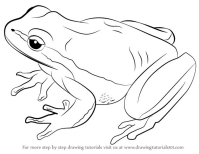
Frog Dissection Lab



Why dissect a frog?

Frogs and humans are vertebrates with similar organ systems. Although all of the internal organs are not the same in frogs and humans, it is helpful to learn about anatomy through dissection. We will be looking at each body system, and exploring individual organs of the frog. We will make comparisons of the frogs' anatomy to our own.

The companies that provide the frogs make sure that the frogs are not an endangered species. The supply companies also use safe solutions to preserve the specimens. We still need to use gloves and wash our hands while working with preserved specimens.

In order to best use this opportunity to learn and show respect for the frog, we must follow all directions that are given to us and follow all safety procedures.

Dissection Safety Rules

1. Conduct yourself in a responsible and safe manner at all times during the dissection.
2. Wear safety glasses while you are dissecting even if you wear glasses or contact lenses. Contact lenses can hold chemicals in the eye(s) increasing the potential damage in the event of an accidental splashing of chemicals into the eye(s).
3. The frog has been preserved with a safe chemical; however, if you need to take a break or the odor is beginning to bother you, notify the teacher.
4. Wear gloves and avoid contact with preservative chemicals.
5. Use the proper procedures described in the tutorial to pin the frog to the dissecting pan. Do not dissect the frog while holding it.
6. Always keep dissection tools in the dissection pan, when working and when moving the pan.
7. Always cut away from your body and away from others.
8. Never remove frogs or frog parts from the classroom. Properly dispose of dissected materials.
9. If continuing dissection, store the frog in the labeled Ziploc bag at the end of each dissection period.
10. Clean up the work area and return all equipment to the proper place when the dissection is completed.
11. Remove nitrile gloves and throw away in waste container.
12. Carefully wash your hands for a minimum of 15 seconds before returning to your seat.

Dissecting Equipment

- **Dissection tray -** Used to contain specimen and tools.
- **Dissection pins -** Used to pin down skin and muscles, which allows for an unobstructed view of internal anatomy.

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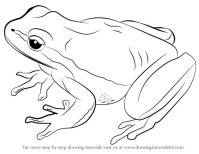

- **Probe or Dissection Needle** - Used to tease and separate specimens, pin body parts, and explore dissected animals
- **Forceps** - Used to lift and move cut tissue.
- **scissors or scalpel** - Used to cut through soft tissue.
- **Ruler** - Used to measure the anatomy of the specimen.

Dissection Procedures

Frog External Anatomy

1. Observe the dorsal and ventral sides of the frog.
    a. Dorsal side color _____ Ventral side color_____
2. Examine the hind legs.
    a. How many toes are present on each foot? _____ Are the toes webbed? _____
3. Examine the forelegs.
    a. How many toes are present? _____Are the toes 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).
    a. Length _____cm
5. Locate the frog's eyes, the **nictitating membrane** is a clear membrane that attached to the bottom of the eye, it closes over the eye to keep out dust and keep the eye moist. Use tweezers to carefully remove the nictitating membrane. You may also remove the eyeball.
    a. What color is the nictitating membrane? _____ What color is the eyeball? _____
6. Just behind the eyes on the frog's head is a circular structure called the **tympanic membrane**. The tympanic membrane is used for hearing, it vibrates in response to sound waves. The tympanic membrane becomes the eardrum in some reptiles, birds, and mammals. Measure the diameter (distance across the circle) of the tympanic membrane.
    a. Diameter of tympanic membrane _____cm
7. Feel the frog's skin.
    a. Is it scaly or is it slimy? _____

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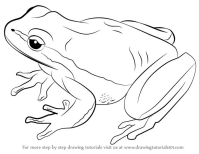

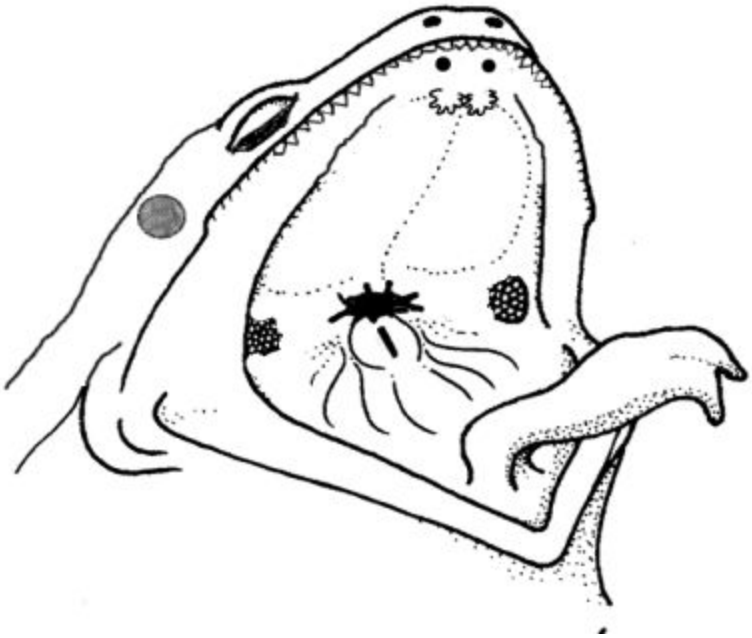

<u>Anatomy of the Frog's Mouth</u>

Procedure: Pry the frog's mouth open and use scissors to cut the angles of the frog's jaws open. Cut deeply enough so that the frog's mouth opens wide enough to view the structures inside.

1. Locate the tongue, and use your gloved fingers to move it around. Does it attach to the front or the back of the mouth? _____ (You may remove the tongue)
2. 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.
3. 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. To what structure does the Eustachian tube attach? _____
4. Just behind the tongue, and before you reach the esophagus is a slit like opening. (You may need to use your probe to get it to open up). This slit is the **glottis**, and it is the opening to the lungs. The frog breathes and vocalizes with the glottis. The glottis is covered by a flap of skin called the **epiglottis**, it keeps food from going down the **trachea** (windpipe).
5. 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. Both are used for holding prey, frogs swallow their meals whole and do NOT chew.
6. On the roof of the mouth, you will find two tiny openings, if you put your probe into those openings, you will find they exit on the outside of the frog. These are the **nostrils**.

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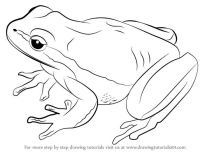
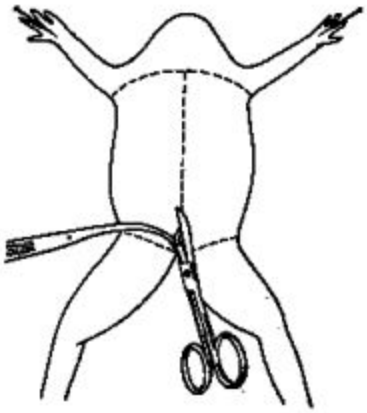


<u>Frog Internal Anatomy</u>

Dissection Instructions



1. Place the frog in the dissecting pan ventral side up.
2. Use scissors to lift the abdominal muscles away from the body cavity. Cut along the midline of the body from the pelvic to the pectoral girdle. Make transverse (horizontal) cuts near the arms and legs. (**Your incisions should follow the diagram on the right**)
3. Life the flaps of the body wall and pin back.

*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.

Locate each of the organs below.

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 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. The large vessel extending out from the heart is the conus arteriosus. Remove and dissect the heart. How many chambers does it have? _____

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

Gallbladder--Lift the lobes of the liver, there will be a small green sac under the liver. This is the gallbladder, 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.

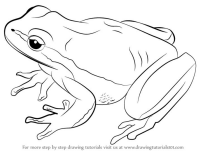
Small Intestine--Leading from the stomach. The first straight portion of the small intestine is called the

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 leads to a pouch and a muscular opening called the **cloaca**. 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 filters blood and is an important part of the immune system.

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 frog's mouth to the stomach. Open the frogs mouth and find the esophagus, poke your probe into it and see where it leads.



STOP! If you have not located each of the organs above, do not continue on to the next section!

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.
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 (tip of head to the end of the vertebrae). Record the measurements below in centimeters.
Frog length: _____ cm Intestine length _____ cm

Urogenital System - The frog's reproductive and excretory system is combined into one system called the urogenital system. You will need to know the structures for both the male and female frog, 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.
Testes - in male frogs, these organs are located at the top of the kidneys, they are pale colored and roundish.
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. Males can have structures that look similar, but serve no actual purpose. In males, they are called vestigial oviducts.
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.

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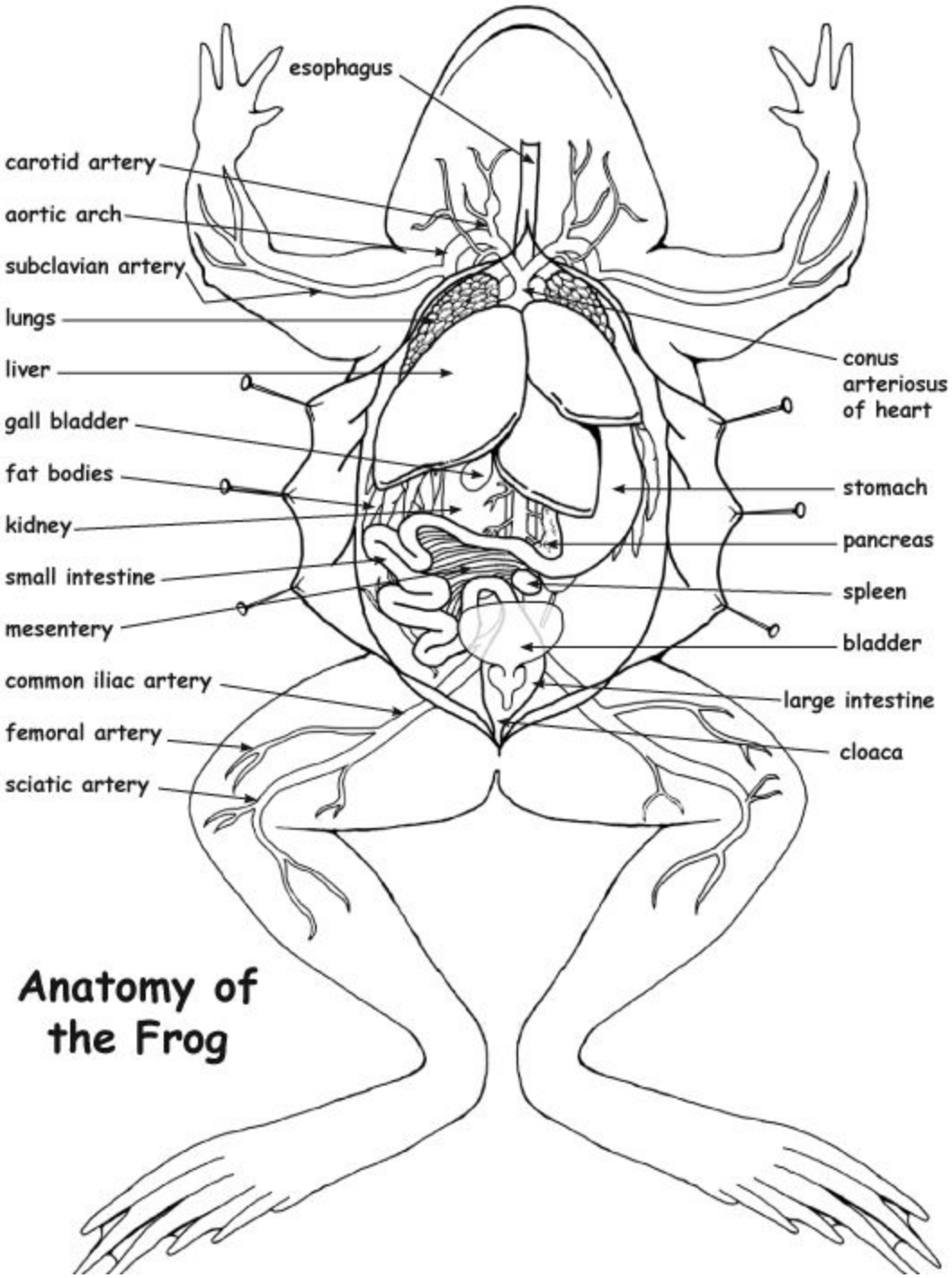

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Label the internal anatomy of the frog