

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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TICKS & MITES OF MEDICAL & VETERINARY IMPORTANCE

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Class: Arachnida

- Arachnids include scorpions & spiders
- Has many subclasses including **ACARINA** (Ticks & mites) which are of medical & veterinary importance
- **Subclass: Acarina – General characteristics**
- Infestation referred to as **Acarosis**
- Study referred to as **Acarology**

Subclass Acarina

- As opposed to the **Class Insecta** the head, thorax & abdomen are fused, while antennae & mandibles are absent
- Ticks & mites have bodies which are divided into two primary sections: the anterior **capitulum** (or **gnathosoma**), which contains the head (**basis capitulum**) & mouth parts
- The posterior **idiosoma** contains the legs, digestive tract, & reproductive organs

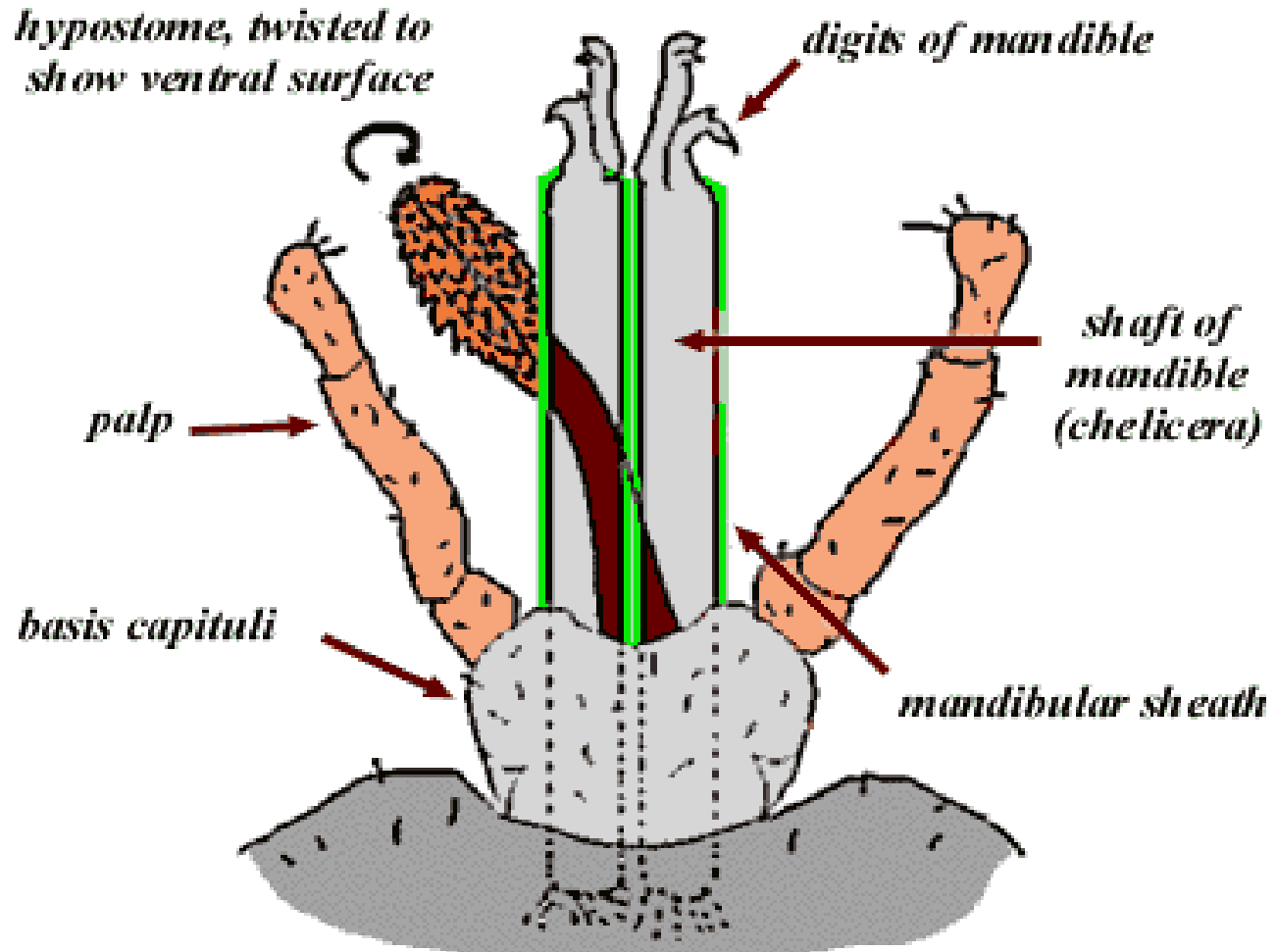
Subclass Acarina contd.

- The mouth parts are composed of the **palps**, **chelicerae** & **hypostome**

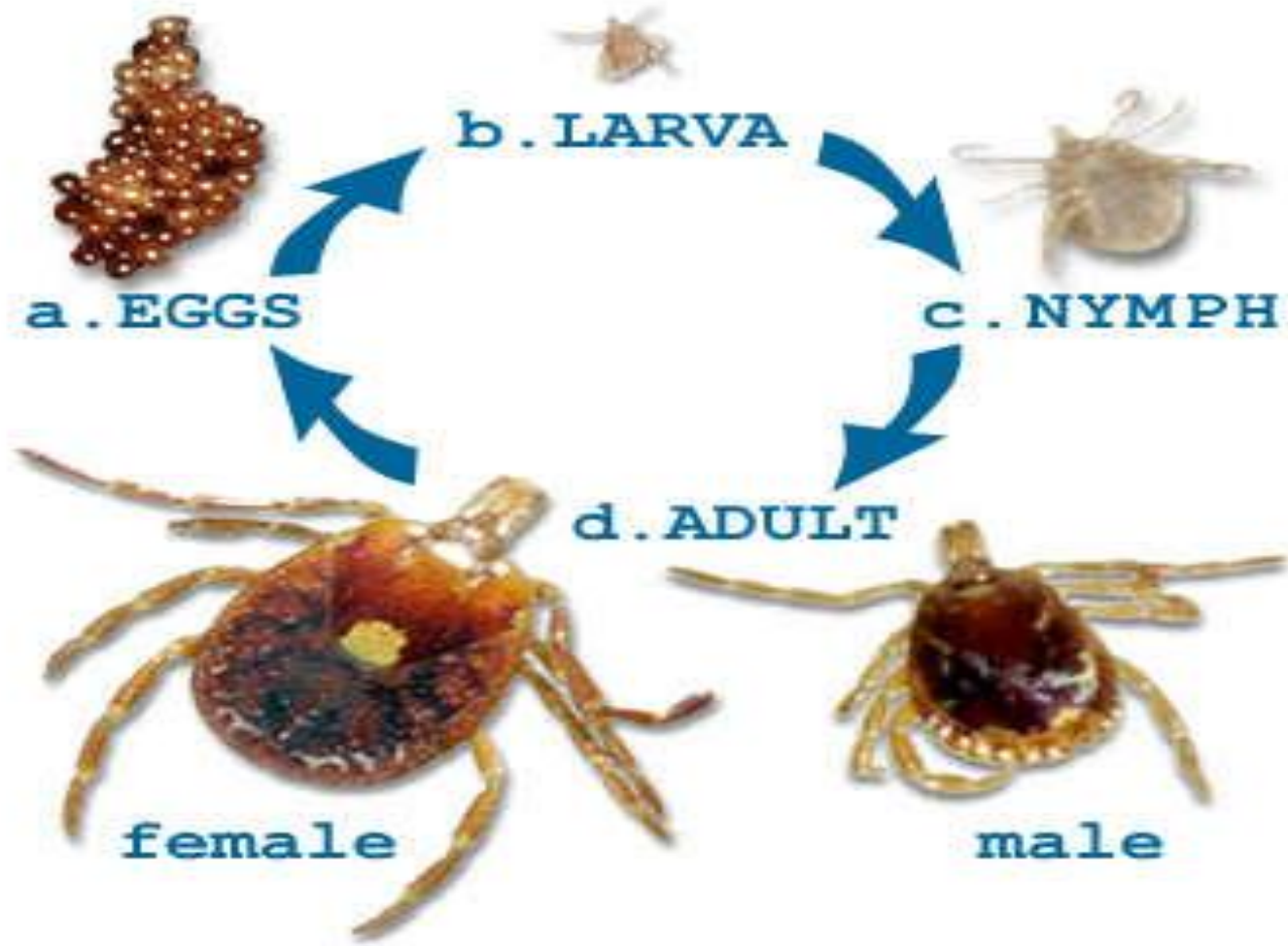
Life cycle

- Undergoes **incomplete metamorphosis** i.e., Egg – larva – Nymph – Adult
- Larval stages of ticks & mites normally have 3 pairs of legs while nymphs & adults have 4 pairs
- Nymphs resembles adults but lacks external sexual organs

Mouth parts of ticks



Life cycle stages of ticks



TICKS

- Ticks are in the order **IXODIDA**, suborder **METASTIGMATA** & superfamily **IXODOIDEA**
- Ticks are the most important ectoparasites of livestock in Africa & there over 60 different spp. in E. Africa
- They are 1⁰ parasites & live by hematophagy on the blood of mammals, birds, & occasionally reptiles & amphibians
- Ticks are vectors of important diseases of domestic animals & Man

Ticks contd.

- Examples includes, ECF, babesiosis, ehrlichiosis, tick-borne relapsing fever, Q fever, tick-borne meningoencephalitis & bovine anaplasmosis

Blood loss

- May leads to anaemia & death

Dermatoses

- Primary inflammation, secondary infections – abscesses (death due to toxaemia)
- Tick bites may lead to screw worm attack (myiasis)

Ticks contd.

Tick paralysis

- Paralysis due to toxins produced by some spp, e.g., female *Ixodes* has been reported

Irritation

- Leads to licking & scratching
- Animal wastes feeding time (tick worry)
- Loss of production

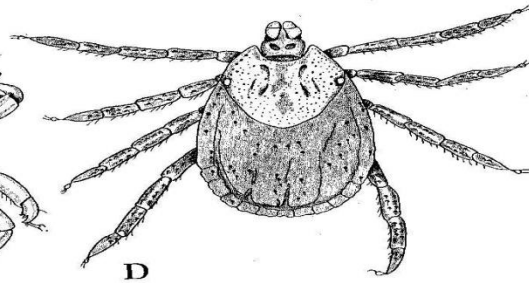
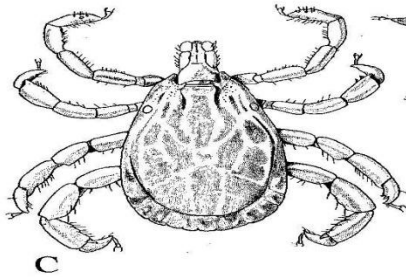
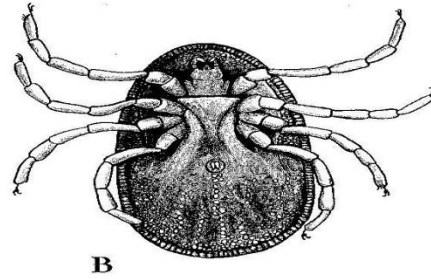
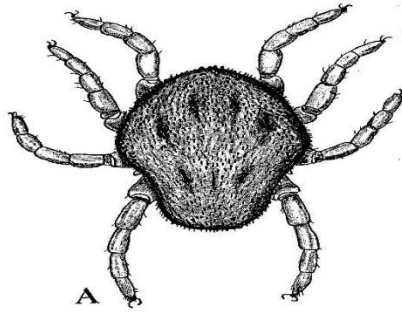
Damage to hides & skins

- ✓ Leads to devaluation of the same

Ticks contd.

- **Ixodidae** nymphs & adults both have a prominent **capitulum** which projects forwards from the body
- Conversely, in the **Argasidae**, the capitulum is concealed beneath the body
- Argasidae contains 193 spp. & the currently accepted genera are ***Antricola*, *Argas*, *Nothaspis*, *Ornithodoros* & *Otobius***

Examples of soft & hard ticks



Examples of hard ticks

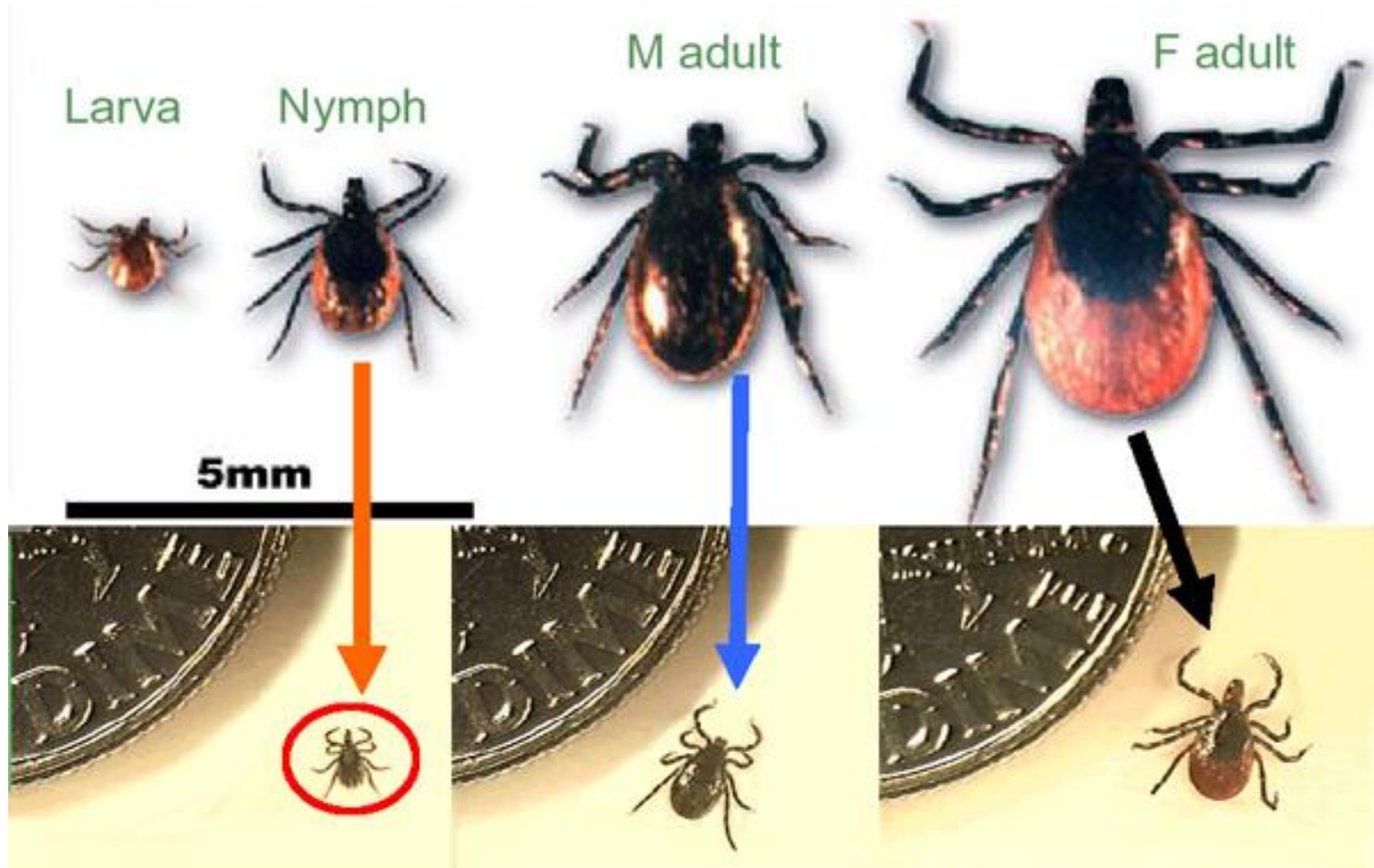
- Hard ticks include the genera:
 - ✓ *Amblyomma*
 - ✓ *Boophilus,*
 - ✓ *Dermacentor*
 - ✓ *Haemaphysalis*
 - ✓ *Hyalomma*
 - ✓ *Ixodes*
 - ✓ *Ripicephalus*

General life cycle (L/C) of ticks

- There are 4 stages in the life cycle of the tick
- Transition from one stage to another is by moltings i.e., shedding of an exoskeleton
- Duration of each stage is influenced by spp. adaption, temp. moisture & host availability

- **NB:** Depending upon L/C – Hard ticks are classified as
 - ✓ One – host tick
 - ✓ Two – host tick, or
 - ✓ Three - host ticks

Parasitic stages of hard ticks



Family: Argasidae (soft ticks)

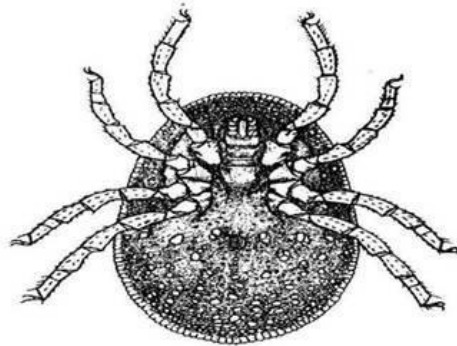
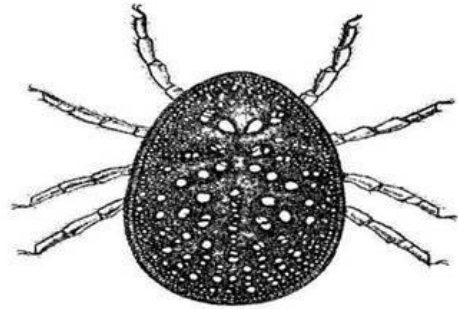
Genus: *Argas persicus*

Common names: Fowl tick, Chicken tick or Fowl tampan

Identification: Nymphs & adults are ovoid, very flat & leathery

- Dorsal & ventral side meet on the edges at a point or **suture line**
- Mouth parts not visible from dorsum
- Adults are uniform reddish brown in color with little sexual dimorphism

Argas persicus



Genus: *A. persicus*

Hosts: Chicks primarily, but other domestic & wild birds may be affected; rarely in domestic animals & man

Distribution: Cosmopolitan

Importance: Heavy infestations may lead to anaemia & death

Transmits : ***Borrelia gallinarum*** which causes fowl spirochaetosis & ***Aegyptinella pullorum*** a protozoan haemoparasite

Diagnosis: Done by finding ticks & dark colored faeces in hiding places (cracks & crevices)

Genus: *Ornithodoros moubata*

Common name

- Relapsing fever tick or eyeless tammans of Africa

Hosts

- Man & various domestic animals

Identification

- Ticks are thick, leathery & pod-like (lacks suture line)
- Has a well developed hypostome & a mammillated integument

***Ornithodoros* spp.**



Importance of *O. moubata*

- This is the most important genus of soft ticks from a medical standpoint
- Sole vector of *Borrelia duttonii* which causes relapsing fever in man in East, Central & South Africa
- The tick can transmit *Coxella burnetti* which causes Q. fever in man
- Spreads African swine fever virus from warthogs to domestic pigs

Family: Ixodidae (hard ticks)

Genus: *Rhipicephalus*

Identification features

- Hypostome & palps are short
- Basis capituli usually hexagonal – projected dorsally
- Eyes present & festoons present
- Anal plates present in males – ventrally
- Coax I, i.e., proximal segment of 1st leg is bifid (or clefted)
- Inornate

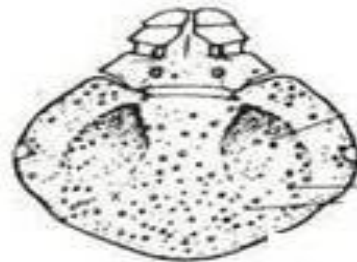
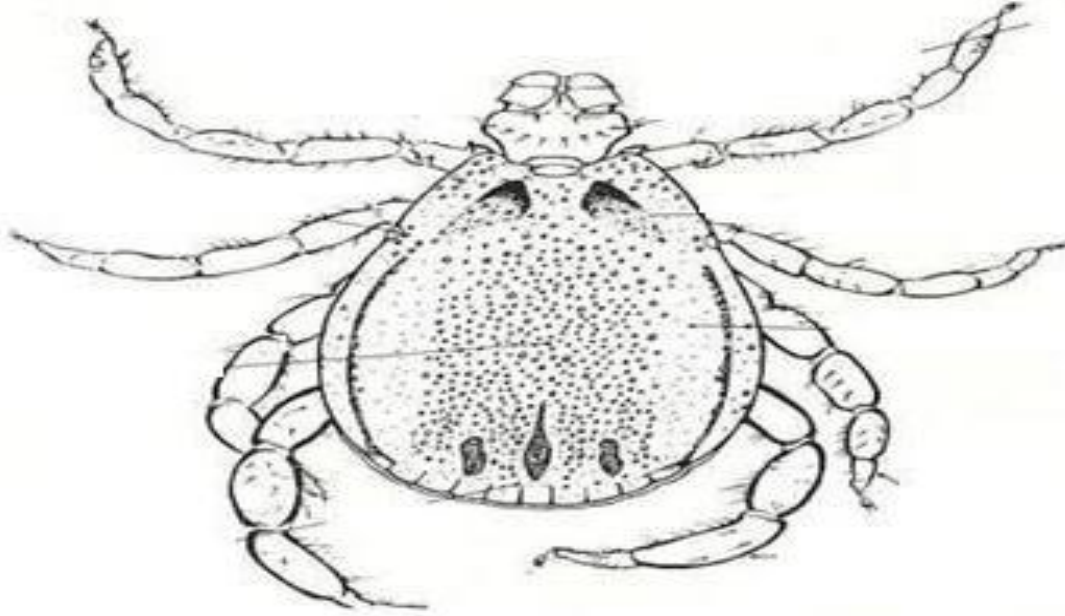
Genus: *Rhipicephalus* spp.

- Anterior process of coxae I visible from dorsal surface
- Spiracles are comma shaped, short in males & long in females
- After feeding, males develop a tail – like **caudal appendage** at the posterior end

Important spps.

1. *R. appendiculatus* – The brown ear tick

Rhipicephalus appendiculatus



***R. appendiculatus* contd.**

Hosts

- Mainly cattle, sheep & goats
- Others – wild antelopes, horses, donkeys & dogs

Sites

- In cattle, individuals attach on edges of the ears & inner surfaces
- Other parts of head, i.e., bases of the horns, eyelids & cheeks & also the tail switch

L/C

- 3 - host tick

Importance of *R. appendiculatus*

- Biologically transmits
 - ✓ *Theileria parva* = E.C.F = most efficient vector (stage to stage)
 - ✓ *T. mutans* = Theileriosis = non pathogenic
 - ✓ *T. Lawrencei* = parasite of buffaloes but cause corridor disease in cattle = fatal
 - ✓ *Babesia bigemina* = red water in cattle
- Can transmit Nairobi sheep disease virus

R. sanguineus

Common names: Brown dog tick or Kennel tick

Identification: As the others but:

- Cervical pits present, eyes slightly convex & marginal groove sharply defined
- Three posterior grooves presented & well defined

Hosts: Mainly dogs, wild carnivores & birds but rarely wild ruminants

- Larvae & nymphs frequently feeds on the same hosts as adults

***R. sanguineus* contd.**

Sites

- Adults mainly on the ears, but can be found in other parts of the body
- Larvae & nymphs may be found anywhere on the host

Distribution

- One of the most widely distributed tick spp. in the world (cosmopolitan)

L/C: 3 - host tick

Importance of *R. sanguineus*

Transmits

- *B. canis* = Tick fever
- *Ehrlichia canis* = Canine monocytic ehrlichiosis (CME)
- Tick - typhus or tick - fever of man
- Spirochaetosis of cattle, sheep & goats
- *B. equi*, *B. cabali* in equines
- Discomfort to dogs
- Blood loss

Genus: *Boophilus*

Features of genera: Inornate

- Hypostome & palps are short
- Basis capituli hexagonal
- Eyes present, though difficult to see
- 1st coax has cleft but not as deep as ***R. appendiculatus***
- Spiracles circular or oval
- Festoons absent
- Anal plates present in males

***B. decoloratus* (The Blue Tick)**

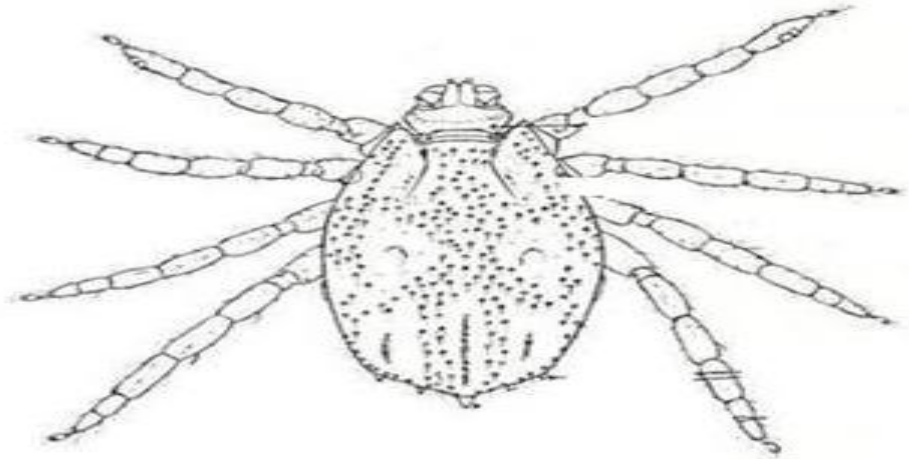
Morphological features

- Hypostome armed
- Internal margin of the first segment of each palp has a bristle – bearing protuberance on it
- Small tail – like caudal appendage present in males

Hosts

- Chiefly cattle, but sheep, goats & horses may be attacked

Boophilus decoloratus



***B. decoloratus* (contd.)**

Sites

- Always attaches on the side of body, shoulders, neck & dewlap
- Immature stages can be found on the tips & upper edges of the ear

Distribution: Prefers moist conditions

- Found from sea level to 2500 m or more
- Widely distributed in E. Africa

L/C: One - host tick

***B. decoloratus* (contd.)**

Importance

- Chief vector of ***Anaplasma marginale*** & ***A. centrale*** which cause Anaplasmosis in ruminants
- Transovarial transmission of ***Babesia bigemina*** which causes red water in cattle
- Vectors of spirochaetes which cause spirochactosis of cattle, shoats & horses
- Causes severe irritation to animals
- Death due to severe anaemia

Other species: ***B. annulata*** & ***B. microplus***

Genus: *Hyalomma*

Characteristic features

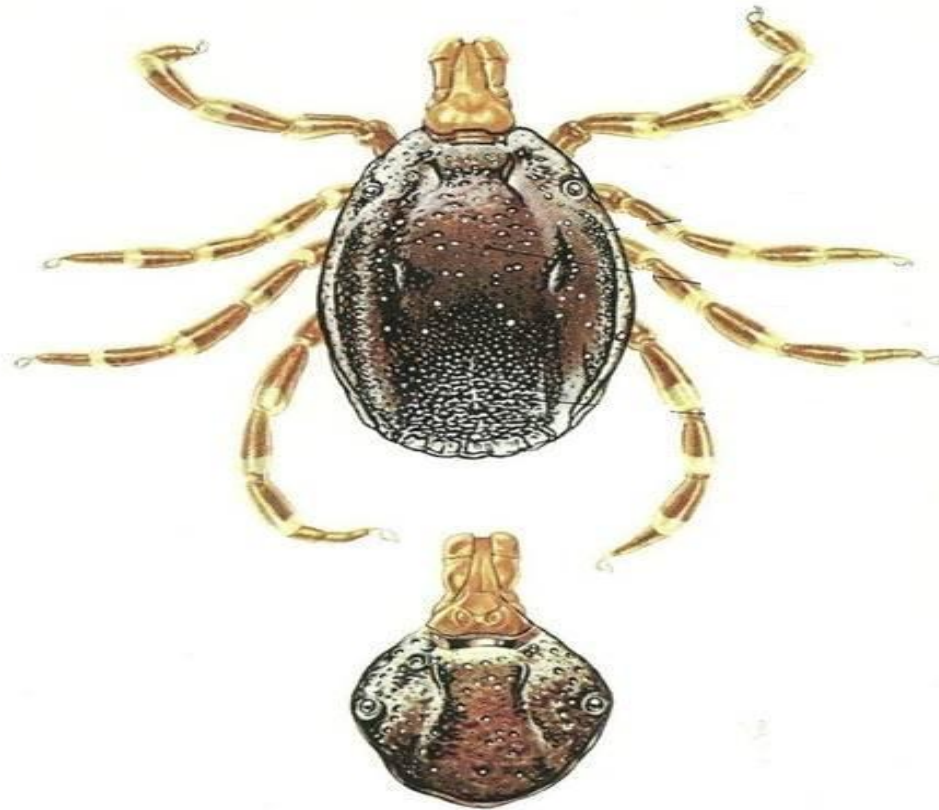
- Ornate, i.e., legs are banded – reddish brown & scutum is uniformly brown
- Hypostome & palps long
- Eyes & Festoons present
- Ventrally anal plates present in males

Important spp.: *H. truncatum*

Common name: African bout – legged tick

L/C: 2 host tick, but may behave a 3 host tick

Hyalomma truncatum



H. truncatum contd.

Hosts

- Adults attaches on cattle, shoats, other domestic animals & wild game (buffalo etc)
- Immatures attack hares & birds

Site

- Adults will be found upon the udder or scrotum, groin, around anus, tail turf & between hooves

Distribution: Widely distributed in many dry areas with rainfall < 650 mm & very common in E.A

H. truncatum contd.

Importance

- Transmits sweating sickness virus (sweating sickness disease) in calves
- Causes tick paralysis in calves (tick toxins)
- Causes lameness & associated with foot rot in sheep – secondary bacterial infection
- Causes tick paralysis in man
- Transmits ***Coxiella burnetti*** that causes Q. fever in man

Genus: *Amblyomma* (The Bont Tick)

Common features

- Highly ornate i.e., colored pattern usually present on scutum & the legs are banded
- Hypostome & palps long with the 2nd segment of palpi being twice as long as the rest
- Eyes present
- Anal plates in male absent ventrally
- Festoons (11) present

Important spp. of *Amblyomma*

Amblyomma variegatum

Common name: The Tropical Bont Tick (Variegated Tick)

Hosts: Cattle favourite host of adult ticks

- Can infest shoats, horses & wild game
- Can attack man causing intense irritation & inflammation

Sites: Adults attaches on the belly, udder or scrotum & dewlap, brisket & flanks of their host

- Nymphae often feed on heels & may be found on the head & ears as are the larvae

Amblyomma variegatum



***A. variegatum* contd.**

L/C: 3 – host tick

Distribution: Frequently found in the same areas as the Brown Ear Tick

- Not found in very dry areas

Importance: **Disease transmission**

- Principal vector ***Rickettsia (Ehrlichia) ruminantium*** which causes heartwater in ruminants'
- Nairobi sheep disease virus

Importance of *A. variegatum*

- Transmits *Coxiella burnetti* that causes Q. fever in man & animals
- *T. mutans*

Bites: Very severe

- Wounds formed becomes septic – abscesses
- Inflammation of teats of cows

Damage to skins & hides

- Secondary bacterial infections – bovine lymphagitis & myiasis

***Amblyomma gemma* (The Bout Tick)**

Features: Eyes slightly convex, not beady & orbited

- Festoons not entirely black in males

Hosts: Normally cattle but other domestic animals & camels

- Wild animals – buffalos, rhinos, zebras & large antenlopes

Sites: As ***A. variegatum***

L/C: 3 - host tick

Amblyomma gemma



***Amblyomma gemma* contd.**

Distribution: Found in dry areas with < than 650 mm of rain & associated with *R. pravus*

Importance: Principle vector of *R. (Ehrlichia) ruminantium* in sheep & goats in marginal areas (heart water)

- Nairobi sheep disease virus
- Bites are also quite painful

Other spp.: *A. lepidum* – occurs in dry & semi-desert areas of E.A.

- Can transmit **Rickettsia prowazekii** of man

Genus: *Haemaphysalis*

Important spp.: *H. leachi* (Yellow Dog Tick)

General features: Inornate

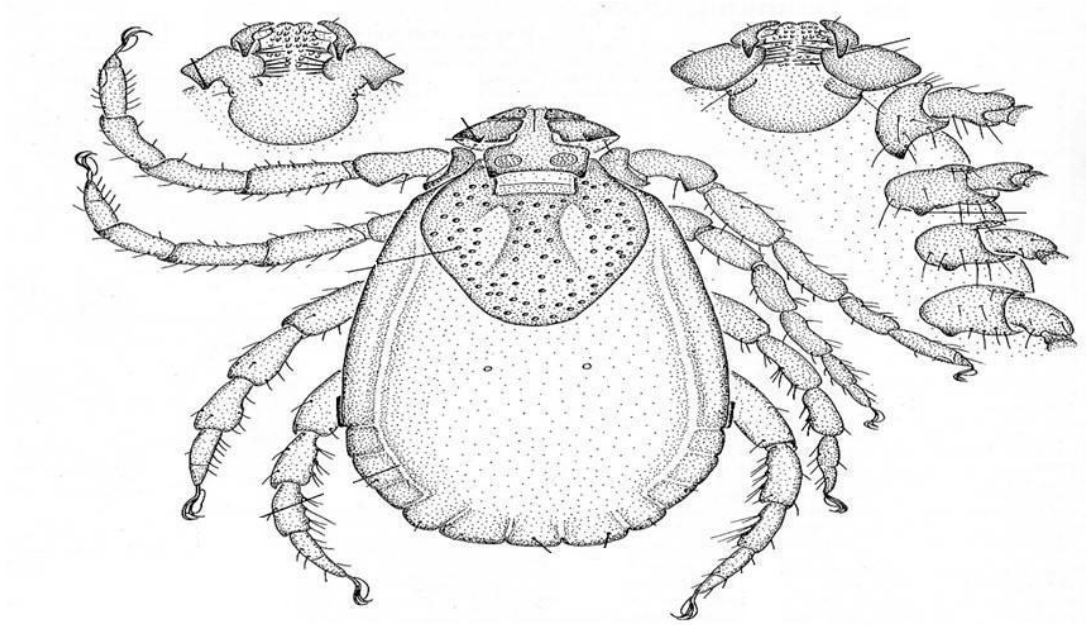
- Hypostome & palps short & conical in appearance
- 2nd segment of palp widely triangular with strong spurs postero – laterally

Hosts: Adults mainly upon dogs & wild carnivores

L/C: 3 - host tick

Importance: Transmits *B. canis* – transovarially

Female *Haemaphysalis* spp.



Genus: *Ixodes*

Important spp.: *I. rubicundus* (Karoo Paralysis Tick)

Features: Inornate, no eyes & no festoons

Host: Adults on cattle & shoats

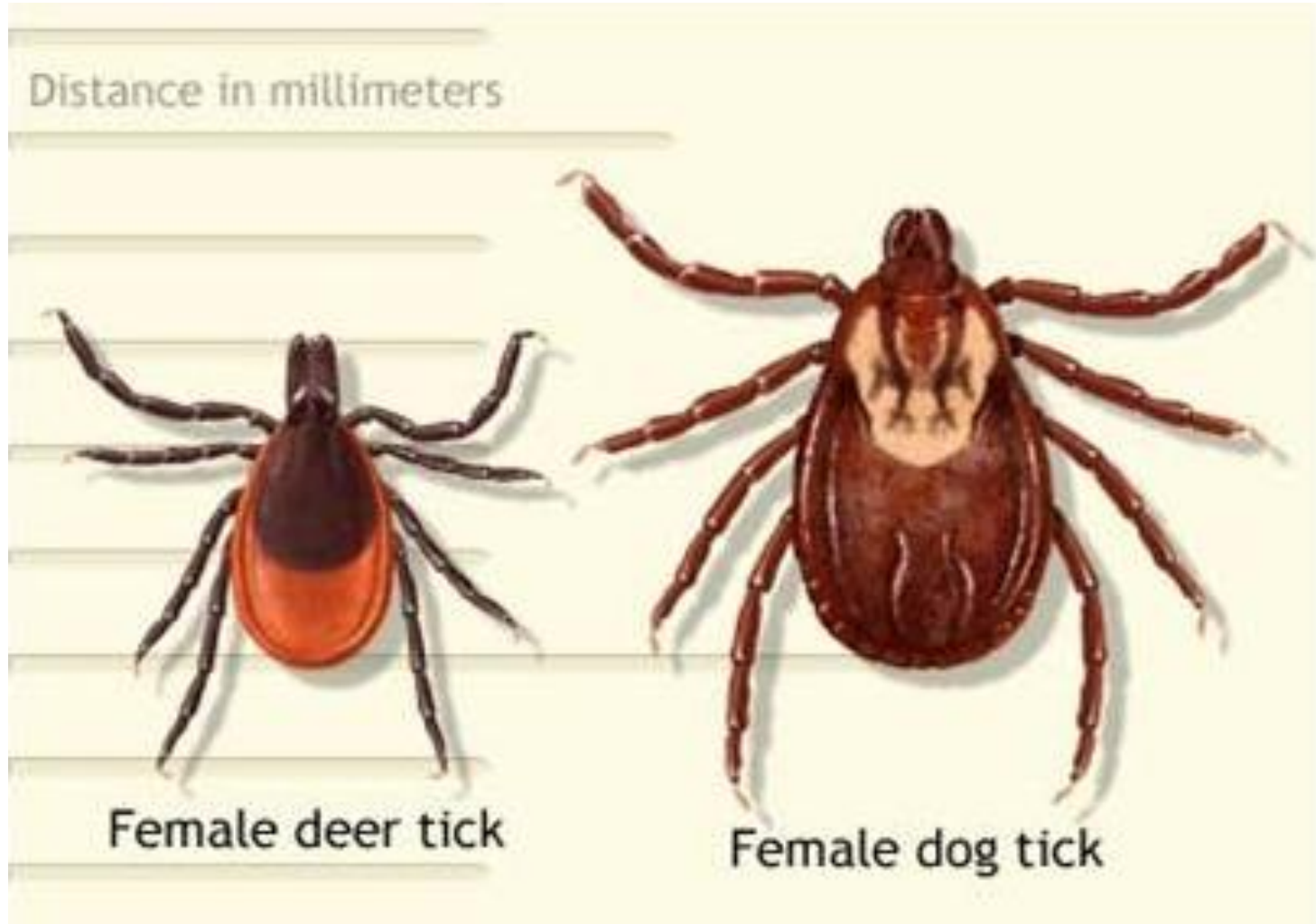
Sites: On legs & ventral aspect of body

L/C: 3 host tick

Importance: Causes tick paralysis in sheep

- The deer tick (*I. scapularis*) is the main vector of Lyme disease, human granulocytic ehrlichiosis & babesiosis

Ixodes scapularis & *Dermacentor variabilis*



Genus: *Dermacentor*

Important spp.: *Dermacentor nitens*

Common name: Tropical horse tick

Features: Basis capitulum is rectangular

- Eyes present
- Festoons (11) present
- Scutum ornated
- No anal plates in males ventrally
- Coxae of males progress in size from 1st to 4th
- Importance: Can transmit *Babesia caballi* – Equine piroplasmiasis

Dermacentor nitens



ACAROLOGY

Collection of ticks

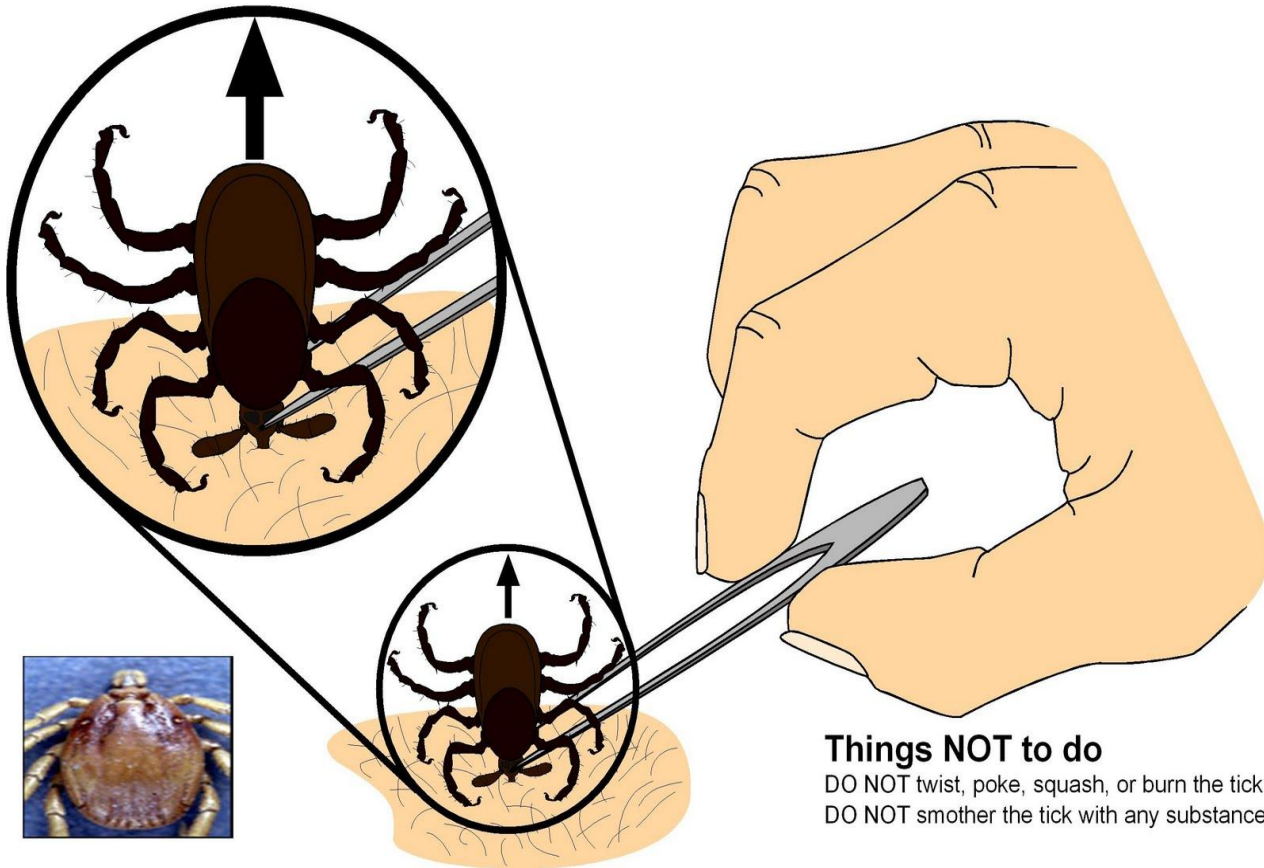
Resistance testing

- Remove ticks from the host animal immediately prior to dipping
- At least 20 **engorged female** ticks should be collected
- Take care not to damage the ticks (especially mouth parts) when removing
- Place ticks in a suitable glass bottle containing a few pieces of green grass

Collection of ticks

Removal of a Tick

Using a pair of tweezers, find where the tick's mouthparts have entered the skin. Place the ends of the tweezers around the base of the mouthparts and while applying gentle pressure pull the tick up slowly and steadily until it releases its hold. Dispose of the tick in a sealable plastic bag in the trash *outside* your home.



Things NOT to do

DO NOT twist, poke, squash, or burn the tick
DO NOT smother the tick with any substance

Acarology contd.

- Plug the neck of the bottle firmly with a piece of cotton wool
- Pack the bottle securely in a suitable container to avoid damage during transport

Tick identification

- Remove the ticks from the host animal taking care to avoid damage
- Male, female & immature stages should be included
- Place into 70% alcohol in a universal bottle
- Attach the lid firmly

Acarology contd.

- Specimen should be accompanied by the following information
 - ✓ Host species
 - ✓ Age & condition of the animal
 - ✓ Site of attachment of the ticks (very important)
 - ✓ Locality
 - ✓ Date

Acarology contd.

Examination

- A glass slide coated with a thin layer of modeling wax is used to support the ticks
- Ticks should be positioned on the wax so that the features to be examined are displayed prominently uppermost
- Examine using a stereo-microscope

MITES OF DOMESTIC ANIMALS & MAN

Suborders of economic importance

- **Prostigmata (Trombidiformes)**: i.e., Genus *Demodex* which causes demodectic mange
- Others include: *Trombicula* spp.

- **Astigmata (Sarcoptiformes)**
- Includes **Oribatid mites** = Acts as I/Hs of tapeworms (**ANAPLOCEPHALIDAE**) of domestic animals

Suborder: Mesostigmata

- Mesostigmatids as the name implies, have **STIGMATA** in the middle of their bodies
- A stigma (Respiratory pore) lies between the 3rd & 4th coxae on each side of the body
- The Coxae are evenly spaced & crowded into the anterior half of the body
- The tarsi are generally armed with claws, & the ventrum is armored with sclerotized plates
- Example: Poultry red mite = *Dermanyssus gallinae*

Genus: *Dermanyssus*

- *D. gallinae*: Blood sucking mites that parasitize birds (fowls, pigeon, canary, other caged birds & wild birds)
- The mite can occur as a temporary parasite of human causing skin lesions
- Common name: **Red mite of poultry** = but only red when it has recently fed on hosts blood
- Otherwise, whitish, grayish or black
- The engorged female adult is about 1mm. long or larger, other stages of the L/C being smaller

Dermanyssus gallinae



***D. gallinae* contd.**

Identification features

- The chelicerae are long & slender (whip-like) & the chelae minute
- There is a single dorsal plate & the sternal plate has two pairs of setae
- The anus is in the posterior half of the anal plate

Habits: Cosmopolitan in distribution

- Nymph & adults periodically visit hosts to suck blood (mainly at night)

Importance of *D. gallinae*

- Causes irritation, affecting production & anaemia due to loss of blood & this may cause death
- *D. gallinae* is a vector of *Borrelia anserina*, the cause of spirochaetosis of the fowl

Diagnosis

- Mites can be seen with unaided eye on physical examination of the birds, especially when they have fed recently on blood & are red
- Differential diagnosis: Soft tick - *Argas pesicus*

Genus: *Railletia auris*

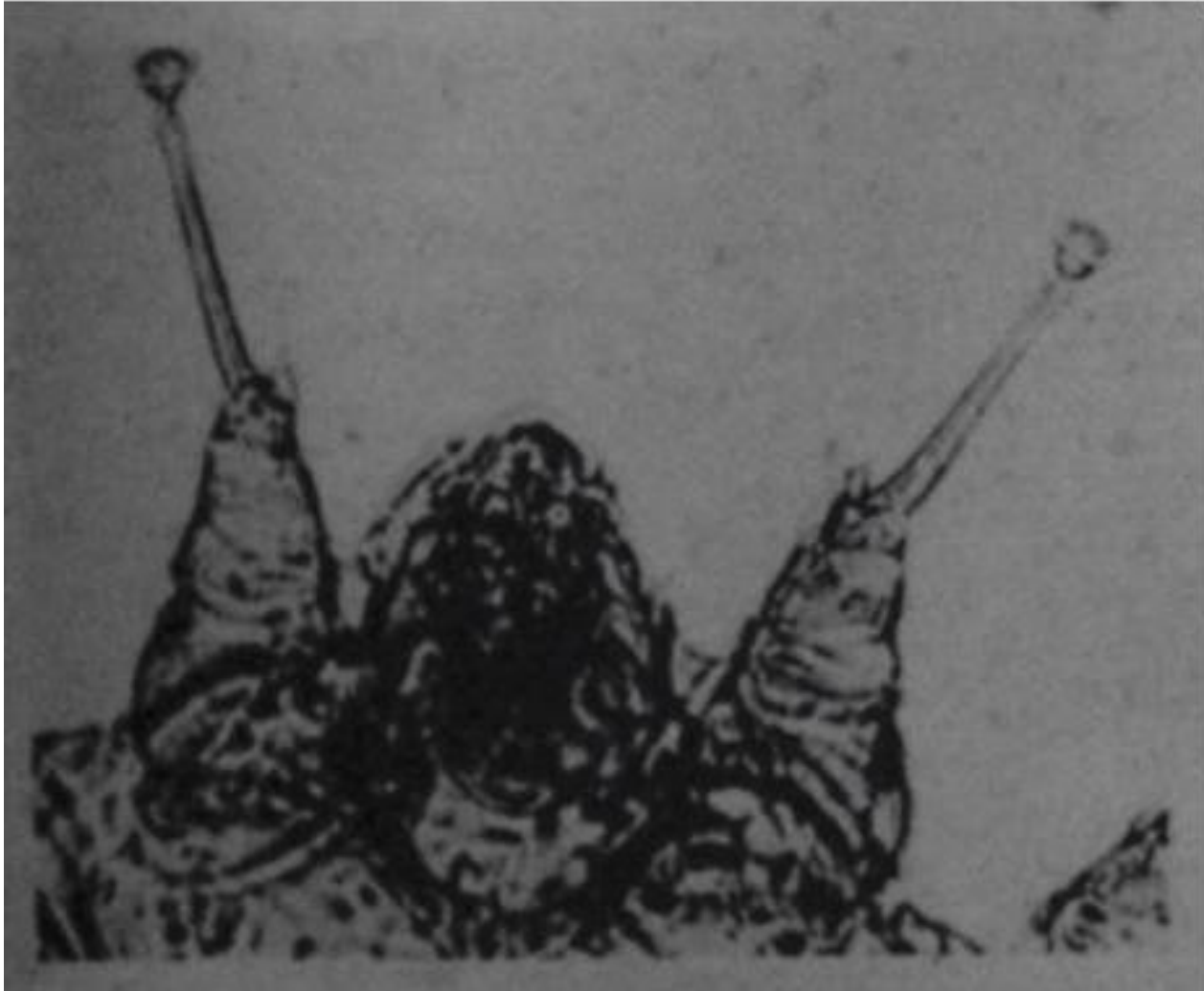
- Long considered a harmless parasite of the ears of cattle
- But has been incriminated as one of the causative agents of bovine parasitic otitis in ranches in Kenya
- Other agents include a nematode - *Rhabditis bovis* & bacteria, i.e.,
 - ✓ *Corynebacterium pyogenes*
 - ✓ *Pseudomonas pyogenes*
 - ✓ *Staphylococcus aureus*

SUBORDER: ASTIGMATA

General information: In contrast to mesotigmata, astigmatid mites lack stigmata & respiration is integumental

- The 1st & 2nd coxae are widely separated from 3rd & 4th coxae
- The ventrum is devoid of conspicuous plates
- The tarsi are equipped with suckers (Sarcoptiforme pretarsi)
- Astigmatids include the mange mites, two internal parasite of chicken & the grain mites

Pretarsi of *Sarcoptes*



Mange mites

- Mange mites cause pathological lesions referred to as **mange** or **scabies**
- It is a pruritic & contagious skin condition often resulting in dermatitis, alopecia, & scab formation
- As the irritation increases, animals rub & scratch the affected areas while keratinization & proliferation of connective tissue lead to thickening & fold formation
- Thus, it is a chronic debilitating skin disease

Mange mites contd.

- The lesions expose the affected animals to secondary bacterial infection, resulting in stress, loss of condition & death of untreated animals
- Death mainly due to progressive emaciation or toxaemia
- **NB:** Mange is a disease of poor- conditioned animals (i.e., due to poor nutrition, hygiene, adverse environment & concurrent infections)
- **NB:** Psoroptic mange in sheep & Sarcoptic mange in cattle should be reported to the DVS

Family: Sarcoptidae

Genus

Sarcoptes scabiei

- Parasites are roughly circular in outline
- The pretarsi have long, unsegmented pedicels
- All the legs of both the sexes are short & the 3rd & 4th pairs do not project beyond the margin of the body
- The anus is at the posterior edge of the body (terminal)

Sarcoptes scabiei* var. *bovis

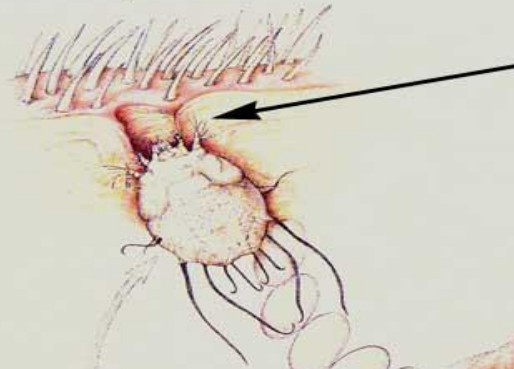


Sarcoptes scabiei

- *S. scabiei* cause sarcoptic mange or scabies of man, dogs, cattle, pigs & others
- There are species varieties i.e., *S. scabiei* var., bovis, ovis, caprae, equi, suis, canis etc)
- L/C:The female burrows into the skin & lay 40-50 eggs in the tunnels it forms
- These hatch in 3-5 days to produce 6 legged larvae
- There are 2 nymphal stages & development from the time the eggs are laid lasts 17 days

L/C of *S. scabiei* . var *canis*

Sarcoptes



Female mites burrow into the skin and form tunnels. It is in these tunnels that the eggs are laid.



Mites cause an intense inflammatory reaction, itching and self-trauma. Secondary bacterial infections are common.



Larvae and nymphs grow in the tunnels.

Clinical signs

- ***Sarcoptes*** prefers areas of the body that are not covered by much hair, such as
 - ✓ The face & ears of shoats & rabbits
 - ✓ The hock, elbow, muzzle & roots of the tail in dogs
 - ✓ The head & neck of equines
 - ✓ The sacral region & neck in cattle & the back of pigs
- When the disease is allowed to spread, all parts of the body may eventually become affected
- Disease rare in woolen sheep
- Local signs are obvious from the pathogenesis

Sarcoptic mange of cattle



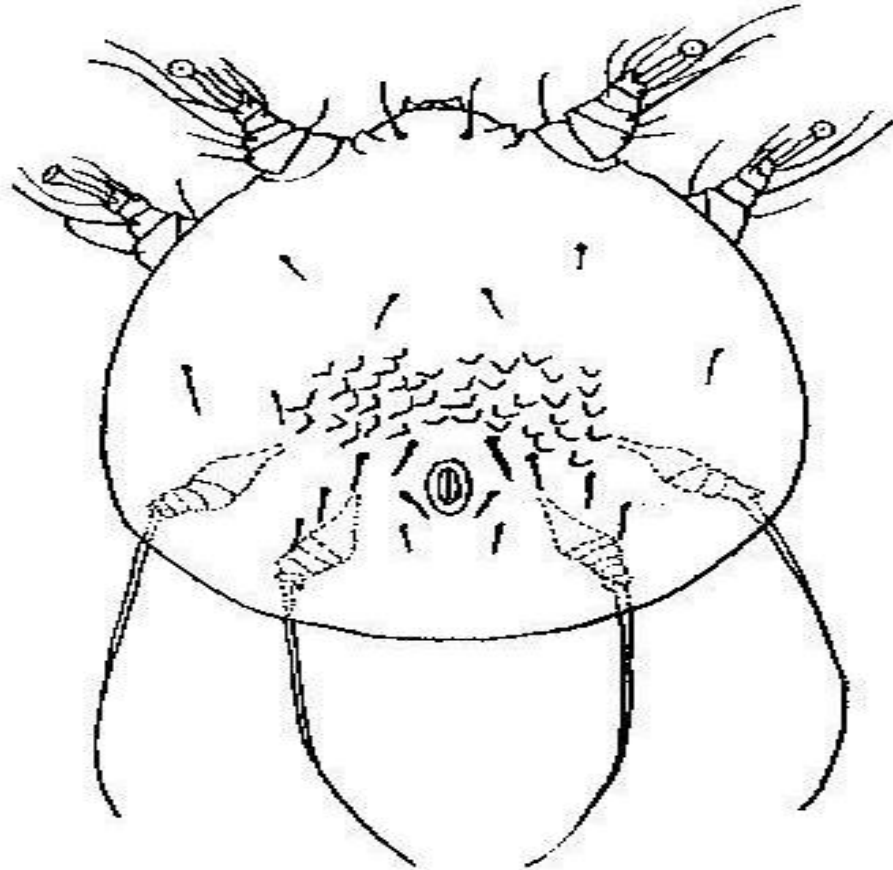
Sarcoptic mange of dogs



***Notoedres cati* (Cat Mite)**

- Genus: ***Notoedres cati*** - A minute parasite of cats, rats, & occasionally & temporarily of man
- Resemble *Sarcoptes* but is smaller & its anus is on the dorsal surface instead of the posterior margin of the body
- *N. cati* occurs chiefly on the ears, & back of the neck, but may extend to the face, foot, hind paws & in young cats, to the whole body
- These mites burrows into the skin, causing mange-like lesions & mites are easily demonstrated

N. cati



Treatment of *N. cati*

- Cats are especially susceptible to the toxic effects of chlorinated hydrocarbon insecticides & also to several of the O/P compounds & special care is needed
- Treatment of choice is **lime sulphur solution**
- The cat is first bathed & then dipped or washed with 1:40 solution of lime sulphur in warm water

Family: Cnemidoptidae

- Genus: ***Cnemidoptes mutans*** = The Scaly Leg Mite
- Causes the condition known as scaly legs in fowls & turkeys
- The female ***C. mutans*** is about 0.5mm in diameter, the legs are very short & lack pretarsi
- The males are much smaller & have longer legs equipped with pretarsi resembling those of ***Sarcoptes***

Cnemidocoptes mutans

- The parasites pierce the skin underneath the scales, causing inflammation with exudate that hardens on the surface & displaces the scales
- This process, accompanied by marked keratinisation is responsible for the thickened scaly nature of the skin, lameness & malformation of the feet

Scaly leg syndrome



C. gallinae

Genus: ***C. gallinae***

- Common name: The Depluming Mite
- Causes Depluming Itch in fowls
- Small mite, resembling ***Sarcoptes***
- Is found at the base of feathers on the back, top of the wings, on the vent , breast, & thighs
- They cause intense pruritus leading in turn to pulling of feathers
- Lesions are mostly seen on the back & wings, more rarely on the neck & head

Family: Psoroptidae

- Genus: *Psoroptes*
- They are oval in shape & larger in size
- The legs are long & the pretarsi have long, three segmented pedicels
- As a general rule these parasites live on the skin of parts of the body well covered with hair or wool or in the ears of their hosts
- They never burrow & are referred to as surface mites (or non-burrowing mites)

Psoroptes spp.



Genus: *Psoroptes* spp.

- *P. communis* var. *cuniculi* is very common & causes ear canker (otic acarosis) in rabbits
- Genus: *Psoroptes ovis* - Sheep Scab Mite
- *P. ovis* cause very serious & reportable form of mange (Scabs) in sheep
- The mites are best demonstrated under the edges of the scab lesions

A rabbit with otic acarosis



Alopecic sheep due to *P. ovis* infestation



Psoroptic mange in cattle

- Psoroptic mange is a severe skin disease in cattle, caused by a mite indistinguishable from *Psoroptis ovis* (the cause of sheep scab)
- It causes severe dermatitis with scab formation primarily along the back & over the shoulders, but other areas can be affected
- Pruritus is intense & secondary infection leads to bleeding & crusting
- Weight loss can be marked & death have been reported

Psoroptic mange of cattle



Psoroptic mange in cattle contd.

- Purchased infected animals are the main means of spread
- Treatment of psoroptic mange is problematic as the majority of cases do not respond to macrocyclic lactones (i.e., ivermectin)
- A 4% permethrin pour-on product (Fly-Por, Norvartis) given to all animals at an increased frequency (three treatments at two-weekly intervals) as proved effective

Genus: *Chorioptes*

- The parasite resemble *Psoroptes*, but the tarsal suckers have unjoined pedicles
- The male has two **turretlike lobes** on the posterior margin of the body
- Different spp. of this genus live on the skin of several spp. of domestic animals & causes chorioptic mange
- Species named after the hosts on which they occur

Chorioptes bovis



Genus: *Otodectes*

- O. cynotis*: Occurs in the ears of the dog, cat, fox & other carnivores, causing ear or otodectic mange
- The parasite resembles *Chorioptes*, they have tarsal suckers with unjointed pedicles on the 1st & 2nd pairs of legs in the female & on all four pairs in the male
 - The 4th pair of legs in the female is small
 - In the male the copulatory tubercles are not prominent

Otodectes cynotis



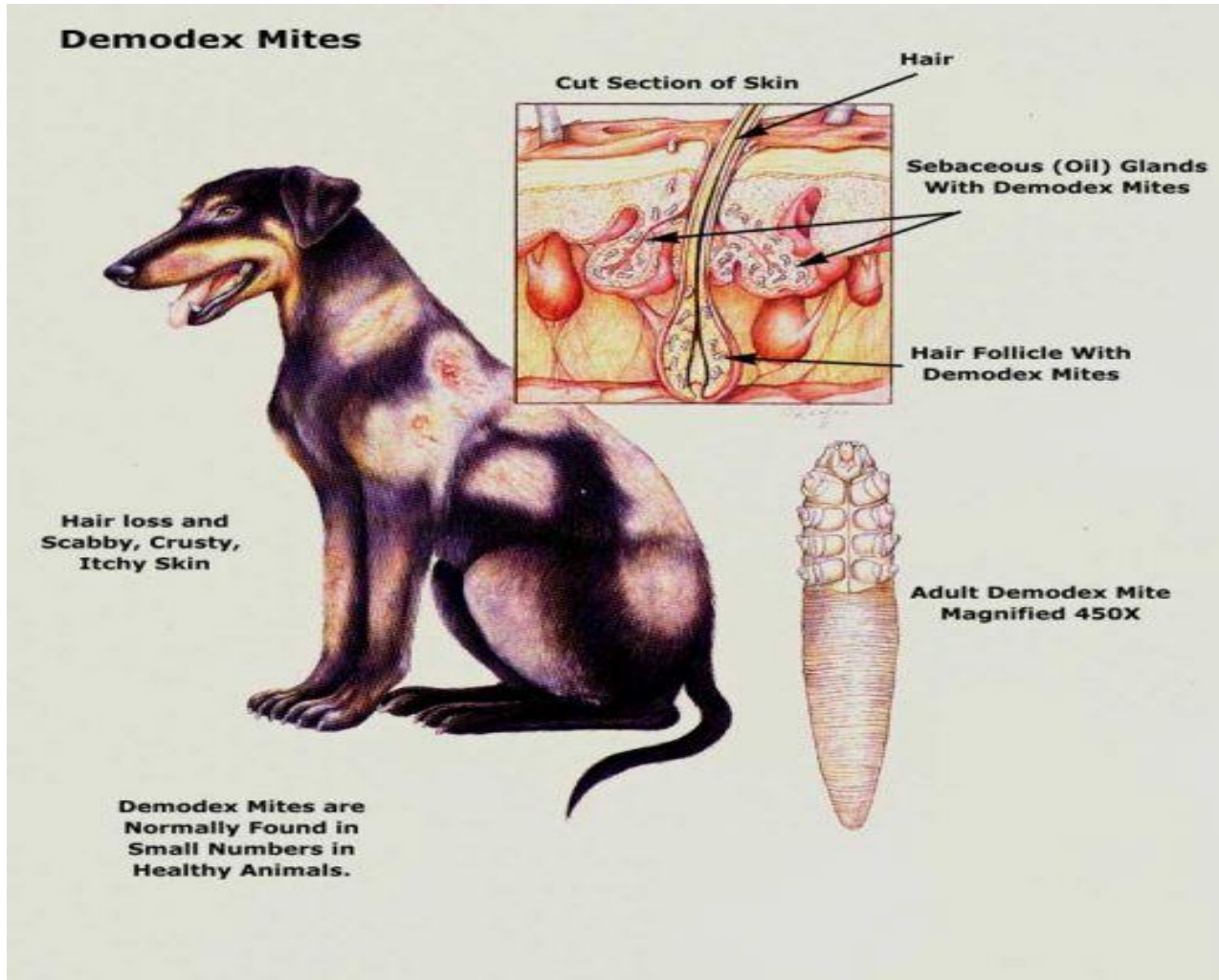
SUBORDER: PROSTIGMATA

Family: Demodicidae

Genus: *Demodex*

- This is a very specialized parasite which live in the hair follicles & sebaceous glands (Pilosebaceous mites) of various mammals
- Causing demodectic or follicular mange
- Most of the spp. are called after their hosts; i.e., *D. canis*, *D. ovis*, *D. caprae*, *D. bovis*, *D. cati*, *D. caballi*, *D. folliculorum* & *D. brevis* in man; *D. phylloida* on the pig

Pilosebaceous mites



Demodex contd.

Morphology

- ***Demodex*** spp. are tiny, worm-like mites with short stumpy legs
- The parasites are elongate, usually about 0.25mm – long
- Have a head, a thorax which bears four pairs of stumpy legs, & an elongated abdomen which is transversely striated on the dorsal & ventral surfaces
- The mouth parts consist of paired palps, chelicerae & an unpaired hypostome

Demodex canis



Epidemiology

- *Demodex* can be recovered from healthy skin especially in older dogs, & produces mange only when the general health & condition are markedly affected
- Infection is transmitted by direct contact or by mechanical means
- For dogs, predisposing factors are age (< 10 month most susceptible), short hair, poor body condition, debilitating diseases - **Canine distemper**

Pathogenesis

- The mites enter the hair follicles & sebaceous glands producing a chronic inflammation with proliferation & thickening of the epidermis & loss of hair (**alopecia**)
- A secondary bacterial invasion, usually by *S. aureus*, frequently takes place & leads to the formation of pustules or abscesses
- Death is due to toxaemia or emaciation in protracted cases

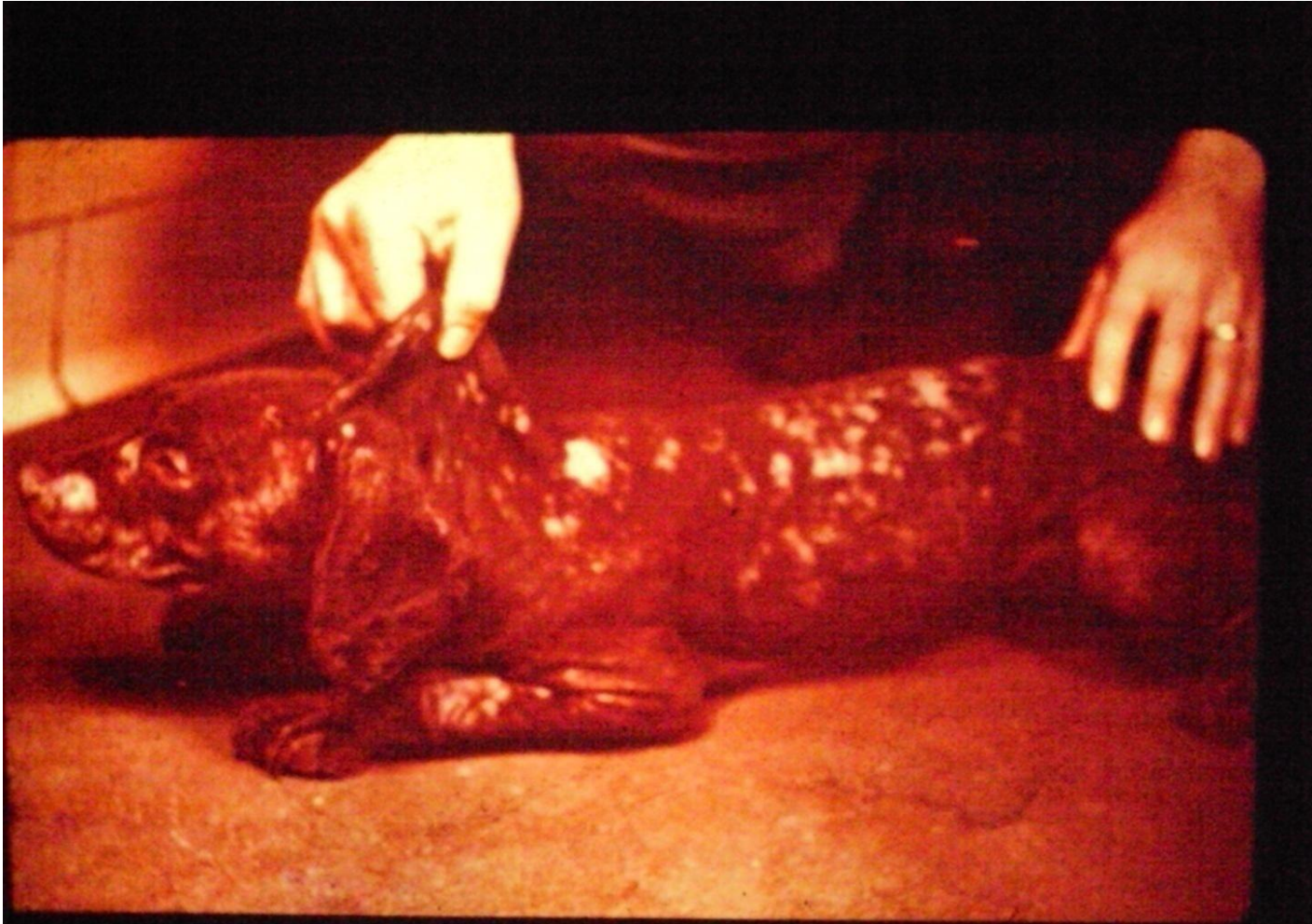
Clinical signs

- Two forms of the disease are usually recognized
- **SQUAMOUS** or scaly form where there is loss of hair, thickening & wrinkling of the skin
- **PUSTULAR** form is due to bacterial infection & is usually preceded by the scaly form
- Pustules are few mm in diameter, but large abscesses may form, & chronic necrotic foci are sometimes seen

Squamous demodecosis



Pustular demodecosis



Treatment

- The treatment of demodectic mange is usually accomplished with topical application of lotions, dips, & shampoos
- A treatment that has been successful for years has been a **1% Rotenone** ointment, or more recently, a **5% Benzoyl peroxide** applied daily
- However, the treatment of choice continues to be **Amitraz** , an organophosphate (**Mitaban**) applied every two weeks

Treatment contd.

- Macrocyclic lactones (i.e., Ivermectin & Moxidectin) have been used by veterinary practitioners with some good results
- Dogs that have generalized demodicosis often have underlying skin infections, so antibiotics are often given for the first several weeks of treatment
- In addition, they should be given a good multivitamin/fatty acid supplement

Diagnosis of mange

- Typical distribution & manner of spread of mange lesions vary with the host & parasite spp. & are characteristic enough to permit accurate diagnosis (DX)
- However, recovery & identification of the mites are necessary for positive DX
- In case of burrowing mites, take deep scrapings but for non- burrowing mites take superficial scrapings
- Examine the scrapings under a stereo-microscope or hand lens to find the mites crawling about

Taking skin scrapings



DX contd.

NB: if no mites are found (observed) directly, the skin scrapings should be digested using potassium hydroxide (KOH digestion)

Proceed as follows:-

- Add 5mls of 10% KOH aqueous solution to each scraping in a test tube
- With the aid of a test tube holder, gently heat the mixture for about 2 minutes for the digestions of the hairs

DX contd.

- Allow it to cool
- Centrifuge at 200 rpm for two minutes
- Decant the supernatant & transfer the sediment onto a slide for examination under the microscope
- The mites should be identified using their morphological characteristics