Chapter 28 **Arthropods and Echinoderms** **Name _____**

Lab Dissecting a Crayfish

Pre-lab Discussion

Like all crustaceans, a crayfish has a fairly hard exoskeleton that covers its body. Its body is divided into two main parts, the cephalothorax and the abdomen. The cephalothorax consists of a head and chest region. The part of the exoskeleton that covers the cephalothorax is called the carapace. The abdomen is located behind the cephalothorax and consists of six clearly divided segments.

The cephalothorax consists of 13 segments. Each segment of both the cephalothorax and the abdomen contains a pair of appendages. The head region has five pairs of appendages. Long antennae are organs for touch, taste, and smell. The mandibles, or jaws, crush food by moving from side to side. Two pairs of maxillae hold solid food, tear it, and pass it to the mouth. The second pair of maxillae also helps to draw water over the gills.

Of the eight remaining pairs of appendages on the cephalothorax, the first three are maxillipeds, which hold food during eating. The chelipeds are the large claws that the crayfish uses for defense and to capture prey. Each of the four remaining segments contains a pair of walking legs.

In the abdomen, the first five segments each have a pair of swimmerets, which create water currents and function in reproduction. The sixth segment contains a modified pair of uropods. In the middle of the uropods is a structure called the telson, which bears the anus. The uropods and telson together make up the tail fan. The crayfish moves backward by forcing water forward with its tail fan.

Problem

How is the crayfish adapted for moving on land and in water?

Materials

Preserved crayfish
Dissecting scissors
Dissection tray
Forceps
Probe
Transparent tape
Hand Lens or dissecting scope
Lamp

Procedures

Part A. External Anatomy

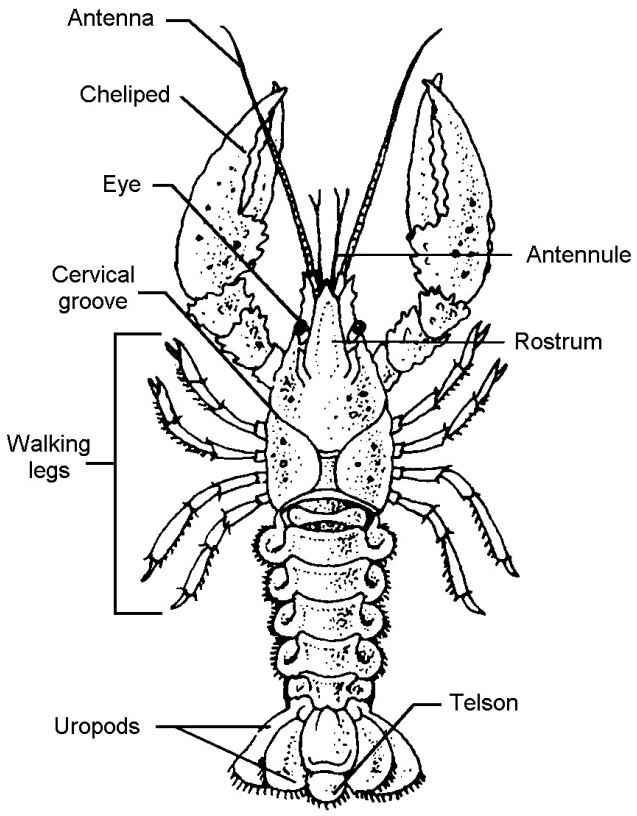
1. Place the crayfish in your dissecting tray. Obtain all the dissecting equipment and place it at your work area.

2. Examine the dorsal, lateral, and ventral views of your crayfish. Refer to Figure 1 to assist you in locating the external structures. Note the two main regions of the body; the cephalothorax consisting of a head and thorax fused together, and the clearly segmented abdomen. Locate the saddle-like carapace covering the gills. The cervical groove indicates where the head and thorax have fused. The rostrum projects forward between the pair of stalked eyes.

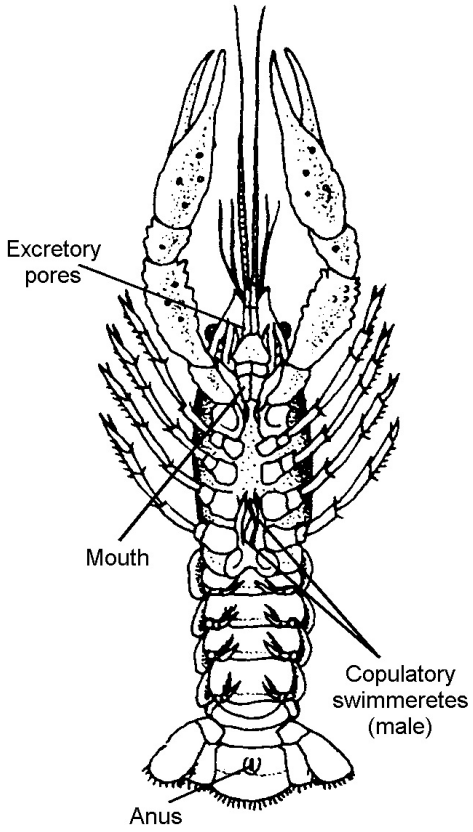
3. Starting at the posterior end of the crayfish remove each appendage located on each segment Place the appendage in its appropriate place on Table 1. Use the forceps to grasp the appendage at its base. Then, pull and twist the appendage free from the segment. Examine each appendage before placing it in place on the table. Read the function of each appendage as described in Table 1. As you remove each appendage you will find that the appendages located near the anterior end of the crayfish are less leg-like.

4. Turn the crayfish so its ventral surface is exposed. Locate the anus in the telson and the specialized male swimmerets (found only on male crayfish).

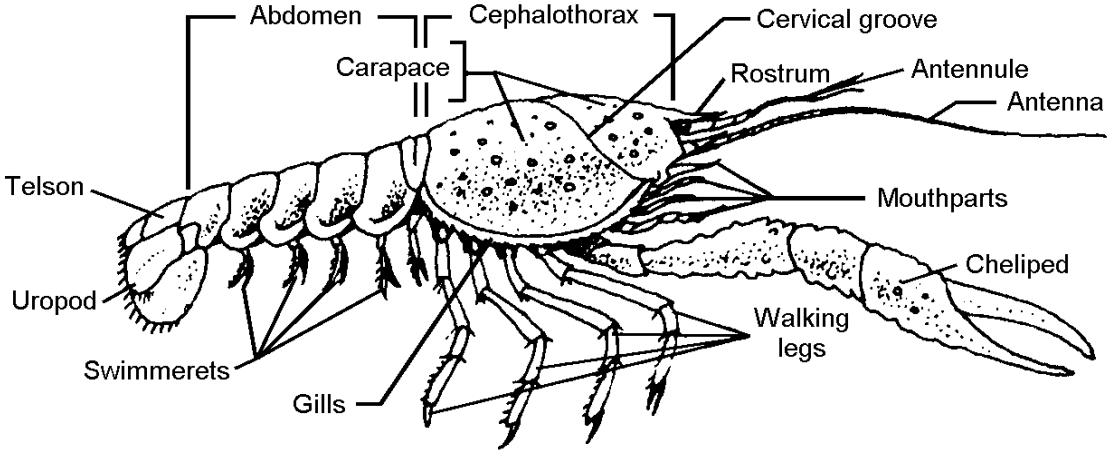
Figure 1



Dorsal View



Ventral View



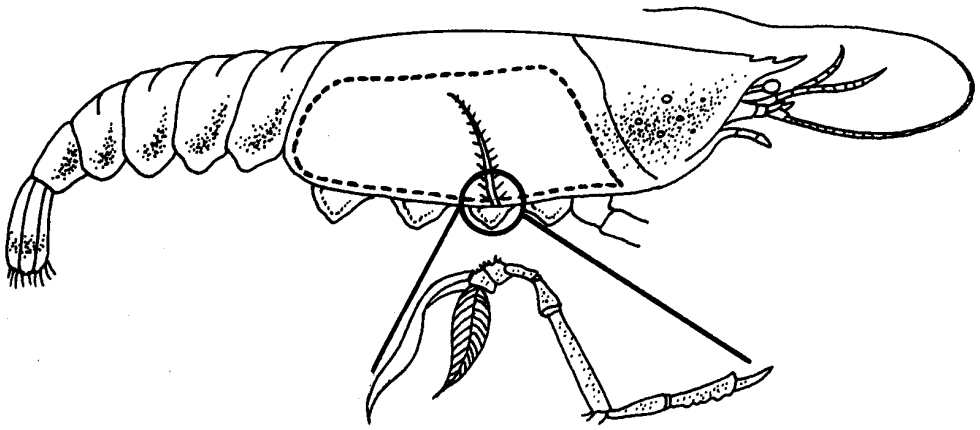
Lateral View

Part B. Gills

1. Cut the carapace as shown in Figure 2. Remove the cut section of the carapace to expose the attached muscles. Then, use your scissors to cut through the muscles at the third leg joint and remove the joint with its attached gill.

2. Examine the gills with a hand lens or a dissecting scope.

Figure 2



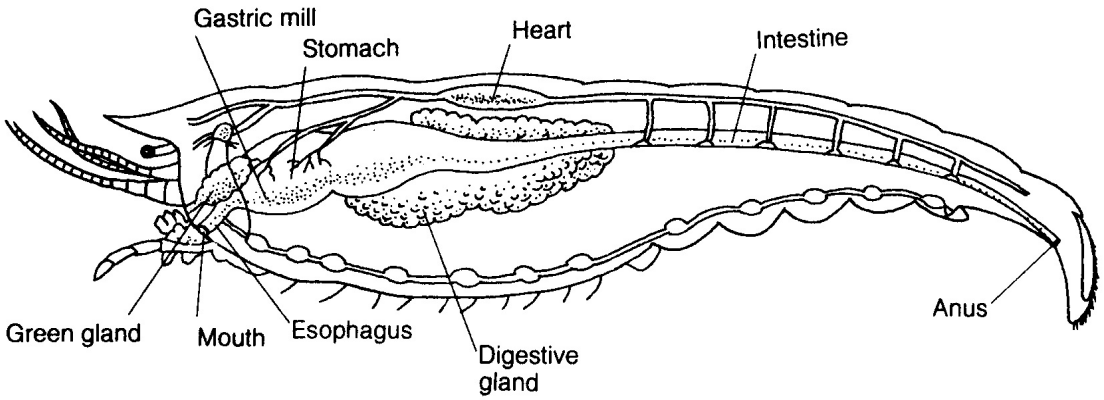
Part C. Internal Anatomy

1. Use your scissors to take out all the gills under the carapace removed in Procedure B. Carefully cut and remove the hard chitinous plates on both sides of the crayfish. Remove the exoskeleton from the head and rostrum to expose the brain and cardiac stomach. By gently lifting up on the stomach, you should be able to see the esophagus leading down to the mouth. (Note: Be careful as you make your incisions so that you avoid cutting and damaging any internal organs.)

2. **Circulatory System**

   Locate the thin, tubular heart in the mid-dorsal section as shown in Figure 3. The heart pumps blood forward toward the head of the crayfish. There are no veins in the crayfish. Instead, the blood flows into sinuses that collect the blood that has delivered nutrients and picked up wastes. From the sinuses, the blood is carried back through arteries to sinuses around the heart.

Figure 3



3. **Digestive System**

   After the maxillae tear the crayfish's food into small pieces, the food enters the mouth. Locate the short esophagus and the stomach. Cut open the stomach and find the chitinous teeth lining the stomach that grind up the ingested food. These "stomach teeth" are known as the gastric mill. From the stomach the food passes on to be digested within the digestive glands that look like large pockets. After nutrients are absorbed the wastes are passed through the long intestine and are eliminated through the anus.

4. **Excretory System**

   The green gland found below and in front of the stomach collect the nitrogenous wastes and excrete them out a pore near the base of the antennae.

Observations

1. What is the gender of the crayfish that you are dissecting?

2. How do the appendages near the anterior end differ in function from the appendages near the posterior end?

3. How many sets of gills can you see on this crayfish?

4. How would having gills attached to walking legs aid the crayfish in breathing?

5. How are the gills adapted for obtaining oxygen from the water?

Analysis and Conclusion

1. How does the storage of sperm in the female throughout the winter increase the chance of the survival of the species?

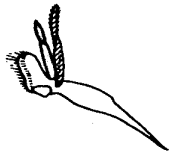
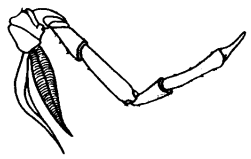
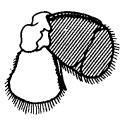
2. The blood of earthworms and humans is red because of the presence of hemoglobin. Does the blood of crustaceans contain this pigment?

3. Which structure of the crayfish secretes the exoskeleton? Does the exoskeleton grow with the crayfish's body?

4. What is the function of the gastric mill? What other structure help digest food in the crayfish?

5. Why is it not dangerous for urine to be excreted close to the eyes and mouth of the crayfish?

Table 1: Crayfish Appendages

Place Here	Appendages	Function	Location
	Antennules	Touch, taste and balance	In front of the mouth.
	Antenna	Senses touch and taste	In front of the mouth.
	Mandible	Crushes food	Mouth
	First Maxilla	Moves food to the mouth	Behind the mandibles
	Second Maxilla	Moves water in the gill chamber	Behind the mandibles.
	First Maxilliped	Holds food, senses touch and taste	At ventral and forward part of the thorax region
	Second Maxilliped	Holds food, senses touch and taste	At ventral and forward part of the thorax region
	Third Maxilliped	Holds food, senses touch and taste	At ventral and forward part of the thorax region
	Cheliped	Grasps food, defense	Posterior to the maxillipeds
	Walking legs	Locomotion	Posterior to the cheliped
	Swimmeret	The first swimmeret in males transfers sperm to females. Females use the 2nd, 3rd, 4th, and 5th swimmerets to hold eggs and young	Abdominal region on the ventral surface
	Uropod	Swimming or tailflip	Posterior or tail end