

Queen substance and Royal Jelly in Social insects

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The social life, among insects is exhibited by termites (Isoptera) and honey bees, ants and wasps (Hymenoptera). A characteristic feature of these social insects is that they are polymorphic having three major castes namely, queen, drone and worker, in the case of higher termites, an additional caste, the soldier caste is also present.

In a colony of the honey bee, *Apis mellifera*, there is a single queen, many drones and workers. The queen governs the entire colony. If the queens die, the workers which are sterile female, their atrophied ovaries enlarge and oogenesis occurs rapidly. They subsequently lay eggs. This shows that the queen bee in the normal colony secretes a substance (a pheromone) which is called Queen substance that has been being continuously licked by the fellow workers. The queen substance consists of seven or eight components, the major one of which is a fatty acid, the 9-oxodec-trans-2-enoic acid. This substance is a versatile pheromone in the sense that it inhibits oogenesis in workers, it controls queen cell rearing and it functions as a sex attractant to the drones. A closely related substance which is derived from it is 9-hydroxydec-trans-2-enoic acid. The co-presence of this pheromone along with the former one is more effective in all respects. They function as colony odour, and promote tranquillity among the queenless bee colonies.

Recent studies show that Queen substance is present in all the three Indian species of honey bee, *A. dorsata*, *A. indica*, *A. florae* and *A. mellifera*.

Besides, termites (*Odontotermes*), the wasp (*Vespa structor*) as well as the ant (*Myrmica*) also possess queen substance.

There are three castes in the colony of the honey bee, namely queen, drone and worker. Of these, the queen is the fertile female and workers are sterile females, whereas the drones are fertile males. Both the two female castes, the queen and worker are derived from fertilized eggs, and the 1-3 day old larva is still bipotent. The sexually developed queen bee develops in a special cell, the queen cell where the larva receives a glandular secretion from the nurse bees. In the queen cells of 3 days old queen larvae the royal jelly is present. During the first 3-4 days worker larvae are fed with a special worker jelly, and after that period a modified worker jelly which is a mixture of pollen and glandular secretion.

Recent biochemical analysis the queen and worker larval food show that there are twelve amino acids with the higher concentration of alanine, aspartic acid, glycine, serine and tryptophane. There are five sugars-arabinose, glucose, mannose, rhamnose and unidentified sugar.