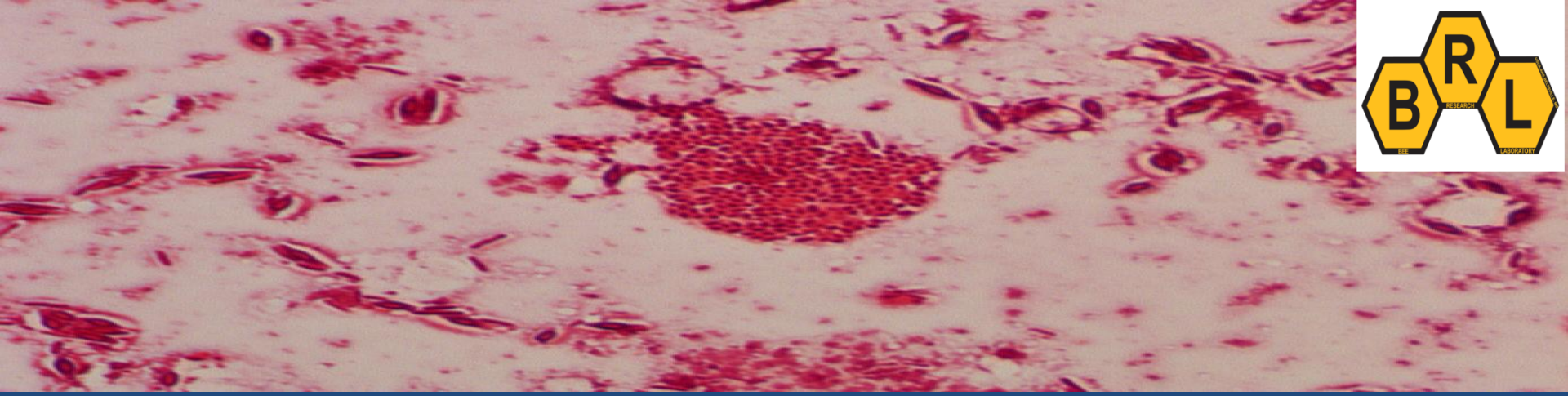

Honey Bee Brood Disease, Detection and Management

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Introduction

- ***Focus my discussion on the major brood diseases***
- ***Diagnosis and treatment options***
- ***Brief discussion of other pests and diseases frequently detected at the lab.***

Diagnostic Service

- ***No charge for this service***
- ***Receives 2,500 plus samples per year***
- ***Samples sent by Beekeepers or apiary inspectors***
- ***3 – 5 days average turnaround time for sample processing***

Diagnostic Service

2702 samples processed in 2016:

- ***1001 (37%) brood samples***
- ***1,688 (62%) bee samples***
- ***13 (1%) other - pollen, honey, beetles, royal jelly, etc.***

Diagnostic Service

Samples from MD in 2016:

- ***93 (3.4%) samples processed***
- ***43 (46%) were comb and smear***
  - ***10 (23%) diagnosed with AFB***
  - ***12 (28%) diagnosed with EFB***

Brood Diseases

- ***American foulbrood***
- ***European foulbrood***
- ***Chalkbrood***
- ***Sacbrood (virus)***

Field Diagnosis of Brood Diseases

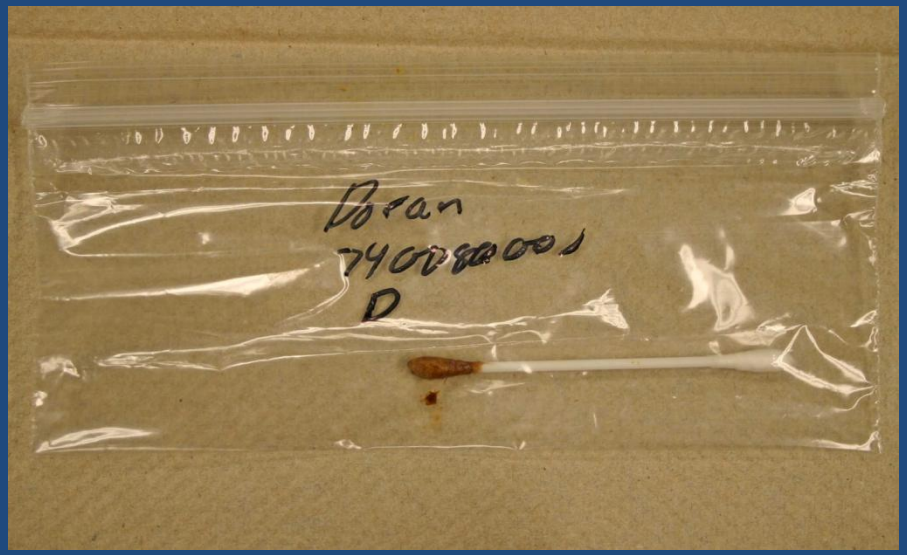
Table 1. Comparative symptoms of various brood diseases of honey bees

Symptom	American foulbrood	European foulbrood	Sacbrood	Chalkbrood
Appearance of brood comb	Sealed brood. Discolored, sunken, or punctured cappings.	Unsealed brood. Some sealed brood in advanced cases with discolored, sunken, or punctured cappings.	Sealed brood. Scattered cells with punctured cappings.	Sealed and unsealed brood.
Age of dead brood	***Usually older sealed larvae or young pupae.****	***Usually young unsealed larvae***; occasionally older sealed larvae. Typically in coiled stage.	Usually older sealed larvae; occasionally young unsealed larvae. Upright in cells.	Usually older larvae. Upright in cells.
Color of dead brood	Dull white, becoming light brown, coffee brown to dark brown, or almost black.	Dull white, becoming yellowish white to brown, dark brown, or almost black.	Grayish or straw-colored, becoming brown, grayish black, or black. Head end darker.	***Chalk white.*** Sometimes mottledwith black spots.
Consistency of dead brood	***Soft, becoming sticky to ropy.***	Watery; rarely sticky or ropy. ***Granular.***	***Watery and granular; tough skin forms a sac.***	Watery to pastelike.
Odor of dead brood	Slight to pronounced odor.	Slightly sour to penetratingly sour.	None to slightly sour.	Slight, non-objectionable.
Scale characteristics	Uniformly lies flat on lower side of cell. Adheres tightly to cell wall. ***Fine, threadlike tongue of dead pupae maybe present.*** Head lies flat. Brittle. Black.	Usually twisted in cell. Does not adhere tightly to cell wall. Rubbery. Black.	Head prominently curled toward center of cell. Does not adhere tightly to cell wall. Rough texture. Brittle. Black.	***Does not adhere to cell wall.*** Brittle. Chalky white, mottled, or even black.

* Bold italics indicate the most useful field characteristics.

Sampling Diseased Colony

smear



Comb

- *Probe or comb piece cut out around brood chamber area*
- *No honey should be present in sample*
- *Loosely wrapped sample in paper, not plastic or foil wrap*

American Foulbrood

Caused by Paenibacillus larvae

- ***Spore forming bacterium (2.5B/scale)***
- ***Highly contagious***
- ***Usually kills colony***
- ***123 (12%) samples diagnosed in 2016***

American Foulbrood

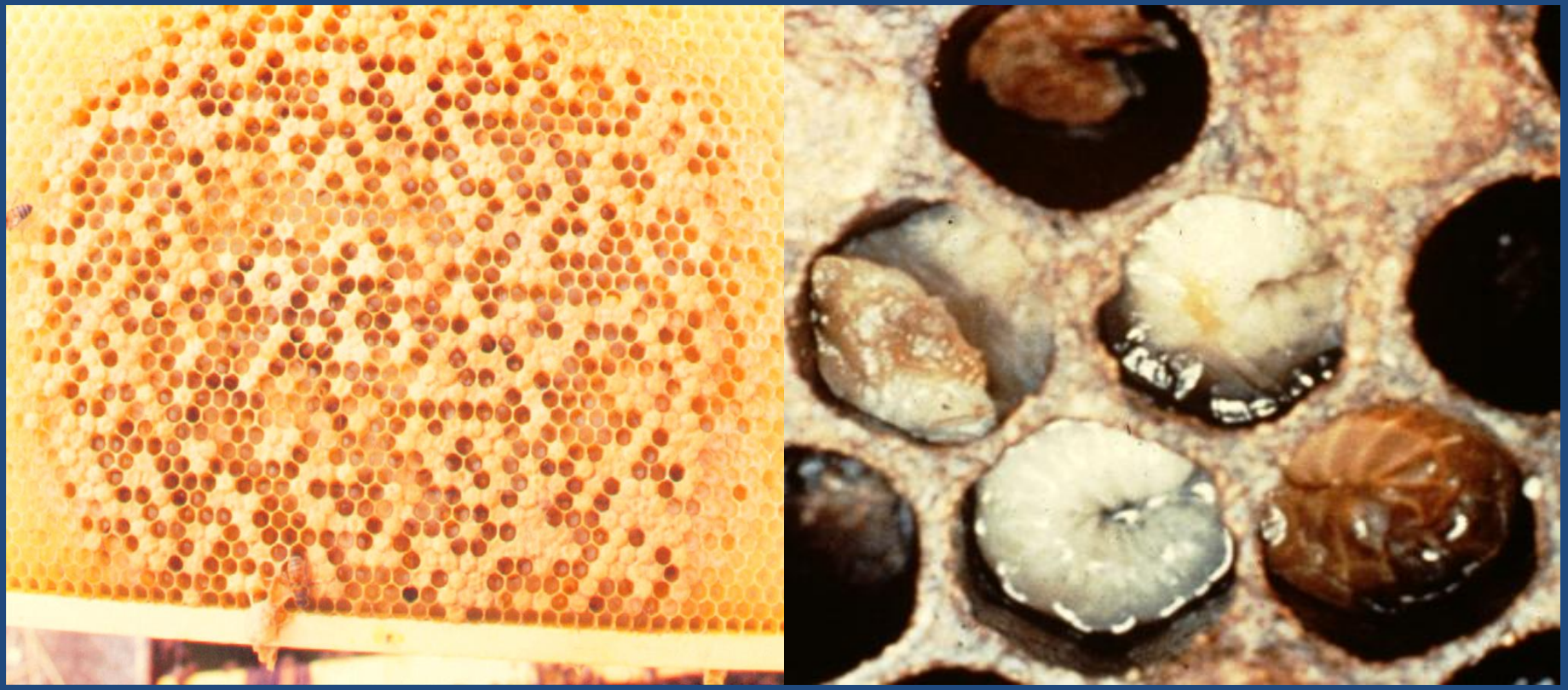
Brood with comb AFB

European Foulbrood

Caused by Melissococcus plutonius

- ***Non spore forming bacterium***
- ***Stress Disease***
- ***Normally does not kill colony***
- ***Associative organisms present***
- ***245 (24%) samples diagnosed in 2016***

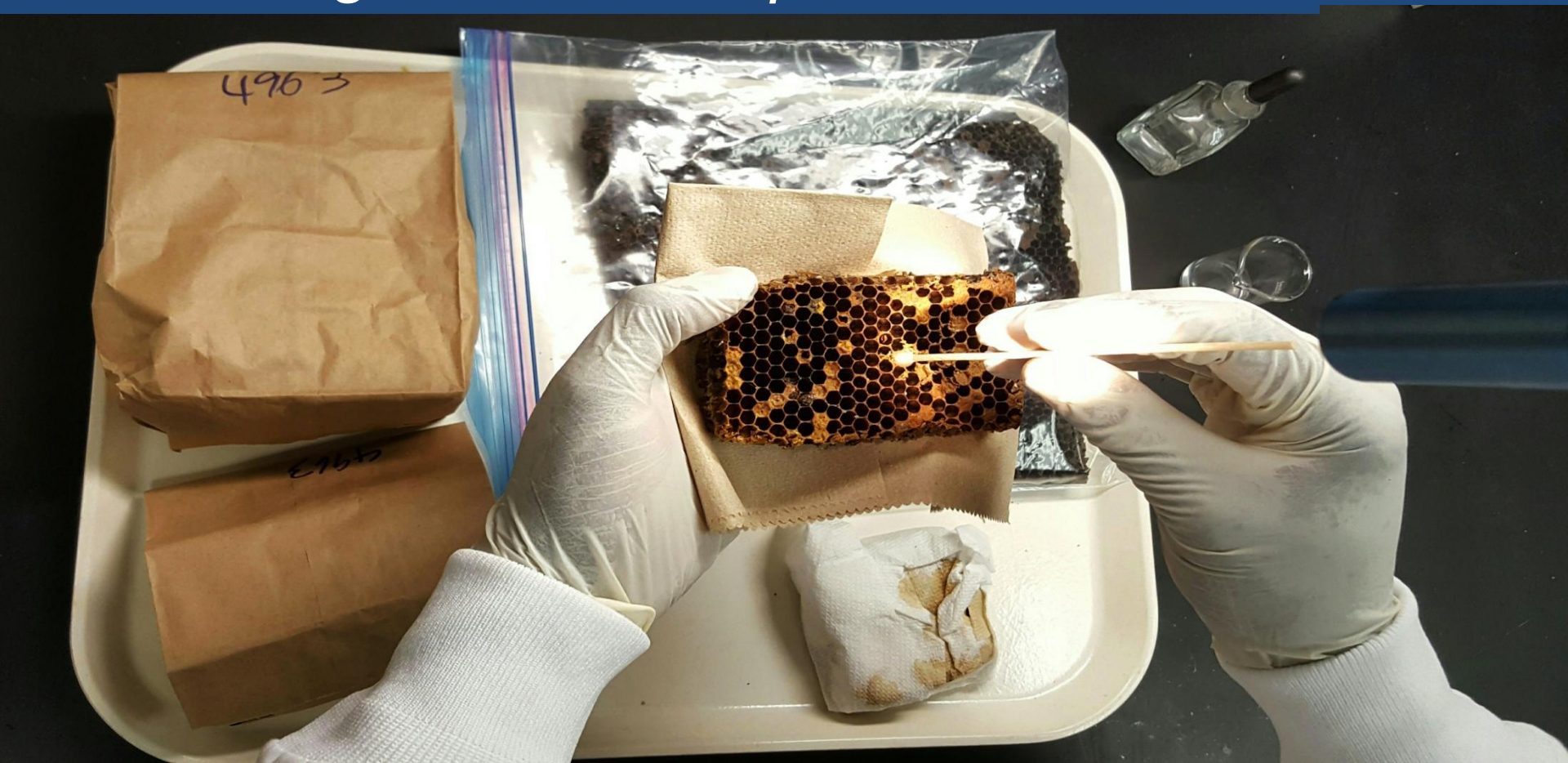
European Foulbrood



Brood comb with EFB

Diagnosing Foulbrood Under the Microscope

- *Examining a comb sample for foulbrood*

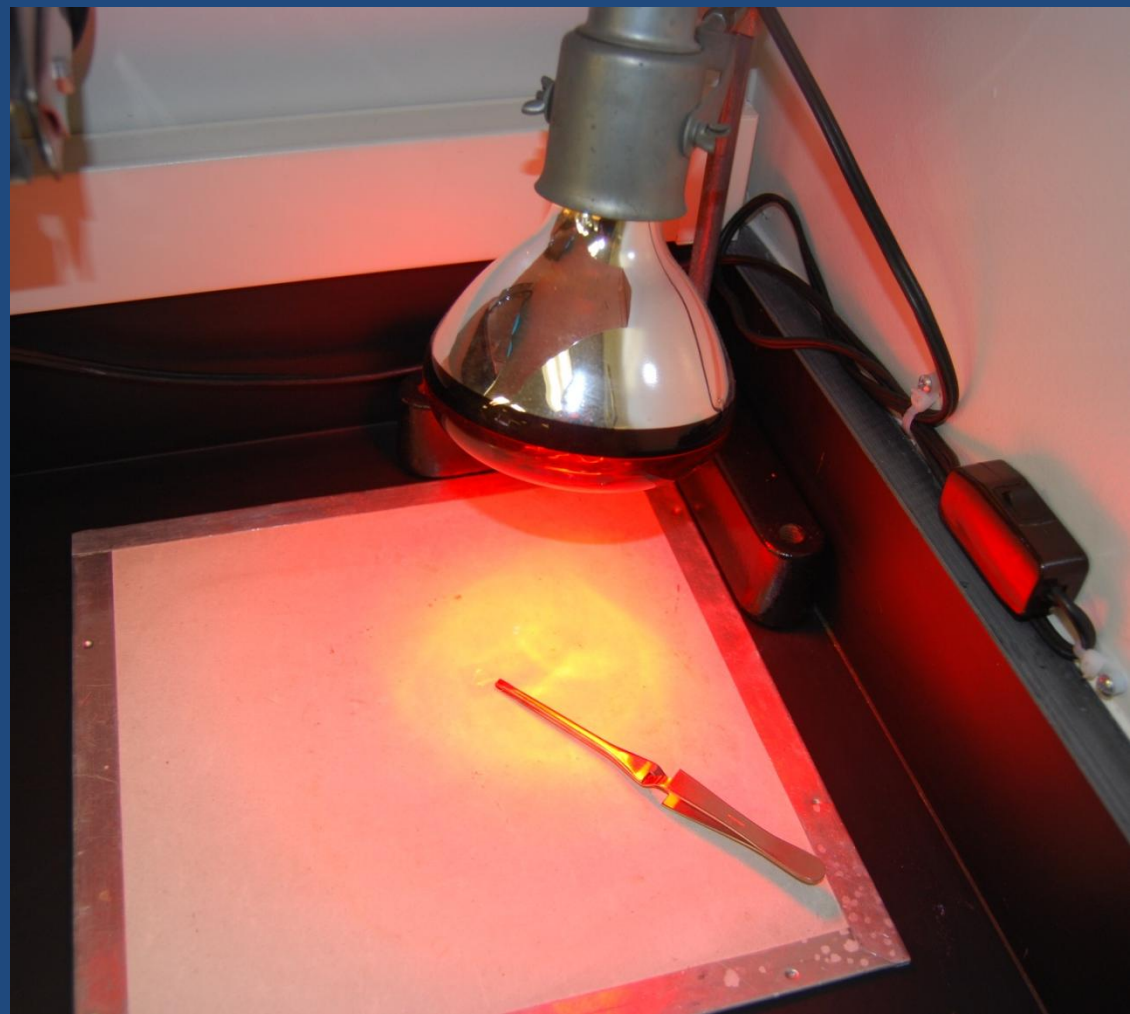


Diagnosis Foulbrood Under the Microscope

- Transfer sample to glass cover slip.

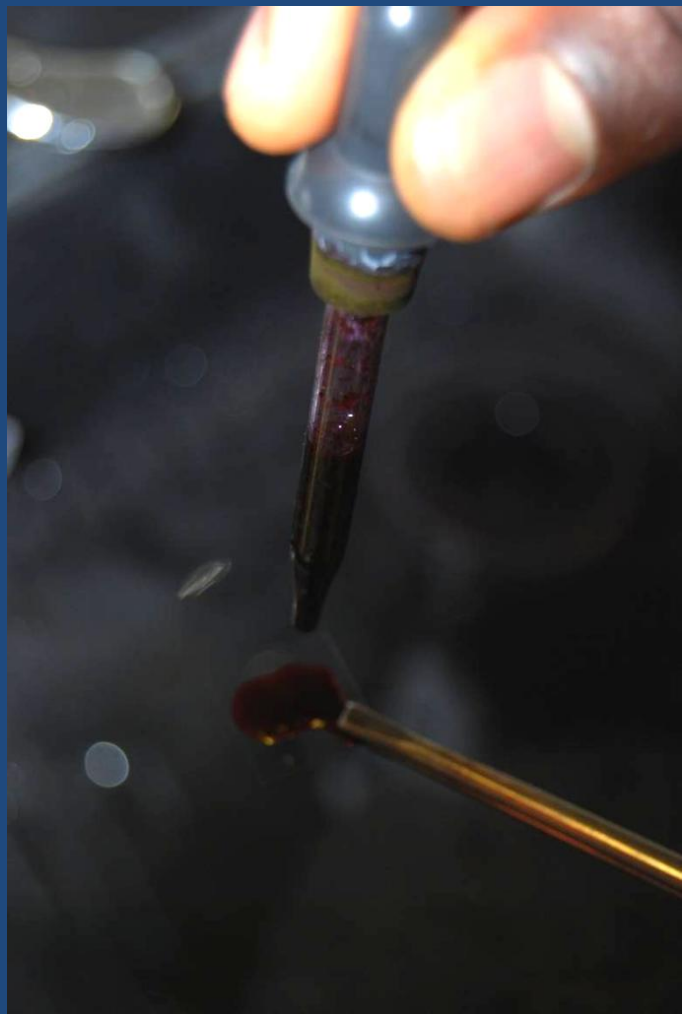
Diagnosing Foulbrood Under the Microscope

- *Place sample under heat lamp to dry. This fixes the sample to the cover slip.*



Diagnosing Foulbrood Under the Microscope

- ***Stain sample with carbol fuchsin for 30 seconds.***

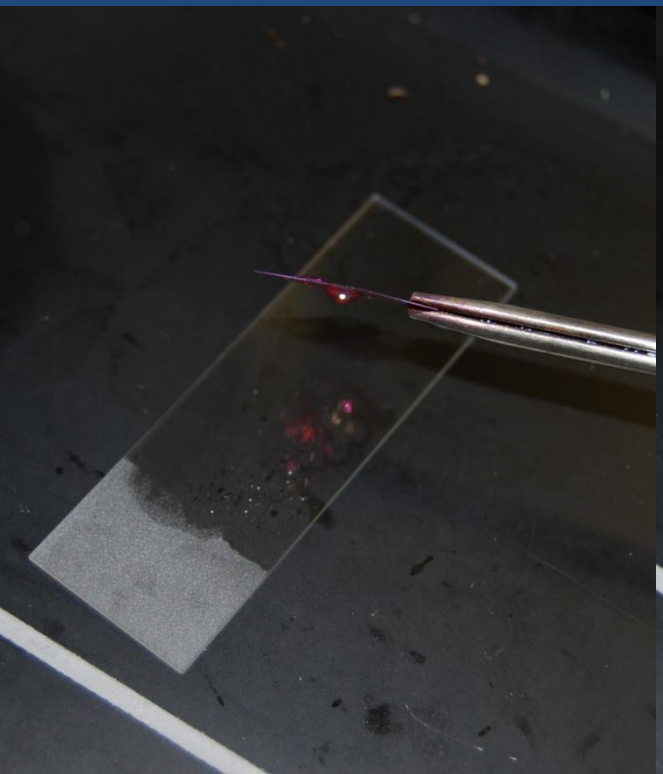


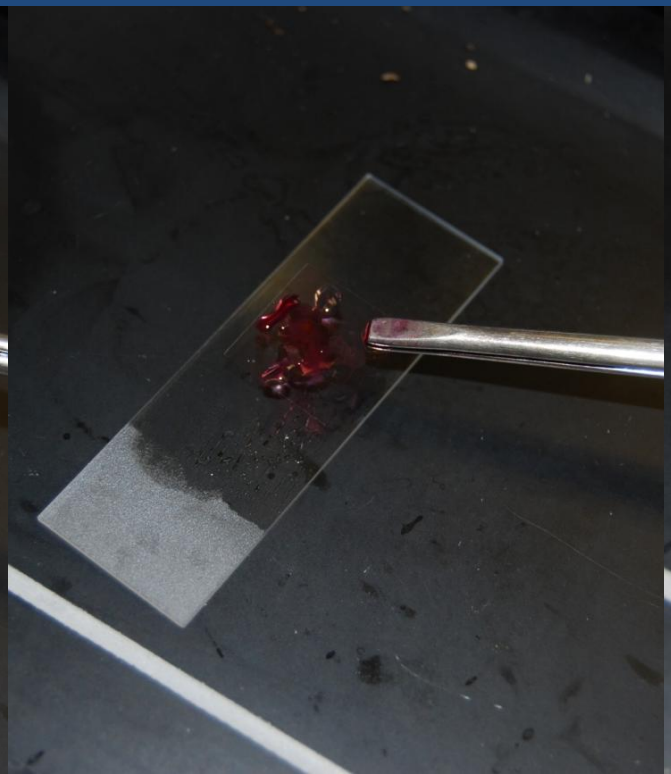
Diagnosing of Foulbrood Under the Microscope

- *Gently wash off excess stain with water.*

Diagnosing Foulbrood Under the Microscope

- Place wet cover glass with sample side down on slide.

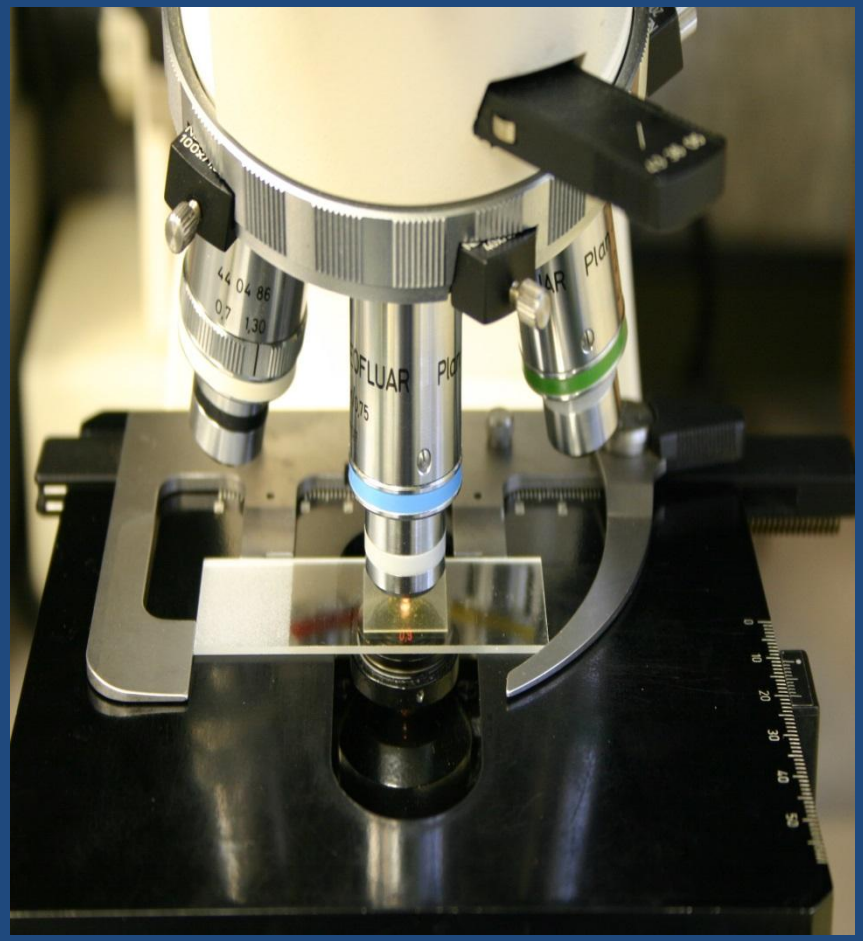


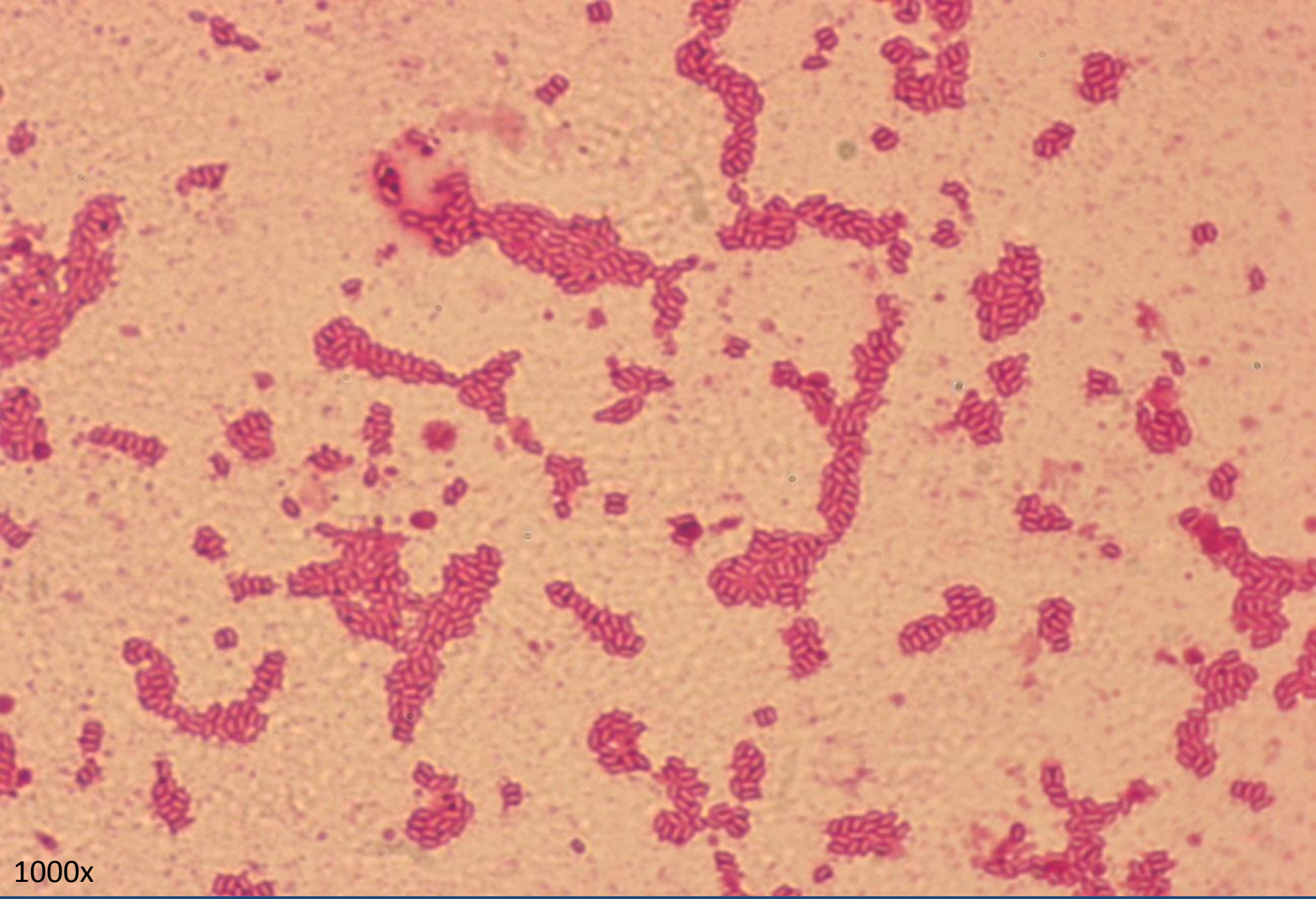


Diagnosing Foulbrood Under the Microscope

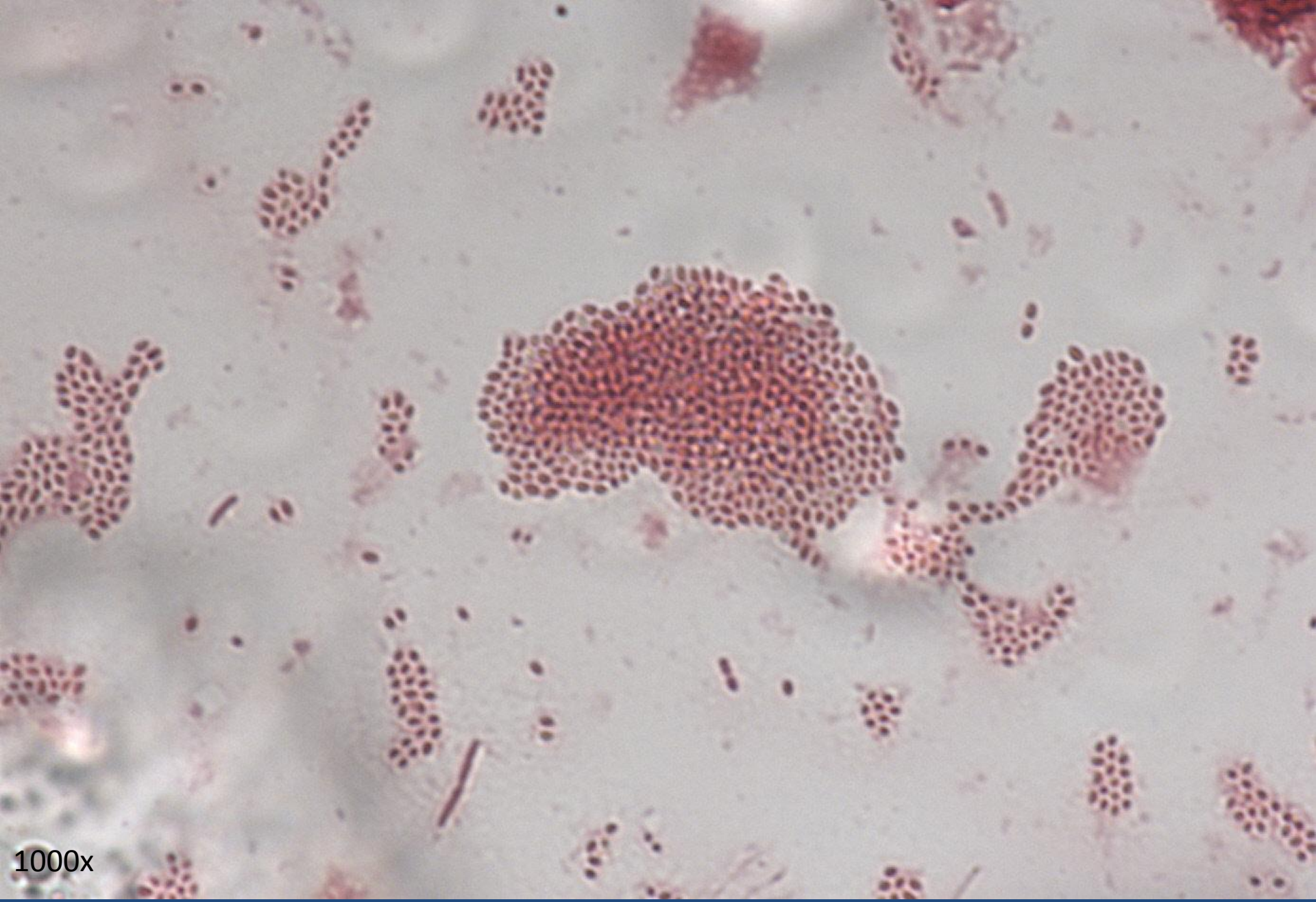
- *Place slide on microscope and view at 1,000X.*
- *P. larvae spores are uniform in shape, oval and twice as long as wide. Moves with Brownian movement*

- *M. plutonius cells are lancet shape, and usually found in singles, pairs or chains. Cells clutters and fixes to slide*





Paenibacillus larvae – causative organism for AFB



Melissococcus plutonius **– Causative organism of EFB**

Diagnosing Foulbrood with Test Kit

ELISA Test kit available for both AFB and EFB

Foulbrood Culturing and Antibiotic Sensitivity Testing

- ***Conducted only for AFB***
- ***Oxytetracycline (OTC) and Tylan***

AFB spore suspensions

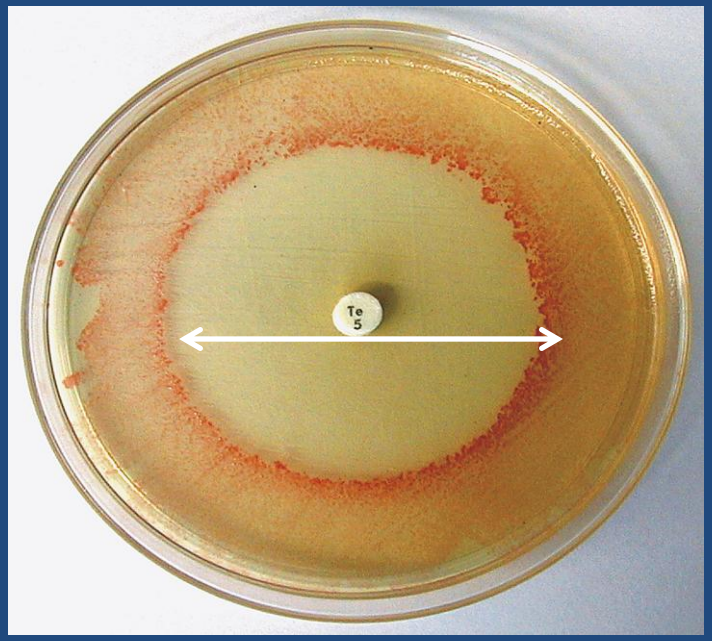
Heat shocked AFB suspensions

Foulbrood Culturing and Antibiotic Sensitivity Testing

- Preparing Petri dishes
- Streaking Petri dish with AFB
- Placing antibiotic disk on Petri dish

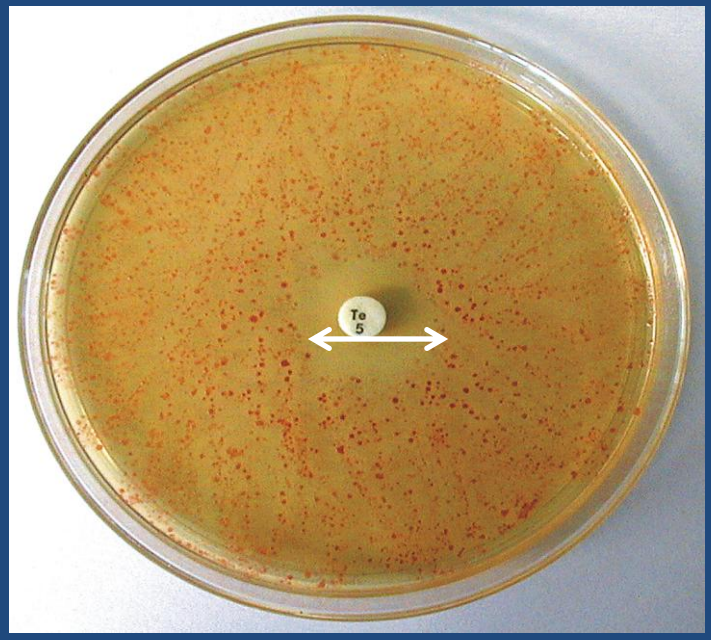
Foulbrood Culturing and Antibiotic Sensitivity Testing

OTC “Susceptible” AFB



52mm inhibition zone

OTC “Resistant” AFB



18mm inhibition zone

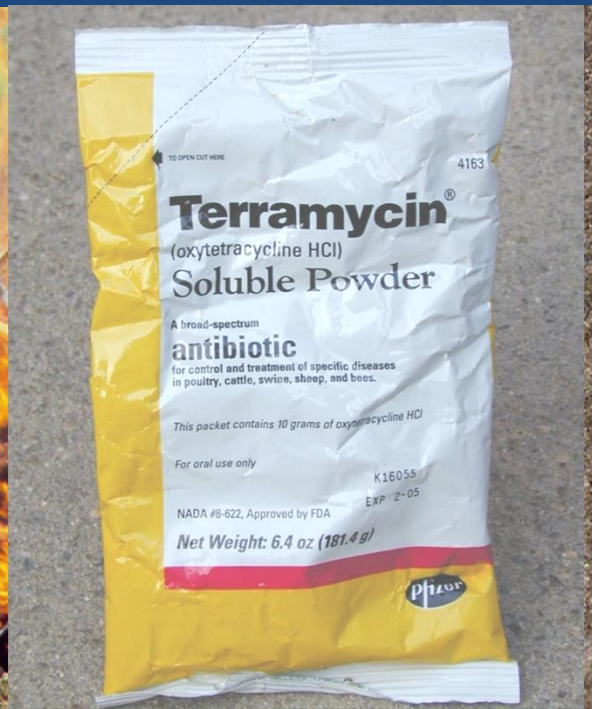
- ***13% resistant and 87% susceptible to OTC in 2016***
- ***No sample resistant to Tylan***

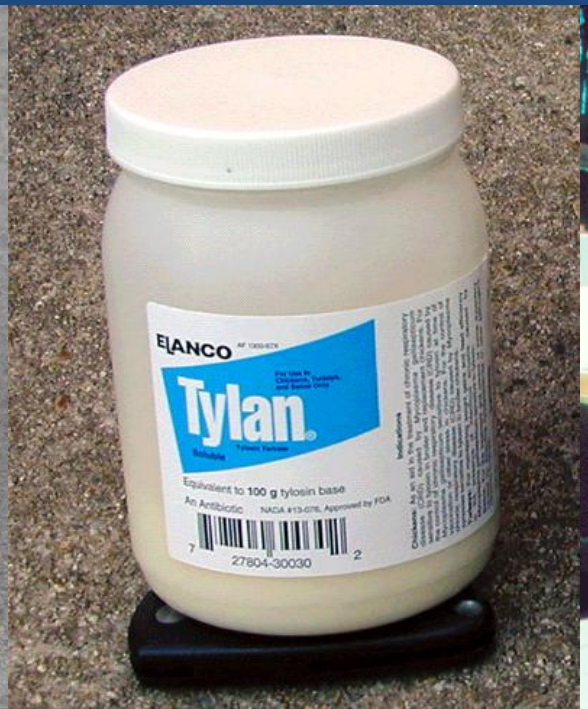
American Foulbrood

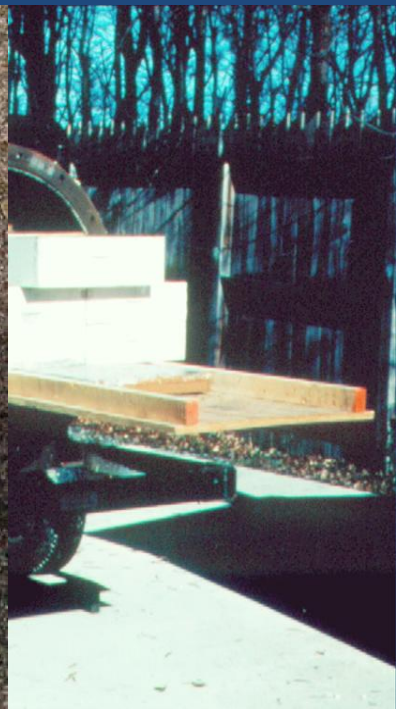
- ***Spread***
  - ***Robbing bees***
  - ***Used beekeeping equipment***
  - ***Transfer of equipment from a diseased colony to a healthy colony***

American Foulbrood

- **Control:**
  - **Burning**
  - **Sterilization**
  - **Drugs?**







European Foulbrood

- ***Controlled by Terramycin***
- ***Follow label directions***
  - ***Treat 3 times at 5 day intervals***
  - ***Do not treat hive 3 weeks before or during honey flow***

Chalkbrood

Ascosphaera apis

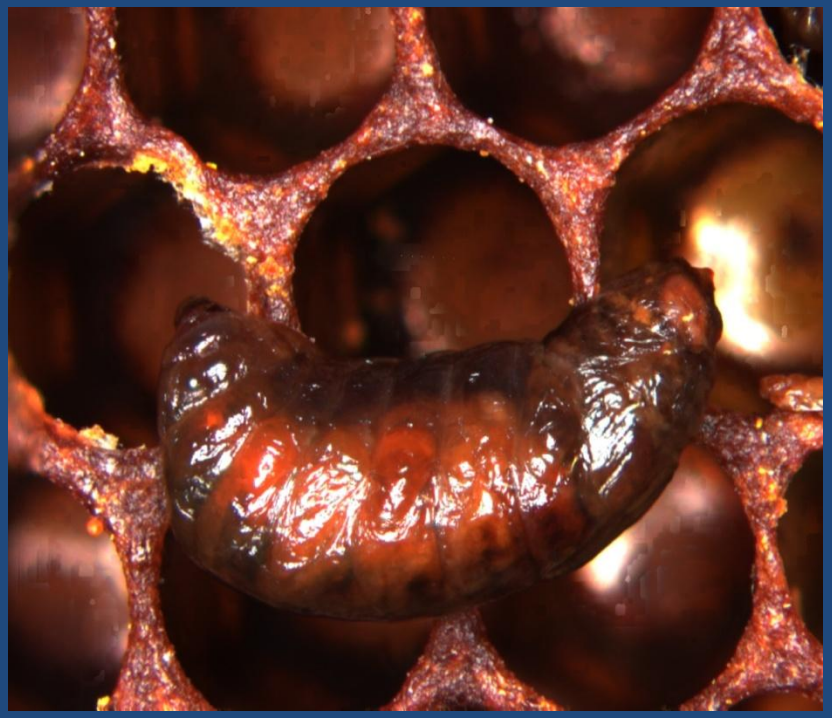
- ***Caused by a fungus***
- ***No medication for treatment***
- ***Requeen colony***

Chalkbrood

Sacbrood

Morator aetalulas

- ***Caused by a virus***
- ***Does not cause severe damage***
- ***Common in spring***

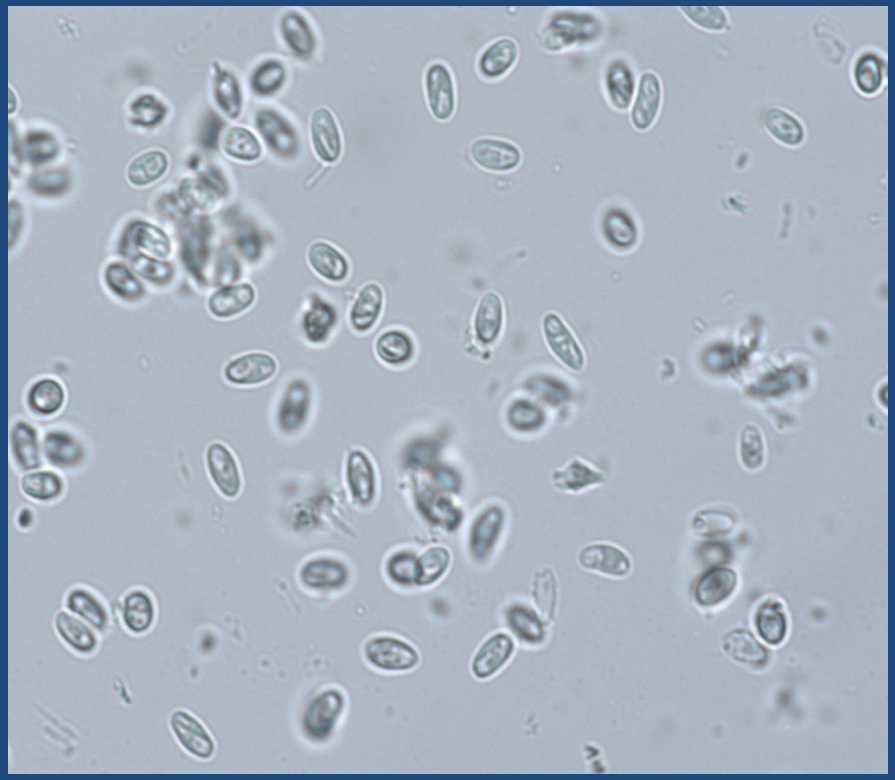


Larva with SBV

Other Pests and Disease

Nosema Disease

- ***A microsporidian (parasitic fungi)***
- ***Infection of digestive tract of adult bees***
- ***Two species:***
  - ***Nosema apis***
  - ***Nosema ceranae***



Nosema sp.

Other Pests and Disease

Varroa Mites

- External parasitic mite
- Present serious threat to colony health
- Activates/transmits viruses

V. destructor

Honey bee tracheal mites

- Internal parasitic mite
- Becoming less of a problem
- Some of the chemical treatments for varroa kill HBTM

A. woodi

BRL Bee Disease Diagnostic Service

- ***We do not conduct…***
  - *Viruses testing*
  - *Pesticide testing (done by USDA-AMS-National Science Lab)*
  - *Race identification (done by USDA Tucson Lab when requested by State or Fed Government)*


Chalkbrood mummy


Varroa Tropilaelaps

Related Topics

- Publications
- ARS Manuscripts
- Search for a publication
- ARS Software

How to Submit Samples

How to Send Brood Samples

- A comb sample should be at least 2 x 2 inches and contain as much of the dead or discolored brood as possible. NO HONEY SHOULD BE PRESENT IN THE SAMPLE.

- The comb can be sent in a paper bag or loosely wrapped in a paper towel, newspaper, etc. and sent in a heavy cardboard box. AVOID wrappings such as plastic, aluminum foil, waxed paper, tin, glass, etc. because they promote decomposition and the growth of mold.

- If a comb cannot be sent, the probe used to examine a diseased larva in the cell may contain enough material for tests. The probe can be wrapped in paper and sent to the laboratory in an envelope.

Send samples to:

Bee Disease Diagnosis
Bee Research Laboratory
10300 Baltimore Blvd
Bldg. 306, Room 317
BARC – East
Beltsville, MD 20705

Summary

- ***Foulbrood is a problem in MD***
- ***Nationwide, seeing some resistant to Oxytetracycline***
- ***AFB is the most destructive of all the brood diseases.***

Questions?