

BEES AND THEIR INSTITUTIONS.

(See page 316.)

(Concluded from our last.)

Each insect, as it quits the cell in which it was reared, leaves behind it its cocoon. As soon as a cell is vacated, some of the workers go in to clean it out and prepare it for future use; in doing this the film or silky threads is not removed, but is incorporated into the walls of the cell; as many as seven of these cocoons have been removed, one after the other, from a single brood cell. While the successive deposit of the cocoons strengthens the comb, it also contracts the cells, and in these smaller apartments the nurse bees are reared. These bees differ from the other workers only in their size and in the functions which they fulfill.

A colony of bees frequently becomes queenless either by accident or through natural causes. In this case a most singular scene may be witnessed in the hive. The bees leave their ordinary work when the news has been communicated throughout the hive; they huddle together as if in the deepest consternation. A great buzz, apparently of consultation, is heard. Finally they seem to come to the conclusion that there is no mending the matter, and they agree to set to work to make another queen. Several worker larvae, in cells not adjacent, are selected and devoted to royalty. (Several are chosen, to provide against contingent loss). The worker maggot chosen may be two or even three days old. The first thing the bees do to each of the selected larvae is to enlarge its cell by cutting away the partition walls of three adjacent cells, thus throwing them into a single apartment. The worms occupying two of these three cells are destroyed, and all the ordinary food removed. The maggot is then supplied with different food, known as royal jelly, and with a much larger quantity of it. This jelly is a translucent substance, possessing a slight acidity and astringency of taste. The embryo bee which has been taken from the ranks and anointed queen receives the most devoted attention. She is royally supplied with a superabundance of food. When she is ready to go into the condition of a nymph, the bees cap her cell over with a pendent convex cover; and the cell looks, in this condition, more like a roasted peanut than anything else. When the queen is mature, the bees thin the cover of her cell by scooping out waved circles, till it becomes easy to distinguish the royal nymph within. She is generally retained prisoner by her subjects for some days after she has reached her full development. This is more frequently the case when the queens are reared for swarming time than when they are made by the bees in order to supply a deficiency.

The captive queen seems very impatient of her detention. She utters a cry, called by apiarians piping. The workers supply her with honey by means of a small hole in the cap of the cell, through which she extends her proboscis to be fed. Many observers, and among them some of the most accurate and faithful, say that the worker bees stand with their heads inclined, as if in reverence, while this note is sounding.

The moment a queen is released her whole energy is concentrated upon one point. She traverses the comb eagerly seeking for other royal cells. When she finds one, she falls upon it in fury, tears away the cover, and stings the nymph within to death. In this way she destroys every possible rival to her own power within the hive.

The bees generally provide against the simultaneous emergence of the several queens which they rear, by selecting larvae in different stages of development. Occasionally, however, two queens come out at once. They soon meet as they wander over the comb in search of royal cells. When this is the case, the workers, who under every other combination of circumstances defend their queens with their very lives, draw back, clear a space, and watch to see the result of the royal combat. The two queens rush upon each other, they grapple, and each endeavours to sting her antagonist fatally. If they happen to get into such a position that the thrust of the stings would prove fatal to both at the same time, their instinct teaches them to withdraw; the hive must not again be left queenless; private animosity must yield in favor of the public weal. They, however, soon rush again at each other. Finally one or the other gains such an advantage that she can destroy her rival without forfeiting her own life, and then the fatal thrust is given. It was long believed that the queen, like the drones, possessed no sting, because she will allow herself to be torn limb from limb rather than use it on any but a royal antagonist.

The peculiar treatment by means of which the larva of a worker is converted into a queen is, as far as we at present know, without a parallel in the annals of natural history. A difference of food, in kind and amount, increased room, and possibly a change of position, to which the embryo insect is subjected, has wrought a transformation almost too wonderful for belief. It is not a mere superficial change which has been effected, but one which penetrates far below form and structure, to the very mystery of life itself; it is a transformation alike of function, of structure, and of instinct. The larva which, under the ordinary conditions of development, would have become a worker, which would have gathered the provisions and stored them, which would have defended the hive and guarded it, which would have reared the young, and performed the thousand domestic, civil, and military offices of the common hive, is converted into a queen who does not possess a single habit in common with the workers. The whole structure of the insect is also changed. The head, instead of being triangular, is round, the legs lose the pollen baskets and brushes, and the ovaries, which in the common bee are rudimentary, become enormously developed. The instincts are not only changed, but in many cases are reversed by this difference of treatment. The worker goes out of the hive many times every day, the queen but twice in her life. The worker is ready to sting anything which interferes with it, but never under any circumstances uses its sting upon a queen; the queen will die sooner than use its sting upon any ordinary foe, but will fly in fury upon another queen and thrust her through. The maternal instincts belonging to the brute creation are curiously divided between the workers and the queen. As mother the sovereign carefully deposits her eggs where they will have the best chance of coming to maturity; here her care ceases. Just at this point the workers take up the maternal duties, and they perform them with a zeal and devotion worthy of all praise. Increased room and two days' feeding on different food have wrought this miracle. It is remarkable, too, that the queens require four days less to develop, and live six or eight times longer than the workers.

Among the workers of a swarm there are found, here and there, a few which are fertile. In the cases where investigation has been possible, it is found that these workers, when larvae, occupied cells adjacent to the royal cell, and so, it is probable, partook of the royal jelly and became partially transformed. They have bodies which are longer and slenderer than become bees, and which approximate more nearly to those of the queen. They never lay anything but drone eggs.

Before swarming time several queens are reared (in this case on the edge of the comb, and frequently they depend from it by a sort of stem). It is not by any means true that swarming takes place always in consequence of the overcrowding of the hive. It seems to be closely connected with extreme heat, whether as cause or effect has not been very satisfactorily ascertained. A number of royal cells have been constructed, so that when the old queen leads off the swarm, a new one may be ready to emerge and take her place in the old hive. The queen wanders over the comb in a restless way; her agitation is communicated to the other bees; a commotion arises; the bees gorge themselves with honey, send out a few scouts to discover a secure place for the swarm, and finally pour out of the entrance in a steadily increasing stream. Among them is the queen, who generally rises, and the workers cluster around her. Sometimes she falls and is lost in the grass, and then the bees return to the hive from which they have just issued. An inverted hive is held below the cluster of bees, which have happily found their queen and settled around her. As many as thirty swarms have come from a single stock in one season; some of these, however, were in the second generation.

Usually the fertilization of the queen take place in June; after this, early in July, there is a general massacre of the drones. When there is no queen, or only a drone laying queen, in the hive, this slaughter is deferred. The bees fall upon the defenseless drones, pierce through their abdominal rings with their little barbed and poisoned darts, and then twist themselves in order to extricate the sting without injury to themselves.

The sanitary regulations of the hive are very wonderful; nothing uncleanly or offensive is ever allowed to remain which it is within their power to remove. Réaumur mentions that a snail once invaded one of his observing hives and attached itself to a pane of glass. The weight of the creature was too great for even bee industry and enterprise, but not too much for bee ingenuity. They fastened the shell securely to the glass by means of propolis, and then sealed over the mouth of the shell with a quantity of the same gum. A slug which was once caught in one of Marede's hives met a similar fate, except that, in this