The Foulbroods

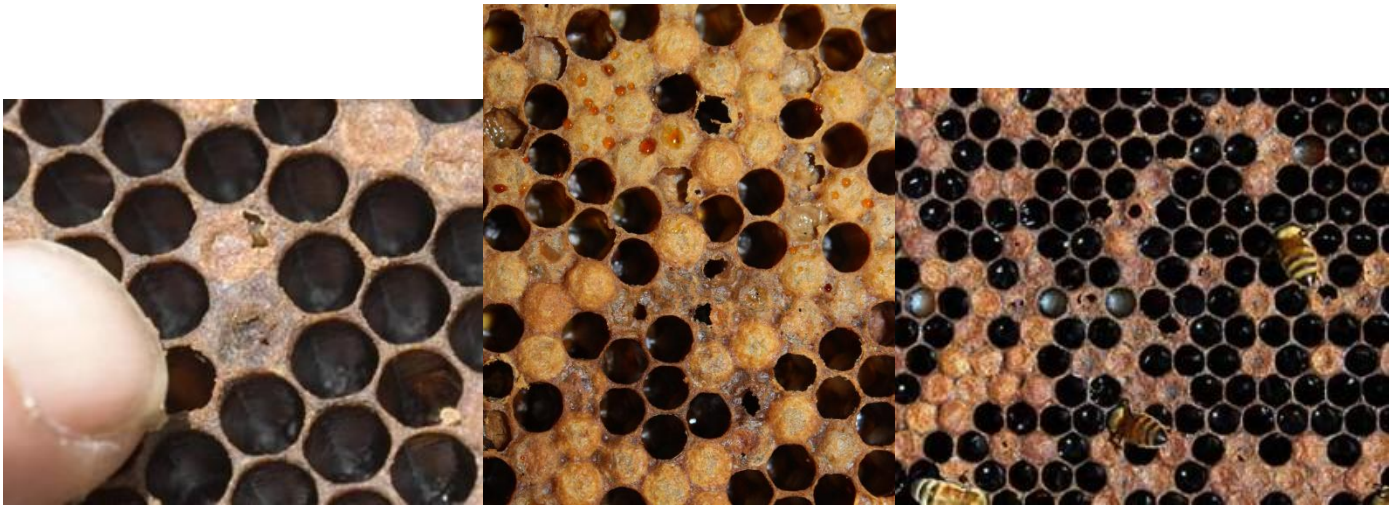
There are two different foulbroods, American Foulbrood and European Foulbrood. Both affect bee larvae, causing them to sicken and die. Left to itself, either foulbrood will weaken and then kill a colony, and in the process will spread to nearby colonies as well. Both of them infect equipment, comb and stores (honey, nectar, bee bread). So addressing a foulbrood infection means dealing with equipment cleanup as well.

Cause: the foulbroods are caused by bacteria that enter the hive either via robbing by your bees of the stores of an infected hive, or when drift bees from an infected hive drift into your healthy hive.

Once in the hive, the bacteria enter the "communal stomach" of the colony. Bees pass food to one another in the act of foraging, storage of nectar, preparation and storage of honey and bee bread, feeding one another, and feeding the drones and brood. So the bacteria are able to find their way into all the bees and all the stores fairly quickly. When the larvae are fed infected brood food, they sicken and die.

American Foulbrood

Is caused by the *Paenibacillus larvae* bacterium. The main symptom is larval death after capping. Uncapped larvae usually appear normal. What the beekeeper may notice first is ragged, off centre scrapes, tiny holes or abrasions in the capped brood. This is caused by the house bees attempting to open the cell and remove the dead larvae inside. The removal spreads the disease further.



Unfortunately, American foulbrood forms very durable reproductive spores. These spores can stay on equipment and combs and in stores for literally decades, only to re-bloom when ingested by a bee. This is why one must never buy used equipment! If you do buy used equipment, sterilize before use. *AFB spores are a common ingredient in commercial and imported honey!!* Never feed store bought honey to bees. And it is safest to never feed them honey of any kind. If you need or want to feed bees, feed white sugar syrup.

The dead larvae under the cappings rot down fairly quickly into a rusty brown gooey mess. Open the suspect cappings and sample the dead larval material with a wood toothpick. The remains will string out in a longish, very stretchy rope, usually a dark orange-brown color (see illustration, below). Finally a tough, black-brown triangular scale will form in the bottom of the cell. That scale can infect bees attempting to clean the cell decades after deposition.

The American Foulbrood “Rope Test”.

http://beeaware.org.au/archive-pest/american-foulbrood/

http://www.nationalbeeunit.com/public/beekeepingFaqs/americanFoulbroodAfb.cfm

European Foulbrood

European foulbrood is caused by the bacteria Melissococcus plutonius. It affects the larvae very early in development, and the larvae generally sicken and die before capping. The beekeeper will notice larvae curling up off centre in the cell, turning yellow or brown, melting, and sometimes the beekeeper will see a yellow stripe along the inside curl of larvae:

Affected larvae may also appear to become glassy and translucent, with white striping, and possibly with a yellow midline (which is the EFB infected gut material):

http://beeaware.org.au/archive-pest/european-foulbrood/#ad-image-0

http://www.nationalbeeunit.com/public/beekeepingFaqs/europeanFoulbroodEfb.cfm

Suspicious Colony Behavior

Colonies that are slow to build, have "shotty" brood patterns, and where adjacent cells have a varied mix of different aged larvae (egg in cell next to older larvae in cell) side by side are all conditions that should impel the beekeeper to examine all brood and brood cells carefully. Check for signs of dead and dying larvae.

Diagnosis

Because other things (chiefly Varroasis, where larvae are so infested with Varroa mites they begin to die) can look like foulbrood, it is critical to sample the dead larvae and test them with a Vita Life foulbrood test kit. The kits are widely available from UK and USA online bee supply companies. Every club should consider keeping fresh kits on hand to sell at cost to any beekeeper that needs to diagnose sick larvae in their hives because foulbrood spreads quickly.

The Vita Life test kits give accurate, specific results in three minutes. Choose your kit (AFB vs EFB) based on the symptoms observed.

Instructions for use are viewable on YouTube: https://www.youtube.com/watch?v=N9wIT6xq_zY

Treatment

If AFB is found, the bees cannot be saved. It is best to euthanize the bees after dark (when all the bees are in the hive, including foragers), then bag and burn the entire colony. This removes any possibility of infective spores remaining in the apiary.

Euthanasia is quick and merciful when entrances are sealed, and a large bottle of rubbing alcohol is used to pour down each seam of bees, reserving a ½ cup to pour on the bees on the inner cover. While pouring on the bees on the inner cover, hold the cover over the opened colony. Close up the hive and leave sealed to ensure total kill and no escape of infected bees.

Woodenware can be disinfected either by scraping and bagging, then sending it for irradiation or by scraping and soaking for 20 minutes in a bath of 1 part bleach to 5 parts water.

Do not attempt to save AFB infected comb, foundation or stores. *AFB spores in honey and bee bread cannot be reliably killed via irradiation or bleach.*

If equipment is being held for burning or disinfection, make sure it is in a bee-proof location. Bees exploring used, infected equipment can infect themselves with AFB.

If EFB is found, the colony can be remediated. Note that even with successful remediation re-bloom rates are high in the following season, possibly due to reinfection from the original source. The beekeeper should remain extra vigilant for recurring cases of EFB until two EFB-free seasons have passed.

Remediation of EFB:

1. Secure a prescription for Oxytetracycline from a veterinarian
2. Dose all colonies in the affected apiary as the EFB count will rise sharply in all nearby hives thanks to drift
3. Apply a 1:1 oxytet containing dribble to the colonies OR apply dose of oxytet in icing sugar on the top bars of the brood frames. This first dose is referred to as a 'flash treatment" and gets the medication into as many bees as possible as quickly as possible.
4. After the initial dose, feed all colonies a dose of oxytet in 1:1 syrup in a hive top or in-hive feeder.
5. Once that feed dose is consumed, perform a shook swarm on the symptomatic colonies. To be thorough, the beekeeper may want to perform a shook swarm on ALL the colonies in the apiary. To shook swarm: prepare a new, clean stack of equipment (bottom board, super(s), bare new foundation/frames, inner cover and outer cover…all must be clean and disinfected or new and unused). After finding the queen and reserving her in a safe place, take each frame of bees from the infected hive and brush them off the frames into the new setup. Then put the queen in amongst her bees. Ensure she goes down into the hive. This is best done late in the day to prevent the bees absconding: they find themselves suddenly without brood or stores and sometimes they decide to leave. Starve the bees overnight to ensure all EFB bacteria in their stomachs are digested.
6. After shook swarming, feed 1:1 syrup containing a dose of oxytetracycline twice over the course of 5 days. Then continue to feed 1:1 to promote comb building and monitor the colony closely for signs of EFB in the new, post shook swarm and medication bees. If EFB re-blooms the colony will not survive.
7. Do not attempt remediation if there is insufficient time for colonies to rebuild before winter.