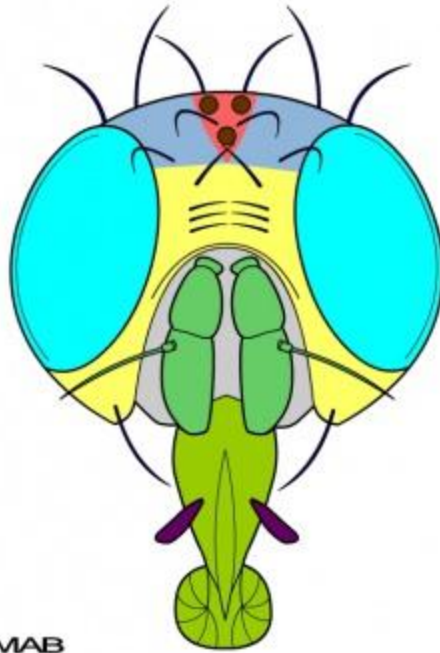
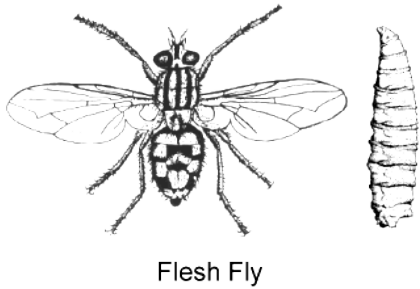
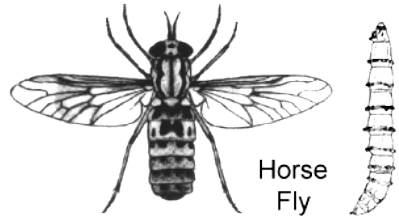
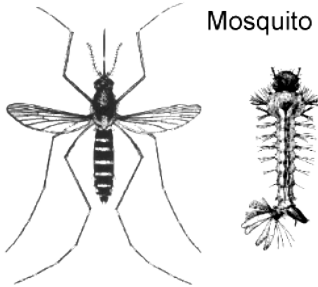
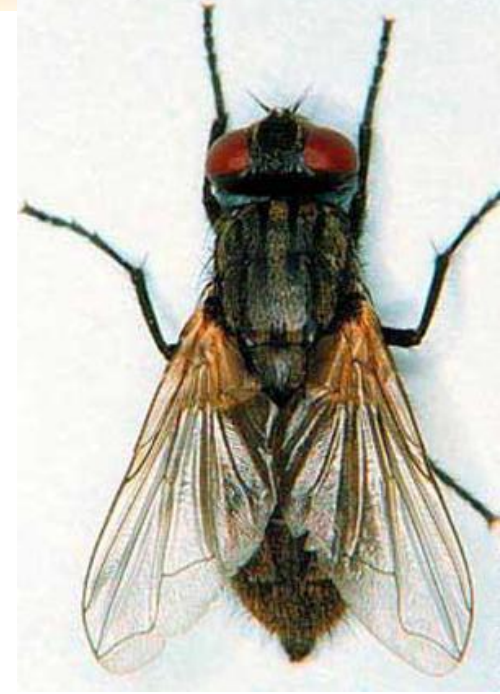
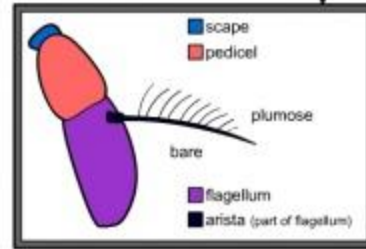


SUB ORDER: CYCLORRHAPHA



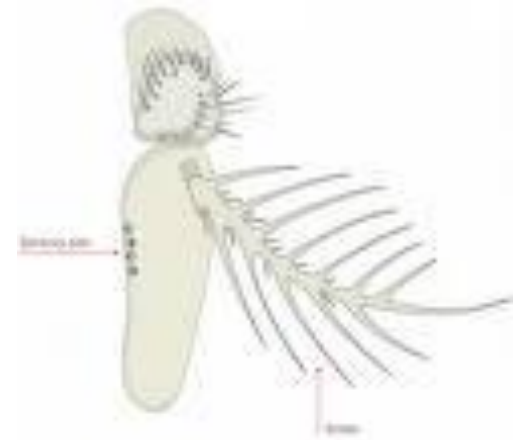
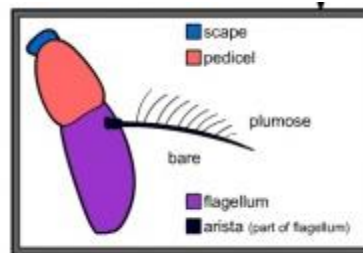
- compound eyes
- vertex
- frons (lower parts include the gena/cheek)
- antennae
- proboscis (labellum at tip)
- ocelli (simple eyes)
- ocellar triangle
- face
- palps
- setae (bristles)



SUB ORDER: CYCLORRHAPHA

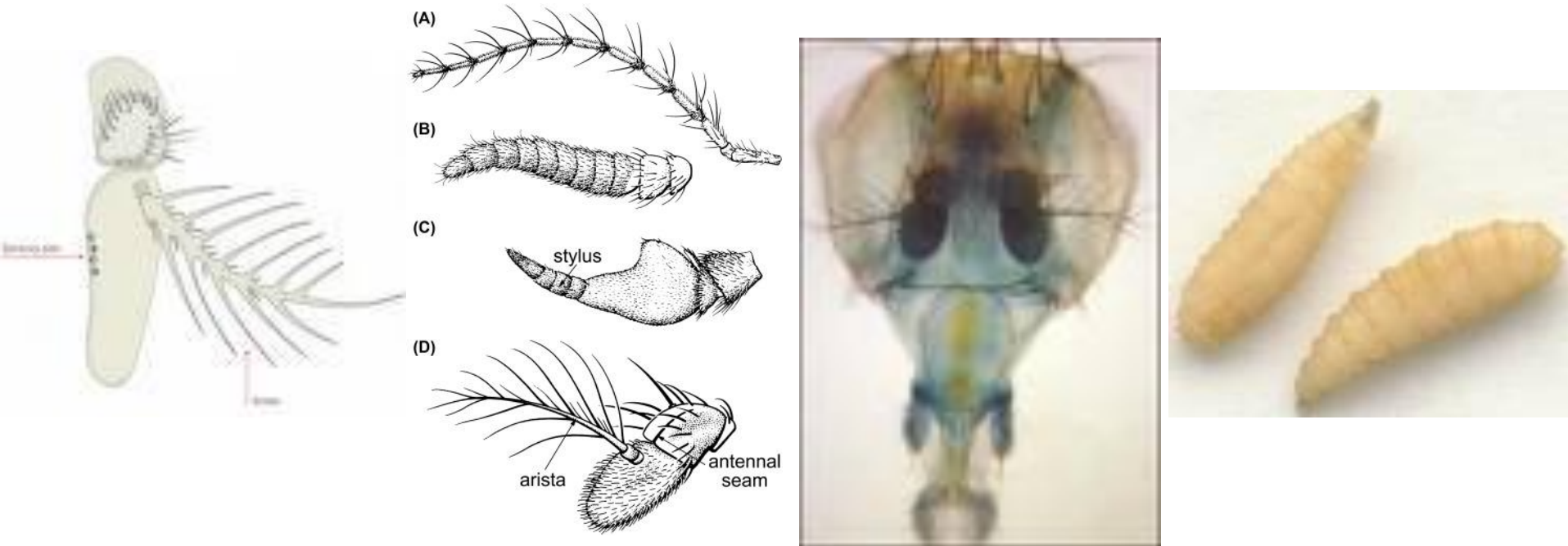
Characters:

1. These are medium to large size flies with a pair of 3-segmented antennae.
2. The antennae segments are unequal and the third or largest segment contain an extra structure known as **arista**.
3. The antennae are projected down ward and the arista projected anteriorly.



Characters:

4. The characters of arista are of taxonomic importance and most of the genera can be identified on the basis of it.
5. Palp are single segmented
6. Larvae without any distinct head and is known as maggot.
7. Pupa has a hard covering; mostly elongated oval in shape and the covering is derived from the last larval skin.



Classification:

Sub-order

Cyclorrhapha

Series

Aschiza

(No vet. imp.)

Schizophora

Section

Acalypterae

Calypterae

Pupipara

Family

Gasterophilidae

Muscidae

Calliphoridae

Glossinidae

Sarcophagidae

Oestridae

Hippoboscidae

Genus -

Gasterophilus

Hippobosca

Melophagus

Pseudolynchia

Acalyptera:

Squama small, not concealing halteres. Thorax is without any distinct transverse suture.

Calyptera:

Squama well developed, concealing halteres; thorax has a distinct transverse suture.

Pupipara:

Aberrant dipterans related to the Muscidae.



In one type of flies, which include flies under family **Muscidae and Hippoboscidae**, the **adults are parasitic**.

Some of these flies are obligatory haematophagous and essentially require blood for their survival and development. Under this comes the family Hippoboscidae.

In case of family **Muscidae**, there are some genera which have mouth parts adapted for **piercing and sucking** of blood whereas the others cannot pierce the skin and have **lapping and sucking** type of mouth parts.

The other groups of Cyclorrhaphan flies which contain family **Calliphoridae, Sarcophagidae, Oestridae and Gasterophilidae** have their larval stages adopted for parasitic life on the body of their respective host where as the adults may not essentially require animals as host for their survival.

In the adult stage of these flies again there are two types of mouth parts, one having lapping and sucking type which contains the families **Calliphoridae and Sarcophagidae,**

where as the other group that consist of mainly **Oestridae and Gasterophilidae,** the adult do not have developed mouth parts (vestigial mouth parts) and do not feed at all in their adult stage.

Family - MUSCIDAE

1. Flies coming under this family are both haematophagus and non-haematophagus.
2. Feeding habit of both male and female are same in particular species.
3. Eyes are holoptic in males and dicoptic in females.
4. This family has five genera of veterinary important.

Family

Muscidae

Genus

Musca

Stomoxys

Fannia

Haematobia

Hydrotaea



→ **Haematophagus**

- M. conducens*
- M. crassirostris*
- M. planiceps*

S. calcitrans

- H. sanguisugans*
- H. irritans*
- H. exigua*
- H. minuta*

- H. irritans*
- H. meteorica*

F. Scalaris

F. canicularis

→ **Non-haematophagus**

- M. nebulosa*
- M. vicina*
- M. domestica*

Among these flies, genus ***Musca*** contains both **haematophages and non-haematophages** flies

where as flies coming under the genus ***Stomoxys, Haemtobia*** and ***Fannia*** (*Siphona / Lyperosia*) are purely haematophagus.

They are medium size flies and feeding habit in both males and females are same.

Eyes are holoptic in male and dicoptic in female.

- Musca domestica* - common housefly.
- M. autumnalis* - face fly (of cattle and other animals)
- Morellia* - sweat fly
- Fannia scalaris* - latrine fly
- Stomoxys calcitrans* - stable fly
- Haematobia exigua* - buffalo fly of India
- Haematobia irritans* - horn fly
- Hydrotaea irritans* - sheep head fly
- Hydrotaea meteorica* - sweat fly of horses and man.



Distribution:

They are found all over the country



Differential morphological character:

Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
-----------	--------------	-----------------	-------------------	------------------------

1. Popular name	House fly	Stable fly	Buffalo fly Horne fly	Latrine fly
-----------------	-----------	------------	--------------------------	-------------



Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
-----------	--------------	-----------------	-------------------	------------------------

2. **Size** Medium size
about 7.5
- 8 mm

Medium size
7.5 – 8 mm as
Musca

Same as *Musca*
nearly 4 mm
- 7.5 mm

About half of
Musca
nearly 4 mm



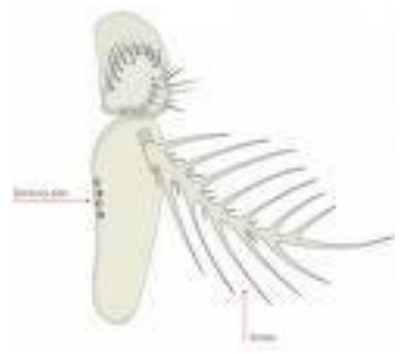
Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
-----------	--------------	-----------------	-------------------	------------------------

3. **Arista** Three segmented antennae and the 3rd segment with bilaterally plumose arista.

Arista with hair on dorsal side only

As *Stomoxys*

Aristae are bare





Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
-----------	--------------	-----------------	-------------------	------------------------

4. Probosis

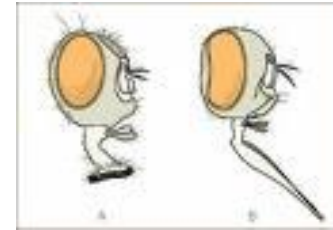
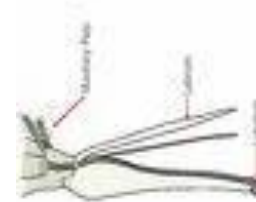
In most flies weakly chitinised and ends in fine tracheal tube

In haematophages flies the tracheal tubes are provided with very strongly chitinised pointed lobular teeth with the help of which they can scratched the skin and make a wound through which they suck blood.

Very strongly chitinised bionet shaped probosis with well developed bulbus base and projected anteriorly beyond the anterior margin of the head

As in case of *Stomoxys* but shorter and thi ' ' ' pe

As in case of *Haematobia*



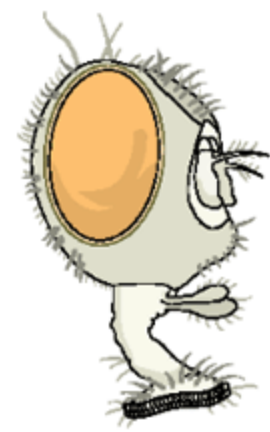
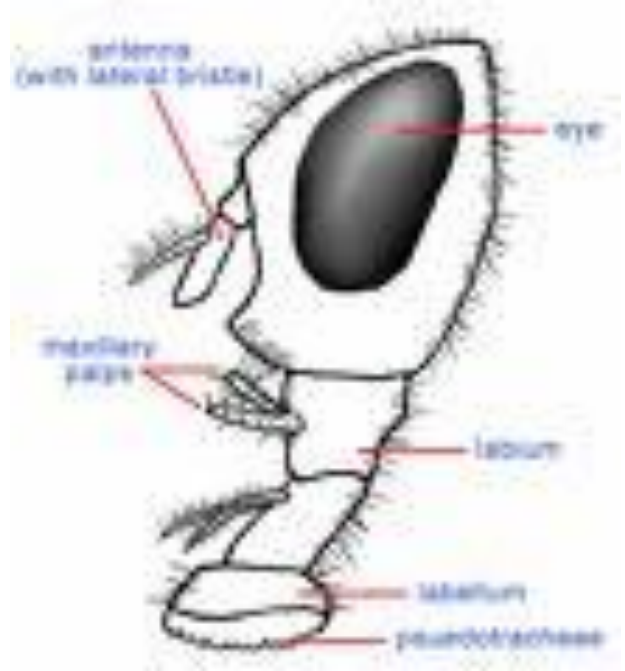
Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
-----------	--------------	-----------------	-------------------	------------------------

5. **Palp** Cylindrical in shape more than half the length of probosis

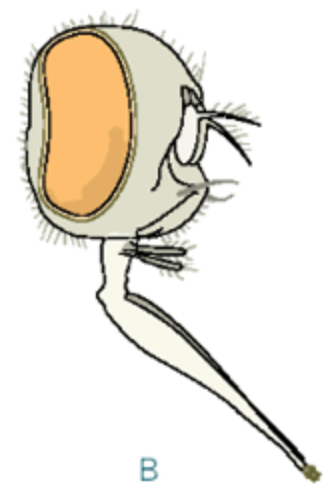
About half the length of probosis

As long as probosis

As in case of *Haematobia*



A

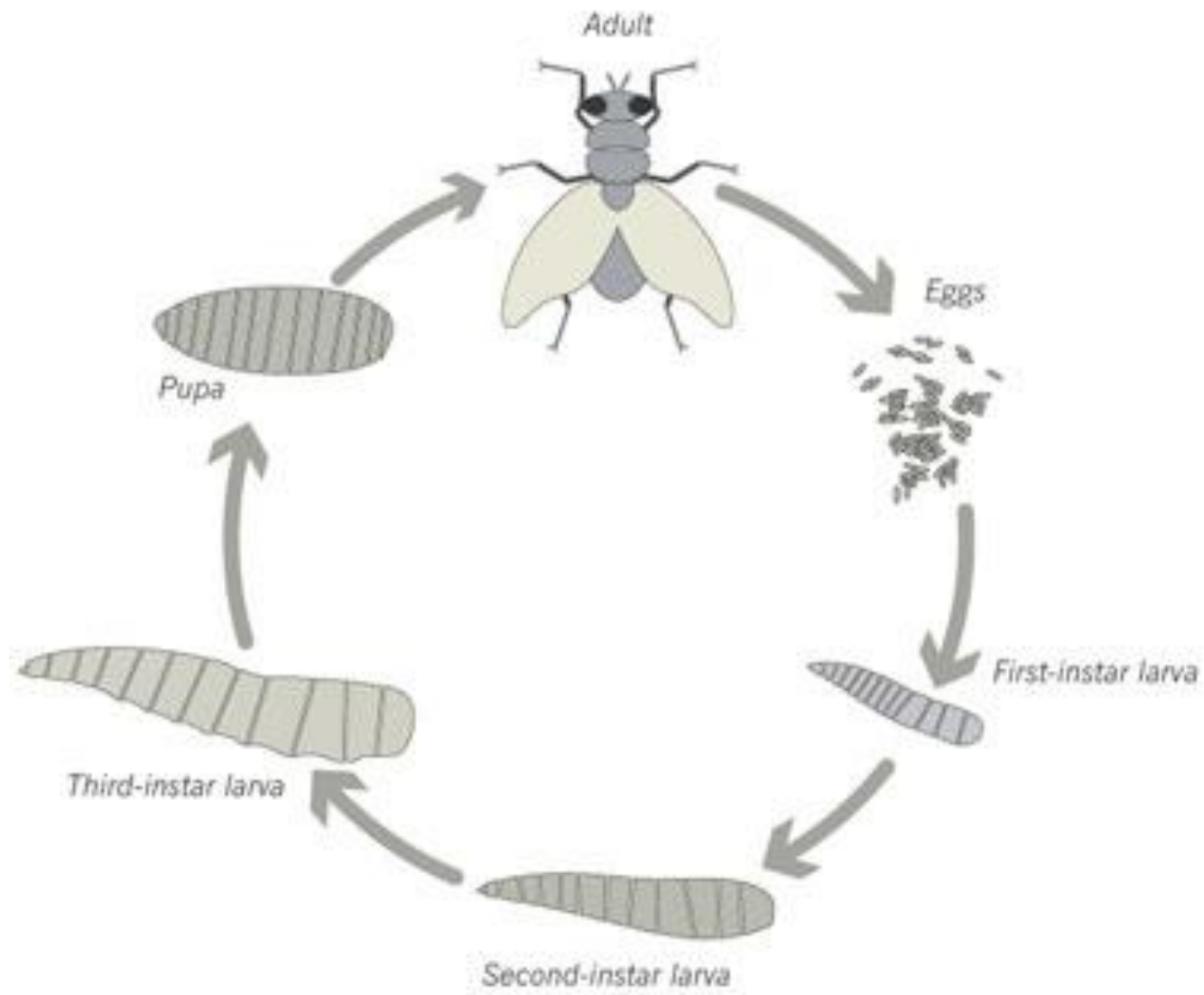
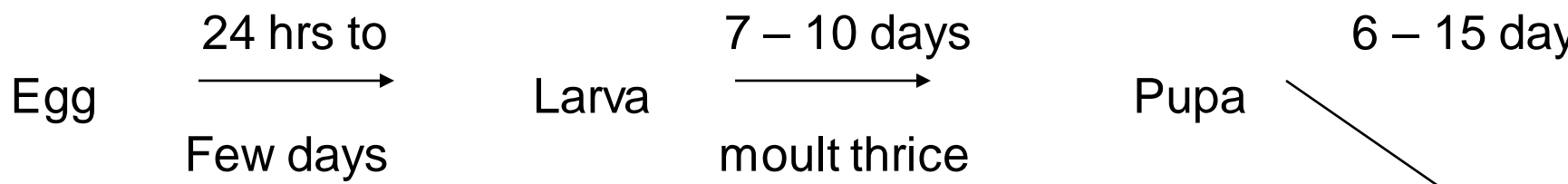


B

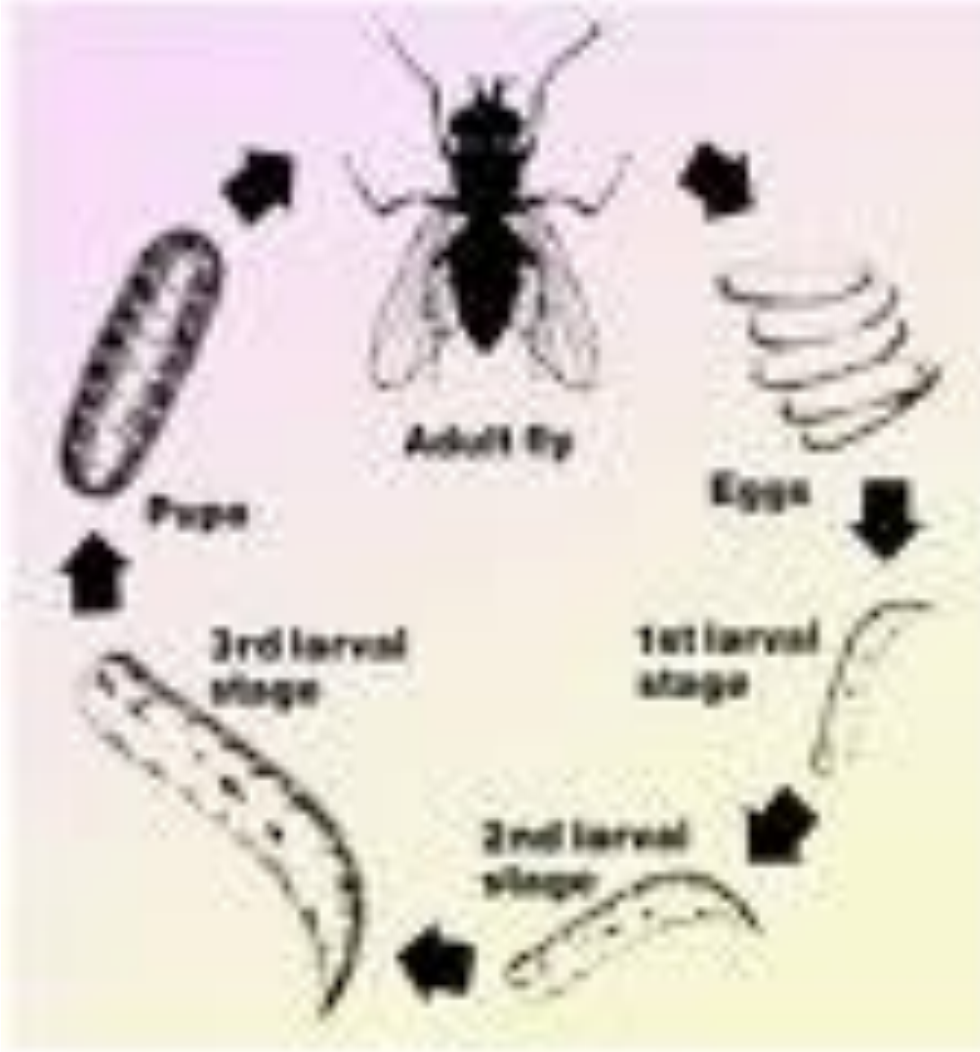
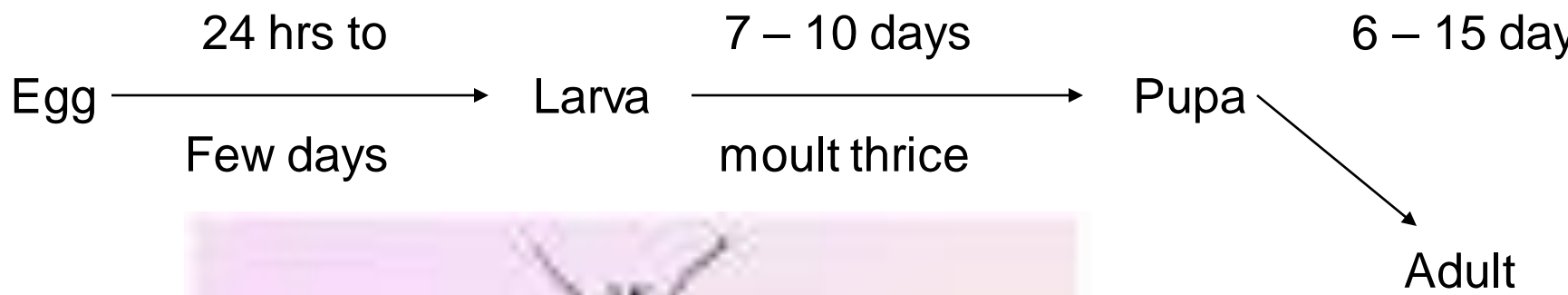
Character	<i>Musca</i>	<i>Stomoxys</i>	<i>Haematobia</i>	<i>Fannia /Siphona</i>
6. Thoracic and Abdominal Marking	Thorax with 4 complete longitudinal strips. Abdominal marking visible but always with a strips at the middle	Thorax with 4 longitudinal strips. Lateral pair of which are broken towards the base. Abdomen comparatively oval in shape with 3 rounded spots on the 2 nd and 3rd abdominal segments.	Thorax with 4 longitudinal segments as in case of <i>Stomoxys</i> . Abdomen with 4 diffused spots on the 2nd and 3rd segment	Thorax with 3 dark longitudinal strips which are broken towards the base. Abdominal spot similar to <i>Haematobia</i> .



Life cycle:



Life cycle:



The different stages of life cycle in Muscidae flies are the egg,

three larval stages, which are known as **maggot** and a cylindrical oval pupa with a hard covering.

The eggs are elongated bannana shaped mostly white or very light yellowish white in colour.



Egg laying performance:

Musca:

Mostly **oviparous** though a **very few viviparous** is also being recorded.

They lay eggs in any **decaying organic materials** such as **garbage hip, decaying vegetables, animal and human excreta etc.**

Eggs are laid in batches of 120-150 at a time and a female may lay 5-10 batches of eggs during its lifetime.

Stomoxys:

Prefer to lay eggs in **dam plies of grasses, hay or grains preferably soaked in animal urine and manure.**

Eggs are laid in batches of 25- 50 at a time and a female may laid up to 800 eggs during its lifetime.

Haematobia:

These are the flies, which spend most of its time on the body of their host and the female rush to lay eggs on the **surface of freshly excreted excreta of animals.**

In the surface of it, side by side in a row of 5-10 eggs at a time. The eggs are light pink in colour.

Under favourable condition eggs are hatched in about 24 hours to few days.



Immediately after hatching the young larvae go deep into the excreting media and start feeding there.



They are elongated in shape without any distinct head with one end tapering and the other end truncated.



They are known as maggot.



They have 12-segmented body and are white in colour.



They are coprophagous in habit and feed on variety of decaying substances.



The youngest one is about 1 mm in length and a fully developed larva is about 8-10 mm in length.



They moulted twice and the fully developed 3rd stage larva migrates in dryer area for pupation.



Depending on temperature the larval stage varies from 7-10 days.



The pupa is elongated barrel shaped with a hard covering derived from the last larval skin.



The colour of the pupa varies from dark yellow to dark brown depending on the species.



The pupa is totally a non-feeding and non-motile stage.



Depending on temperature and species the imago or adult emerges between 6-15 days.



Habits:

Musca:

1. These flies feed on a variety of materials such as common foodstuff, decaying material, decaying vegetable and human and animal excreta *etc.*
2. Some are purely haematophagus.
3. Before feeding the flies have a habit of regurgitating or vomiting a fluid from its crop to moisten its food so that they can suck it up very easily. In this way they transmitted a number of diseases.
4. In case of haematophagus flies either they scratch and produce a wound on the body of their host or they feed on already formed wound and suck blood from there.
5. Feeding habit of both males and females are same.

Stomoxys:

1. Both males and females are blood sucker.
2. They prefer feeding during day time.
3. In summer month when they are at the pick of their prevalence they prefer feeding at morning and evening hours.
4. They feed both in animal shed as well as in pasture.

Haematobia:

1. Both male and female are haematophagus.
2. The flies are abundant in hot and humid areas.
3. They remain on the body of the host during most of their lifetime and female only suck blood to lay eggs on freshly laid excreta.
4. After feeding they rest on the head and horn of their host.

Pathogenesis:

Musca:

1. The feeding habits of these flies are mainly responsible for their ability to transmit mechanically a member of bacteria, protozoan cyst, helminthic ova *etc*, mainly enteric in nature.
2. They act as intermediate host of poultry tapeworm, ***Choanotaenia infundibulum*** and equine stomach worm, ***Habronema muscae*** and ***H. megastoma*** and the round worm of hump sore in cattle caused by ***Stephanofilaria assamensis***.
3. Because of their irritating habit they also cause a lot of annoyance to their host.
4. Viral disease such as **poliomyelitis**
5. Bacterial such as **diarrhoea, enteric fever, typhoid, cholera, anthrax tuberculosis, leprosy** etc.
6. Protozoan such as ***Entamoeba***
7. Helminths e.g. ***Enterobious, Ascasis, Eye worm*** (by *M. autumnalis*) etc.

Stomoxys:

Bite:

Initially the bite is very painful because of the strong and long proboscis of the fly.

But the pain subsides with the withdrawal of the proboscis.

Though smaller than *Tabanus*, they suck about 0.6 - 0.7 ml of blood in a single feeding.

They come in large swarms and cause heavy loss to livestock.

Disease transmission: Due to their intermittent feeding habit they transmit a member of pathogens mechanically.

They are found to be able to transmit **anthrax** and experimentally found to transmit ***Trypanosoma evansi*** and other African trypanosomes.

They act as intermediate host of ***Habronema majus*** and the roundworm ***Setaria cervi*** in bovine.

They act as intermediate host of poultry tapeworm ***Hymenolepis carioca***.

***Haematobia* and *Siphona*:**

Bites of these flies are very painful and irritating.

Being voracious feeder they feed on substantial amount of blood and cause considerable blood loss and fail in productivity of the animals.

They are not potent carrier of any diseases

Disease transmission:

<i>Haematobia</i>	-	<i>Trypanosoma evansi</i> and <i>Habronema majus</i>
<i>H. irritans</i>	-	<i>Stepharofilaria stilesi</i> .

Control:

1. Reduction of breeding:

This can be achieved by proper disposal of animal and human excreta, garbage hips, used animal bedding *etc.*

Different insecticides can also be used as larvicide.

Disposal of different types of garbage and excreta should be done in closed container or pits, so that the adults do not have access to lay eggs in these places.

2. **Reduction of adult population:**

This can be achieved by spraying insecticides at regular intervals and is not difficult in case of *Siphona* and *Haematobia* as these flies spent most of their adult stage on the body of the animals.

In case of other flies it is very difficult since they are found both in animal sheds and pasture.

Control of housefly has become difficult in recent years because of development of insecticide resistance strains.

Trapping of these flies are also used is different countries by using different types of traps.

Sticky flypaper impregnated with insecticides have also being developed in which the flies get trap when they sit on them and die due to the insecticides.

Light traps are also used to trap flies.