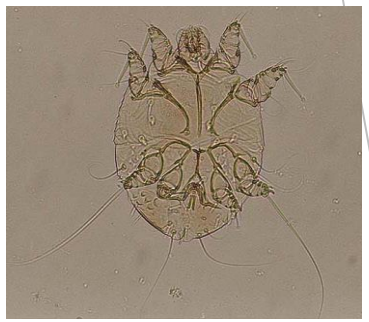
Mites-I



डा. अजीत कुमार

परजीवी विज्ञान विभाग

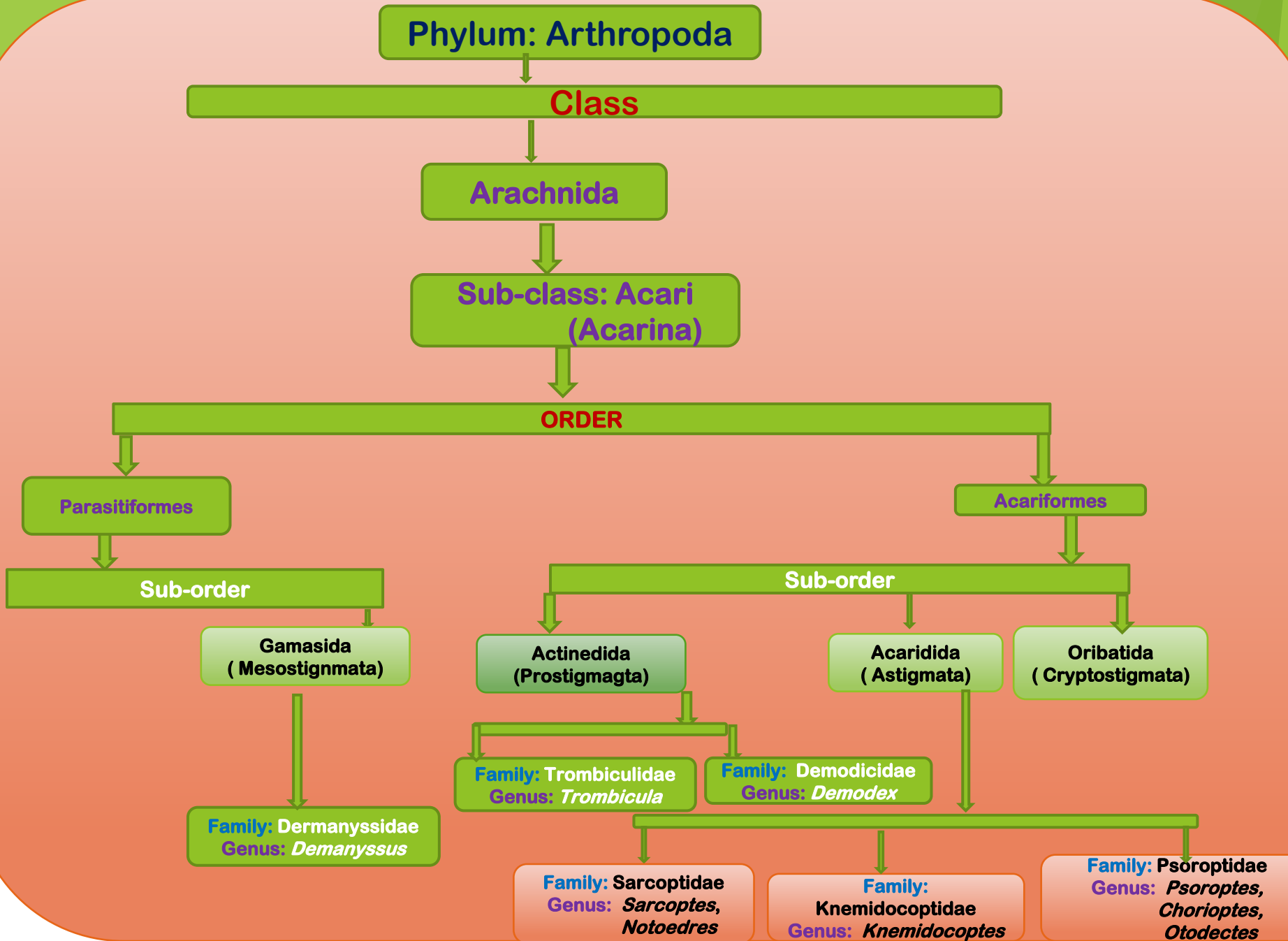
बिहार पशुचिकित्सा महाविद्यालय

बिहार पशु विज्ञान विश्वविद्यालय

पटना–800014 (बिहार)

Image source: Google image

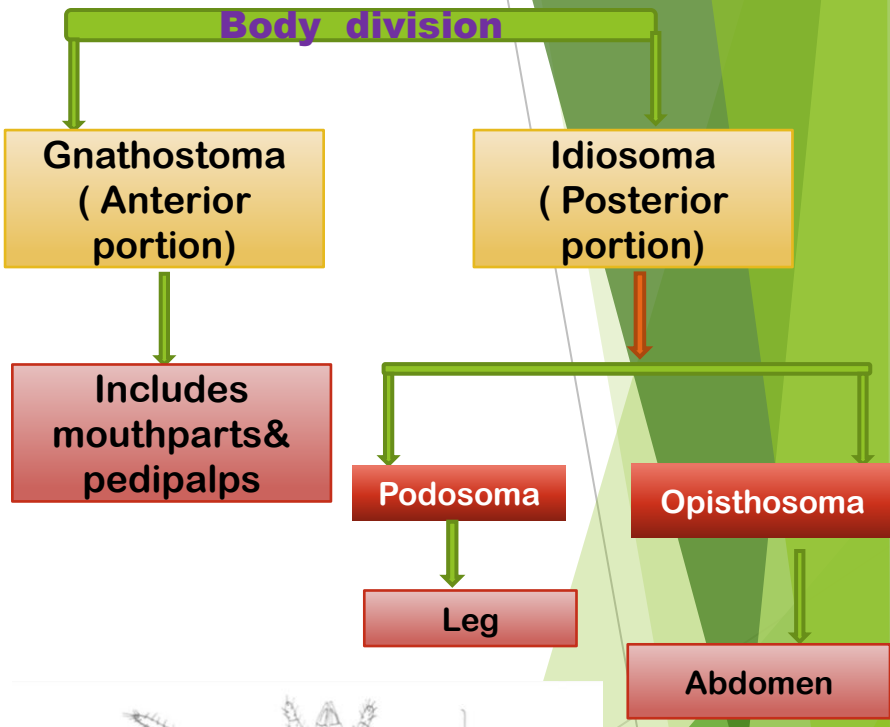
Mites

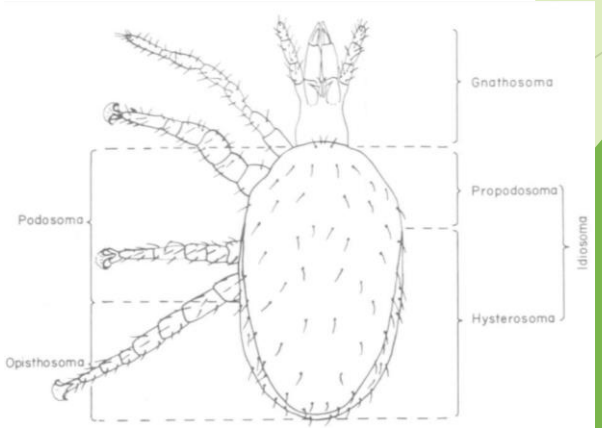

Phylum: Arthropoda
Class
Arachnida
Sub-class: Acari (Acarina)
ORDER
Parasitiformes
Acariformes
Sub-order
Sub-order
Gamasida (Mesostignmata)
Actinedida (Prostigmagta)
Acaridida (Astigmata)
Oribatida (Cryptostigmata)
Family: Dermanyssidae
Genus: Demanyssus
Family: Trombiculidae
Genus: Trombicula
Family: Demodicidae
Genus: Demodex
Family: Sarcoptidae
Genus: Sarcoptes, Notoedres
Family: Knemidocoptidae
Genus: Knemidocoptes
Family: Psoroptidae
Genus: Psoroptes, Chorioptes, Otodectes

Class: Arachnida

General characters of Class -Arachnida:

- Outer body covering is known as integument which is consisted of cuticle and epidermis.
- Body divided into two portions- i. Gnathostoma or capitulum (Anterior portion)- which includes mouthparts or rostrum ii. Idiosoma (Posterior portion) - it again subdivided into podosoma (legs) and Opisthosoma Abdomen)

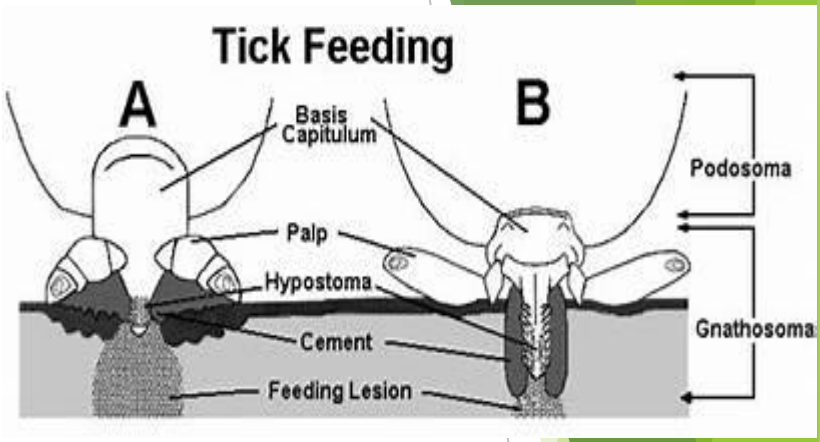


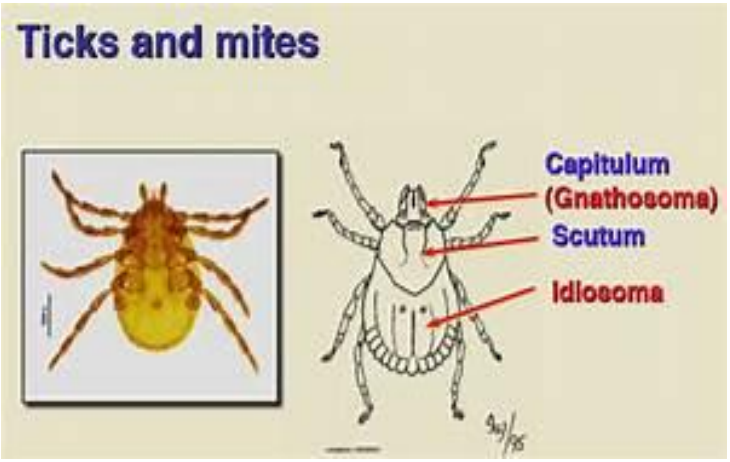


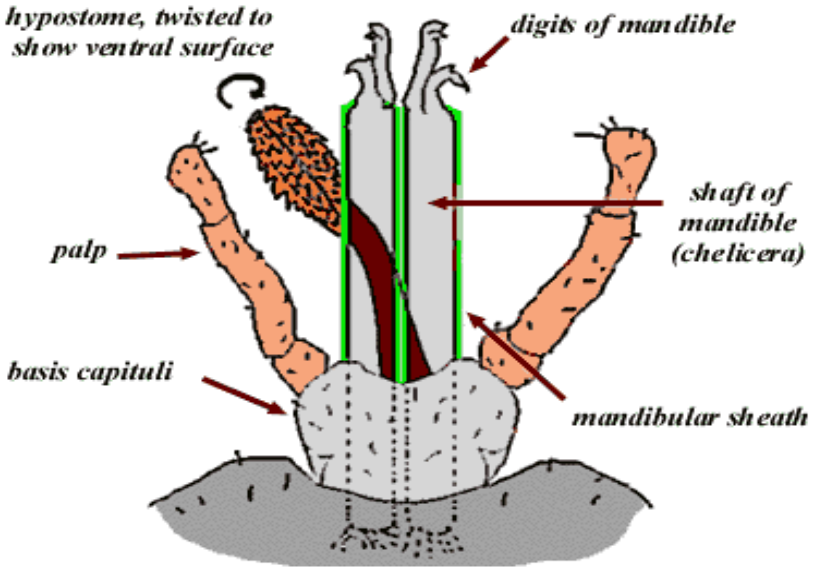
Class: Arachnida

General characters of Class -Arachnida:

- Basis capitula bears mouth parts and together called gnathostome or capitulum.
- Mouth parts consist of a pair of chelicerae, a pairs of pedipalps and a median toothed structure called hypostome.
- Segmentation of the body is almost absent or inconspicuous.







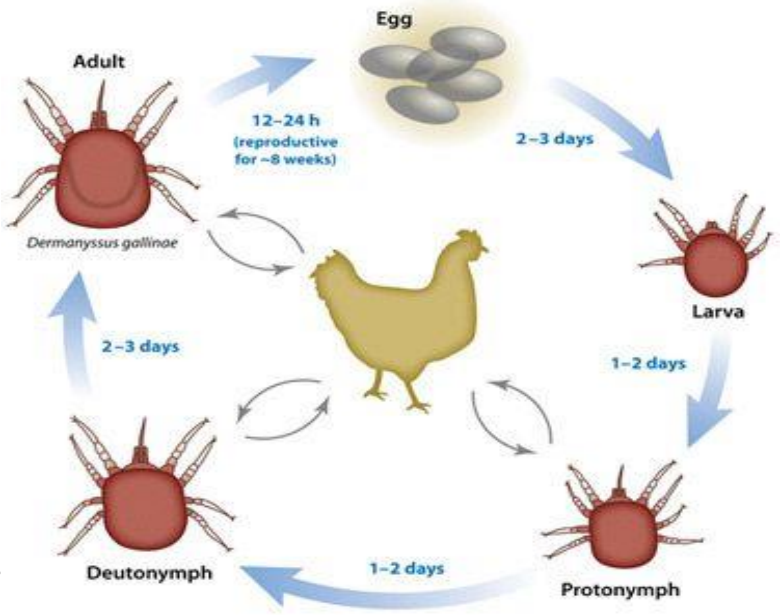
Class: Arachnida

Life-cycle of Class-Arachnida:

Hemimetabolus

(Incomplete metamorphosis)

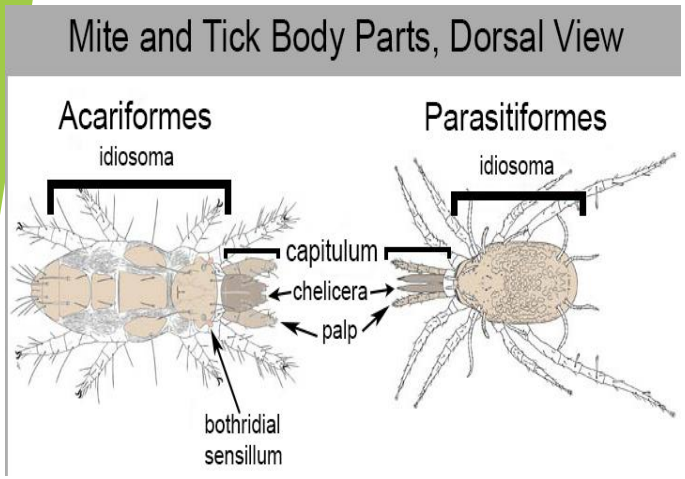
- Nymph resembles to the adult but has no sexual organs.
- Usually more than one nymphal stages or instars occurs i.e. protonymph, deutonymph and tritonymph.

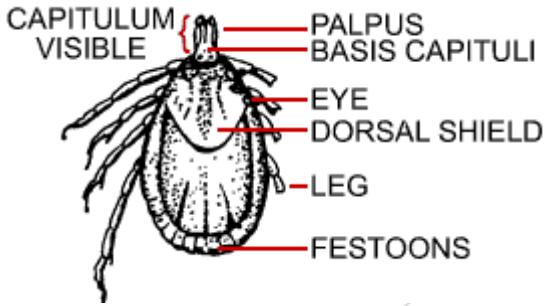


Ticks *vs* Mites

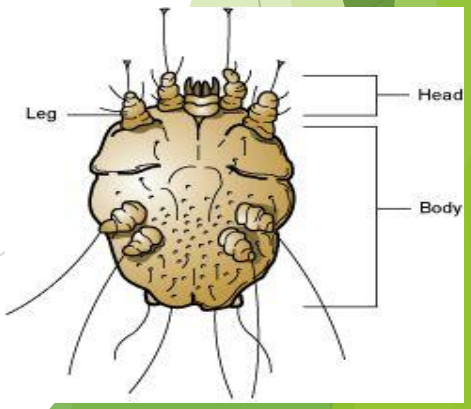
Difference between Ticks & Mites

Character	Ticks	Mites
Size	Macroscopic	Mostly microscopic
Eye	Usually present	Usually absent
Basis capituli	Well developed	Not well developed
Legs	Laterally situated and uniform in shape	Last two pairs of leg are situated posteriorly. legs of some mites bear stalk and/or sucker at the terminal part
Type of parasite	Temporary	Permanent
Location on host	On the skin	beneath the skin
Hiars and bristles	Not prominent	Prominent





Tick



Mite

Class: Arachnida

Sub-order :

- ✓ Gamasida (Mesostignmata)
- ✓ Actinedida (Prostigmagta)
- ✓ Acaridida (Astigmata)
- ✓ Oribatida (Cryptostigmata)

Mites

Class: Arachnida

Acarology: Study of ticks and mites

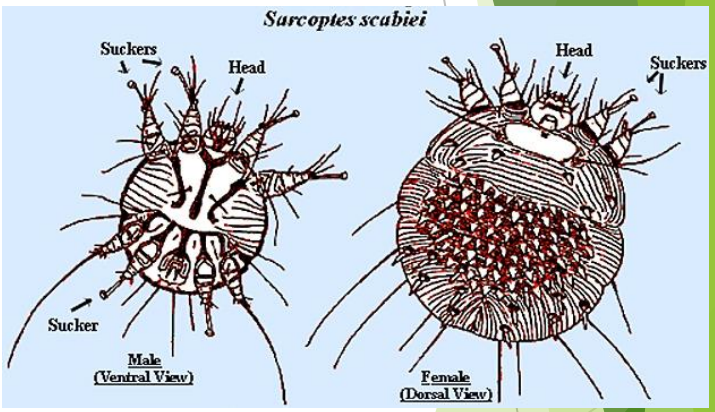
Acaricides: Pesticides that kill ticks and mites.

Mange: A skin condition occurs during mite infestation

Family: Sarcoptidae

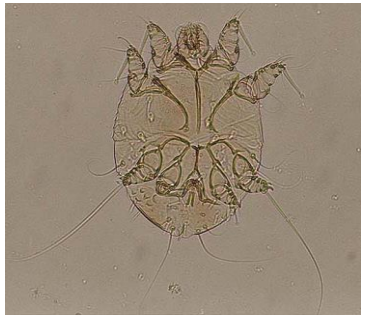
General Characters:

- Globular shaped body
- Scales and spines are present on the dorsal surface.
- Legs are short and last two pairs of legs do not project beyond the posterior body margin.
- Bell shaped suckers are present in 1st and 2nd pair of legs in females and 1st, 2nd and 4th in male while the 3rd pair of legs in the male and the 3rd and 4th in the female end in bristle.
- Pedicels which bear suckers or bristles are non- segmented.
- Male has no adanal suckers (Copulatory discs).



Family - Sarcoptidae

- **Mites create burrow, in the skin causing marked thickening rather than scabs formation.**
- **It includes burrowing mites of Genus: *Sarcoptes* & *Notoedres***



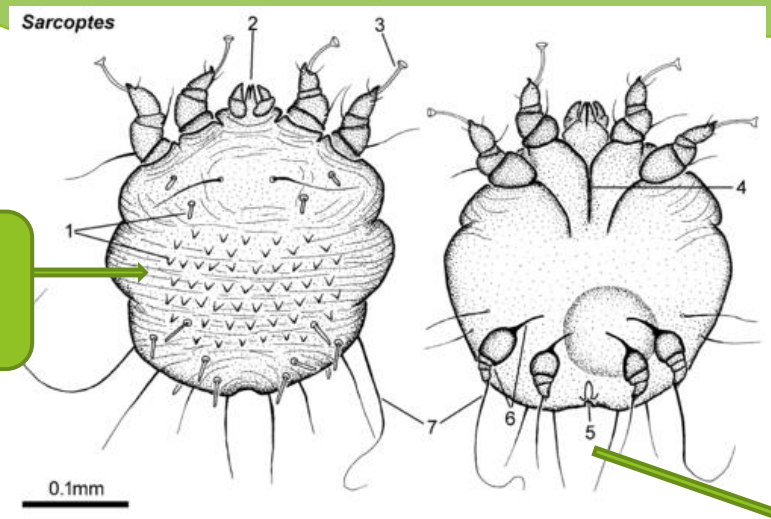
Sarcoptes

Notoedres

Genus: *Sarcoptes*

General Characters:

- Body is globular with short legs which scarcely project beyond the body margin.
- 3rd and 4th pairs of legs do not project beyond the body margin
- Dorsal surface has the numerous transverse ridges and triangular scales on the dorsal surface of body.
- Anus is terminal



Transverse ridges & triangular scales

Anus situated ventrally

Genus: *Sarcoptes*

Transmission:

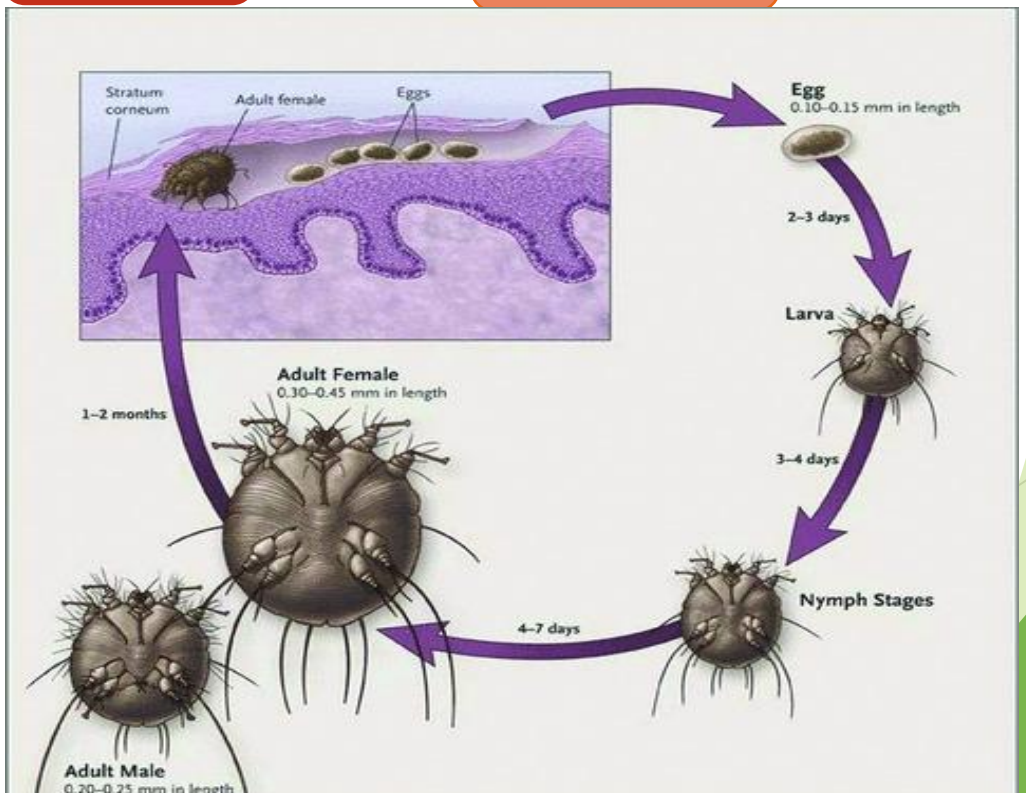
- Infection is spread mainly by contact by the wandering larvae, nymphs and fertilized young females.
- through fomites i.e. grooming tools, clothing, blanket etc. also

Sarcoptes

Life-cycle:

Hemimetabolus (Incomplete metamorphosis)

Egg → Larva → Nymph → Adult



Genus: *Sarcoptes*

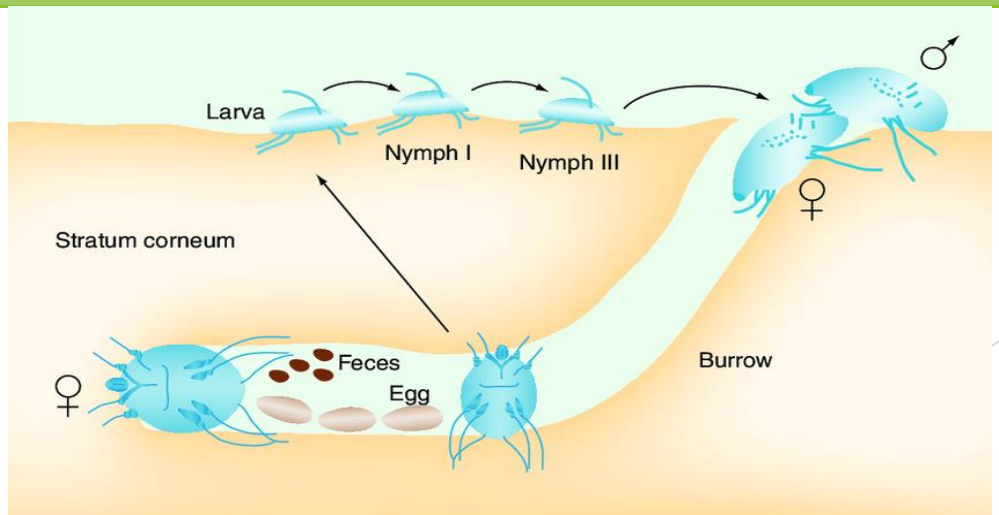
Life-cycle:

- Female mites lays about 35-50 egg in the tunnel of the upper layer of skin.
- Eggs hatch into larvae. Larvae burrow into the superficial layer of skin layer and create a small pockets in which larvae molt in to nymphal stages.
- Male mites die after mating and female extend the pockets and form a new tunnels.
- Entire life-cycle is completed on the host in 17-21 days.

Genus: Sarcoptes

Pathogenesis:

- Mites create burrow in the skin causing marked thickening rather than scabs formation.
- Mites suck lymph and may also feed on young epidermal cells.
- Female mites burrows into the epidermis and forms molting pockets and tunnels.
- The burrowing and feeding activities of the mites cause irritation and consecution itching leading to exudation and formation of crusts .
- Skin become thickened and wrinkled due to proliferation and keratinization of connective of skins.
- Hair losses (alopecia) leading to bald patches on the skin.
- Secondary bacterial infection may occurs
- Death of animals may occurs due to severe mite infestation



Genus: *Sarcoptes*

Pig – It is most affected animals and preferably sites are foreheads and ears.

Dog- Lesions mainly found in ears, face, elbows etc. Diagnostic features of canine sarcoptic mange are a ***scratch reflex*** is produced on rubbing the edges of infested ears and intense itching.

Sheep- *Sarcoptic* mange in sheep is also known as head mange as it is mainly infect non-wooly portions like head regions such as nostrils, lip, face and head.

Cattle- It occurs rarely in cattle

Horse- *Sarcoptic* mage found on the head, neck and shoulder

Camel- *Sarcoptic* mange caused serious disease in camel.

Genus: Sarcoptes

Predisposing Factors:

Sarcoptes mites infestation depend upon the

- ✓ Species of the host
- ✓ Stress
- ✓ Poor management
- ✓ Malnutrition, Age, Overcrowding, log hairs etc.
- ✓ Deficiency of Vitamin-A, Protein, Phosphorus etc.

Genus: Sarcoptes

Clinical signs :

Sarcoptes scabiei **infestation cause**

- **Intense itching and scratching**
- **Skin become thickened (barn itch) and wrinkled**
- **Loss of hair (alopecia)**
- **Emaciation, restlessness**
- **Reduced feed intake**
- **Reduced milk yield etc.**

Scabies is an itchy skin condition caused by a tiny burrowing mite called *Sarcoptes scabiei*.

Genus: *Sarcoptes*

Diagnosis :

- Skin scraping examination
- Burrow ink test- Human scabies usually diagnosed.
- Rubbing index- To assess the clinical mite infestation in pigs. Rubbing index is calculated by no. of rubbing or scratching are recorded and is divided by the no. of pigs in a group.
- ELISA etc.

Genus: *Sarcoptes*

SKIN SCRAPING METHOD:

- Used for the diagnosis of parasitic mites.
- Mites causing a skin disease in animals called mange.

Procedure:

- ✓ Clip the hairs around lesion and scrap the edges of skin lesions with the help of a blunt scalpel or blade to extent that a little blood begins to ooze through the abrasions .
- ✓ Collect the scraping materials on a plane paper.
- ✓ Skin scrapings should be taken from moist part near the edge of the lesion avoiding the inclusion of large amount of dry crust, hair or wool. It is also desirable to take scrapings from more than one lesions.
- ✓ Boil the scraping materials in 10 percent KOH to dissolve debris.
- ✓ After cooling pour the materials into centrifuge tube and centrifuge for 2 minutes at 2000 rpm.
- ✓ Take one drop of sediment on a glass slide , cover with cover slip and examine under low power (40X) of microscope for the presence of mites.

Genus: Sarcoptes

Treatment:

- ✓ By the use of Chemical acaricides (Deltamethrin, Amitraz, Ivermectin, Doramectin etc.) or herbal acaricides like Neem oil, Pestoban, Karanj oil etc. as dips or sprays on the body of infested hosts

Genus: *Sarcoptes*

Control:

- Isolation of infested animals.
- Treatment of infested animals by using acaricides
- Treatment repeat after 2 weeks
- Spraying of acaricides also on brushes, combs etc.
- Providing of proper level of nutrition.

Genus: *Notoedres*

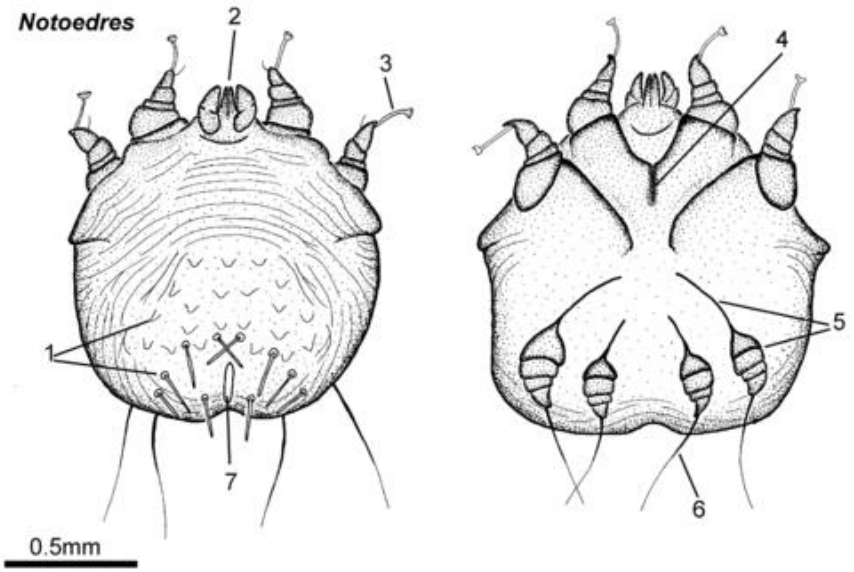
Species: ***Notoedres cati***

Host: **Cat and sometimes rabbit**

Morphology:

Similar to *Sarcoptes* but the differentiating characters are:

Anus is dorsal and sub-terminal position whereas anus is terminal in *Sarcoptes*.



Genus: *Notoedres*

Pathogenesis:

- It is a type of burrowing mite.
- It produces characteristic yellow crust lesions mainly on ears, face and neck but may be found on other body parts also.

Genus: *Notoedres*

Treatment:

Acarcides like Ivermectin, Amitraz, Deltamethrin etc. should be given 3-4 times at weekly interval

Genus: *Cnemidocoptes* (*Knemidocoptes*)

Species:

- *Cnemidocoptes gallinae*
- *Cnemidocoptes mutans*
- *Cnemidocoptes pilae*

Host: Birds chiefly fowl.

Morphology:

- ✓ Globose shaped body with short and stumpy legs
- ✓ Two longitudinal chitinized transverse bars runs from the bases of the pedipalps to the legs where they are united to a transverse bars.
- ✓ Suckers only present on all legs of male mite.
- ✓ The striations on dorsal surface are uninterrupted in *C. gallinae* whereas interrupted in *C. mutans*.

Genus: *Cnemidocoptes*

Pathogenesis:

It is burrowing mite.

Cnemidocoptes gallinae

- It caused depluming itch in fowl.
- Mites burrow into the skin alongside the shafts of feathers causing itching which responsible for pulling out of feathers by the infested fowls and gives a bared areas.

Cnemidocoptes mutans

- ✓ It caused scaly leg in fowl.
- ✓ Mites burrows the epidermis of lower portion of legs which results scales become loosen and lift up.
- ✓ Mite infested fowls show the symptoms like lameness, arthritis, distortion of feet, loss pf appetite decrease egg production etc.

Cnemidocoptes pilae

- ❖ It caused tassel foot in fowl

Scaly leg

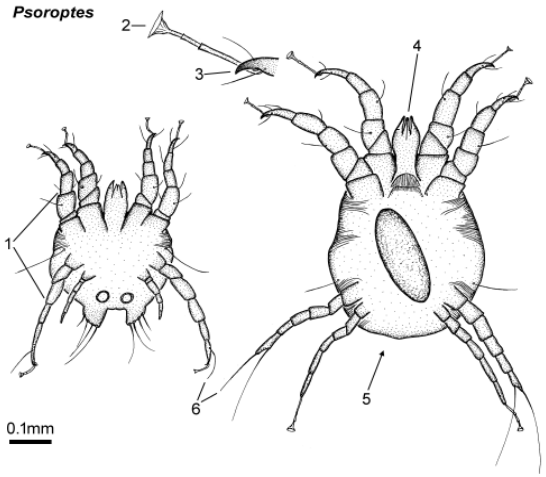
Family : Psoroptidae

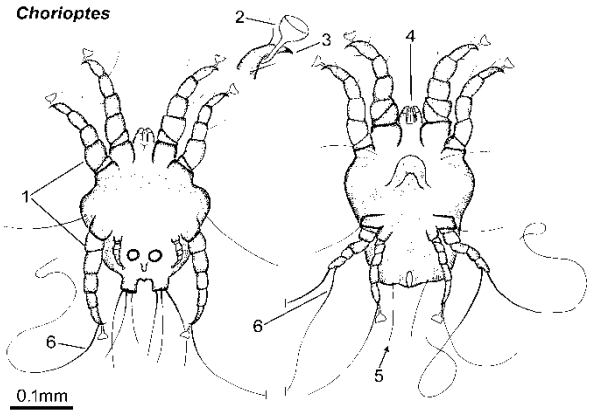
General characters :

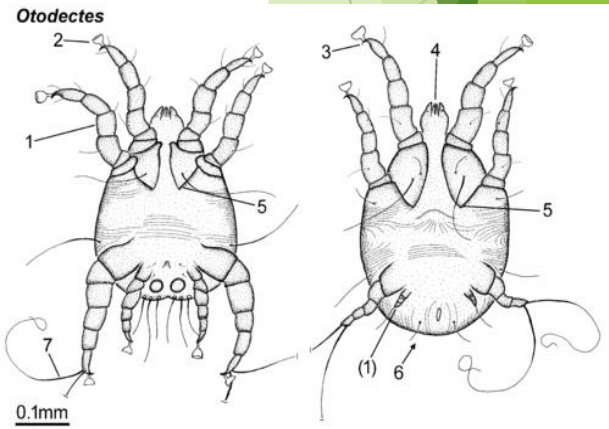
- Members (*Psoroptes, Chorioptes and Otodectes)* are non- burrowing mites.
- Do not burrow in to the dermis and feed generally on skin scales but few also suck tissue fluid or blood and causing the formation of thick heavy scabs rather than thickening of the skin.
- Oval in shaped body with no scale and spine.
- All legs are projected beyond the body margin.
- Anus is terminal and the male has adanal suckers.

Family : Psoroptidae

Mites	Salient features
Psoroptes	Host-specific, legs projecting beyond the body margin, male has posterior two abdominal lobes, bell shaped suckers on pedicels (three-jointed).
Chorioptes	Unjointed Pedicels. Suckers are present on all legs of male and in females on 1st and 2nd pair of legs. 4th pair of legs is small in female.
Otodectes	Pedicels are unjointed. Suckers are present on all legs of male and in females on 1st and 2nd pair of legs. The 4th pair of legs are small for female.

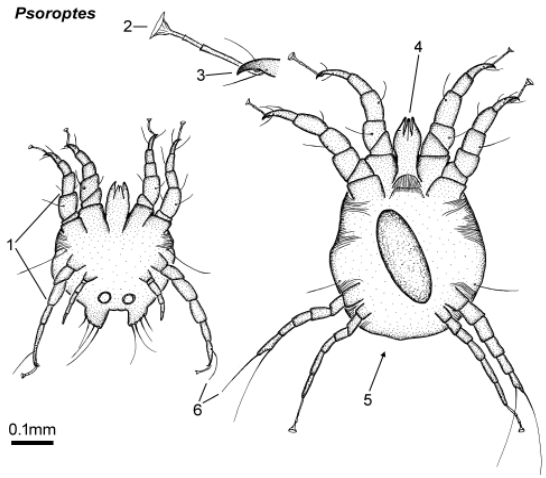






Psoroptes

Species	Host
Psoroptes ovis	sheep and rarely cattle
Psoroptes equi	Horse
Psoroptes natalensis	Cattle and water buffalo
Psoroptes cuniculi	Rabbit, goat, sheep, horse etc.



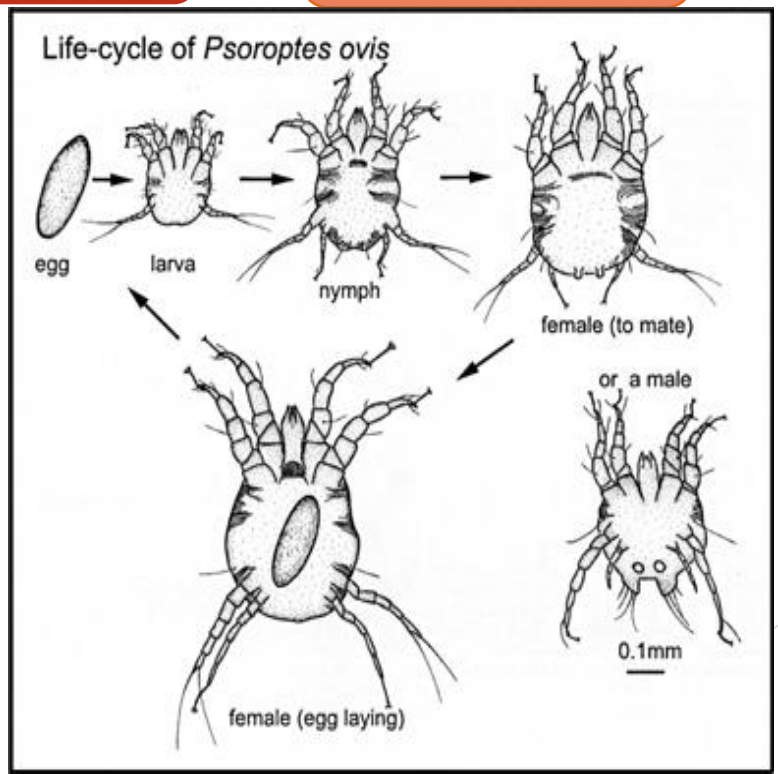
Psoroptes

Life-cycle:

Various stages of mites do not burrow into the skin.

The whole life-cycle takes about 9-12 days

Egg → Larva → Nymph → Adult



Psoroptes ovis

Pathogenesis:

It is a type of non-burrowing mite.

- It causes **sheep scab (sheep scabies)** in sheep.
- Mites pierce the skin and suck host's lymph and cause irritation and inflammation.
- Exudation of lymph coagulates to form crusts.

Clinical signs:

- Rubbing and scratching of the affected areas against hard objects.
- Wool becomes loose and fall out or it pulled up by the infested sheep during biting and scratching of the lesions
- Sheep scab is most active during autumn and winter while latency tends to occur in summer due to less active feeding and decreased oviposition by the mites.

Genus: *Psoroptes*

Pathogenesis:

- ***Psoroptes cuniculi*** found mainly in the ear canal of rabbits, deer and goat and leading to **ear canker** commonly in laboratory rabbits.
- Symptoms of ear canker are repeated shaking of the head, scratching, crust formation leading to a septic otitis media and loss of balance may also occur.
- ***Psoroptes natalensis*** is called body mite of domesticated cattle.

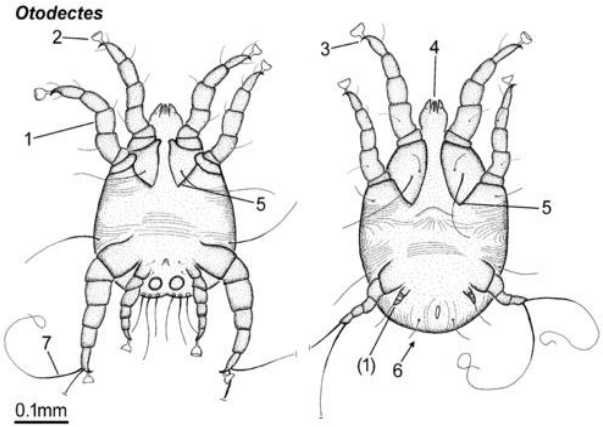
Ear canker

Genus: Otodectes

Pathogenesis:

Non-burrowing mite

- *Otodectes cynotis* is commonest mange of cats and dogs and cause ear or otodectic mange (**Otitis externa**) or otoacariosis in the dog, cat, fox and other carnivores.
- It causes shakes head and scratches the ears, ears droop and haematoma of ear.



Genus: *Choriotes*

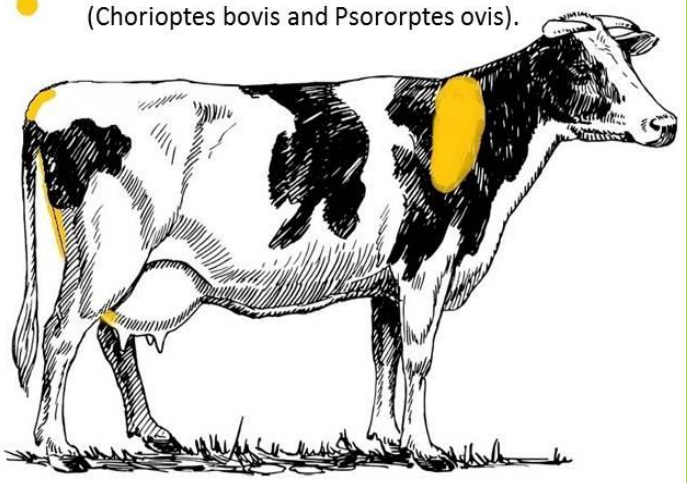
Pathogenesis:

Chorioptes bovis

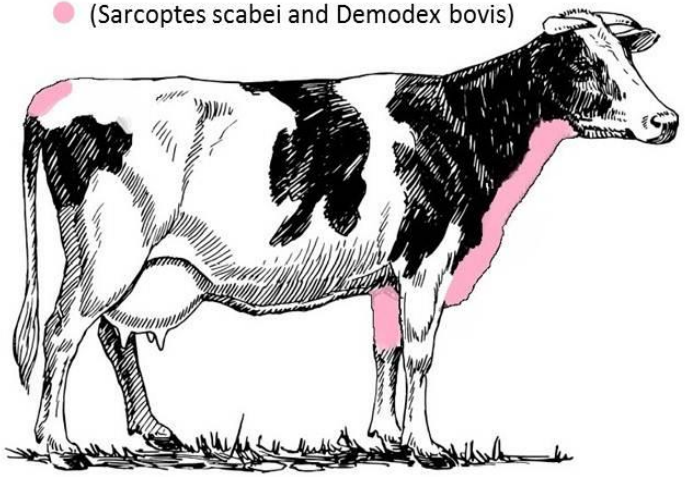
Non-burrowing mite.

- It causes **leg mange** or **foot and tail mange** or **symbiotic mange** or **scrotal mange** or **barn itch** or **itchy disease** which affects usually the long hair fetlock region of horse and is characterized by itching and scab-like lesion.
- Affected horses rub, stamp, scratch and bite the legs and kick frequently especially at night.
- In cattle, camel and in wild ruminants, the root of the tail are generally affected.
- *Chorioptic* mange is most prevalent during the winter.

Typical locations of non- burrowing mites (Chorioptes bovis and Psororptes ovis).



Typical locations of burrowing mites (Sarcoptes scabei and Demodex bovis)



Non-burrowing mites

Treatment:

- Acarcides like Ivermectin, Amitraz, Deltamethrin etc. should be given 3-4 times at weekly interval.

- In case of *Otodectes cynotis* infestation, dressing is essential before treatment, Treatment may includes antibiotic, antifungal, corticosteroid and analgesic therapy.

Non-burrowing mites

Control:

- Treatment of infested animals
- Segregation of infested animals
- Burning of bedding materials

THANK YOU