

**GENERAL INSECT MORPHOLOGY**  
**Lab 12 - A study of the circulatory system in the cockroach**

- A. Circulation in wing veins - Obtain a live cockroach specimen. With a pair of scissors quickly remove all 6 legs. Under high magnification examine the wing veins. You may have to tilt or rotate the wing and adjust the angle of the light, but you should be able to see hemolymph and maybe even a tracheole inside the veins.
- B. The heart and associated structures - Use the same specimen from part A. With scissors carefully remove the wings. Look at the dorsal surface of the abdomen under the microscope. You should be able to see through the cuticle and see the heart beating. Turn the specimen over so that you are looking at the ventral surface. With the scissors carefully make an incision from the posterior end of the abdomen to the base of the head. Pin the specimen to the wax dish with a pin through the head and one through the epiproct. Then separate the integument along the incision and pin the body wall out flat. Carefully remove the ovaries and the eggs (these will nearly fill the entire cavity), and then carefully remove the alimentary canal. Place 1-2 drops Nile Blue sulfate stain on the preparation and allow this to set for 1 minute. Then add some cricket Ringer's solution; keep the preparation moist, but do not use water. You should now be able to clearly see the heart beating (Note - the heart does not stain blue, but some of the surrounding tissue stains blue and makes the heart stand out). Identify the different parts of the heart and its accessory structures. Draw the system in situ and label the following: **aorta**, **heart**, **heart chambers**, **incurrent ostia** (you may not be able to see these), **segmental blood vessels** (you may not be able to see these), **alary muscles**, and **dorsal diaphragm**. Use small arrows to designate the flow of blood in the circulatory system.

The **heart** or **dorsal vessel** extends through most of the abdominal segments and thorax into the head. The portion of the heart extending into the thorax is thinner and is called the **aorta**. The aorta continues anteriorly and terminates in an open mouth under the brain. Note the constrictions with **valves**, between the segmental **chambers** in the abdomen. One pair of lateral openings, or **ostia** (singular **ostium**), are found on each chamber. The ostia permit the passage of blood from the body cavity into the heart. A pair of triangular **alary muscles**, with their **membrane**, support the dorsal vessel and constitute the **dorsal diaphragm**. Note the movement of blood through the dorsal vessel toward the head.