

## American foulbrood

**Causative agent:** *Paenibacillus larvae*

**Common name:** American foulbrood

**Acronym:** AFB

AFB is a statutory notifiable disease in the European Union in the framework of trade and export requirements (Directive 92/65/EEC).

**Damage in colonies:** AFB is a brood disease, caused by the spore-forming bacterium *Paenibacillus larvae*. Only the young larvae are susceptible to infection, adult bees are immune. Once an individual larva is infected, quickly the entire brood of the colony can get affected. The colony will not be able to raise enough young workers in time, which leads to weakening and eventually death of the colony.

### Biological cycle

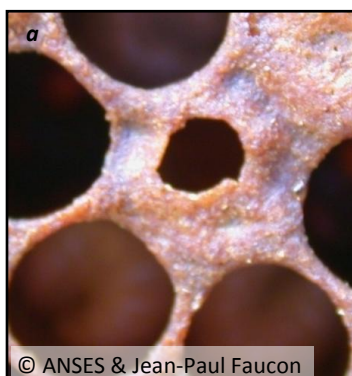
Young larvae get infected by the ingestion of spores of *P. larvae*. Ingested spores germinate and proliferate inside the midgut of the larva and finally break through the midgut epithelium, which results in the death of the larva. If not removed through hygienic behaviour of nurse bees, the tissues of infected larvae are disintegrated in the sealed brood cells. Later the larval remains dry down to hard black scales, which are very hard to clean up by the worker bees and contain up to 2.5 million spores that are highly infectious to other larvae. This may lead to a rapid spread of the disease when not detected in time.

Spores of *P. larvae* are very resistant to disinfection and may survive up to 30 years and more.

### Suspicion criteria / Infection consequences on the colony

Clinical signs of infection by AFB:

- Sunken / Darkened cappings (concave caps)
- Abnormal perforations in caps - holes in capping (a)
- Wet-looking caps (greasy, sweaty)
- Ropy larvae (brownish colour) that can be checked by the match test, viscosity (b and c). After this stage, the larvae dry out and form a hard scale, stuck to the cell wall.
- Formation of a pupal tongue (very characteristic but rarely observed – d)
- "Spotty" brood pattern / mosaic brood / scattered brood / patchy brood pattern: this as a result of the hygienic behaviour of nurse bees that remove the dead larvae from open or sealed brood cells (e)
- Specific odour of sick larvae (foul smell)
- Weak colony (less activity on the flight board)





#### How to check your hive:

- Check every brood frame individually
- Check the brood, including the sealed brood cells, for abnormalities such as described above
- If dead brood is observed, check for the viscosity of the larvae using the match test

#### **Prevention / Treatment**

The focus should be on the prevention of the disease by applying good beekeeping practices and prophylaxis. Adding 'foreign' bees (e.g. bought nuclei or queens, caught swarms...), beekeeping products (honey, pollen, wax...) and material to a colony or into an apiary should be done with great caution. Robbery should be prevented. All colonies (particularly the brood) should be frequently checked for abnormalities. Brood combs should be renewed regularly.

In case of an outbreak, the applied sanitary measures aim at isolating and destroying the outbreak. A protection zone has to be established around the outbreak and all movements of honey bee colonies and beekeeping material into and out of this zone is prohibited. Heavily clinically affected colonies are destroyed in order to prevent the disease from spreading. Several means exist to destroy these colonies, but generally they are sealed in the evening, when all honey bees are inside, and then killed (e.g. using sulphur dioxide). Afterwards the colonies (bees and material) are destroyed by burning.

Colonies in an affected apiary that do not show any clinical signs of AFB or affected colonies that seem to be curable, may be treated by the shook swarm method, where all the combs, including the brood are destroyed and only the adult honey bees are kept alive. All material that was in contact with the affected colonies has to be properly cleaned and disinfected. This can be done by burning the surface of the material with a torch or by cleaning it with hot sodium hydroxide (6%). If this is not possible, the material has to be destroyed. All this is done under the supervision of the competent veterinary authorities. Honey of affected colonies may contain enormous amounts of spores. These spores are not harmful to men, so the honey is still fit for human consumption. However, spore-contaminated honey cannot under any circumstance be fed to honey bees.

Antibiotic treatment is no solution. Antibiotics are not efficient on the highly resistant spores. In the EU there are no veterinary medicinal products authorised for the treatment of AFB.

#### **What to do in case of suspicion?**

In the EU, AFB is a notifiable disease. From the moment the disease is suspected, the competent authority must be alerted. Samples of the abnormal brood will be taken as soon as possible to an approved laboratory to perform analyses to confirm or exclude the suspicion.