statistics changed from 400-500 swarms of European honey bees (EHBs) per year to 4,000-5,000 AHB swarms per year. Steve's crews handle swarms and swarm traps with latex surgical gloves because the dexterity is so much better than with leather gloves. Steve also reported that Varroa is common on EHB swarms, but not found on AHB swarms in the Tucson area.

Local beekeeeper, Lenard Hines, shared his experiences keeping EHB colonies in areas filled with AHBs. Agreeing with Dr. Thoenes, Lenard stated that AHBs don't stay on the desert, but move into "tropical paradises" that we call cities. Then Lenard listed some characteristics of AHB that make them different from EHBs: 1. variations in defensiveness that sometimes can be extreme, 2. runniness on combs and around the insides and outsides of boxes (sometimes in "waves"), 3. fly around your head in clouds emitting noticeable amounts of alarm pheromone (sometimes so loud that you can't converse without yelling), 4. persistence; not only follow you for long distance, but will continue to sting inside a vehicle or building, 5. smaller size and "always in high gear," clusters usually small (fist to quart size) and tightly packed (break up as clumps); usually pretty docile, 6. willingness to be combined at night (will fight during the day), 7. often raising queen cells (20 to 30 if queen is removed for re-queening), 8. abundance of laying workers if queen perishes (most of drone brood dies), 9. willing to nest in smaller spaces than EHBs, 10. really use propolis (reduce entrance to size of two bees and glue front ends of bottom combs to bottom board), and 11, reaction to vibration - as soon as hive is touched, the bees pour out and are in your face.

In Lenard's operation AHBs produced as much or more honey than EHBs, if provided with enough space (takes a lot). Chalkbrood seemed to be up a bit; AHB about the same; tracheal mites problematic at first, now OK; and the more African like, the lower the Varroa level.

Requeening hot colonies is an interesting challenge. If the old queen can be found and eliminated, putting in a mated EHB queen can change colony behavior for the better within a week. Whether or not queen or brood pheromone is responsible for that change has to been determined. Lenard's last statement was not reassuring - he feels that AHBs can survive all over the country.

Dr. Gloria DeGrandi-Hoffman was next on the program. She described some findings concerning how AHBs sort of "take over an area" from EHBs. Part of the mechanism deals with queen production. Pure AHB queens develop quickest, hybrids in between, and pure EHBs slowest. That means that if more than one cell is started, at random, from larvae in a hybrid colony, the first queen out is likely to be an AHB queen. That makes sense, but what surprised me was the effect that mis-mating (AHB drones with EHB supersedure queens) has on AHB success. When virgin queens mate with only 20-30% AHB drones, queens reared from those colonies will be over 50% AHB queens.

Those genes from AHB drones, that lead to supersisters that Gloria called "patrilines," also influenced colony defensive behavior to a very great extent.

In mixed (hybrid)colony populations, it was the AHB patrilines that shot out of the colonies within seconds of being disturbed. In the worst cases, AHB X AHB, the researchers documented a full 10% of the colony population out of the hive and into the air within 30 seconds following being disturbed. We usually can never get more than 200 bees riled up like that from EHB colonies with 30,000 to 45,000 bees inside (0.67 to 0.44%).

Justin Schmidt was the last speaker to talk about AHBs and bee stings in general. He said that a healthy person should be able to withstand 6 stings per pound with-out trouble. Around 8 stings per pound could be lethal to about 1/2 the individuals stung at that level, and 10 or more stings per pound would be lethal to nearly anyone. Based on examinations of dogs killed by AHBs around Tucson, the head receives the most stings with areas of exhalation and dark colors getting the greatest attention.

Human lives are lost to bee stings due to: 1. overwhelming dose of venom, 2. heart attacks, or 3. bowel infarct. Allergies are not so involved as might be expected. Studies suggest that the allergic state of bee stings wears off in 7 years. Two years on bee sting immunotherapy eliminates hyper-sensitivity. Only one in 125,000 persons who are thought to be hypersensitive to bee stings, actually dies from a bee sting on any given year. Given that reassurance, we headed off to see the AHBs.

The USDA AHB yard is located well out of the city of Tucson, well off the beaten path. It is surrounded with chain link fence that is plastered with warning signs. The day that we visited, the temperature was only in the mid 90's, but that was more than hot enough when everyone was suited up in double layered bee suits, boots, gloves and duct tape over every space that could have ventilated body heat.

All was clam when we approached the apiary, and stayed that way until some hives were bumped and tilted. The immediacy of the response was interesting. Within 10 seconds, most of the bees that ever came out the entrance were out. On this occasion, they banged into suits and veils repeatedly, but did not sting. The one exception was a pair of gloves holding a black video camera. But the gloves were stung many times.

The bees on the combs were sparse. Large areas of capped brood were evident, but other brood rearing was quite limited. Pollen was evident, but honey stores were down and not much nectar was seen. It wasn't hard to see in the cells because the bees were always walking around quickly ("running") on the combs. Many flew off the combs when they were lifted from the hives. Standing right near the hive, there were less bees pounding your veil than if you were further removed toward the periphery of the group.

The AHB didn't eat us alive, but they definitely would not be the type of bees that you would want in your hives. They are way too touchy to disturbances, they fly out of the hives very quickly and in large numbers, and they definitely convey the message that they don't want us around. If I have just described the bees in your hive, it is time to requeen!

The third day of presentations attempted to give

us some idea of what may be the future of bee-keeping. Heidi Savage, from the California Almond Board reported that almond acreage is increasing. More bees are going to be needed for pollination, and only honey bees are cost effective. While Heidi estimated that colony rental represents 10% of an almond grower's per acre cost of pro-duction, the beekeepers felt the estimate was high. Regardless of the exact proportion, honey bees are going to be needed in even larger numbers real soon. Current, reasonable to high, prices of bulk almonds have stimulated plantings, and there will be a need for 1 million colonies of bees in California during February of the year 2000. We already have two-fifths of the US bees in California at that time. If total US colonies numbers continue to decline, we will need about half the nation's bees in our state during early spring in the new millennium.

The Almond Board publishes a Pollination Directory for the benefit of growers and beekeepers. You can have your name listed, free of charge, simply by contacting the Almond Board of California, 1104 12th Street, Modesto, CA 95354 [(209)549-8262]. The future of almond pollination looks bright. [Editor's Note: Full implementation of NAFTA may encourage migratory beekeeping from Mexico to Canada.]

Kim Flottom's view of the future was sobering. He projected the current trend of less federal and state support for bee research to continue. He sees "high-tech" types of research being funded while practical application research continues to decline. The one ray of sunshine is the possibility that increasing the assessment to the National Honey Board may provide up to $250,000 a year in colony production research.

A national change in expecta-tions of extension personnel was described. Extension specialists now are expected to compete with the professors for research funding and institutional support for extension activities is drying up. Dr. James Tew, Extension Apiculturist at Ohio State University and I commiserated over that topic at length while strolling through Old Tucson.

Electronic information is just a stroke of a few computer keyboard keys or click of a "mouse" away. What sorts of information are out there about honey bees? Lots! Our old standard problems of AHB, EHB, chalkbrood, Nosema, viruses and mites are all discussed. Legal, illegal, rational and irrational approaches to solving these problems are on the web. Your problem will be to separate the wheat from the chaff.

Apiary regulators are redefining their roles and becoming more like extension agents. With the "relaxed" regulations in NAFTA, continent-wide beekeeping will lead to many changes that successful beekeepers will have to know about.

Some of Kim's ideas about the future of commercial beekeeping were interesting. Truthfully, little has changed in beekeeping since Langstroth developed the moveable frame hive in the mid 1800's. We are better mechanized for hive movement and honey handling, but beekeeping is still in its infancy. On the horizon Kim sees: 1. computerization and greater

mechanization to replace ever more expensive manual laborers; 2. behavior manipulation of bees through the use of pheromones; and 3, development of “designer” queens with emphasis on pollination, honey production, wintering, pest and disease resistance, gentleness, etc.

Africanized honey bees are not going away. In fact, Kim believes that they will continue to expand their areas of “colonization” until they cover quite a bit of the country. More work needs to be done in the area of education of the general public. Kim fears that an uneducated public will put an end to hobby beekeeping.

Honey marketing appears to be headed in two directions. Large efficient packers will corner the national retail trade in major outlets. The few remaining small to medium sized packing operations will have to turn to niche marketing to survive.

Kim still sees beekeeping well into the future in the US, but he believes that colony management must become more intensive, and that means higher costs. Bee-keepers must find ways to offset these costs with higher per colony income.

Dr. James Tew interjected some very serious considerations into an otherwise delightfully humorous presentation on who and what beekeepers are. He related that people who like to keep bees are out of the ordinary. They are so fond of their bees and beekeeping that they cannot imagine why family members and friends tend not to be enthused about moving hives at night and spending hours extracting (and cleaning up) honey. Bee-keeping can become such a passion that family and friends take a back seat to the avocation. Jim caught himself in such a situation when he objectively criticized himself for nailing frames on Christmas day: “Let’s see; eat breakfast, open presents, and nail together 40 frames before lunch.” Jim’s message is to keep things in balance.

Dr. Hayward Spangler has devoted quite a few years to studying wax moths and potential methods for non-chemical control. Both lesser and greater wax moths will destroy stored combs if they are left unprotected. Chalkbrood mummies are consumed, but American foulbrood scales remain unscathed. On a small scale, like a single comb, wax moths can be induced to crawl out of the cells simply by knocking on the top bar. A mechanical “knocker” was developed, but it’s practical use is limited to obtaining larvae for other experiments or, perhaps, fish bait.

Studies on three different biological control agents proved that they were measurably effective, but did not provide economic control.

Both moths rely on hearing to escape being eaten by bats. Buckets filled with soapy water will drown 50 to 80% of lesser wax moths, if a tone generator puts out a 40 kHz or 100 kHz tone, respectively. Female lesser wax moths can also be attracted to a weak tone around 100 mHz, which corresponds to a mating sound from the male.

Greater wax moth reproductive behavior is more complex. Apparently, the male can make a sound that is perceived by the female. She fans her wings at the flight frequency. The male detects the vibrations and liberates more perfume (the male has the

attractive scent in this species - the odor is very unpleasant to me). The female approaches the male for mating.

Kathy Heasley related that her company assists clients in marketing their products. She provided an overview of the process used to identify potential customers and modify the product to meet their needs. Kathy has modified a computer program specifically to meet the needs of beekeepers: BK Economics. If you would like to correspond with Kathy about that program, you may write to: Kathy Heasley, Integrated Marketing Solutions, 14754 E. Golden Eagle Blvd., Fountain Hills, AZ 85268.

Dr. Eric Erickson was our final presenter at the meeting. He was a little disappointed that his AHBs were so tame at the time of our visit. So he showed us a video of what the same colonies were like earlier in the season. I'm glad they were "off" when we were there.

Eric reported that local bees, living in combs with smaller cell sizes, have survived the onslaught of Varroa and have less than 10% infestation rates. Tracheal mites are very low, too. They are hoping to breed from those queens for mite resistance. [Editor's Note: The AHBs in the USDA yard were living in previously drawn EHB combs. Their mite level in uncapped drone brood was about 50%.]

If you have knowledge of one or more colonies of bees that seems to have survived for years without treatment for either mite, Dr. Erickson would like some samples of the workers from those colonies.

The WAS Conference wrapped up with the annual awards banquet. Dee and Ed Lusby, Tucson area beekeepers, received the Thurber Award for Inventiveness in Beekeeping. The Lusby's have spent many years and personal resources on breeding a bee specific for desert beekeeping. They also have experimented with reduced sized comb foundation and cell sizes. When adequately small, the cell size seems to positively affect disease and mite control in a colony.

The award for Outstanding Service Beekeeping was presented to Dr. Gloria DeGrande-Hoffman. Gloria has devoted many years to designing and validating computer models dealing with almond pollination, apple pollination, and honey bee colony populations. Her honey bee model includes effects of mites, diseases, and pesticides on otherwise healthy colonies. Copies of the programs are available, free of charge, from Gloria, but you need an up-to-date computer to run them (486 or better with at least 8MB RAM; Pentium processor and 16 MB RAM, if you don't want to wait all day to see the results). Dr. DeGrandi-Hoffman is at the Carl Hayden Bee Research Center, 2000 E. Allen Road, Tucson, AZ 85719-1596.

Sincerely,

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