SCOUT BEE NEWSLETTER

A publication from the Hagerstown Valley Apian Society

www.scoutbee.org

March 2007

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HVAS Dues are due!

The annual $10.00 dues were due January 1, 2007

They can be paid in person at the meeting or sent to the treasurer Don Wheeler at:

5960 Medallion Court

Alexandria, VA. 22303

There is a 3 month grace period. After March, those who have not paid will no longer receive the Scout Bee Newsletter

Dr. Dewey Caron will be here this month.

Dewey Caron, the well known and respected author, speaker and scholar of honeybees, will be speaking on Honeybee nutrition and feeding. Dr. Caron is the author of many beekeeping reference books including: *Honeybee Biology and beekeeping, Observation Hives* and *Africanized Honeybees in the Americas*

The next meeting will be held on Tuesday March 13, 2007 7:30pm

at the Washington County Extension Office. 7303 Sharpsburg Pike

Hagerstown Valley Apian Society

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MD 2007 Registrations are Due

If you have not sent in your registration forms to the Dept of agriculture, please do so. These records are necessary in order to keep track of the beekeepers in Maryland. If an outbreak of AFB occurs, it will be much easier to track down the source if everyone is registered. It is for your protection and it's free. They have even provided a self addressed stamped envelope.

Ernie Miner's Equipment sale is Saturday March 17

10:00 am

9933 Kelly Road

Mount Pleasant, MD

Call 301-606-4745

Colony Defense - More Than Just the Sting!

You may think that the only defense mechanism a honeybee colony has is its sting. Colony defense has a lot more involved in it than just getting a bunch of bees together to sting something, it has, in fact many mechanisms at its disposal for colony defense. Some are obvious, like the guard bees at the entrance, the choice of location of the nest site, the disposal of diseased brood, and the rapid way of recruiting other bees to engage in a counterattack by the release of alarm pheromones.

But there are other, more subtle and inconspicuous techniques and biological processes that wouldn't, at first glance, be thought of as defense mechanisms. These include nestmate recognition, removal of dead bees by undertaker bees, collection of plant resins (propolis) that are antifungal and antibacterial, the ability of the bees to filter out bacteria spores in their gut, and the maintenance of high nest temperatures during brood rearing.

If you look at a honeybee colony from the point of view of an evolutionary development standpoint, you can begin to get a feel for just what specific environmental challenges they have faced and where those traits originated from.

The first point to consider is that a colony is that a colony is established in a permanent location. Once the decision is made to move into a nest site, it is for the most part, a permanent move. The colony then begins investing a substantial amount of resources to building their home. It takes 8 pounds of honey to produce 1 pound of wax. Once made, this comb is a permanent fixture of the location and can't run away from an attacker. The fact that this location is permanent is one factor that puts them at risk. It must mount a counterattack and make a standing defense against their would be attackers.

Another factor that has an influence on the popularity of a honeybee's nest to predators is the rich supply of food stored within. There are hundreds of different kinds of predators, ranging from one-celled organisms, such as viruses, fungi or bacteria, to large animals, for example bears and yes, man.

When one takes a closer look at the subject of colony defense, it becomes apparent that it is a subject that is complex due to the combination of traits that are exhibited. One defensive trait that works well with one predator may be totally ineffective against another. The ability of the bees to find and remove varroa from their nestmates through grooming has no benefit whatsoever to protecting the colony against robber bees sneaking in to make off with their hard worked resources. That is where nestmate recognition through pheromone detection comes into play.

Another reason that it is so difficult is that several traits may contribute to each other to provide an adequate defense, that is is often difficult to state where one trait ends and another begins.

I'm going to break the defensive trait into several groups;

1) behavioral – the actions that bees take

2) biological – biochemical processes that aid in defense

3**) morphological** – the form and structure of the organism that contribute to its protection

Behavioral

- **Protective nest site** – Generally, Apis Mellifera prefers nest sites where the entrances are approximately 10 feet above the ground and in a slightly shaded location. This location makes the nest more difficult to spot for visually oriented predators

- **Guard bees** – About 20% of all workers serve 1 to 2 days as guard bees before moving on to foraging activities. They do this by positioning themselves at the entrance facing out, with their 2 forelegs off the deck , antennas projected forward and mandibles slightly open. In this position, they examine all worker bees that come by them by touching them with their antennas for about 1 to 3 seconds.

- **Removal of dead bees** - Within about 15 minutes of death, honeybees rapidly develop a change in odor that can be detected by their sisters. They are promptly removed and dropped off in front of the hive. This prevents microorganisms that feed on decaying matter from gaining a foothold and possibly causing infection within the nest. In a normal colony, approximately 100 bees die in the hive every day, but you may only be able to find 1 or 2 dead bees on the floor of the hive.

- **Synchronous orientation flights** – When honeybees are ready for their first flights (this varies from 4 to 18 days after emergence) 100's of bees can be seen flying in a cloud out in front of the hive, where they hover in the cloud facing the entrance. This is where they first get oriented to the hive's position. This cloud of bees increases their chances of avoiding being picked off by predatory insects and small animals.

- **Collection of propolis** – Propolis has been found to be both antibacterial and antifungal. The word propolis comes from the *Greek* words *pro*- (for or in defense of) and *polis*- (the city). It is very well named because bees use it to plug cracks in the walls of the hive, to strengthen combs, embalm carcasses (such as wax moths and mice that are too big from them to remove, reduce entrances that make them easier to defend, and varnish the walls and combs with a thin coating.

- **Hygienic behavior** - This trait allows bees to detect and remove reproducing Varroa mites from the cells under the cappings while the honeybee is in the pupal stage. This helps keep down their numbers. They also remove adult mites from themselves and their siblings by grooming.

Biological

- **Nestmate recognition** – Honeybees are able to tell the difference between their own nestmates and foreign bees. They do this by recognizing their hive's own characteristic pheromone combination. These unwelcome visitors are promptly attacked and removed by the guard bees protecting the entrance.

- **Alarm-recruitment pheromones** – When an intruder threatens the colony, the guard bees will raise their abdomens and extend their sting. This releases pheromones that call other bees to the defense. When a bee stings, pheromones are also released to provide a target for other bees to find.

- **High brood nest temperature** – the colony maintains a constant temperature in the broodnest (32-35°C) that causes it to be resistant to bacterial, viral and fungal infections. These temperatures are higher than the cluster temperature without brood (which might be as low as 20-25°C).

- **Antibiotics** - An adult honeybee's digestive system is sterile and antibacterial. Bacteria cannot reproduce in it. A larva, on the other hand develops this quality as it ages. They are vulnerable to bacteria for only 24-36 hours or so. AFB spores cannot infect larvae over that age.

- **Reproduction by swarming** – Throughout her life, the queen is protected by her retinue. When she goes out with a swarm in search of another nest site, she is similarly protected. The colony increases their chances of survival by reproducing by generating swarms. This behavior itself doubles their survival possibility and thus promotes regeneration of the species.

Morphological

- **Gut anatomy and defecation** – The proventricular valve (located) between the bee's crop (honey stomach) and their digestive tract. The primary function of this valve is to filter out pollen grains for digestion but this also acts as a filter for spore forming microorganisms. Since the digestive tract is antibacterial, they cannot reproduce. The other behavior that complements this morphological feature is the fact they bees never defecate in the hive. They always fly out for a cleansing flight. This allows for the removal and disposal of bacteria.

- **Venomous sting** – When a bee stings, the abdomen is bent and the sting is driven into the victim. The sting consists of two lancets that are each powered by muscles. The muscles alternate their pulsing and with each successive pulse, one lancet is driven in at a time, the barbs one lancet prevent it from sliding back while the other lancet slides by it, driving the entire apparatus deeper into the victim. The two lancets pressed together forms are semicircular canal that the venom flows down. When the bee pulls away from the victim, the entire system of muscles, plates and lancets pulls out of the bee. The muscles continue to do their work independently after the bees has flown away. There is a powerful biochemical mixture of toxins in the venom that destroy cells and cause pain in the victim. When combined with 100's of other workers homing in on the sting sites with pheromone release, this makes for an extremely strong deterrent for even some of the largest an most persistent predators.

With all these weapons in their arsenal, it is no wonder that bees have stood the test of time and have been around for 100 million years. They have adapted and persevered in spite of all the predators that nature has thrown at them.

Honey Nut Spice Cake

½ cup shortening
½ cup sugar
½ cup rendered or liquid honey
1 egg separated
½ cup coarsely chopped nuts
2 cups sifted flour
2 teaspoons baking powder
¼ teaspoon soda
¼ teaspoon salt¾ teaspoon cinnamon
¼ teaspoon cloves
½ cup water
¼ teaspoon nutmeg

Grease and flour two 8" layer pans. Cream shortening and sugar until well blended. Add honey, egg egg yolk and nuts: beat 1 minute. Sift together flour, baking powder, soda , salt and spices. Add alternatively with water to creamed mixture, beating thoroughly. Beat egg white until stiff but not dry. Add to creamed mixture, folding in carefully. Bake at 350 degrees for 25 minutes. Frost with your favorite frosting.

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