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Figure 1. Government House, Darwin

Background on bees

At Government House, there are European honeybees (Apis mellifera) in the gardens. Because they make honey and beeswax, these are the best known type of bee. However, European honeybees are not native to Australia and have only been present here for approximately 190 years. There are also some native bees at Government house.

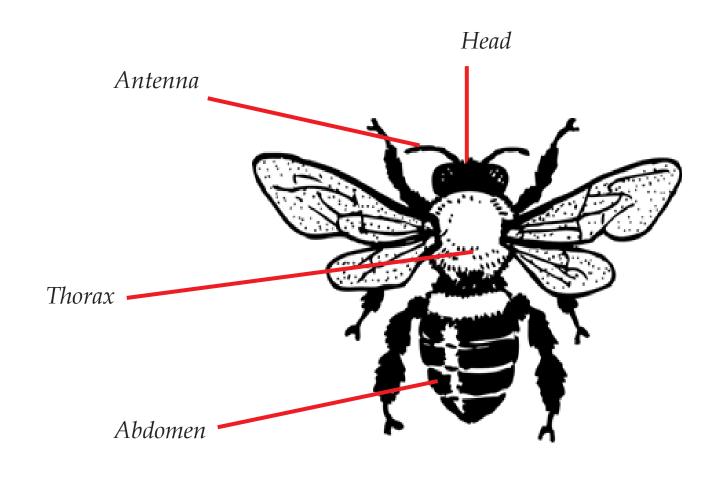


Figure 2. Diagram of a bee

Adaptations

Bees are insects and have:

- Large, compound eyes
- Antennae
- Mandibles and proboscis for eating
- A body with three parts (head, abdomen and thorax)

Bees have a number of adaptations. An adaptation is something that makes it easier for a living thing to survive and can be a behaviour (how a living thing acts) or how their body is made (structural) or how their body works (physiological).

Where do bees live?

European honeybees are social, which means they live and interact in large groups called colonies. There can be thousands of bees living together in structures called nests or hives, which they build out of wax and use to store honey.

Bees build their hives in a particular way. They build cells that are shaped like hexagonal prisms, using their antennae, mandibles and legs. Each hexagonal prism is surrounded by six other hexagonal prisms. A lot of research is being done to determine how they build cells of this shape. Currently scientists believe that the cells start off circular and become hexagonal. Exactly how bees create their geometrically patterned hives is not yet known.

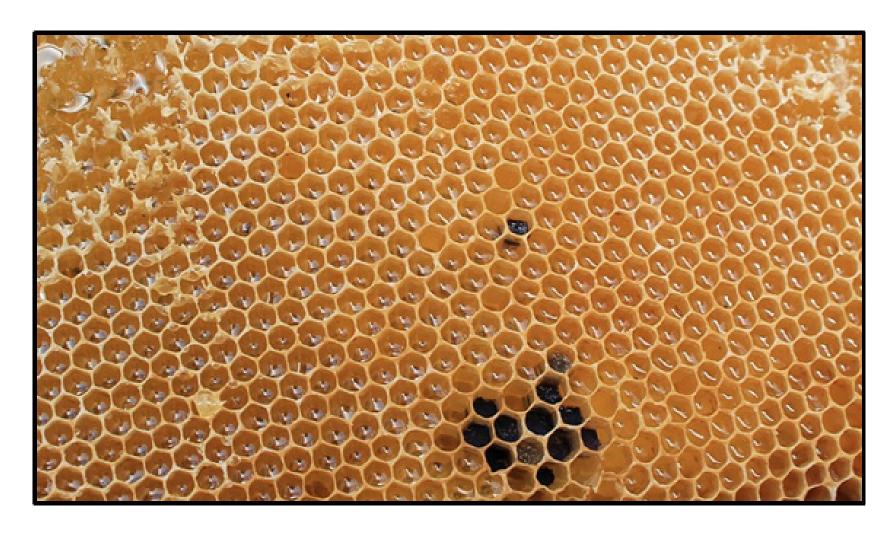


Figure 3: Bee hive, showing hexagonal cells



Figure 4: Beehive showing eggs and larvae

The hive

The hive is also where the bees lay their eggs and where their offspring develop. In each hive, there is normally one queen bee who is female, thousands of male bees (called drones) and thousands of female bees (called worker bees).

The queen bee is the only fertile female in a hive, which means she is the only one to lay eggs. When a queen lays eggs, they develop into larvae, then into pupae and then into adult bees.

Pheromones and swarming

Bees can communicate using chemicals, called pheromones. These chemicals are very important in coordinating the social behaviours of the colony including reproduction and defence.

If a colony of bees is threatened or disturbed, the worker bees can release alarm pheromones that tells the other bees to attack. The bees can swarm and may defend themselves by stinging anything that is threatening them.

Bees also swarm as a way of reproducing. After laying eggs that will become new queens, the original queen bee can leave the colony with a large group of worker bees. This splits the original colony to split into two or more colonies. The new site for a hive is found by a scout bee, who uses a waggle dance to communicate to other bees.



Figure 5: A swarm of bees
https://commons.wikimedia.org/wiki/File:MelbourneSwarm.JPG#filelink

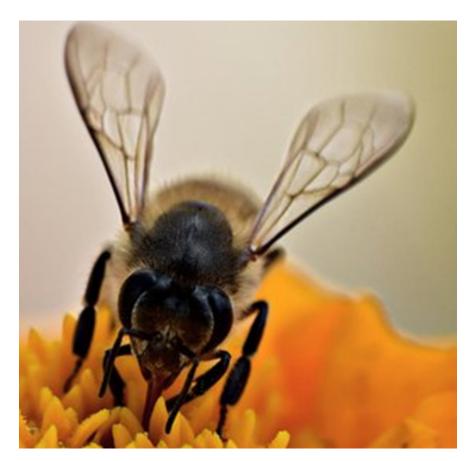




Figure 6 and 7: Honey bees feeding on nectar, with proboscis unfolded

The diet of bees

Bees consume pollen from flowers, which is the only natural form of protein that they eat. They also eat nectar from plants by licking and sucking, using a long proboscis that is normally folded up. The nectar is a source of carbohydrates (sugar) for the bees.

Can you see the proboscis in the photos on the left?

Worker bees

Worker bees also carry pollen and nectar to their offspring in their hives. They transport nectar they have eaten to their hives where they regurgitate it. It is then turned into honey and is stored in the hives.





Figure 8: Honey stored in hexagonal shaped cells in a beehive.

Worker bees use a different method to carry pollen.

Their bodies have branched hairs on the outside of their bodies that collect the dust-like pollen and allow bees to carry it easily. They also have corbiculae (or pollen baskets) on the back of their hind legs which they use to carry pollen to the hive.



Figure 8: A bee covered in pollen.



Figure 9: Bees with pollen in their corbiculae.

Worker bees that are foraging for food communicate the direction and distance of food sources to other bees using a waggle dance. This can increase the amount of food that a colony collects.



How do bees help humans?

Bee products

Humans have been keeping bees for thousands of years, even in Ancient Egypt and Greece. Before bees were domesticated, humans were stealing honey from their hives!

Beekeepers collect a range of substances from beehives, including wax (Figure 10), pollen (Figure 11) and honey (Figure 12). This is one way that bees are useful to humans.

Pollination

Another way that bees are useful to humans is through the pollination of plants. A side effect of bees collecting and eating pollen is that they spread it from flower to flower. This is important in the reproduction of plants as pollen comes from the male part of a plant and is needed to fertilise the female part of a plant, which leads to the development of seeds. This fertilisation process is called pollinatation and for this reason, bees are called pollinators.

When flower are pollinated, they can form fruit and vegetables. In fact, bees have a very important role in the growth and production of food for humans. It is estimated that pollinators, such as bees, are responsible for pollinating over one third of the world's crop production.

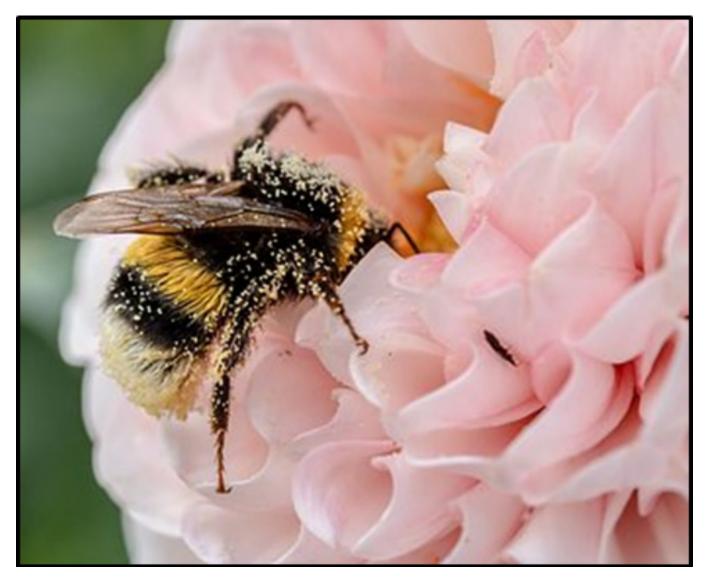


Figure 13: A bee covered in pollenbucket of water

The bees at Government House

At Government house, the bees live in a man-made hive, shown on the left. They collect their food from the gardens and return to the hive where they store their honey. The honey can then be collected by beekeepers.

As well as having European honeybees, there are also native bees at Government house. There are more than 1,500 types of native bees in Australia but only 10 species live in social groups. These bees do not produce as much honey as European honeybees.

Figure 14. Right: Bee hive at Government House



IOSECURITY ALERT!

Bees in the Northern Territory

For safety and biosecurity reasons, the Government has a number of rules around bees and beekeeping. For example, bees cannot be imported into the Northern Territory and beekeepers must have a health certificate for their bees.

In 2019 there is an alert out for the Asian honeybee, which is already present in Queensland. The Asian honeybee is smaller than the European honey bee and is more aggressive. They can also carry the Varroa mite (Varroa destructor), which has been responsible for the death of millions of honeybee colonies worldwide. There is current research being conducted as to exactly how and why this mite causes the death of bees, but it is known that the mite injures the bee and also can carry viruses which infect the bee. This can lead to bees developing disfigurements such as a small body or deformed wings.



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