

The Birth of a Queen

By Queen Irene

It is only natural that the queen would write about queen cells.

I'm sure by this time ye have all seen a queen cell or two as your inspections are completed. If you haven't let me know as I would like to breed queens from your bees.

Queen cells come in all sizes and shapes. If you would like to refresh your memory refer back to An Beachaire June 2005 which gives a very comprehensive description of all the different cell shapes and sizes. This month I am not really interested in the outer appearance but more so as to what happens inside. What magic can convert an egg into an insect that can lay up to 2000 eggs a day? All this magic takes only sixteen days to complete.

Well it all starts with the egg. There are two types of eggs layed in the hive, unfertilised eggs which result in a drone and fertilised eggs maturing to either a worker or a queen. In theory a fertilised egg should produce one type of bee. So what differentiates the worker from the queen? The obvious answer would be cell size and orientation, but there are more complex factors involved.

For a worker the egg is fertilised by the sperm stored in the spermatheca in the queen. She deposits this egg in a worker cell. It hatches after three days, and is fed brood food for the first three days, then a mixture of brood food, pollen and honey. It is sealed on the eighth day and on day 21 a worker bee emerges.

The egg destined to become a queen like the worker hatches in three days but that is the only similarity. When layed, the egg is deposited into a different type of cell known as a queen cup which is extended to a full queen cell as the larvae grows and develops. Cell size and orientation does not have an influence on the final result. When it hatches it is fed royal jelly for the entire larvae stage. It is this feeding, the quantity or quality or maybe both that trigger the change from worker to queen. The royal jelly the only food of the queen contains 34% sugar where as the worker brood food only contains 12% sugar for the first two days and then 47% as honey is introduced into its food. Also there are chemical differences between both foods. It is this enriched sugar content that stimulates the queen larvae to eat more food. It has several sensors on its mouth parts that are particularly sensitive to sugar. I'm sure it's similar to someone having a "sweet tooth" and eating a full box of chocolates. This increased intake of food has a corresponding increase in body weight. A queen cell is fed ten times more food than a worker.

More importantly the sizes of its internal organs are also larger. One of particular interest is a gland called the corpora allata, which secretes a hormone know as juvenile hormone. This gland is 50% larger in the queen than the worker giving ten to fifteen times more hormone. This hormone which is distributed in the blood not only controls the juvenile state at each moult but also those processes leading to the development of both the queen and worker. A high level of juvenile hormone on the third day of larval development results in a queen, a lower level results in a worker. This demonstrates the importance of

grafting larva of the right age for good queen production. It also shows why old larvae result in small unproductive queens.

It can be concluded that queen production is determined by the quantity and quality of food it is fed. A worker larva under 3 days can become a queen by transferring it into a queen cup and the bees will feed it accordingly. However the younger the larva the better the queen, ideally a larva twelve to eighteen hours old.

I'm sure that at this stage we have not discovered the full facts on queen production. Hopefully the above will help you understand and appreciate the wonders of such an egg producing machine.