New York State

Bee Wellness Workshops

Professor Christina Wahl, Wells College and Cornell College of Veterinary Medicine
October 26, 2013. This NYS Bee Wellness workshop is sponsored by the *Betterbee* company.

TODAY'S TOPICS:

1. Recognizing and diagnosing *Nosema* spp. (both *apis* and *ceranae*).

2. Recognizing and diagnosing *Acarapis woodii*, the honeybee tracheal mite (HBTM).

3. Tutorial on microscopes and their uses.

Recognizing an infection of HBTM:

1. Populations of bees are dwindling.
2. Weak bees are crawling on ground with K-wings.
3. Hives with plenty of honey stores are abandoned in the spring.
4. Hive bodies are spotted with fecal matter.

Recognizing an infection of *Nosema*:

1. Populations of bees are dwindling.
2. Weak bees are crawling on ground with K-wings.
3. Hives with plenty of honey stores are abandoned in the spring.
4. Hive bodies are spotted with fecal matter.

The outward symptoms of the two honeybee diseases—*Nosema* and HBTM—are ***the same*** at the colony level.

The treatments are ***different.***

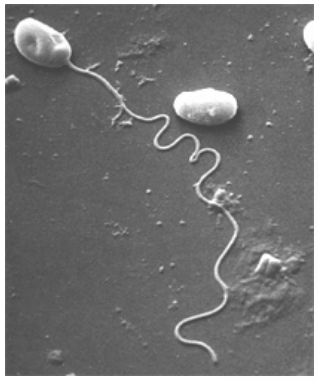
You cannot cure Nosema by treating for HTBM, (or vice versa).

If you want to help your bees heal themselves, you need to identify the problem and know what you are treating.

Some basic biology of these two parasites and their host, the honeybee:

All three are eukaryotes.

Nosema is a "microsporidian", a highly specialized fungus.
HTBM is an arachnid…it has eight legs and two main body segments that are mostly fused.
The honeybee is an insect….it has six legs and three main body segments.



http://comenius.susqu.edu/biol/202/fungi/microsporidia/microsporidia/nosema-lu.jpg

Scanning electron microscopy

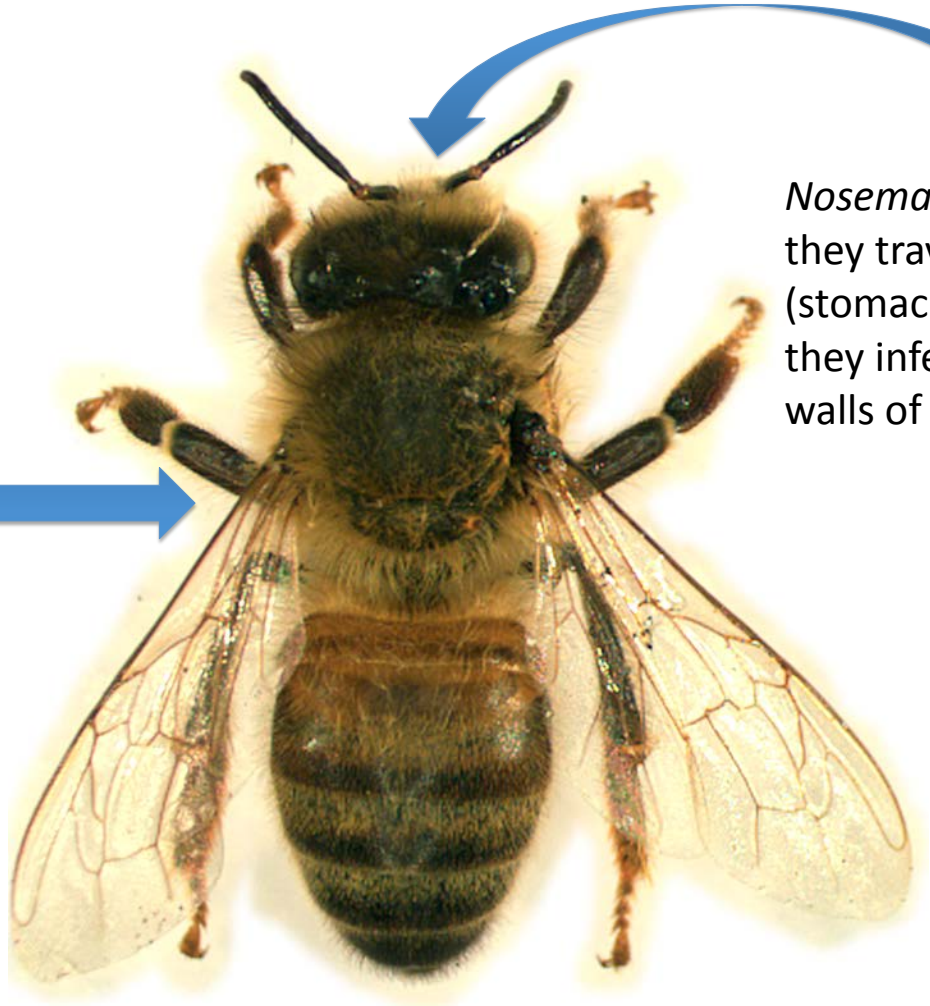
C. Wahl

Compound microscopy

C. Wahl

Dissection microscopy

HTBM enter through the thoracic spiracles of a bee generally less than two weeks old.



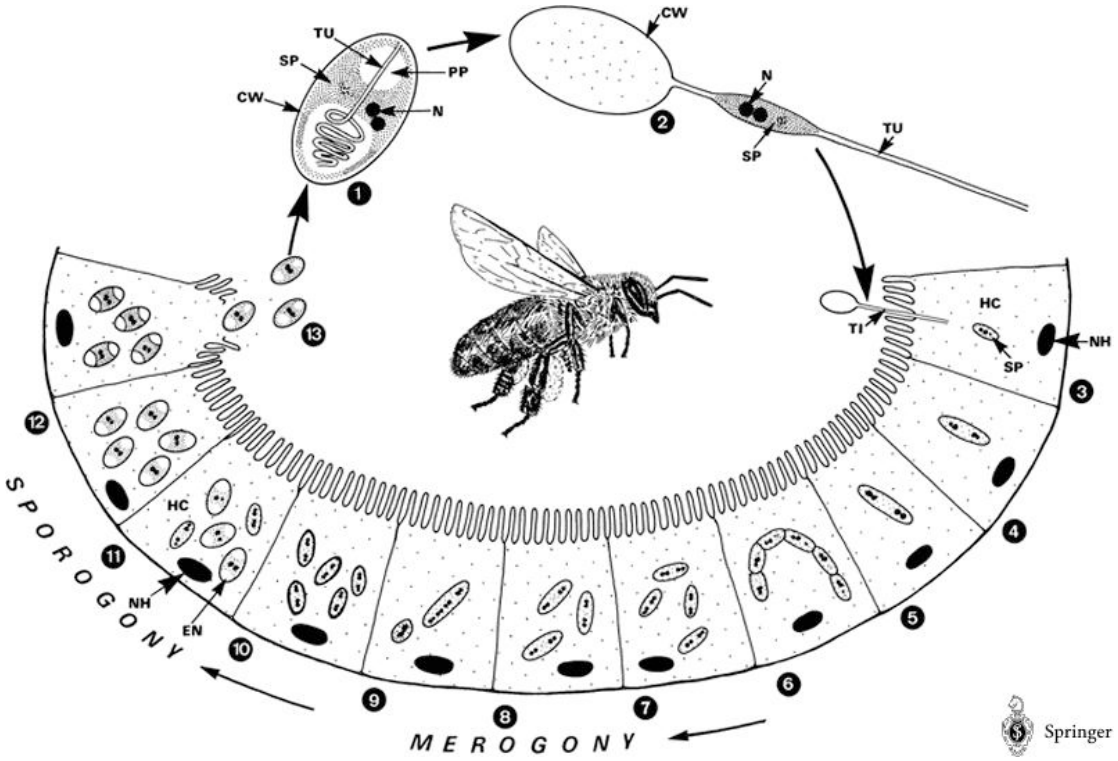
Nosema spores are ingested, they travel into the ventriculus (stomach) of the bee, where they infect the cells lining the walls of the stomach.

Phylum: Microsporidia
Class: Haplophasea
Class: Minisporea
Class: Microsporea
Class: Metchnikovellea
Class: Dihaplophasea

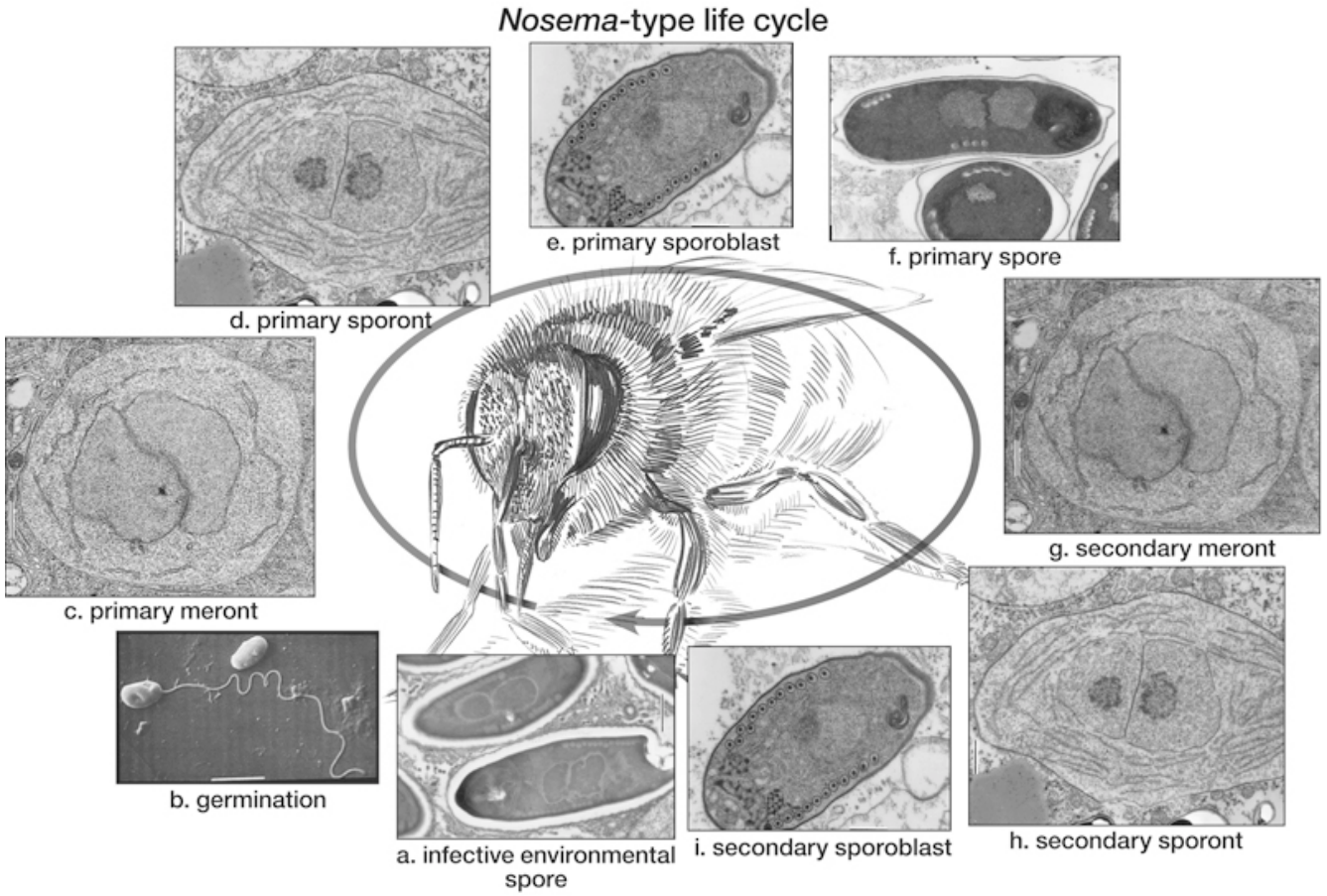
Order: Dissociodihaplophasida

Family: Nosematidae

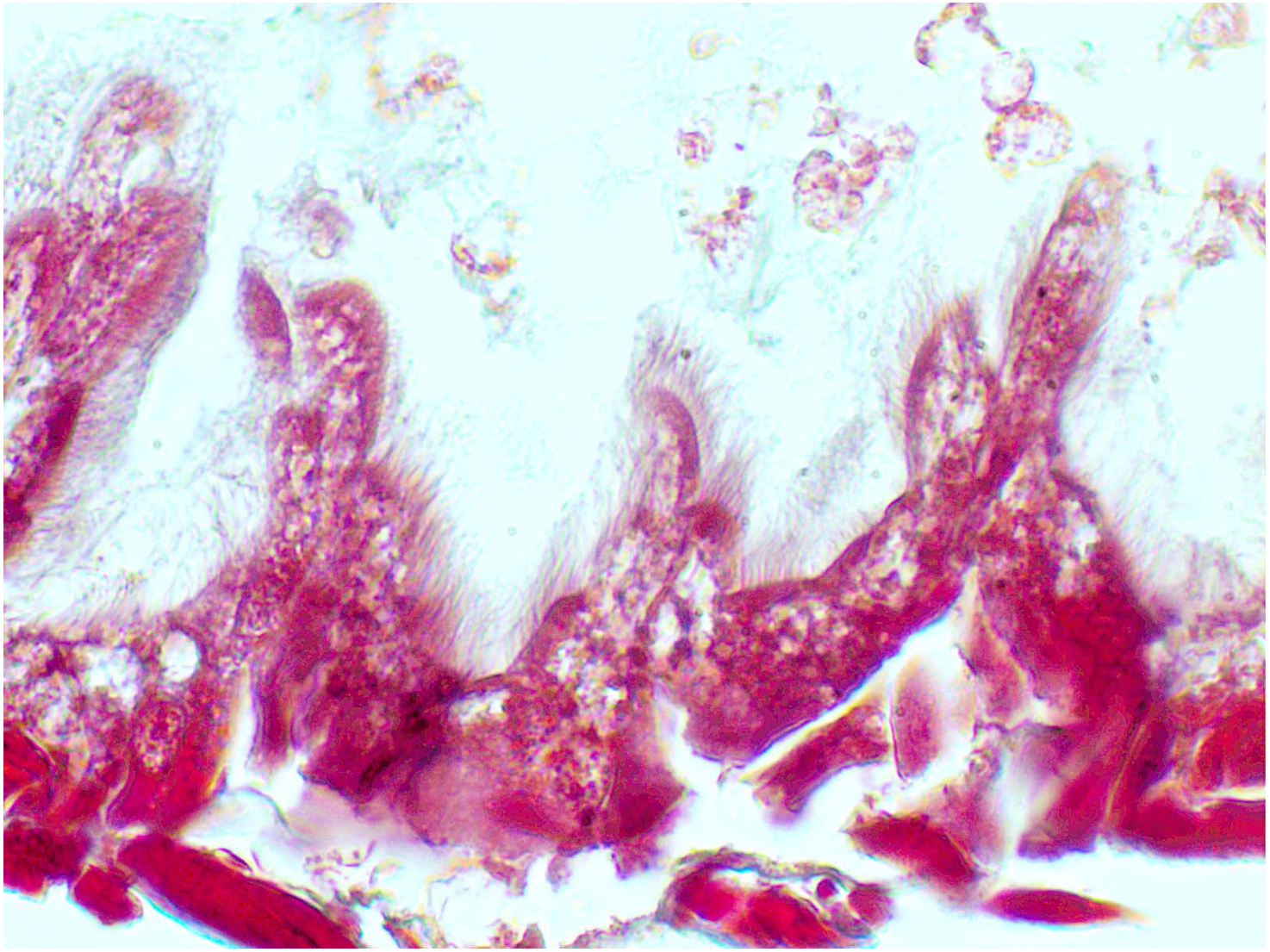
Genus: *Nosema*



A good source: http://www.extension.org/pages/27064/nosema-ceranae-the-inside-story#.Umh3SiTyizY



http://www.extension.org/pages/31234/nosema-microsporidia:-friend-foe-and-intriguing-creatures#.Umh1RiTyizZ Leellen Solter



Cells lining the ventriculus of the honeybee

C. Wahl

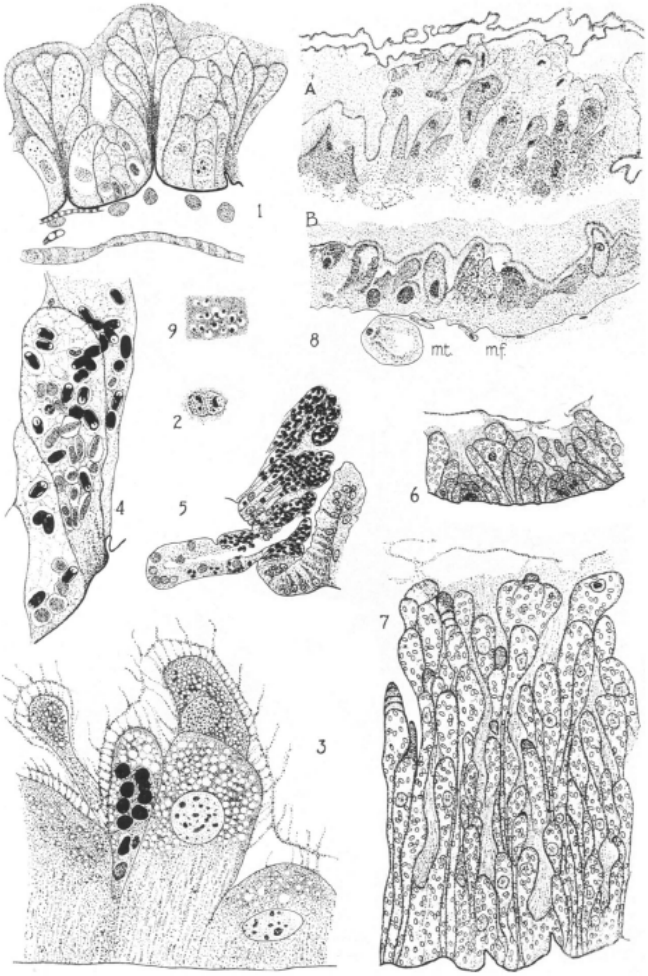
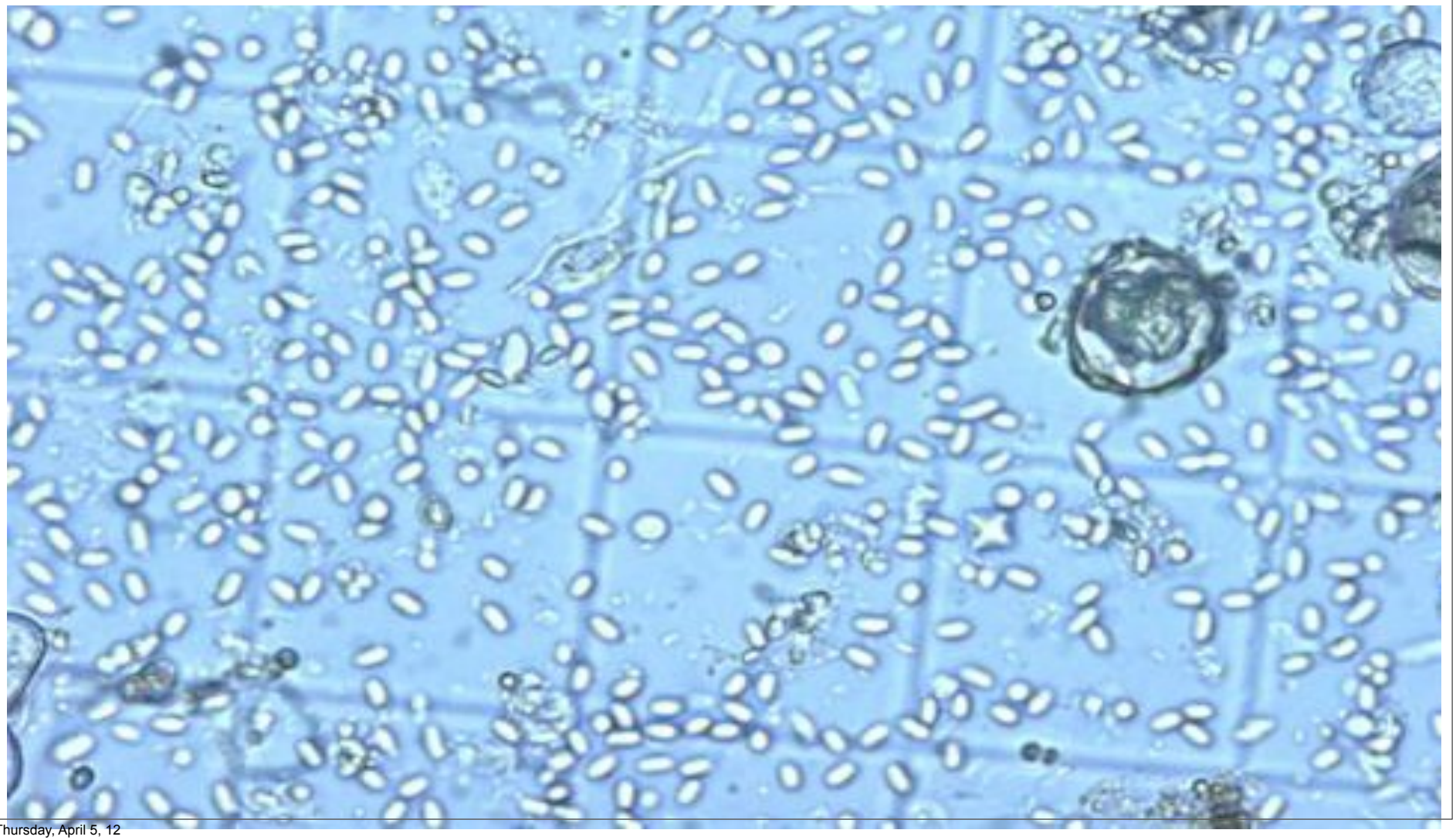


PLATE IX

From Hertig, 1923. The normal and pathological histology of the ventriculus of the honey-bee, with special reference to an infection with *Nosema apis.* The Journal of Parasitology, Vol. 9, No. 3 (Mar., 1923), pp. 109-140

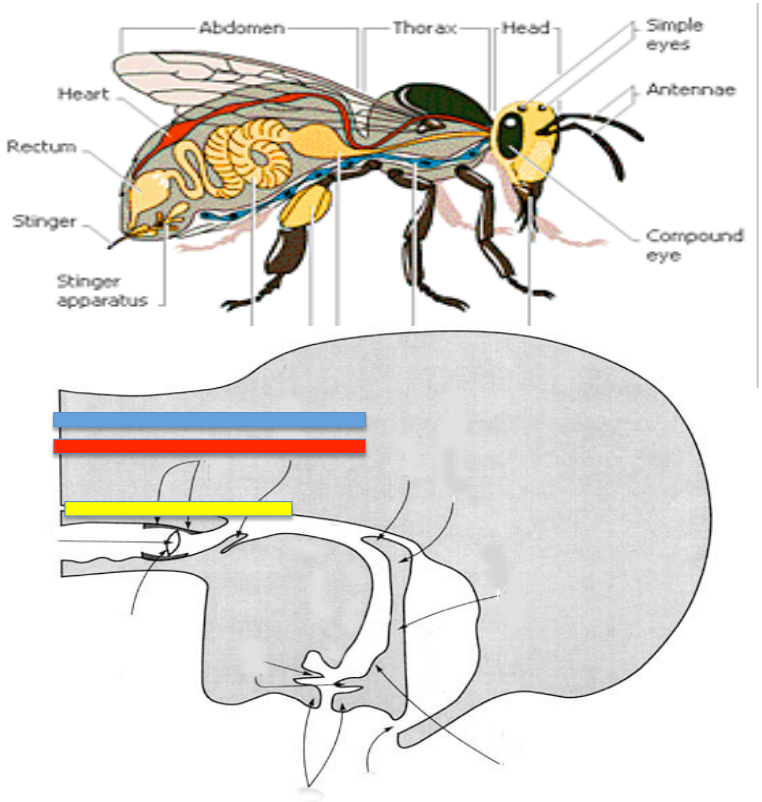


The Honeybee Tracheal Mite

Class Arachnida
Order Acarina
Family Tarsonemidae
Genus *Acarapis*
Species *woodii*

The female mite attaches 5–7 eggs to the tracheal walls, where they hatch and develop in 11–15 days into adult mites

Like all true insects, honeybees are built "upside-down" compared to us vertebrates (we are animals with backbones).



Insect (top down):
Back
Main cardiovascular trunk
Digestive tract
Nerve trunk

Vertebrate (i.e. us)
Back
Nerve trunk
Main cardiovascular trunk
Digestive tract
(Secondary cardiovascular trunk)

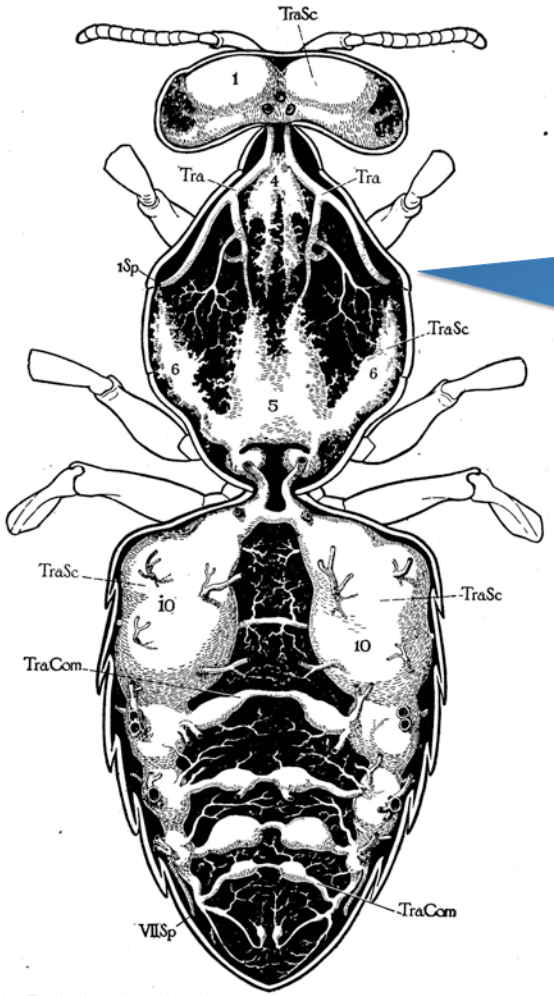
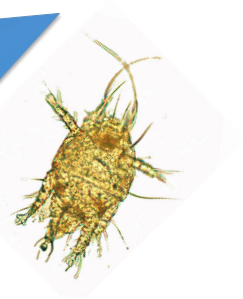


FIG. 51.—Tracheal system of worker showing lateral and ventral parts as seen from above, with dorsal sacs and trunks removed in both thorax and abdomen.

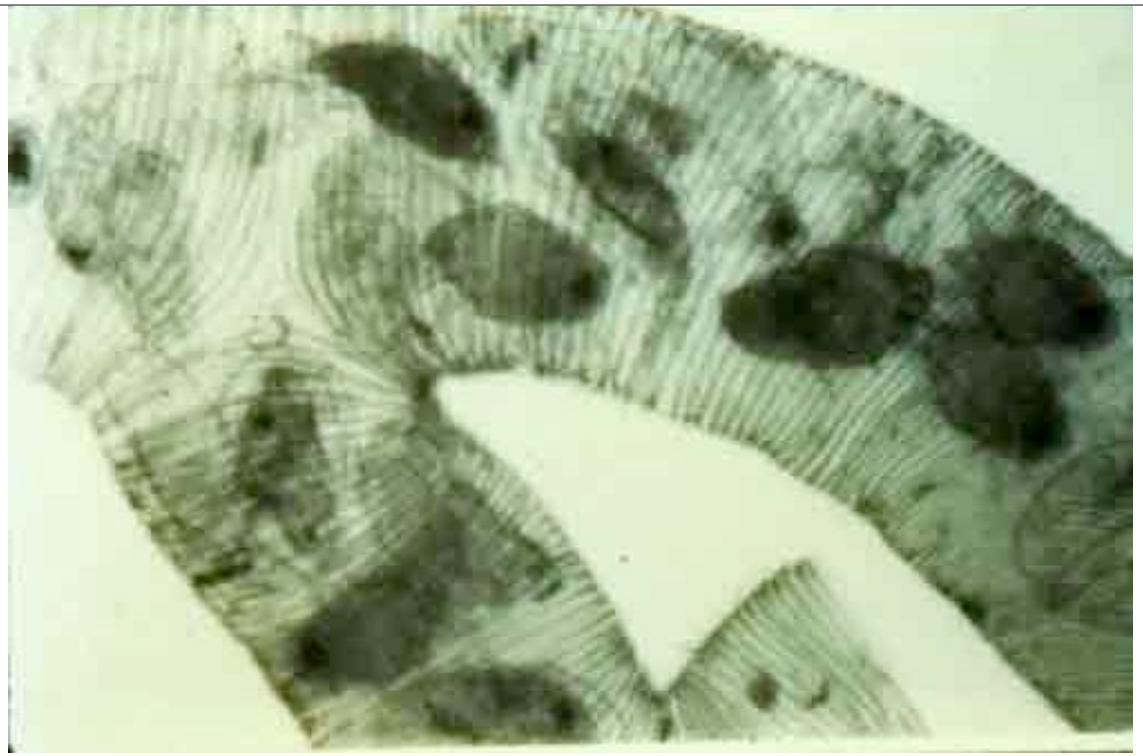
Snodgrass



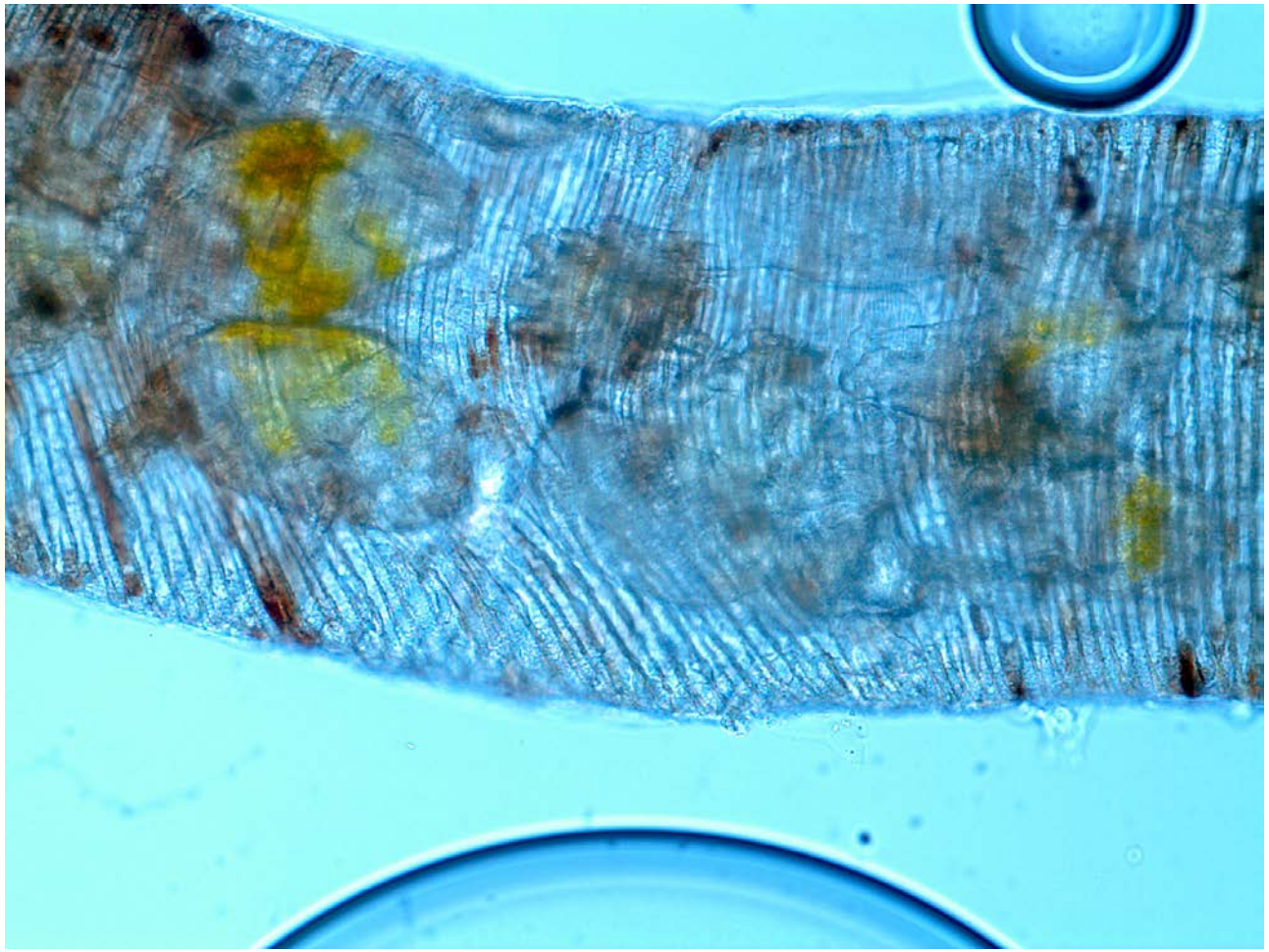
The mite enters the thoracic spiracles, near the wings.

This is how we diagnose the disease…we look at the large tracheae that branch from the thoracic spiracles.

Honey bee tracheal mite *(Acarapis woodi)*



A second mite that infests honey bees is the honey bee tracheal mite. This internal parasitic mite lives within the tracheae, or breathing tubes, inside the thorax of adult honey bees. Tracheal mites also may be found in air sacs in the thorax, abdomen, and head. The mites pierce the breathing tube walls with their mouth parts and feed on the hemolymph, or blood, of the bees.



Immature HBTM. C. Wahl

A reminder about “normal” inside your colony…

Normal Brood

A healthy worker brood pattern is easy to recognize: brood cappings are medium brown in color, convex, and without punctures. Healthy capped worker brood normally appears as a solid pattern of cells with only a few uncapped cells; these may contain eggs, uncapped larvae, nectar,

Peter Borst Photo

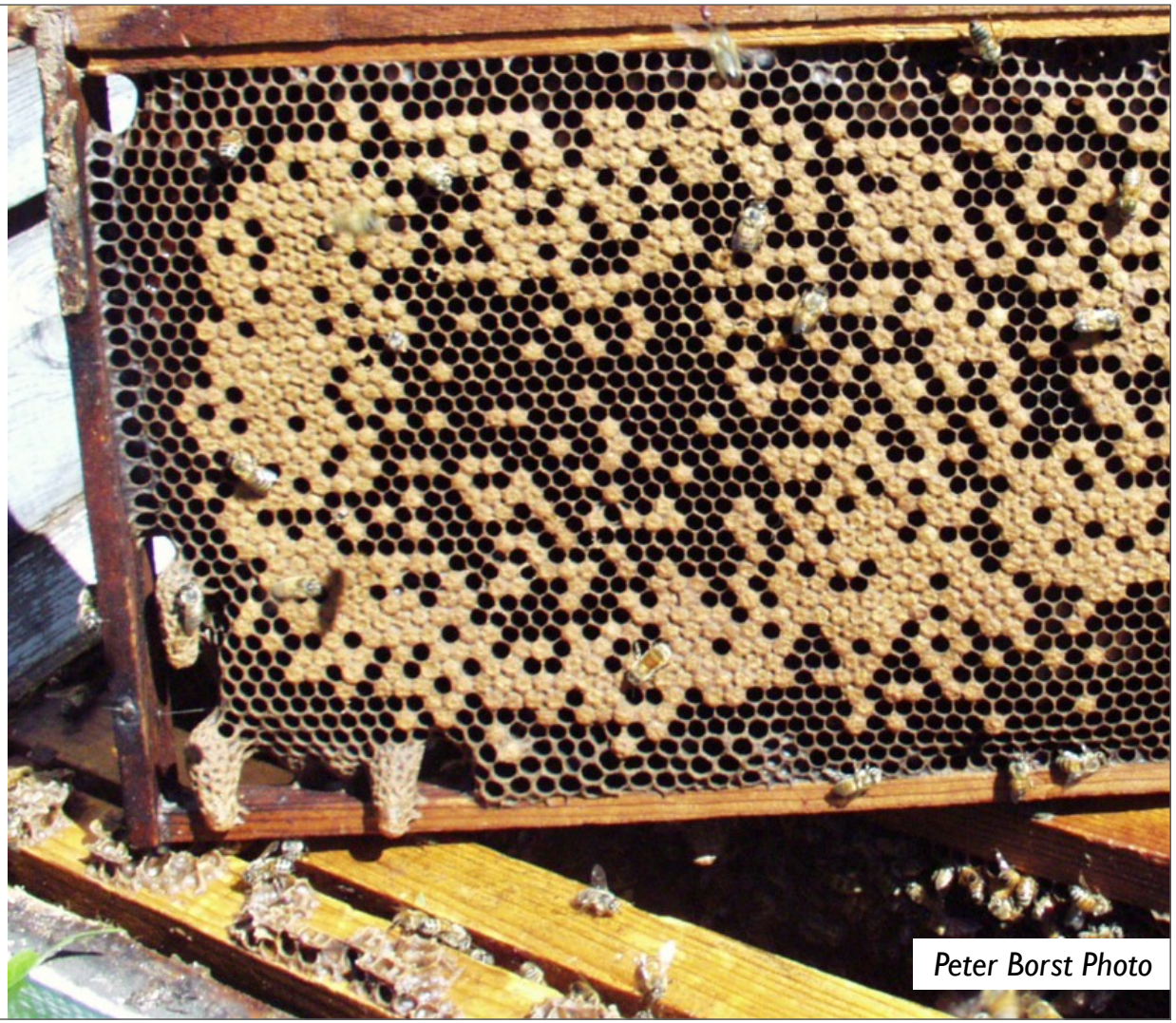
Failing Queen or other problems

1. Occupied queen cells are present in the center of the comb.

2. The age of queen larvae in the cells is the same.

3. Scattered brood pattern is observed.

4. Drone brood may appear in worker cells.



Treatment for *A. woodii*:

Miticides, grease patties.

Treatment for *Nosema* spp:

Fumagillin

Good Information on the internet

http://beeinformed.org/ — Bee Informed Partnership – Using beekeepers' real world experience to solve beekeepers' real world problems

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BEE INFORMED

Using beekeepers' real world experience to solve beekeepers' real world problems

Be Included, Be Involved, Bee Informed

Blog

Queen Bee Identification

How to Install Package Bees

Queen Season

Häagen-Dazs Loves Honey Bees

How to Interpret Management Survey Results (Confidence

http://www.ontariobee.com/outreach/ttp

http://www.extension.org

nybeewellness.com