Honors Biology **Due by Tuesday March 16th!**

Name: _____ Period: _____

LAB 26: FROG DISSECTION

INTRODUCTION:

As members of the class Amphibia, frogs may live some of their adult lives on land, but they must return to water to reproduce. Frogs are more complex than Perch, but not as complex as mammals. Amphibians have a three chambered heart as well as lungs for the respiratory system. Frogs can also exchange gases and some nutrients through their skin, which must stay moist for this function. Complete the following lab procedures to investigate the anatomy of the common grass frog.

MATERIALS:

Forceps Probes Scalpels Scissors Ruler Dissecting mat

SPECIMEN:

Common grass frog (preserved)

DAY 1:

For the first day, you will complete an examination of the external anatomy, anatomy of the mouth, observation of frog skin under the microscope, and the initial dissection cuts to observe the internal anatomy. As you observe each item during the dissection, note the number and observations in Table 1 and draw and label Figures 1 and 2.

EXTERNAL ANATOMY

1. Observe the dorsal (back) and ventral (belly) sides of the frog. In Table 1, note the colors of the dorsal side and ventral side.
2. Examine the hind or back legs. In Table 1, note the number and make observations about them including if they are webbed.
3. Examine the forelegs or front legs. In Table 1, note the number and make observations about them including if they are webbed.
4. Use a ruler to measure your frog, measure from the tip of the head to the end of the frog's backbone. (Do not include the legs in your measurement). Then measure the length of the frog's legs. Note these measurements in Table 1.
5. Locate the frog's eyes. The nictitating membrane is a clear membrane that attached to the bottom of the eye. Use forceps to carefully remove the nictitating membrane. In Table 1, note the number and make observations about the nictating membrane. Then draw and label the nictating membrane on Figure 1.
6. Carefully remove the eyeball. In Table 1, note the number and make observations about the eye(s). Cut open the eye to find a hard sphere; this is the lens of the eye (much like yours). Then draw and label the eyes on Figure 1.
7. Just behind the eyes on the frog's head is a circular structure called the tympanic membrane. The tympanic membrane is used for hearing. Measure the diameter (distance across the circle) of the tympanic membrane. In Table 1, note the number and size of the frog's tympanic membranes. Make other observations such as color and shape. Then draw and label the tympanic membranes on Figure 1.
1. On the roof of the mouth you will find two tiny openings of the nostrils. Use the probe to identify where inside the mouth the nostrils connect. Make your observations of the esophagus in Table 1. Then draw and label the nostrils on Figure 1.
8. Feel the frog's skin. In Table 1, describe the color, patterns, texture, etc.
9. In Day 1 or Day 2, go to the microscope labeled frog skin and observe the microscope slide. Draw your observations in the section with the microscope observations.

MOUTH ANATOMY

2. Pry the frog's mouth open and use scissors to cut the angles of the frog's jaws open.
3. Cut deeply enough so that the frog's mouth opens wide enough to view the structures inside.
4. Locate the tongue. Note whether it attaches to the front or the back of the mouth. Make your observations of the tongue in Table 1. Then label the tongue on Figure 2.
5. In the center of the mouth, toward the back is a single round opening. This is the esophagus. This tube leads to the stomach. Use a probe to poke into the esophagus. Make your observations of the esophagus in Table 1. Then label the esophagus on Figure 2.
6. Close to the angles of the jaw are two openings, one on each side. These are the Eustachian tubes. They are used to equalize pressure in the inner ear while the frog is swimming. Insert a probe into the Eustachian tube and identify what structure the probe pokes through on the head. Make your observations of the Eustachian tubes in Table 1. Then label the Eustachian tubes on Figure 2.
7. The frog has two sets of teeth. The vomerine teeth are found on the roof of the mouth. The maxillary teeth are found around the edge of the mouth. Locate and count the number of each set of teeth and make your observations in Table 1. Then draw and label the two types of teeth on Figure 2.

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Table 1: External and Mouth Anatomy

Coloring:	**Ventral Side**	**Dorsal Side:**
Frog Body Length (cm):		**Frog Leg Length (cm):**

Structure	**Number**	**Observations (approximate size, color, shape, location)**
Hind Leg Toes		
Foreleg Toes		
Nictating Membrane(s)		
Eye(s)		
Tympanic Membrane(s)		
Nostrils		
Frog Skin		
Mouth		
Esophagus		
Eustachian Tube(s)		
Vomerine Teeth		
Maxillary Teeth		

Figure 1

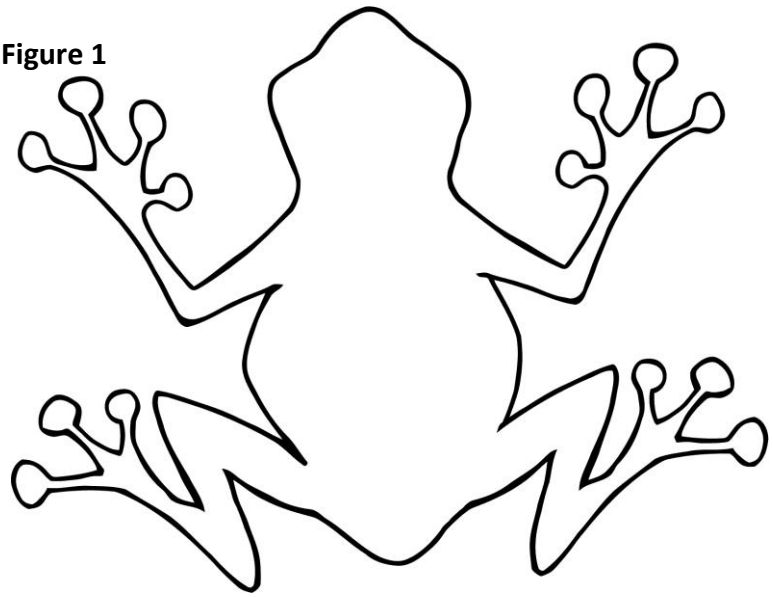
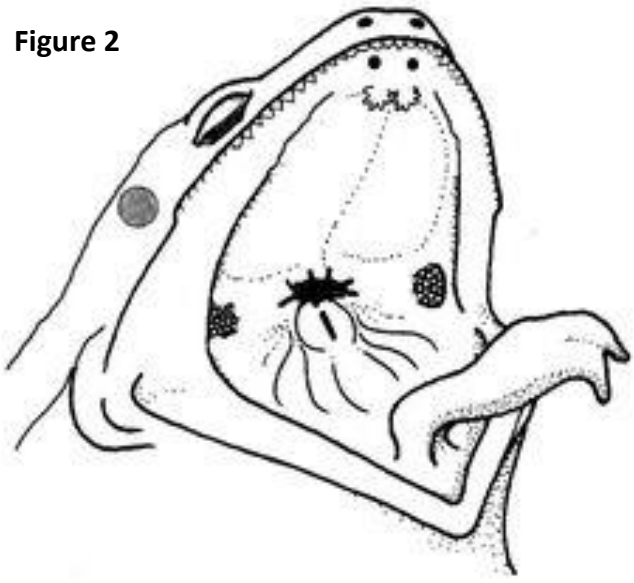


Figure 2



INITIAL INTERNAL ANATOMY:

1. Your frog should be ventral or belly-side up. Force the forelimbs and hind limbs as open as possible down to dissection mat.
2. Use the diagram to the right to initiate dissection. Make a small puncture into the lower part of the abdomen near the pelvis. Then use the scissors to cut straight up the middle, careful not to cut any internal organs underneath. You should cut through two layers of tissue: the skin and the abdominal muscles. Continue cutting up through the jaw past the line of the forelimbs.
3. Again using scissors, cut vertical from forelimb to forelimb. Cut past the forelimbs almost to the backside of the frog. Do the same from hind limb to hind limb. Make the cuts around the trunk of the frog almost to the back to allow the skin flaps to easily open.
4. Splay open the flaps of skin and muscle and pin them down.
5. **Observe the following items making notes in Table 2 and diagramming them in Figure 3. Remove these structures and dispose of them during cleanup for Day 1.**
    - **Fat Bodies** –Greasy spaghetti shaped structures if you have a particularly fat frog. 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
    - **Oviducts -** Females do not have testes, though you may see a curly-q type structure around the outside of the kidney, these are the oviducts. Oviducts are where eggs are produced. The oviducts may be filled with small black eggs. Carefully remove these from your frog. A male frog will not have these structures.

Incisions for Dissection

Table 2: Internal Anatomy – Day 1

Structure	Number	Observations (approximate size, color, shape, location)
Fat Bodies		
Peritoneum		
Oviducts (Females only)		

STOP HERE!

Carefully fold skin back over internal organs. Carefully store frog in provided plastic bag LABELED WITH YOUR GROUP NUMBER & PERIOD. Make sure air is pressed out of the bag and bag is sealed completely to keep your frog moist. Dispose of the oviducts (if female) and fat bodies.

OBSERVE THE FOLLOWING UNDER THE MICROSCOPES:

(Can be done day 1 or day 2)

Skin Tissue

Small Intestine Tissue

Heart Tissue

Lung Tissue

DAY 2:

For the second day, you will complete an examination of the frog's internal anatomy and three microscope observation.

INTERNAL ANATOMY CONTINUED

1. Make sure your frog is ventral. Open the cut skin flaps to continue your dissection below.
2. **Observe the following items making notes in Table 3 and diagramming them in Figure 3.**
   - **Liver**--The largest structure of the body cavity. 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. Remove the lobes of the liver to see the rest of the structures.
   - **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. The large vessel extending out from the heart is the **conus arteriosis**.
   - **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.
     - **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 texture of the inside of the stomach
     - Describe the contents of the stomach
   - **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.
   - **Kidneys** - flattened bean shaped organs located at the lower back of the frog, near the spine. They are often a dark color. The kidneys filter wastes from the blood. Often the top of the kidneys have yellowish stringy fat bodies attached.
   - **Testes** – If your frog is male, the testes are located at the top of the kidneys, they are pale colored and roundish.
   - **Bladder** - An empty sac located at the lowest part of the body cavity. The bladder stores urine.
   - **Cloaca** - mentioned again as part of the urogenital system - urine, sperm and eggs exit here.

Table 3: Internal Anatomy – Day 2

Structure	Number	Observations (approximate size, color, shape, location)
Liver		
Heart		
Lungs		
Gall Bladder		
Stomach		(Describe stomach contents!)
Small Intestine		

Large Intestine		
Spleen		
Kidneys		
Testes (Males only)		
Bladder		
Cloaca		

Figure 3