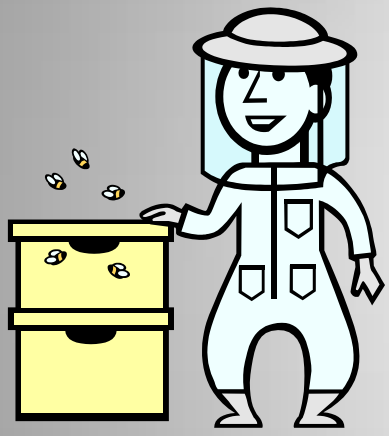
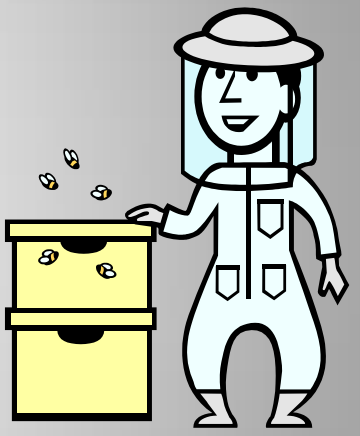
Gold Coast Regional Beekeepers Inc.





Pests & Diseases

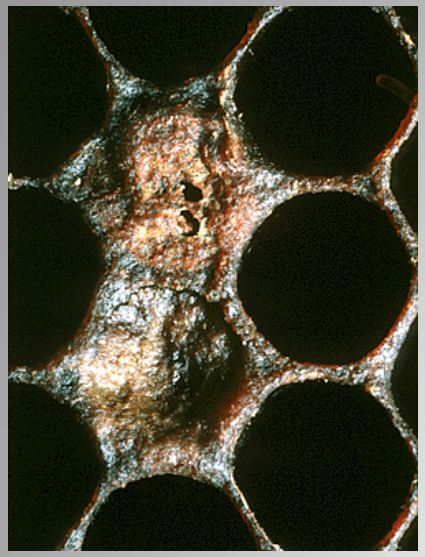
prepared by

John Polley

New O H & S regulations for Workers

Bees with hygienic behaviour tend to do a lot better at preventing pests and diseases.

Pests & Diseases



AFB

SHB

Lesser Wax Moth

Treacheal Mite

EFB

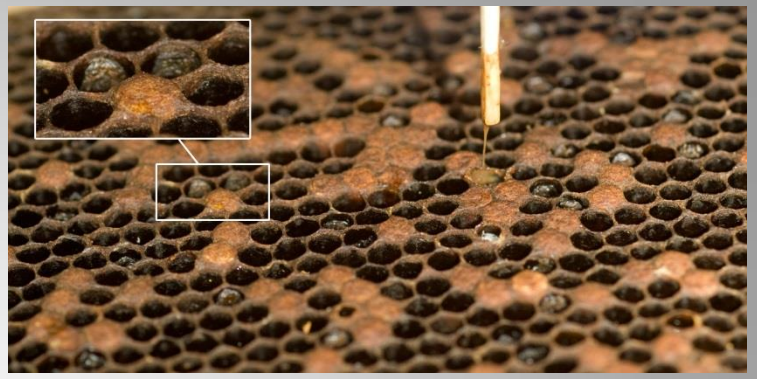
Chalkbrood

Greater Wax Moth

Varroa Mite

There are many pests and diseases for honey bees. Below we cover only a small number of them. One important thing to remember with pests and diseases is that it is much easier to prevent them rather than to have to treat them. Many pests can be prevented by keeping the colonies strong. Another thing that can make a big difference is the stock of bees. Bees with hygienic behaviour tend to do a lot better at preventing pests and diseases. There are many places available that sell queens that have hygienic backgrounds.

American Foulbrood



American foulbrood

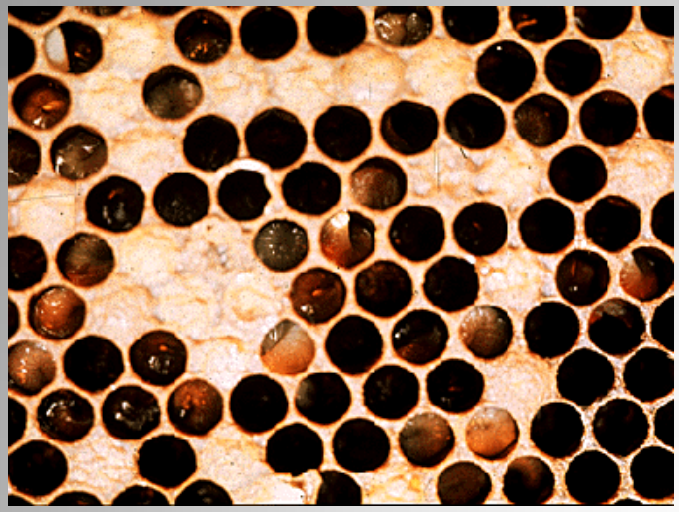
American foulbrood (AFB) is a fatal bacterial disease of honey bee brood caused by the spore forming bacterium *Paenibacillus larvae*. It is not a stress related disease and can infect the strongest to the weakest colony in an apiary. Infected brood usually die at the pre-pupal or pupal stage. Heavy infections can affect most of the brood, severely weakening the colony and eventually killing it. The disease is not able to be cured, meaning that destruction of infected colonies and hives or irradiation of infected material is the only way to manage AFB. Although AFB is not highly contagious, bacterial spores can easily be spread between hives and apiaries through beekeeping practices such as through the exchange of equipment and movement of infected combs. Adult bees are not affected by AFB but can spread spores within and between infected and clean hives through robbing and drifting. AFB spores can remain viable for over 50 years and are very resistant to freezing and high temperatures. Therefore, the only way to manage the disease is to stop infections from occurring through adopting beekeeping best management practices, and if an AFB outbreak does occur, quickly dealing with it before additional colonies become infected.

AFB is a brood disease and therefore causes a range of symptoms in the brood which can be observed by beekeepers.

Typical symptoms include:

- **Irregular and patchy brood pattern.**
- **Cell capping's on infected brood may appear sunken, darker coloured or greasy. This is due to the decomposing larvae inside.**
- **Capping's may also be perforated by bees trying to remove the dead brood (the remains of which are infective).**
- **The larvae die after capping and become a light to dark brown semi-liquid mass.**
- **Infected hives may also have a sulphurous smell due to the decomposing brood.**
- **Advanced stages of American foulbrood, showing sunken and perforated capping's with oozing brood moisture on the surface of the comb. Rob Snyder, www.beeinformed.org**
- **Closer inspection of individual cells in the advanced stages of infection will show that:**
- **Infected brood changes from a healthy pearly white to a dark brown The dead larval remains become a tough, but brittle scale that is difficult to remove from the cell.**
- **If older larvae are infected the 'tongue' of the pupae may become stuck to the top of the cell wall.**

European Foulbrood

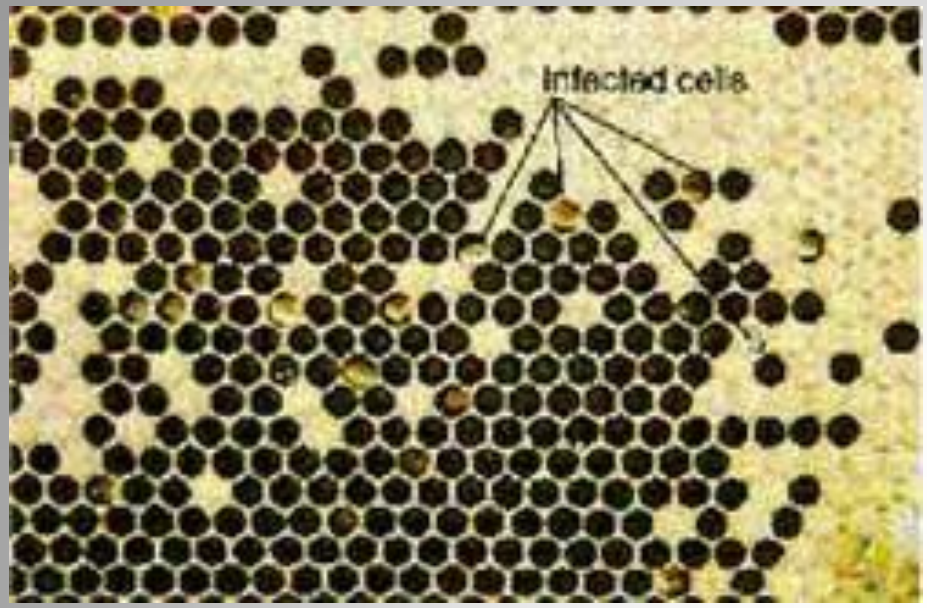


European foulbrood (EFB) is a brood disease caused by the bacterium *Melissococcus plutonius*. EFB was first detected in Australia in the late 1970s and since then it has spread and is now found in all states and territories except for WA and NT.

Larvae of all ages are susceptible to infection and become infected after ingesting food contaminated with the bacteria. The bacterium then multiples in the mid-gut of the larvae and competes for larval food, resulting in the larvae dying of starvation. EFB is characterised by patchy brood with uncapped brood cells where the dead or dying larvae appear curled upwards, and are brown or yellow, making the larvae appear to be 'molten' in the cell.

The incidence of EFB is generally higher when the colony is under stress, which may be caused by hive movement, climatic conditions such as cool and wet weather conditions, or poor nutrition. Heavy infestations will affect a large percentage of the brood, weakening the colony over time, and possibly leading to the death of the colony.

Chalkbrood



Chalkbrood infected frame

Chalkbrood mummies in front of hive entrance

Chalkbrood disease is caused by the fungus *Ascosphaera apis*. The fungus rarely kills infected colonies but can weaken it and lead to reduced honey yields and susceptibility to other bee pests and diseases.

Young infected larvae do not usually show signs of disease but will die upon being sealed in their cells as pupae. Worker bees will uncap the cells of dead larvae, making mummies clearly visible, before sometimes removing the mummified larvae and depositing them on the hive floor or at the entrance to the hive.

Chalkbrood disease is present throughout most of Australia and its incidence is generally higher when a colony is subject to temperature changes, particularly cooler weather, or other sources of stress.

Chalkbrood

The dead larvae dry out to become hard, white or grey/black chalk-like mummies.

Chalkbrood mummies ejected from the hive

Small Hive Beetle

Small hive beetle (SHB) (*Aethina tumida*) is a small brown-black beetle with clubbed antennae that originated from sub-Saharan Africa. In Africa, the SHB is not a significant honey bee pest species; however, since arriving in Australia in 2002, the SHB has caused a major impact to honey bee colonies throughout the warm and humid coastal strip between Victoria and North Queensland.

The larval stage of the SHB life cycle causes the majority of damage to active hives by burrowing into combs, eating brood, honey and pollen. Unlike some other honey bee pest species, SHB is preferentially attracted to active hives because of the availability of food. Whilst feeding the larvae also carry a yeast species (*Kodamaea ohmeri*) which contaminates the honey causing it to ferment. Heavy infestations cause the hive to become 'slimed out' and may cause the colony to die or abscond.

SHB

The most common pest most beekeepers will encounter

Larvae – note the 6 legs at the front of the body

The head of a Small Hive Beetle

The adult Small Hive Beetle

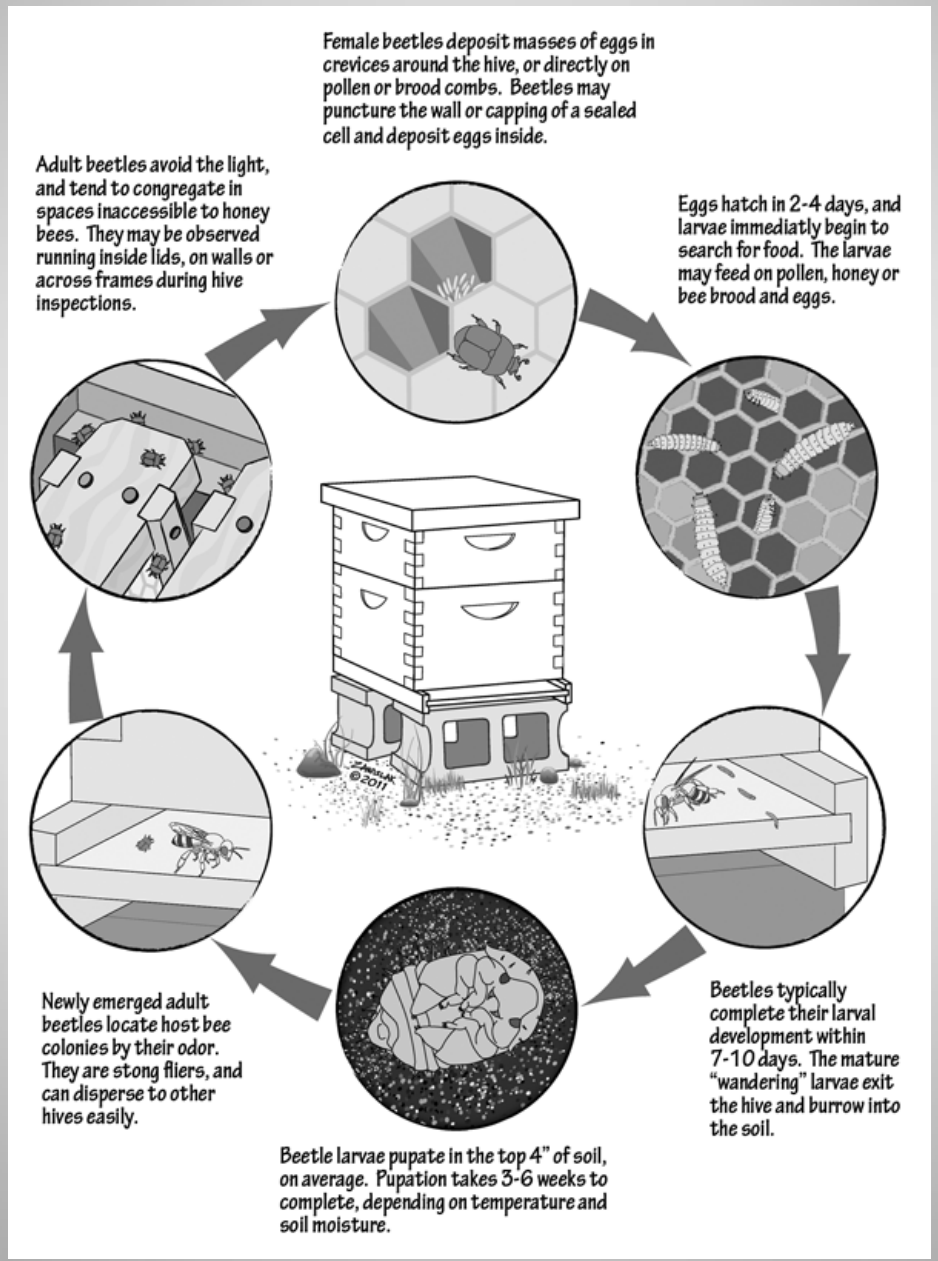
Adult beetle

Adult SHBs are able to fly up to 15km to locate a honey bee colony to infest. Adult beetles prefer weak hives in spring and summer, but strong hives in autumn where the higher honey bee numbers keep them warm. It is believed that the SHB adults find the hives by detecting the odour of adult bees and hive products (honey and pollen). There are some suggestions that the adult beetles can also detect the honey bee alarm pheromone.

Adult SHB vary slightly in colour depending on age, ranging from yellowish or reddish brown to a darker brown or black and have distinctive club-like antennae. Adults are 5–7mm long and 3–4.5mm wide and females tend to be longer and heavier than males on average. The adult beetles avoid sunlight and can be observed running for cover into corners, over the comb or flying away when a hive is inspected. The adult beetle may also be present in comb cells or in the debris at the bottom of the colony.

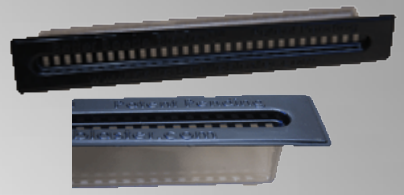
The eggs of the SHB are tiny (about 1.4mm long and 0.26mm wide) and are pearly white. In strong honey bee colonies the eggs can be found in clutches in small cracks and crevices of the hive frame, while in weaker colonies the eggs can be found directly on brood comb. Larvae are white with a brown/tan head, are approximately 10 mm long with three pairs of prolegs near the head. The larvae also have two rows of small spikes down their back. Once they mature, larvae leave the hive and burrow into the ground surrounding the hive to pupate. It may be possible to find larvae and pupae by sifting through the soil surrounding the honey bee colony.

Small Hive Beetle life cycle



Types of SHB traps

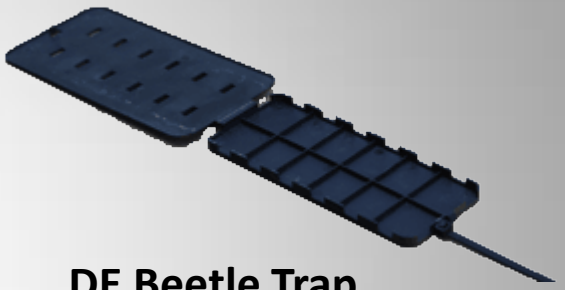
Beetle Jail



Beetle Blaster

Hive Doctor Base

AJ's Beetle Eater



DE Beetle Trap

Bluebees Brood Box Bottom Board
(frame needs to be made to fit)

DE beetle trap filled with Diatomaceous Earth

Vinyl

The good old Chux cloth

Lesser & Greater Wax Moths

Greater Wax Moth

Adult moths are pale brown to grey, usually about 20 mm long. The grey wings are often mottled and appear as "roof" or "boat" shaped when folded over the body.

Lesser Wax Moth

This moth is smaller than the greater wax moth and has a silver-grey to dull-yellow, slender body about 13 mm in length. Lesser wax moth larvae are usually white with a brown head. They feed on combs, pollen and litter found on the hive floor. They are usually solitary, whereas greater wax moth larvae often congregate in large numbers.

Nosema

Nosemosis, or Nosema disease, is caused by two species of microsporidian parasites (a type of spore forming fungus) called *Nosema apis* and *Nosema ceranae*. *N. apis* is thought to have originated on European honey bees, while *N. ceranae* is thought to have evolved as a pest of Asian honey bees (*Apis cerana*) and has only started to affect the European honey bees relatively recently. *N. ceranae* appears to be more damaging than *N. apis*, affecting more cells in the bees mid-gut and killing infected bees faster than *N. apis*. Infection of adult bees at a young age can cause the bee to have difficulty digesting food for the rest of its life. These bees usually do not produce brood food/royal jelly secretions from the hypopharyngeal glands and often skip the brood rearing stage of their life, becoming forager bees at a young age. The infected bee often has a shortened adult lifespan. When queen bees become infected they also have reduced lifespans and cease to lay eggs. These impacts cause reduced colony health, population and performance, which can ultimately result in the colony dying.

Both species of Nosema infect worker bees, queen bees and drones. The fungi produce spores which are ingested by adult honey bees when they feed on food and water contaminated with spores, or are picked up while cleaning contaminated combs, robbing contaminated hives or by infected bees drifting to new hives. A single spore can cause infection, and by the time that infection is fully developed in an adult bee, there could be between 30-50 million spores in the gut of the bee.

The life cycle of both Nosema species are similar and consist of the following:

- **Infection begins when a bee ingests Nosema spores, which then germinate inside the mid-gut of the bee.**
- **The fungus enters the cells of the mid-gut and begins to absorb nutrients. This causes the cell to become damaged and the bee to be more susceptible to secondary infections.**
- **The fungus grows and multiplies infesting more of the mid-gut cells and produces spores.**
- **Several million spores can be produced in a single worker. The spores either germinate within the bee's mid-gut, infecting new cells, or pass through the bee's digestive system.**
- **Faecal material containing Nosema spores can contaminate food and water sources, where they can then be ingested by other bees. Spores can also be spread to non-infected bees when they clean contaminated combs, or rob contaminated hives and ingest spores in the process.**

Sacbrood virus

Sacbrood virus is caused by a virus in the Iflavirus genus. The virus mostly affects worker larvae, but can also infect adult honey bees. Sacbrood virus causes an uneven brood pattern with discoloured, sunken or perforated capping's scattered throughout the brood. Larvae are thought to be infected by consuming brood food contaminated with Sacbrood virus. The virus then multiplies within the infected larvae, which cause the larvae to sit in the cell with their heads raised and causes the larvae to die shortly after capping. The skin of the larvae then gradually becomes a fluid filled sac. The Sacbrood virus may remain viable in dead larvae, honey or pollen for up to four weeks. Sacbrood virus is present throughout most of Australia and its incidence is generally higher during the brood rearing season when the colony is under stress from a shortage of nectar or pollen, unfavourable climatic conditions or a poorly performing queen bee.

Sacbrood virus is most damaging and obvious when larvae are affected. The disease cycle for Sacbrood virus affecting larvae is as follows:
It is thought that the virus infects larvae when infected nurse bees feed larvae brood food contaminated with particles of the Sacbrood virus.
The virus multiplies within the infected larvae causing it to display unusual behaviour (such as sitting in cells with their head up).
The infected larvae die shortly after capping before they pupate. The larvae then changes colour from a white to a yellow and then brown.
The skin of the larvae hardens and fills with a fluid which gives the impression of the larvae becoming a fluid-filled sac. The fluid contains viral particles, which allows the virus to spread and infect other bees.
Over time the larvae dries out becoming a brown to black coloured, brittle, scale that adheres loosely to the cell. The scales contain viral particles, providing another mechanism for spreading the virus.
Sacbrood virus can also affect adult bees:
Adult honey bees that are less than eight days old become infected when they ingest the virus. The virus can be ingested either in contaminated food or by removing larvae that were killed by the Sacbrood virus.

Exotic pests

The pests contained on this page are exotic pests of Australian honey bees. The climate of Australian honey bee producing areas, as well as the natural environment in Australia, would likely allow each of these pests to survive, spread and establish should be they introduced. Each of these pests pose a constant threat and would have serious consequences should they enter and become established in Australia. Beekeepers are at the front line for early detection and should be familiar with what the pests look like, the symptoms produced and their affect on a honey bee colony. Regular monitoring, early detection and reporting greatly improves the chances of containing and eradicating any new pests should they enter Australia.

Varroa Mite

Tropilaelaps Mites

Tracheal Mite

Asian Hornet

Africanised Honey Bee

Cape Honey Bee

Exotic pests

Large hive beetle

Dwarf honey bees

Giant honey bees

For more information on these exotic pests go to:
http://beeaware.org.au/pest_category/exotic-pests/