

TRENDS IN VETERINARY PARASITOLOGY

A TWO-DAYS COURSE

**DEPARTMENT OF VETERINARY PATHOLOGY, MICROBIOLOGY &
PARASITOLOGY**

**FACULTY OF VETERINARY MEDICINE
UNIVERSITY OF NAIROBI**

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**Parasites of the honey bee
(*Apis mellifera*)**

By Dr. J.N. Chege



University of Nairobi

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Types of honey bees

African honey bee
(*Apis mellifera*)



Stingless honey bee
Meliponula sp.



Honey bee- *A. Mellifera* - castes



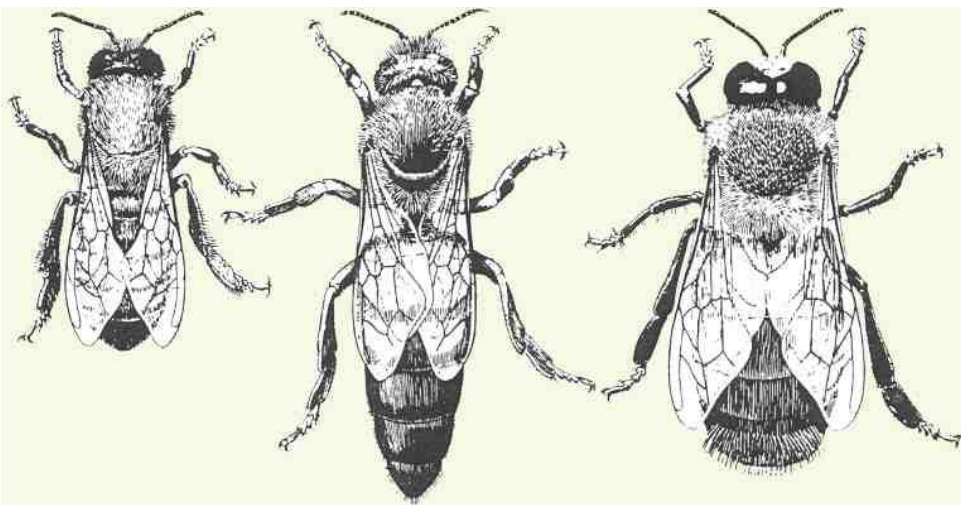
Worker bee
(Infertile female)
12 – 15 mm



Queen
(fertile female)
18 – 22 mm

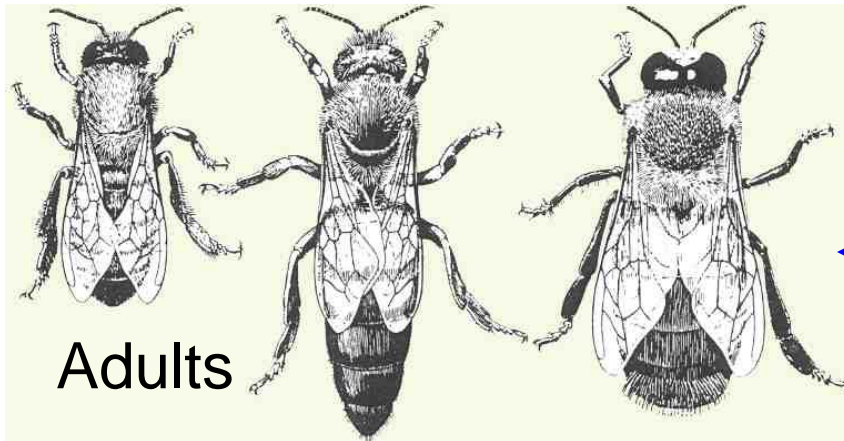
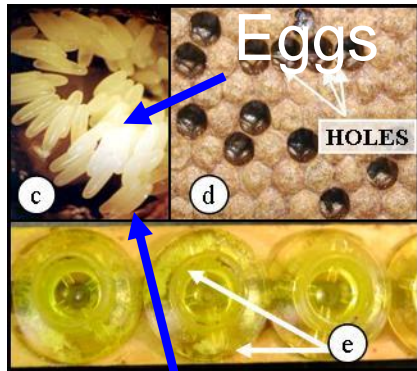


Drone
(male)
15 – 17 mm, rather stout



Honey bee- Life cycle stages

- Bees have two distinct life forms, brood & adult



Benefits of honey bee

1. **Agricultural**
 - Pollination



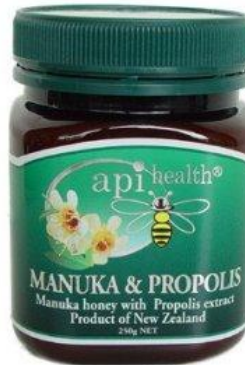
2. **Nutritional**
 - Honey



- Propolis

- Pollen

- Royal jelly



3. **Medicinal**
 - coughs

4. **Industrial**
 - Wax

- Lubricants



5. **Socio-economics**

- Income

- Conservation

Bee housing & production systems

1. Natural (wild bees)

- Holes/ cracks on tree trunks
- Underground hives

2. Man made housing (hives)

a) Traditional

- Log hives
- Bark reeds, gourd & pots

b) Modern/ commercial

- Langstroth hive
- Kenya top bar hive*



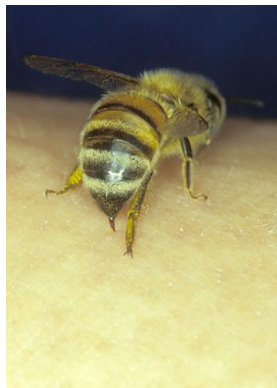
Kenya top bar hive

Demand for honey & products

- High demand for honey & products
 - International markets
 - Local
 - Kenya produces 65% locally, 35% import
 - Current production (15,000 honey & 140 wax, metric tones)
 - Potential (100,000 honey & 10,000 wax, metric tones)
- High potential for organic honey production
 - ASALS

Factors limiting honey production

- Attitude
 - Producer
 - Consumer
- High population density
- Feed availability
 - Nectar, pollen, water
- Marketing infrastructure
- Diseases & pests



Sting

- Stings produce local necrosis, lymphocytic infiltration, hyperemia & extensive oedema
- Stings by large number of bees may cause shock & suffocation due to oedema in the neck region & death may follow

Diseases & pests of the honey bee

- Most diseases are specific to either brood or adults
- The most virulent diseases are those of the brood

Etiology of disease

1. Bacteria
2. Viruses
3. Parasites



Parasites of the honey bees

A. Arthropod parasites

Insect parasites

1. Wax moth

- **Achroia grisella (Lesser wax moth)**
- **Galleria mellonella (Common wax moth)**
- Larvae are called wax worms
- Larvae are pests of combs, in hives & in storage
- They tunnel through the combs leaving masses of webbings & debris

Distribution:

- World wide
- Most common in warm areas



Achroia grisella



Galleria mellonella

Wax moth cont.

Morphology:

- Adults measure 19mm long
- Wing span of 38mm
 - When resting wing held in roof like position
- Colour influenced by diet
 - The darker the brood combs the darker the moth pigments
- Mature larvae measure about 22mm long



Wax moth cont..

Life cycle

- Clusters of eggs deposited in dark cracks, crevices & between hive parts out of reach of worker bees
- Hatch into larvae in 5 days to 5 weeks depending on prevailing temperatures
- Rapidly invade unprotected combs
 - Strong colonies remove larvae from hives
- Larvae mature in 1-5 months depending on prevailing temperatures
- They spin cocoons in which they pupate
- Pupal stage lasts 8-65 days, adults emerge

Wax moth cont...

Damage:

- Severe in diseased & weak colonies

Benefits:

- Artificially produced larvae used as fish bait
- In nature helps clear brood diseases

Prevention & control

- Ensure strong colonies
- Clean excessive wax & propolis in colonies
- Fumigate with carbon dioxide

Wax moth damage



2. Hive beetles

1. **Large hive beetle**
(*Oplostomus fuligineous*)
2. **The small hive beetle**
(*Aethina tumida*)
 - Are destructive pest of honey bee colonies
 - Indigenous to Africa

Morphology

- They are small, 5-5mmlong, 3-4.5mmwide, with flat bodies
- They appear dark brown, nearly black



Hive beetles cont..

Life cycle

- Start laying eggs within a week of emerging from their pupae
- Eggs laid in cracks & crevices of hives & bee keeping equipment
- Eggs hatch into larva in a few days
- Larvae mature in 2-3 weeks & drop to the ground to pupate
- Pupal stage last 3-4 weeks
- Adults can live at least 6 months



Hive beetles cont..

Damage

- Causes damage to combs, stored honey & pollen
- Larvae tunnel through combs with stored honey or pollen, damaging or destroying cappings & combs
- Larvae defecate in honey
- The honey become discoloured from the faeces
- Activities of the larvae cause fermentation & frothiness in the honey
- The honey develops a characteristic odour of decaying oranges

Hive beetles cont..

- Damage & fermentation causes the honey to run/flow out of the combs, creating a mess in the hives or extracting rooms
- Heavy infestation causes the bee to abscond
- Rapid collapse of even strong colonies following infestation may occur
- Emerging & migrating larvae ready to pupate leave dark lines or streaks along the outside of hives (diagnostic sign)
- Adults forage throughout the hive causing damage as they go

Hive beetles cont..

Control

- All equipment be cleaned & treated
- Fumigation
- Pesticide especially pyrethroid based

3. Bee lice

***Braula coeca* (bee louse)**

- External parasites of adult bees
- Several parasites on queen bee
- Mostly single parasites on worker bee, preferably on nurses
- Rarely on drones



Bee lice cont..

Morphology

- Wingless
- Size: Slightly smaller than the head of a straight pin
- Colour: Whitish when newly hatched
- Reddish-brown when mature



Bee lice cont..

Life cycle

- Females lays eggs then dies
- Eggs laid on honey comb cappings
- Hatch to release larvae
- Larvae tunnels into the cappings leaving small whitish lines
- Feeds on wax & pollen
- Tunnels lengthen & broaden as the larvae grow
- Pupate inside the tunnel
- Adults emerge & crawls up a bee

Bee lice cont...

Behaviour

- Normally hides in the constriction between the thorax & abdomen
- No direct harm to bees, but takes food directly from the mouth of bees

Damage

- Limited, irritates queen when feeding
- Larvae damage honey combs

4. Apimyiasis

- Some larvae of flies parasitize on honey bees leading to apimyiasis

Senotainia tricuspis

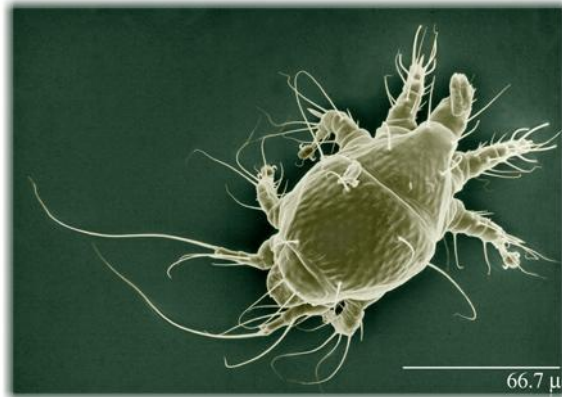
- Adult fly larviposites on the back of honey bees
 - Usually at the joint of the head & the thorax
- Larvae penetrate into the haemolymph of the host
- Feeds on the haemolymph until the bee dies
- Then feeds on thoracic muscles & abdominal tissues of the dead bee before pupating
- Adults emerge in 7-16 days

Parasitic mites of honey bees

1. *Acarapis woodi* (honey bee tracheal mite)

Predilection sites

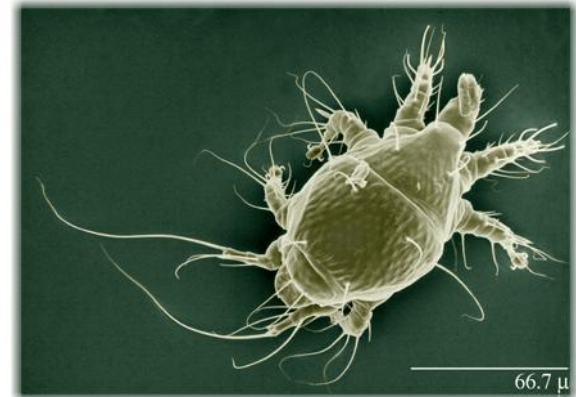
- Mainly infects the trachea that leads from the first pair of thoracic spiracles of adult bees
- Also in thoracic & abdominal air sacs



Acarapis woodi cont.

Morphology

- Oval body
- Widest between the 2nd & 3rd pairs of legs
- Whitish or pearly white with shiny, smooth cuticle
- Have few long hairs on body & legs
- Have elongate beak like gnathostoma, with blade like stylets
- Size: Female 143 – 174 μm long
- Male 125 – 136 μm long



Acarapis woodi cont..

Pathogenicity & symptoms

- None characteristic
- Bee may have disjointed wings & unable to fly, distended abdomen or both
- Affected bees die earlier than expected

Diagnosis

- Demonstration of mites in the trachea
- Health trachea is creamy white
- Severely infected trachea has brown blotches with crust-like lesions & obstructed by many mites in various developmental stages



Varroa destructor (V. jacobsoni)

Predilection sites

- Can occur in adult bees, on the brood & in hive debris
- Most severe in older larvae & pupae
- Higher preference for worker broods
- Attach between the abdominal segments or between body segments (head, thorax, abdomen)

Morphology

- Adult females have oval & flat bodies
- Pale to reddish brown
- Size: Females 1.1 mm long by 1.5mm wide
 Males are smaller & pale to light tan



Varroa destructor cont.



Varroa destructor cont..

Pathogenicity & symptoms

- Suck lymph, decreases weight of emerging adults
- Deformities at all stages
- Death of larvae, pupa or early deaths in worker bees, thus weakens colony
- Transmits several viral diseases

Varroa destructor cont..

Diagnosis

- Demonstration of mites on adult bees, on the brood & in hive debris
 - Use hand lens or dissecting microscopes
 - Mites on adults not easily visible as they hide in between the segments
 - Easily seen in the white pupae & when moving on adult bees



Varroa destructor cont..

Control

1. Mechanical

- Screened bottom boards (wire mesh)
- Drone-brood trapping (remove infected brood before hatching)

2. Chemical (synthetic pesticides)

- Placing plastic strips impregnated with the active chemical in the hive (pyrethroids, coumaphos)

3. Biopesticides

- a) Sucroside (tobacco derivative), sprayed once per week for 3 weeks
- b) Formic acid: Place pads soaked in acid on top of hive
(Not to used in honey flow, hot seasons)

2 Microspora

Nosema apis

Predilection site:

- Epithelial cells of the mid-gut, malpighian tubules & hypopharyngeal glands

Life cycle

- Infection is by ingestion of spores
- Spores germinate in the ventriculus
- Invade epithelial cells where they multiply
- Large numbers of spores are released & accumulate in the rectum
- Spores shed in faeces & infect other bees

Microspora cont.

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Microspora cont..

Pathogenicity & symptoms

- Severe in cold seasons when bees can not leave hive to defecate
- Causes dysentery in bees
- Weakness
- Wings appear disjointed
- Distended abdomen
- Decreased productivity in worker bees
- Decreased egg output in queen
- Reduced life span

Microspora cont...

Diagnosis

- Demonstration of spores
- Affected ventriculus is swollen, chalky or milky white
- Normal ventriculus is amber or translucent
- Weak worker bees crawl in front of hive
- They lose stinging reflex thus weak defense & easy predation