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The Cause and Control of Swarming in Bees

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SWARMING : WHAT IS THE CAUSE ?

By WM. HAMILTON

SWARMING of the honey-bee is a natural phenomenon. It is Nature's method of propagating the species.

Swarming causes work to the beekeeper, reduces the possible crop of surplus honey, and often results in the loss of the swarm.

But every colony of bees does not swarm every year, and therefore it is obvious that under certain conditions existent in the colony bees have no inclination to swarm. If a few colonies have no desire to swarm would it not be possible to subdue or eradicate the desire to swarm in all colonies, provided the condition which induces swarming were known ?

Theories have been advanced at different times as to the cause, among which are the Gerstung theory or brood food theory ; the unbalanced condition of the colony theory ; and the congested brood-nest theory. Gerstung's theory, which is explained by other speakers, was at one time widely accepted by theorists, but in my opinion and, I believe, in the opinion of most of the professional beekeepers in Britain and America, the theory is unsound.

If the brood-food theory be correct why does not every colony swarm every year ? Of course, the nurse bee need not do much, if any, nursing of the brood. There appears to be a general impression among beekeepers that bees under certain ages cannot perform other than certain duties which the experiments of Rösch and others have shown they are best fitted for. Further, I believe there is also a general impression that bees under ten days old make brood food automatically. Neither of these impressions are correct.

The giving of brood either sealed or unsealed often checks the preparations to swarm. Giving sealed brood should accentuate the desire to swarm if Gerstung be right.

The successful entry of a virgin queen accidental or otherwise to a colony preparing to swarm usually has the effect of stopping swarming for the season.

A period of bad weather has the tendency to make the bees destroy the queen cells that have been built, and in some cases to cease making further attempts to swarm.

How do these cases square with Gerstung's theory ?

It can easily be proved that young bees by themselves have no more inclination to build queen-cells than have old bees by themselves.

The congested brood-nest theory is widely accepted as a probable cause of swarming but in my opinion it is only a contributory cause.

Many other contributory causes have been advanced, such as old or failing queens, drones, lack of ventilation, and strain or race of bee. There is little doubt that these factors have a bearing on swarming.

I propose to examine the problem as briefly as possible.

The first thing to find out is whether we can make bees swarm at will. That is not difficult, for all we have to do is to take the queen out of a good colony in the summer and twelve to fourteen days later a swarm will issue headed by a virgin queen.

From this experiment it is easy to see that the presence of more than one queen cell caused swarming. If all had been destroyed but one, no swarm would have issued. And in natural swarming the same thing applies. Bees never swarm normally unless young queens are being reared in the hive.

Sealed queen-cells, then, are definitely the indirect cause of swarming and I submit that the urge to rear young queens when made queenless is precisely the same urge as when queen right. It is only a question of degree.

What then is the urge which causes the bees to rear young queens at the time they have a fertile queen present. I do not believe it is the surplus of brood food, for as has been shown, when a colony that has been making no obvious preparations to swarm, is dequeened cells are started, although the effects on the amount of brood food needed cannot be felt for about three days. Further I am of opinion that the manufacture of brood food is automatically reduced as the need for it lessens. As I see it, the association between the brood and the queen is inseparable. The urge to rear brood is dominant in the bee colony for a period, and is always a powerful instinct in the working season. Bees associate the queen with brood, and feed her with pap. If the instinct to rear brood is stronger than the capacity of the queen to produce it ; if her stamina is not sufficient to stand the strain of high egg production ; and if she refuses the food provided, the bees instinctively associate the food she refuses with the brood, and lavish it on a few selected larvae. It may be that the odour of a failing queen is akin to the odour of the brood. If so, the bees may be instinctively impelled to feed the pap to selected larvae in the hope that it will re-create the odour which the queen, by her inability to take the food, is losing.

I think it is generally agreed that the queen has a distinctive odour. To prove that all sound queens have the same odour I have succeeded in publicly demonstrating the transference of queens from colony to colony without mishap. If however we try to introduce a virgin queen to a colony that has recently had a fertile queen taken out, the bees refuse her unless special precautions are taken. On the other hand if a virgin queen is taken away from a colony, the bees

miss her in a few minutes, but will take a fertile queen without demure. If the brood and queen be taken away the bees become almost frantic in their excitement. If we return the brood they become quieter and in a day or two become normal.

Which goes to prove that there is an association between the brood and queen.

To make the proposition clear I submit that when the brood-rearing instinct is dominant the failure of a queen for any reason whatsoever, such as old age, poor breeding, congested brood nest, physical defect, or racial characteristics, causes the bees to rear queens.

It is necessary now to glance at the preparations bees make for normal swarming. The first sign is the rearing of drones. The second is the construction of embryo queen-cell cups. I am of the opinion that when a queen begins to lay drone eggs she literally begins to die. It is a sign of weakness and nature directs that precautions be taken, and just in case of accidents the male element in the colony must be provided. Of course the queen may live for a year or two longer but Nature takes no chances. To say that the bees know that they will need drones or that the queen feels that she is failing is nonsense. Bees have no intelligence as we understand the word and are merely creatures of instinct and habit.

Regarding queen cups I do not believe that they necessarily mean the rearing of queens and believe that initially they merely signify an excrescence of wax within the cluster.

Have we found the cause of swarming yet? No! I have only dealt with the first phase. The second phase I propose to deal with now.

Bees don't always swarm when the queen is failing. They build cells sometimes and then destroy them. Sometimes they rear only one young queen and thus supersede the old one. In the first case, bad weather may be the cause of the destruction of cells; in the second case, it is usually after the brood-rearing urge has subsided that supersedure takes place.

There are three powerful instincts inherent in bee-life, namely, brood-rearing, honey-storing, and swarming. The first two instincts are primarily concerned with the preservation of the colony and the third is probably more concerned with the preservation of the race.

If we examine the methods of swarm control and prevention we shall find that most of them are based on the instincts which demand the preservation of the colony before that of race.

Take the Demaree system; the brood is separated from the old bees and the queen. The advocates of the brood food theory claim that this proves their theory, but nothing could be farther from the truth. The fact is that the instinctive desire to rear brood for the preservation of the colony is at once aroused and checks swarming. The same applies to the Snelgrove system and many others. Take

the "shook" system where the colony is deprived of all its brood. Here again the fear for the existence of the colony is aroused.

Take the method of giving the bees a big hive or unlimited room. Again the instincts aroused are the brood rearing and storing instincts for the preservation of the colony. The larger brood nest requires more food to keep it going and the queen is less apt to be checked. Furthermore the tendency is strong to develop the storing instinct.

I now suggest that the ultimate cause of swarming is instinctive fear, which develops an excitement and results in swarming. There are many conditions which might cause this excitement. One instance, which most beekeepers see often, is the effect of smoke on a colony. The bees become frightened and fill themselves with honey, and in that condition are similar to the bees in a swarm. They do not leave as a swarm, however, but that is probably because the smoke has, in addition, a demoralising effect.

The best example for our purpose, however, is the condition in a colony when queens are being reared. The bees recognise that there is a potential queen in each queen cell, and they group themselves into bands in the vicinity of each cell. They do so because they are unable to determine which queen is the right one. The well ordered colony which by its very nature is a unit is divided into a number of units. One queen is needed; a fully developed and prolific queen; and the existence of the colony is at stake. The excitement grows, and the queen herself, fertile or unfertile as the case may be raises the excitement to "boiling" point, when she instinctively tries to destroy the rivals present. The groups of bees refuse to surrender the unborn queens to her fury. Something happens. The swarm has issued.

Bad weather for a few days at the time of sealing the queen cells may prevent the swarm. Dull damp weather subdues the excitement and lowers the temperature in the colony.

High temperature has always a powerful effect on fostering excitement, and a hot sun, masses of clustering bees secreting wax, and a congested hive, are factors which by themselves raise the temperature to danger point without any other excitement such as queen cells. It is well known how difficult it is to get rid of the swarming fever when the weather is very hot.

Many other examples might be given such as the effect of drones but it is time to sum up.

- (1) The indirect cause of swarming is queen-cells.
- (2) The direct cause of queen-cells is the failure of the queen.
- (3) The cause of swarming is excitement engendered by a fear for the existence of the colony.

This fear makes, firstly, the bees build queen-cells and then again this fear makes them divide themselves, through excitement.

But paradoxically as it may seem fear can be used to prevent them from swarming.

Take away the brood. Take away the queen. Take away the honey from proximity to the brood. Give them a lot of work to do that excites them to the storing or breeding instincts rather than the swarming instinct. In short make the colony feel that its existence is at stake. These are the chief points in the modern methods of swarm control. Let us endeavour to dispense with these methods as far as possible.

Remove the cause of the excitement and you remove swarming. What is the cause of the excitement? The queen! What then is the remedy? The only possible remedy as far as I can see is to breed better bees. It is as natural for a colony to supersede its queen as it is to swarm. Some strains of bees are given to superseding their queens rather than swarming. I have seen these bees. Why should not all bees have this characteristic developed? Some races of bees are inveterate swarmers for reasons I have not had time to go into.

But there are strains of Italians, Caucasians and French Blacks that with good management seldom attempt to swarm. Some people think that it is not possible to breed a selected strain of bee, because of the risk of unwanted drones spoiling the effort. Believe me there is no danger. The person who tells you that after years of selective breeding, he has been unable to make any improvement, obviously lacks knowledge of the subject. Few beekeepers give this matter even a tithe of the study it deserves. My advice is keep a pure strain of bee and avoid mongrels. Keep a record of the non-swarmers and nine times out of ten these will be found to produce most honey. Of course it is obvious that if the Demaree or Snelgrove methods are practised, no true guide can ever be obtained of the qualities of the bee. Select the best and rear queens from it. Introduce these queens to *all* colonies. These queens may mate with strange drones but that is of little matter. Next year all the drones in the apiary will be directly related to the workers of the best colony of the year before.

If a good colony is again selected and queens reared from it these queens will mate, almost without exception with the drones in the apiary, in every hive of which the drones have the same blood. If a strange drone or two comes in and mates a queen, it doesn't matter because no blood other than the beekeeper desires can ever contaminate his or her bees. Never breed from bad tempered bees however good they are and never keep two kinds of bees in the apiary.

In conclusion, I claim nothing very original in this paper on swarming except that I have divided swarming into two phases. Even if the brood food theory were correct as to the building of cells it could never explain the phenomenon of the swarm. I trust I have given at least a feasible explanation of that phenomenon.