



AMERICAN FOULBROOD DISEASE

Cause: *Paenibacillus* (= *Bacillus*) *larvae*, a spore-forming bacterium.

Effect: American foulbrood is one of the most widespread and the most destructive of the honey bee brood diseases. At first, the population of an infected colony is not noticeably decreased and only a few dead larvae or pupae may be present. The disease may not develop to the critical stage where it seriously weakens the colony until the following year, or it may advance rapidly and seriously weaken or kill the colony the first season.

Symptoms: First the capping of the diseased cell becomes moist and darkens in color. Then as the larva shrinks, the capping is drawn down into the mouth of the cell so the normal convex capping becomes concave. Worker bees may puncture this sunken capping and eventually remove it altogether. Death of an infected larva takes place after the cell has been sealed and the cocoon has been spun. At death, the diseased larva changes from a normal pearly white color to a creamy brown, then gradually darkens. These larval remains can be drawn out into a brown thread or rope. As the larva dries, it becomes dark brown. The final state is a very dark brown scale that lies uniformly on the lower side of the cell and extends from just below the mouth of the cell down to the base. These scales adhere very tightly to the cell and can be removed only with great difficulty. (If death occurs at the pupal stage, the tongue of the pupa may protrude from the scale.) The overall appearance of a comb infected with American foulbrood disease is patchy because of the mixture of diseased and healthy brood cells and also because the remains vary from the rosy moist larvae in cells with dark sunken or perforated cappings to the dry scales lying in open cells whose cappings have been chewed away completely by the bees.

Transmission: The spores are fed to young larvae by the nurse bees. They then germinate in the gut of the larva and multiply rapidly, causing the larva to die soon after it has been sealed in its cell. By the time of death of the larva, the new spores have formed. When the house bees clean out the cell containing the dead larva, these spores are distributed throughout the hive and more and more larvae become infected. The honey in an infected colony can become contaminated with spores and can be a source of infection for any bee that gains access to it. For example, as a colony becomes weak, it cannot defend itself from attacks by robber bees from strong nearby colonies; these robbers take back the contaminated honey to their own colony, continuing the cycle of infection. The beekeeper also may inadvertently spread the disease by exposing contaminated honey to other bees or by the interchange of infected equipment. Moreover, drifting bees or swarms issuing from an infected colony may spread the disease.

Updated: October 24, 2002