

**NEDWIDEK REVISED: LABORATORY EXERCISE #13  
HOW ARE THE INTERNAL ORGANS OF A FROG ORGANIZED?**

**INTRODUCTION**

In this second laboratory exercise on the frog, you will dissect and examine the digestive, respiratory, circulatory and reproductive systems. As you are working, think about the organization and structure of the organs and how the systems compare with those of man.

**OBJECTIVES**

1. Dissect and study the internal organs and the organization of the following systems of the frog: digestive, respiratory, circulatory and reproductive systems.
2. Compare the structure and organization of the organs with those from the human systems.
3. Improve dissection skills.

**PRE-LAB QUESTION:**

1. Describe courtship and mating in frogs and the stages of frog development. How does the respiratory system change as the frog undergoes metamorphosis from a tadpole to an adult frog? How does the frog heart differ from that of a human? Compare the circulation of blood in the heart and lungs for the frog & human. Does a frog need pulmonary circulation system as “efficient” as a human’s? Explain.

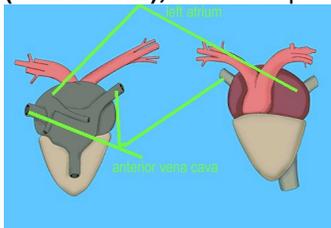
**MATERIALS**

Preserved frog, dissecting pan lined with a paper towel, dissection kit, hand lens, dissection manual, charts or pictures of various types of frogs, liner-size plastic bag with twist-tie, piece of cardboard or white paper.

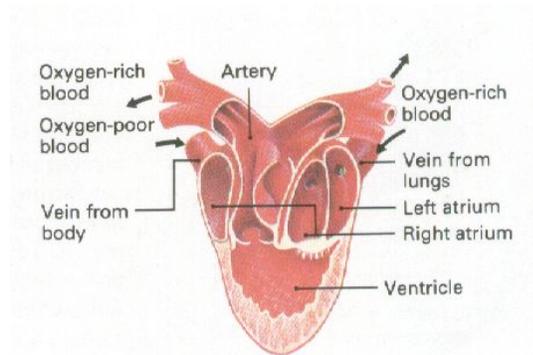
**PROCEDURE****I. Dissect and Study the Internal Organs**

1. Lay the frog on the pan, ventral side up. Pin the legs down. Use the scissors from your kit to cut through the skin, and then go back, repeating the cut through the underlying muscle. Follow the dissection pattern in the diagram below. Lift up the scissors as you cut so as not to cut into the organs beneath the skin. At the **PECTORAL** region, the ventral region between the two forelegs, there is a bone called the clavicle.

Cut through this carefully and spread out the two sides. Pin down these and the flaps of additional skin so that you can clearly observe the organs. If there is liquid inside the body cavity, the **COELOM (SEE LOME)**, blot the liquid with paper towels.



**Fig. 1 Ventral & Dorsal View of Heart:** <http://mcsd-ws.mcbarons.manheimcentral.org/~williamst/Frog/frog.htm>



**Fig. 2 cross section of the heart**

<http://slohs.slcsd.org/pages/teachers/rhamley/Biology/Frog%20Dissection/respiratory%20system.htm>

- The heart lies in a sac-like **PERICARDIUM**, surrounded by the three-lobed **LIVER**. Identify these parts of the heart: The single **VENTRICLE**, the two **ATRIA**, the right and left **VENA CAVA**, and the **SINUS VENOSUS**. The **CONUS ARTERIOSUS** and the **TRUNCUS ARTERIOSUS** can be seen on the dorsal side. The two **LUNGS** are attached to the heart and look like brown raisins. Find the two **TRACHEAE**.
- Observe the organs in the body cavity. Note the presence of long yellow “fingers” of fat. Unlike man, frogs store their fat in these **FAT BODIES** and not subcutaneously (below the skin) as we do. Remove them carefully with a scalpel. Lay a few on the cardboard. Wrap the rest in a paper towel and discard them in the waste baskets immediately. Do not confuse fat bodies with oviducts. See 4.
- If you have a female frog, you might see black and white eggs in a membranous sac. Remove them carefully if they obstruct the other organs as you are examining them. But note their connections to other organs in the frog body.

## II. The Digestive System

Review the parts of the human digestive system with your partner. The same organs will be found in the frog. Use the stomach, the enlarged muscular part of the alimentary canal, to orient yourself. Find the **ESOPHAGUS**, **STOMACH**, **SMALL INTESTINE**, **LARGE INTESTINE (COLON)** and the **CLOACA**, an enlarged cavity into which waste products and reproductive cells pass. The **PANCREAS** is attached to the stomach and the **DUODENUM**, the beginning part of the small intestine. Note the presence of the greenish **GALL BLADDER** underneath the **LIVER**. The **SPLEEN** is a dark red-brown organ the size of a bean. It is not paired.

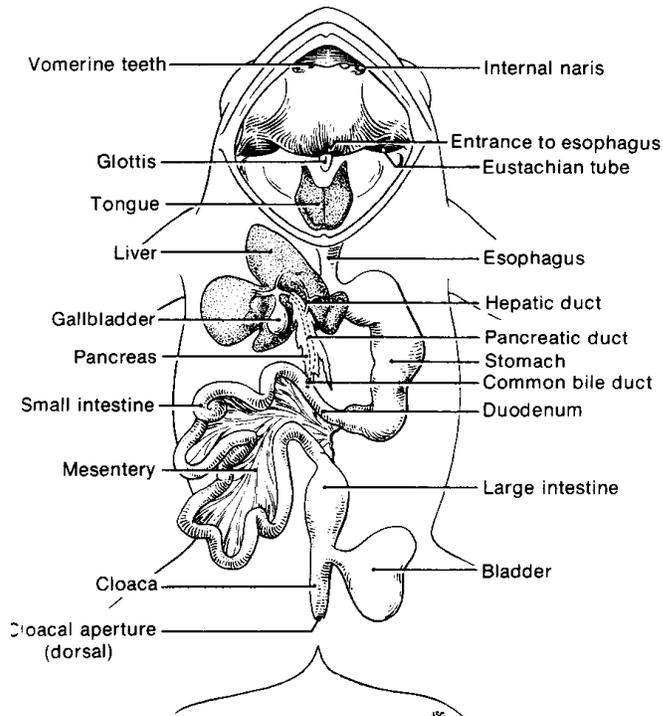
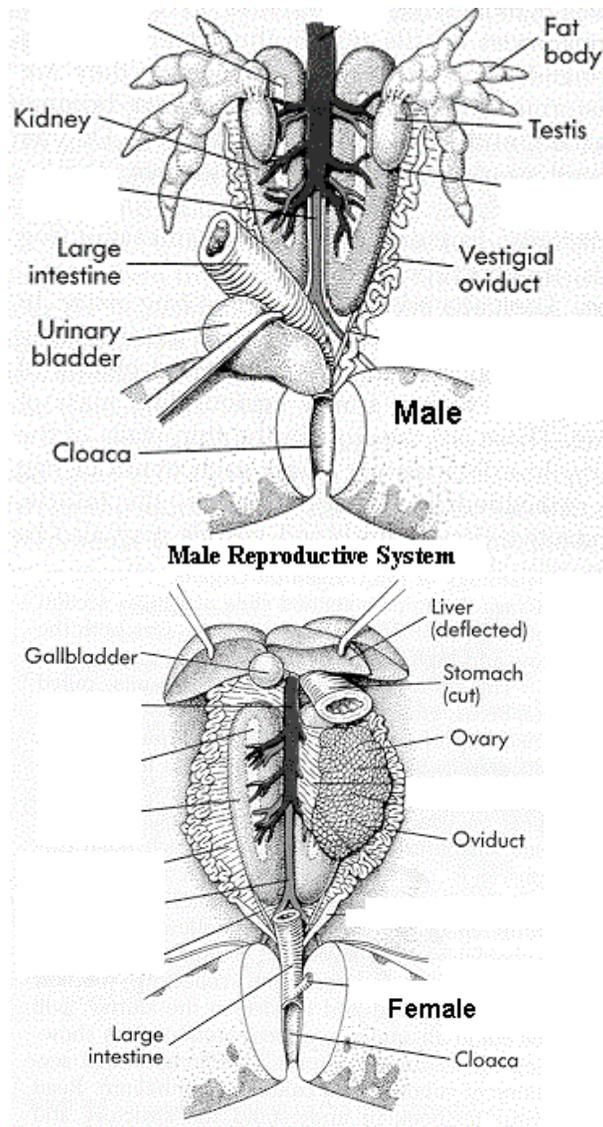


Fig. 2 Digestive Organs: [http://www.arthursclipart.org/frogs/frogs/page\\_01.htm](http://www.arthursclipart.org/frogs/frogs/page_01.htm)

Observe the large blood vessel which connects the liver to the stomach and the intestine. This blood vessel is called the **HEPATIC PORTAL VESSEL**. If you have trouble seeing the other organs, you may carefully remove some lobes of the liver. Lay the organ lobes on the cardboard/paper provided.

### III. The Excretory and Reproductive Systems

1. Locate the paired, oval, brown kidneys which lie next to the dorsal side of the body cavity. Observe the translucent **URINARY BLADDER**, which is joined to the **CLOACA**. In a male frog, the testes are paired, small, whitish organs which lie ventral to the kidneys. Sperm, which is made in the testes, pass through the kidneys via the sperm ducts. They are released into the urinary ducts and then into the cloaca. They do not pass into the bladder.: <http://faculty.uca.edu/march/bio2/VertStrucFunc/frogfemale.htm>



- If your frog is female, you may have already seen the eggs in the thin-walled, stretchable **UTERUS**. Locate the long, thin, coiled **OVIDUCTS**.

#### IV. Removal of the Viscera

- Use your scissors to cut out the alimentary canal. Include as much of the esophagus and the cloaca as possible. Stretch it out straight, carefully removing the pancreas, the spleen, and the rest of the liver. Lay the alimentary canal on the cardboard and label the sections. Label the other organs.
- Continue removing the organs which you have identified *in situ* (in their original positions). Place the organs on the cardboard. Label each organ if you can, but system drawings and identification are your primary goal.

#### V. Examination of the Brain

- Study the model of the frog brain. Note its position in the frog's skull.
- Snip off the tip of the frog's nose with a pair of scissors. Using a **SHARP** scalpel, begin gently shaving the muscles and bones off the top of the skull until you see the brain. I'll show you how to do this—it is much harder than it looks and can be very messy. It is tricky. Be careful, because the brain has the consistency of butter. You can continue shaving the bone and picking at it to expose the spinal cord. Identify the parts of the brain: **CEREBRUM**, **OPTIC LOBES**, **CEREBELLUM**, and **MEDULLA**.

