Swarm or Supercedure Cells?

Walt Wright

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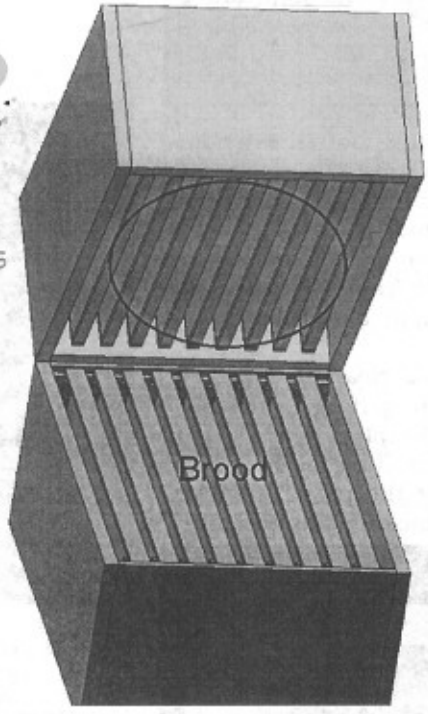
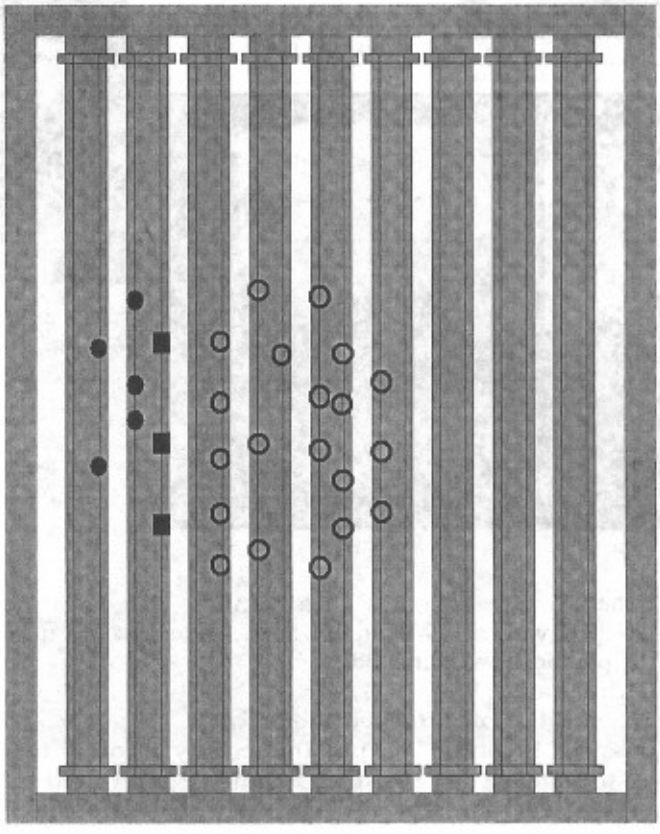


Upper Deep Tilted Up for Inspection

Basic Brood Nest (9 Frame)



- Original Insurance Cups
- Contemplating Swarm (Either Way Cups)
- Back Up Swarm Cells

The literature is weak on guidelines for determination of supersedure versus swarm cells. This article will describe some observations that will help. Genetic diversity in colonies is reported to be a survival advantage, but genetic diversity means that all colonies do almost nothing exactly alike. The best we can do is describe how most colonies implement supersedure. That's more than you will get from the popular reference literature. In the way of introduction to the subject, it should be noted that swarming is the colony's preferred means of requeening on a regular basis. Supersedure is a backup process that is not as well controlled. We see supersedure as a weak link in the overall survival format. The details will be provided as we slog through the following descriptions.

Most colonies have no queen-rearing (QR) structures (cells) over the winter. Any remaining in the Fall are torn down and the wax stored in and around the brood nest. They have uses for old wax in the late Winter brood rearing for build-up. Two of those uses are building drone cells and QR structures. If the QR structures were left over Winter they might be poorly located during build up.

The first of those QR structures are generated for supersedure. The overwintered queen has been inactive for some time, and she is going to be called on to lay at an increasing rate through build-up. Should she falter, structures are prepared in advance for rearing a replacement. In this discussion those early structures will be called *insurance*

It's location, location, location. But not where you were taught to look.

cups. I would prefer to call them bases, but was chastised by a well-known expert for making a distinction between bases and cups. He contended that QR structures are either "cups" or cells. It made no difference to him that a cup normally has sidewalls. In compromise, those bases will be called insurance cups in the following discussion.

Before we get into a description of structures we should describe the supersedure process. When you understand the process, you will have a better appreciation for the location of the structures.

The colony that decides their queen is not up to the task at hand starts supersedure promptly. After starting supersedure cells the old queen is expendable. The colony is not going to let her interfere in the process. If the old queen insists on removing the competition, and balling her away from the supersedure cell in development does not provide adequate attitude adjustment, they are forced to terminate her. They would prefer to have her continue to lay until her daughter is mated and laying. The literature calls that an efficient supersedure, but those are rare. There is almost always a brood break caused by supersedure. If the old queen doesn't get uncontrollable until her replacement matures to the point of making noises in the cell, the brood break may be short. But often the brood break stretches for nearly a full month. It doesn't seem like the old queen should recognize a larval replacement as a threat to her status, but she is often terminated very early in the process.

If the brood break is relatively short, the slow down in population growth is not noticeable. The replacement queen lays at a faster rate – playing catch up. In the longer brood break, with an empty brood nest, she really gets in a hurry. Sometimes she doesn't take time to stand the egg neatly on end at the bottom of the worker cell. Eggs are every which way at the cell bottoms.

The literature states that supersedure cells are located in the "center" of the brood nest. That statement is not supported by observation. Although it can happen, that is not the norm. The bees have been at this survival business for a very long time. To avoid terminating the existing queen early, insurance cups are normally located outside the queen's traveled area. The insurance cups, and supersedure cells if required, are located in the fringe areas of the brood nest. One of their favorite places is above the feed pollen frame at the outside of the brood nest. Of necessity, the feed pollen frame is in the warmed cluster area, but the queen does not travel there in her egg laying rounds. We have also found them above the brood nest on a nectar storage super. That may be six inches or more from the brood nest, but is within the warmed cluster volume.

Insurance cups in a Langstroth hive are normally built on the bottom bars of frames. As the cluster expands into the next higher box insurance cups are constructed on a brood nest fringe frame. There may be as many as six in a short row about the center of the frame. Warmth is controlled by the shape of the expansion dome and may not extend to frame ends. Three or four is normal early, but they may add a few more as the cluster envelops the whole frame. When an insurance cup is added on the face of the comb, a standoff is used to suspend the queen cell between combs. In the wild brood nest where comb is continuous from top to bottom, some rather ornate standoffs can be found. We have seen them arched like the mounting for a city streetlight.

The insurance cup juts out from the bottom bar to permit building a queen cell below. The end of the structure above the open space has a downward facing, dished-out surface to start a chamber for the larger queen larvae. If not used for queen rearing, it can stay like that until it turns quite dark in color. When built, the cell face was lighter color than the old wax used for capping brood. That implies some new wax was mixed in.

When the colony is contemplating rearing a queen on the insurance cup, sidewalls are started. The sidewalls flare out to make the chamber for the queen larva. (Now, it is a real cup.) When the chamber necks back down to cell dimensions to form a goblet appearance it is likely populated with egg or larva. This development is not necessarily continuous. The colony reacts to conditions as the season unfolds – both in the colony and in the field. Field forage and the demand for queen egg production both oscillate during the early season. The colony consensus is finely tuned to these variations, and their inclination to start or work at queen cells oscillates accordingly. Supersedure is the colony's first line of defense when things are not going well. If they have problems they don't understand, they tend to blame it on Mama. If the problem resolves itself, as in the case of field forage availability after a dearth, the colony can suspend any supersedure work in progress.

The experts have grappled with trying to describe the difference between swarm and supersedure cells. That's a tough assignment. There is no difference in appearance of the individual cells – with good reason. Either the primary swarm cells or supersedure cells are built on the early insurance cups. Although the cells themselves look the same, there are differences in patterns of cells and development ages of the replacement queens.

The sketch is intended to show variations in patterns for recognition of supersedure cells. In the introduction of this article it was noted that supersedure appears to be the weak link in survival traits. This assessment is based on the lack of backups generated in the supersedure process. When supersedure is endorsed, essentially all the insurance cups available are populated as a group. There may be only a week spread between the first and last. In contrast, there may be two weeks age difference for the swarm cells.

The emergence of supersedure

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Tip Of The Month

Filling the basic brood nest with nectar is a sure sign of hopelessly queenless. If the colony has a replacement queen in work, they will hold the brood nest open for the replacement. They may spot some pollen and nectar, here and there, but the brood nest is basically empty. When you find a colony with no brood, filling the brood nest with nectar, don't waste your time looking for a queen. Order one.

queens essentially as a group and the ensuing competition among them leaves just one to ascend the throne. Mating is risky business considering the distances flown and that purple martins are feeding on the drone congregation areas in the early season. The high success rate of supersedure is a credit to the moxie of the virgin queen. My records indicate that supersedure is successful about 95% of the time in this area.

Back to the sketch: The indications of supersedure are queen cells of nearly the same stage of development, located at the fringe area of the brood nest. Swarm cells have backups into the interior of the brood nest. As noted earlier, the primary swarm cells are also built on the insurance cups. The interior of the brood nest can be peppered with those back up cells. Twenty or more is not uncommon. Those backup cells are not as well cared for as the early cells and can be just nubbins by comparison. But they will produce at least a temporary queen to tide them over. A swarmed parent colony is not likely to go queenless as a result of swarming.

And then there is the middle ground between swarm and supersedure. Here, we have to debunk another literature misrepresentation. You can find literature references to a swarm being used to rid the colony of a failing queen. The species has a lot riding on successful reproduction. To suggest that they would commit a swarm to certain failure is akin to you telling your kid to "go play in traffic." In actual fact, the colony is very careful to insure that the old queen is able to handle the duties associated with establishment of the swarm in a new location. If the consensus decides she is not able to hack it, they will opt to supersede well into swarm preps. A cornerstone in the honey bee's survival format is that they do not waste resources.

For the sake of discussion, let's examine a colony on its way to swarming that decides its queen is not capable of heading a swarm. They have not populated the primary swarm cells yet, but have started adding cups toward the brood nest interior. They opt to supersede. Now, in addition to the nominal five or six insurance cups, there are a few backup cups. Let's say four more. They have a total of 10 cups available to start supersedure. They may use them all for supersedure. This makes for a very difficult call for the beekeeper. If you have absorbed the criteria above, you might make the right judgment.

In the sketch ● represents the original insurance cups, prepared well in advance of a need that will be used either for supersedure or the primary swarm cells. ○ represents backup swarm cells that will be distributed randomly in the interior of the brood nest. They are often built at the time the colony commits to swarm by populating the primary cells, and some can be added even later. In between, ■ are the either way cells. They add a confusion factor to interpretation of colony intent. If all cells in work are at approximately the same stage of development and in a tight pattern, think supersedure. If the colony is still adding cells trailing in development and into the brood nest interior, think swarm. We hope this article has been some help in your interpretation of what you see.

Did you notice how many features of insurance cup construction reflect advance planning on the part of the colony? There were four. The first three: Built before needed, located over space for the queen cell, and dished underside for queen larva chamber are less important. The fourth you should remember. Has to do with *where*. BC

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