B-PLUS
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WHERE ARE THE SWARMS?

At the time I am writing this (the end of May) we have had only one swarm call. It has been a cool and generally unfavorable month. Thus, the lack of swarms may only be a delay caused by the weather. Or it may be the result that tracheal mites have moved into the feral population as well. If that is the case, the pattern of foraging bees and pollination may be changed. There are various estimates of the percentage of bees that come from wild (feral) colonies. We have some data that would indicate that as much as 80 percent of fruit pollination may come from these colonies. Estimates of this population in New York were that they accounted for at least 50 percent of the bees. We hope to take tracheal mite samples from swarms that come from these feral colonies. We think that this might be a way to determine the movement and the effect of this parasite on that population. We hope to use the same technique to sample for varroa mites as well. If any of you would like to help in this study we would appreciate the cooperation. What we would need is a sample of 50 bees put into a plastic bag with information regarding the swarm. Write in pencil on a piece of paper when the swarm was captured, where it was located and its approximate size. Put the paper into the bag and freeze the sample. You can then contact me about the samples, and we will make arrangements to pick them up, or have you bring them to a beekeepers meeting.

TALES FROM THE LONESOME HIVE

It was Earth Day, Sunday April 22nd, and I decided that it was a good day to give the colony a complete spring examination. There were several things that I could have been doing for there were many demonstrations and programs in honor of the 20th anniversary of the first Earth Day. Though somehow, to me, it seemed good to be looking at my colony. Maybe being with my colony of bees brings me closer to nature and makes me think more of the Earth.

It was a beautiful day and the bees were flying very well. Probably, one of the best days we have had during this springtime. To bring you up to date, the colony had been wintered in two deep hive bodies plus a shallow. They were very strong with the queen laying in both the top deep body as well as the shallow. It was quite evident that the LH had not yet encountered tracheal mites. I decided that

something had to be done as the colony was too strong to leave without some changes. It would most likely swarm. In fact, the colony was already preparing queen cell cups. The simplest thing was to reverse the deep bodies. However, with that done I was not sure that the colony would still not swarm. I then thought it might be possible to raise a queen in a division above the colony. So I put on a double screen and put the shallow super above to make the division. It was really quite early in the spring to try to raise queens, though the colony had many drones with many more ready to emerge. The presence of adult drones in a colony is the cue that Steve Taber says allows you to start queen rearing. The reason for this timing cue is that it takes about 12 days after the drone emerges from the cell before it is capable of mating, and it takes about that long for a colony to raise a queen. Therefore, in the time that it takes the colony to raise a queen the drones will be ready to mate.

I have suggested to beekeepers that raising queens as early as possible would have some very beneficial results in a selection program, as only the very best colonies would have produced many drones early. It would only be those colonies that survived winter in a strong condition. And maybe only those colonies that had some resistance to trachealmites, if the mites were killing colonies over the winter.

April 22nd was early to try to raise **AND** mate a queen. Yet I reasoned that it was warm, I had drones already, and it would be nearly two weeks before a queen would emerge and need to be mated. Little did I know that the next four weeks were going to be so bad as far as mating weather. The division did raise a queen though she never made it back from one of her mating flights. When I checked them, after three weeks, to see if she was laying the nuc was queenless. I then returned to the lower colony to get some new bees and brood and started over. It was now the middle of May. The weather should allow for better success.

There are several things that can go wrong in the queen rearing and mating process. The success rate is probably no more than 75-80 percent. The queen can be lost (eaten?) on her mating flights, the queens can kill each other during the fight for supremacy, or the nuc does not start a queen cell, for several reasons.

One of the advantages of using a division above the parent colony is that you can wait until you see the results of the queen's mating and emergence of workers. That is, you can wait until the queen has "proved" herself before you kill the old queen, and unite the nuc to the original colony. In this case I will probably have both queens laying for at least some time as I will operate it as a two-queen colony (providing that thenuc raises a queen this time).

I have put my antibiotic extender patty on the colony to control the foulbrood diseases. There is also some possibility that the vegetable shortening in the patty may cause a disruption of the tracheal mites. Even if the LH is free of tracheal mites at the moment it will surely have them before long. With all of the drifting that Walter Boylan-Pett has seen in his studies, with marked bees, we can be sure that the mites will come. However, if I can disrupt the growth of the mites within the colony by using the extender patty, it will be worth something. Control of the tracheal mites with menthol has proven to be less than ideal.

The Lonesome Hive is now poised for the major nectar flow to begin. The next month, or so, will be critical to its success. Rainfall has been about normal here so far. I will be putting more supers on the colony as they will need more space. As we have mentioned before, the more nectar storage room the more the bees try to fill up the space. The only decision that a beekeeper has to make is how much extra space to allow. It makes little sense to have only 15 or 20 pounds of honey in a super even if it means more total honey. The cost of the equipment and the labor of handling it are too high for the amount of extra honey that comes in.

IBRA - BEE WORLD

The International Bee Research Association is beginning its 5th decade of service to beekeeping and apiculture research. IBRA publishes a quarterly beekeeping journal ***Bee World***, which generally has very good articles of in-depth coverage on many different subjects. For example, articles on varroa, honey plants, or pollination. The organization also publishes ***Apiculture Abstracts***, a quarterly abstracting service that covers the world-wide literature on bees, beekeeping, honey, beeswax, and honey plants. This journal is a must for most of us in apiculture research. It helps us to keep in touch with what has been published. While the cost of this service seems high the cost to do the same searching by yourself would be many times more costly. IBRA also publishes the ***Journal of Apiculture Research***. This is one of the major outlets for scientific writing.

The IBRA is now located at 18 North Road, Cardiff CF1 3DY, U.K. If you travel in Wales a stop to visit is worth the trouble. The cost of membership, along with a subscription to Bee World is $44/year. This is high by U.S. standards but your money is supporting a much larger base of scientific literature on bees and beekeeping. Without IBRA and its services, research programs like ours here at MSU would have to do much more work and spend more dollars.

PHEROMONES: THE SILENT CONTROL WITHIN THE HIVE

During the last forty years we have learned much about the communication system of bees. Karl von Frisch's Nobel Prize winning work on the dance language has been a fascinating story. The ability of a forager bee to indicate to other bees the angle and distance to a source of nectar is very important for the success of the colony.

In the last few years scientists have begun to unlock another "communication" system of insects. This system is based on the detection of chemicals given off by one member to influence the action of another member of the same species. Most examples of such chemicals are sex attractants, that is they are used by females to attract males in order for mating to take place. (One exception of this rule is the attraction of the female wax moth to the male.) A name was given to the chemicals that are used in this communication system, they are called **pheromones**. The pheromones are usually excreted by specialized glands, though sometimes they are produced in more than one location within the body of the insect. I

feel that this communication system may be far more important to the colony's success than the dance language.

Pheromones are used for more than just mate attraction. Finding a mate **is** important for the continuation of a species, however there are many other things that pheromones do that are important to the success of a colony of bees. What follows is a short summary of honey bee pheromones, for more information I would direct you to a book by J. B. Free, "Pheromones of Social Bees", published by Cornell University Press, 1987.

Queen pheromone, or queen substance as it was first called, was the first insect pheromone chemically identified. The major source of this material is the queen's mandibular gland. This gland is located in the head and its location is shown in the figure above. This pheromone is interesting in that it has more than one effect. The primary function is to prevent the development of queen cells within the colony. Along with this action is its ability to suppress the development of the ovaries of worker bees. When the concentration of pheromone becomes too low within the bodies of the workers in the hive the nurse bees begin to raise queen cells, and/or the workers ovaries begin to develop. The titer of the pheromone often becomes too low when the population of the colony is large, which often leads to queen cells being made, and this leads to swarming. The queen just can not produce enough pheromone to distribute to all of the bees within the colony. Those bees that you see surrounding the queen (her court) are picking up the pheromone as they clean and groom her. The pheromone is then distributed throughout the colony via the exchange of food. The pheromone may also be in too low concentration in the workers when the queen is old and incapable of producing enough pheromone to prevent queen cell production. Of course, if the queen is killed there is no pheromone and emergency cells are produced.

A corollary of the production of queen pheromone is that two-queen colonies generally do not swarm since they have excess pheromone.

This pheromone also acts as a sex attractant. When the queen is in the air flying within drone congregation areas, the pheromone attracts the drones to the queen for mating.

The pheromone has been synthesized and, in theory, could be added to a colony to control swarming. The cost of this material would generally prevent its use for that purpose, however.

Aggregation pheromone is produced in the scent (Nasonov) gland that is located at the tip of the abdomen. The bees expose this gland and the pheromone is fanned into the air when bees are swarming to tell the nestmates where the aggregation is located, and it is used once the swarm starts into the nest to give others the location. You will also see bees open this scenting (Nasonov) gland when they are queenless, or have a virgin queen. This is probably helpful for the mating queen to find her way home again. Forger bees often will use this pheromone to mark flowers, or water- gathering places, so that other foragers can find the source. This pheromone is made up of many chemicals. A synthetic blend of these is sold for attracting bees to swarm boxes and to lure bees into blossoms.

Alarm pheromones are produced in two places. The first is the mandibular gland of the worker. The same gland that produces the queen substance in the queen. If a worker marks a spot with their mandibles other guard bees will often sting at the spot. The major source of alarm pheromones is the sting itself. Again it is a mixture of materials. You can smell these chemicals if you get several stings in a given area.

The secret of not getting stung is not receiving the first sting. Most beekeepers know that once they get stung on a hand, or other location, the bees seem to concentrate on that spot. The workers are able to smell the alarm pheromone given off by the sting. They detect these chemicals through some very sensitive organs that are located on the antennae.

Footprint pheromone - This material has not been chemically identified, as yet. It seems to act by coming in contact with the honeycomb and the bees interact at that location. The pheromone is apparently produced in the Arnhart glands located in the tarsi of the bees. The queen effects some of her control of queen cell production by the fact she walks over that portion of the comb that might have cells produced on this surface. When the colony becomes very large, or she becomes older and slower, there is less footprint pheromone and thus more queen cells that are made, by the nurse bees, in those places without footprint pheromones.

One of the ways that swarming can be controlled is by having a young queen within the hive. She is more active and this keeps the footprint pheromone on all of the comb surfaces. In addition, the young queen will produce more queen pheromone and this will suppress the production of queen cells within the colony.

I am sure that there will be other pheromones identified in the future. They may be "minor" actors in the chemical communication scheme, though sometimes a very subtle thing can cause a major effect. In the past most of us were very interested in the visual communication scheme of the honey bee. And it is fun to learn how the bees "tell" each other where a source of nectar or pollen is located. I believe that in the future we will learn that these odors (pheromones) may be doing more to regulate, and control, the colony, and in the end are more important to its success. Understanding how these chemicals act within the colony will help you understand many of the events that occur during the beekeeping season. This knowledge should also help you make such decisions as the replacement of queens.