



Diseases and Pests,
Tammy Horn, 2016

Photo by Jason Gaines, 2015

Let's Start with the Healthy patterns:
Below are photos of a Good Queen
Laying Pattern



Photos courtesy of Maryann
Frazier

Healthy larvae

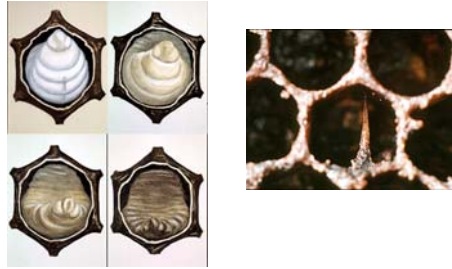


American Foul Brood (AFB)

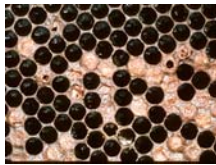
- Kills pre-pupae or pupae, which causes foul odor
- Difficulty comes from having to recognize the disease hidden by a wax capping
- The wax capping is sunken
- Worker bees make puncture marks in the cell cappings
- Pupal “tongue” but not tongue at all. Decayed larvae

American Foulbrood (*Paenibacillus larvae*)

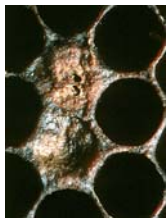
- 2 stages: an active stage called “vegetative” stage and a spore-forming stage
- Larvae up to three days old become infected by ingesting spores present in their food
- Spores will not germinate in larvae over three days old
- Infected larvae normally die after their cell is sealed
- The vegetative form of the bacterium will die but not before it forms millions of spores



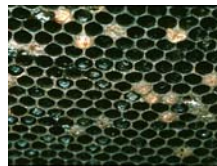
The larvae gradually change from pearly white to dark brown. There is a pupal "tongue." in very late stages



During early stage of American foulbrood disease, dead larvae will have glue-like consistency. Do a “rope” test to puncture the cell, and liquefied larva comes out in a long rope.



American Foulbrood



Sunken caps, and scales. Each scale contains 100 million AFB spores. Pictures from MAARC

American Foulbrood

- Burning is the only way to ensure that this disease does not spread.



How to Burn Equipment

- Wait until evening when all the bees have returned
- Dig a whole large enough to hold equipment
- Kill the bees by dumping a 5-gallon pail of soapy water into colony from top (use 1 cup of dish soap)
- When burning, put in frames first, then boxes
- Cover the pit when finished
- Obey fire safety laws, have fire extinguishers

European Foulbrood

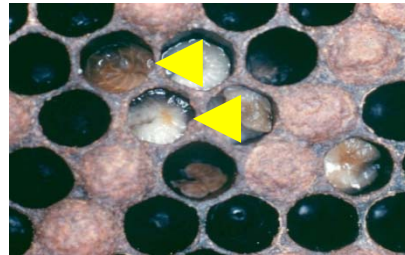
Melissococcus plutonius

- Developing larvae rather than pre-pupae or pupae (you can *see* it, not under a cap)
- Does not create spores
- Once this bacteria disappears, it is gone; it does not persist
- Bees can care of themselves if there is a strong honey flow or new queen

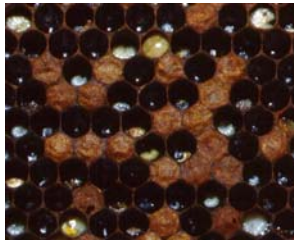


1. You can ****see**** damaged c-shaped larvae since cell is uncapped
2. Larvae will be discolored (not pearly white)
3. Can see intestines
4. Foul smell
5. No rope-test (as with AFB)

European Foulbrood



Stephanie Tarwater, TN inspector



1. Bacterium overwinters on comb.
2. Multiplies in guts of larvae,
3. Typically associated with early spring and
4. Disappears with honey flow

European Foulbrood

- Requeen if a diagnostic kit shows that the hive has European foulbrood
- The honey bee gut has over 109 beneficial bacteria. If you choose to apply an antibiotic, you are killing those beneficial bacteria and you are also increasing the European foulbrood's resistance to antibiotics in the future. You will need a vet's prescription to apply an antibiotic once the infected hive has been diagnosed

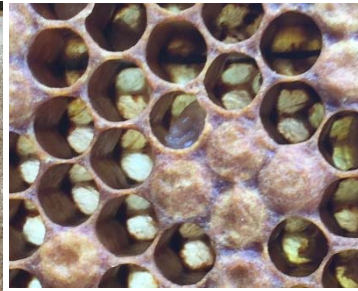
First Aid Nuc:
Deals with 97% of the problems
except American foulbrood



Chalkbrood

Ascosphaera apis

- Fungus—antibiotics are useless
- Chalkbrood infected larvae die
- The pupae hardens, turns white, and becomes “mummified”
- Adult bees will remove these mummies
- Best solution is to requeen
- Chalkbrood is generally already present in the hive, but stress from the environment promotes its transition to an active disease



Chalkbrood,
Kelly Lewis,
2016

Chalkbrood

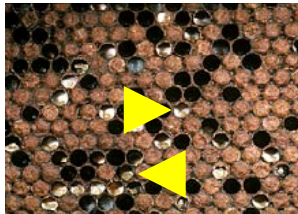


Photo from MAARC

Hive has run out of honey stores

- Weight of hive is light, no capped frames
- Dead bees in the center of the hive, front of the hive, or in bottom of the hive
- “Tails in the cells”





Photo by Leah Steiner, 2016

Varroa Mites
(*Varroa destructor* or *jacobsoni*)



- *Varroa destructor* has no free living stage, it is totally dependent on its honey bee host
- (obligate parasite)

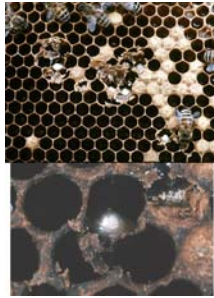


- Female mites have two distinct phases in the life cycle:

1. phoretic phase- mite is on adult bee and being transported

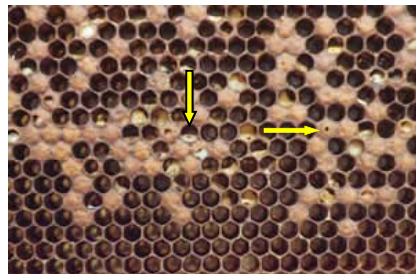
2. reproductive phase – in sealed drone or worker brood cells





- Larvae are dull white (not glistening)
- Prepupae die after cell has been capped
- If you try to pull out larvae, it will be chunky, not ropey

Varroa Mite Damage



Viruses: Nothing you can do but control varroa mite population



Deformed
Wing Virus



Israeli Acute
Paralysis Virus

Nosema



- Spore-forming fungal disease
- Infected **adult** workers defecate close to hive rather than out in the field
- Can resemble CCD
- Only treat with fumigillan if you know you have nosema spores

Nosema

- Caused by a Microsporidia.
- Effects the midgut of bees.
- Has a detrimental effect on the hypopharyngeal glands in infected bees, therefore decreasing their ability to produce brood food.
- Heavy infections correlated with dysentery.

Nosema symptoms you can see without a microscope

- 1. Bees wandering on ground outside colony (not a true and only indicator)
- 2. Exhibit k-wing (forewing and hindwing become unhooked)
- 3. Fecal stain on the front of the colony
- 4. Slow spring build-up
- Send samples of 30 adult bees in alcohol to Dr. Tom Webster for analysis

Colony Collapse Disorder



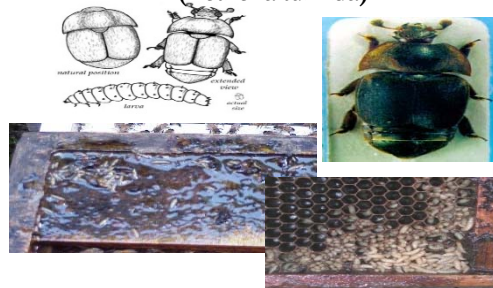
Photos courtesy of Maryann Frazier

Colony Collapse Disorder

- A colony has a laying queen, good brood pattern
- There is no nurse bee population
- There are no dead bees either inside or outside the hive
- Other pathogens and pests are not taking advantage of the exposed brood
- Hasn't been a case in the U.S. since 2013

Small Hive Beetle

(Aethena tumida)



SHB Life Cycle

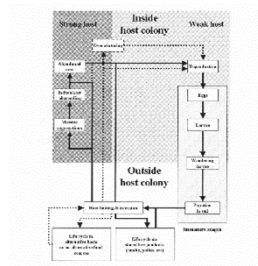


Figure 1. Flowchart of the life cycle of the termite host colony. Solid lines = castes in vector; dashed lines are 40224204 - castes of *Eciton burchardi* (termites) only.

Small Hive Beetle

- Female hive beetles lay when temps are high
- Use table salt around and under the hive
- Move the hive to a new area
- Scour the top layer of earth to expose the small hive beetle pupae to UV light
- Insert small hive beetle traps inside the hive
- Use Swiffer dust sheets or non-woven shop towels as beetle control
- Use coumaphos (CheckMite) as last resort

Small Hive Beetle symptoms

- Fermentation of honey
- Once larvae finish feeding (7-14 days), they tunnel into ground and pupate
- Stays in ground 21 days, depending on temperature
- Mid-late summer peaks
- If you see beetle larvae in your frames, it may be too late.

SHB Feeding

Laboratory

- SHB reproduces on a variety of fruits
- SHB like bananas (component of alarm pheromone)
 - * SHB prefers bee brood

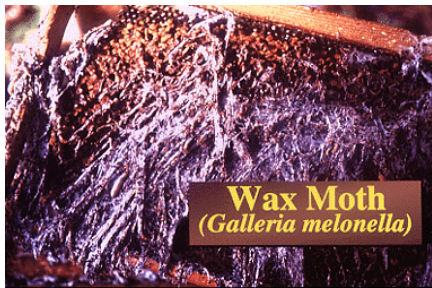
Field

- SHB does not use other sources when bees present
- Have appeasement substance (yeast) so bees accept them
- Defensive posturing = "turtling"
- Rogatory behavior = bees feed them



SHB Controls—interior traps, salt around the hives, or a “graveyard”





Symptoms

- Moths enter in hive at night and lay eggs on unprotected beeswax
- These eggs hatch into caterpillar or larvae
- Larvae damage beeswax as they feed on cocoons, cast-off skins, and pollen
- Always “present” threat unless temperatures are under 40 degrees.
- Use Paramoth to control when storing drawn foundation; put honey in freezers



Within cocoon,
the larvae turns
into pupae, can
overwinter





CV Sample	Sample Size	# miles found	Miles per 100 bases	Mile Levels Exceed Threshold	Resonance Present	Resonance Exceeds Threshold	SBPV Present	ABPV Present	SBPV Present	OWPV Present	LIV 2 Present	CBPV Present	OVV
CV-03-2016	1230	5	0.41	-	-	-	-	Yes	Yes	Yes	Yes	-	-
CV-03-2016	2270	28	1.23	-	Yes	-	-	Yes	-	Yes	Yes	-	Yes
CV-03-2016	1008	20	1.98	-	-	-	-	-	-	-	-	-	-
CV-04-2016	1035	4	0.39	-	-	-	-	-	-	-	-	-	-
CV-05-2016	1140	37	3.25	-	-	-	-	-	-	Yes	-	-	Yes
CV-05-2016	1451	65	4.50	Yes	-	-	-	-	-	Yes	-	-	-
CV-07-2015	1232	48	3.90	Yes	Yes	-	-	Yes	-	Yes	Yes	-	-
CV-08-2016	1071	63	5.86	Yes	Yes	-	-	Yes	-	Yes	-	-	-
CV-09-2016	1143	124	10.85	Yes	-	-	-	Yes	-	Yes	-	-	Yes
CV-10-2016	1081	81	7.49	Yes	-	-	-	Yes	-	Yes	-	-	-
CV-11-2016	1100	27	2.47	Yes	-	-	-	-	-	Yes	-	-	Yes
CV-12-2016	1099	37	3.38	Yes	-	-	-	Yes	-	Yes	Yes	-	-
CV-13-2016	1038	1	0.08	-	-	-	-	-	-	Yes	Yes	-	-
CV-14-2016	1075	7	0.65	-	-	-	-	-	-	Yes	Yes	-	-
CV-15-2016	1133	0	0.00	-	Yes	-	-	-	-	Yes	Yes	Yes	-
CV-16-2016	963	49	5.10	Yes	-	-	-	-	-	Yes	Yes	-	-
CV-17-2016	1161	10	0.86	-	-	-	-	-	-	Yes	Yes	-	-
CV-18-2016	999	9	0.90	-	-	-	-	-	-	Yes	Yes	-	-
CV-19-2016	935	13	1.40	-	-	-	-	-	-	Yes	Yes	-	-
CV-20-2016	1115	31	2.77	-	-	-	-	Yes	-	Yes	-	-	-
CV-31-2016	1060	18	1.70	-	Yes	-	-	-	-	Yes	Yes	-	-
CV-22-2016	822	8	0.97	-	-	-	-	-	Yes	Yes	Yes	-	Yes
CV-23-2016	837	6	0.72	-	-	-	-	-	-	-	Yes	-	-
CV-34-2016	879	11	1.25	-	-	-	-	-	-	Yes	-	-	-
Total:	28	7	5	0	0	0	8	4	20	13	2	4	
Percent:	25%	6%	2.2%	0%	0%	0%	29%	14%	71%	46%	8%	17%	
Notes:	High Resonance	High Mileage	High Resonance	High Resonance	SBPV Present	ABPV Present	SBPV Present	OWPV Present	LIV 2 Present	CBPV Present	OVV Present		
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Honey Bee Health Coalition

- Tools for Varroa Mite Management
- 12 Videos showing sampling, treating for mites, available on the KY State Beekeepers Association website
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- www.ksabeekeeping.org

Resources



Dr. Jamie Ellis (University of Florida)
jdellis@ufl.edu

Dr. Tom Webster (KY State University)
Thomas.webster@kysu.edu

Honey Bee Health Coalition Varroa Mite Tools

Thank You!



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<http://www.kyagr.com/statevet/honeybees.htm>