

# **EXOPTERYGOTA**

## **Order: HEMIPTERA**

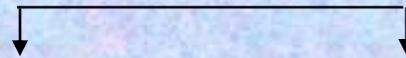
**Common name: Bugs / plant lice**

1. Dorso-ventrally flattened.
2. Wings may or may not be developed.
3. Size greatly variable
4. They have got very strong piercing and sucking type of mouth part
5. The proboscis is looped below the head ventrally.
6. Parasite of both mammals and plant.
7. Most of them are parasites of plants and only bed bugs are parasite of man, animal and birds.

**Order:**

**HEMIPTERA**

**Sub-order:**



**HAMOPTERA**

**HETEROPTERO**

(Parasite of plant)

(Bugs of mammals and birds)

**Family:**

**Cimicidae**



**Genus:**

*Cimec*

**Species:**

*C. lectularius*

*C. hemipterus*

**Rudividae**

*Triatoma*

*T. infestus*

*T. megastus*

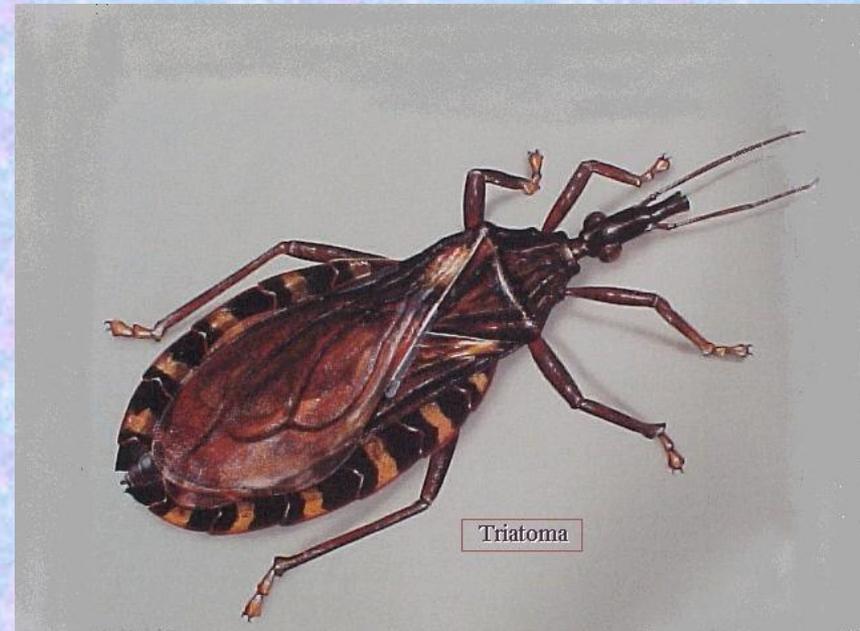
**Common name:**

**bed bugs**

Kissing bug/ Assassination/ Cone nose bug bug

## Morphology:

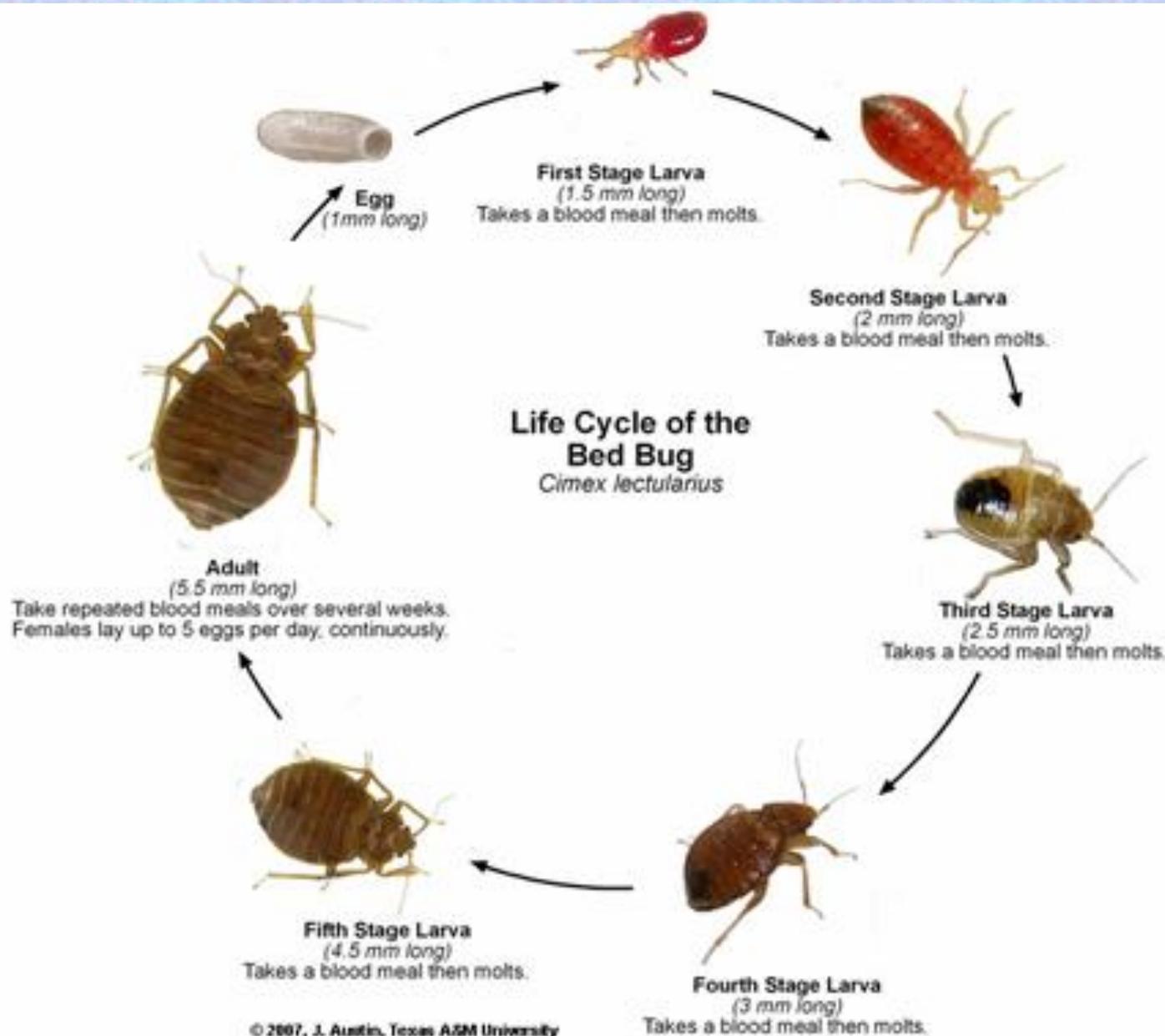
1. Dark brown dorso-ventrally flattened insect with distinct head, thorax and large abdomen.
2. Three pair of legs placed laterally from each segment of thorax.
3. Four jointed long antennae.
4. Proboscis long and looped under the head wings not developed.



## Life cycle:

Eggs → Larva → 1st nymph → 2nd nymph →  
3rd nymph → 4th nymph → 5<sup>th</sup> nymph → Adult

A female lay about 150-200 eggs at a time in cracks and crevices around the dwelling places of their host but always away from host. Eggs are elongated oval in shape with a ring at one pole. Eggs are creamy white in colour with an operculum at the pole where there is also being rim.



Metamorphosis is simple or incomplete.

Depending on temperature eggs hatch in about 3 -14 days in a larvae that is morphologically similar to the adult but very small in size and is not at all chitinized.

Larvae also feed like adult and moult into first stage nymph immediately after feeding.

There are five nymphal stages each having duration of 5 -7 days. Nymphal stages also resemble the adult morphologically and gradually increase in size with each moult.

They feed also like the adult but are not sexually mature.

The last nymphal stage finally moults into adult.

Adult lives for about 8-12 days.

## Habits:

1. Bed bugs are found all over the country in all dwelling places of human, animal and birds.
2. Larvae and nymph feed like adults.
3. Nymph and adult can withstand starvation for longtime.
4. They live in cracks and crevices around human dwelling, animal houses and poultry houses and come to feed when they feel hungry and prefer a resting host.
5. They prefer feeding during night time and leave their host as soon as they are fully fed and again hide in cracks and crevices.

## Pathogenicity:

1. They are very annoying pest and their feeding is quite painful and irritating.
2. They feed on a substantial amount of blood, which may lead to anaemia in small laboratory animals and in poultry.
3. They are a great problem in laboratory animal houses.
4. They are not potent carrier of any pathogen.



## **Control:**

1. Regular spraying with insecticides reduces the population to a great extent.
2. Since they live in cracks and crevices around the dwelling places of their host, spraying should be made on bed, chair, wire meshes and other cracks and crevices and not on the host.
3. These insects are very susceptible at high temperature. So hot water or blowlamps are very useful for their control.

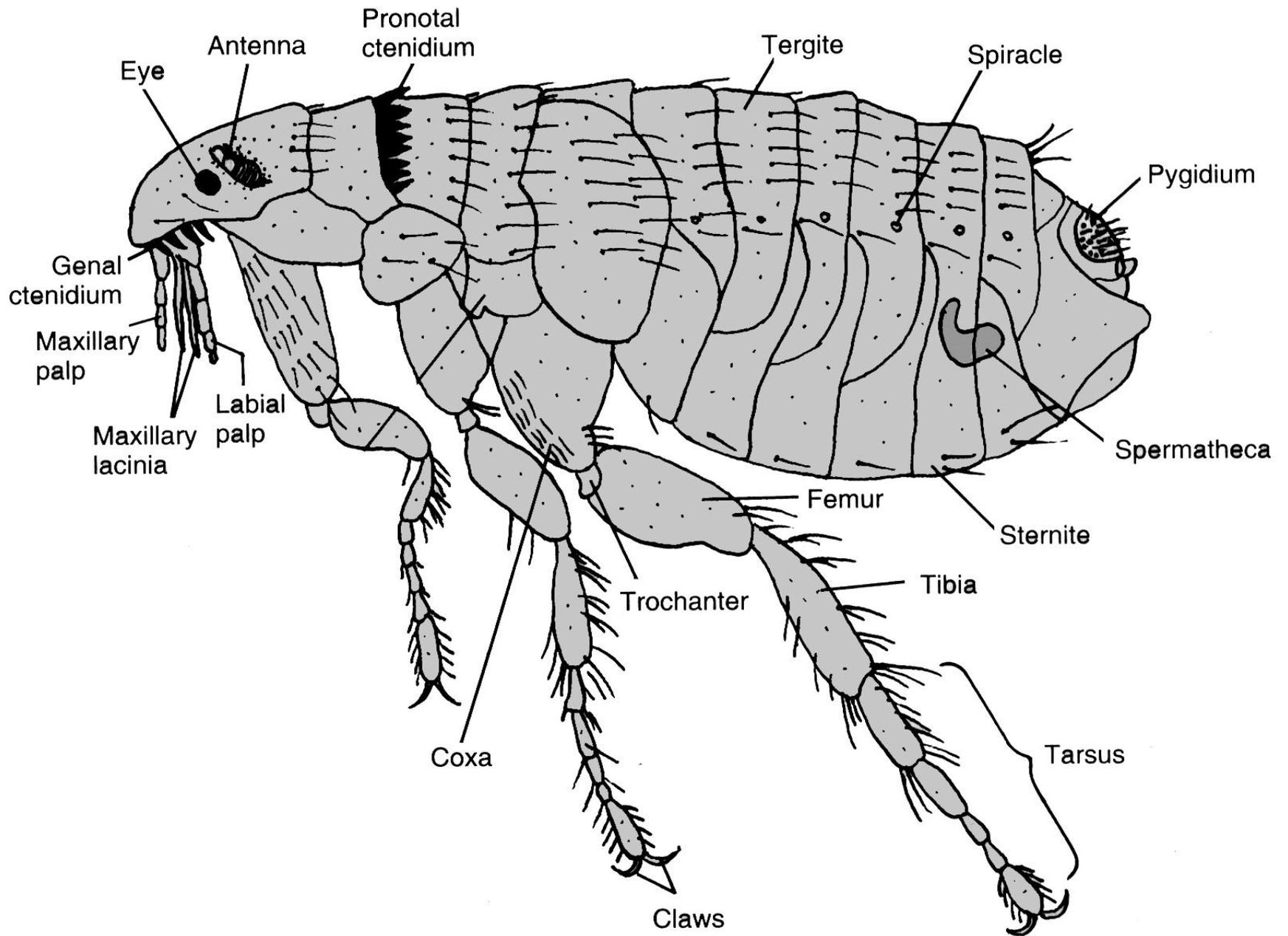
## **Order: SIPHONAPTERA**

### **Common name: Flea**

1. Most of the adults are parasitic on mammals or bird and feed on blood.
2. They have a preferential host but not totally host specific and may sometime leave the preferential host and attack another host.
3. Feeding habit of both males and females are same.

## General morphology:

1. Laterally compressed three-segmented body
2. Abdomen is large ten-segmented.
3. Antennae are present in the head and placed in a groove.
4. Coxae of legs are very well developed and 2nd and 3rd pairs of legs are generally very strongly developed which help them in jumping and leaping.
5. Wingless insect.
6. Chitinous covering is thick and dark brown.
7. Compound eyes are absent.
8. Ninth abdominal segment of both male and female bears a dorsal plate called the **sensillum** or **pygidium**.
9. There are a large number of spines on the head and the thorax known as **combs** or **ctenidia**.
10. On the cheek (gena) there may be a **genal comb** and on the posterior boarder of the first thoracic segment a **pronotal comb**.



**Order:**

# Siphonaptera

**Family:**

**Pulicidae**

**Sarcopsyllidae**

**Genus:**

***Pulex***

***Xenopsylla***

***Ceratophylus***

***Ctenocephalides***

*P. irritans*

*X. cheopis*

*C. gallinae*

*C. canis*

*X. austia*

*C. felis*

*Echidnophaga*

*Tunga*

*E. gallinacea*

*T. penetrans*



## Pulicidae

1. Coxa and femer of 2nd and 3<sup>rd</sup> pair of legs are very well developed
2. Thorax not generally reduced
3. Head conical
4. Species

*Pulex*

*Xenopsylla*

*Ctenocephalides*



## Sarcopsyllidae

1. Not so much developed
2. Thorax generally reduced and some time may be confused as a part of abdomen.
3. Head angular
4. Species

*Echidnophage*

*Tunga*



<b>Species</b>	<b>Common name</b>	<b>Host</b>
1. <i>Pulex irritans</i>	Human flea	Pig, dog, cat & rat,
2. <i>Xenopsylla cheopis</i>	Oriental rat flea	Man and rodmt
3. <i>Xenopsylla austia</i>	Black rat flea	Rat and man
4. <i>Ceratophyllus gallinae</i>	Chicken flea	Chicken
5. <i>Tunga penetrans</i>	Jigger, chigoe	Man, pig, baboon
6. <i>Ctenocephalides canis</i>	Dog flea	Dog and related species
7. <i>C. felis</i>	Cat flea	Cat, dog, man, rat and primates.
8. <i>Echidnophaga gallinaeca</i>	stick tight flea	Poultry, bird, rodent, dog & cat

***Echidnophaga gallinaeca***

stick tight flea      Poultry,  
bird, rodent, dog & cat

Having very strong mandibulate mouth part and remain permanently attached to less feathery and less hairy part of their host such as around the eyes, comb around rectum *etc.* of their host.

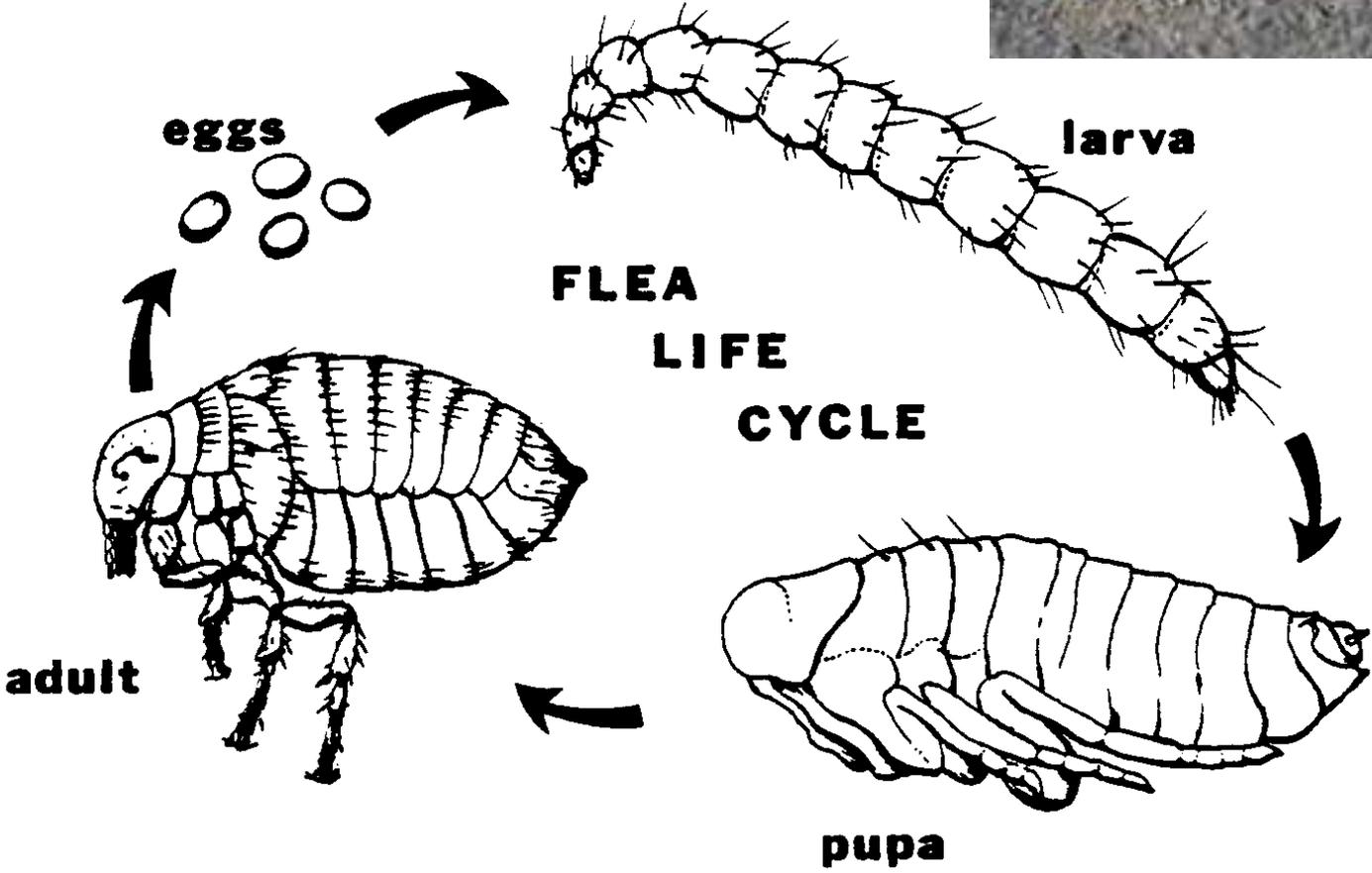


## **Life cycle:**

All fleas have essentially similar life cycle pattern. Eggs are elongated oval in shape, glittering white or yellowish in colour, lays in batches of 3 -20 at a time in and around dwelling places of their host such as in cracks and crevices, below carpet, below bed, in kennel, bedding of poultry *etc.*

Depending on temperature egg hatch in 2 -16 days into a 14-segmented vermiform larvae with spine on each segment

The larvae feed on all types of decaying organic materials and moult twice in 7-10 days. A fully mature third stage larva becomes inactive and quiescent and then spins a silky cocoon in which the pupa developed. Adult emerges in about 10-17 days depending on temperature.



Immature flea  
(one that has  
not yet fed)

⑤



Pupa/cocoon ④



③ Larva



Eggs ②

②



① Adult flea



## **Distribution:**

Found all over the country and a very common pest.

## **Habits:**

1. Fleas can move very fast through the feathers and hairs of their host because of their thin lined body and are difficult to catch.
2. They are less host-specific than lice and may leave their preferential host and attack other host also.
3. They spend most of their life on the body of their host and female usually leave for laying of eggs.
4. Fleas cannot withstand starvation under dry condition but can do so even for 4 months when humidity is high.

# Pathogenesis:

Bite is very painful and irritating.

1. *Echidnophaga gallinacea* have very strong mandible with which they remain permanently attached to their host.
2. They are responsible for causing fleabite allergy





## Disease transmission:

1. *Yersinia pestis*, causing (bubonic) plague in human being by *Pulex irritans* and *Xenopsylla cheopis* and rodent act as reserver host.
2. *Rickettsia typhi*, causes typhus fever in human being.
3. *Pulex irritans*, *C. canis* and *C. felis* also act as intermediate host of *Dipylidium caninum* (a tapeworm of dog).
4. *C. canis* and *C. felis* act as intermediate host of the filarid worm of the dog, *Dipetalonema reconditum*.
5. Flea also transmits murine typhous,
6. Tularemia caused by *Francisella tularensis*
7. Salmonellosis, caused by *S. entertidis*.

## **Control:**

It is achieved by using insecticides on the body of the host, which should be least toxic and least irritant.

1. Flea collars, a plastic strip impregnated with Dichlorovos is effective.
2. For destroying the immature stages spraying of insecticides in kerosene solution is very effective in the kennels.

1. Treatment of animal
2. Eliminate developmental stages in animal.
3. Prevention of re-infection.

DDT and BHC are also effective but being toxic to cat and dog causing environmental pollution, they should be avoided in these animals. In case of poultry dry dusting with any insecticides is effective and wet spray should preferably be avoided.

# Fleas of Birds –

## 1. *Echidnophaga gallinacea*

- (a) Thorax reduced, the three thoracic segments together shorter in width than the first abdominal segment.
- (b) Occurs on poultry
- (c) No ctenidia
- (d) Two bristle on occipital lobe
- (e) Frons (forehead) angled anteriorly.



## 2. *Ceratophyllus*

- Pronotal ctenidium present, genral comb absent



# Fleas of mammals

## 3. *Tunga penetrans* -

(Man and rarely pig)  
(gigger)

(a) Thorax reduced

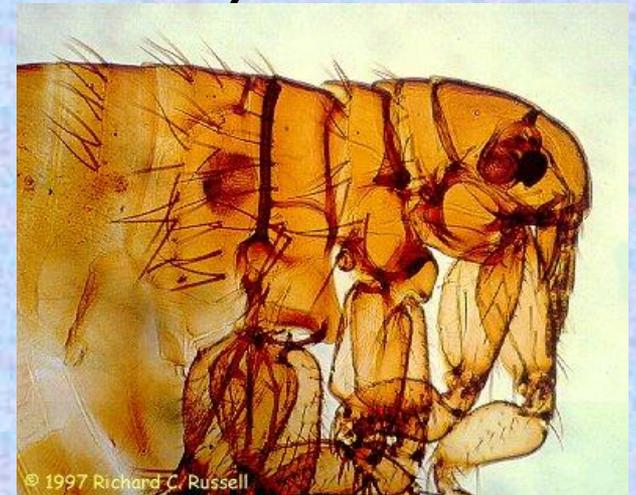
(b) Occurs on man  
and other mammals

(c) Frons sharply  
angled



# 4. *Pulex irritans* (man, Dog and cat)

- Thorax not reduced, the 3 thoracic segments together much wider than the first abdominal segment.
- Genal and pronotal ctenidia absent
- Mesopleural rod absent. Frons rounded anteriorly
- occurs on human.
- Occular bristel is below the eye



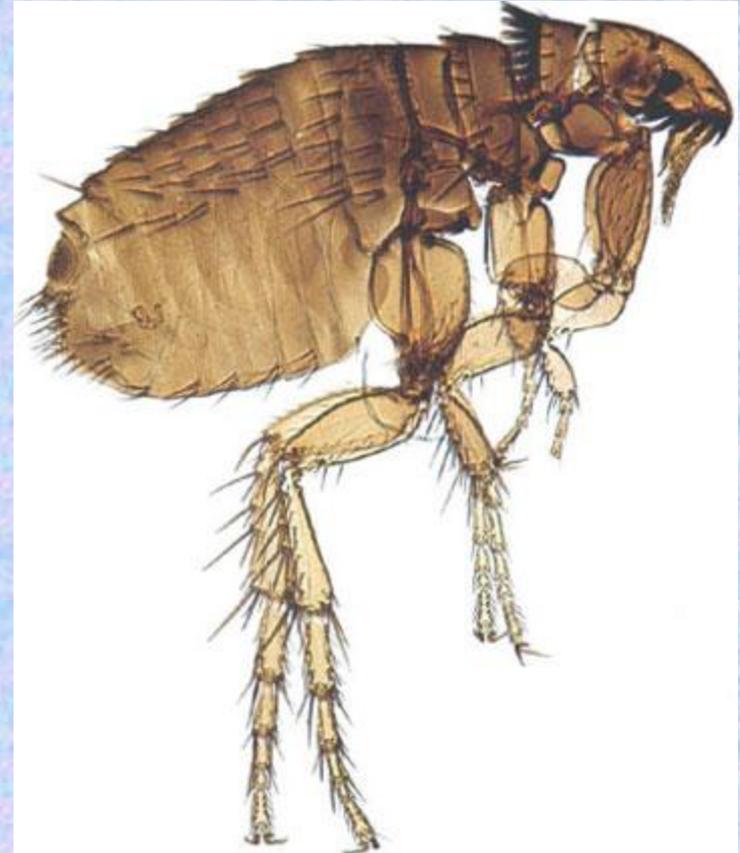
## 5. *Xenopsylla cheopis* (Rat flea) - Man

- Thorax not reduced
- Genal and pronotal ctenidia absent
- Meropleural rod present
- Occurs on black rats
- Occular bristrel is in front of the eye



# *Ctenocephalidis felis* (Cat, Dog and Man)

- Thorax not reduced
- Genal and pronotal ctenidia present
- Genal ctenidia of 8 elements horizontally placed.
- Frontal spine of genal ctenidium as long as the second spine
- Head with low sloping front about two times as long as high.



# *C. canis* (Dog)

- (1), (2), (3), (4) as *C felis*.
- Frontal spine of genal ctenidia shorter than second spine.
- Head with rounded front, about 1 1/2 time as long as high.

