

<b>Subject</b>	<b>Adv.Insect morphology</b>
<b>Lect. No.</b>	<b>4</b>
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## **TYPES OF INSECT MOUTHPARTS**

Mouth parts vary to a great extent among insects of different groups depending upon their feeding habits. They are mainly of two types viz., mandibulate (feeding mainly on solid food) and haustellate (feeding mainly on liquid food).

### **1. BITING AND CHEWING TYPE**

It is the primitive type of mouth parts. Mouth parts consist of the following parts. **e.g. Cockroach**

#### **i.Labrum (Upper lip) ( Fig.    )**

It is flap like, bilobed and attached to the clypeus by an articular membrane. It is movable, covering the mouth cavity from above. It helps to pull the food into the mouth. It holds the food in position so that mandibles can act on it. It forms the roof of the pre oral food cavity.

#### **ii. Labrum - epipharynx ( Fig.    )**

Inner surface of the labrum is referred to as epipharynx. It is frequently membranous and continuous with the dorsal wall of pharynx. It is an organ of taste.

#### **iii. Mandibles( Fig.    )**

There is a pair of mandibles. They are the first pair of jaws. They are also called as primary jaws or true jaws. Mandibles articulate with the cranium at two points. They are heavily sclerotised. They are toothed on their inner border. There are two types of teeth. Distal teeth are sharply pointed and are called incisor or cutting teeth and

proximal teeth are called molar or grinding teeth. They act transversely to bite and grind the food into small fragments.

#### **iv. Maxillae ( Fig. )**

They are paired and more complicated than mandibles. They are called secondary jaws or accessory jaws, joins the maxilla to head. The second sclerite is called stipes which articulates with cardo. Stipes carries a lateral sclerite called palpifer which bears a five segmented antenna like **maxillary palp**. On the distal end of the stipes, there are two lobes. The outer lobe is called **galea** and inner lobe, **lacinia** which is toothed. Maxillae direct the food into the mouth. They hold the food in place when the mandibles are in action. They act as auxiliary jaws and assist in mastication of food. Sense organs connected with the perception of touch, smell and taste are abundantly found in palpi.

#### **v. Hypopharynx ( Fig. )**

It is a tongue like organ. It is located centrally in the preoral cavity. Salivary gland duct opens through it.

#### **vi. Labium : (Lower lip)( Fig. )**

It is a composite structure formed by the fusion of two primitive segmented appendages. It bounds the mouth cavity from below or behind. It forms the base of the preoral cavity. It consists of three median sclerites viz., submentum (large basal sclerite), mentum (middle sclerite) and prementum (apical sclerite). On the lateral side of the prementum there are two small lateral sclerites called palpiger bearing three segmented labial palpi. Distally prementum bears two pairs of lobes. The outer pair of lobes is called paraglossae and inner pair of lobes, glossae. Both pairs when fused are called ligula.

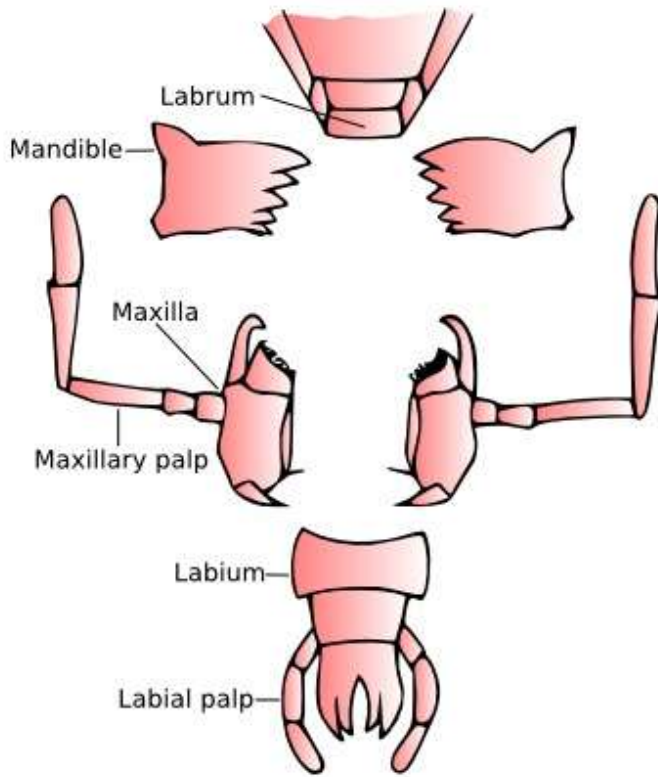
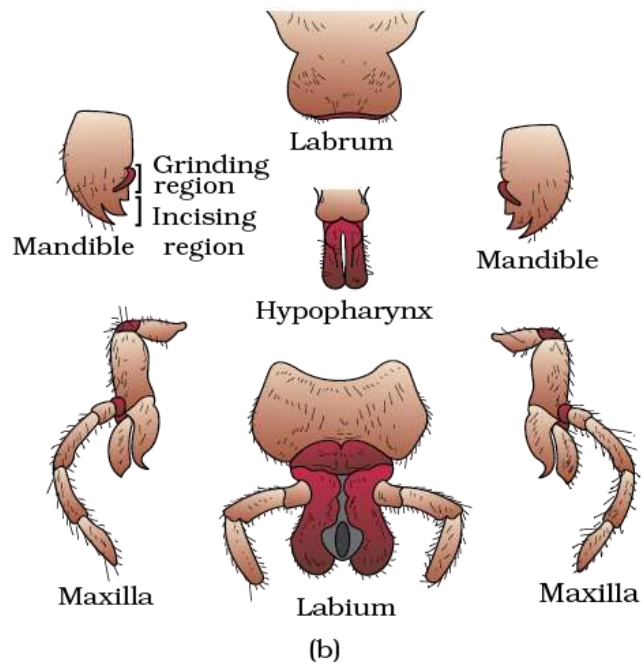


Fig. a. Mouthparts biting and chewing type, Cockroach



b. Beetle

**2. PIERCING AND SUCKING or HEMIPTEROUS or BUG TYPE (Fig. )**

Labium projects downwards from the anterior part of the head like a beak. Beak is four segmented and grooved throughout its entire length. At the base of the labium there is a triangular flap like structure called labrum. It functions as a protective covering for the four stylets (**fascicle**) found with in the groove. Both mandibles and maxillae are modified into long slender sclerotized hair like structure called stylets. They are lying close together and suited for piercing and sucking. The tips of the stylets may have minute teeth for piercing the plant tissue. The inner maxillary stylets are doubly grooved on their inner faces. When these are closely opposed they form two canals viz., food canal and salivary canal through which plant sap and saliva are conducted respectively. Both palps are absent.

e.g. Plant bugs

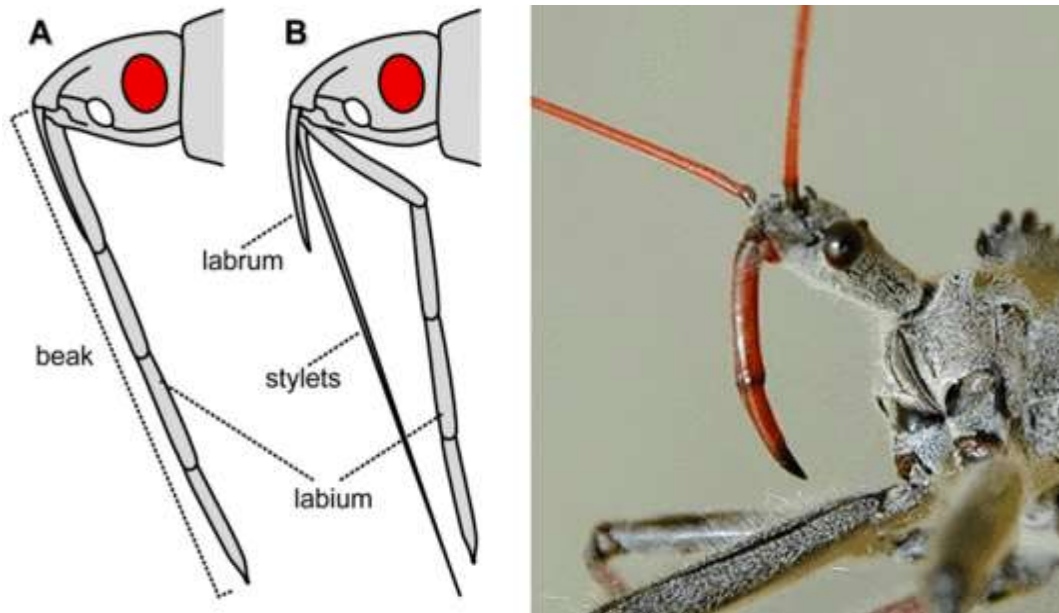


Fig. Plant bugs mouth parts

**3. PIERCING AND SUCKING or DIPTEROUS or MOSQUITO TYPE (Fig. )**

Mouthparts of female mosquito consists of an elongate labium which is grooved forming a gutter which encloses six stylets. The stylets are composed of labrum - epipharynx (enclosing the food canal), the hypopharynx (containing the salivary canal), two maxillae and two mandibles. Both the ends of maxillary stylets and mandibular stylets are saw like and suited for piercing flesh

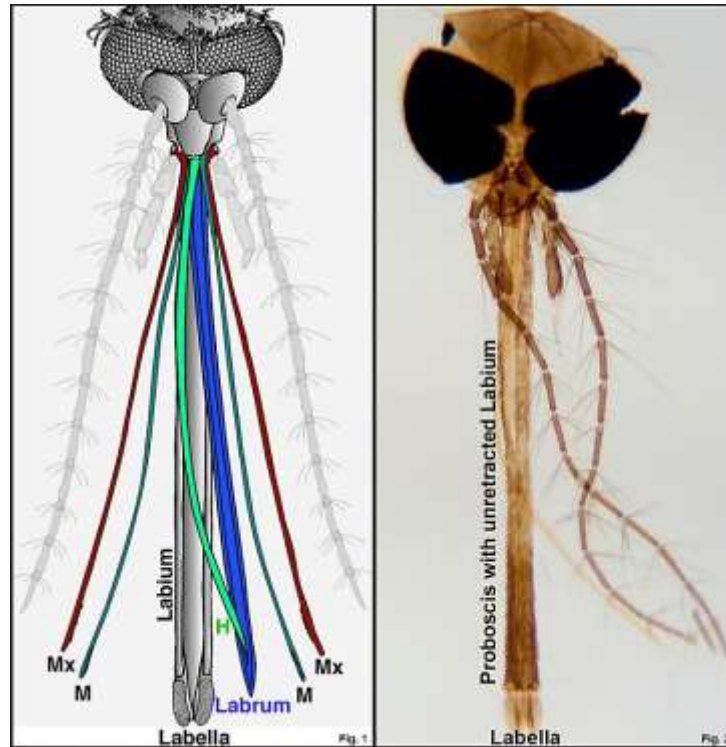


Fig. Mouthparts(Mosquito) a. Female

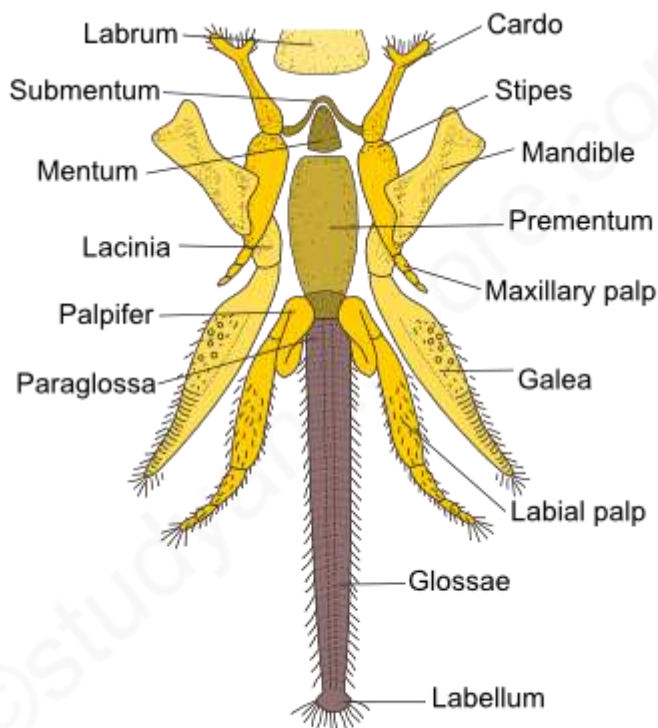
b. Male

. Both mandibles and maxillae are reduced in male and they feed on plant nectar and juices of decaying fruits. Female pierces the skin of human beings into which it injects saliva containing an anticoagulant (to keep the blood flowing without clotting) and an anesthetic (to keep the victim unaware of the bite) and sucks up the blood. Labium does not pierce but folds up or back as stylets pierce. Maxillary palpi are present. **e.g. Female mosquito**

**4. CHEWING AND LAPPING TYPE : e.g. Honey bee.( Fig. )**

Labrum and mandibles are as in biting and chewing type of mouthparts. But mandibles are blunt and not toothed. They are useful to crush and shape wax for comb building; ingest pollen grains and other manipulative functions. Maxillo-labial structures are modified to form the lapping tongue. The tongue unit consists of two **galea** of maxillae, two labial palpi and elongated flexible hairy glossa of labium.

The glossa terminates into a small circular spoon shaped lobe called spoon or bouton or **flabellum**, which is useful to lick the nectar.



MOUTHPARTS OF HONEY BEE - CHEWING & LAPPING TYPE

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## 5. RASPING AND SUCKING

Mouth cone consists of labrum, labium and maxillae. There are three stylets derived from two maxillae and left mandible. Right mandible is absent. Stylets are useful to lacerate the plant tissue and the mouth cone sucks up the oozing sap. Both maxillary palpi and labial palpi are present.

**e.g. Thrips**

## 6. MANDIBULOSUCTORIAL TYPE ( Fig. )

Mandibles are elongate sickle shaped and grooved on the inner surface. Each maxilla is elongated and fits against the mandibular groove to form a closed food canal. The opposing mandibles pierce the body of the insect victim and fluids are extracted. **e.g. Grub of antlion**

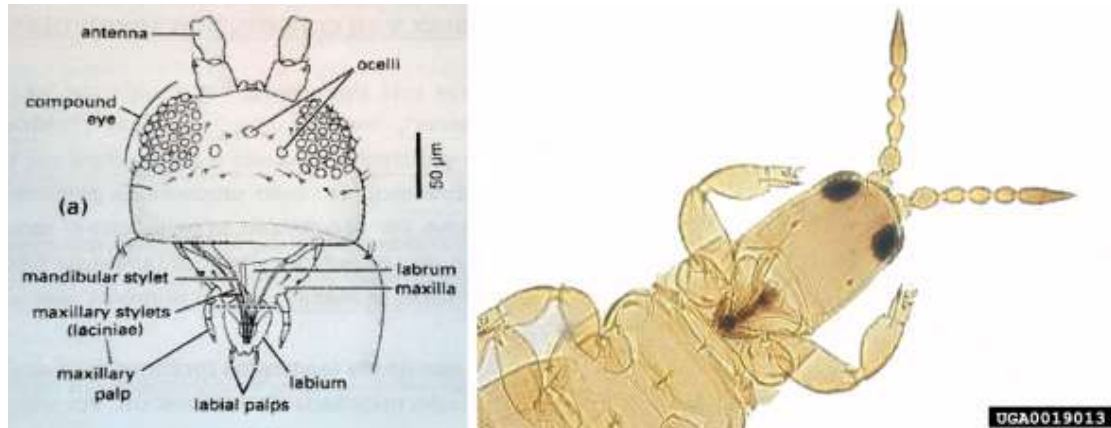
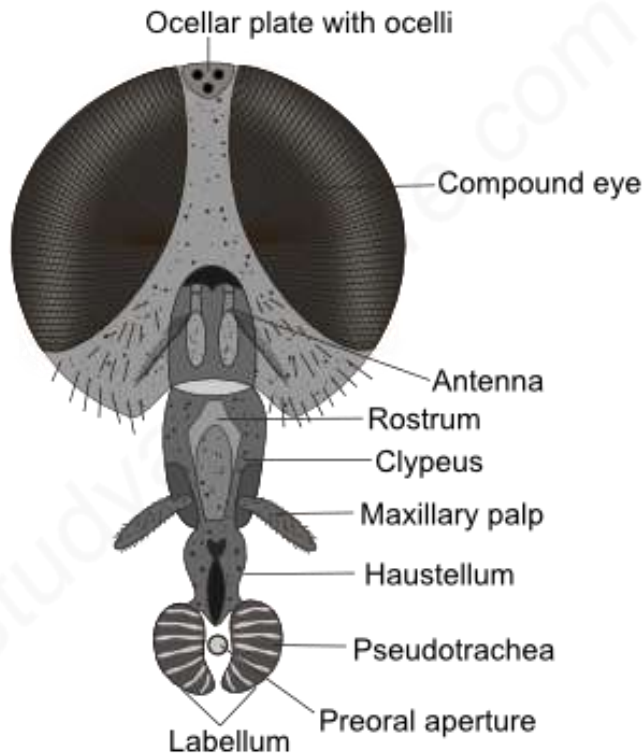


Fig. Mouthparts of *Thrips*

## 7. SPONGING TYPE : e.g. House fly ( Fig. )

The proboscis is fleshy, elbowed, retractile and projects downwards from head. The proboscis can be differentiated into basal rostrum and distal haustellum. The proboscis consists of labium, which is grooved on its anterior surface. Within this groove lie the labrum-epipharynx (enclosing the food canal) and slender hypopharynx (containing the salivary canal). Mandibles are absent. Maxillae are represented by single segmented maxillary palpi. The end of the proboscis is enlarged, sponge like and two lobed, which acts as, suction pads. They are called oral discs or labella. The surfaces of labella are traversed by capillary canals called pseudotracheae which collect the liquid food and convey it to the canal. Labella function as sponging organs and are capable of taking exposed fluids. These insects often spit enzyme containing saliva onto solid foods to liquefy them.



MOUTHPARTS OF HOUSE FLY - SPONGING TYPE

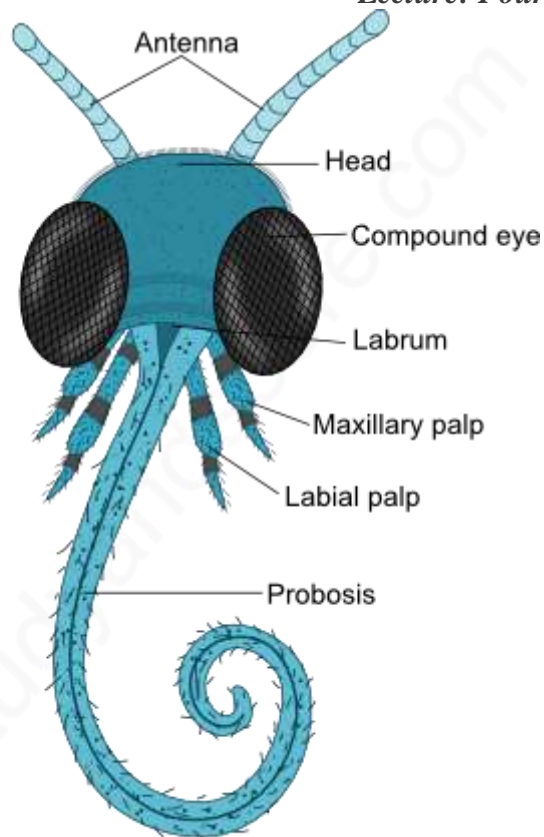
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Fig. Mouthparts House fly

### 8. SIPHONING TYPE : e.g. Moths and butterflies ( Fig. )

Mouth parts consists of elongate sucking tube or proboscis. It is formed by two greatly elongated galeae of maxillae, which are zippered, together by interlocking spines and hooks. Galeae are grooved on their inner surface and when they are fitting together closely they form a suctorial food canal through which the nectar is sucked up. The proboscis is coiled up like watch spring and kept beneath the head when it is not in use. By pumping of blood into galeae, the proboscis is extended. The other mouth parts are reduced or absent except the labial palpi and smaller maxillary palpi.





MOUTHPARTS OF BUTTERFLY - SIPHONING TYPE  
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Fig. M.P. Moths and butterflies

### 9-Cutting and Lapping Mouthparts:

Mandibles are modified as sharp blades; the maxillae appear as long stylets. Blood lapping occurs via labella. From meeting of labrum and hypopharynx, food canal is composed. .ex. Horse fly mouthparts

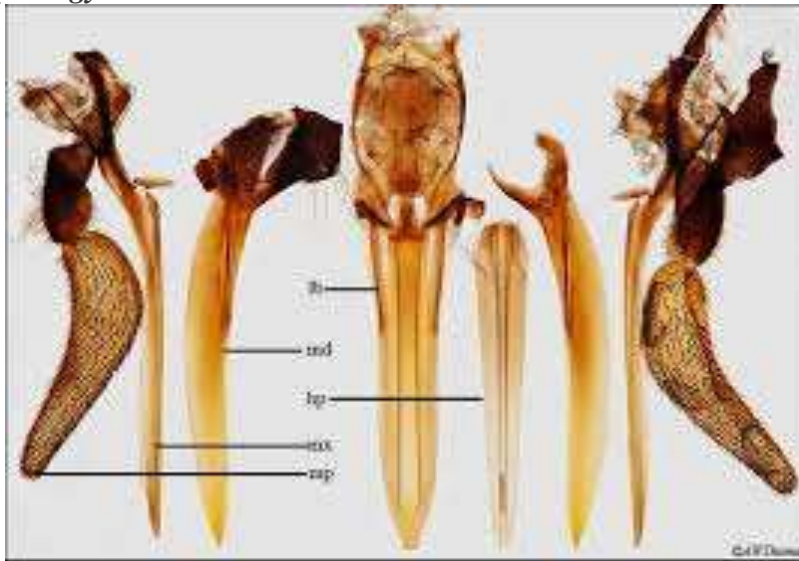


Fig. a. Cutting and Lapping Mouthparts

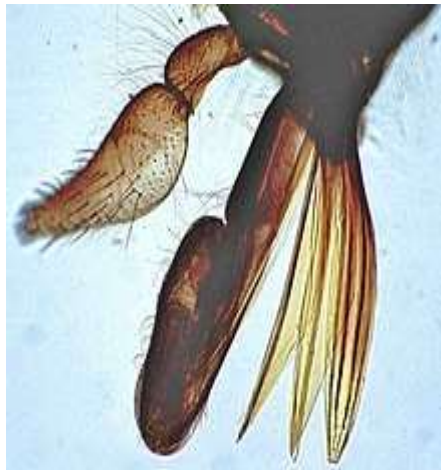


Fig. b. MP.



c. Horse fly