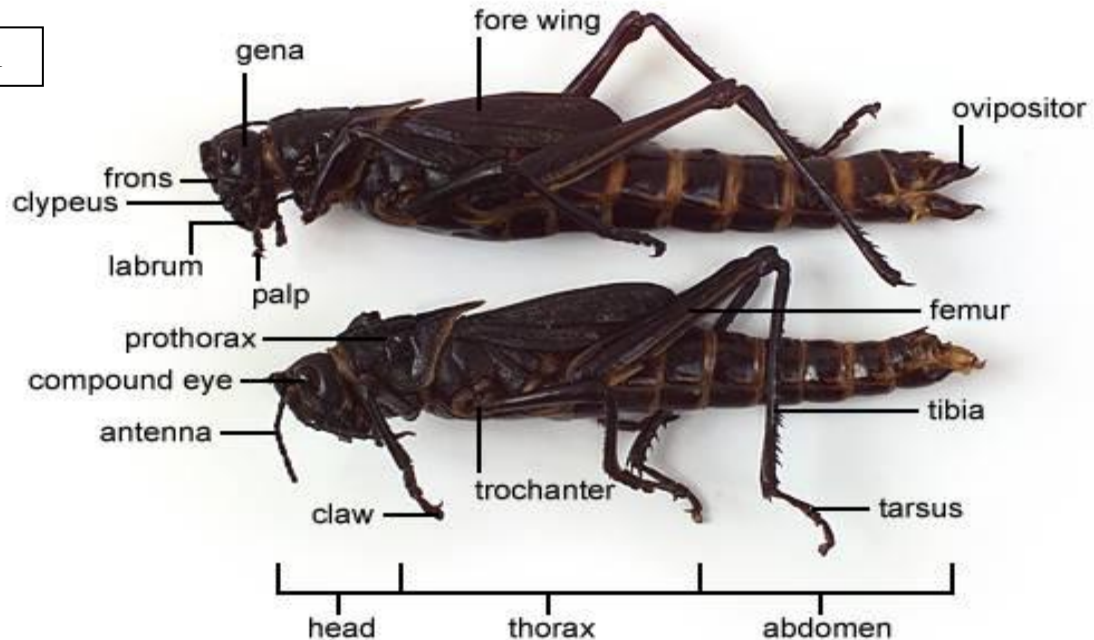


Lab 4: Overview of Insect Internal Anatomy

OBJECTIVES: This lab is intended to introduce you to the internal anatomy of a generalized insect: Part A, a grasshopper (Orthoptera: Acrididae, *Romalea sp.*); as well as Part B, a dissection of a honeybee. I expect you to know and to be able to identify all the underlined and/or **bolded** terms. Not all structures may be visible in your specimen, so work with your peers and observe other dissections that may better show structures that you cannot easily see in your specimen. Part of your grade will be based on the quality and accuracy of your dissection.

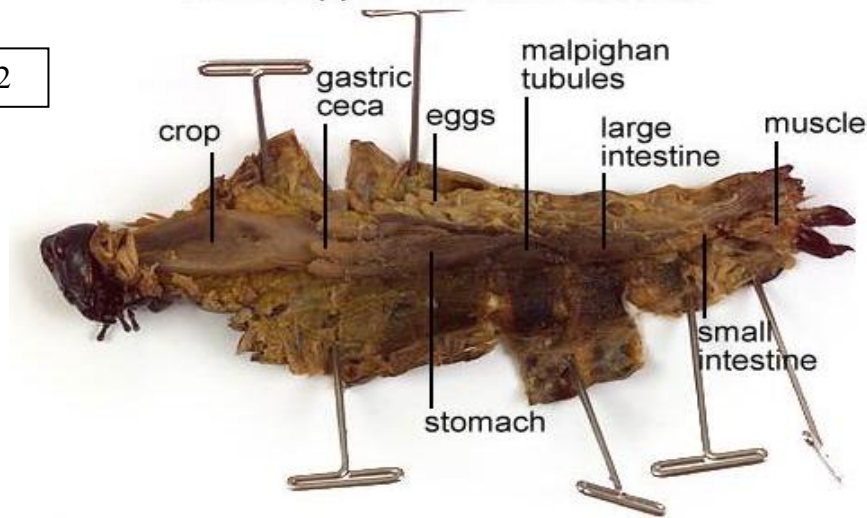
Grasshopper - External Features (Female and Male)

Figure 1



Grasshopper - Internal Features

Figure 2



Part A: Grasshopper Anatomy

1. Visit: <https://youtu.be/dkeoHISaSJ4>

This YouTube video will show a dissection of a locust grasshopper. Please watch the video and make sure you can identify the major digestive and excretory structures that are outlined and described.

2. Visit: <https://genent.cals.ncsu.edu/>

Click 'Bug Bytes' tab at top right of page

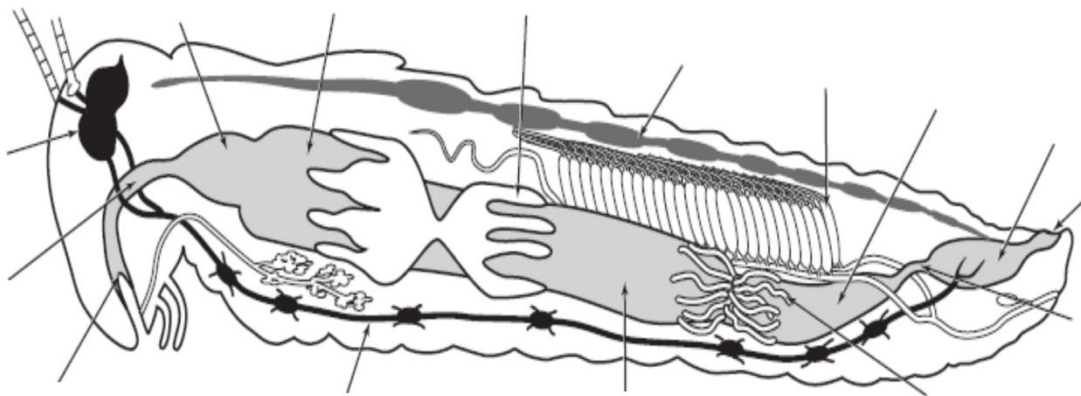
Click 'Internal Anatomy and Physiology' tab

Read the sections about: 1) Digestive & Excretory, 2) Circulatory, and 3) Respiratory systems and take note of the **bolded** terms and diagrams. You will need to know these.

3. Use the above resources to label the diagram below.

Sagittal View of a Generalized Insect Digestive System

Figure 3



Part B: Honeybee Dissection

I. Preparation

Obtain a preserved honeybee from the front bench. Examine the specimen to determine its sex (Fig 1). The female will have a stinger which may or may not be visible protruding from the last visible sternite. Drones (male honey bees) are larger, with 11 flagellomeres as opposed to the 10 found in females. Place the specimen in a dissecting tray and pin it down **through its thorax**. Place another pin at the end of the abdomen, use this pin to gently extend the abdomen and then pin it into the dissecting tray.

Figure 1. Castes in honey bees.



II. DISSECTION

1. Obtain micro-scissors from the bench. Insert the point of your scissors under the top surface of the first abdominal tergite at the side where it connects to the sternite. Cut along the membrane from the posterior to anterior margin of the tergite. Repeat this procedure on the other side. You should now be able to use your forceps to remove the tergite. Repeat this procedure for all tergites. Be careful not to damage the organs underneath.
2. Locate the large **dorsal blood vessel** and **aorta**. They may be under a layer of fatty tissues.
3. See if you can find the **trachea** associated with the abdominal spiracles.
4. Cut away the tissue to show the digestive system. You should see the **midgut** and **hindgut** in the abdomen.
5. **Malpighian tubes**, which collect wastes from the blood, are located at the junction between the midgut and hindgut.
6. Observe the **colon**, which enlarges to form the **rectum**. Wastes collect here before passing out the anus. Note that the **rectal pads** are heavily invested with tracheae. Gently lift the alimentary canal out of the body cavity and pin it to the side (do not puncture the gut).
7. In the female, the **ovary** is located above the intestines. Worker bees have reduced ovaries so they will likely not have any eggs located inside them. In the male, a series of whitish tubes, the **testes**, are located above the intestine.
8. Next, cut through the middle of the exoskeleton along the thorax. Observe the flight muscles and the **crop** which should be found in this region.

9. Continue to cut through the exoskeleton of the head. Try to find the **dorsal ganglion** or **brain**.
10. Running ventrally from head to abdomen you should be able to observe the **paired ventral nerve cord** along the midline. Note the **segmental ganglia** associated with each body segment.
11. WARNING: When you are done place the specimen in the waste bin. Wash your tools and wax tray and place them to dry at the sink area. Wipe down your bench area. Always wash your hands after a dissection procedure. RETURN THE MICROSCISSORS TO THE FRONT BENCH.

Submit labeled photos of the head, thorax, and abdomen region of your dissection.