

# GRASSHOPPER ANATOMY & DISSECTION

Introduction: In this lab, you will observe the external anatomy of a preserved grasshopper, locate structures and label a diagram. Internal anatomy is optional and can be observed after you have completed the external anatomy of the grasshopper.

PreLab Questions (use your book or other references)

1. Grasshoppers belong to the Kingdom	, the Phylum _	, and
the Class		

2. What kind of skeleton does a grasshopper have?\_\_\_\_\_

External Anatomy – Examine your grasshopper & check the boxes as you complete each step.

5. Locate the segments on the abdomen. How many segments does your grasshopper have?
Compare this number to other grasshoppers in the class. Do they all have the same number of segments?

 $\Box$ 6. Note the thorax. It is the center area to which all appendages attach. The hard covering of the thorax is called the carapace.

T. Locate the antenna. Is the antennae branched or unbranched? \_\_\_\_\_ How many antennae are there? \_\_\_\_\_

8. Locate the compound eyes. How many eyes does the grasshopper have?

9. Locate the grasshopper's legs. To what part of the body are they attached? \_\_\_\_\_\_ (head, thorax, or abdomen). How many pairs of legs does the grasshopper have? \_\_\_\_\_\_ How many jumping legs are there? \_\_\_\_\_\_ How many walking legs?

10. Notice the claws at the end of the legs. Do both sets of legs have these claws? \_\_\_\_

□11. Locate the wings of the grasshopper. There are actually two sets of wings- one on the top and one underneath. The top wing is called the forewing and the bottom wing is called the hindwing. Which wing seems the most fragile?

12. Turn the grasshopper over and view the mouthparts.

Find the outside most plate (like an upper lip) which is called the labrum, its opposite is the lower plate (lower lip) called the labium.

UThe moveable mouthparts that look like antennae are the maxilla. Locate them.

The mandible is located under the maxilla and is used for chewing. Does the mandible open from top to bottom or from side to side?

Label the labrum, maxilla, and mandibles on the picture. Also label the compound eyes and antennae.

13. Raise the wings to find the disk shaped tympanum underneath. The tympanum functions as an eardrum. How many tympanum are found on the grasshopper?

□14. Look at the abdomen and find the row of holes along it; these are the spiracles and they function in respiration (breathing). How many spiracles do you count? \_\_\_\_\_

□15. The sex of the grasshopper can be determined by looking at the last segment of the abdomen. Females have a large pair of pointy structures called the ovipositor, which are used to deposit eggs into soil. Is you grasshopper a male or a female? \_\_\_\_\_

## 2. Internal anatomy

#### Instructions

Lay the grasshopper dorsal side up onto a tray. Use scissors to cut midsagitally through the dorsal side of the thorax and abdomen. Try to cut only through the exoskeleton, so as not to damage deeper tissues. Use pins to spread the sides out. Use the figure below to guide you. Observe and identify the thoracic and abdominal structures. You may have to pull aside the *egg masses* of females in order to see what lies underneath. Finally, cut midsagitally through the vertex of the head. Spread apart the head capsule to observe the whitish *brain* inside.

### Notes

- The *proventriculus* is just a hard, muscular structure between the *crop* and the *ventriculus*, approximately where the *gastric caecae* join the gut..
- *Tracheae* may be found anywhere in the body as whitish filaments.

## List of required structures--Internal anatomy



#### Questions

1. Look at the mouthparts. Use a probe to examine the mouthparts including the labrum, mandibles, maxillae, and labium. What is the function of these parts?

2. Locate the thoracic **spiracle**s, which are the openings to the tracheal system. What is the function of the tracheal system?

3. Locate the digestive system. If your grasshopper is female everything may be covered with a large yellow mass of ovaries, follow them back to the ovipositor. Then push the ovaries aside and look for the gut. The esophagus leads from the mouth to the crop which functions to store food. Under the esophagus you may be able to see very small grayish grape-like clusters of the salivary glands. This leads to the gizzard and to the stomach. Which is larger, the gizzard or the stomach? In which one do you think food remains the longest? Why do you think this?

4. Which characteristics make the grasshopper well adapted for its life on dry land?

5. Which region of the insect's body is specialized for sensory functions? Explain your answer.

6. Which region of the insect's body is specialized for movement & explain why?

7. How are the ends of the legs adapted for holding onto plants?

8. How is the third pair of legs adapted for jumping?

- 9. Describe the differences between the two pairs of wings (appearance & function).
- 10. How does the tympanic membrane help a grasshopper?
- 11. What system do spiracles open into on a grasshopper?
- 12. How did you determine the sex of your grasshopper?