MOHANLAL SUKHADIA UNIVERSITY UDAIPUR

DEPARTMENT OF ZOOLOGY

Topic:

Adaptive Modification in Insect Mouthparts

B.Sc. 3rd

Practical of Zoology

By

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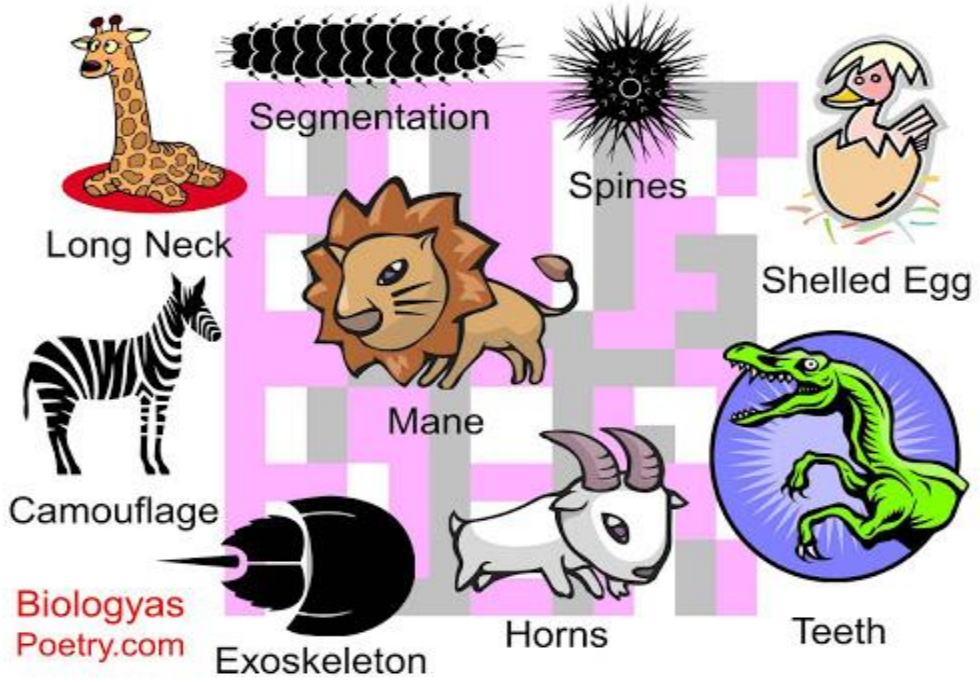
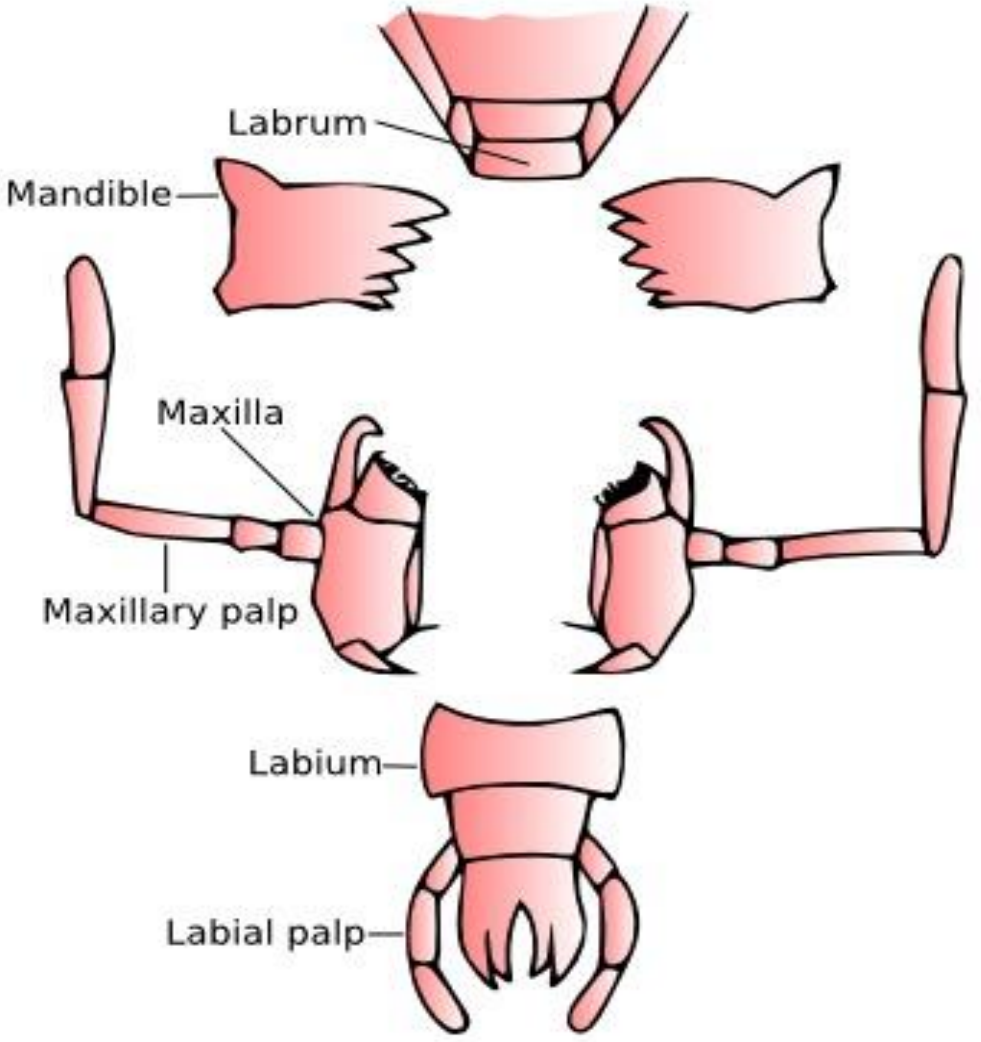
Adaptation: any **Modification** in the **Structure** or **Function** of an Organism or any of its parts due to **Natural Selection** by which, the organism becomes better fitted to survive and multiply in its environment.

- It is a dynamic evolutionary process that fits organisms to their environment by enhancing their evolutionary fitness.
- It is a state reached by the population during the process of natural selection.
- it is a phenotypic trait (characteristic that passes in offspring) or adaptive trait, with a functional role in each individual organism, that is maintained and has evolved the natural selection.



Mouth Parts of Insects: Mouthparts are the structures surrounding to the mouth that are involved in the mechanics of feeding, processing and manipulating the food to make it ingestible.

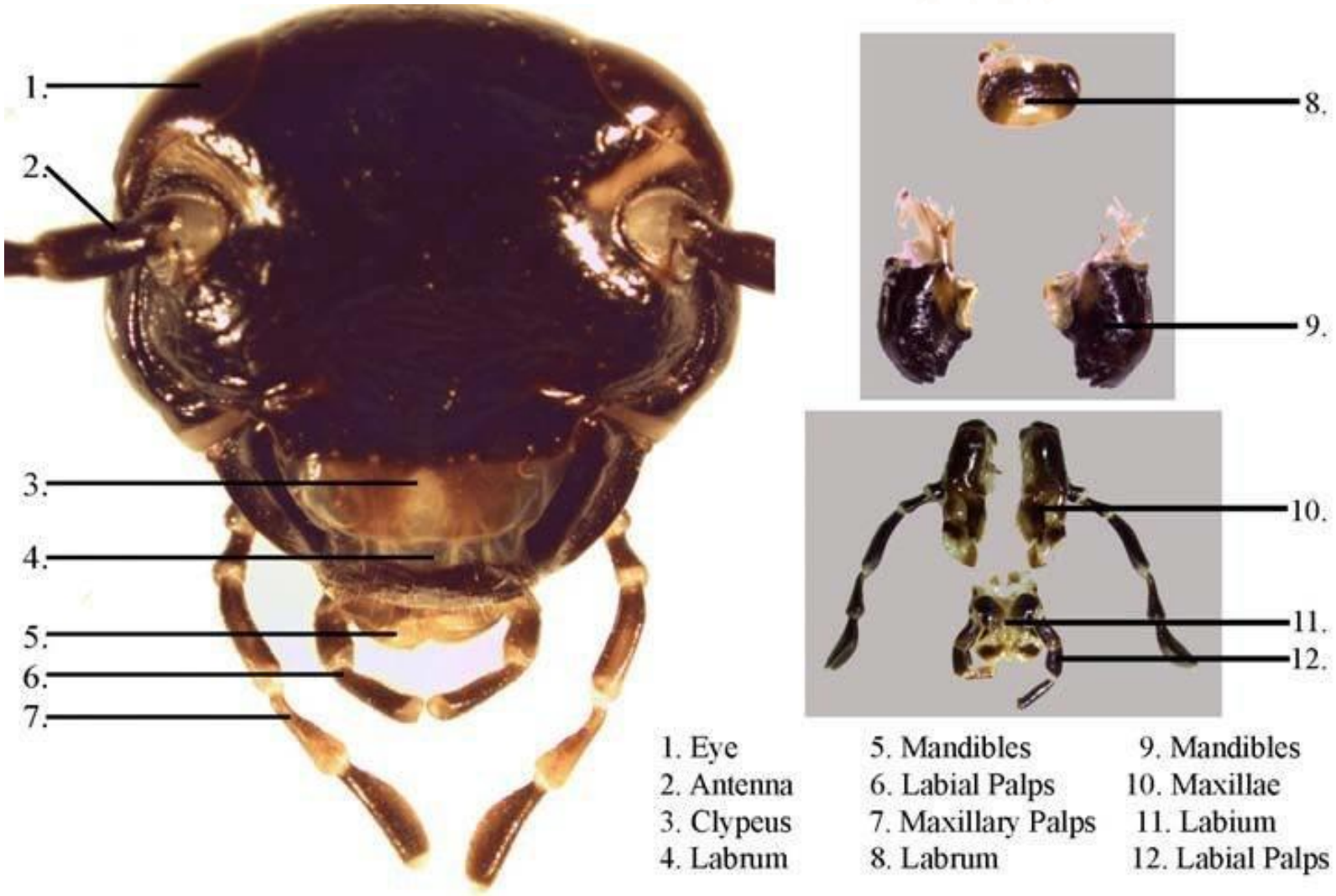


Types of Mouthparts:

- Chewing
  - Ex. Grasshopper or mantis
- Piercing-sucking
  - Ex. Mosquito or assassin bug
- Sponging
  - Ex. House fly
- Siphoning
  - Ex. Butterflies
- Chewing-lapping
  - Ex. Honey bee

1. Biting and Chewing: ex. Cockroach, Grasshopper, larvae of butterflies and Moths

- ✓ The 'primitive' arrangement of mouthparts



Labrum - a cover which may be loosely referred to as the upper lip.

Mandibles - hard, powerful cutting jaws used to grind the food.

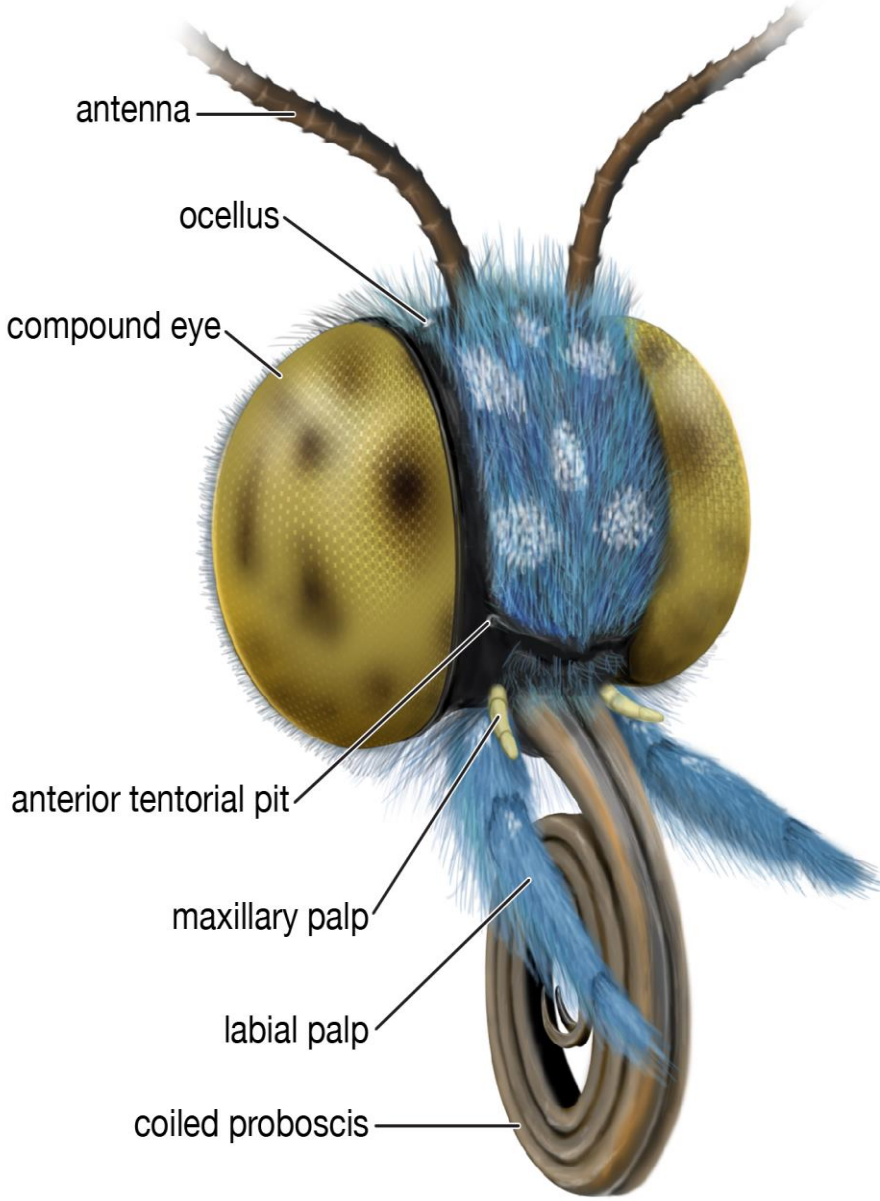
Maxillae - are less powerful than the mandibles. They are used to steady and manipulate the food. They have a five segmented palp which is sensory and often concerned with taste.

Labium - the lower cover, often referred to as the lower lip. It actually represents the fused pair of ancestral second maxillae. They have a three segmented palp which is also sensory.

Hypopharynx - a tongue-like structure in the floor of the mouth. The salivary glands discharge saliva through it.

2. Siphoning:

- ✓ Simple sucking type mouthparts Found in Butterflies and Moths (adult)
- ✓ Mandibles are absent
- ✓ Maxillae is composed of elongated Galea.
- ✓ Each maxillary galea elongated, semi-circular towards inner side. Galea of both side meet together to form a tubular structure to form “Proboscis”
- ✓ Coiled proboscis can be observed beneath the head.
- ✓ Liquid food can be suck by the proboscis.



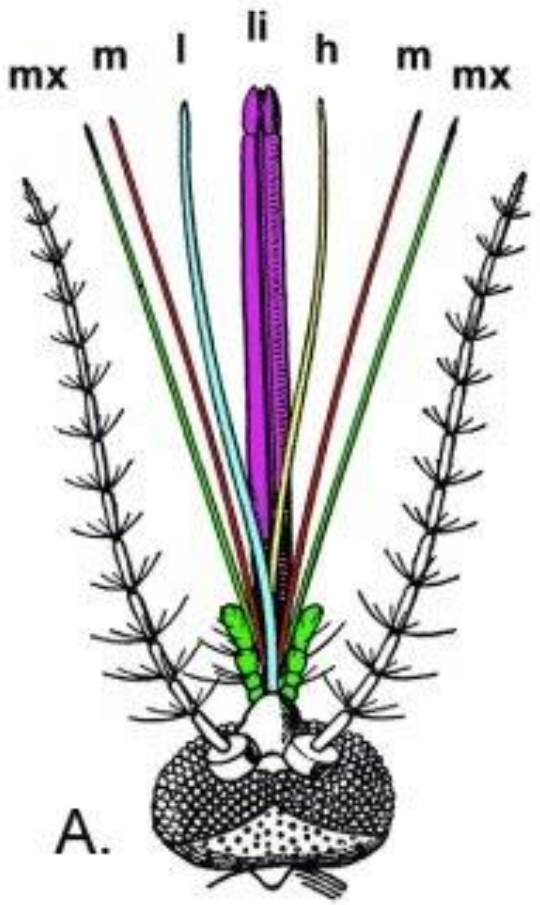
3. Piercing and Sucking: ex. Mosquitoes

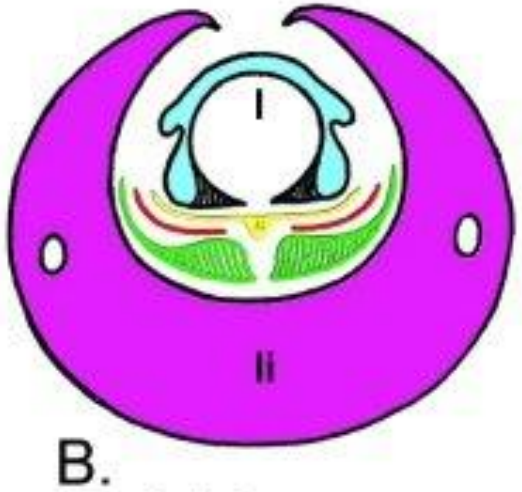
Labium forms a sucking tube over which labrum fits like a lid.

Maxillae and Mandibles are sharp and needle-like to pierce the skin to draw blood which is sucked by labium.

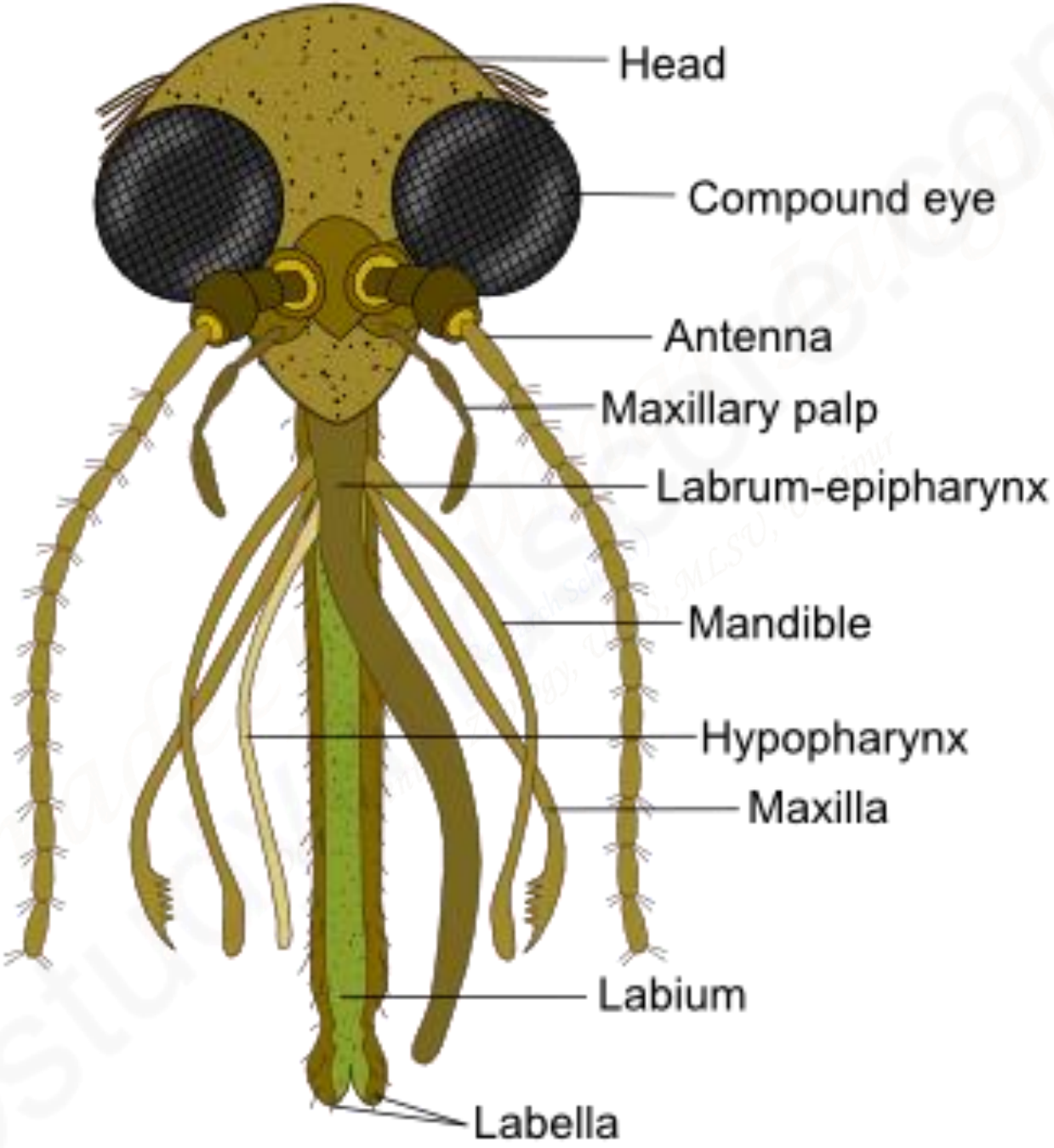
Saliva is injected by the hypopharynx that have anticoagulant substances.

Maxillary palps bear chemoreceptors.





l= labrum
m= mandible
h= hypopharynx
mx= maxilla
li= labium


Head
Compound eye
Antenna
Maxillary palp
Labrum-epipharynx
Mandible
Hypopharynx
Maxilla
Labium
Labella

4. Chewing & Lapping Type:

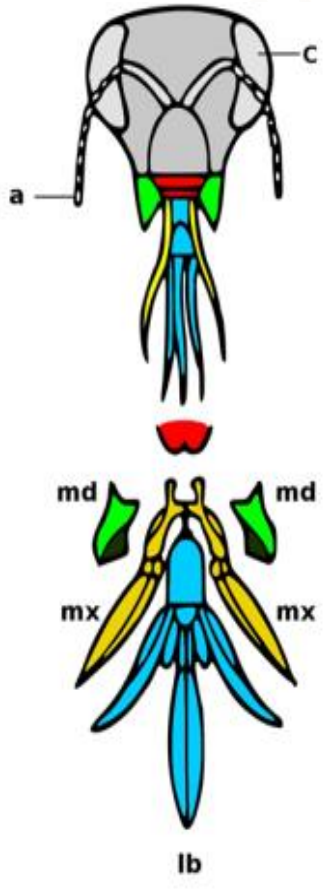
Ex. Honey Bee

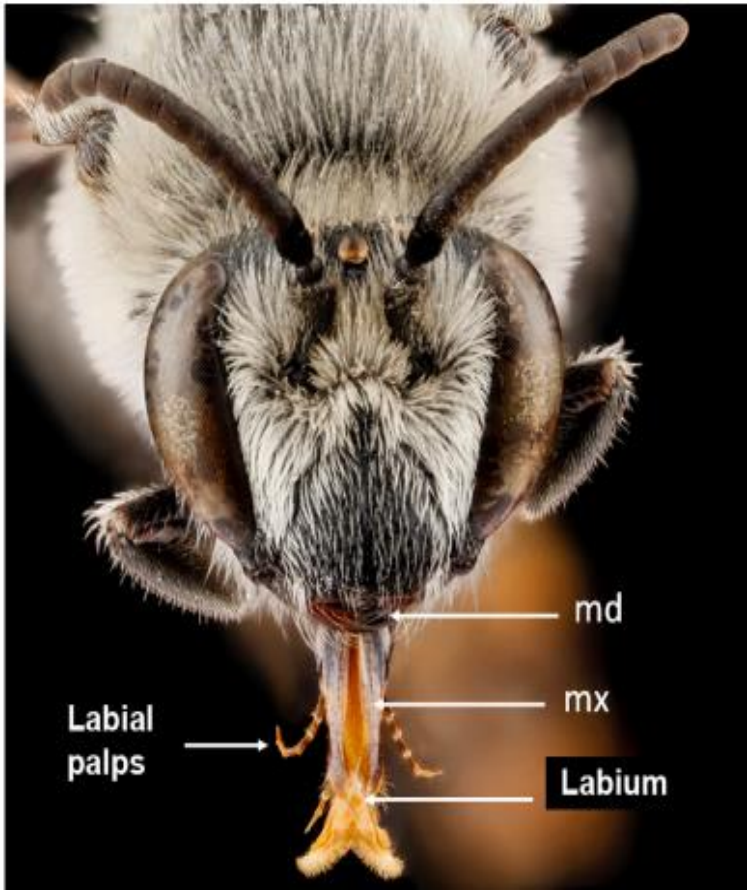
These mouth parts are found in honey bees which have to lap up nectar and honey and chew pollen balls and wax.

Labrum forms the upper lip and labium is large and long and forms a lapping tongue–like structure along with labial palps.

Maxillae and maxillary palps are reduced.

Mandibles are quite well developed with teeth for biting and chewing pollen and wax





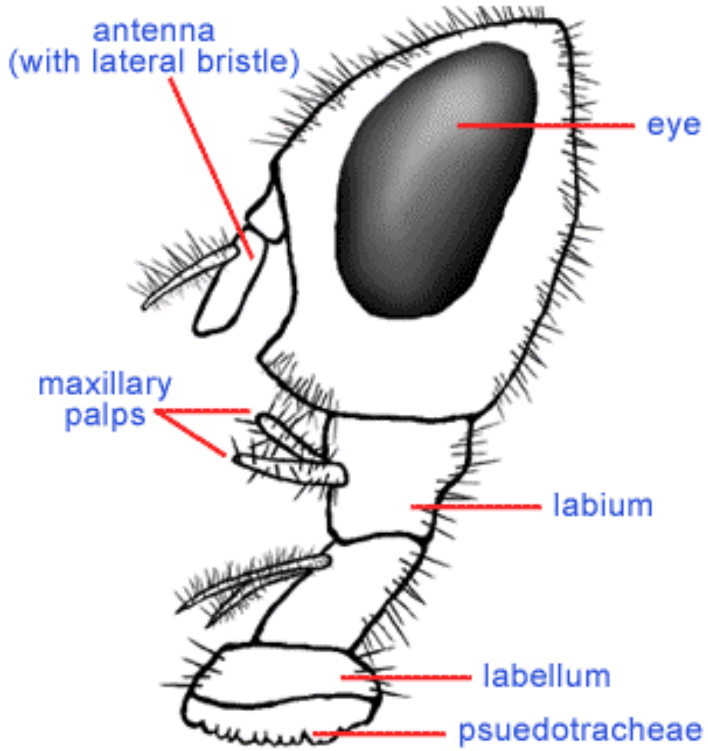
5. Sponging Type: Ex. Houseflies

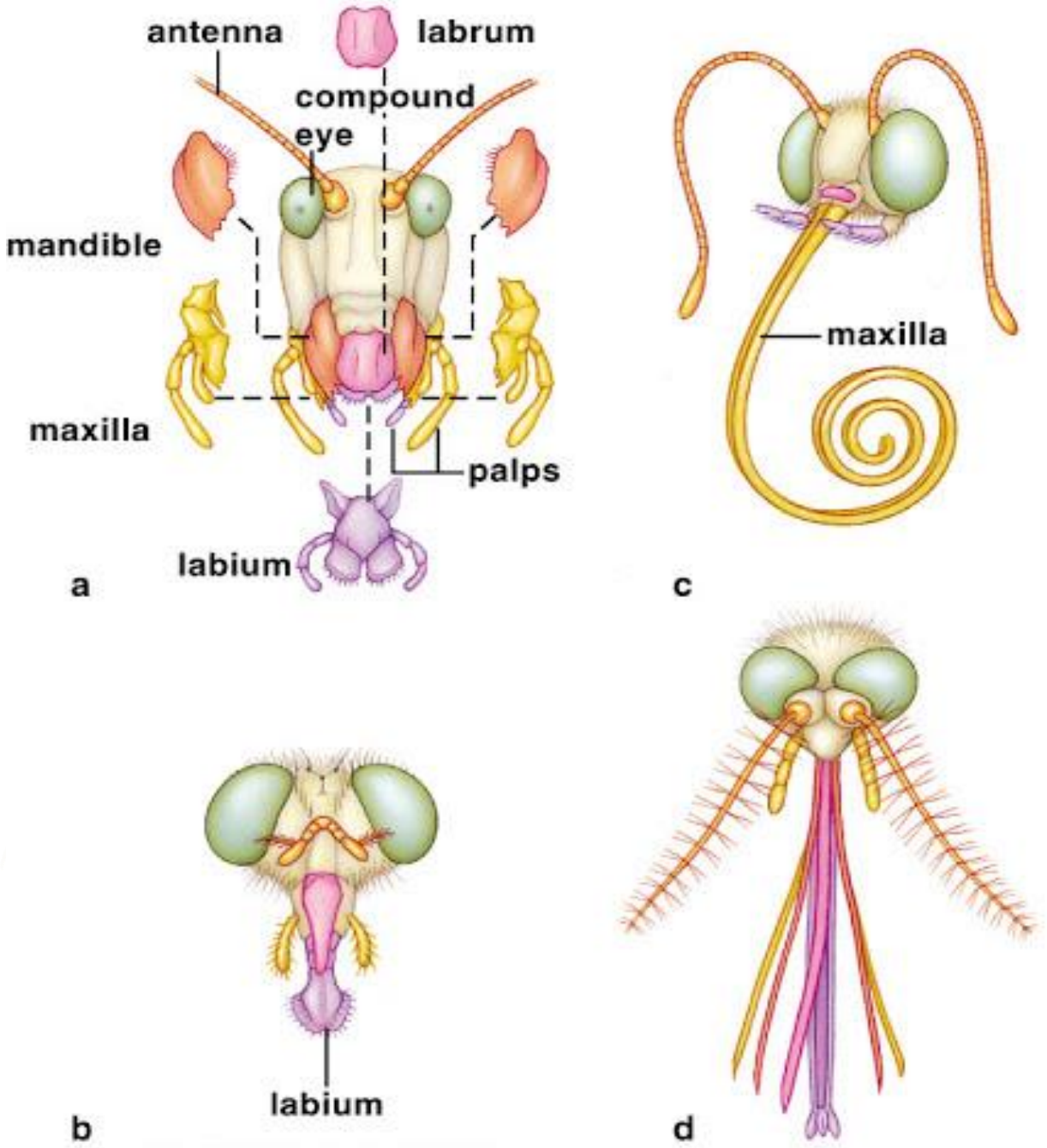
Found in **houseflies** these mouth parts are suitable for feeding on liquid food only.

The long proboscis-like structure is made of basal **rostrum** and an apical **haustellum** that formed by the fusion of maxillae and labium as maxillary palps can be seen near the base.

The apical part of labium forms a broad bilobed sponging apparatus called **labellum**, which consists of lamella-like **pseudotracheae** that quickly absorb fluid that is then sucked through the mouth and a food channel located inside the proboscis.

Labrum forms a small portion at the base of proboscis. Mandibles are completely absent in flies


antenna
(with lateral bristle)
eye
maxillary
palps
labium
labellum
psuedotracheae



Thank You

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