

# Grasshopper Dissection

## Introduction

Insects are arthropods with jointed appendages, segmented bodies, and an exoskeleton composed of chitin. Insects are in the class Insecta, and are the largest and most diverse group of animals on earth. The genus *Romalea* is a large grasshopper common in the southeastern United States. Insects have three body regions (head, thorax, & abdomen), 3 pairs of legs attached to the thorax, a single pair of antenna attached to the head, mouthparts adapted for chewing or sucking, and two pairs of wings. Some insects may have a single pair of wings or be wingless. Insect legs are often adapted for digging, crawling, jumping, or swimming. The insects are mostly terrestrial; they breathe air, which enters small lateral openings on the body called spiracles and circulates in a system of ducts to all organs and tissues. Their chewing or sucking mouthparts are adapted for feeding on plant or animal materials.

## Pre-lab Questions

- Name the kingdom, phylum, class, and order for grasshoppers:
  - Kingdom: \_\_\_\_\_
  - Phylum: \_\_\_\_\_
  - Class: \_\_\_\_\_
  - Order: \_\_\_\_\_
- Name the three parts of a grasshopper's body.
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

## Objective

Identify and label the internal and external anatomy of a grasshopper.

## Materials

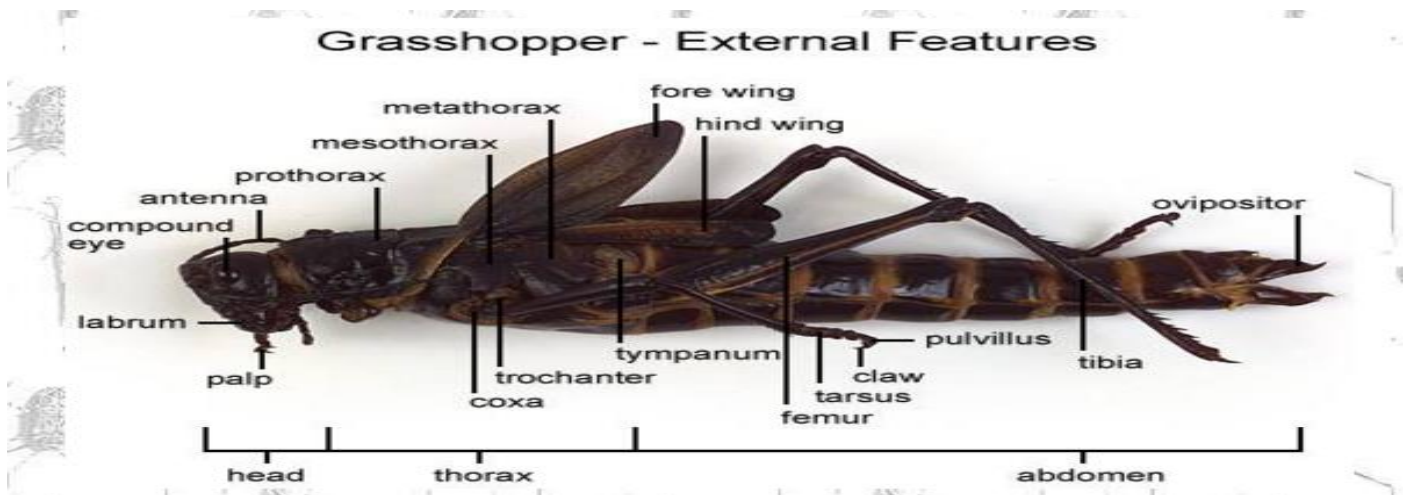
Dissecting pan, dissecting pins, forceps, scalpel, preserved grasshopper

## Procedure

### External Anatomy

Examine the entire grasshopper and identify the major subdivisions and parts of the body.

- Obtain a preserved grasshopper. Observe that the body of the grasshopper is divided into 3 regions: the head, the thorax, and the abdomen. Label these on [Figure 2](#).



2. Examine the head and locate the following parts:

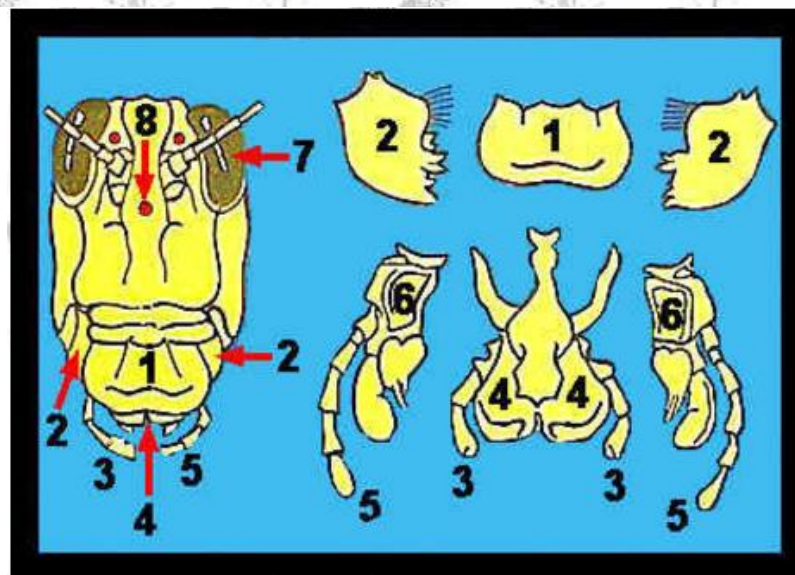
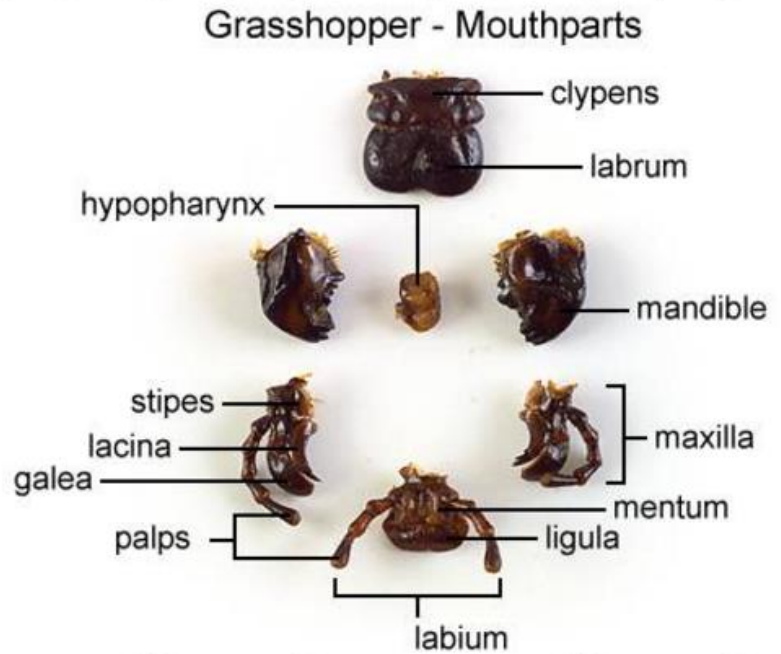
**HEAD**

Antennae (two, slender appendages)

Compound eyes (2, large lateral)

Ocelli (or simple eyes) – 3, small, between compound eyes

Mouth parts – Labrum (upper lip), mandibles (jaws) below the labrum, maxillae located behind the mandibles to help cut & hold food, and the lower lip or labium



- 1. Labrum
- 2. Mandibles
- 3. Labial Palps
- 4. Labium

- 5. Maxillary Palps
- 6. Maxillae
- 7. Compound Eye
- 8. Ocelli

3. Label the mouthparts, eyes, and antenna on Figure 1.

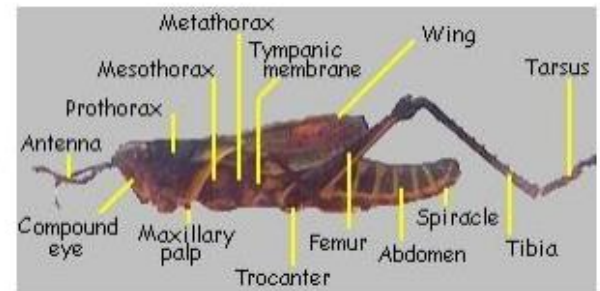
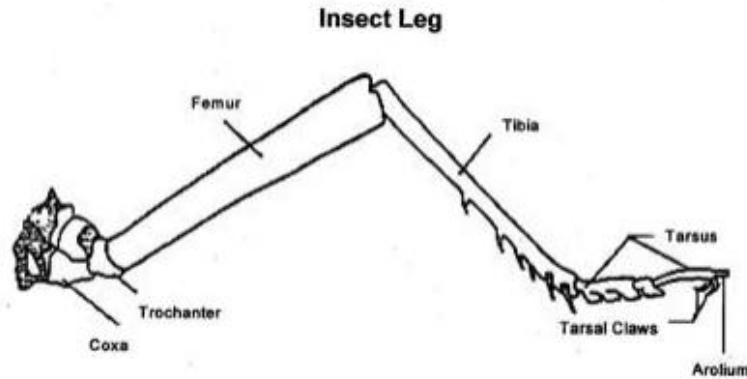
4. Using forceps, remove each of the appendages from the head , and attach them to Table 1.

- Examine the following appendages on the thorax (middle section of the grasshopper's body):

**THORAX**

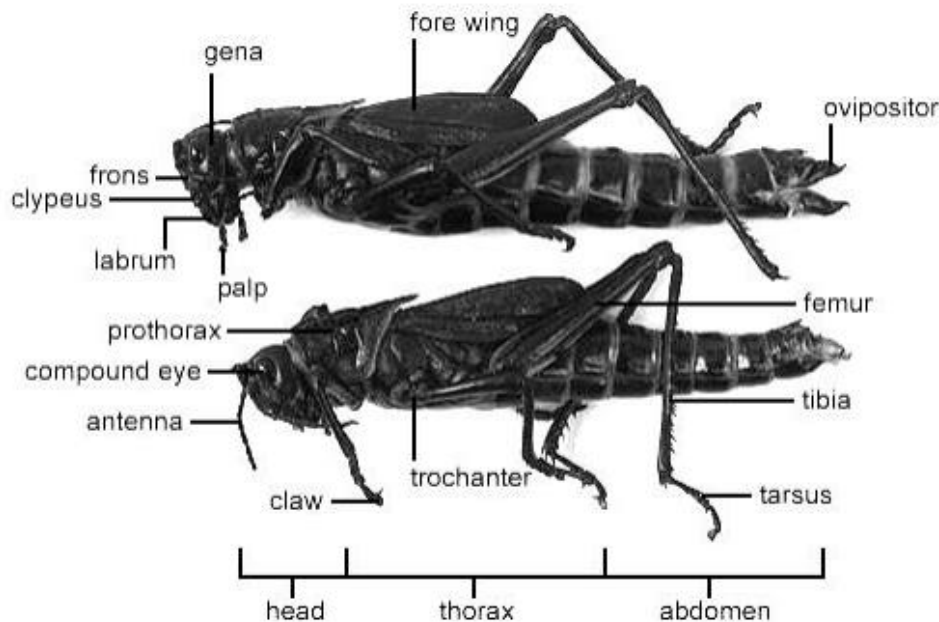
Legs (first 2 pairs are for walking and the last pair are for jumping)

Wings (forewings have a leathery appearance and protect the hind wings)



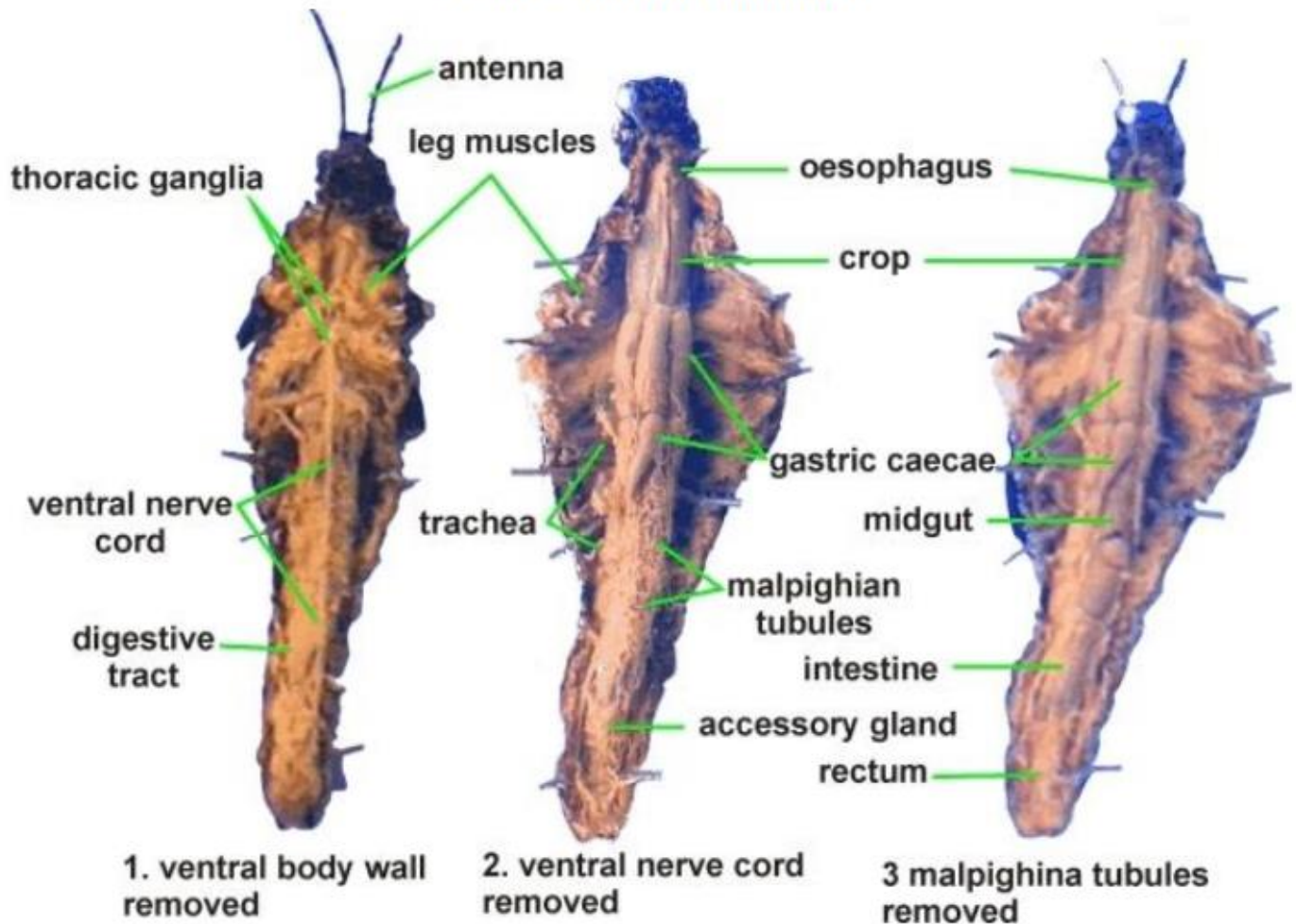
- Using forceps, remove one of the walking legs and identify these parts: the coxa connects the femur (the thickest part of the leg) to the grasshopper's body; a slender, spiny tibia connects the femur to the tarsal segments (lowest part of leg). Label these on Figure 2.
- Remove a jumping leg and attach the walking leg and jumping leg to Table 1.
- Raise both pairs of wings and locate the first abdominal segment.
- Locate the tympanic membrane or eardrum on the first abdominal segment. Label this on Figure 2.
- Locate the spiracles (tiny pores) for respiration on each side of the abdominal segments. Label these on Figure 2.
- Determine if your grasshopper is a male or female by looking at the end of the abdomen. Females have a tapered abdomen that ends in a pointed egg laying tube called the ovipositor. Males have a more rounded abdomen that turns upward.

**Grasshopper - External Features (Female and Male)**



- Label the ovipositor on Figure 2.
- Examine the abdomen and identify the following parts:
  - Spiracles (small openings on the side of somites or body segments)
  - Auditory organs (two located laterally on the 1<sup>st</sup> body somite or segment)
  - Ovisositor (on female)

## Part 2—Internal Structure



1. Remove the three left legs. Insert the point of your scissors under the top surface of the last segment of the abdomen. Make a cut to the left of the mid-dorsal line. Be careful not to cut the organs underneath. In front of the thorax, cut down the left side to the bottom of the grasshopper. Cut down between the next to the last and last abdominal segments.
2. Use your forceps to pull down the left side. Locate the large dorsal blood vessel.
3. Use your scissors to cut the muscles close to the exoskeleton. Locate the finely branched trachea leading to the spiracles.
4. Cut through the exoskeleton over the top of the head between the left antenna and left eye to the mouth. Remove the exoskeleton on the left side of the head. Find the dorsal ganglion or brain.
5. Cut away the tissue to show the digestive system. Refer to figure 3 and identify the mouth, esophagus, crop, gizzard, and stomach. Note that the gizzard and stomach are separated by a narrow place. The digestive glands, called caeca that secrete enzymes into the stomach, are located here.
6. Another narrow place separates the stomach from the intestine. Malpighian tubes, which collect wastes from the blood, are located here.
7. Observe the colon, which enlarges to form the rectum. Wastes collect here before passing out the anus.
8. In the female, the ovary is located above the intestines. In the male, a series of whitish tubes, the testes, are located above the intestine.