

## Frog Internal Dissection (5ec)

### III.) Setup for the Dissection

Preparation: This section explains the steps necessary to prepare your frog for the dissection process.

#### 1. Place Frog in Pan

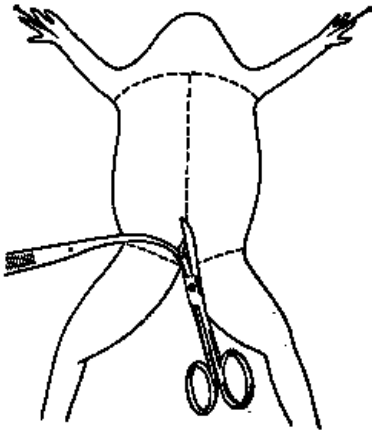
The frog should be lying on its dorsal (back) side with the belly facing up.

#### 2. Pin the Frog

Pin the frog for dissection by securing each of the four limbs to the pan. Place the pins through the hands and feet to secure them to the pan.

#### 3. Begin the First Skin Incision

Once the legs of the frog are securely pinned to the dissection tray begin the first skin incision by using the forceps to lift the skin midway between the rear legs of the frog. Using the scalpel, make a cut along the center, or midline, of the frog, bisecting it equally.



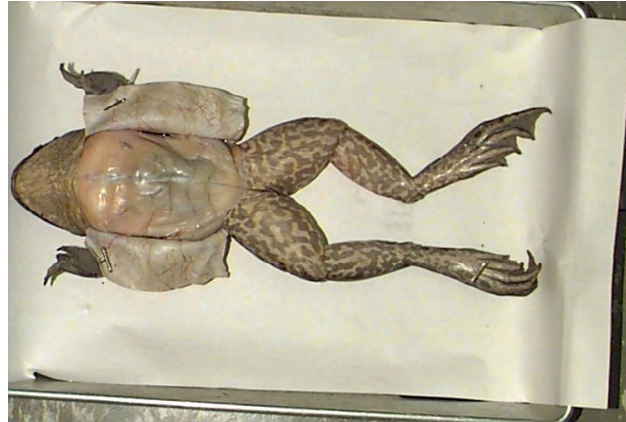
4. Continue the Skin Incision by using the scissors to cut all the way up the frog's body to the neck. Be very careful not to cut too deeply.

#### 5. Make the Leg Incisions

Still using the scissors, make horizontal incisions just above the rear legs and between the front legs of the frog.

#### 6. Separate the Skin & Muscle

Once you have finished the incisions between the front and rear legs of the frog you need to separate the skin flaps from the muscle below. To do this: Pick up the flap of skin with the forceps, and use a scalpel to help separate the skin from the muscle below.



#### 7. Pin Skin Flaps

Once the skin flaps have been cut pin them to the dissection tray using several pins.

#### 8. Begin the First Muscle Incisions

This section will describe the procedures for making the incisions through the frog's abdominal muscles.

Now that the skin has been removed, begin the abdominal muscle incision by using the forceps to lift the muscle midway between the rear legs of the frog. Next use the scalpel to start the incision in the direction of the chin.

#### 9. Continue the Muscle Incision

Using the scissors, carefully continue the incision up the midline of the frog, but do not cut too deeply as to damage the organs.

#### 10. Turn Scissors Blades

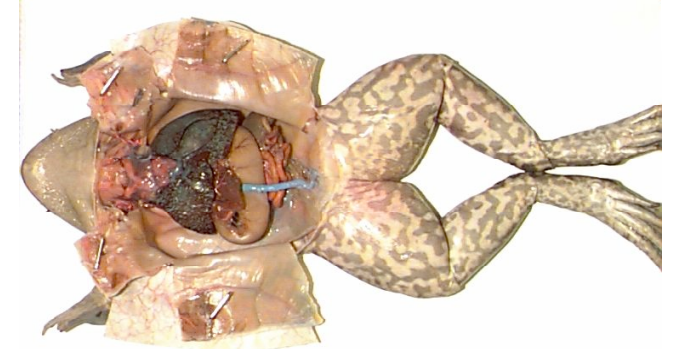
This is very important. When you reach a point just below the front legs, turn the scissors blades sideways to cut through the bones in the chest. This should prevent damage to the heart or other internal organs. When your scissors reach a point just below the frog's neck you have cut far enough.

#### 11. Make the Second Muscle Incisions

Next, using the scissors, make horizontal incisions through the muscle between both the front legs and above the back legs.

#### 12. Separate Muscle & Organs

To finish opening up the frog's body cavity therefore exposing the abdominal region, use the forceps to hold the muscle flaps while separating the muscle from the tissues below with a scalpel.



#### 13. Pin the Muscle Flaps

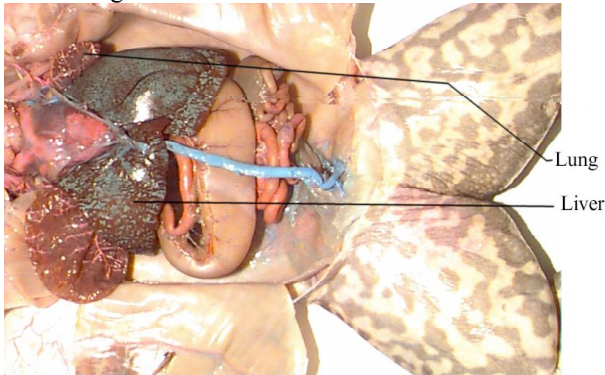
Once the muscle flaps have been separated from the underlying tissue, they must be pinned back. This will allow easy access to the frog's internal organs.

\*If your specimen is a female, the body may be filled with eggs and an enlarged ovary. You may need to remove these eggs to view the organs.

## D) Respiratory System and Liver

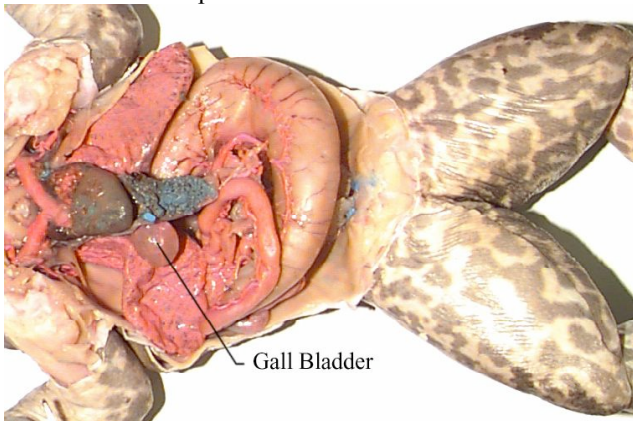
The respiratory system consists of the nostrils and the larynx, which opens into two **lungs**, hollow sacs with thin walls. The walls of the lungs are filled with **capillaries**, which are microscopic blood vessels through which materials pass into and out of the blood.

1. Insert a probe into the glottis, and observe its passage into the trachea. Enlarge the glottis by making short cuts above and below it. When the glottis is spread open, you will see a fold on either side; these are the vocal cords used in croaking.



2. Identify the lungs, two small sacs on either side of the midline and partially hidden under the liver. Trace the path of air from the external nares to the lungs.

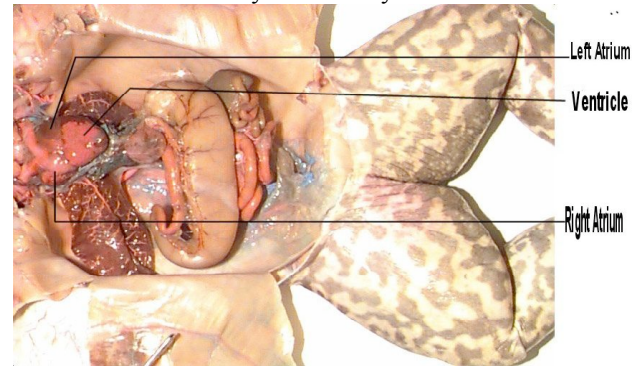
3. Locate the liver, the large, prominent, dark-brown organ in the mid ventral portion of the trunk.



4. Under the liver, find the gallbladder.

## II.) Circulatory System

The circulatory system consists of the heart, blood vessels, and blood. The heart has two receiving chambers, or **atria**, and one sending chamber, or **ventricle**. Blood is carried to the heart in vessels called veins. Veins from different parts of the body enter the right and left atria. Blood from both atria goes into the ventricle and then is pumped into the **arteries**, which are blood vessels that carry blood away from the heart.

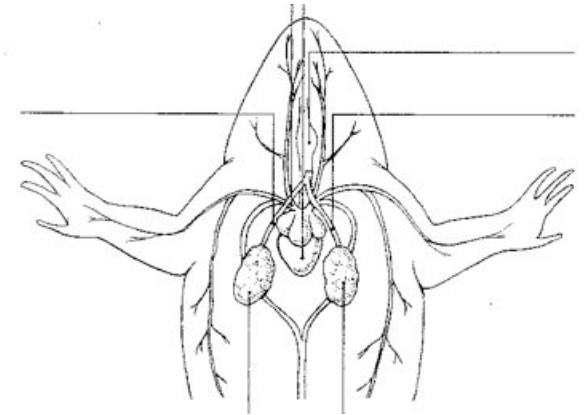


1. Lift the liver gently. Identify the heart, covered by a membranous covering (the pericardium). With forceps, lift the covering, and gently slit it open. The heart consists of a single, thick-walled ventricle and two (right and left) anterior, thin-walled atria.

2. Locate the three large veins that join together beneath the heart to form the sinus venosus. (To lift the heart, you may have to snip the slender strand of tissue that connects the atria to the pericardium.) Blood from the sinus venosus enters the right atrium. The left atrium receives blood from the lungs.

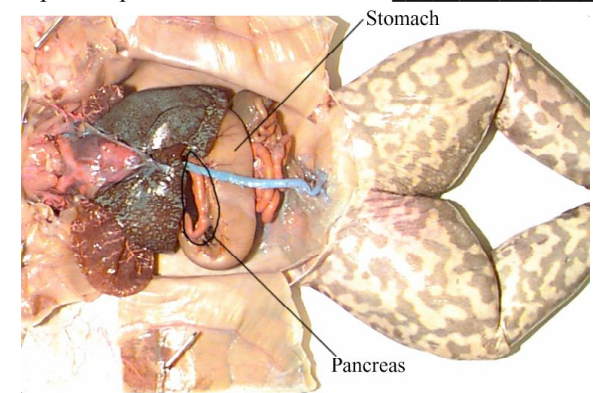
3. Find the conus arteriosus, a single, wide arterial vessel leaving the ventricle and passing ventrally over the right atrium. Follow the conus arteriosus forward to where it divides into three branches on each side. The middle artery on each side is the systemic artery, which fuses behind the heart to become the dorsal aorta. The dorsal aorta transports blood through the body cavity and gives off many branches. The posterior vena cava begins between the two kidneys and returns blood to the sinus venosus.

Locate the following on your frog **and label them on the diagram below**. Larynx, right & left bronchi, aortic arches, heart. The heart is covered by a membranous sac. Remove it with the scissors to find the right & left atria, and the ventricle. Why is the wall of the ventricle thicker than the walls of the atria?



## III.) Digestive System

The digestive system consists of the organs of the digestive tract, or food tube, and the digestive glands. From the esophagus, swallowed food moves into the **stomach** and then into the **small intestine**. Bile is a digestive juice made by the **liver** and stored in the **gallbladder**. **What color is the gallbladder?** \_\_\_\_\_  
Open it up. **What is it filled with?** \_\_\_\_\_



1. **What color is the liver?** \_\_\_\_\_  
2. **How many parts or lobes does the liver have?** \_\_\_\_\_

Bile flows into a tube called the **common bile duct**, into which **pancreatic juice**, a digestive juice from the **pancreas**, also flows. The contents of the common bile duct flow into the small intestine, where most of the digestion and absorption of food into the bloodstream takes place. Indigestible materials pass through the **large intestine** and then into the **cloaca**, the common exit chamber of the digestive, excretory, and reproductive systems.

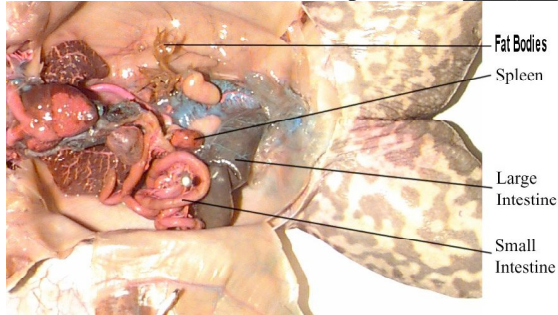
1. Identify the esophagus, a very short connection between the mouth and the stomach. Lift the left liver lobe, and identify the stomach, which is whitish and J-shaped. The stomach connects with the esophagus anteriorly and with the small intestine posteriorly.

**Where does the esophagus start?** \_\_\_\_\_

**Where does the esophagus end?** \_\_\_\_\_

2. Find the small intestine and the large intestine, which enters the cloaca. The cloaca lies beneath the pubic bone and is a general receptacle for the intestine, the reproductive system, and the urinary system. It opens to the outside by way of the anus. Trace the path of food in the digestive tract from the mouth to the cloaca.

3. As you lift the small intestine you will see the pancreas, a thin, yellowish ribbon, between the small intestine and the stomach. **What color is the pancreas?** \_\_\_\_\_



4. Locate the fat bodies near the stomach. Removal of the Stomach: Cut the stomach out of the frog and open it up. You may find what remains of the frog's last meal in there. Look at the texture of the stomach on the inside.

**Describe the stomach's texture.**

**What did you find in the stomach?**

Measuring the Small intestine: Remove the small intestine from the body cavity and carefully separate the **mesentery** from it. Stretch the small intestine out and measure it. Now measure your frog. Record the measurements below in centimeters.

**Frog length:** \_\_\_\_\_ **cm Intestine length** \_\_\_\_\_ **cm**

**Is the small intestine straight or coiled?** \_\_\_\_\_

**Cut the small intestine. Is there anything in there?**

**Is the large intestine straight or coiled?** \_\_\_\_\_

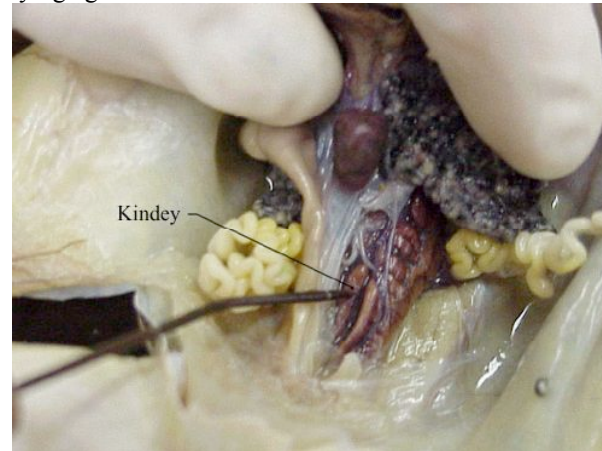
**Cut the small intestine. Is there anything in there?**

#### IV.) Urogenital System

The urogenital system consists of both the urinary system and the reproductive system.

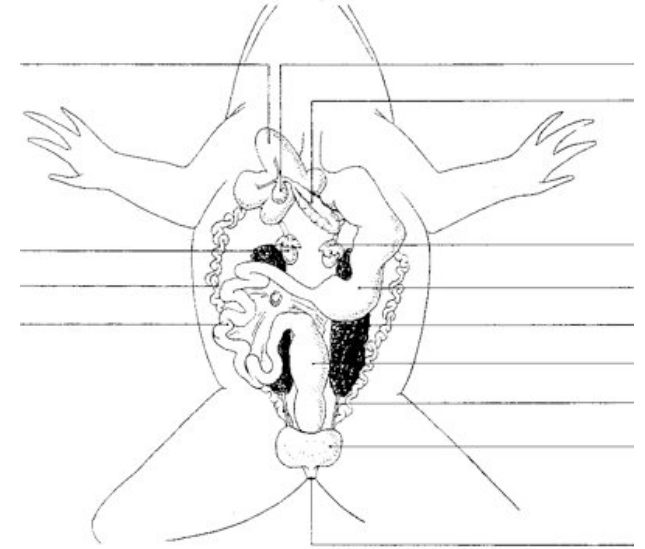
The urinary system consists of the frog's kidneys, ureters, bladder, and cloaca. The **kidneys** are organs that excrete urine. Connected to each kidney is a **ureter**, a tube through which urine passes into the **urinary bladder**, a sac that stores urine until it passes out of the body through the cloaca. The organs of the male reproductive system are the testes, sperm ducts, and cloaca. Those of the female system are the ovaries, oviducts, uteri, and cloaca

1. Identify the kidneys, which are long narrow organs lying against the dorsal wall.



2. Identify the urinary bladder, attached to the ventral wall of the cloaca. In frogs, urine backs up into the bladder from the cloaca. **What 3 things does it receive?**

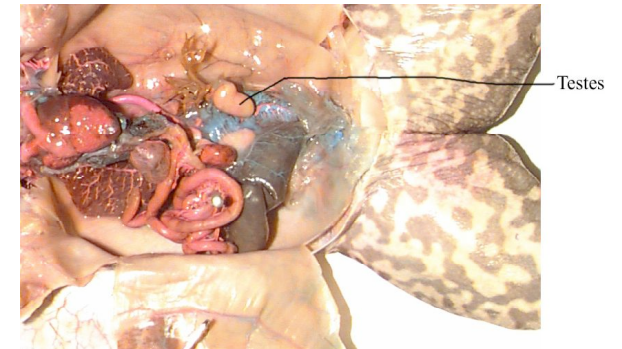
**Label all the parts of the urogenital system below:**



#### V.) Male Anatomy

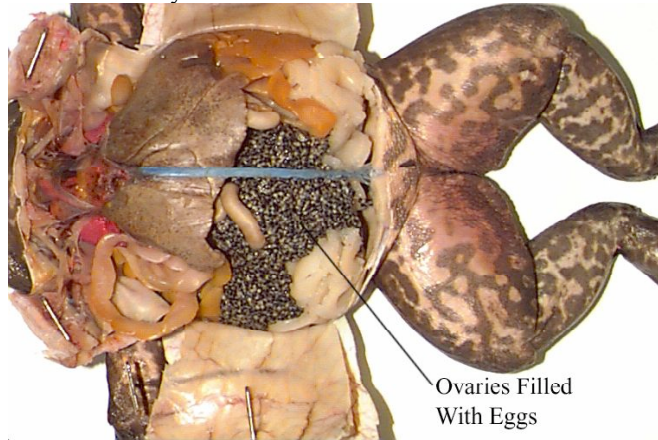
The **testes** produce **sperm**, or male sex cells, which move through **sperm ducts**, tubes that carry sperm into the cloaca, from which the sperm move outside the body.

1. Locate the testes in the male frog. They are yellow or tan-colored, bean-shaped organs near the anterior end of each kidney. Several small ducts, the vasa efferential, carry sperm into the kidney ducts that also carry urine from the kidneys. Fat bodies, which store fat, are attached to the testes.



## VI.) Female Anatomy

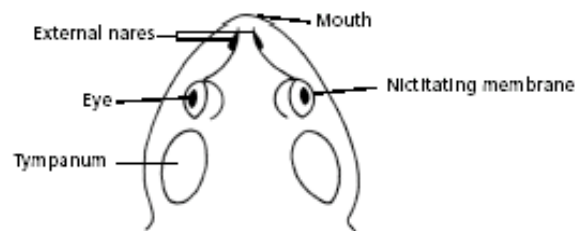
The **ovaries** produce **eggs**, or female sex cells, which move through **oviducts** into the **uteri**, then through the cloaca outside the body.



1. Locate the ovaries in the female frog. They are attached to the dorsal body wall. Fat bodies are attached to the ovaries. Highly coiled oviducts lead to the cloaca. The ostium (opening) of the oviducts is dorsal to the liver.

## VII.) The Central Nervous System

The central nervous system of the frog consists of the brain, which is enclosed in the skull, and the spinal cord, which is enclosed in the backbone. Nerves branch out from the spinal cord.



Remove the frog's eye. Make an incision to remove and observe the nictitating membrane, cornea, lens and retina. Use your hand held lens to see the parts. What do you see?

---



---



---

## VIII.) The Skeletal & Muscular System

The frog's skeletal and muscular systems consist of its framework of bones and joints, to which nearly all the voluntary muscles of the body are attached.

**Voluntary muscles**, which are those over which the frog has control, occur in pairs of flexors and extensors. When a **flexor** of a leg or other body part contracts, that part is bent. When the **extensor** of that body part contracts, the part straightens

**IX.) Locate each of the organs below. Cut out each of parts below Check the box to indicate that you found the organs.**

**Fat Bodies** --Spaghetti shaped structures that have a bright orange or yellow color, if you have a particularly fat frog, these fat bodies may need to be removed to see the other structures. Usually they are located just on the inside of the abdominal wall.

**Peritoneum** , A spider web like membrane that covers many of the organs, you may have to carefully pick it off to get a clear view

**Liver**--The largest structure of the the body cavity. This brown colored organ is composed of three parts, or lobes. The **right lobe**, the **left anterior lobe**, and the **left posterior lobe**. The liver is not primarily an organ of digestion, it does secrete a digestive juice called bile. Bile is needed for the proper digestion of fats.

**Heart** - at the top of the liver, the heart is a triangular structure. The **left and right atrium** can be found at the top of the heart. A single **ventricle** located at the bottom of the heart.

**Lungs** - Locate the lungs by looking underneath and behind the heart and liver. They are two spongy organs.

**Gall bladder**--Lift the lobes of the liver, there will be a small green sac under the liver. This is the gall bladder, which stores bile. (hint: it kind of looks like a booger)

**Stomach**--Curving from underneath the liver is the stomach. The stomach is the first major site of chemical digestion. Frogs swallow their meals whole. Follow the stomach to where it turns into the small intestine. The **pyloric sphincter valve** regulates the exit of digested food from the stomach to the small intestine.

**Small Intestine**--Leading from the stomach. The first straight portion of the small intestine is called the **duodenum**, the curled portion is the **ileum**. The ileum is held together by a membrane called the **mesentery**. Note the blood vessels running through the mesentery, they will carry absorbed nutrients away from the intestine. Absorption of digested nutrients occurs in the small intestine.

**Large Intestine**--As you follow the small intestine down, it will widen into the large intestine. The large intestine is also known as the **cloaca** in the frog. The cloaca is the last stop before wastes, sperm, or urine exit the frog's body. (The word "cloaca" means sewer)

**Spleen**--Return to the folds of the mesentery, this dark red spherical object serves as a holding area for blood.

**Esophagus**--Return to the stomach and follow it upward, where it gets smaller is the beginning of the esophagus. The esophagus is the tube that leads from the frogs mouth to the stomach. Open the frogs mouth and find the esophagus, poke your probe into it and see where it leads.

**Conclusion: (5 sentence)**

---



---



---



---



---



---