

American Foul Brood

AFB

Gary Martin October 2023

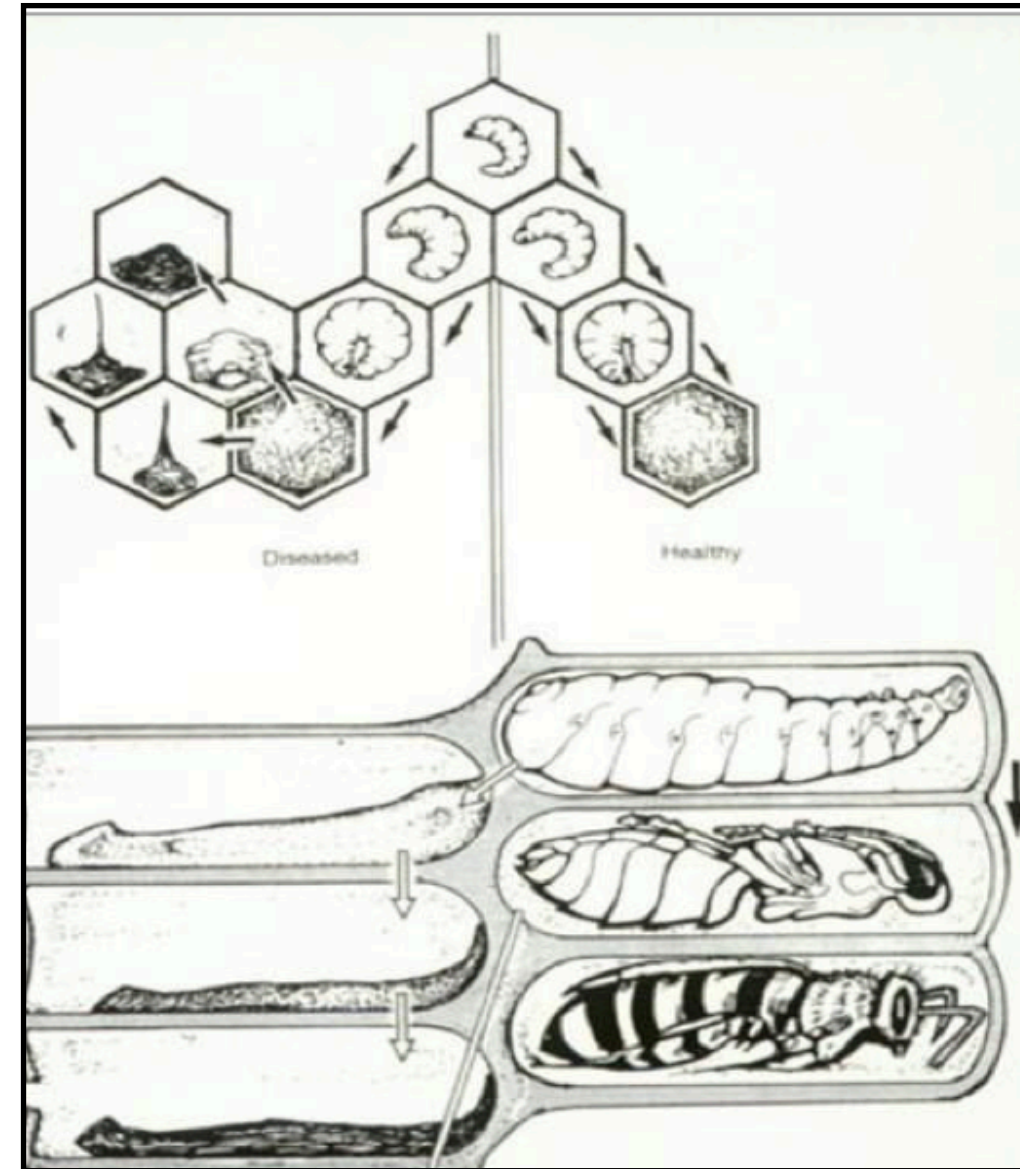
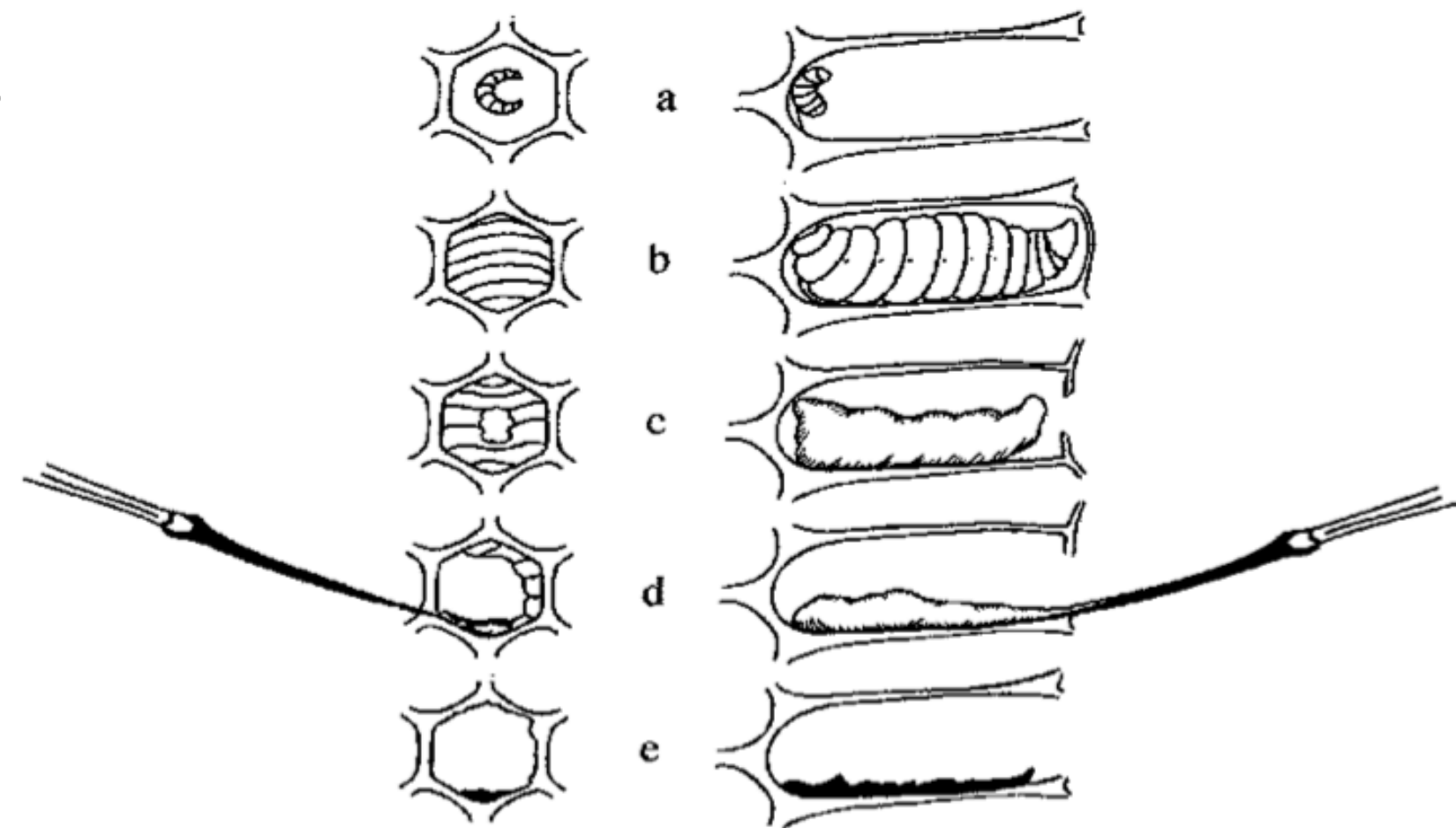
AFB

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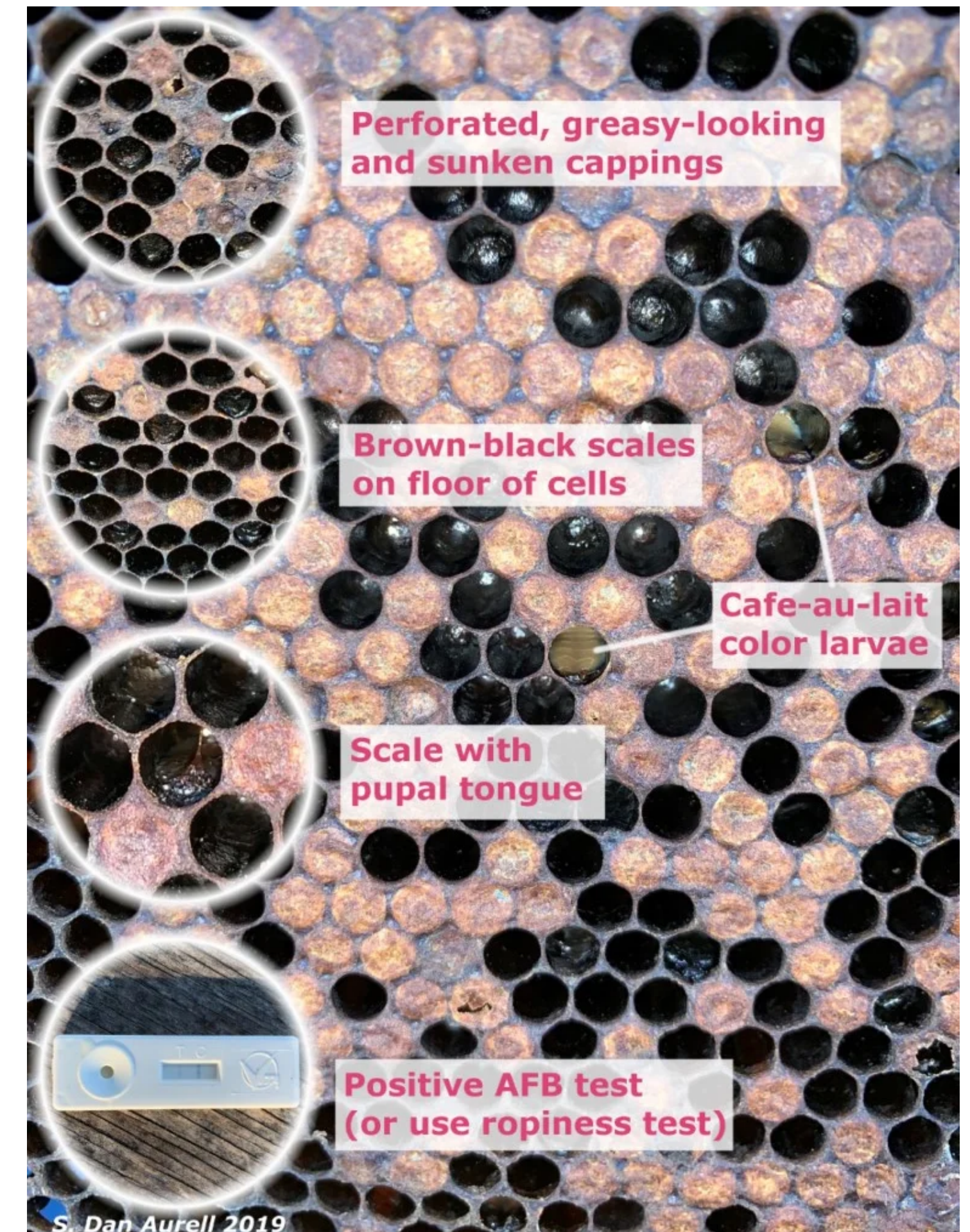
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What

Bacterial Disease



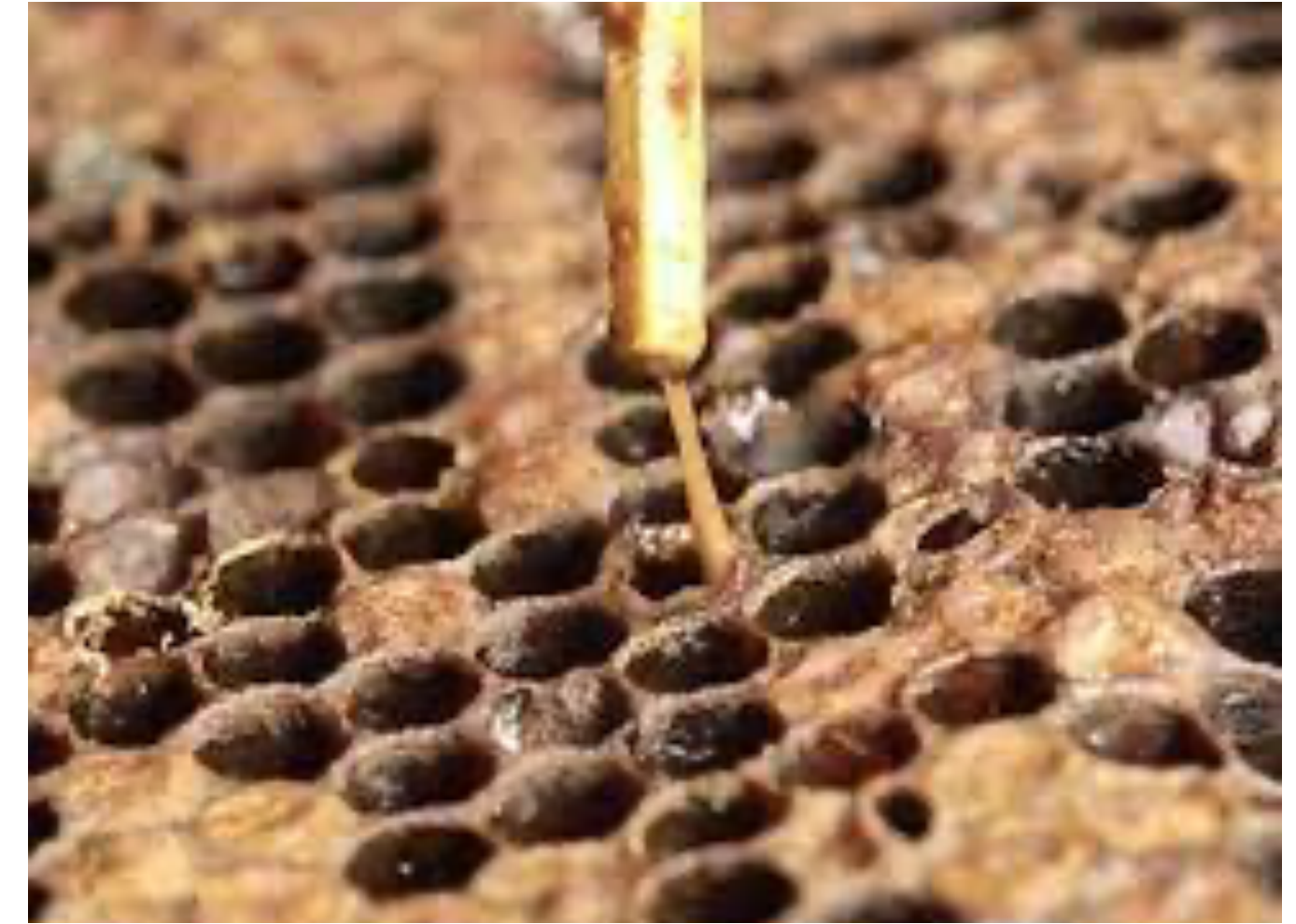
- **a** point of infection (**First couple of days**) **b** development Laval to pupal, **c** cell contents is reduced, and cell capping is drawn inward or is punctured, **d** cell contents become glutinous, with residual scale tightly ahead to the bottom of the cell



Detection

Symptoms in the Hive Symptoms

- Smell
- Ropy
- Scale
- https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/animal-and-crops/animal-production/bee-assets/api_fs205.pdf



Detection - Microscope

Paenibacillus larvae With Brownian Motion From A Honey Bee Colony

- <https://youtu.be/KzVRcMBmW20?si=pp0vdEziXeI14fBc>
- Spores of the causative agent of American foulbrood disease in honey bee colonies are shown here. Paenibacillus larvae spores (seen here at 1000x) display brownian motion when the microscope slide is prepared with the hanging drop method.
Acknowledgements: Organized, prepared slide: Michael E Wilson, University of Tennessee; videography & microscopy: Ernest Bernard, University of Tennessee; Review: Bart Smith, USDA-ARS Beltsville Bee Research Lab.

Mitigation Plan

Control Strategy and Options

American Foulbrood (AFB) remains one of the greatest health threats to honeybees. The disease caused provinces to introduce bee legislation in the early 1900s. After antibiotics were introduced in the 1950s, AFB control became easy and beekeepers no longer faced mandatory destruction of infected colonies and equipment through burning and burial. The use of veterinary drugs became a standard management practice when it was applied as a seasonal prophylactic treatment. With the ease of application, ready availability and low cost, the industry lost sight of the true value of antibiotics and took their remarkable efficacy for granted. **It was surprising that oxytetracycline hydrochloride remained effective as long as it did. Antibiotic-resistant AFB (rAFB) was first diagnosed in Alberta in the early 1990s and in BC in 1997.** A comprehensive survey across British Columbia confirmed its wide distribution but at low prevalence.

In the early 2000s, the Canadian and US governments recognized the need to place restrictions on the availability and distribution of veterinary antibiotics in light of the rapid increase of MRSA microbes (~superbugs) in human health care. This initiative led to the ban on over-the-counter (OTC) drug purchases and distribution. As of **December 2018, veterinary antibiotics can only be obtained through veterinary prescription.** (Note: Fumagillin is exempt from veterinarian prescription since it is exclusively used to combat Nosema disease).

The restricted access to veterinary drugs has placed emphasis on hygienic beekeeping practices to control AFB including regular brood frame inspections, sampling of suspect brood cells, and aggressive culling of infected brood frames. Instead of applying a standard “fits-all” control strategy, beekeepers can employ different control methods and strategies according to the level of AFB in the hive.

In all cases, a sample of a brood cell can be submitted for laboratory analysis at no cost. Alternatively, a rapid antigen detection test (~Vita Bee Health) can be used for prompt diagnosis.

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Mitigation Plan

Level 1

Symptoms: One or few infected cells on a brood frame. Colony size, bee brood and bee activity are normal.

- Mark the top bar of the frame with infected cells and place it outside the brood center to allow the healthy brood to emerge. When most of the healthy brood has emerged, remove the frame for recycling or destruction.
- Keep the colony crowded in one box so that the bees are forced to clean and utilize all available space. This may require the temporary removal of the honey super.
- Inspect all brood frames weekly for one month. Re-install the honey super when the brood chamber has become overcrowded.
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Mitigation Plan

Level 2

Symptoms: Few infected cells appear on different frames throughout the brood chamber. Some scales and uneven brood patterns may be present. Colony size appears normal.

- At this condition, AFB is distributed throughout the brood area. To save the colony, the only option is to transfer the adult bee population to new equipment.
- Slide the hive over a few feet. Place a new single box hive with new frames and foundation in the location where the colony was before. Shake the bees from each frame onto the new equipment. (Check for the queen first before shaking the bees and transfer her by hand onto a new frame!).
- After all bees have been transferred, remove the empty infected hive and frames for cleaning, disposal and recycling.
- Leave the colony on the new equipment alone for 5-7 days. Since there is no comb, there will be a temporary brood break. After 5-7 days, feed the bees medicated syrup (i.e. sugar syrup with antibiotics). This will stimulate comb construction. For bees to produce 1 kg of wax, about 6 kg of sugar syrup is needed. Syrup feedings may need repeating.
- Antibiotics such as oxytetracycline (~*Terramycin, Oxytet, Oxysol*), tylosin (*Tylan*) can be obtained through veterinarian prescription.

Mitigation Plan

Level 3

- **Symptoms: Abnormal brood cells, scales throughout the brood chamber. Capped brood unevenly distributed with punctured holes. Colony appears weak and small.**
Brood frame with AFB scales held at 45 degree angle.
- There is **no option of saving the colony**. The bees can be shaken into a hole in front of the hive and dispatched through various methods, including soapy water and burial, pour gasoline and ignite, or insecticidal spray.
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Mitigation Plan

Disposal and recycling of infected hive equipment

When AFB has been confirmed, wooden brood frames need to be disposed. Plastic foundation can be reused by removing it from the frame, scraping off the comb on both sides with a hive tool, placing the foundation in a tub of hot water and scrubbed with a stiff brush. Alternatively, a power washer can be used to remove the comb residues from the plastic foundation. The cleaned foundation can be inserted into a new wooden frame.

Boxes, inner covers and bottom boards on good condition can all be reused after cleaning with power washer or light scorching of surfaces with a blow torch.

Mitigation Plan

Hygienic Beekeeping Practices

Beekeeping Equipment:

- When moving between bee yards, it is important to ensure that the equipment is clean of spores. Hence, all tools should be scraped free of wax and propolis initially and then heated to a high temperature to destroy spores that may be present. This can be accomplished through the use of a propane torch to scorch the outside of the equipment.
- **Hive tool. Clean frequently with a torch**

Gloves:

- Disposable gloves should be worn when working with colonies and changed between as a method to prevent spores from coming into contact with an uninfected colony. Do not use leather or reusable gloves.

Beekeeping suit and veil:

- While typically not a high-risk transmission point, ensure that your suit and veil are clean of wax and propolis at potential contact points with the colony.. Regularly wash and disinfect these pieces of equipment to prevent transmission of spores.

Pollen:

- As beekeepers sometimes collect pollen to feed their colonies in periods of shortage, it is important to ensure that collection is made only from healthy colonies to prevent spore transmission

Honey:

- Do not feed honey to your colonies from outside sources

<https://www.amstewardship.ca/faast-reviews/honey-bee-industry/preventing-american-foulbrood/>

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