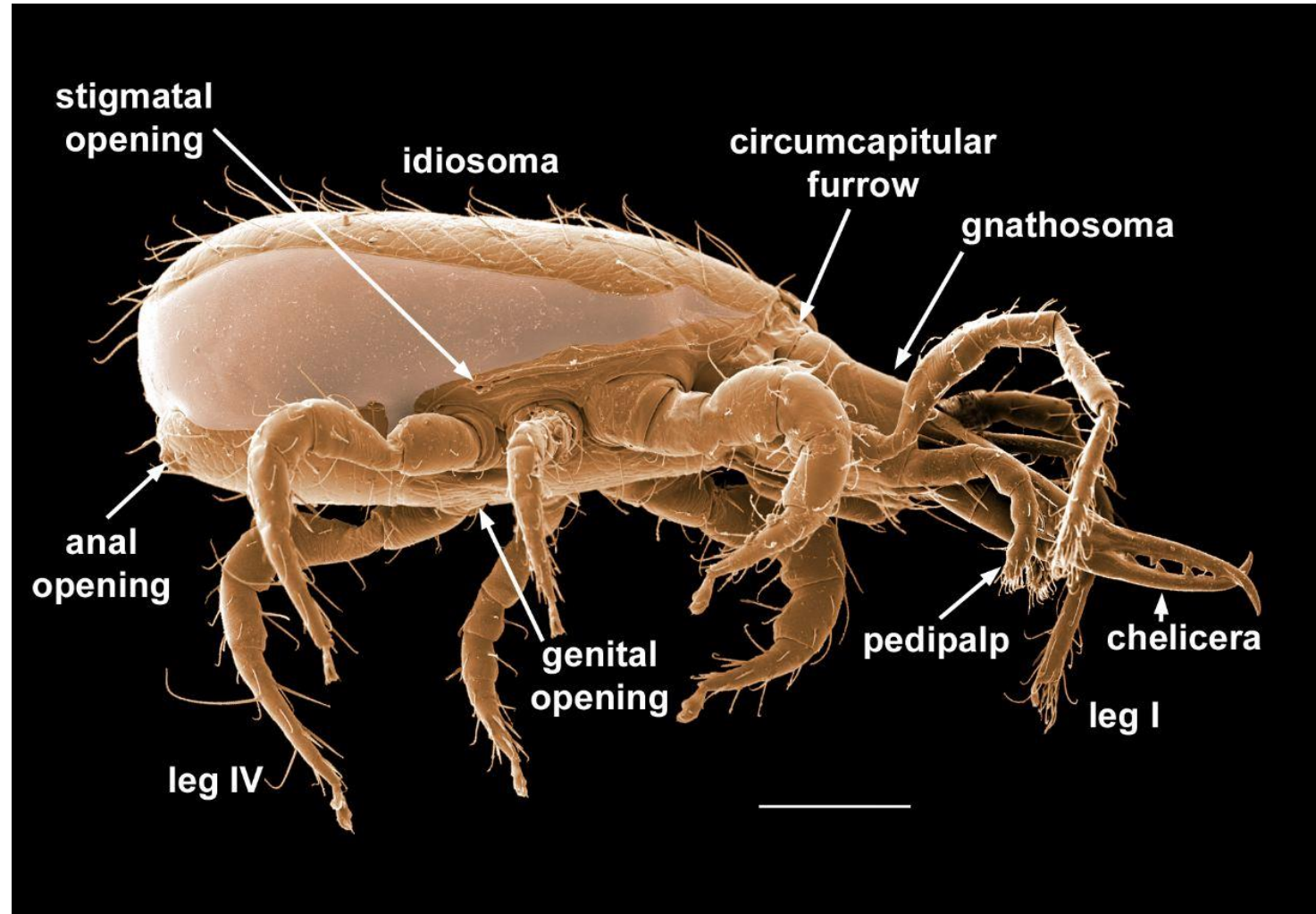


Mites –Importance, morphology and biology

Class: Arachnida
Order: Acarina



Importance of Mites

- loss to a variety of agricultural and horticultural crops particularly under dry situations

Phytophagous mites:

1. Eriophyidae (Erenium or gall or itch or rust mites)
2. Tetranychidae (spider mites)
3. Tenuipalpidae (Broad mites)
4. Tarsonemidae (False spider mites)

- **vectors** of important viral diseases

Aceria cajani- redgram sterility mosaic disease

Aceria tulipae- wheat streak mosaic diseases

- **Allergies** in human beings Eg. **House Dust Mite**: Dermatophagoides farina
- loss to the stored produce Eg. **Stored grain mite**: Acarus siro
- honeybees parasites

Ecto Parasite: Tropilaelaps clariae, Varroa jacobsoni

Endo Parasite: Acarapis woodi(Tarsonemidae)

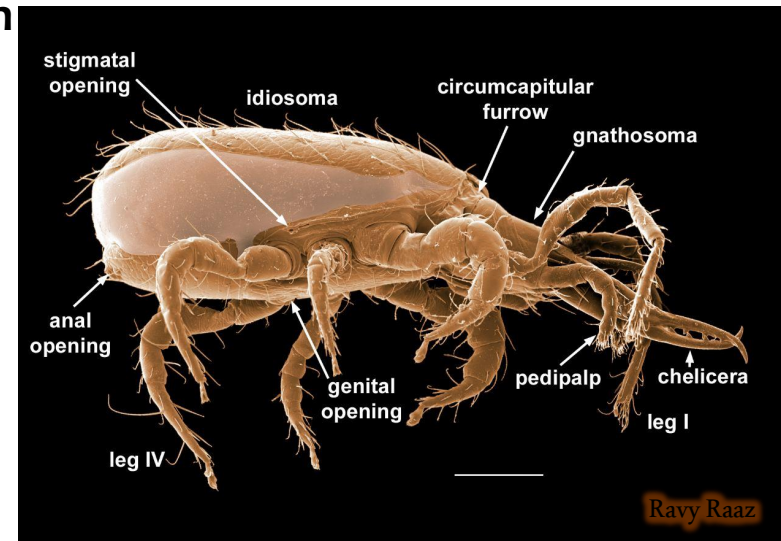
Locustacarus buchneri (Poapolidae) on **bumble bees**

- (predatory mites) very useful in biological control of some insect pests and mites

Phytoseiidae- Phytoseilus persimilis, Amblyseius fallacies

MORPHOLOGY:

- Vermiform, divided into **cephalothorax and abdomen** with **2 pairs of legs** in family **Eriophyidae**
- In **Tetranychidae**, body is divided into **Gnathosoma and Idiosoma**
- Gnathosoma contains 3 segments with mouth parts like **Chelicerae** on **2nd** and **Pedipalpi 3rd** segments
- Above the mouth cavity there is a **capitulum or tectum** dorsally
- Idiosoma is further divided into **Podosoma** and **Opisthosoma**
- Podosoma further divided into **Propodosoma** and **Metapodosoma** with **2 pairs** of legs on each
- Opisthosoma is the **posterior part** of the body having anal opening
- Eyes may be present or if eyes are absent **body surface act as photo sensitive organ**
- Chelicerae , **3 segmented**, modified into **stylet like piercing organs**
- Pedipalpi are resembling the **legs** and are modified as **piercing or grasping organs**
- Legs may be 2 or 4 pairs
- Each leg consists of coxa, trochanter, femur, Genu, tibia and tarsus



Character	Eriophyid mite	Tetranychid mite
Size	Very minute	Bigger
Body	Vermiform	Flat or oval
Segmentation	Body is divisible into Cephalothorax and long tapering abdomen	Body unsegmented and not divided into cephalothorax and abdomen
Legs	2 pairs of legs (situated near the anterior end of the body) both in the adult and nymphal stages	4 pairs of legs in the adult and also nymphal stages. The larva (1st nymphal stage) has only 3 pairs of legs (mites living enclosed within plant tissues have vestigial legs)
Life Cycle	2 nymphal instars (protonymph and deutonymph) which are almost similar to adults	3 nymphal stages (protonymph, deutonymph, tritonymph) and an adult stage.
Symptoms	Gall formation is the main symptom	Formation of the red spot is the main symptom
Examples	Eg: Gall mite, blister mite, rust mite & bud mite	Eg: spider mite

Family: Tetranychidae(spider mites)

Body is 0.2-0.8 mm long with colour is red, green, yellow, brown etc.

Body is flat, oval and **neither divided nor segmented**

Body of male **tapers posteriorly**

Chelicerae are fused to form a **stylopore**

movable segment forms a **flagellate stylet**

no mitotic division in larval stage

Most of the species are having **narrow host range**

Palpal thumb claws are present

Life cycle includes

Egg-Larva (3 pairs of legs)-Protonymph (4 pairs of legs)

Deutonymph(4 pairs of legs)-Tritonymph(4 pairs of legs) and Adults (4 pairs of legs)

Examples:

1. Red spider mite on okra, cotton, citrus, tomato, grape, papaya, jasmine, pumpkin *Tetranychus macfarlani*(telarius) results in Browning of leaves, fruits and hairy out growth on both.
2. Jowar mite (greyish green): *Oligonychus indicus*, lower side of leaf becomes wet, red spots appear in patches on leaf
3. Vegetable mite, *Tetranychus cucurbitae*



Family: Tenuipalpidae (false spider mites)

- Same as Tetranychidae, but **without thumb claws**
- Three types of setae namely **hysterosomal, dorsocentral and mediolateral** are present
- True tarsal claw is **hooked or pad like** and with **tenent hairs**

Examples: Citrus flat mite- *Brevipalpus lewisi*

Brevipalpus californicus- It causes serious injury to a wide variety of ornamental and agricultural crops



Family: Tarsonemidae (Broad mites)

- Body is elliptical (ovoid) and 0.1-0.3 mm long and colour is opaque white, light green, pinkish
- three parts **Capitulum, Propodosoma and Prohysterosoma** (the later two parts together known as Idiosoma)
- Mouth parts are contained in a distinct capsular head known as **Capitulum**
- **Females are bigger than males** and adult integument is **hard and shiny**
- Few hairs, spines are present on body
- Chelicerae are **needle like**
- **Egg – larvae – adult**

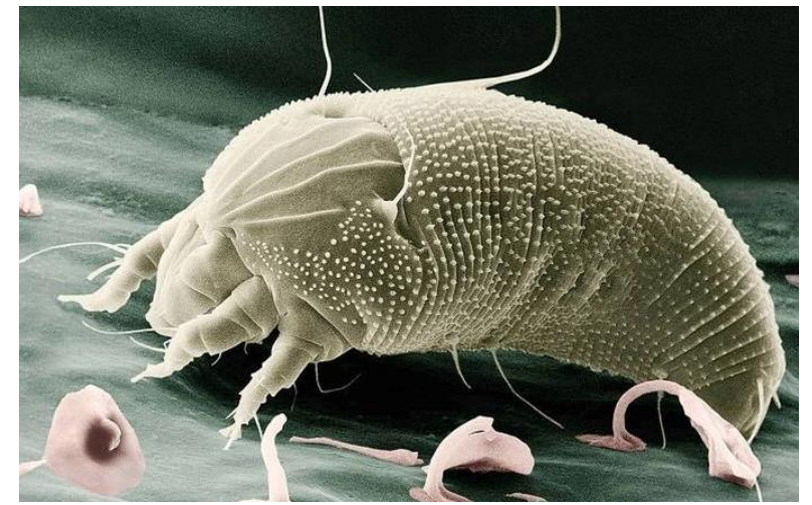
Examples: Yellow mite on chilli- *Palyphagotarsonymus latus*

Paddy panicle mite - *Stenotarsonemus spinki*



Family: Eriophyidae (Blister, rust, gall mites)

- Body is minute measuring 0.08 – 0.2 mm long
- Body is 2 types:
 - a) Elongate (vermiform), worm like, soft body
 - b) Wedge shaped, hard body
- Body is divided into **cephalothorax and tapering abdomen**
- Abdomen is finely striated with long setae
- 2 pairs of legs on anterior end of body Pedipalpi or chelicerae move independently and form a telescope or fold base
- **No thrusting stylopore**



Egg-Protonymph-Deuteronymph-Adult (2 pairs of legs in all the life stages)

Examples:

1. Citrus rust mite- *Phyllocoptruta oleivora*
2. Jasmine mite- *Aceria jasmini*
3. Mango gall mite- *Aceria mangiferae*
4. coconut mite- *Eriophyes guerreronis*

Nature and symptoms of Mite damage:

- **Both nymphs and adults suck sap** from plant parts like leaves, shoots, fruits etc with their **needle like chelicerae**

1) Formation of **white blotches** on leaves in vegetables

2) Characteristic **red spots** that enlarge and coalesce making whole leaf reddish

3) Drying of leaves and stems in sugarcane

4) Formation of **galls** on leaves in pongamia

5) Production of **felt like growth** on leaves in jasmine

6) Formation of **crowded buds ,crumpled shoots** in mango

7) Formation of **pinkish blotches** on fruits of citrus

8) Curling of **leaves upwards** in chillies

9) Formation of **warts** and longitudinal tissues on coconut

10) Act as **vectors** by transmitting viral diseases

11) **Spin delicate webs** on the lower surface of the leaf



Mites of Agricultural Importance

1. Jowar mite : *Oligonychus indicus* - Tetranychidae
2. Red spider mite : *Tetranychus neocaledonicus*
T. telarius - Tetranychidae
3. Citrus rust mite : *Phyllocoptruta oleivora* – Eriophyidae
4. Citrus leaf mite : *Eutetranychus banksi* - Tetranychidae
5. Sugarcane mite : *Schizotetranychus andropogonii* Tetranychidae
6. Coconut eriophyid mite : *Aceria guerreronis*
7. Jasmine mite (felt mite) : *Aceria jasmini* – Eriophyidae
8. Sweet potato rust mite : *Oxpleurites convolvuli* – Eriophyidae
9. scarlet mite of tea : *Brevipalpus anstralis* – Tetranychidae
10. Chilli mite : *Tarsonemus translucens*
Polyphagotarsonemus latus - Tetranychidae
11. Sugarcane mite : *Tarsonemus spinipes*
12. Coffee mites : *Oligonychus coffeae* – Tetranychidae

Management of mites:

1. Removal of **alternate hosts** in the field
2. Spraying of sulphur @ 3 gm or Dimethoate 30 EC @ 2 ml/lit or Methyldemeton 25 EC @ 2 ml /lit or kelthane (Dicofol) 5 ml /lit or Ethion @ 1 ml/lit
3. Fungal pathogen, **Hirsutella thompsoni** reported to be effective against coconut eriophid mite
4. Predaceous insects on mites Ex. Scolothrips indicus, Scymnus gracilis



Acaricides: Most of the organophosphatic insecticides are also effective acaricides

i) **Sulphur:** fine dust (80–90%), FLOWABILITY of the dust is increased by adding 3% tricalcium phosphate

ii) **Dicofol:** hydroxylated product of DDT, It is non-systemic, effective against all stages of mites Trade names: Kelthane

iii) **Tetradifon:** Persistent acaricide, kills all stages of mites except adults Trade names: **Tedion**

iv) **Propargite:** It is non-systemic acaricide, used for control of mites on fruits, grain, vegetables, nut and crops

Trade names: Comite, Omite