

Mouth parts of Insects and their Types

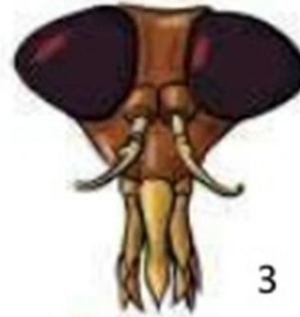
Insects have different mouth parts for feeding



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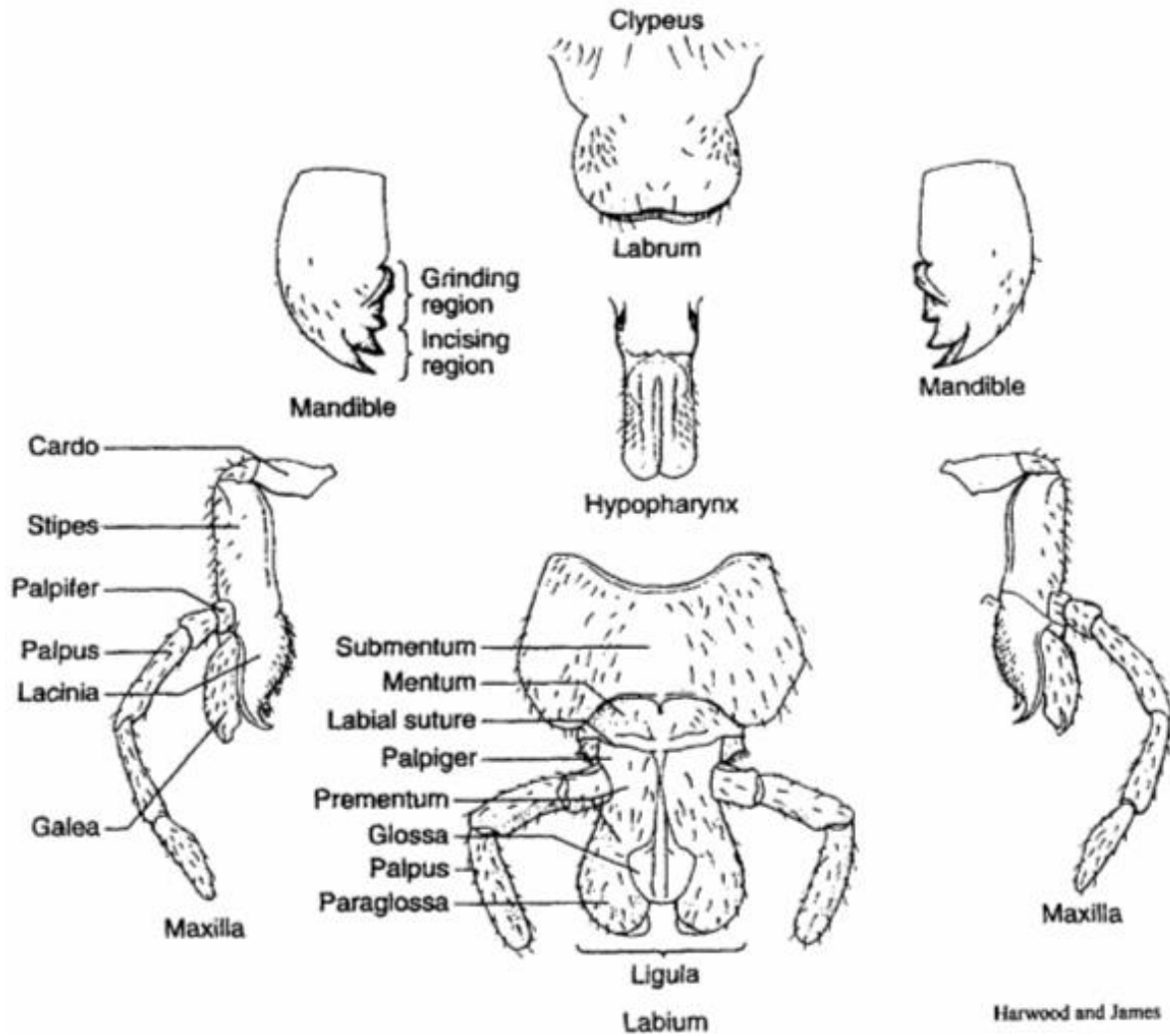
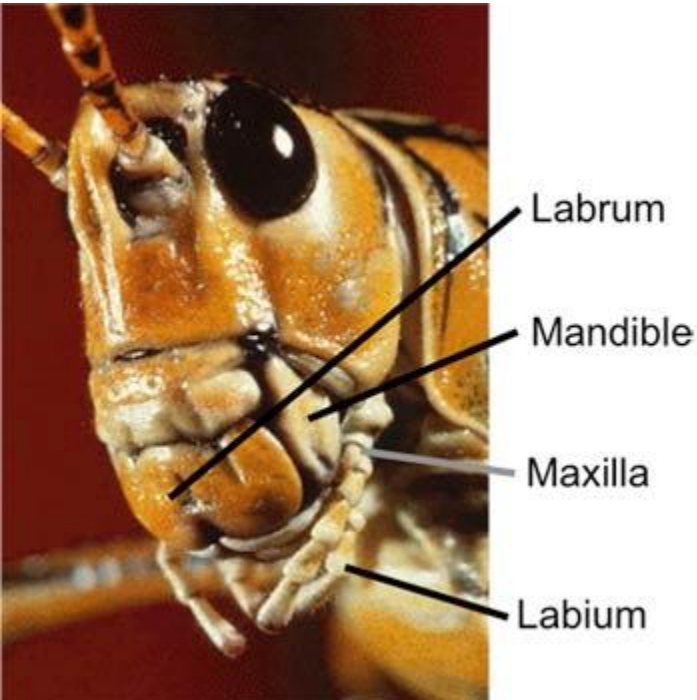


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1. Cricket (chewing); 2. House fly (mopping); 3. Horse fly (piercing and sucking); 4. Mosquito (piercing and sucking); 5. Moth (sucking); 6. Froghopper (piercing and sucking). (Illustration by Ryan Burkhalter)

Typical mouthpart of an insect consists

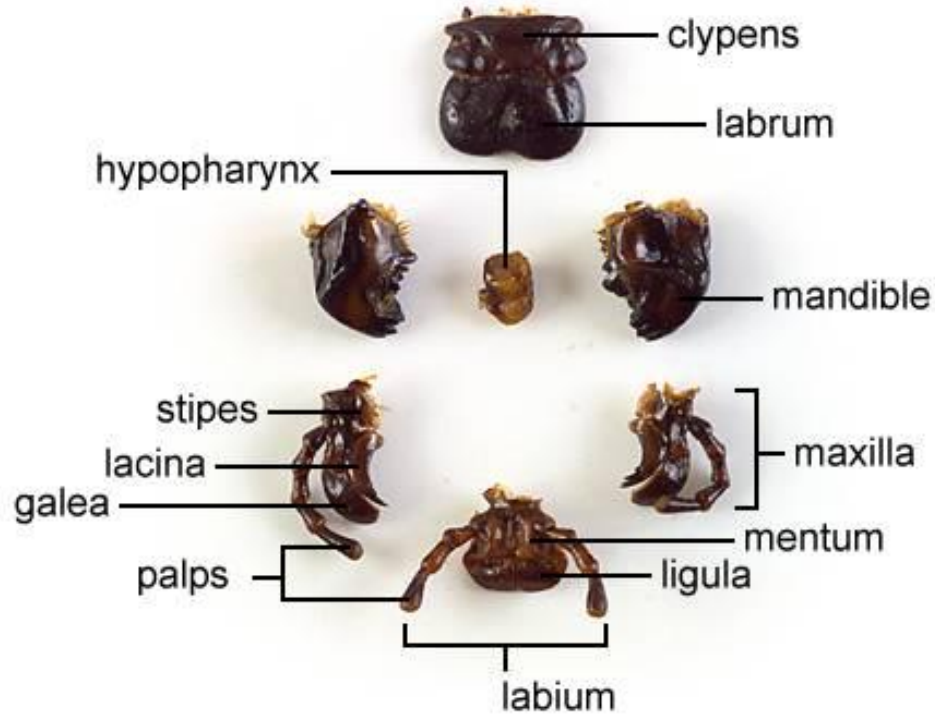
- (i) Labrum (upper lip)
- (ii) A pair of mandibles
- (iii) A pair of maxillae
- (iv) Labium (lower lip)
- (v) Hypopharynx (tongue)



I. Biting and chewing type

primitive and found in Orthoptera, Isoptera and Coleoptera, larvae of Lepidoptera and Neuroptera etc.

Grasshopper - Mouthparts



Labrum : small sclerite that forms the upper lip of the mouth cavity

protects the mandibles

helps in closing of the mouth cavity

guide the food in to mouth

On its inner surface, a lobe like structure called labrum – epipharynx eg. Hymenoptera.

Labrum hangs down from the clypeus through a clypeo-labral suture

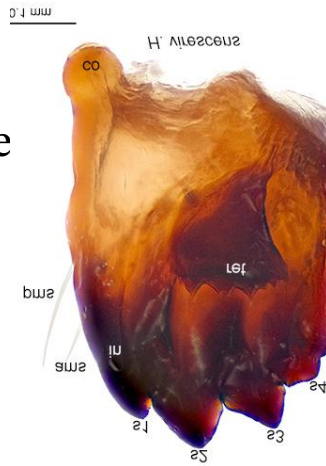
Hypopharynx : It is a tongue like structure situated between labrum and labium and ducts of salivary glands open on or near its base

Mandibles : paired, unsegmented, strongest and sclerotized structures called jaws

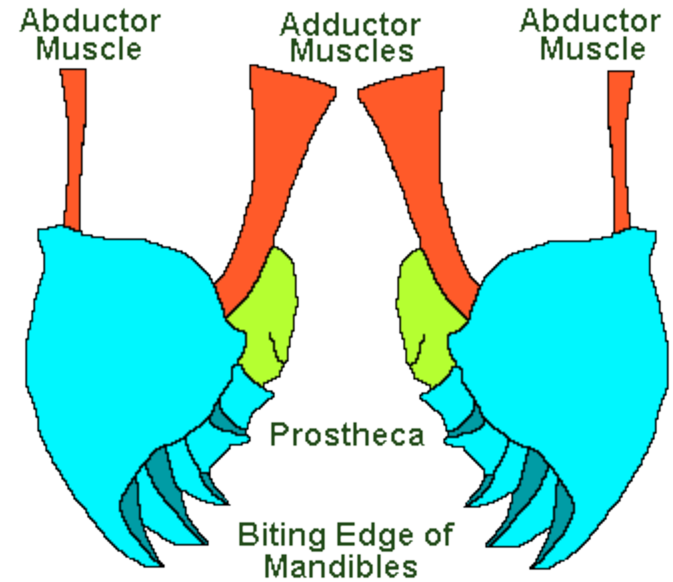
They are attached to the head capsule by means of two joints known as ginglymus and condyle

They possess teeth like molars and incisors that help in the process of cutting the food material

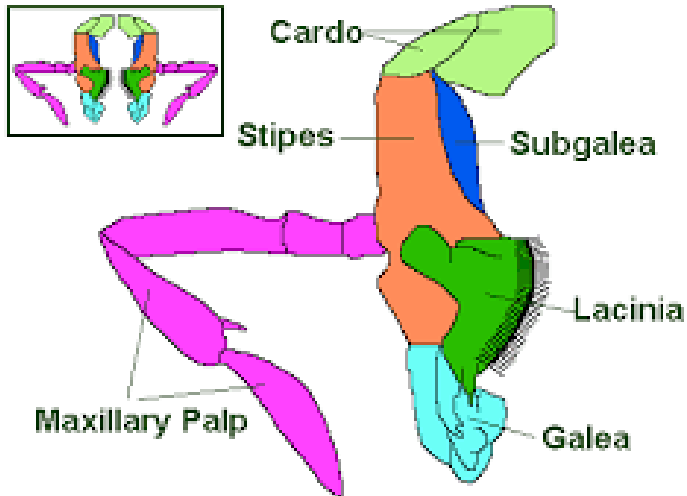
moved by powerful Abductor and adductor muscles



The Insect Mandibles



The Insect Maxillae (one side only)



Maxillae: paired homologous structures with basal triangular 'cardo', middle rectangular 'stipes' lateral 'palpifer' bearing maxillary palpi lobe like inner 'lacinia' and outer 'galea'

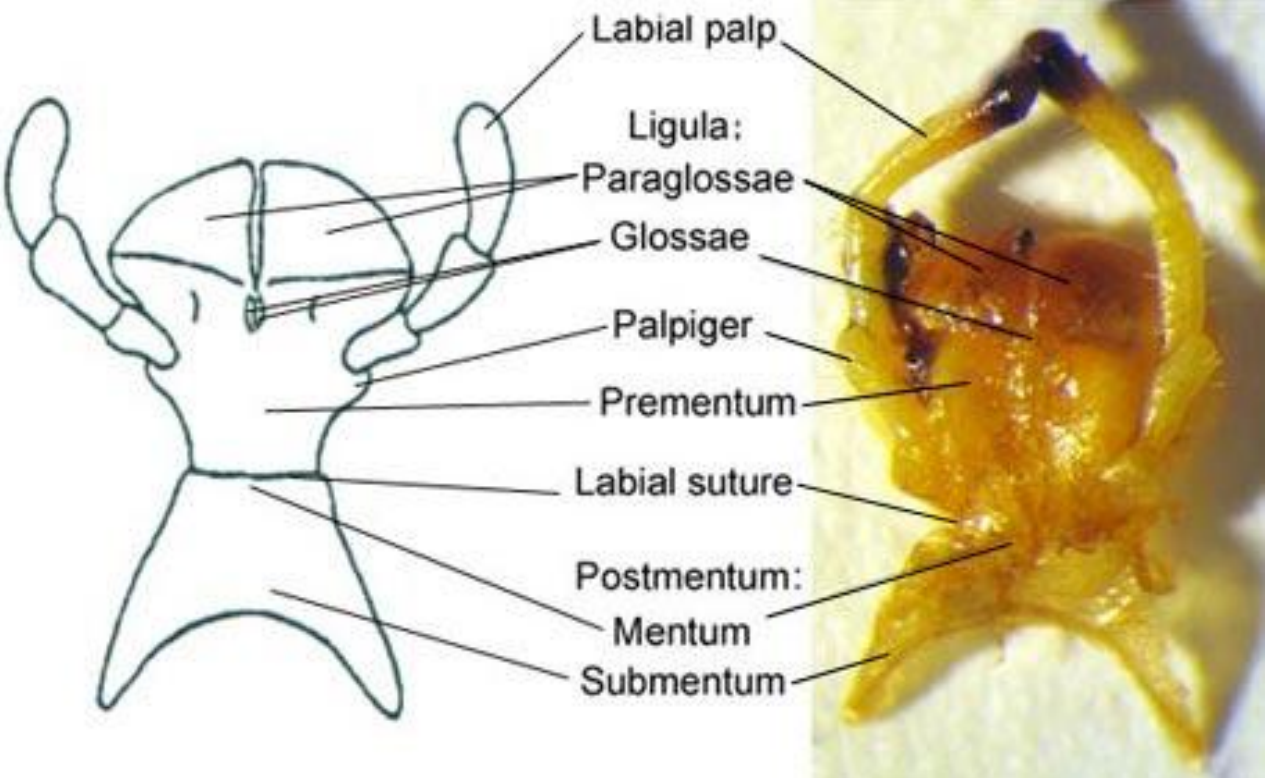
possess olfactory and gustatory sense receptors and function as sensory organs

Galea and lacinia helps in holding the food material along with the mandibles

Labium: lower lip and is also called as second maxillae and closes the mouth cavity from below
divided in to proximal prementum central mentum and distal submentum

Near the base of pre mentum, on either side lobe like ‘palpiger’ is present which bears labial palps.

Premenum has four terminal lobes. The median pair is ‘glossae’ and outer ‘paraglossae’ together called ligula that function mainly as gustatory sense organs.



II. Sucking type of Mouth Parts

Piercing and sucking type e.g: plant bugs, mosquitoes

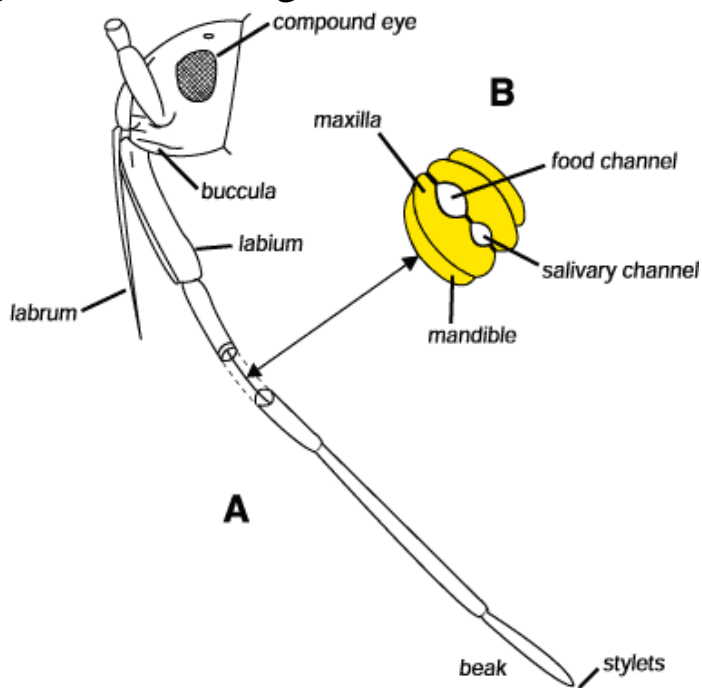
for piercing the tissues and sucking either plant sap or nectar or blood

Mouth parts are represented by rostrum/beak -modification of Labium acts as a pouch for protecting the mandibular and maxillary stylets

Mandibles and maxillae are modified in to sharp needle like stylets

mandibular stylets -serrated margins at their tip

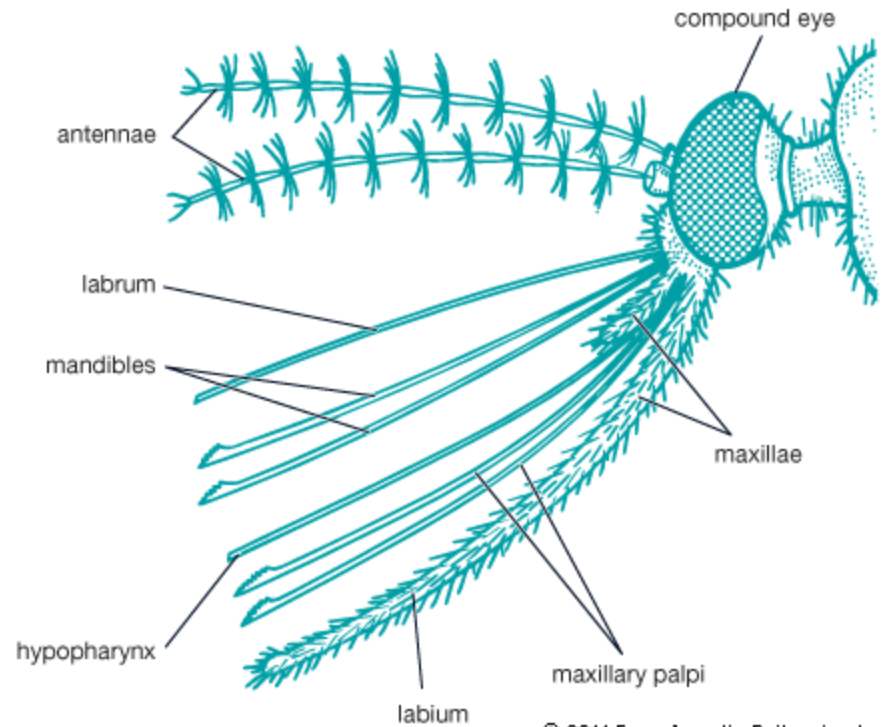
maxillary stylets -smooth curved tips and combin together enclosing a food channel



A, lateral view of the head showing beak, with the labrum detached from the front of beak

B, cross section of stylets

Mouthparts of a mosquito



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food channel- upper **cibarium** and lower **salivarium**

the help of the grooves inside the maxillary stylets

Salivarium is used for releasing the saliva

cibarium is used for sucking the sap.

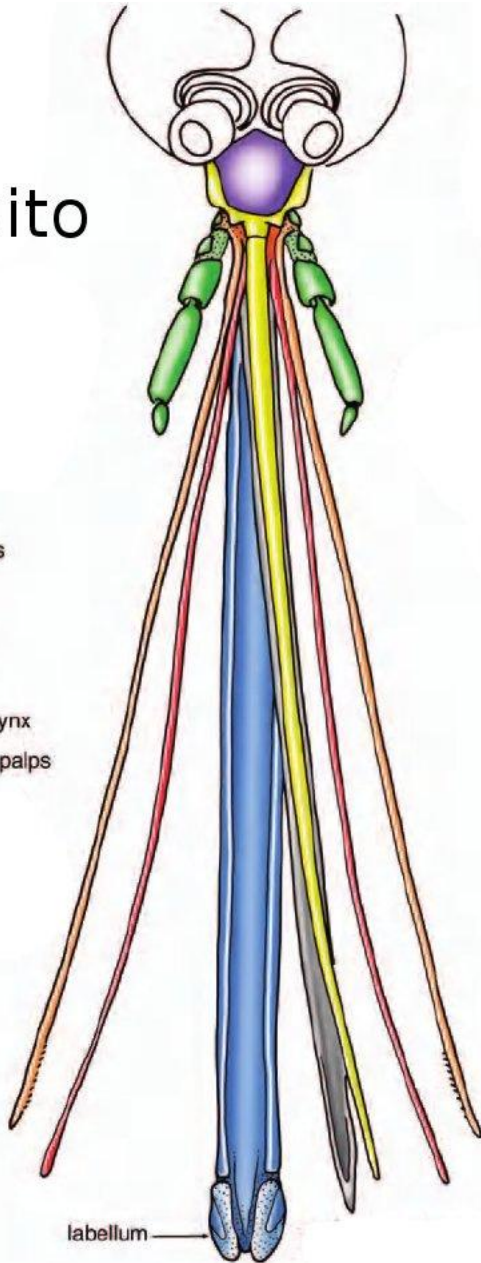
hypopharynx -modified in to a pharyngeal pump

situated at the tip of the food channel

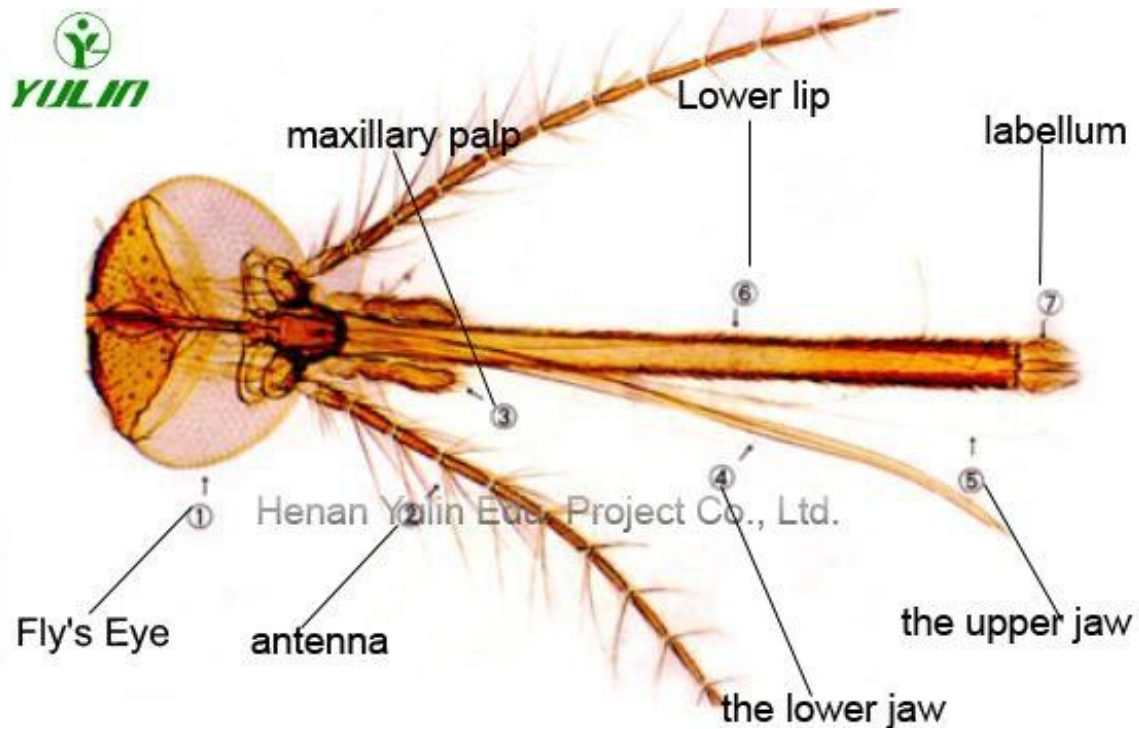
Labrum -a small flap at the base of rostrum

Mosquito

- labrum
- mandibles
- clypeus
- laciniae
- labium
- hypopharynx
- maxillary palps



Insects with these type of mouthparts pierce the tissues with the mandibular stylets and suck the contents (sap/ blood / nectar) through cibarium with the action of pharyngeal and cibarial muscles



Rasping and sucking type e.g. thrips

- asymmetrical type , since right mandible is rudimentary
- Intermediate b/w biting – chewing type; and piercing - sucking type
- Mouth parts are represented by mouth cone which is formed by the labrum and clypeus above and labium below.
- With in the beak/mouth cone hypopharynx and left mandible is present.
- Right mandible is absent
- left mandible is modified in to a mandibular stylet.

Maxillae are modified in to maxillary stylets which are mainly useful for sucking the sap that is released outside due to the rasping of tissues by the left mandible.

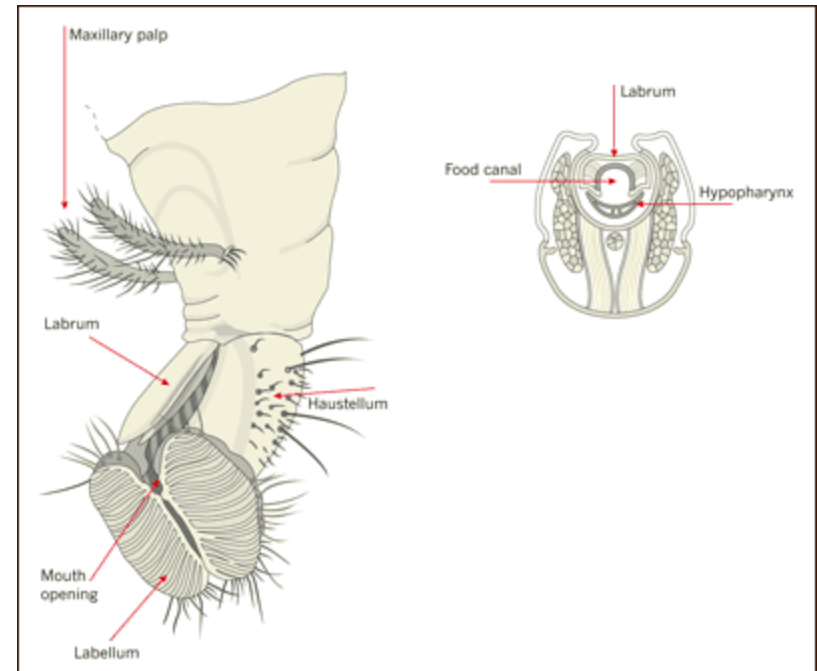
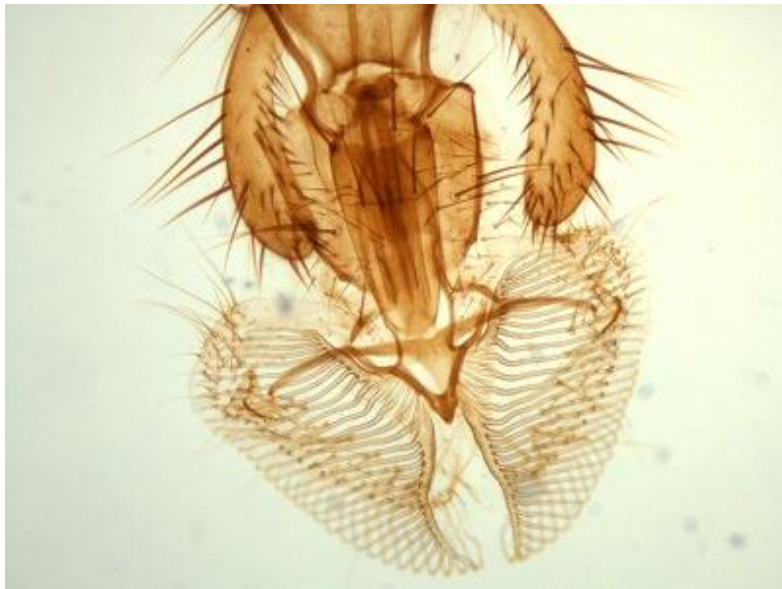


Sponging type eg: housefly

- Mouthparts are represented by proboscis formed from the labium
- It divided into a basal rostrum, middle haustellum and a distal labellum
- Mandibles are absent (reduced) maxillary palpi are 1-3 segmented (Fig. 13).

Labellum is sponge like, traversed by a number of narrow transverse channels called pseudotrachea which converge at one point in the centre of the labellum.

From this point, the food enters in to food channel which is formed by the labrum- epipharynx and hypopharynx.



During feeding, the proboscis is pressed over the food material.

The pseudo trachea gets filled with the food material by the capillary action and is sucked up from the central point in to the oesophagus.

Chewing and lapping type e.g. : honey bees

The labrum and mandibles are biting type whereas maxillae, labium and hypopharynx combine together to form a sucking proboscis .

The mandibles are dumbbell shaped, non-trophic and industrial in function

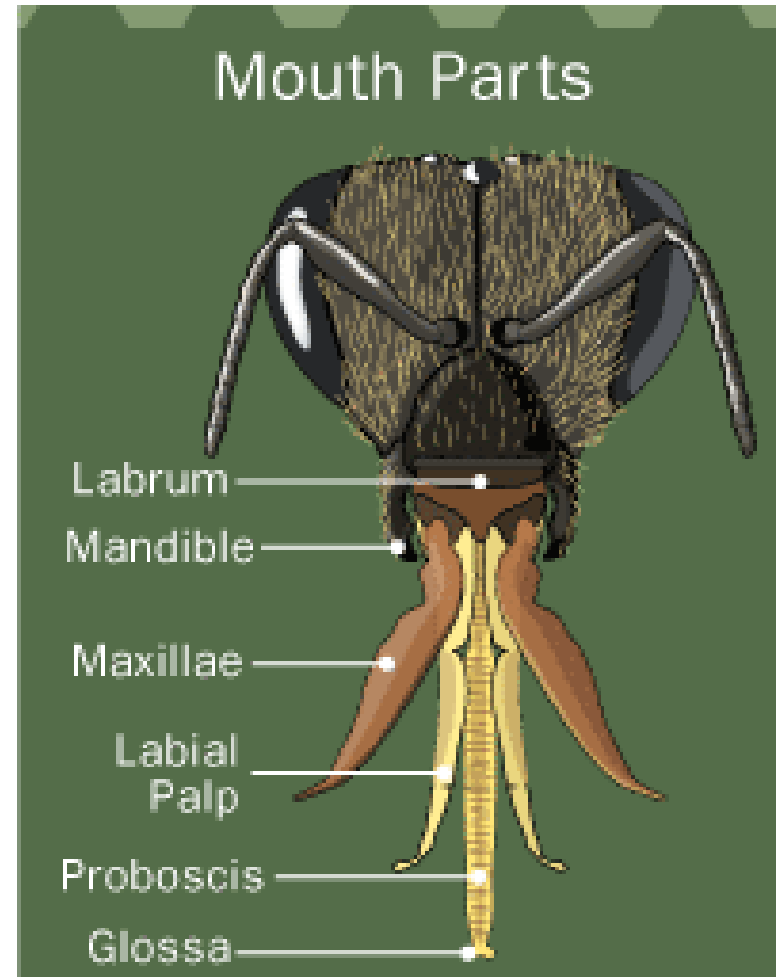
The cardo of maxillae unite with submentum of labium forming an inverted “V” shaped lorum. The maxillary palpi are very small or reduced.

Galea and lacinia of maxillae remain suspended from the cranial wall and attached at the lorum. Labial palpi are conspicuous and 4- segmented

Elongated central organ of the proboscis is the glossa and at the base of glossae are two small concealed lobes are paraglossae

Glossae is provided with long hairs and a small spoon shaped lobe, called flabellum or bouton at its apex

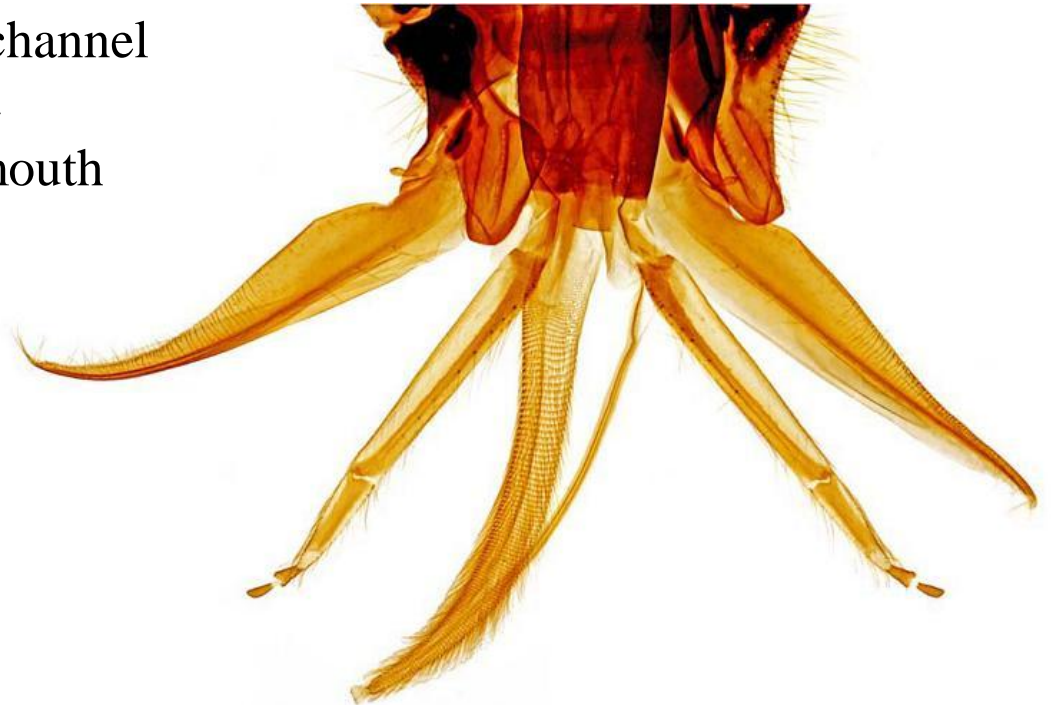
The side walls of glossae are inclined downwards and inwards until they almost meet along the mid ventral line and form the boundaries of a central cavity



- At rest, mouth parts are folded beneath the head against stipes and mentum.
- During feeding they are straightened with labial palpi closely applied to glossa and partly embraced by the ensheathing of galea and lacinia

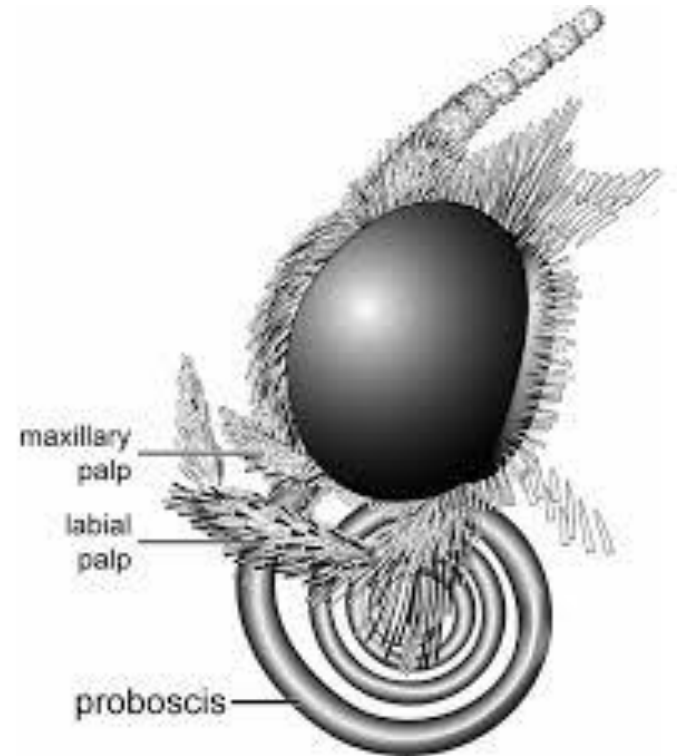
Glossa is very active while food is being imbibed retracting and protruding from the base of mentum.

The liquid food (nectar) ascends by means of capillary action in to the central channel of glossae and enters in to the space between paraglossae and in to the mouth cavity.



Siphoning type eg: butterflies, Moths

These are specially modified for taking nectar from the flowers. Galea of maxilla form into a slender, hollow, tubular structure which remains as an elongated coiled proboscis underneath the head during non feeding.



The food channel is formed by the fusion of both the galea . The nectar will be sucked from the flowers through muscular action.

Mandibles are totally absent. The labrum and maxilla palpi are reduced. Labium is modified in to a small basal plate possessing a 3 segmented labial palpi

Others

Mask type e.g. Nails of dragon flies

Mainly useful for catching the prey

Labium is modified in to a mask where the prementum and post mentum forms in to an elongated structure with a joint

The labial palpi are represented as teeth like structures / spines at the tip of the labium that are helpful for catching the prey. All other parts remain rudimentary (reduced).

During resting period, when the insect is not feeding, the mouthparts cover a part of the head. Hence it is called mask type.

Degenerate type

e.g.:Maggots of Diptera.

In apodous maggots a definite head is absent and mouth parts are highly reduced and represented by a mouth hooks/ Spines

