

The Bee Line



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American Foulbrood

by Jennifer Lund

During the 2019 beekeeping season there were two separate confirmed positive cases of American foulbrood (AFB) in Maine. AFB is the most contagious and devastating of the brood diseases. It is caused by a spore-forming rod-shaped bacterium (*Paenibacillus larvae*) and is found across the U.S. and in parts of Canada. The AFB life cycle includes an active vegetative stage and the dormant spore stage. The disease is transmitted by the spore stage, but it is the vegetative stage that kills the brood. Honey bee larvae become infected with AFB by ingesting spores present in larval food. The spore germinates in the insect gut, ultimately killing it. AFB spores are resistant to heat, cold and ultraviolet radiation and can remain dormant, yet viable, for up to 80 years.

AFB can be spread by:

1. using infected equipment and tools,
2. when spore-laden honey is robbed by neighboring hives/apiaries, or
3. when bees drift from diseased hives to clean hives.

In both 2019 cases, the beekeepers bought used equipment that was not inspected or tested for AFB prior to sale.

AFB is not very common in Maine but beekeepers should be vigilant during hive

inspections. The brood pattern of hives infected with AFB will appear mottled and irregular. Pupal cappings are sunken, perforated, greasy, and wet. Larvae turn from white (healthy) to dark brown and die upright in their cells. Advanced cases of AFB have an offensive odor described as rotten meat, sulfur, dirty socks, or rotten eggs. Field diagnosis of active AFB is usually accomplished by the “toothpick test”. A toothpick or twig is inserted into the suspect pupal capping that contains the brown, collapsed pupal remains. The toothpick is then slowly removed from the cell. If the brown, sticky mass of dead tissue “ropes out” ½ inch or more, it is highly probable that AFB is present.

As pupae decay, the mass of dead tissue will dry to a rigid “scale” at the base of the cell. Each scale can contain billions of spores. AFB scale adheres tightly to the cell wall, lays flat and appears to be black and shiny. Often remnants of a pupal tongue are visible from the scale and at times are attached to the upper cell wall. Scale can usually be seen in AFB infected equipment that has been in storage for many years. Routine inspection of brood combs for the presence of scale and thorough autopsy inspections of colonies lost during winter is essential before equipment is restocked or dispersed to other hives.

The first confirmed case of 2019 AFB was in southern Penobscot County and the hives showed all the “characteristic” symptoms of AFB. The second case was in northern Penobscot County and visual inspection of old brood comb did not locate any definitive symptoms of AFB. In both cases AFB infection was confirmed by the USDA ARS Bee Research Laboratory.

If you suspect you have a hive with AFB call your state bee inspector. Your state inspector can confirm diagnosis, help with abatement, and will attempt to locate the initial source of infection (another apiary, diseased equipment, etc.). They will inspect other hives in the area for AFB. The earlier an infection is caught, the less likely it has had a chance to spread to other hives. In the case of the southern Penobscot County AFB case, the living hives were sick but still relatively strong when AFB was detected. If the infection was not caught as early as it was, the weakened/dead hives would have been robbed by other hives in the area, spreading disease to non-infected hives.

Honey bee colonies found to be infected with AFB must be abated according to existing state regulations. In most states, including Maine, hives infected with AFB are depopulated and burned. Between the two cases, six living hives and several pickup loads of equipment were destroyed.

See the Maine State Apiary Rules and Regulations for more detail on AFB abatement (https://www.maine.gov/dacf/php/plant_health/statutes_rules.shtml#bees)



Photo courtesy of Jennifer Lund

Some states allow the use of antibiotic treatment as a means of abating AFB. Maine does not allow this because treatment of AFB infected hives using antibiotics has limited success and several associated problems. First, the disease is likely to reappear once the treatment ceases after larvae ingest bacterial spores originating from dried scales and contaminated honey. In addition, overuse and improper dosing of antibiotic has resulted in strains of AFB with antibiotic resistance. Currently, strains of AFB with Terramycin resistance are found globally.

Besides AFB, more than a dozen pests and pathogens are associated with honey bees. The easiest way to minimize the possibility of hive contamination is to maintain good apiary hygiene. Beekeepers should:

1. Make sure any used equipment you are planning on buying is inspected by the State Apiary Inspector and has been tested for brood disease.
2. Exercise caution with equipment of unknown health history or origin. Clean any used equipment by placing it in a deep freeze for 48 hours and then scraping any wax, propolis, and other debris from the boxes. Collect and dispose of this waste.

Finally, sterilize equipment by scorching with a propane torch. Never use old frames and comb with an unknown health history; rather discard these.

3. Never open-air feed honey or syrup. This includes letting bees have open access to frames after extracting honey.
4. Never leave burr comb or hive scrapings about the apiary. Carry a bucket with you to collect the waste. Dispose of it at the end of the day or store it in the freezer.
5. Store unused equipment under "bee tight" conditions to prevent robbing behavior and access to the stored equipment by rodents, wax moths and hive beetles.
6. Clean hive tools between hives while performing inspections. Scrape off any honey or wax from tools and scorch in a lit smoker.
7. Never combine sick or collapsing hives with healthy ones, especially if you do not know why the hive is sick or collapsing.
8. Replace old black comb on a schedule with new foundation. Try to rotate comb out of your hives on a 3-5 year cycle. An easy way to keep track of the age of your comb is to mark the year with marker on the top of the frame.

The brood in a healthy colony has a uniform appearance with few interruptions of the

brood pattern. Healthy larvae are pearly white and the pupal cappings should appear convex, not perforated or greasy. Larvae should move and roll when prodded. There should not be an offensive odor. When one or more of these criteria is not met, the colony needs further inspection and evaluation.

For more information on AFB please visit: https://honeybeehealthcoalition.org/wp-content/uploads/2019/06/HBHC__AFB-EFB-Final-061119.pdf

USDA ARS Bee Research Laboratory: <https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/bee-research-laboratory/>



Photo courtesy of Jennifer Lund

Bee school listings are available
to view on the website

mainebeekeepers.org

A list of beginning and intermediate beekeeping
classes across the state is available by clicking
on the link to 2020 Bee Schools