

## A Bug's World – The Bumblebee

There are over 300 species of bumblebee in the world, with that number growing as we continually discover new insects. The genus *Bombus* belongs to bumblebees. Although here in the Pacific Northwest, *Bombus terrestris* is usually our first queen bumblebee to emerge in the spring. It is quite often *Bombus pratorum* workers that are seen first, as their nests reach maturity faster than other species.

### What are the differences between a bumblebee and a honeybee?

The differences are many. Bumblebees produce honey, but not enough to make it worthwhile to domesticate them. The queen bumblebee is usually larger than the workers and maintains her dominance over the hive by being aggressive. She will open her **mandibles** and head-butt the most dominant worker occasionally. Whereas, the honeybee queen controls her hive by passing on her "queen substance" (**pheromonal control**) throughout the hive when workers groom her and then groom each other, passing it on to the entire hive.

Bumblebees can sting and because their stinger is not barbed like the honeybee, they can sting more than once. A bumblebee's sting is more venomous than a honeybee's.

With bumblebees, a new colony is started each year with only the new queens that have survived the winter hibernation. The honeybee hive, on the other hand, continues year after year.

Foraging bumblebees tend to avoid flowers already visited by other bumblebees of the same species, though they often visit the same patch of flowers, or even the same spike. This is because bumblebees can scent-mark the flowers they have visited. They use a great deal of energy while foraging and the scent marking helps save energy. The honeybee forager, on the other hand, performs a figure-eight dance on the combs, which tells her work-mates the whereabouts of a good source of food.

### What is a bumblebee's life cycle?

#### Definitions

##### Eusocial

An extensively studied social system in three main insect orders, Hymenoptera (which includes bees), Isoptera, and Homoptera.

##### Mandibles

Any of various mouth organs of invertebrates used for seizing or biting food.

##### Pheromonal Control

A pheromone chemical secreted by an animal, in particular, an insect, that influences the behavior or development of others of the same species. Often functioning as an attractant of the opposite sex.

##### Proboscis

The long slender tubular feeding and sucking organ of certain invertebrates, such as insects, worms, and mollusks.

Most bumblebee colonies have a yearly cycle. Queens that have mated in late summer hibernate, usually in the soil, and emerge in spring. They search for a suitable nest site and then build a wax honey pot and fill it with regurgitated nectar. The wax for the honey pot is exuded from between the segments of the abdomen. The queen also builds up a store of pollen, some of which she eats, and the rest is formed into a ball that she moistens with nectar. This is sometimes called "bee bread". This store will enable the queen to survive a couple of days of bad weather without foraging. The pollen stimulates the ovaries to produce eggs, which she lays in batches of 4 to 16 on the ball of pollen. This is then covered with wax and placed within reach of the honey pot, enabling the queen to brood the eggs and drink honey at the same time. The queen rarely leaves the eggs unattended during this time, as she needs to keep them at about 86 degrees. The larvae pupate and emerge as adults. During the larvae stage the queen lays a new set of eggs and the process continues.

The average worker starts to forage after only two or three days, with a life span of about four weeks. Not all adults leave the nest to forage. Some of the smallest stay behind to perform "household" duties. They empty chambers that have held larvae, and exude wax for building cells to store honey and pollen.

At about the same time as the queen starts laying unfertilized eggs that will produce males, the ovaries of some workers, usually those performing household duties, may develop. Some workers try to lay eggs of their own and may even attempt to eat eggs laid by the queen. In many cases the more persistent workers will succeed in laying some eggs that will reach maturity. The queen maintains dominance over her daughters by head butting and pulling the legs of the most aggressive ones.

The production of males usually signals the beginning of the end of the cooperation and organization of the nest. When the adult males emerge they spend a few days in the nest drinking the stores of honey, but don't forage to replace it. They then leave for good and forage for themselves. New queens emerge about a week or so later, mate with the male adults, drink lots of nectar to build up their body fat, and then find a suitable place to hibernate. As with many other animals that hibernate, it appears bumblebees must reach a certain weight in order to survive the winter.

Not all nests go on to produce males and queens. Many fail in the early stages, some are damaged, and some never build up enough reserves to produce offspring. The size of a colony depends on the species and the food supply. Some can have as few as 30 or as many as 400 bees.

Bumblebees are the only group of **eusocial** insects to initiate nectar theft. They do this by biting a hole in the base of the nectar spur or some other suitable part of the flower to give them access to nectar from flowers they normally would be unable to get it from. Though bumblebees are the only ones to make the holes, the holes are often used by honeybees. Generally speaking, it is the short-tongued species of bumblebee such as *Bombus terrestris* and *Bombus lucorum* that instigate this thievery.

## Why are bumblebees important to us?

They are responsible for pollinating plants that provide much of our food. Bumblebees are the chief pollinators of red clover, alfalfa, cotton, raspberries, apple, and plum. Bumblebees are increasingly being used in greenhouse cultivation, where a honeybee hive would be too large for crops such as cabbage, strawberries, and tomatoes. A decrease in our honeybee population due to the Varroa and tracheal mites only increases the importance of our bumblebee.

Bumblebees can fly at much lower temperatures than honeybees, around 48 degrees. That is important in colder climates and for early flowering plants. Many bumblebee species have a longer **proboscis** than honeybees, so they can pollinate flowers with long, narrow corollas. They are also very hairy (fuzzy), which is perfect for picking up and transferring pollen.

## What about that hair of theirs?

Bumblebee hair is quite thick and can act as insulation keeping them warm in cold weather. The hairs are also branched or feathery enabling more pollen to stick to them. When flying, a bee builds up an electrostatic charge, so as the bee enters the flower the pollen is attracted to the bee's hairs and even grains of pollen that are not touched by the hairs can jump a few millimeters to the nearest hair. When a pollen-covered bee enters a flower, because the stigma is better grounded than the other parts of the flower, the charged pollen is attracted to it. So even if the large, hairy, bumblebee fails to brush against the stigma, the pollen can jump the short distance necessary for pollination.

## What if you find a bumblebee that cannot fly?

The bumblebee is sick, too old or too cold to fly. If it is sick, there is not much you can do. However, if it is early in the year, she may have been caught in a sudden shower or cold spell. The best thing you can do is pick her up using a piece of paper or card, put her somewhere warmer and feed her a few drops of a mixture of 30% honey, 70% water placed nearby within her reach. When she has warmed and fed she will likely fly off. Be careful not to wet her hair or get her sticky. By saving the queen you may have saved an entire nest.

A grounded bee at the end of the season is another matter. If the wings are ragged around the edges you probably have an old worker or queen. You could take it in and feed it if you wish, but most likely there is little you can do; its life cycle is near the end. If the wings are fairly intact, you might have a male that is either cold or has been so busy patrolling that he forgot to drink.

## What can you do for our bumblebees?

1. Add additional native nectar and pollen producing plants to your property every year. Native plants produce more nectar and pollen than hybrids.
2. Learn to identify beneficial insects and their nest sites, especially the bees, digger wasps, and hunting wasps.
3. Teach children to love pollinators, by setting a good example.
4. Do not spray insecticides. They are indiscriminate and can kill non-target insects as well as spiders and many other useful invertebrates. The same poisons that work on the insects work on the birds that feed on them, causing nerve damage.
5. Become a beekeeper yourself by making your property into a haven for beneficial insects. Construct and install nest sites for bumblebees and solitary bees.

For construction of a bumblebee nest box, see [How to Build A Bumble Bee Nest](#)

## Sources

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