



**BENHA UNIVERSITY,  
FACULTY OF SCIENCE,  
ENTOMOLOGY DEPARTMENT**

**PRACTICAL NOTES ON  
GENERAL ENTOMOLOGY (111 E)**

**Prepared by**

**Staff members of the Department**

**Revised by**

**Prof. Abdelwahab A. Ibrahim**

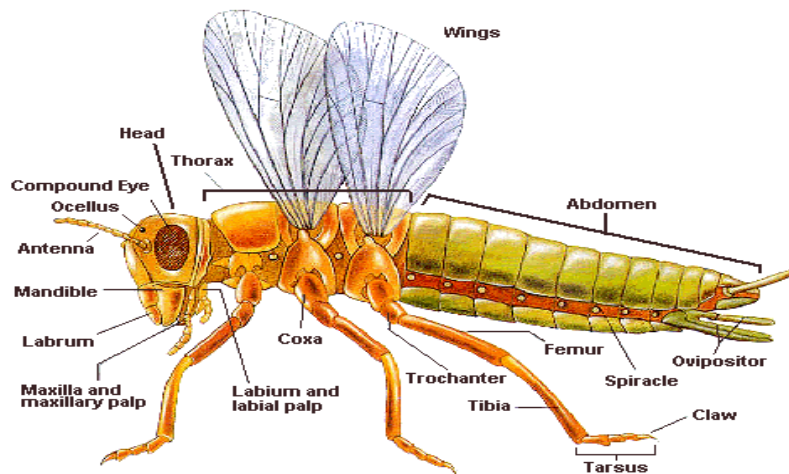
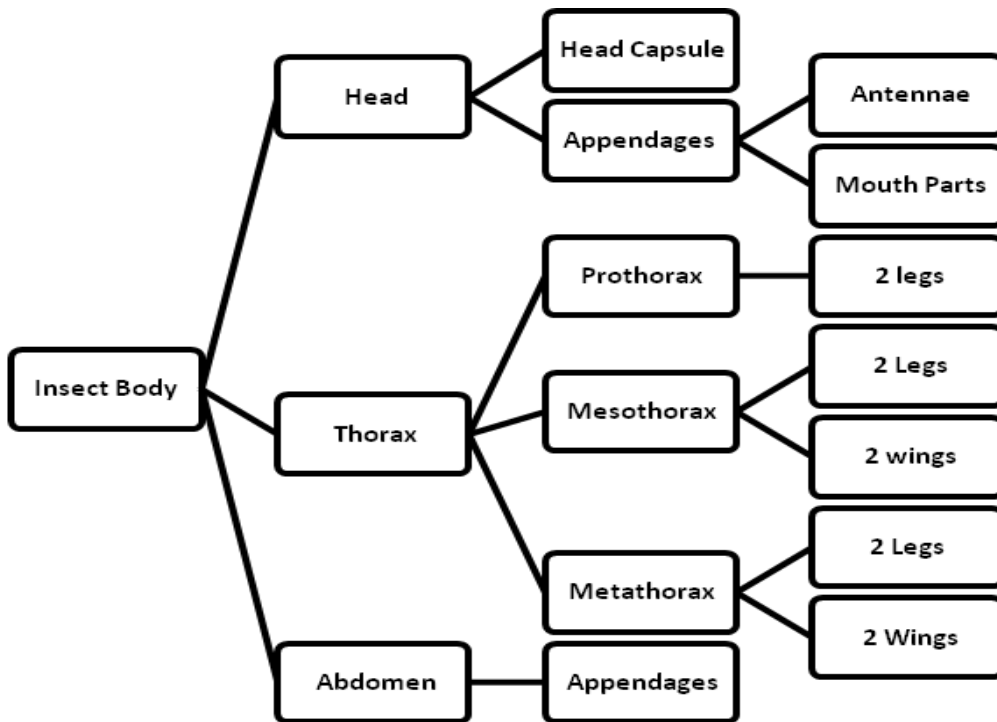
<b>Student Name</b>	
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**Lab No:1**

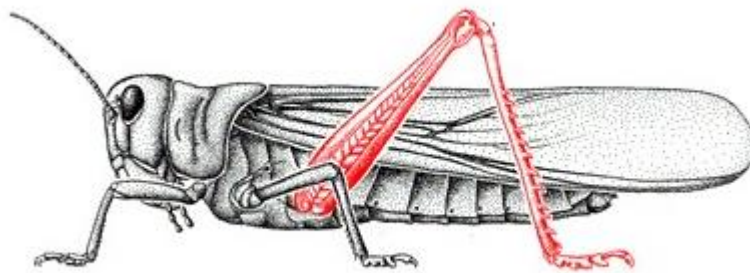
# EXTERNAL ANATOMY

## Gross Morphology

An insect body is divided into three main parts (the head, thorax and abdomen) each of which is in turn composed of several smaller segments.



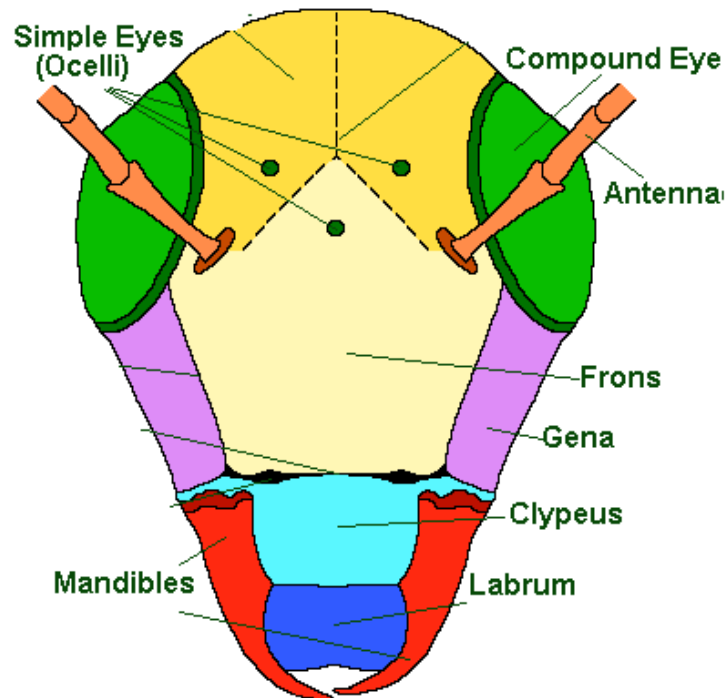
**Label The Following Diagrams**



## The Head

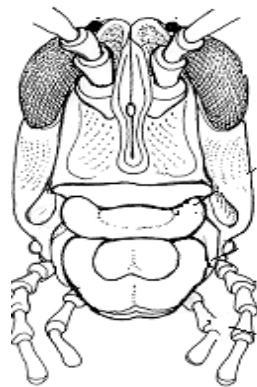
### Structure of the Head Capsule

#### The Insect Head (Frontal)



#### Locate and label the following areas of the head:

- Gena – cheeks on each side of the frons.
- Frons – The area below the vertex extending to the transverse suture, which separates it from the clypeus.
- Clypeus – the sclerite above the mouthparts and below the frons.



## Lab No:2

### INSECT ANTENNAE

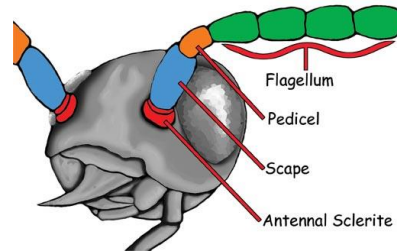
1) **Function:** Sensory organ


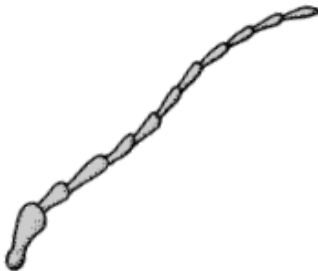
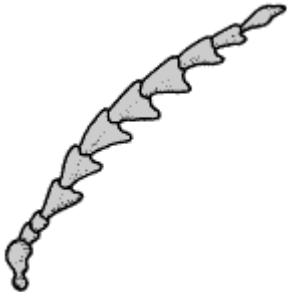
- Tactile, Smell, Taste

2) **Morphology:**


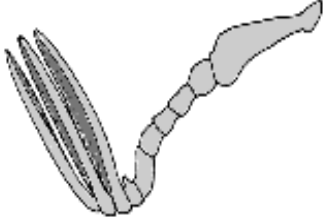

- First segment: **Scape**
- Second segment: **Pedicel**
- Remaining segments: **Flagellum**

3) **Antennal types:**


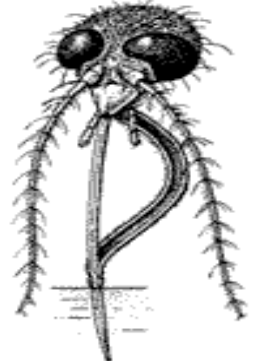
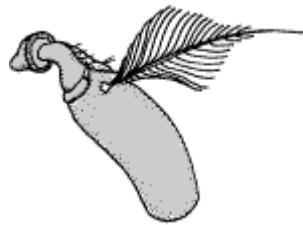


Type	Shape	Student Draw
<b>Setaceous</b>	 <p>Setaceous</p>	
Bristle-Like		
E.g. Cockroaches		
<b>Filiform</b>		
Thread-Like		
E.g. Grasshoppers		
<b>Serrate</b>		
Saw-Toothed		
E.g. Click beetles		

**Antennal types:**

Type	Shape	Student Draw
<b>Clavate</b>		
Gradually Clubbed		
E.g. Butterflies		
<b>Lamellate</b>		
Nested Plates		
E.g. Scarab Beetles		
<b>Pectinate</b>	 Pectinate	
Comb-Like		
E.g. Female Moths		

**Antennal types:**

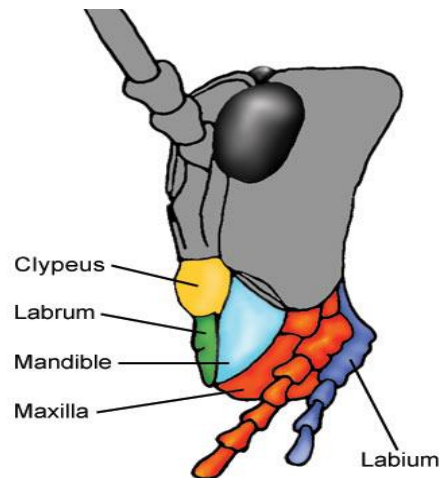
Type	Shape	Student Draw
<b>Plumose</b>	 <p>Plumose</p>	
Feather-like		
E.g. Male Mosquitoes		
<b>Pilose</b>		
With Short hairs		
E.g. Female Mosquitoes		
<b>Aristate</b>		
Pouch-like with lateral bristle		
House flies		

## Lab No:3

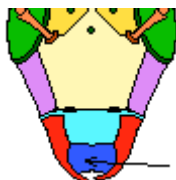
### TYPES OF MOUTHPARTS

#### Chewing (Biting) mouthparts:

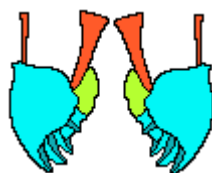
- Ex. Cockroaches and Grasshoppers
- Carefully examine the mouthparts of a Grasshopper in position.



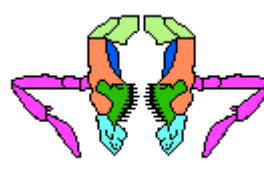
- Carefully examine the mouthparts of the Cockroach under the microscope using the accompanying illustration:
  1. **Labrum** (upper lip)  
Situated directly below the clypeus.
  2. **Mandibles** (upper maxillae)  
behind and below the labrum.
  3. **Hypopharynx** – tongue-like organ  
inside the mouth through which the salivary glands open.
  4. **Maxillae**  
Behind the mandibles. Function as secondary jaws.
  5. **Labium** (lower lip)



Labrum



Mandibles

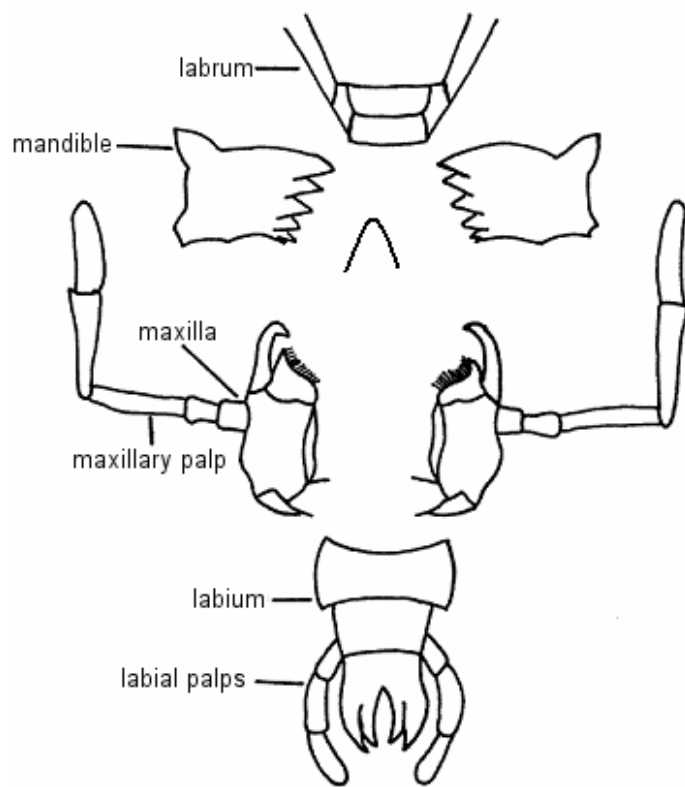


Maxillae

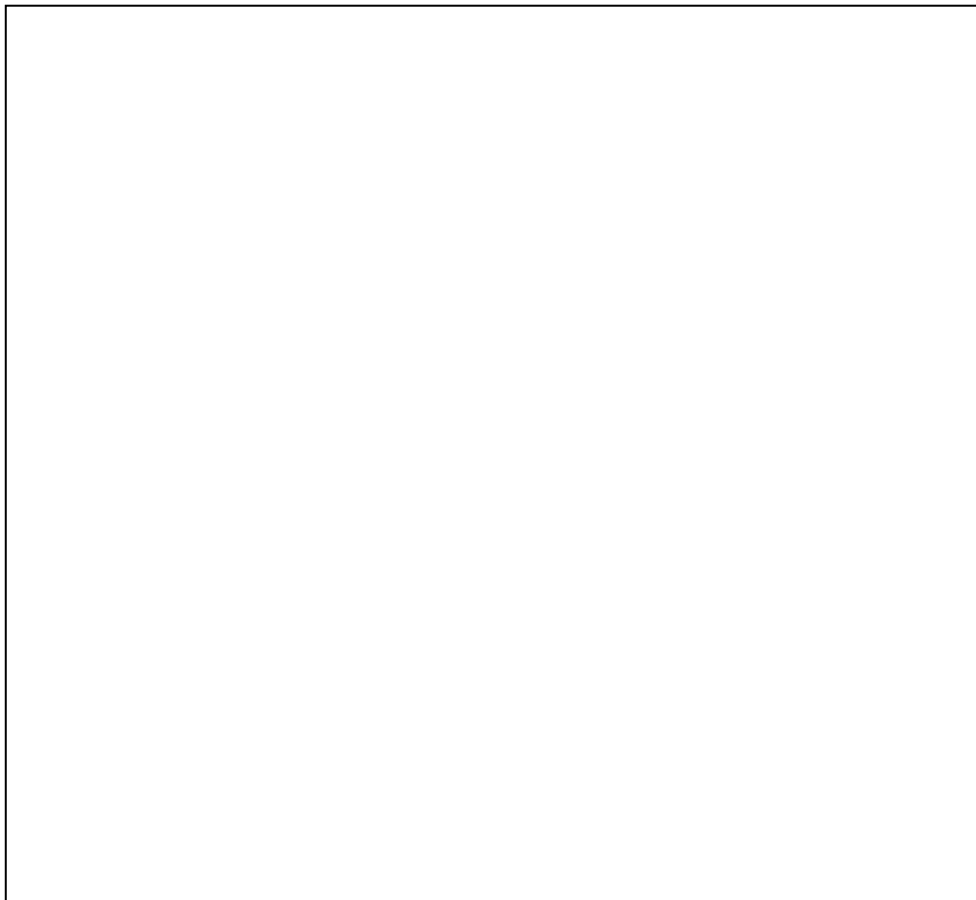


Labium





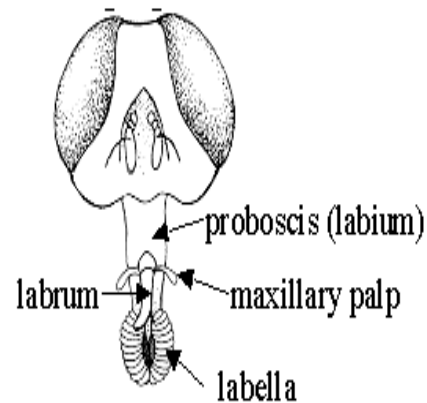
- **Draw and Label** the Mouthpart of the Cockroach



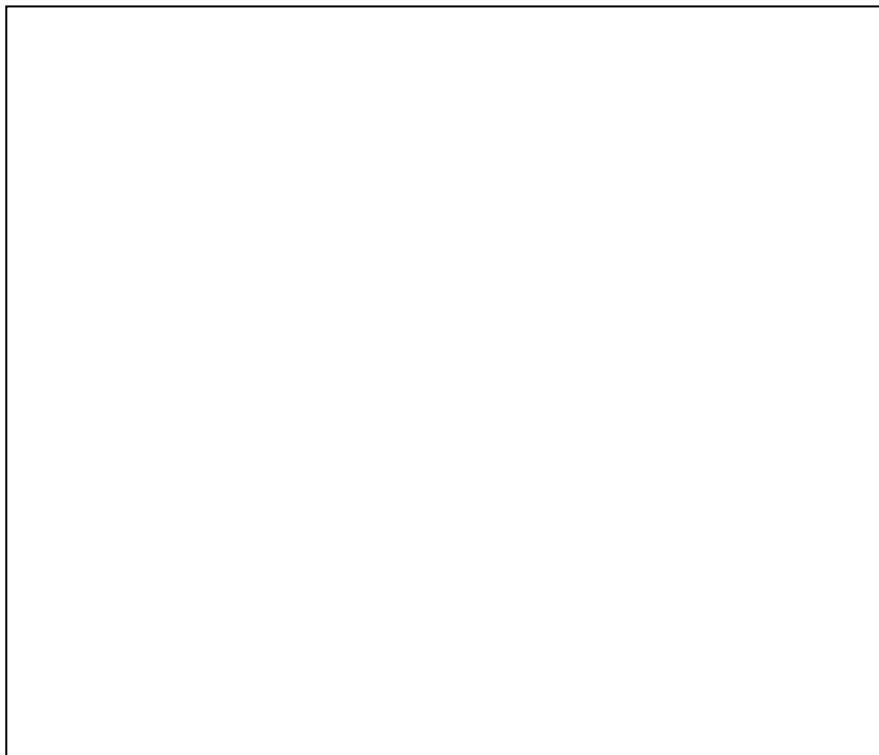
## TYPES OF MOUTHPARTS

### Sponging mouthparts:

- Ex. House fly adult
- Carefully examine the mouthparts of the house fly in position.
- Carefully examine the mouthparts of the House fly under the microscope using the accompanying illustrations:

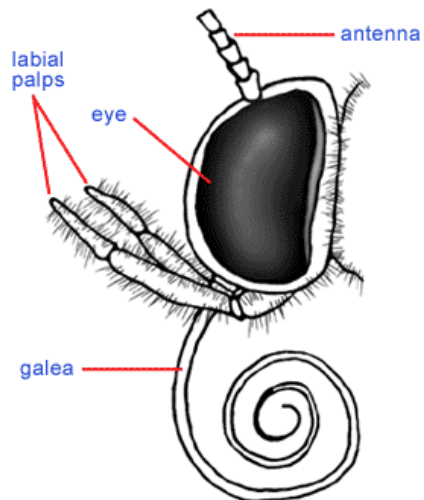


- **Draw and Label** the mouthparts of the house fly as you see under the microscope

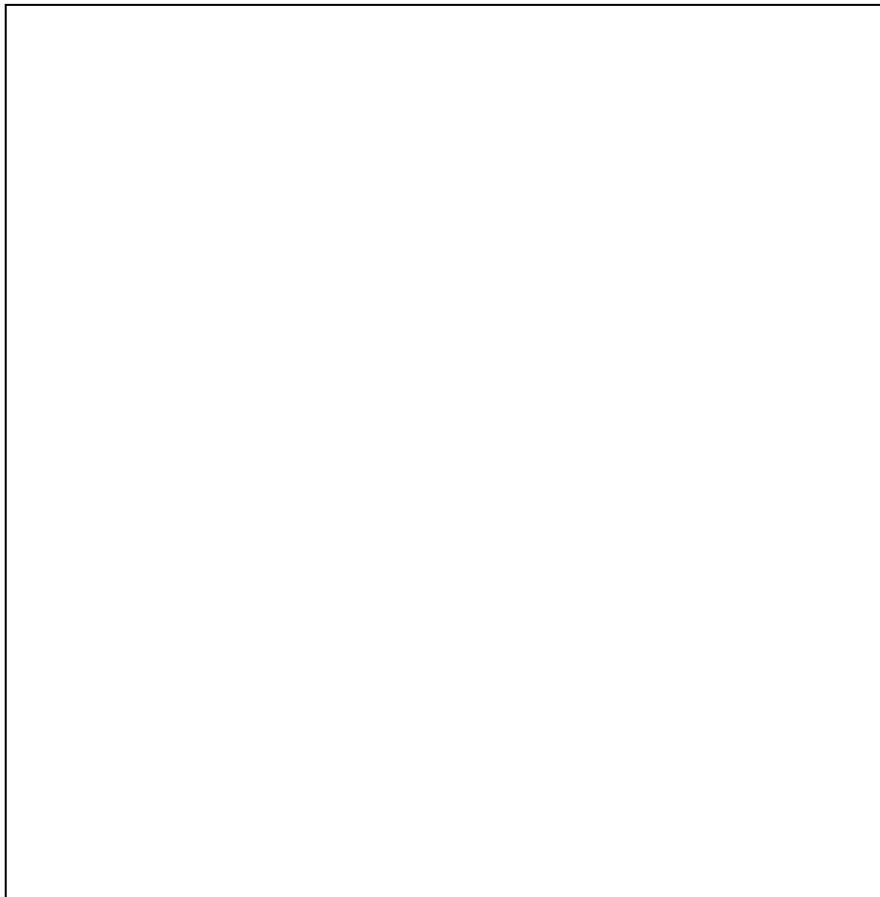


### Siphoning mouthparts:

- Ex. Moths and butterflies
- Carefully examine the mouthparts of the male moth under the microscope using the accompanying illustrations:



- **Draw and Label** the mouthparts of a moth as you see under the microscope

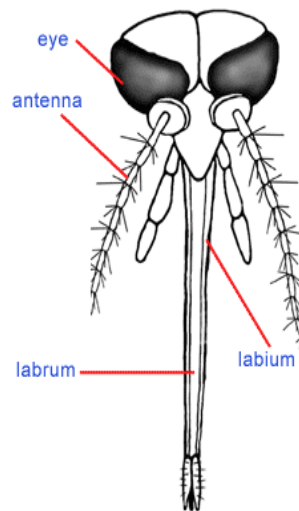


## Lab No:5

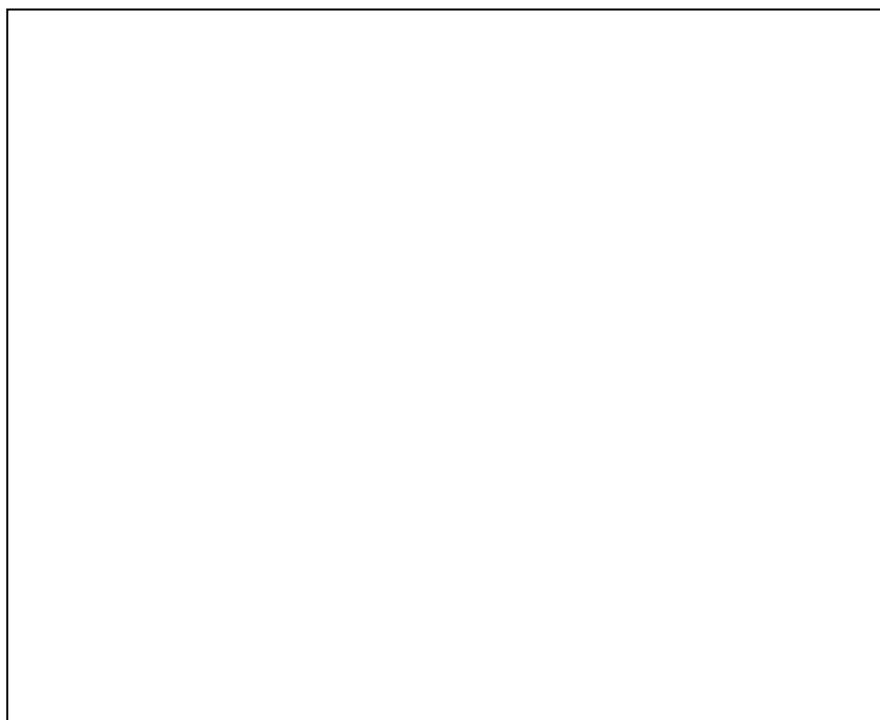
### TYPES OF MOUTHPARTS

#### Sucking mouthparts:

- Ex. Male mosquitoes
- Carefully examine the mouthparts of the male mosquito under the microscope using the accompanying illustrations:

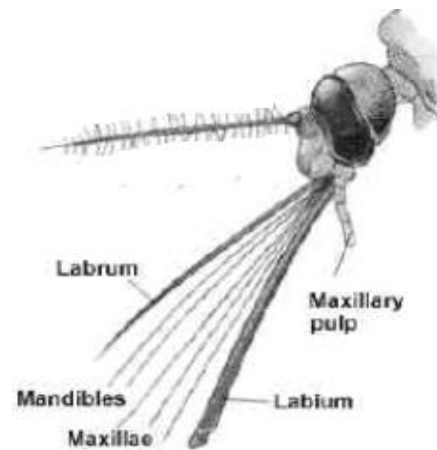


- **Draw and Label** the mouthparts of the male mosquito as you see under the microscope

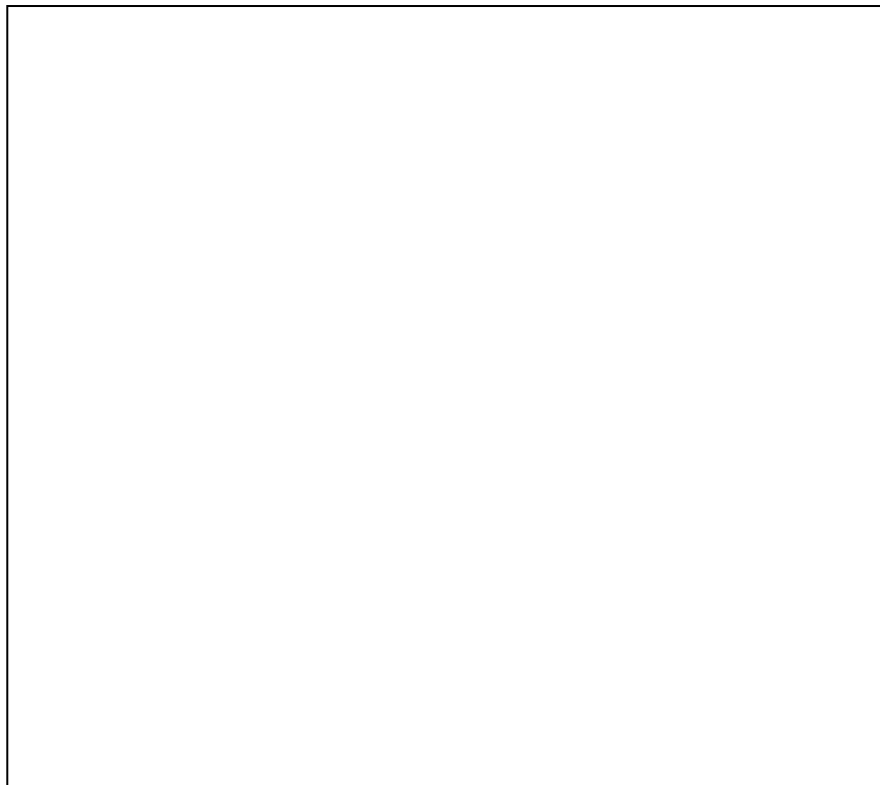


### Piercing sucking mouthparts:

- Ex. Female mosquitoes
- Carefully examine the mouthparts of the female mosquito under the microscope using the accompanying illustrations:



- **Draw and Label** the mouthparts of the female mosquitoes as you see under the microscope

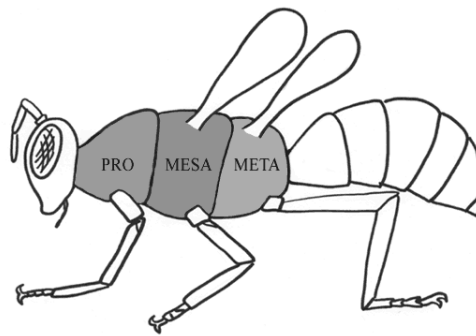
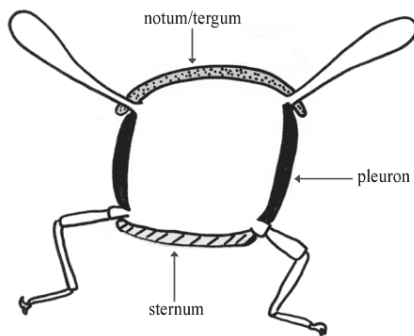


## Lab No:6

### THORAX

Examine the insects provided and notice the structure of insect thorax and its appendages.

- The segment nearest the head is the prothorax, the second is the mesothorax, and the third is the metathorax.
- The thorax is composed of three segments. Each bears a pair of legs, and the last two bear a pair of wings each.

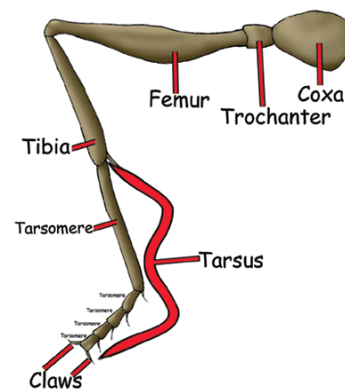


### THORACIC APPENDAGES

#### LEGS:

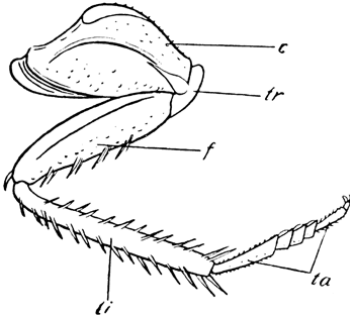


- Most insects have three pairs of walking legs -- one pair on each thoracic segment. Each leg contains five structural components (segments) :

1. Coxa
2. Trochanter
3. Femur
4. Tibia
5. Tarsus

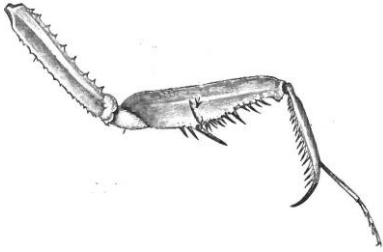
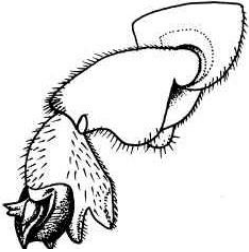
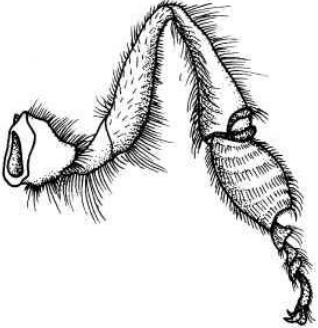


- Legs adaptations and modifications are shown in the following tables.

## TYPES OF LEGS

Type	Shape	Student Draw
<b>Walking</b>		
adapted for running		
E.g. Cockroaches		
<b>Jumping</b>		
adapted for jumping		
E.g. Hind legs of Grasshoppers		
<b>Swimming</b>		
adapted for swimming		
E.g. Water beetles		

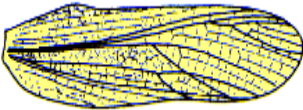

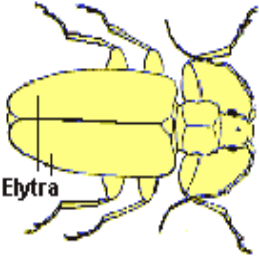

## TYPES OF LEGS

Type	Shape	Student Draw
<b>Seizing</b>		
For Catching and holding the preys		
E.g. Praying Mantis		
<b>Digging</b>		
adapted for digging in soil		
E.g. Mole Crickets		
<b>Collecting</b>		
adapted for collecting pollen		
E.g. Hind legs of Honey bee Worker		


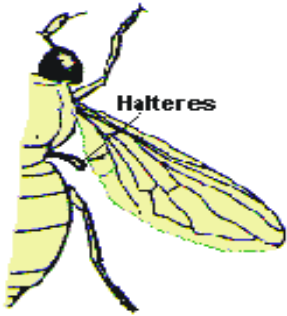
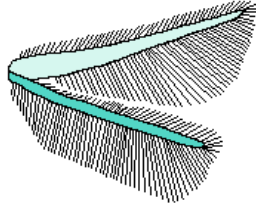


## Lab No:7

### TYPES OF WINGS

Type	Shape	Student Draw
<b>Tegmina</b>		
completely leathery		
E.g. Grasshoppers and Cockroaches		
<b>Membranous</b>		
Thin and transparent		
E.g. Honey bee and Hind wings of most insects		
<b>Elytra</b>		
hard, sclerotized front wings		
E.g. Fore wings of Beetles		
<b>Hemelytra</b>		
fore wings that are leathery at the base and membranous near the tip		
E.g. Heteroptera		




**TYPES OF WINGS**

Type	Shape	Student Draw
<b>Scaly</b>		
covered with flattened scales		
E.g. Butterflies and Moths		
<b>Halteres</b>		
small, club-like hind wings act as stabilizers during flight		
E.g. Hind wing of the House fly		
<b>Hairy</b>		
slender with long fringes of hair		
E.g. front and hind wings of Thrips		

## Lab No:8

### ABDOMEN AND ITS APPENDGES

- The abdomen is located just behind the thorax.
- Each segment of the abdomen consists of a dorsal tergum, ventral sternum, joined by a pleural membrane.
- In many adult insects, there is a spiracle near the pleural membrane on each side of the first eight abdominal segments.
- At the very back of the abdomen, the **anus** is nestled between three protective sclerites
- Locate and Draw the abdominal appendages in the provided samples

Abdominal appendages	Insect Name	Shape	Student Draw
Styles	Male Cockroach		
Cerci	Male and Female Cockroach		
Sting	Honey bee worker		

- Other abdominal structures may also be present in some insects. These include: **Pincers, Median caudal filament, Cornicles, Abdominal prolegs, Abdominal gills, Furcula, and Collophore.**

## METAMORPHOSIS

### Types of metamorphosis

#### 1. Ametabolous – Slight metamorphosis (e.g., Silver fish)

Egg → Immatures → Adult

Cannot distinguish between adults and immature stages

#### Ametabolous Development

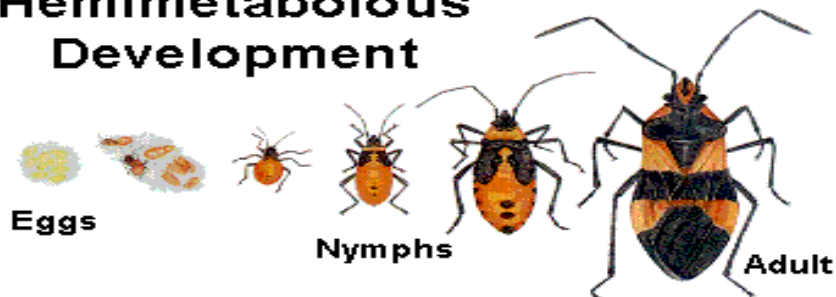


#### 2. Hemimetabolous – incomplete metamorphosis (e.g., Hemiptera)

Egg → Nymph or Naiad → Adult

Immature stage similar in appearance to adult but without wings

#### Hemimetabolous Development



#### 3. Holometabolous – complete metamorphosis (e.g., Butterflies)

Egg → Larva → Pupa → Adult

Immature stages do not resemble the adult stage

#### Holometabolous Development



**Examine the specimens provided and identify different types of metamorphosis in different insects**






Specimen No.	<b>1</b>
Type of Metamorphosis	
Insect Name	
Insect Stages	
Draw a Labeled Diagram	

Specimen No.	<b>2</b>
Type of Metamorphosis	
Insect Name	
Insect Stages	
Draw a Labeled Diagram	



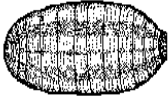
Specimen No.	<b>3</b>
Type of Metamorphosis	
Insect Name	
Insect Stages	
Draw a Labeled Diagram	

Specimen No.	<b>4</b>
Type of Metamorphosis	
Insect Name	
Insect Stages	
Draw a Labeled Diagram	

**Lab No: 9****TYPES OF LARVAE**

Appearance	Larval Type	Common Name	Description	Examples
	Eruciform	Caterpillar	Body cylindrical with short thoracic legs and 2-10 pairs of fleshy abdominal prolegs	Moths and butterflies
	Campodeiform	Crawler	Elongated, flattened body with prominent antennae and/or cerci. Thoracic legs adapted for running	Lady beetle, lacewing
	Scarabaeiform	White grub	Body robust and "C"-shaped with no abdominal prolegs and short thoracic legs	June beetle, dung beetle
	Elateriform	Wireworm	Body long, smooth, and cylindrical with hard exoskeleton and very short thoracic legs	Click beetle, Flour beetle
	Vermiform	Maggot	Body fleshy, worm-like. No head capsule or walking legs	House fly, flesh fly

## TYPES OF PUPAE

Appearance	Pupal Type	Common Name	Description	Examples
	Obtect	Chrysalis	Developing appendages (antennae, wings, legs, etc.) held tightly against the body by a shell-like casing. Often found enclosed within a silken cocoon.	Butterflies and moths
	Exarate	None	All developing appendages free and visible externally	Beetles, Lacewings
	Coarctate	Puparium	Body encased within the hard exoskeleton of the next-to-last larval instar	Flies



## Lab No: 10

### Beneficial insects

**Identify the specimens**  
**What do you know about their benefits?**









## Lab No 11

### Harmful insects

**Identify the specimens**  
**What do you know about their Damages?**



## Evaluation Sheet

Lab No	Attendance	Signature
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
Total		