



American Foulbrood (AFB) is a bacterial disease of developing honey bee brood. AFB spores infect the larva in the earliest larval stage (newborn to 2 days old), generally through infected food. Infection spreads quickly among the larvae, as nurse bees, which carry the bacteria but are not affected by it, move from cell to cell feeding larvae. Only a few spores (<10) may be infectious. Once ingested by the larva, spores germinate into the active vegetative form within larval intestine. There they begin to massively colonize the larval midgut.

As the bacteria numbers increase, they escape the larval gut and the infection spreads to all tissues of the developing larva, causing sepsis and cell death. Larvae do not die until just as the larvae are capped – at this stage infected larvae completely breakdown into a glue-like consistency. When conditions become unfavorable for the vegetative form, this bacteria forms spores. Spores can survive decades. A single dead, desiccated larva may contain millions of potentially infectious spores.

In the 1920s American Foulbrood (AFB) was a huge problem killing hives and causing the loss of thousands of dollars of equipment for U.S. Beekeepers. Strict state (but no national) AFB control bee laws were passed and state inspection and registration programs were begun. After years of enforcement, management, and education, AFB has been contained, but not eliminated. As AFB cases dropped dramatically, state apiary inspection programs were discontinued and strict laws and regulations either were sunsetted or repealed. There is no current Oregon state (or national) law regarding American Foulbrood. Controlling American Foulbrood disease, like other diseases, is the responsibility of the beekeeper.

What needs be done?

The most important thing that you can do is to learn what this disease looks like, so that you can take swift action to control its spread. Educate yourselves and educate others. The disease originates when the bees establish contact with an active infestation (via robbing, drifting, beekeeper transfer of infected brood primarily) or when spores are contacted via honey from another colony or the dried down scales left in comb (such as might occur in stored

equipment from a dead-out that previous succumbed to the disease are put into service) is moved into a colony with brood. Colonies that are dying from the disease become weaker and weaker and serve as a source of the bacteria to surrounding neighboring colonies up to couple miles away.

An active (undiagnosed) AFB infection often begins among the strongest colonies in an apiary. We are concerned that nucs being widely used to establish new colonies may be a major source for this disease in Oregon. If such nucs are left to weaken and eventually die from the disease they will serve as an inoculum source for neighboring beekeepers.

How to look for [field symptoms] of American Foulbrood

1. **Look for active signs of AFB:** It is nearly impossible to see dying larvae so concentrate on looking at capped worker cells. Examine cells that are perforated, sunken, greasy-looking and/or discolored (not looking like healthy capped brood). Initially you will be looking for a colony with only a few infected cells among the vast majority that are healthy.
2. **Look for discolored brood:** infected larva become brownish then blackish in color (not yellow (that is more characteristic of EFB) or not grayish (that is neglected brood)).
3. **Look for Presence of scale:** desiccated remains of pupa that sticks tightly to lower cell wall and is not removable without damaging the cell wall. They will be brood comb not easily distinguished as they tightly melt into the lower cell wall. You need orient the frame upside-down to detect the dried remains adhering to the lower cell surface. These dried remains tightly adhere to lower cell wall and are not removable.
4. **Look for extended pupal proboscis (false tongue):** Sometimes the tongue of developing pupa stretches from one cell wall to opposite cell wall. Although a very positive sign of AFB, the characteristic is only seen when death occurs in early pupal stage. Not always present.
5. **Smell distinctive foul odor** – not the typical sour smell of dead brood. Odor variously described as glue-pot or 1000 dirty socks or gym locker long overdue for cleaning.
or sulfurous chicken house
6. **Conduct the “ropy” test;** This test relies on the unique characteristic of AFB-infected honey bee brood. Select a brood cell that looks infected but not dehydrated (the prepupa/pupa structure is still evident and gooey). Take a thin stick, forceps or toothpick to swirl the contents of the cell and slowly withdraw it. If the contents draw out ½ up to an inch in length (2.5 centimeters) then snaps back, the cell is most likely infected with AFB.
7. **Use an AFB diagnosis kit:** Kits are available from several bee supply companies. Be cautious to interpret the results correctly because the test may yield false results. Ideally, the test results should be considered with other lines of evidence.

Please note that false results may occur using any of the methods above. Use multiple methods to corroborate results.

Confirm the field test if you suspect AFB:

- 1. Send a sample to USDA or OSU Bee lab.** Collect a sample of the suspected brood
 - A. Cut out a piece of the comb (2 by 2 inches - 5 cm by 5 cm). Wrap the sample in paper (not plastic or aluminum) and send it to a lab. Make sure to include return contact information.
 - B. Coating a clean stick or toothpick with contents of one or more suspected cells. Put it in paper and send to lab NOTE: ONLY USDA lab will do this diagnosis not the OSU lab. Due to Covid-19 lab closures this will not be promptly done.

What to do if confirmation of AFB is positive:

- 1. RECOMMENDED Burn and bury:** After dark, when bees have returned to the colony, kill the adult bees (Soapy water recommended). Dig a hole large enough to completely burn and bury adult bees and all colony frames (both brood and honey). Larger hive bodies, bottom board, hive stand and/hive tops can be thoroughly scraped of wax and propolis then scorched with fire or portable torch. You may need to request a burn barrel to burn.
- 2. ALTERNATIVE Bag bees and frames and bury in landfill:** IF OPEN BURING IS PROHIBITED or burn barrel not available, kill adults after dark and move dead bees and all frames (brood and honey) into heavy-duty trash bags and bury in a landfill. Kill bees first by pouring soapy water from the top into the hive after dark when all the bees are in the hive.
- 3. NOT RECOMMENDED Use antibiotics:** will only mask the vegetative growth signs. Burning and burying the infected hive is the recommended treatment option. Do not seek to follow unproven remedies you might find available on the internet. Some have tried to save the bees by shaking into a holding container, keep them 24 hour in dark, cool spot then re-hiving them in brand new equipment (boxes and frames) and dusting them with terramycin. To get this antibiotic you need get a VFD (prescription) from a veterinarian.

For more information:

Diagnosis and Control of AFB (Mich State)

http://www.pastatebeekeepers.org/pdf/AFB_Milbrath_2018.pdf

Varroa mite control alternatives (Penn State) <https://extension.psu.edu/methods-to-control-varroa-mites-an-integrated-pest-management-approach>

Leaflet from State with Inspection service (Texas):

<https://txbeeinspection.tamu.edu/files/2018/02/Identifying-Brood-Diseases-trifold.pdf>

HBHC Tools for Varroa Management www.Honeybeehealthcoalition.org/varroa

Inexpensive booklets

CAPA: **Bulletin Honey Bee Diseases & Pests** 3rd Edition 2013 (Amazon \$25.97; Mann Lake \$18.95)
BIP: **Diagnosis and Treatment of Common Bee Diseases** Rev 2019. (Mann Lake \$35.00) Penn State:
Penn State: **A Field Guide to Honey Bees and their Maladies** (<https://extension.psu.edu/a-field-guide-to-honey-bees-and-their-maladies> \$12.00 + shipping); or directly from Dewey (author) \$15; or Amazon \$38.59; or Mann Lake \$19.95)

Websites

The Bee MD www.thebeemd.com

Bee app from Alberta: <https://play.google.com/store/apps/details?id=ca.ab.gov.beehealth&hl=en>

How to Submit Samples to Beltsville Lab:

<https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/bee-research-laboratory/docs/how-to-submit-samples/>

AFB Test kit website: <https://www.vita-europe.com/beehealth/products/afb-diagnostic-test-kit/>

USE : <https://bee-health.extension.org/diagnostic-kits-for-american-and-european-foulbrood/>

Veterinarian Feed Directive (to permit use of antibiotic for AFB):

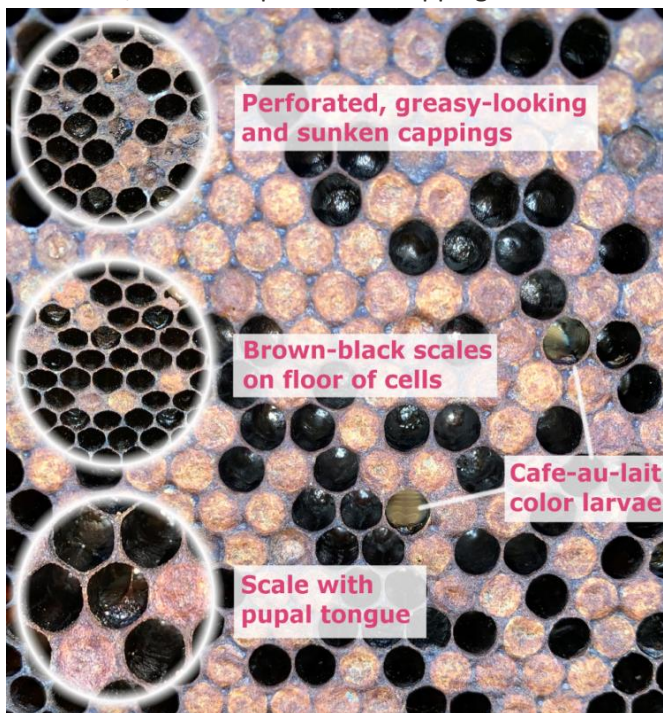
https://honeybeehealthcoalition.org/wp-content/uploads/2019/06/HBHC_AFB-EFB-Final-061119.pdf

Euthanizing (killing) live bees (NJ): <https://mail.google.com/mail/u/0/#inbox?projector=1>

How to examine for AFB/EFB (England): <https://www.youtube.com/watch?v=kj8NHSIVTCw>

How to recognize AFB (NZ): <https://www.youtube.com/watch?v=bQ1TrF8jGtg>

Sunken, darkened perforated cappings



Ropy test

