

Social Insects—II. Bees and Wasps

P. KACHROO
Indian Council of Agricultural Research,
New Delhi

BEES LIVE in permanent communities. Their body has a marked waist. The head and thorax bear branched feathery projections which help them in collecting pollen from flowers. These projections cannot be seen by the naked eye but this character distinguishes bees from wasps. The honey bees have three types of individuals: males (drones), females (queens), and sterile females (workers) (Fig. 1). It is interesting to note that distinction between queens and workers is caused by the different food with which the larvae are fed. After hatching, the brood are fed alike for the first four days. Later, some i.e., the would-be queens are fed with richer food throughout their growth. They are finally provided with cells which are larger and better ventilated.

The males are large, stingless and bigeyed. The queen is smaller than the male. It continues to fertilise her eggs for the rest of her life which is three to four years. The workers are much smaller but have larger brains. They gather pollen in basket-shaped hind thighs and also possess the honey making and wax secreting organs. The egg-laying organ

is developed and used as a weapon (sting) in the workers. After use, it is withdrawn; but if the bee is hastily shaken off, the sting and other organs are torn from her and she dies.

The adult bee feeds upon the nectar of flowers. Its larvae are fed upon the pollen of flowers mixed with honey, the latter being a substance made in the body of the bee out of nectar gathered from the blooms. The larvae of cuckoo-bees, before beginning to eat the stored honey, devour the eggs or larvae of another species of bees in whose nest they have earlier been placed!

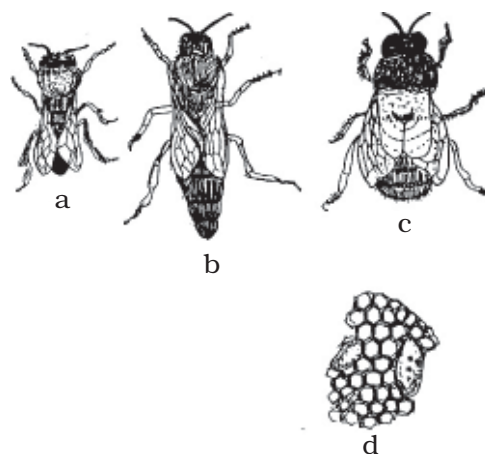


Fig. 1. Bees: (a) worker, (b) queen, (c) drone, (d) comb - a portion of normal cells and two large queen cells

Community Life

The permanent social community of the bees is called the hive. Here, each individual does its share of duties involved in the community life. However, communities of bees differ from those of

ants in certain respects. The bees in the wild state build their home in a hollow tree. Under domestication, the hive is designed by man to enable him to rob the honey without killing all the bees. The 'comb', with which the hive is furnished, built of wax prepared in the bodies of the worker-bees. Such an architectural symmetry is not met within the ants' nest. In each hexagonal separate tubular cell is reared a single bee from the egg to the adult stage. Normally only one queen bee lives in a hive at a time. The hive is stored with garnered foods but the ants' nest does not usually store food. The bees fly out to gather food, but the ants walk for the same.

A new hive is founded more or less in the same way as that of the ants. In May, i.e., summer, when the hive becomes overcrowded, the community needs a new queen. At this time, the Queen Mother is led round the queen cells by her attendant workers and she is made to lay an egg in each cell. The larvae hatching from these eggs are supplied with special food or 'royal jelly'



Fig. 2. Honey bees: a swarm clustered on a branch

throughout their life. In about 18 days the first of the bees developed in a royal cell is crowned as the heir-apparent. She is the maiden queen. Before she leaves her royal apartment, the Queen Mother leaves the hive accompanied by a swarm (about 30,000) of faithful bees, mainly workers. The swarm flies for some time, then the queen alights and is wrapped in a protecting mass of bees as big as a watermelon. The bee-keeper, if he is lucky, collects them in this condition in a 'skep' and brings them home to a new manmade hive.

Immediately, the workers get busy in building the comb. They pluck the flakes of wax from between the segments of their bellies, mould it in their jaws, and build the exact cells they need. The wax is made from the honey which the workers carry in their crops while leaving the mother hive. The cells are of a standard size, those in the centre are the nursery cells for the young workers, those around them are the storage cells for honey and pollen. Drones are housed in larger cells and the still larger cells are the royal apartments meant for the future queens. Soon after the new hive is ready the routine life begins. The egg fertilising capacity of the queen can be increased or diminished by the amount of food given to her. In winter, she does not lay eggs but feeds herself on the storage cells.

Efforts are made to collect new stores and put these into the new comb as it is built. Each cell containing a larva is looked after well before it pupates; the cell is sealed up by the workers with a lid of pollen and wax, the latter is eaten by the emerging bee to get out.

Ventilation in the hive is provided by a novel method; the young workers, who have yet not flown, steadily fan with their wings so as to make a current of fresh inflowing air. This fanning also serves to evaporate the surplus water from the honey. The entrance is guarded by guardsman to stop intruders, particularly robbers from other hives. Some intruders which cannot be stung (such as ants) are fanned away from the entrance. The dead bees are removed by outgoing workers and dropped at a distance. The comb is repaired with a special glue which is obtained from resinous buds and twigs and secreted by workers. This is additional work for the workers who have also to collect nectar and pollen.

Incoming bees report to their fellows the discovery of any rich source of food by a dance of triumph. The scene of the dancing bee tells others what kind of flower they must seek, and once a bee has found nectar the colour of the flower helps to guide her back to it.

In the old hive, soon after the swarm departs, interesting events take place. The young queen emerges from her cell and at once dashes towards the cells in which her sister princesses are still in the pupal stage. She tears open their cells and stings them to death. How awful, yet true! Sometimes she is prevented from this murderous act by the workers and a second princess is allowed to emerge. She leads another swarm from the old hive. Thus, only one queen can stay in a hive. When the princess is the only female in the hive, she mates with a drone, returns to the hive as a feeds

queen. Till she is fertile the workers do not pay any attention to her and she feeds herself at the comb. Before leaving the hive for her 'marriage' the would-be queen flies round and about the entrance to learn her way home.

The queen lives for three to four years and her end is a tragic event. As soon as it is noticed that she is no longer active, her escort ruthlessly crushes, (not sting) her to death; or she is allowed to be killed by a daughter princess. At the approach of winter another tragedy betakes the hive: there is a massacre of unwanted drones due to shortage of food. When they return to the hive hungry after their usual short unhurried flight in the sunlight, they are denied admittance and those still in the hive at the moment are attacked and thrown out. Drones still at large while the massacre is on die of cold and starvation after crawling helplessly about for a day or two.



Fig. 3: Wasps

True Wasps

True wasps are social insects living in large colonies and producing males and females and a large number of sterile females or workers. Their social life is seasonal since the colony lasts only for a single season. The young fertilised females (queens) are the only survivors which live through winter. Each of the queens builds a new nest in the spring.

The adult wasps live on plant food, mostly nectar and sweet liquids (especially ripe fruits and jams). The young brood is fed mostly on insects captured by adults and chewed up by them before being fed to the larvae.

The mated females, like those of the ants and bees, fertilize their eggs for the rest of their lives. They hibernate during the cold weather by hanging by the jaws to curtains or other rough surfaces in some secluded spot (often in houses or sheds, in a hole in a wooden fence or a crevice in a tree). The dormant queens awake in the late spring and start constructing a nest alone. They try to find a hole under the roots of trees or shrubs and there begin to excavate a cavity, large enough to build the first comb of their nests. They do not have wax but build with wood pulp paper, filings of wood shaved from any wooden surface with their jaws and made into paper with the wasp's own saliva. The comb resembles in shape the bee hive only in that the cells are hexagonal tubes, set one beside the other, and each destined for one egg and its development into an adult wasp. The top layer is the first to be built. It has few cells to begin with and forms a solid hanging rod. It sustains the whole nest when completed. Later, layers

are built below the first, each hanging from the one above it by similar rods and forming a platform upon which the wasps can walk with access to the open ends of the cells above their heads. The comb when completed is surrounded and enclosed in a very thick envelope which is constantly enlarged.

The queen after having built parts of the comb lays an egg in each cell and when the larvae hatch out, she feeds them all on countless caterpillars, flies, and other insects which she chews up and deals out from her own tongue to her hungry brood. While the larvae grow, she goes on completing their cells. Before they pupate, they themselves close the lid of the cell. Through it, they eat their way out as adult wasps. From egg-laying to emergence of the adult, it takes about a month.

The first eggs develop into workers and when they are strong enough they relieve the queen of her manual duties. She at last rests from foraging and building and gives herself exclusively to egg-laying. For a month more the nest increases and prospers and then manual comb is built with larger cells for the production of male and female wasps. With this increase in population, insect food for the brood begins to run short and it is hard for the workers to collect nectar for themselves. Besides, as their own life is drawing to a close, they set about a "reign of terror; the unhatched larvae are thrown away from their cells to the bottom of the nest hole and allowed to die there. Soon winter sets in and the whole population of the nest dies of cold and starvation. The few mated queens left to survive start fresh nests the following year.