

Honey Bee Behavior Guide

Honey bees have been important to humans for thousands of years. Ancient civilizations stole honey, a valuable, energy-rich food source, from wild honey bees. Egyptians, who may have been the first to domesticate honey bees, were keeping bees in man-made hives as early as 2400 BCE, in the same era when the pyramids were built. Our modern society depends on honey bees to produce honey and wax, and to pollinate many important crops, including citrus fruits, apples, nuts, melons, peppers and squash. In the last few hundred years, scientists have become fascinated with a different aspect of honey bees: their complex behavior.

Honey bees live together in colonies of as many as 80,000 bees. There are three types of bees in the colony: workers, a queen, and drones.

Most of these are female worker bees, sisters or half-sisters that perform all of the necessary tasks to keep the colony running. These tasks include building new honey comb, caring for baby bees (larvae), fighting off predators, and collecting pollen and nectar for food. This last task, called foraging, is performed only by the older worker bees, which no longer perform the inside-the-hive tasks. The mother to all these workers, the queen bee, is the only bee in the whole colony that can lay eggs that hatch into more female worker bees, or new queens. That is her only task in the colony; worker bees do everything else for her, including grooming her, protecting her, and providing her with food. The queen bee is also mother to a small number of male bees, called drones. Drones, like the queen, do not help keep the colony running. They stay in the colony, being fed and cared for by the worker bees, until they are old enough to leave the colony and find young queens to mate with.

The colony can be thought of as an organism (colonies of eusocial insects are sometimes referred to as “superorganisms”). The queens and drones are like the gonads of a single organism; by mating, they pass on alleles that are shared by many of the individuals in the colony, much as eggs and sperm do for all the non-reproductive cells in the body. The colonies themselves “reproduce” through a process called swarming: in the late spring and early summer, colonies that have many worker bees and large honey stores will split in half. The queen and many workers will leave the nest and fly to a temporary gathering point. After a few days, they will select a new nest site and move in. The worker bees that are left behind will raise a new queen, who will then mate with several drones from other colonies and return home to begin laying eggs. Eventually, all the old workers in the colony (the new queen’s sisters) will be replaced by new workers (the new queen’s daughters); the new drones will be the new queen’s sons. Because each queen mates with multiple drones, some of the worker bees in the colony she lays eggs in will be half-sisters to each other.

The first scientists to study honey bees and describe their behaviors started out by

Typical honey bee behaviors:

- Antennation: Bees that bump into each other in the hive may “chat” with each other by touching antennae—this is somewhat like two dogs sniffing each other after not seeing each other for a while.
- Trophallaxis: One bee may ask the other to regurgitate some nectar for her to eat—this feeding is called trophallaxis.
- Attending the queen: A small group of bees will cluster around the queen bee, grooming her and feeding her if necessary.
- Laying eggs: the queen may walk from cell to cell on the honey comb, looking inside each cell to make sure it is empty and then sticking her rear inside to lay an egg.
- Feeding: worker bees may put their heads into cells with nectar or honey for a meal.
- Caring for young bees: “nurse” bees may put their heads into cells with white larvae (young bees) to check on them and give them fresh food.
- Undertaking: If there are any dead bees inside the hive, some bees may pick them up and try to carry them away.
- Guarding: Some bees stand at the entrance of the hive, inspecting other bees as they come in to make sure they belong there. These bees will attack any intruders, and alert the colony to their presence.
- Foraging: Older bees fly away from the hive, seek out nectar, pollen, water, or other materials needed by the hive, and carry it back.
- Waggle dance: Foraging bees sometimes use a special movement, referred to by researchers as a dance, to tell other bees where to find patches of flowers. Different parts of the dance tell other bees the direction of and distance to the flowers.

Reference: Winston, M. L. (1987). *The biology of the honey bee*. Harvard University Press. Cambridge Massachusetts.