

This module was prepared for members of the New Westminster Beekeeper's Association and are intended to be augmented by a hands-on experience in the bee yard.

Review of basic bee biology to help us understand bee diseases and pests:

1. There are four stages in an insect's life – egg, larva, pupa, and adult.
2. The larva stage is five days long and during that time. The larvae are fed royal jelly constantly and triples in size every 24 hours.
3. It is the 3-5 day of the larval stage that a beekeeper can identify EFB disease.
4. The pupa stage for a worker bee is 13 days.
5. It is the pupa stage that a beekeeper can identify AFB disease.
6. The adult stage is 45 days during the spring and summer and several months long during winter.
7. It is in the adult stage that a beekeeper can identify deformed wing virus (DWV) that indicates a high infestation of the varroa pest.
8. Although the egg stage is an indication to the beekeeper that there is a laying queen, the egg stage itself does not provide evidence of any common disease or pest.

## Diseases and Pests

There are about two dozen disease and pest issues for honeybees, however, there are only a handful that we need be concerned about. In order of importance:

1. Varroa mites – the number one problem of beekeepers in the world today.
2. European foulbrood – a major concern of beekeepers in the Lower Mainland.
3. American foulbrood – not common, but deadly.
4. Chalkbrood – common, but not often a big problem.
5. Nosema – common, difficult to diagnose, sometimes fatal.

<b>Disease</b>	<b>Organism</b>	<b>Diagnosis</b>	<b>Treatment</b>	<b>Prevention</b>
European foulbrood	Bacteria	Yellow larvae in day 3-5 of larval development	Antibiotic – Oxytet, Oxytol or Tylosin	Strong, healthy bees. No disease in comb.
American foulbrood	Bacteria	Bee dies after cell is capped at the start of the pupa stage. Infected pupa decomposes into a thick and gooey mess	Burn colony	Strong, healthy bees. No disease in comb.
Chalkbrood	Fungus	Larvae dies and turns 'chalky'	Requeen	Strong, healthy bees. No disease in comb.

Nosema	Virus	Slow, crawling bees on the ground. 'K' wings on bees in the colony. Colony is not growing during spring buildup.	Antibiotic - Fumagilin-B	Strong, healthy bees. No disease in comb.
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**Varroa mites**

The scourge of beekeeping world-wide.

- Burgundy-coloured eight-legged mite.
- Grows to a population of over 5,000 mites in one colony.
- Feeds off adult bee by biting it in the back of the neck and drinking the bees' hemolymph (blood).



Figure 1: Varroa mite on bee abdomen

Varroa kills the bees two ways:

- High mite population causes the bees to die of stress. If untreated in August/Sept – colony can die as late as March.
- Varroa mite is a vector of about 6 different viruses. The viruses can kill the bees as well.

Identification

- Observing adult mites on bees.
- Observing adult and nymph mites by removing undeveloped drone pupae (drone comb method).
- Observing deformed wings on bees (caused by the deformed wing virus (DWV)).
- Proactively checking mite population by rolling 300 bees (1/2 cup) in 2 tablespoons of icing sugar for a full minute, until the mites dislodge; then counting the mites.
  - Check for mite levels once each month from March to October.
  - Must immediately treat the colony if
    - More than 6 mites (September to October)
    - More than 15 mites (March to August)

Rolling for Mites



Figure 2: 1/2 cup of bees covered in icing sugar



*Figure 3: Varroa mites dislodged from bees using icing sugar (spritzer with water to see mites more clearly)*

### **Rolling Instructions**

- Place ½ cup of bees in a mason jar and cover with meshed lid (scoop them off a brood frame). The mesh size must be small enough to prevent bees from escaping but large enough to allow mites to fall through. The common mesh used by beekeepers is number 8 hardware cloth, which has 8 squares per inch.
- Add 2 tablespoons icing sugar.
- Roll gently for a full minute (use a timer).
- Pour out icing sugar (with mites) onto a light coloured background.
- Spritzer with water to dissolve the sugar and expose the mites.
- Count the mites and record the count.
- Put bees back into the colony (sister worker bees will clean them up)

## European Foulbrood

- Bacteria
- Infects larvae 1-3 days old (but visible to the beekeeper until 3-5 days old)
- Kills larvae 3-5 days old
- Turns larva yellow, then brown
- Larvae dies and turns watery – can smell like rotten eggs



Figure 4: Early stage of EFB

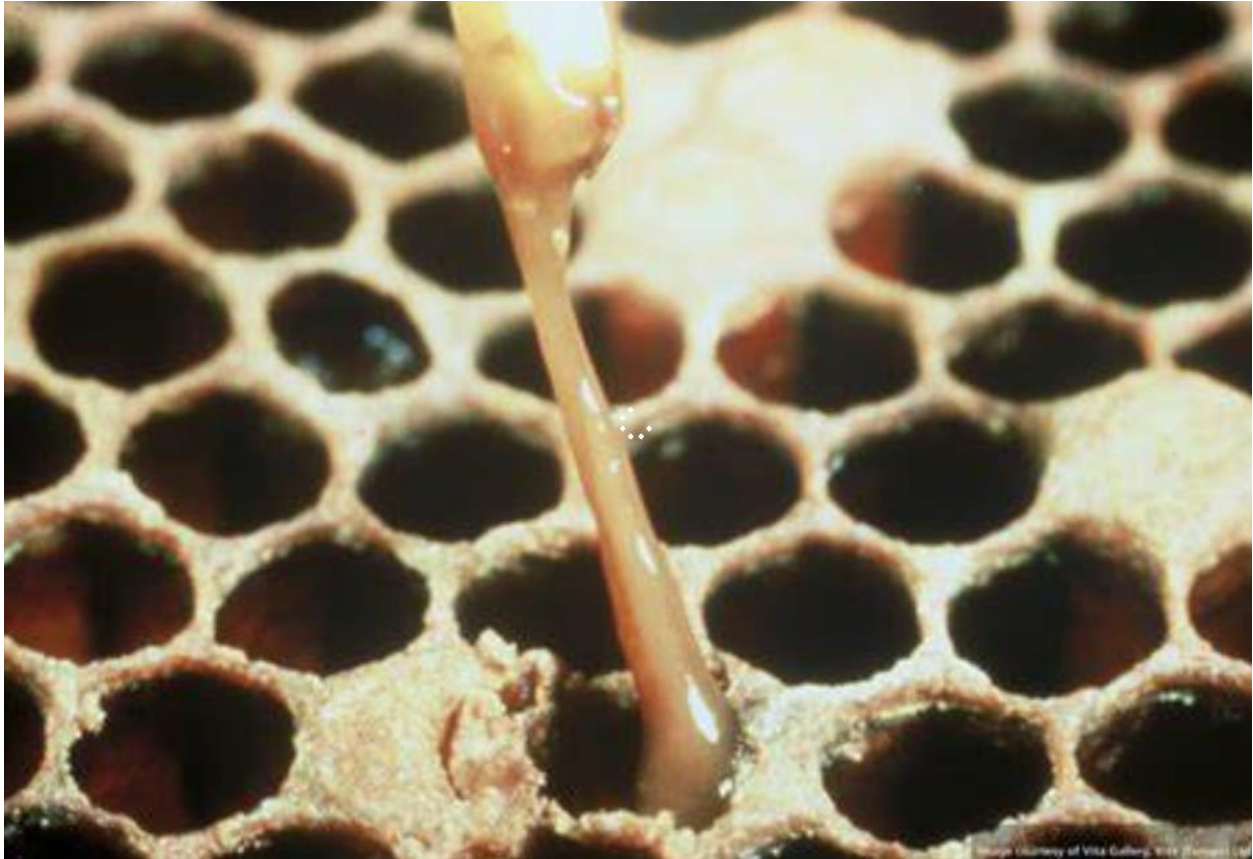
### Prevention & Treatment

- Brood check every 10 days from April 15 to October 15 looking for spotty brood with yellow larvae 3-5 days old.
- If EFB is present, remove honey supers, treat with antibiotic
- Add honey supers 4 weeks after the last antibiotic treatment (withdrawal period)



## American Foulbrood

- Bacteria
- Infects larvae 1-3 days old but is not visible to the beekeeper during the larval stage
- Kills larvae after the cell is capped. Cappings have a concave or depressed look.
- Turns larva dark brown
- Larvae dies and turns gooey



### Prevention

- Brood check every 10 days from April 15 to October 15, looking spotty brood with sunken cappings and cappings with small torn holes
- If AFB is present, remove honey supers (honey is good for human consumption)
- Kill bees and burn frames
- Torch inside of brood chamber, inner cover, and bottom board (reuse them)

## Chalkbrood Disease

- Common disease – not fatal if small amount present (less than 6 cells on a frame)
- Fungus – worse in spring when the inside of the colony is damp
- Easily identifiable
- If more than 6 cells on a frame
  - Cage queen for 10 days to give bees time to clean it up
  - Then release queen – if chalkbrood reappears, requeen



*Figure 5: Chalkbrood inside the cell*



*Figure 6: Chalkbrood mummy after removed from the cell*

## Nosema Disease

- Virus, invisible to the beekeeper
- Prevents bees from digesting their food
- Slowly kills the bees through malnutrition

### Diagnosis and Treatment

- Colony is not growing at the same rate as all others
- Colony is dwindling in population for no apparent reason
- May see crawling bees in the grass in front of the hive
- May see dysentery on the colony near the entrance
- May see bees with fore wings and hind wings unhooked
- Colony is very gentle, and the bees are listless
- Microscopic examination is available to confirm the disease
- Treat with an antibiotic specific to this disease – Fumagilin-B



*Figure 7: Nosema spores in the gut of a bee*

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