

Fall Dwindle Disease

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Symptoms



- Adult bee population suddenly gone without any accumulation of dead bees
- Small cluster with queen, remaining bees often young
- Brood, pollen, and honey present
- Little evidence of robbing, or wax moth or small hive beetle attack

Case Studies

- Seven beekeepers, managing colonies in 10 states
- Factors **not** in common
 - Antibiotic use
 - Miticide used
 - Source of queens
 - Supplemental feed

Case Studies

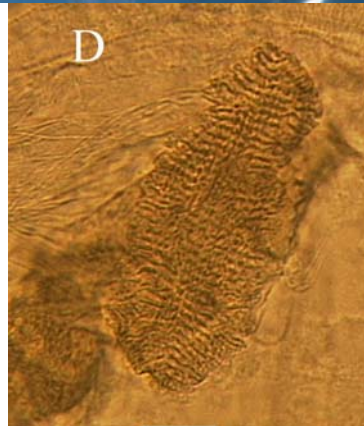
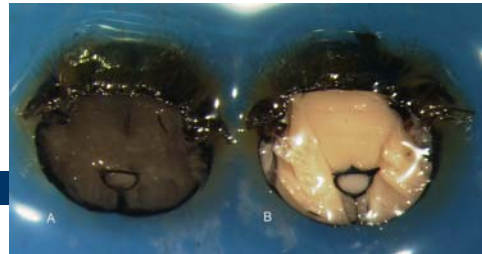
- Factors in common
 - migratory
 - cumulative dead-out rate of >30%
 - continuously “split” to increase numbers
 - experienced “stress” 2 months before die-off

Examination of samples

- Dead out colonies
 - Little known virus or other microbes in honey or bee bread
 - Pesticide analysis (initiated)
- Dwindling colonies
 - Worker bees
 - Digestive track examined
 - HBTM and Varroa load
 - Viruses, fungi, bacteria, and other microbes
 - Queens
 - Viruses, fungi, bacteria, and other microbes

Mite load

- Varroa levels high but may be artificial
- No HBTM
- Sign of virus in thoracic cuts?



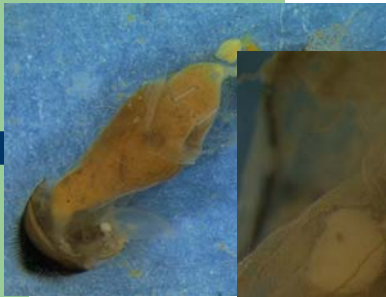
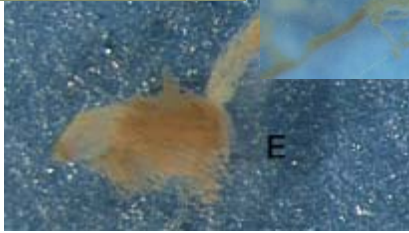
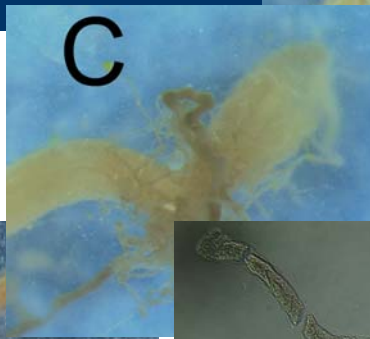
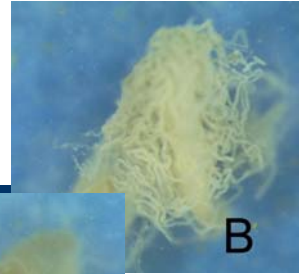
Viral load in adult bees

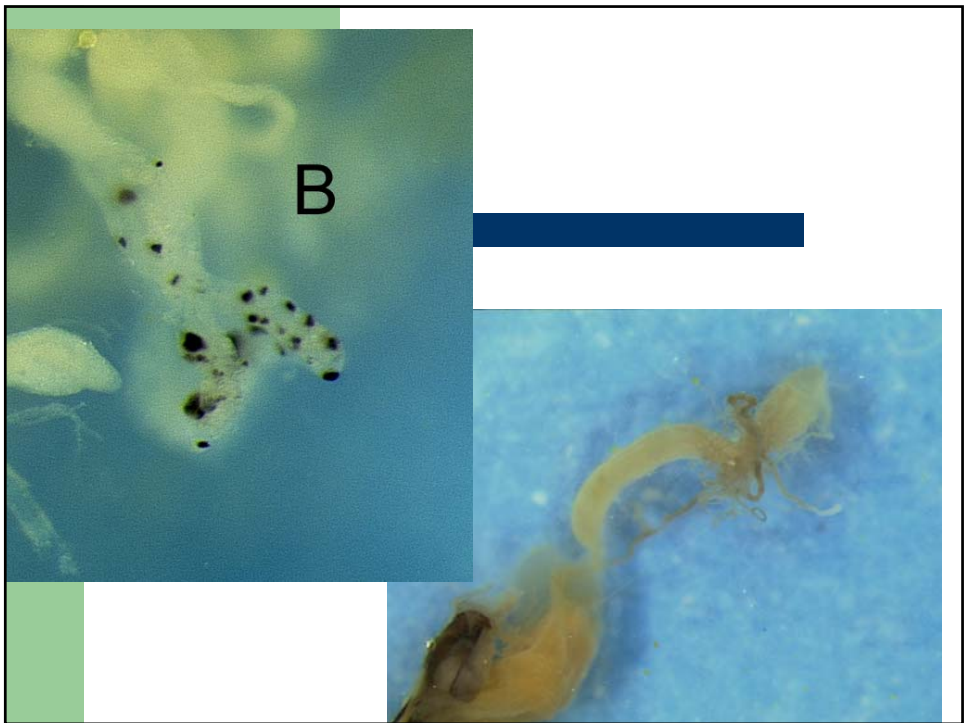
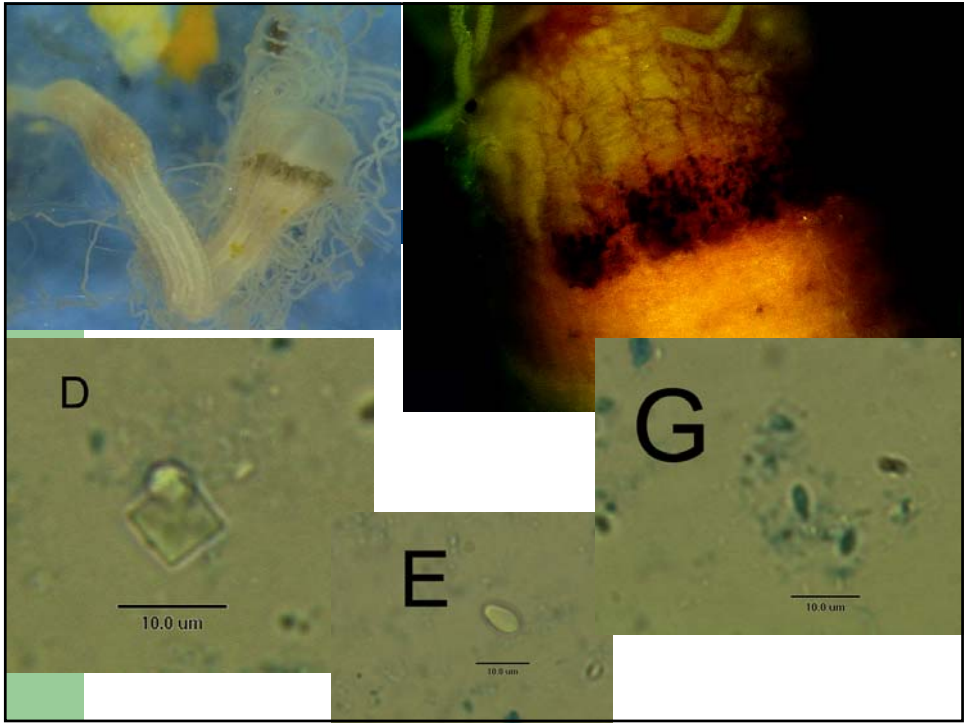
- Abnormally high but not a smoking gun
- In queens
 - 5/5 DWV, 2/5 KBV, 2/5 SBV, 5/5 BQCV
 - 4/5 CB, 1/5 AFB
- In workers
 - 5/5 DWV, 5/5 KBV, 3/5 SBV, 4/5 BQCV
 - 1/5 CB, 1/5 AFB

Examination of digestive tract

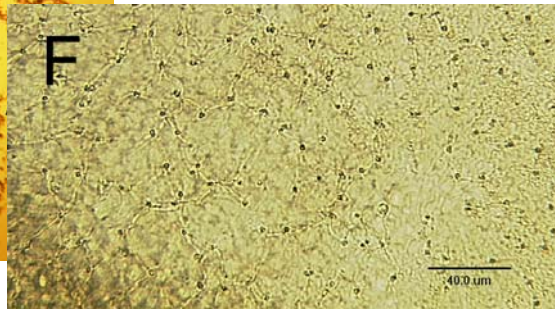


Evidence of "kidney damage"





Evidence of Fungal Conditions



Tentative Hypothesis

- Common denominator is the presence of fungi, likely *Aspergillus* sp. (stonebrood)
- Burnside 1930
 - Caused infected adult bees to fly from hive and die
- THIS IS AN OPPORTUNISTIC FUNGUS LIKELY ABLE TO ESTABLISH BECAUSE OF ANOTHER CONDITION

Previous Reports

- 1896 (Howard)
- 1930 (Burnside)
- 1915 Disappearing Disease
 - Self limiting as disease disappeared
- Other names
 - May disease
 - Spring dwindle
 - Fall dwindle
 - Autumn collapse

Aspergillus sp

- Common in soils
- Can infect other animals including humans
 - Immune compromised individuals susceptible
 - Increase rates of infection are reported in people
 - Produces a toxin
 - Can this explain the lack of wax moth damage and robbing?

Why the sudden outbreak?

- Stress or immune suppressant
- Many possibilities suggested in the past and in the present

Why the sudden outbreak?

- Unlikely causes
 - HBTM
 - None found
 - Food source and type
 - Different food stores, types and applications used
 - Both sugar and protein used/not used
 - Queen source
 - Queens from various states and countries used

Why the sudden outbreak?

- Potential causes under current investigation
 - Chemical contamination
 - Beekeepers reported multitude of chemicals used for varroa control
 - Use of newly available pesticides on crop and ornamental plants
 - neonicotinoids
- Unknown diseases

Why the sudden outbreak?

- Causes identified as requiring further investigation
 - “Stress”
 - Adult bee diseases
 - Pathogen load build up in comb
 - Antibiotic use
 - Genetics
 - Africanized bee
 - Cape bee

Possible Remedies

- Fumagillan
- Irradiation of comb
- Consistent mite control
- Supplemental feeding

Understanding Epidemiology

- Year round sampling
 - Base line information
- Identifying organisms

Developing paths of communication

- To and from beekeepers
- Among researchers
 - Questionnaire
 - MAAREC.org
 - Beesurvey.com or call 406-541-3160