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

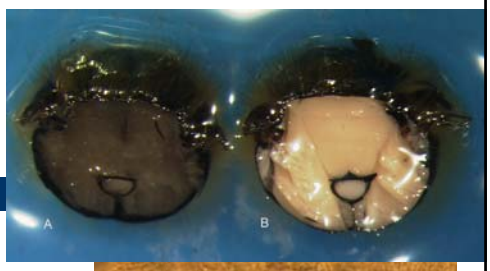
Case Studies

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

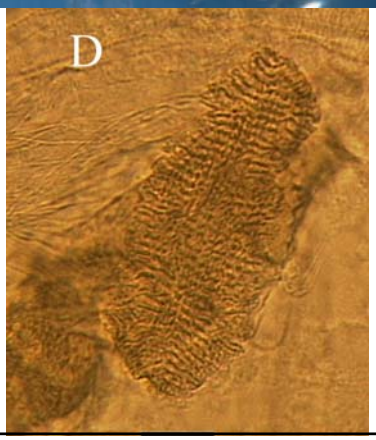
Examination of samples

- 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?

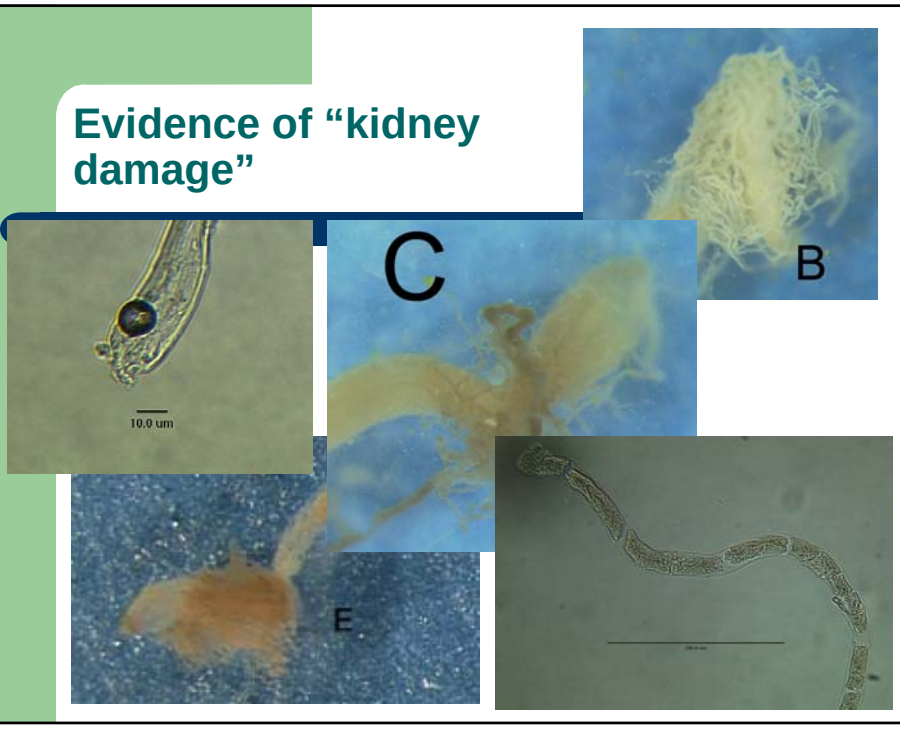


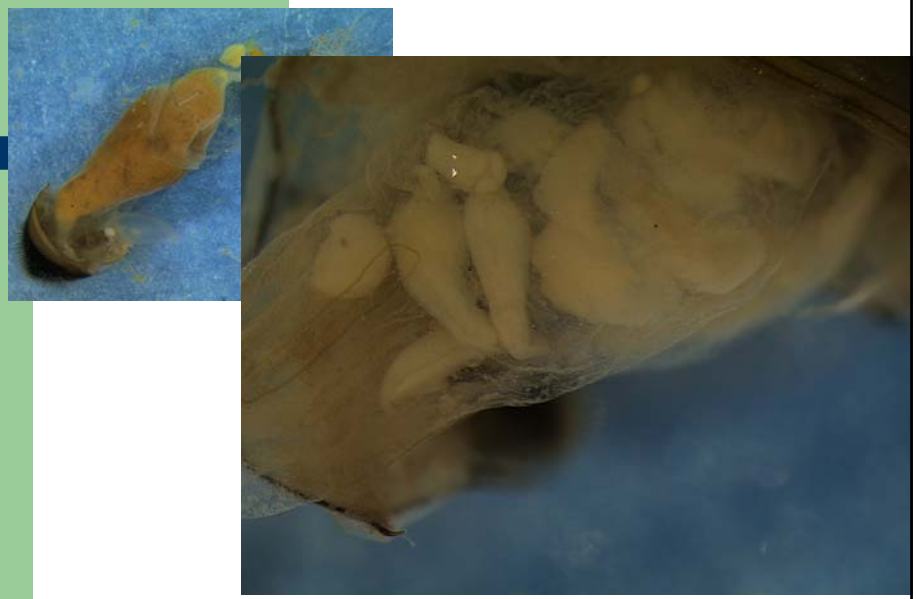
Viral load in adult bees

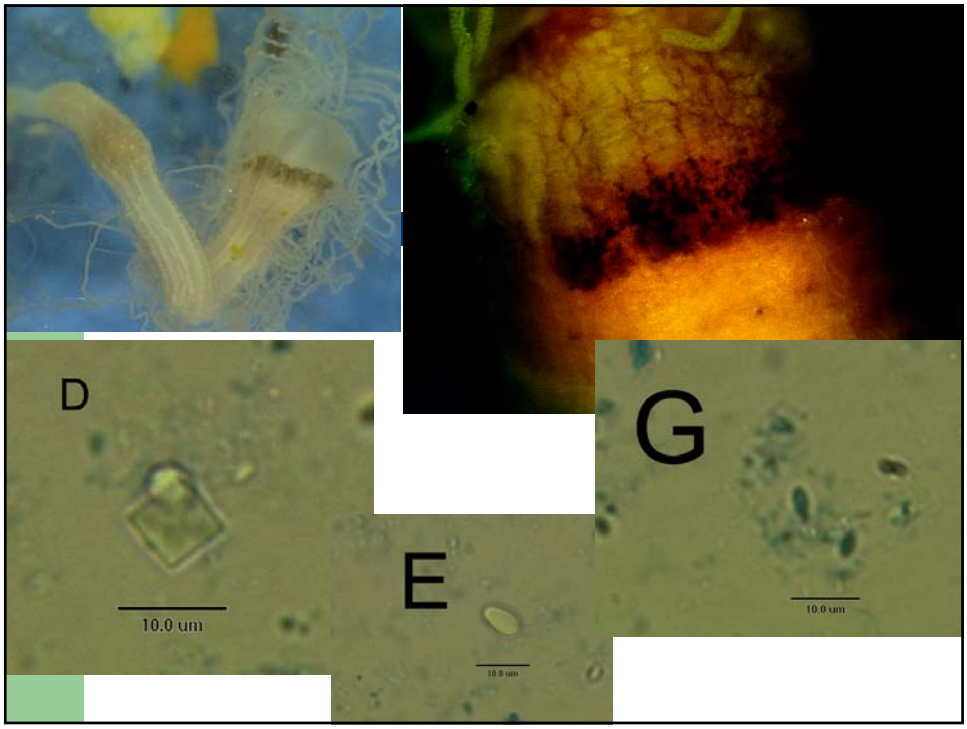
- Abnormally high but not a smoking gun
- In queens
  - 5/5 DWV, 2/5 KBV, 2/5 SBV, 5/5 BQCV
  - 4/5 CB, 1/5 AFB
- In workers
  - 5/5 DWV, 5/5 KBV, 3/5 SBV, 4/5 BQCV
  - 1/5 CB, 1/5 AFB

Examination of digestive tract

Evidence of “kidney damage”



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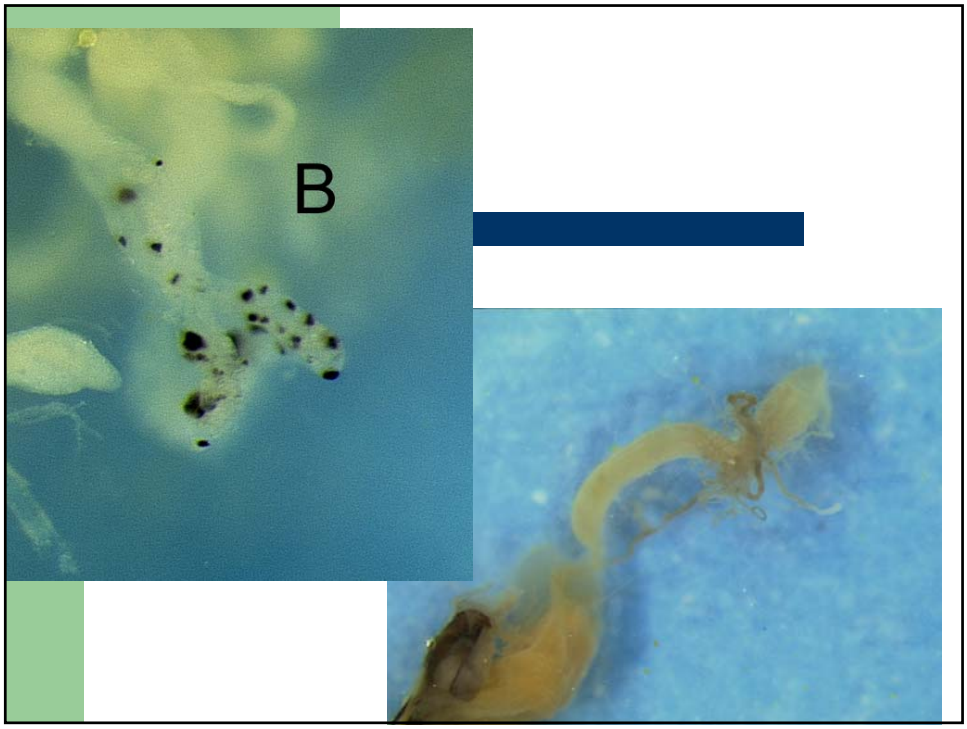
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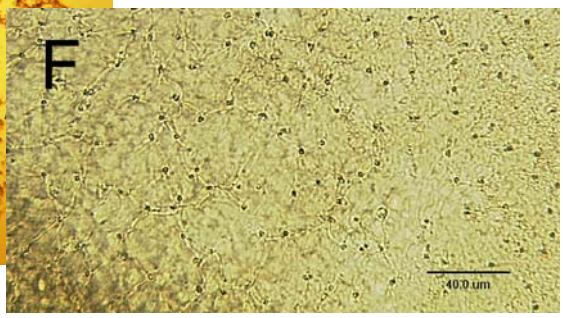
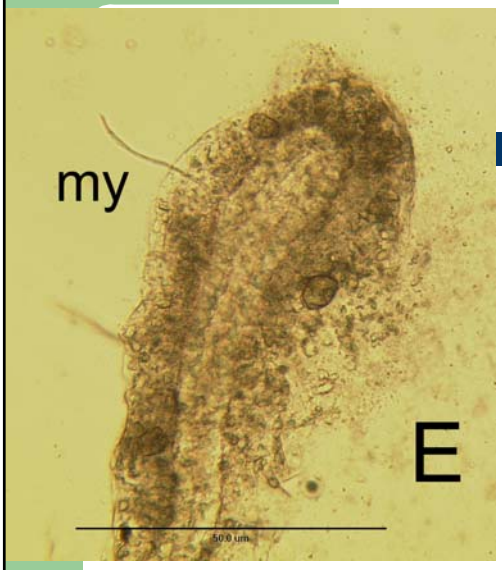
Evidence of Fungal Conditions





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
      - neonicotinioids
- 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