

# Social Organization In Insects

In insects social life has evolved only in two orders, namely, Isoptera (termites) and Hymenoptera (bees, wasps and ants) which make a nest and live in colonies of thousands of individuals that practice division of labour and social interaction.

# SOCIAL LIFE IN TERMITES

Termites were the first animals which started living in colonies and developed a well organised social system about 300 million years ago, much earlier than honey bees, ants and human beings.

Although termites do not exceed 3-4 mm in size, their **queen** is a 4 inch long giant that lies in the royal chamber motionless, since its legs are too small to move its enormous body. Hence workers have to take care of all its daily chores.

Termite queen is an egg-laying machine that reproduces at an astonishing rate of two eggs per second. Generally the queen of a termite colony can lay 6,000 to 7,000 eggs per day, and can live for 15 to 20 years. The other castes, **workers** and soldiers are highly devoted to the colony, working incessantly and tirelessly, demanding nothing in return from the society.

**Soldiers** have long dagger-like mandibles with which they defend their nest and workers chew the wood to feed to the queen and larvae and grow fungus gardens for lean periods.

**Nasutes** are specialized soldiers which specialize in chemical warfare. They produce a jet of highly corrosive chemical from their bodies that can dissolve the skin of enemies and can also help in making galleries through the rocks.

## **SOCIAL STRUCTURE OF A BEE COLONY**

The population of a healthy bee hive in spring and honey flow period may contain 40,000-80,000 individuals but the population declines in winter and extreme summer. There is remarkable order in the hive and no conflicts are seen among the members.

**Queen** is one and a half times larger than the workers and is the only fertile female in the hive. Queen keeps the colony together by secreting a pheromone called queen substance from its mandibular glands. In multiqueen colonies, young queens after emergence attempt to sting and kill the rival queens.

Generally only one queen stays in the hive and other queens along with their army of workers swarm out and seek new places for building their own hives. Queen takes one to several nuptial flights and after mating with drones settles in the hive and starts laying eggs.

- **Drones** are haploid fertile males of the colony, whose only job seems to be to mate with the queen and transfer their sperms in her spermatheca. There are 2-3 dozen drones in a bee hive all of which energetically pursue a queen in her nuptial flight. Once the breeding season is over drones are driven out of the hive by workers and die of starvation, since they are unable to forage for themselves.
- **Workers** in a hive are 20,000-80,000 in number, which are genetically sterile females that build, maintain and protect the hive. A worker attends to cleaning and maintaining the hive and feeding the larvae with honey and bee bread. It also secretes wax from the abdominal wax glands and participates in building honey comb cells. The workers function as foragers of nectar and pollen and in later part of life as water carriers, and eventually die while working.

## **SOCIAL ORGANISATION IN WASPS**

Insects known as wasps belong to family Vespidae, about 75,000 species of wasps are known, most of them parasitic or predators. Wasps are characterized by two pairs of membranous wings, three pairs of legs and an ovipositor that may be modified as sting in sterile females.

The abdomen is narrowly attached to the thorax by a petiole. In addition to their compound eyes, wasps also have three simple eyes known as ocelli, arranged in a triangle on the top of the head. Females have diploid number of chromosomes and develop from fertilized eggs. Males are haploid and develop from unfertilized eggs.

Yellow jackets and paper wasps prey on caterpillars and other larvae that can destroy crops. Wasps feed on flower nectar and play a role in pollination. Wasps can be solitary or colonial and social insects that exist in colonies numbering up to several thousand strong and build nests.

- The type of nest produced by wasps can depend on the species and location. Many social wasps produce paper pulp nests on trees, holes in the ground or in other such sheltered areas. Unlike honey bees, wasps have no wax producing glands.
- Many instead create a paper-like substance primarily from wood pulp, which is gathered locally from weathered wood that is softened by chewing and mixing with saliva. The pulp is then used to make combs with cells for brood rearing. Mud daubers and pollen wasps construct mud cells in sheltered places typically on the sides of walls. Potter wasps similarly build vase-like nests from mud, often with multiple cells, attached to the twigs of trees or against walls.

## ANT SOCIETIES

Ants are cousins of honeybees and wasps but while bees and wasps are diurnal and sleep in the night, ants are busy working day and night. Ants have no wings, except in sexual forms in breeding season, and therefore their job of travelling to long distances in search of food is very difficult, but addicted to work as they are and having never-say-die spirit, make them excellent foragers that work round the clock, apparently without any rest.

Ants have the highest developed social system, next only to man, with no apparent conflict seen in the society. A colony may have few thousand to over 500,000 individuals. The nests are built in various designs and are called *formicaria*. Extreme devotion to duty and “Work is worship” attitude binds them together.

- Like honeybees, they have *polyethism*, which means castes are specialized to carry out specialized duties in the colony. For example, the queen has large abdomen to lay a lot of eggs (2-3 million in a year), males fertilize her, workers have broad, sharp mandibles for cutting and chewing and the soldiers have large head that bears sharp dagger-like mandibles for fighting. Workers and soldiers are sterile females.
- Ants have poor eyesight and are deaf but have a highly sophisticated chemical language for communication. They possess glands that secrete pheromones for communication. The mutual attraction among the members of a colony is maintained by endless antennal caressing, licking and nuzzling during which they trade food, glandular secretions and enzymes, which is called *tropholaxis*.

- Most ant species excavate nests in the ground or wood but some construct suspended nests on trees made of earth, carton, wax or silk, while some, like safari ants, do not build nests at all. Desert ants build crater-like nests or mounds in which they are able to maintain temperature much below the outside heat. The tropical ant *Oecophylla* makes nest by webbing the leaves with silken thread that is produced by their larvae.