

This is Unit 5 :Parasitic Arthropods

and the module name is : Biology, Importance and Control measures of *Xenopsylla cheopis*.

In this module we will be dealing with general morphology of *Xenopsylla cheopis*, its lifecycle, importance and control measures.

At the end of this module,

the learner understands the basic morphology of *Xenopsylla cheopis*.

Describes its lifecycle, understands its importance, and explains the control measures of *Xenopsylla cheopis*.

It's commonly called the Oriental rat flea.

They are small, bilaterally compressed, wingless insects.

Now these characters make it very easy for it to glide between the hair of the host.

The adults are light to dark brown and are ectoparasites, feeding on the blood of rats and other mammals, including humans.

Now these only attach to the host,

while sucking blood and at other times

it is in the host nest or burrow. The fleas are known to jump almost 200 times its body length.

Adult rat fleas measure around

1.5 to 4 millimeters in length.

The flea body consists of three regions,
the head, thorax, and abdomen.

The head and thorax have rows
of bristles called combs.

The Oriental Rat Flea has
no genal or pronotal combs.

Now this is a characteristic that
differentiates it from other fleas.

The head is closely set into the thorax.

It bears a pair of simple eyes.

It has short antennae, concealed in grooves behind the eyes.

There is also an ocular bristle, in front of the eye.

Mouthparts are piercing and sucking type.

The thorax is compact and it has three segments.

Each thoracic segment bears a
pair of elongated muscular legs.

Now the third pair of legs are the most elongated and they
help in the phenomenal jump that characterizes these fleas.

The abdomen consists of eight visible segments.

And the fleas have a sensory organ called as the pygidium--on the dorsal side at the posterior end, and this detects vibrations.

There are some differences between male and female flea.

The male flea has a complex genital apparatus,

which is called aedeagus towards the posterior end of the abdomen.

The female flea has a dark coloured spermatheca resembling small sacs

towards the posterior end of the abdomen.

The life cycle of the rat flea takes place in the rat burrows.

It comprises the egg, larva, pupa and adult.

Their eggs are white in colour.

They hatch into larvae in three to four days,

not on the host, but in the nest. The larva is maggot like and has mandibles.

They feed on detritus and faeces of the adult fleas which are

found in the nests of the host.

The larva moults about three times forming 3 instars.

And then the last instar turns into a pupa which is enclosed in a cocoon that is made with a mix of flea silk and dust.

Under favourable conditions, the life cycle is completed in three weeks.

If the conditions are not favourable, it can remain in the cocoon stage for up to a year.

Adult fleas live up to four years. Now both the sexes bite and suck blood.

Importance:

They do cause a lot of irritation ,a bit of blood loss and discomfort as pests

Now the fleas also play a very important role in the transmission, both among the reservoir hosts

and to humans of the causative organisms of two human diseases- Plague and murine typhus.

Plague is caused by the bacterium *Yersinia pestis*. It has two clinical forms,--bubonic and pneumonic.

Bubonic is characterized by the swellings or buboes, mainly in the armpits and the groin area.

It is more common and less severe. Though, If left untreated it may turn fatal.

It ordinarily results from the bite of an infected flea.

Fleas become infected by feeding on a diseased host.

The bacteria multiply so rapidly that it blocks the food passage of the flea.

To overcome the block, the flea regurgitates the stomach contents into the bite wound before it can suck blood.

Now, this regurgitated fluid contains numerous plague bacteria causing the infection in the host.

Pneumonic plague

is highly contagious and it is usually fatal.

The pneumonia, like disease, spreads directly among people by droplets coughed up by sick individuals.

It occurs secondarily to the bubonic type when the plague bacteria become localized in the lung.

Now, murine typhus or endemic typhus

is primarily a disease of rodents. It is caused by *Rickettsia typhi*.

Usually transmitted among rodents by their fleas. Now, these may also be transmitted to humans from the rodents by the rat fleas.

The most likely mode of transmission is by contamination of the bite wound by infected faeces or crushed fleas.

Control measures :

insecticides like malathion, fenitrothion and cyfluthrin as a spray with strength of 5% can be used to control the fleas.

Now this spray should at least cover 1 foot height of the walls from the floor in areas frequented by rats.

Flea repellents like diethyltoluamide and benzyl benzoate can also be used

Now rodent control measures also need to be adopted. These measures could include proper

waste disposal, proper food storage, closing of ratholes, and using rodenticides like barium carbonate, zinc phosphide, warfarin, etc.

And these are certain references which you may go through.

Thank you.