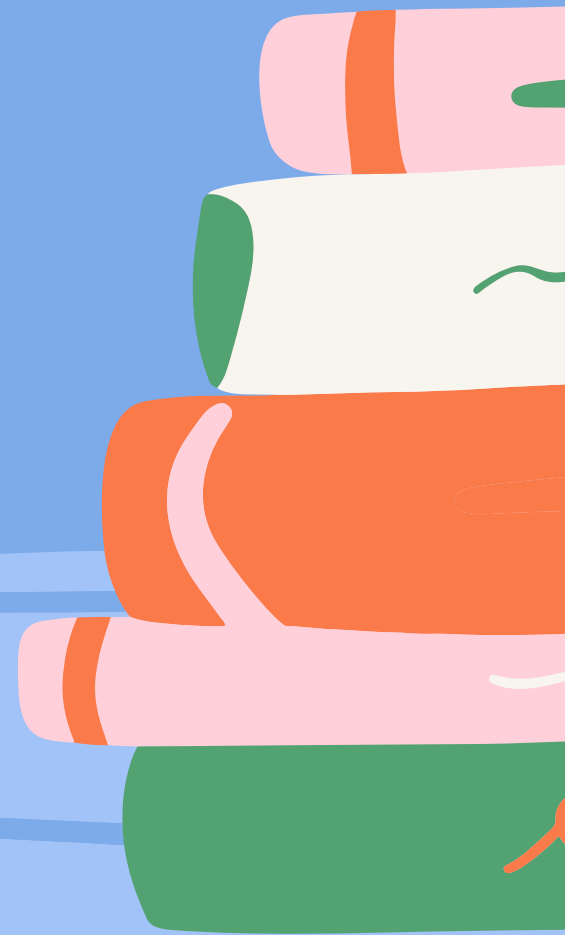


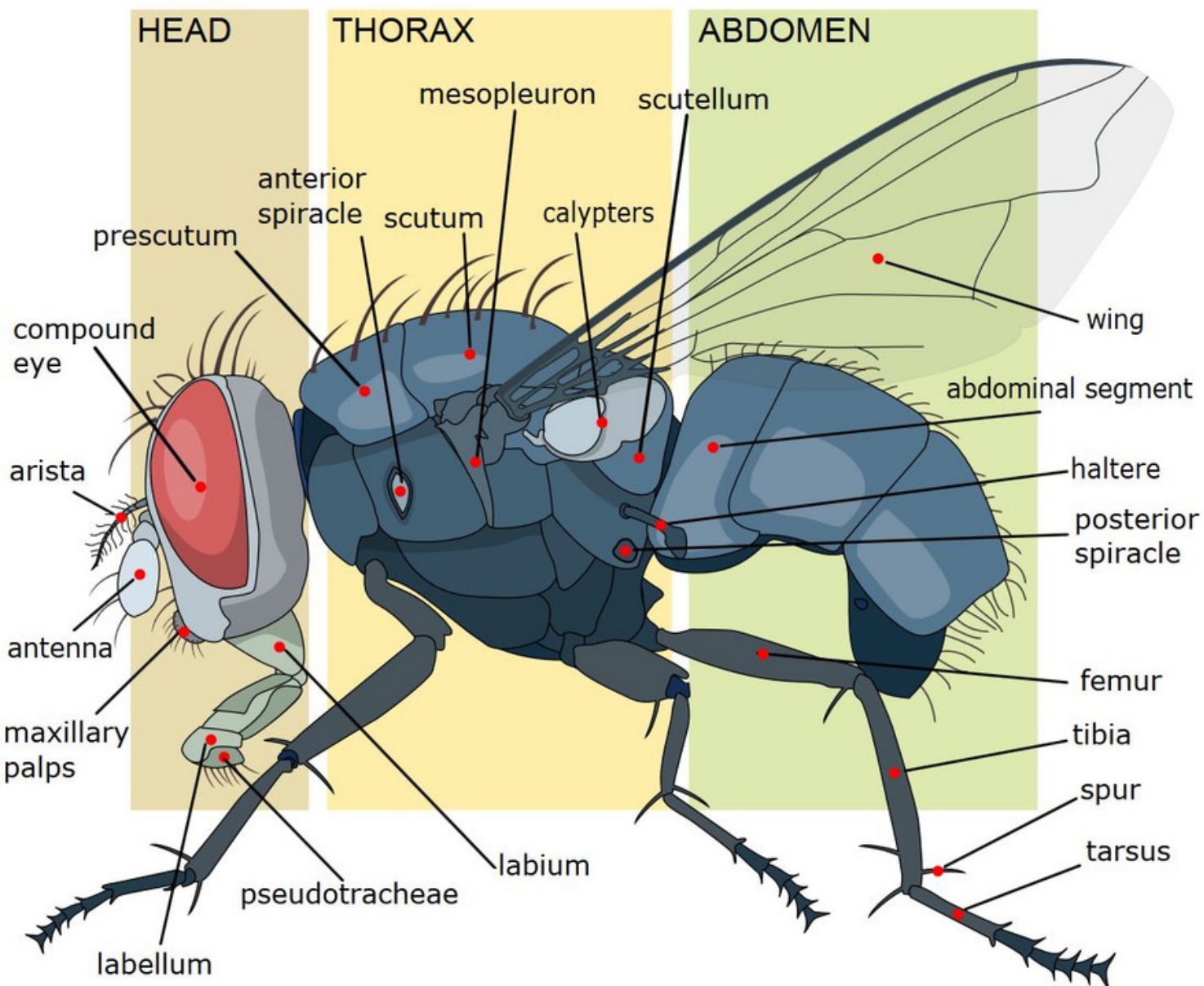
SILAPATHER COLLEGE

Dipteran as disease vector

With Manash P Dutta



What is an insect?



INSECTS

➤ Systematic Position:

Insects are members of one of the biggest classes of the..... Phylum: Arthropoda (Nonchordata with jointed legs)

Class: Insecta (Hexapoda) (i.e. =six-legged or possess 3 pairs of legs) .

➤ General Characters:

A- Characters common between insects and other arthropods:

- Triploblastic coelomate with bilateral symmetry
- Segmented body and jointed appendages.
- Exoskeleton.
- Locomotory system with skeletal muscles.
- 3 pairs of peristomal appendages.
- Sense organs, Antennae (tactile & olfactory) & compound eyes.
- Mostly Dioecious (sexes separate)
- Hemolymph (corresponding to both blood & lymph of vertebrates).
- Blood circulation is open type.
- Undergo metamorphosis (post-embryonic development).

Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: (see below)

* Note there are many more insect orders, so if you find an insect that doesn't seem to belong to any of the orders listed below – you are probably right!

Diptera

- Large compound eyes
- Small and soft-bodied
- One pair of wings for flying
- Hind wings (halteres) are small knobby structures used for balance
- Mouth parts for sucking, piercing, sponging, and lapping



What are dipterans?

Dipteran, (order Diptera), any member of an order of insects containing the two-winged or so-called true flies.

Odonata

- Two pairs of long outstretched wings
- Front and hind wings are similar in shape and size
- Large compound eyes make up most of the head.
- The immature stages are aquatic while the adults spend much of their time flying.



Lepidoptera

- Scales on wings, come off like dust if handled
- Mouth parts are usually for sucking
- In some species adults don't have mouth parts and can't eat at all!
- Mouth parts usually long and coiled
- They have relatively large compound eyes



One of the largest insect orders, it numbers more than 125,000 species that are relatively small, with soft bodies.

Orthoptera

- Relatively long antennae
- Ears are located on front legs near knees (looks like a small swelling)
- Long rear legs for jumping
- Large plate covering the thorax
- Large compound eyes



Hemiptera

- Thin, delicate back wings
- Base of front wings is thick and leathery
- Front wings cover the back wings, forming an X on insect's back
- Mouth parts are for piercing and sucking
- Compound eyes



Flies are beneficial, too, functioning as scavengers, predators, or parasites of certain insect pests, as pollinators of plants, and as destroyers of weeds noxious to humans.

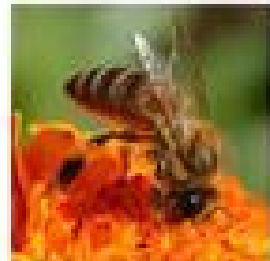
Coleoptera

- Often brightly colored.
- Antennae threadlike or clubbed
- Tough armor-like front wings that cover membranous hind wings used for flying
- Large prominent compound eyes
- Chewing mouthparts



Hymenoptera

- Many are social insects
- Four membranous wings
- Hind wings are smaller than front wings
- Row of tiny hooks attach back and front wings like velcro
- Some have no wings at all (eg. ants)
- Mouth parts are for chewing or sucking



Adults feed on plant or animal juices or other insects.

Diptera falls into three large groups: Nematocera (e.g., crane flies, midges, gnats, **mosquitoes**), Brachycera (e.g., horse flies, robber flies, bee flies), and Cyclorrhapha (e.g., flies that breed in vegetable or animal material, both living and dead).

Our focus

House fly

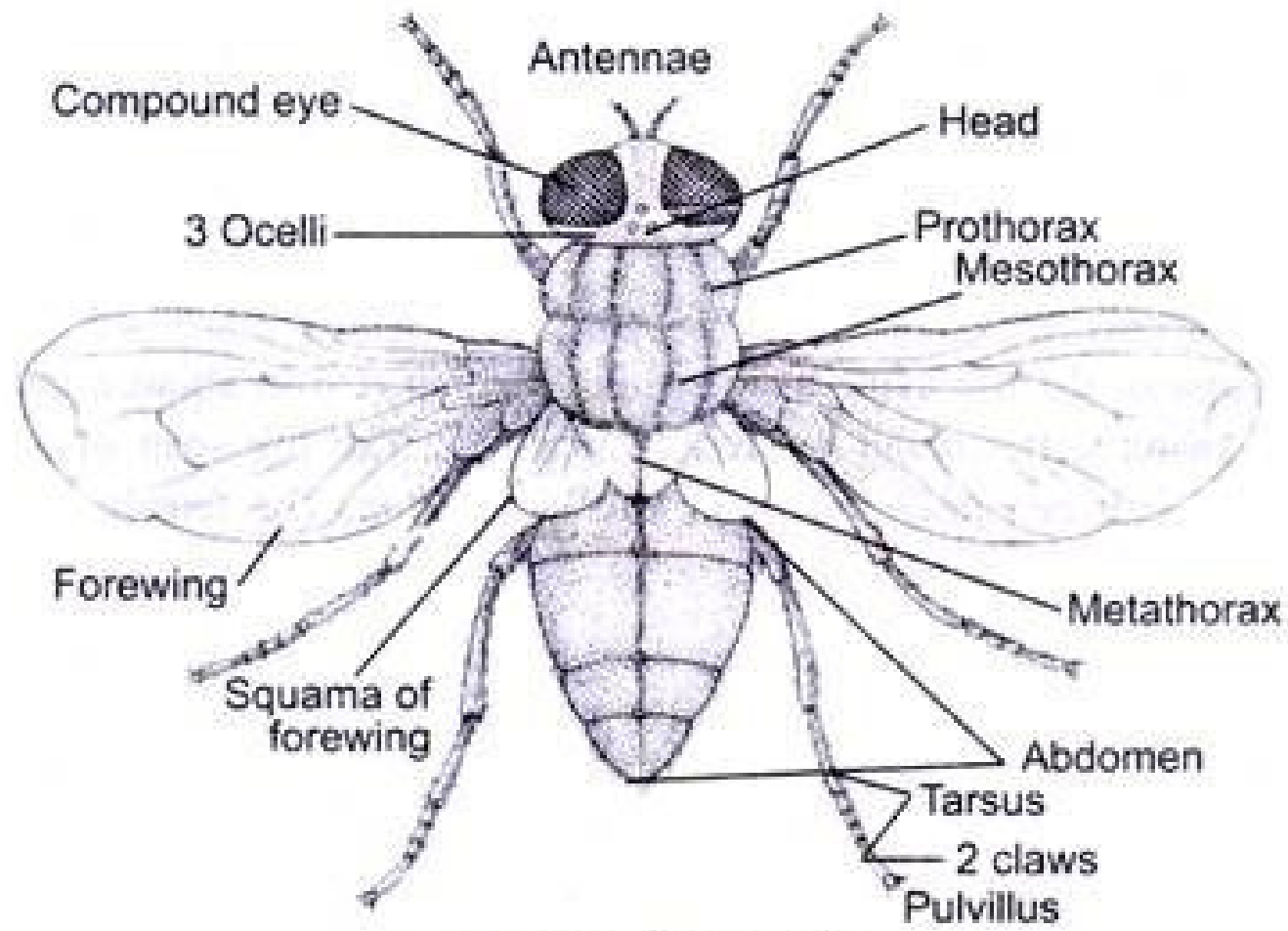
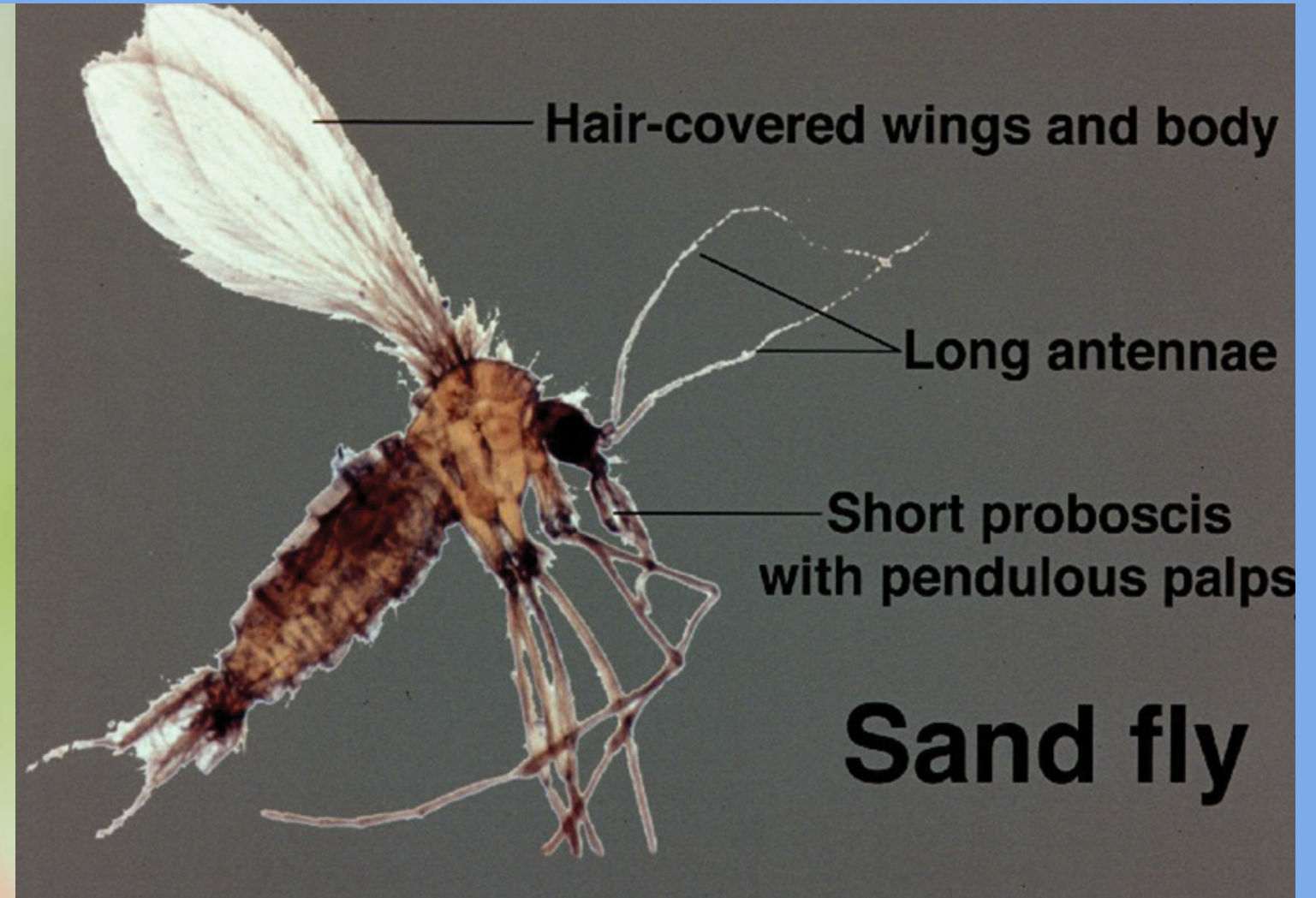


Fig. 8.9. A Housefly

Mosquitoes



Sand fly



Sand fly

- Sand fly adults are small flies – only about 3 mm long – and are golden, brownish or gray colored.
- They have long, piercing mouthparts that are well adapted for sucking blood from their selected host.
- Sand flies hold their hairy-looking wings in a vertical V-shape when at rest, a characteristic that distinguishes them from some other small flies.
- Also, the six legs on the adults are extremely long, being longer than the insect's body.

Phylum: Arthropoda

Class: Insecta

Order: Diapter

Family: Psychodidae

Genera: Phlebotomus

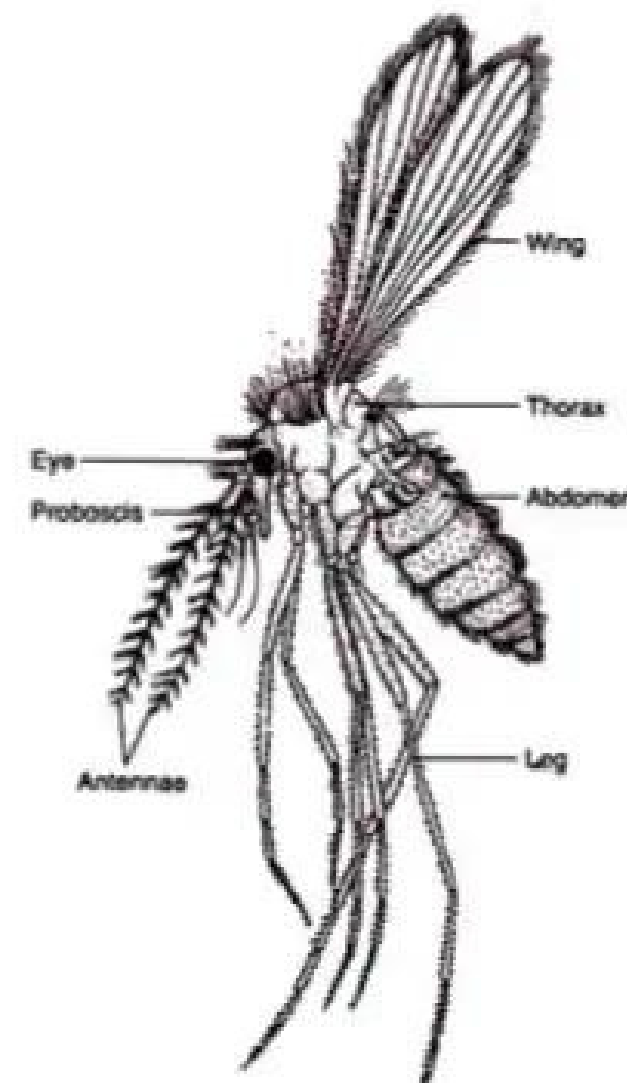
Sandflies are small insects, light or dark- brown in colour.

They are smaller than mosquitoes, measuring 1.5 to 2.5 mm in length with their bodies and wings densely clothed with hair. Some 30 species of sand-flies have been recorded in India. The important ones are: *Phlebotomus argentipes*, *P papatasi*, *P sergenti*, and *Sergentomyia punjabensis*.

Morphology:

The body is divided into 3 distinct parts namely head thorax and abdomen.

Diagram of Sandfly:



Head:

The head bears

- A pair of large, prominent, black eyes,
- A shaggy median proboscis,
- A pair of maxillary palpi and
- A pair of multisegmented antennae.

Thorax:

Thorax bears

- A pair of hairy, lanceolate shaped wings dorsally
- Three pairs of legs ventrally.
- The legs are long and slender, hairy, disproportionate to the size of the body and adopted for hopping or jumping.

Abdomen:

Abdomen has ten segments, covered with hairs, 8 are visible and the last two are modified into genitalia. (Clasper/ Style in male sandfly and Cerci in female sandfly).

The sandflies differ from mosquitoes in that they are smaller, hairy, wings are lanceolate shaped, second vein branches twice, the first branch taking place in the middle of the wing, legs are abnormally longer, adopted for hopping and the sandflies do not fly by choice.

Mosquito

Phylum: Arthropoda

Class: Insecta

Order: Diapter

Family: Culicidae

Genera: Anopheles, Aedes, Culex, Mansonia

Mosquitoes constitute the most important single family of insects, constituting public health importance by transmission of diseases. They are found all over the world, the four important groups of mosquitoes commonly known for transmission of diseases are Anopheles, Aedes, Culex and Mansonia.

Morphology:

The body is divided into 3 distinct parts namely head thorax and abdomen.

Head:

It is a semi-globular structure comprising of:-

- (i) A pair of compound eyes
- (ii) The proboscis (needle like structure inside which are hidden delicate mouth parts with which mosquito bites),
- (iii) A pair of palpi (on either side of the proboscis)
- (iv) A pair of antennae or feelers .

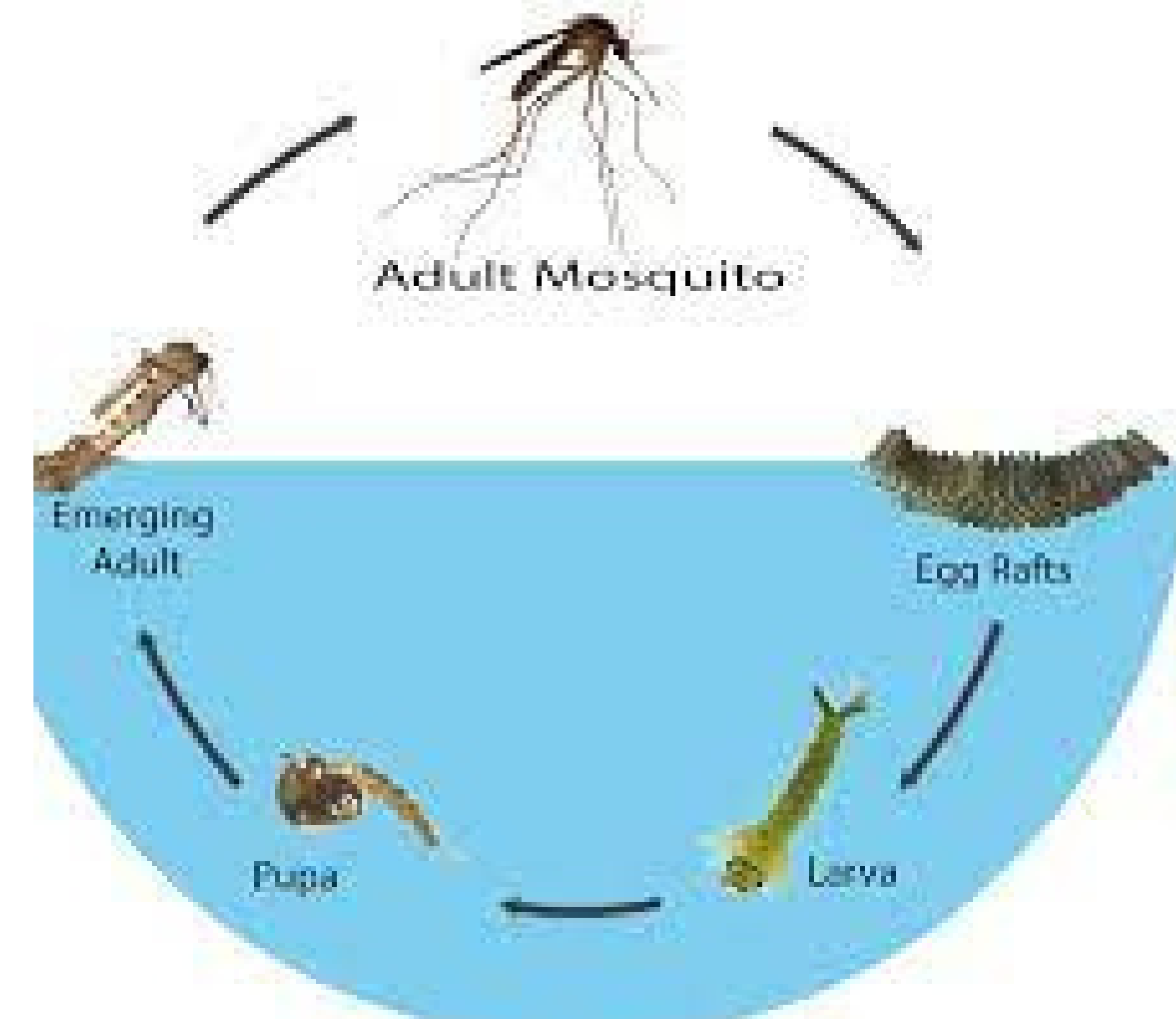
Thorax:

The thorax is large and rounded in appearance and bears :-

- (i) A pair of wings dorsally
- (ii) Three pairs of legs ventrally.

Abdomen :

The abdomen is long and narrow and is composed of 10 segments, the last two of which are modified to form the external genitalia (Clasper in male mosquito and Cerci in female mosquito).



Characteristics of mosquitoes

- ❑ Adult mosquitoes are terrestrial and capable of flight.
- ❑ With piercing-sucking mouthparts, the females feed mostly on animal blood and plant nectar
- ❑ Males mouthparts are modified to suck nectar and plant secretions.
- ❑ Eggs develop a few days after females take a blood meal.
- ❑ Females oviposit on the water, in crevices in the soil.....
.....and also in special niches that are flooded such as natural and artificial containers or tree holes.

Common Housefly



- Kingdom:** Animalia
- Phylum:** Arthropoda ("jointed foot")
- Subphylum:** Hexapoda ("six-legged")
- Class:** Insecta
- Order:** Diptera (flies with one pair of wings)
- Family:** Muscidae (stocky flies with large eyes)
- Genus:** *Musca*
- Species:** *domestica* ("domestic")

- 3 body segments-head, thorax and abdomen
- 6 legs
- 1 pair of antennae
- Usually 1-2 pairs of wings
- Simple brain
- Have a hard **exoskeleton**-external skeleton, made of chitin
- When skeleton gets too small, they molt

