

## **FLEAS AND BUGS**

CLASS: Insecta

Sub-class: Pterygota

Divisions: (a) Exopterygota

Order: Hemiptera

Their mouth parts are adapted for sucking of piercing family: Cimicidae

Genus, Cimex

Spp: cimex lectularius

C. hennotenus

\* Haematosiphon inodora (Mexican chicken bug)

Cimex lectularius (bed bug)

-Best known attack man and animals to suck blood.

-4-5mm long, flat bodies, elongate oval in shape and yellowish-brown to dark-brown in colour.

-Head bears a pair of long antennae with 4 joints of which the first is short and the third and fourth are slender.

-Compound eye project conspicuously at the side of the head.

-Prothorax is large and deeply notched anteriorly where the head is inserted in it.

-Wings are vestigial.

-Abdomen has eight visible segments.

-Whole body is covered with x-tic spinose bristles and some hairs.

-Tibiae are long and tarsi have 3 joints.

-Adults have a pair of ventral thoracic stink glands and young stages have similar dorsal abdominal glands. These glands are responsible for the x-tic order of insects.

## **LIFE CYCLE AND HABITS**

Female lays about 150-200 eggs in dark crevices. The eggs are creamy white about 1mm long and has an operculum with a thick rim at the pole.

Larva too and resembles the adult. There are 5 nymphal stages. The rate of development depends greatly on food supply and the temperature. Under favourable conditions the adult stage is reached in 8-13 weeks after hatching. The bugs live long and can survive long period of starvation, Adults have been kept without food for over a year.

The insects live in boards, crevices and cracks of wood near the sleeping – places of their host e.g. Bedsteads behind picture rails and skirting /in the nest/perches of poultry.

They are mainly nocturnal insects but will bite sitting hen also in the day time. After a meal the bug defecates and usually turns round in such a way that its faeces fall on /near the wound thus providing the possibility for transmission of disease through its faeces. (E.g. Bugs may be

naturally infected with hepatitis B virus which can transmit this virus mechanically) or via faeces. Bed bugs may cause dermatitis \ asthma.

Bugs may travel relatively long distances, passing to adjoining houses from an infected one.

(Apart from being very annoying insects in human swellings, severe irritation and anaemia in poultry especially fowls, Turkeys and Pigeons.

### **CONTROL**

Lindane, chlordane, dieldrin are all powerful killers of bed bugs.

They can be used as sprays, smokes/powders. WHO recommends application of a 5% emission /solution of DDT to baseboards crevices, beds and mattresses.

On resistance to DDT use 0.1-0.9% of gamma BHC. On resistance to BHC are suggested, dusts being applied 2 weeks but sprays of these organophosphorous compound are too toxic for human beings.

\*Pouring of boiling water to kill the egg and nymph.

### *Triatoma*

Numerous spp of this family are vector of Trypanosoma cruz the cause of human trypanosomiasis in S/America, natural host of this trypanosome being dogs, fox, cat, monkey and other animals.

Triatoma are larger than cimex and have well developed wings and a cone – shaped head with abdomen flatter than that of cimex.

### **CONTROL**

Because these bugs can fly long distances control is difficult.

Houses may be screened and nets may be used to protect beds.

Application of 50mg/cq foot of dieldrin and elimination of the breeding places of these bugs.

Class : Insecta

Subclass : Pterygota

Division : Endopterygota

Order : Siphonaptera

They are called fleas. They are of veterinary significance not only because of their effects on their hosts but also as disease carriers.

## **MORPHOLOGY**

- Dark brown wingless insects laterally compressed bodies which have a glossy surface, allowing easy movement through hairs and feathers. Eyes when present, are simply dark, photosensitive spots and the antennae which are short and club-like are recessed into the head. The third pair of leg is much longer than other an adaptation for leaping on and off their hosts. Producing characteristic jump called FLEA, JUMP.

The head may bear at its posterior (prenatal), or ventral (genal) borders rows of dark spines called CTENEDIA or COMBS and these are the most important features used in identification.

## **LIFE CYCLE**

Female and Male are blood suckers and only adults are parasitic.

Ovoid eggs have smooth surfaces and may be laid on the ground or on the host from which they soon drop of hatching occurs 2 days – 2 weeks depending on the temperature of the surroundings. The larvae are maggot-like and have a coat of bristles. They have chewing mouth parts and feed on debris and on the faeces of the adult fleas which contain blood and give the larvae a reddish color under the influence of internal growth regulators, the larva moults twice, the final stage being about 5.0mm long, and then spins a cocoon, a form of woolly puparium, from which the adult emerges. Moulting and pupation are dependent on the ambient temperature, and though in warm conditions the whole cycle. The most important in dogs and poultry their readiness to parasitize humans as alternative hosts gives these domestic animals a relevance in PH. about 3 weeks, in low to it may extend to two years.

It is important to recognize that most of the flea's life is spent away from the host. This includes not only the eggs, larvae and cocoon but also if necessary the adult flea which can survive for as long as six months between feeds. Usual life span 1-2 yrs.

Most fleas feed for only for a few minutes before moving to another part of the host or leaping to the ground or to a fresh host.

A few genera remain permanently attached throughout adult life. These are the burrowing (stick fast) fleas whose females are embedded in the skin within modules. Only the posterior part of these flea communicates with the surface, allowing the eggs/larvae to drop to the ground and develop in the usual manner.

### *Classification and Identification of Fleas*

a) Presence/absence of pronotal/genal combs e.g. combs are absent in *Pulex* and *Echinophaga* + *Xenospsylla*. Pronotal comb is present but genal comb is absent in *Ceratophyllus*.

Both are present in *Ctenocephalides* and *Spilopsyllus*

b) Presence/absence of eyes

Ctenocephalids H, Xenopsylla

- c) Fusion/separation of thoracic sgs.
- d) Absence/presence of menopleural nod.

### **FLEAS OF MAMMALS**

Ctenocephalides

The only important genus in dog and cat. *C. canis* and *C. felis* occur on the dog and cat but *C. felis* is much more widespread and in many areas it is the dominant spp on dogs and on man as well as cats. Both spp can act as intermediate hosts for the common tapeworm of dogs and cats. *Dipylidium caninum* and for the Flaroid of dogs, *Dipetalonema reconditum*.

Through adult flea can acquire the flaroid infection by intake of microfilariae in a blood meal, the specialized mouthparts do not allow the ingestion of the eggs of *Dipylidium* and this infection can only be acquired by flea larva which has chewing mouth parts developmental of cestode occur concurrently with that of the flea so that the adult contains the cysticercoid.

Ctenocephalides is the only genus largely responsible for provoking allergic flea bite dermatitis in dog and cats.

*Pulex irritans*

Primarily parasitic on man, but in some areas it is common on dogs and cats. It can act as intermediate host of *D. caninum* and is since involved in flea-bite dermatitis.

*Spilopsyllus*

*S. cuciculi* – on the ears of rabbits and it is the main vector of myxomatosis. It has a more sedentary habit than most fleas and will remain on the ear even when it is handled. It is quite commonly found near the edges of the ear pinna of dogs and cats that frequent rabbit habitat.

*Xenopsylla*

Xp little important to vets but one spp *X. cheopis* is the main vector of *Yersinia pestis* (bubonic plague in man).

*X. cheopis* – rat flea acquire *Y. pestis* when feeding on its usual hosts.

Although now rare in man plague exists in wild ruminants ("sylvatic plague") in parts of Africa, Asia, South Africa and Western States of the United States of America.

*Tunga*

*T. penetrans* – rep in mammals of burrowing flea occurs in man and rarely in pigs popular name in man "Jigger" distribution – Parts of Africa, Asia, N&S/America but not in Europe.

F. burrows into the skin where its abdomen balloons enormously distended and filled with eggs forming a distinct nodule.

Occurs mainly on human feet causing severe irritation. Localization of jigger in the teats of sows has led to death of piglets from lack of milk due to mastitis.

#### Pathogenic Significance

- Response to a flea-bite is a raised, slightly inflamed wheal on the skin, associated with wild pruritus - D intermittent scratching.
- Repeated bite (several months) - D flea-bite allergy in dog and cat.
- Hypersensitive rxn
- Seasonality in some areas peaks in summer when flea activity is highest (temperature regions).
- Area affected - preferential biting sites of the fleas e.g. back, ventral abdomen and inner thighs.

Lesions in dogs - discrete crusted papules - distense pruritus.

Most important damage - scratching and biting infected by the and themselves. The area of alopecia/of moist dermatitis (wet eczema).

Skin thickened, folded and hairless in older and with pruritus less intense.

#### **DIAGNOSIS**

##### Clinical Signs

When signs are indicative of flea infestation, but no parasite can be found, the host should be sprayed with an insecticide, placed on a large sheet of paper/plastic and vigorously combed. The combings and debris should be examined for flea/faeces which shows as dark brown to black crescentic particles consisting almost entirely of blood, there will produce a spreading reddish stain when placed on moist tissue.

Use of vacuum cleaner with fine gauze inserted behind the nozzle, the latter nozzle is applied to the host or its habitat and the fleas are retained on the gauze.

##### TREATMENT AND CONTROL

In distress use corticosteroids topically/systemically as palliative Rx specific Rx: insecticide mainly in the form of powders, sprays, shampoos/spot on preparations are available (organophosphorus cpds - pyrethrum and its derivative or carbamates).

Oral in-feed drugs - benzoylurea derivative fenoxycarb.

A spray containing fiprovil (protects for 2-3months) flea collar 9dog and cats – lesser conc in cat).

NB: Insecticide to be used read instructions carefully.

- Some for one host spp.
- To be used at different doses/application rates for each. Control flea in the living quarters, indoor habitat and destroy bedding where possible.
- Fitted carpet should be thoroughly vacuum cleaned. Methoprene/insect growth regular aerosol for direct application to beddings carpets and other habitat of flea larvae.

## **FLEA OF BIRDS**

(a) Ceratophyllus

C. Gallinae – commonest flea of domestic poultry may be responsible for irritation, restlessness and even anaemia. Feeds readily on humans and domestic pets and its often acquired in the handling of poultry and from injured and wild birds brought into houses could migrate into rooms from nests under adjacent caves.

Echidnophaga

E.gallinacea ('stick tight' flea)

- burning fleas
- seen on the skin of the fowl (usually comb and wattles)

After fertilization F. burrows into the skin (as above) resulting in nodule formation in which eggs are laid. These eggs hatch within the nodules and the larvae dig to ground to complete development.

The skin over the nodules often becomes ulcerated and young birds may be killed by heavy infestation. E. also attacks mammals mainly dogs, nodules being formed around the eyes and between the toes.

Treatment and Control

Several organophosphorus compounds (carbamate and pyrethrum based).

- dust for ceratophyllus
- solution Echidnophaga.

Fleas establishment in a poultry house.

- Remove and burn all litter then spray the poultry house with an insecticide.

## Mites

Belongs to the acarine group. It consists of both parasitic and free-living forms; few of the free-living are of interest to the vets because they could serve as occasional parasites or as intermediate hosts of Anophoccephalid cestodes (Anplocephala, Moniezia and Stilesia).

Parasitic mites are small (most being less than 0.5mm long) though a few blood sucking *spp.* may become more when fully engorged.

Except for few, mites are in prolonged contact with the host's skin causing various forms of skin condition generally known as MANGE.

Because most of the mites groups spend their entire Life Cycle (egg to adult) on the host transmission is mainly by contact.

Taxonomy of mites is a bit difficult so they are better considered based on their location.

(a) Burrowing      (b) Non burrowing

### **SUBORDER Trombidiformes**

#### **Family: Trombiculidae**

Family contains the mites whose parasitic larvae are called "harvest mites", "chigger mites". They have a scarlet, red, orange/yellow color and adult may be very large.

Nymphs and adult are free living. May feed on invertebrates/plants.

Bodies are covered with dense hair which gives them a velvety appearance. Their bodies are divided into a gnathosoma, a propodosoma bearing the first two pairs of legs and a hysterosoma which bears the third and fifth pairs of legs.

The larvae are parasitic on various animals and man, causing marked irritation and in some cases they transmit important diseases

Natural host – small rodents e.g. field-mice. The larval mites attach themselves to the host and their salivary secretion hydrolyses the cuticle of the host, forming a tube called the **stylostome**, through which the larva sucks up the host's tissue fluid. When they are ready to moult they drop off and moult to become the non-parasitic nymphal stage.

#### **Trombicula autumnalis**

The larvae of this and other *spp* of this genus attack man and practically all *spp* of domestic animal including poultry. (Heavy infestations may kill poultry).

Larger animals are usually attacked on the head and sometimes neck, where the mites produce an itching dermatitis with loss of hair and scaliness of the skin. They cause generalized

pruritus and lesions in the interdigital spaces of dog. Has been suggested to be the likely cause of "heel-bug" in racehorses.

Engorged larvae are ovoid and about 0.6mm long their most notable gross feature being their bright orange color.

Eggs are laid in soil and the hatched larvae crawl on to vegetation, where they can have contact with mammalian/avian hosts.

The larvae insert their mouthparts into the skin, inject a cytolytic enzyme and feed on the partly digested tissue. The feeding larvae causes irritation which becomes more intense, with the formation of weal, papules and vesicles in successive attacks, due to the development of hypersensitivity to their secretions. Self-injury may result from rubbing and scratching in response to the irritation.

### **Leptotrombidium –**

*Leptotrombidium akamushi*

Vector of scrub (mite) typhus (tsutsugamushi fever) caused by *Rickettsia tsutsugamushi*.

Control (Mite typhus)

- Lindane as spray/dust (1/2 lb/acre)
- 2lb/acre of toxaphene/chlordane
- Benzylbenzoate as a repellent to clothes.

### **Family : Demodicidae**

#### **Genus ; Demodex**

Specialized group of parasitic mites which live in the hair follicle and sebaceous glands of various mammals causing demodetic/follicular mange.

#### **Species**

Except *D. Phylloides* (pig)

*D. folliculorum* (man)

All spp are named after their hosts e.g. *D. canis* *D. suis*, *D. bovis*, *D. equi* etc.

### **MORPHOLOGY**

The parasites are elongate, usually about 0.25mm long. They have a head, a thorax which bears 4 pairs of stumpy legs and an elongate abdomen which is transversely striated on the dorsal and ventral surfaces. Mouth part is made up of palps and chelicerae and an unpaired



hypostome. Penis protrudes on dorsal side of the male thorax and vulva on the ventral of the Female. Eggs are spindle shaped.

### **LIFE CYCLE**

Demodex spp live as commensals in the skin of most mammals and are exceptional in being selective for hair follicles and sebaceous glands.

The mites develop on the skin of the host where they live. The larva has three pairs of legs and there are three nympha/stages.

Most spp spend their entire life cycle in the follicles or glands in each of which they occur in large number in characteristic head-downward posture.

In the newborn and young animals these sites are simple in structure, but later they become compound by out growths.

The mites then moves into the extended habitats going much deeper into the dermis and hence being not so accessible to surface-acting acaricides.

### **DEMODECTIC MANGE OF DOG**

May be due to its deep location in the dermis. Demodex is not easily transmitted between animals unless there is prolonged contact.

These contacts occur during suckling thus it is thought that most infections are acquired in the early weeks of life the commensal population in the bitch skin being transferred to the in-contact areas of the pup. Thus initial lesions are seen in the muzzle, face, peri-orbital region and forelimbs.

### **PATHOGENESIS**

Early in infection there is a slight loss of hair on the face and forelimbs, followed by thickening of the skin and the mange may progress no further than the in contact areas, many of these localized mild infections resolve spontaneously without treatment.

At times lesions may spread over the entire body (generalized) and this may be in one of these two forms.

(1) Squamous/Scaly Demodicosis – Less serious. A dry reaction with little erythrema but wide spread alopecia, desquamation and thickening of the skin, At times in this form only the face and paws are involved.

(2) Pustular/follicular Demodicosis – Severe form, follows bacterial invasion of the lesion often by staphylococci. Skin becomes wrinkled and thickened with many small pustules from which serum, pus and blood ooze hence the name **Red mange**. Affected dogs have an offensive odour.

Prolonged treatment indicated, survivors may be disfigured (Euthanasia may be indicated).

A notable feature of all type of demodetic mange is the absence of pruritus.

Also, demodex is thought to cause a cell-mediated immunodeficiency which suppress the normal T-lymphocyte response, this defect disappears when the mites have been eradicated from the animal.

Demodetic mange may erupt when dogs are given immunosuppressants for other conditions.