LAB 2 Laboratory Activity

Grasshopper Anatomy

A grasshopper is well adapted to its way of life. Its features are representative of the insect group. A grasshopper is large enough that its features can be seen easily.

Strategy

You will observe and identify the specialized body parts of the grasshopper.
You will examine and identify the internal structure of the grasshopper.

Materials

dissecting pan
grasshopper (preserved)
hand lens
forceps
dissecting scissors

Procedure

Part A—External Structure

1. Place the grasshopper in the dissecting pan. Locate the head, thorax, and abdomen. (See Figure 1.) Use your hand lens to observe the grasshopper carefully. As you observe, record your data in Data and Observations.
2. Observe the parts of the head. The grasshopper has two compound eyes and three simple eyes. The sensory parts located on the head are antennae.
3. Identify the mouth parts. (Refer to Figure 2.) With your forceps, remove the parts. The labrum is the hinged upper lip that is used to hold food. The mandibles are crushing jaws. The maxillae are used to chew and taste food. The labium is the broad, fat lower lip used to hold food while it is being chewed.

Figure 1

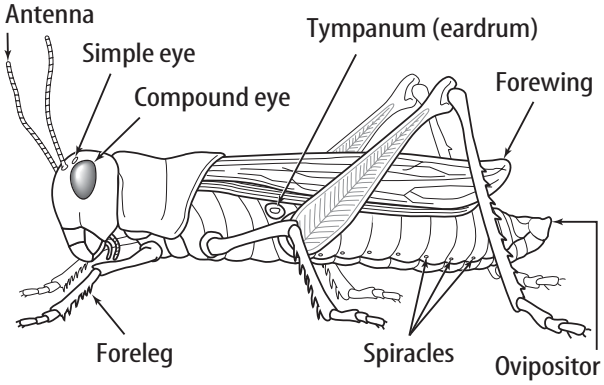
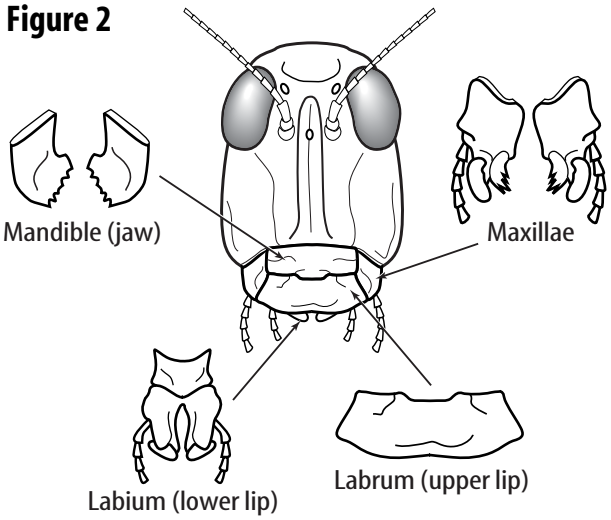


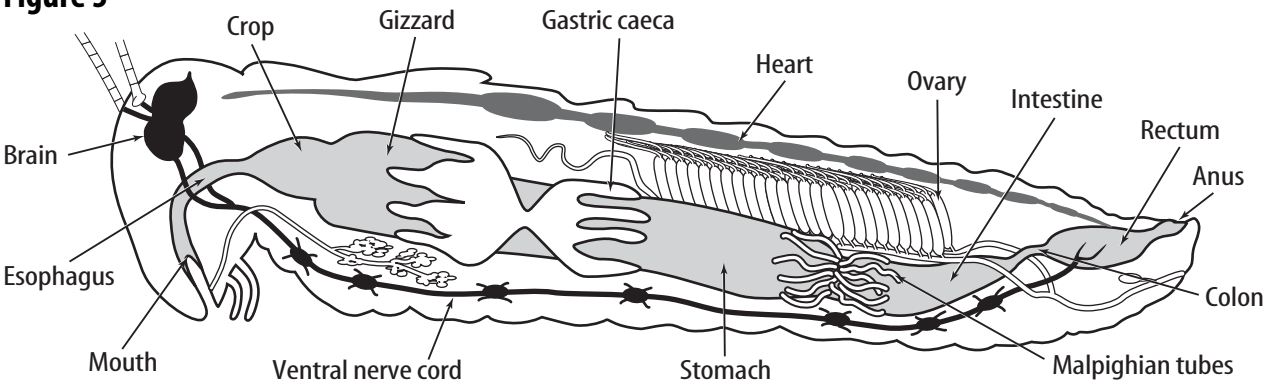
Figure 2



4. Locate the eardrums or tympana, small drum-shaped structures on either side of the thorax.
5. All insects have six legs. In the grasshopper, the front pair is used for walking, climbing, and holding food. The middle legs are used for walking and climbing. The hind legs are large and enable the grasshopper to jump.
6. Locate the two pairs of wings.
7. Use the hand lens to look at the tiny openings along the abdomen. These are breathing pores called spiracles through which oxygen enters and carbon dioxide leaves.
8. A female grasshopper has a much longer abdomen than a male. It ends in a four-pointed tip, called an ovipositor, through which eggs are laid.

Laboratory Activity 2 (continued)

Figure 3



Part B—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. **CAUTION:** *Always be careful with all sharp objects.*
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 gastric caeca, that secrete enzymes into the stomach are attached here.
6. Another narrow place separatesthe 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.
9. **CAUTION:** *Give all dissected materials to your teacher for disposal. Always wash your hands after a dissection procedure.*

Laboratory Activity 2 (continued)

Data and Observations

1. What are the three sections of a grasshopper's body?

2. Record your observations of grasshopper body parts in Table 1. Complete the table by listing the function of each part.

Table 1

Body part	How many?	Function
1. Eyes		
2. Antennae		
3. Labrum		
4. Mandibles		
5. Maxillae		
6. Labium		
7. Eardrums		
8. Legs		
9. Wings		
10. Spiracles		
11. Ovipositor (if female)		
12. Digestive glands		
13. Tubules		
14. Rectum		

Questions and Conclusions

1. How is a grasshopper's mouth adapted for plant eating?

2. What is the difference between a grasshopper's skeleton and yours?

Laboratory Activity 2 (continued)

3. How is a grasshopper's digestive system different from yours?

4. How does a grasshopper's legs help it to survive?

5. To which animal group does the grasshopper belong?

6. How does a grasshopper breathe?

Strategy Check

_____ Did you observe specialized parts of the grasshopper?

_____ Can you identify the internal and external parts of the grasshopper?