The Honey Bee

The honey bee, *Apis mellifera*, is the most common and widespread bee. It is native to Europe, the Middle East and Africa, and has been introduced into the rest of Asia, America, and Australia. It has recently even been introduced to Greenland. Honey bees help humans by supplying honey and beeswax and by pollinating crops. Beekeeping using hives began 4500 years ago in Egypt.

a. Queen bee (marked with paint) laying an egg in a cell and surrounded by workers.
b. Freshly-built comb, many cells with eggs, with more cells being built on the edge.
c. A bee is "born"; a worker emerges from her cell, soon to begin cell cleaning.
d. Entrance guards preventing a robber bee from another colony from entering the hive.

In the wild, a honey bee colony makes its nest in a hollow tree or other cavity. Inside, the bees build their own honeycombs. These hang vertically from the top of the cavity and are made up of hexagonal (six-sided) cells. The cells are made of wax which the workers secrete from glands on their abdomen and fashion into cells with their jaws. The cells have two basic functions: they hold food stores (honey and pollen) or brood (eggs, larvae, pupae). Honey is stored above the brood. The hexagonal cells come in two sizes. Small diameter cells are used to rear worker bees. Large diameter cells are used to rear male bees, the drones. Queens are reared in round cells shaped like an acorn cup.

Like most social insects, a honey bee colony is a giant family: the queen is the mother, and the workers are her daughters. The workers all look the same, but carry out a variety of different tasks to keep the colony running smoothly. Young bees clean cells, attend the queen and feed the brood. Older bees store nectar and pollen, and guard the nest entrance. The oldest bees, beginning when they are about three weeks old, have the most dangerous job—foraging. They may be killed by predators, get lost, or just wear out and die.

When a worker finds a good patch of flowers she makes "waggle" dances that communicate the distance and direction of the patch to nestmates. Most workers locate flowers using dances, but some scout new patches. By scouting and sharing information a colony tracks the changing locations of flowers. Honey bees forage up to 12km from the hive.

The waggle dance is one of approximately 20 communication signals used by honey bees to organize colony life. Several other dances are known. One of these is known as the vibratory signal and means "prepare for work". It is used to restart a colony's foraging in the morning or after rain. One bee stands over another and shakes it. Honey bees also have many pheromone signals. These are chemicals released by one bee that convey a specific message. The queen bee makes a pheromone called queen substance. If she dies the pheromone level in the colony drops. The workers sense this and begin rearing a new queen.

Did You Know?

* A honey bee colony survives the winter by drawing on its honey stores.
* Are you named bee? Deborah means bee in Hebrew and Melissa in Greek.
* Worker bees live for about one month but the queen can live several years.
* The food that honey bees need is obtained from flowers: pollen and nectar.
* It takes three weeks for an egg laid by the queen to turn into an adult worker bee, passing through egg, larva and pupa stages. Larvae are fed by the workers.
* A bee hive is a substitute for a hollow tree, the normal honey bee nest site.
* The value of honey bee crop pollination is estimated at £25 billion p.a. worldwide.

How Amazing!

* Worker bees have a built-in clock and learn when to visit particular flowers.
* When a queen honey bee lays an egg she can choose whether to make it male (unfertilised) or female (fertilised). She almost never makes a mistake.
* Worker bees can lay eggs but seldom do. If a worker lays an egg another worker will eat the egg. This is called worker policing and keeps the hive in order.
* No one bee is in charge in a bee colony! Neither the queen nor any worker.
* In February, a honey bee colony starts rearing brood using stored honey and pollen as food. The brood area is kept warm, 34C, even in winter.
* A worker honey bee dies after stinging. The sting is barbed like a fish hook, and is designed to lodge in the attacker's flesh where it continues pumping venom.

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LASI does research on honey bees and social insects, trains students, and provides outreach to beekeepers, schools, and the public. This Information Sheet was written by Francis Ratnieks, Professor of Apiculture. ©2011
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