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B. Sc. Part -I
Zoology (Hons.)
Paper -

MOUTHPARTS OF INSECTS

Introduction :

Insects feed on animals and plants in a diversity of ways and their mouthparts have become modified for these purposes. Mouthparts are essentially the paired appendages of mandibles and maxillary and labial segments of the head. These have evolved into a variety of forms, which have been perfected to meet different kinds of highly specialized feeding habits. Important types of insect mouthparts may be described as follows :--

1) Biting and Chewing Type :

This type of Biting-chewing mouthparts represent the most primitive and unspecialised type which appeared in early insects in course of evolution. These consist of labrum or upper lip, a pair of 'mandibles, paired maxillae (first maxillae), labium (second maxillae) or lower lip, epipharynx and hypopharynx.

Maxillary palps act as sensory feelers to locate the food. Lacinia are often employed for grasping the food and cutting or chewing it. Mandibles, worked by two sets of muscles, masticate food with their teeth like processes. Ligula, formed by paired and glossae paraglossae, help in pushing the food into pharynx.

This type of mouth parts (Biting and chewing type) found in common among orthopteran insects such as grasshoppers, cockroaches and crickets, They also occur in silver fish (*Lepisma*), earwigs, termites, book-lice, bird lice, beetles, some Hymenoptera and many larval forms, specially the caterpillars of Lepidoptera.

2) Piercing and Sucking Type:

This type of mouth parts of insects which feed on fluids are modified in various ways to form a tube through which liquid can be drawn and saliva can be injected. This results in the elongation of some parts and in the loss of some of the typical structures. Piercing-sucking mouthparts are found in blood-sucking insects like the mosquitoes, the bugs such as the bedbug and kissing bug, and the herbivorous insects such as aphids, which feed on plant juices. In this type the mandibles and maxillae resemble to fine needles, meant for piercing the skin or plant tissues. Labium forms the hollow grooved channel which encloses these needles. Open part of the groove is covered by the labrum. Hypopharynx, when present is hollow and needle – like, through which flows the saliva.

In mosquito, mouth parts consist of a long proboscis or beak, which is composed of the labium, forming an elongated, fleshy and mid–dorsally grooved tube. It encloses the needle – like stylets formed by the modifications of the mandibles, maxillae and hypopharynx. Needlelike labrum is fused with the epipharynx and forms the long covering of the open groove of proboscis. Proboscis bears, at its tip, two small labellae, which are used as feelers and enables the mosquito to

select the appropriate part of its victim to attack. Mouthparts are well developed in female mosquitoes as they feed on blood. In bedbug labium forms a three-jointed proboscis. Stylets are four in number, consisting of two mandibles and two maxillae, former with blade-like and the latter with saw-like tips. Labrum is a flap-like structure, covering the groove of proboscis at the base only. Of the four stylets, the maxillae are doubly grooved on their inner faces, one acting as a food canal for the flow of blood and the other as a salivary canal for the flow of saliva.

3) Chewing and Lapping Type :

Chewing-lapping mouthparts occur in the honey-bees and bumble-bees. These consist of a long tongue which is formed from the glossae of the labium, ending in a spoon-shaped labellum or flabellum. Galeae of the maxillae form blade-like structures and the maxillary palps are very small. A temporary food channel is formed by the proboscis, galeae and labial palps fitting together. Through this food channel the liquid food is sucked up, assisted by the pumping action of the pharynx. Labrum and mandibles act for chewing.

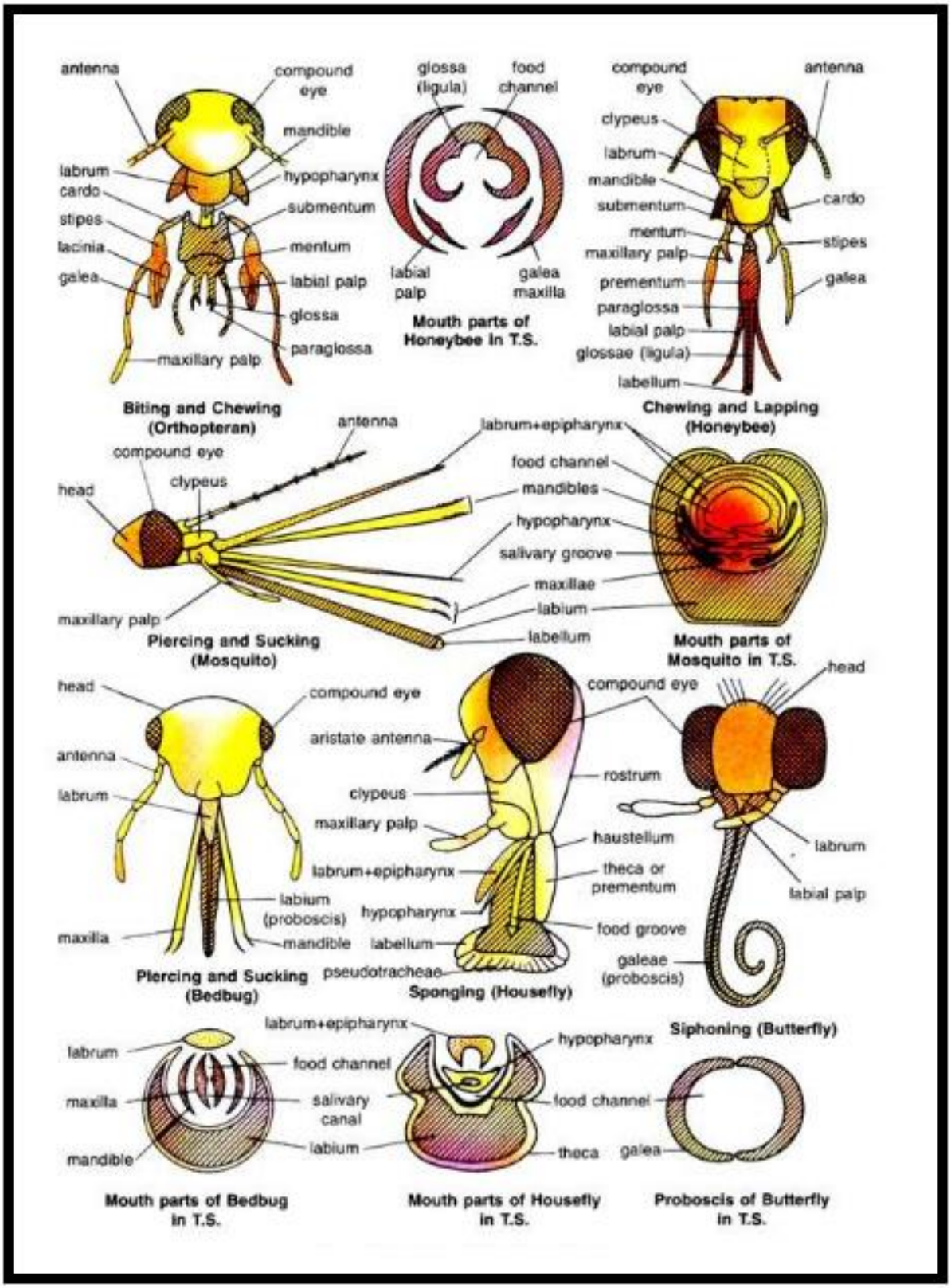

FIG 1: MOUTHPARTS OF INSECTS

4) Sponging type :

Sponging mouthparts are found in the housefly and some other flies to suck up the liquified food. These flies lack the cutting weapons of the insects that chew the food. Mandibles are altogether absent, while the maxillae are represented only by two maxillary palps, each made of a single piece. Labium is greatly modified to form the so-called proboscis, which is divisible into three parts : (i) a proximal cone-like rostrum bearing the maxillary palps, (ii) middle haustellum with mid-dorsal groove, serving as food passage and ventral heart-shaped plate called theca, and iii) distal labellum (oral disc) consisting of two expanded lobes or labellae, underside of which is made of numerous incomplete cylindrical tubes, the pseudotrachea, all converging in the centre to the mouth aperture, which leads into the food groove. Labellum is used to lick the food by its contractile activity. It is first collected into the pseudotracheae and then passed on to the food canal, formed by the labium, epipharynx and hypopharynx, lying in mid-dorsal groove of the haustellum.

5) Siphoning Type

'Butterflies and moths are adapted for feeding on nectar, like the bees, but in their mouthparts the maxillae form the main proboscis and not the labium. Mandibles and labium are much reduced, he maxillary palps are rudimentary and labium forms a triangular plate bearing labial palps. Galeae are much elongated and coiled, each forming a half tube, which makes complete tube when both are locked together.

When not in use, proboscis is coiled into position beneath the head and when insect wants to feed, it becomes uncoiled to reach the nectary. It is the rise in blood pressure which uncoils the proboscis.
