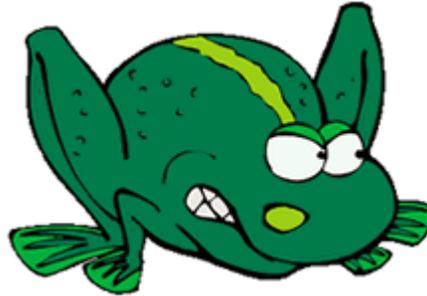


Frog External Anatomy

1. Observe the dorsal and ventral sides of the frog.
Dorsal side color _____ Ventral side color _____

2. Examine the hind legs. How many toes are present on each foot? _____
Are the toes webbed? _____

3. Examine the forelegs.
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). Compare the length of your frog to other frogs

Your Frog (cm)	Frog 2	Frog 3	Frog 4	Frog 5	Average Length

5. Locate the frog's eyes, the nictitating membrane is a clear membrane that attached to the bottom of the eye. Use tweezers to carefully remove the nictitating membrane. You may also remove the eyeball.
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. Measure the diameter (distance across the circle) of the tympanic membrane.
Diameter of tympanic membrane _____ cm

7. Feel the frog's skin. Is it scaly or is it slimey? _____

Anatomy of the Frog's Mouth

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. Play with the tongue. 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.

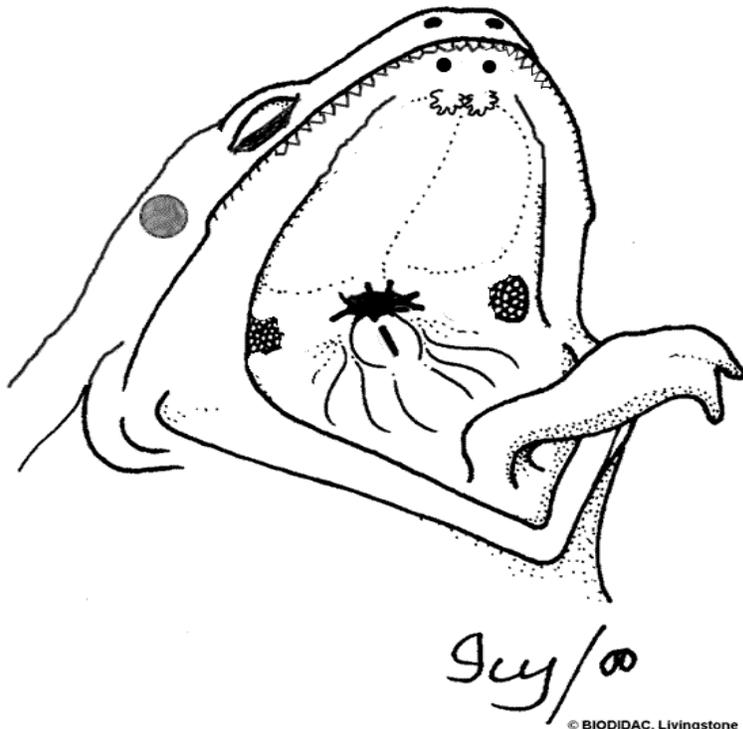
Insert a probe into the Eustachian tube. To what structure does the Eustachian tube attach?

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.

5. The frog has two sets of teeth. The vomarine 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.

Draw the frogs mouth. Label each of the structures underlined above.



Complete the chart below

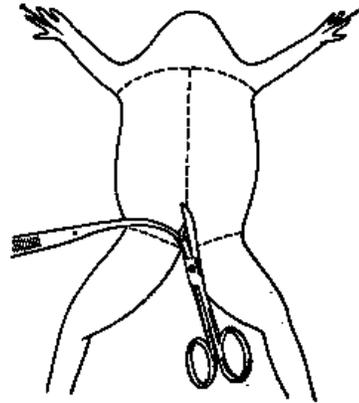
Structure	Function	Location
Vomarine teeth		
Eustachian tubes		
Nictitating Membrane		
Tympanic Membrane		
Esophagus		
Glottis		
Tongue		

Frog Internal Anatomy

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.
3. Make transverse (horizontal) cuts near the arms and legs.
4. Lift 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 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 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.

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.

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

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. 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.

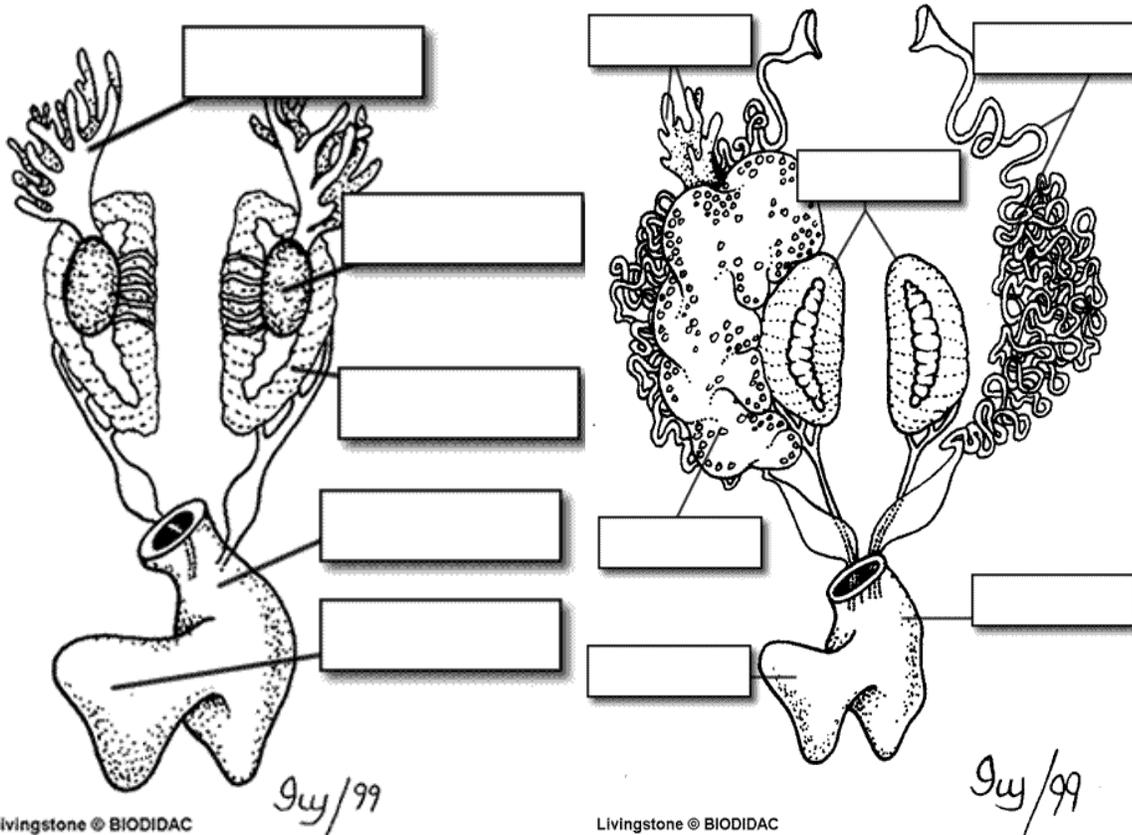
Testes - in male frogs, these organs are located at the top of the kidneys, they are pale colored and roundish.

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.

Label the parts of the urogenital system below.

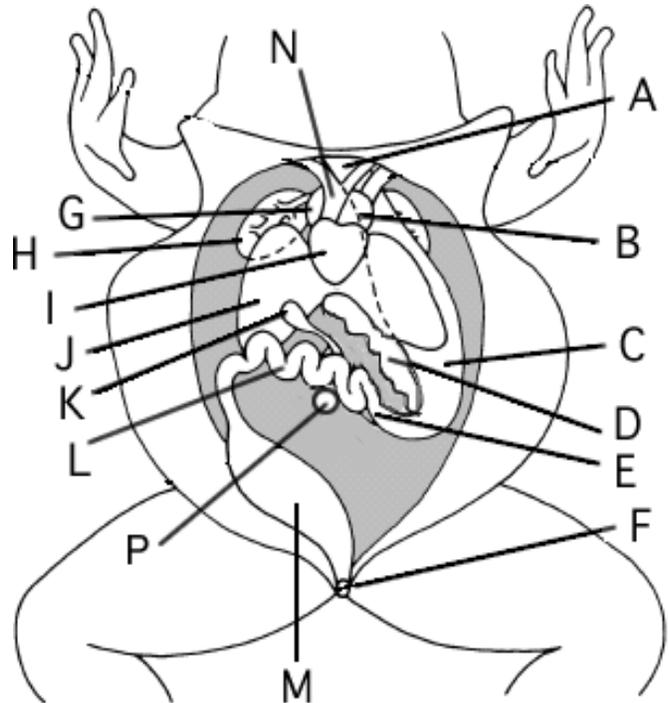


Some Post Lab Questions

1. What is the name of the membrane that holds the coils of the small intestine together?
2. What is the organ that is found under the liver that stores bile.
3. Name the 3 lobes of the liver:
4. What is the organ that is the first major site of chemical digestion?
5. What is the structure that eggs, sperm, urine and wastes all empty into?
6. The small intestine leads to the:
7. The esophagus leads to the:
8. Yellowish structures that serve as an energy reserve:
9. The first part of the small intestine(straight part):
10. After food passes through the stomach it enters the:
11. The spiderweb like membrane that covers the organs is called:
12. This regulates the exit of partially digested food from the stomach:
13. The large intestine leads to the :
14. Organ found within the mesentery that stores blood:
15. The largest organ in the body cavity:

Label the Diagram

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____
- I. _____
- J. _____
- K. _____
- L. _____
- M. _____
- N. _____

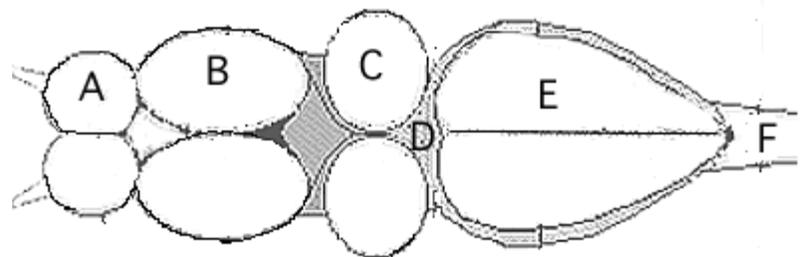


Study and Removal of the Frog's Brain

Starting at the most anterior part of the head, the olfactory nerves connect to the nostrils and then to the olfactory lobes (A) where odors are processed. Just posterior to the olfactory lobes are two elongate bodies with rounded bases, this is the cerebrum (B), and it is the frog's thinking center. The cerebrum is the part of the brain that helps the frog respond to its environment. Posterior to the cerebrum are the optic lobes (C), which function in vision. The ridge just behind the optic lobes is the cerebellum (D), it is used to coordinate the frog's muscles and maintain balance. Posterior to the cerebellum is the medulla oblongata (E) which connects the brain to the spinal cord (F).

Brain Part	Function	Letter
Cerebellum		
Cerebrum		
Olfactory Lobe		
Optic Lobe		
Medulla Oblongata		

Complete the chart.



Removal of the Frog's Brain

Turn the frog dorsal side up. Cut away the skin and flesh on the head from the nose to the base of the skull. With a scalpel, scrape the top of the skull until the bone is thin and flexible. Be sure to scrape AWAY from you. With your scalpel held almost horizontally, carefully chip away the roof of the skull to expose the brain. Use scissors to cut away the heavier bone along the sides of the brain.

To receive extra credit for removing the brain, you must present it to me on a paper towel. All lobes should be attached with as much tissue as possible present. GOOD LUCK!

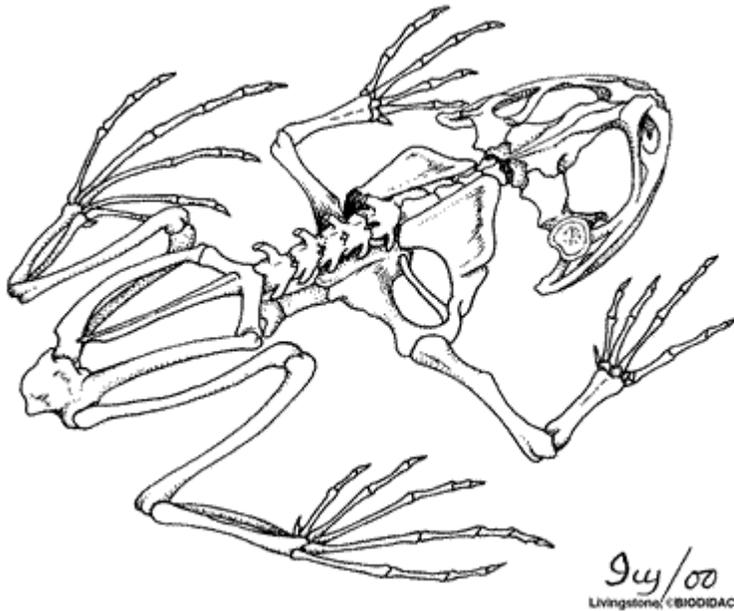
FROG BONES

The bones of the frog follow the same pattern (basically) as other vertebrates. The lower leg of the frog is a muscular leg that the frog uses for jumping. There are 3 main sets of bones in the lower leg. The femur is found in the upper thigh, and the tibiofibula is found in the lower part of the leg. The foot and ankle are made of the tarsals and metatarsals (toes).

To expose the frog's leg bones you must remove the thigh muscle - the biceps femorus and the calf muscle - the gastrocnemius. You can leave the Achilles tendon intact (this tendon connects the muscle to the bone). The tarsals and metatarsals do not need to be exposed.

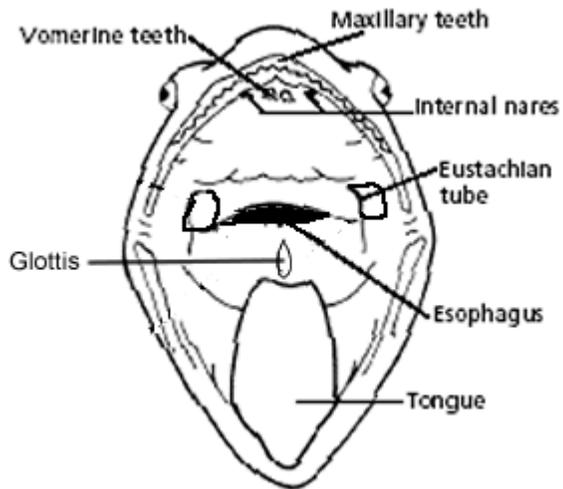
To receive extra credit, clean your bones by removing the surrounding muscle. Bring the two bones on a paper towel. Good Luck!

Label the leg bones: Femur, Tibiofibula, tarsals, metatarsals, pelvic girdle



Notes: Frog Anatomy

The Mouth



Vomerine and Maxillary Teeth: Used for holding prey

Internal Nares (nostrils) breathing

Eustachian Tubes: equalize pressure in inner ear

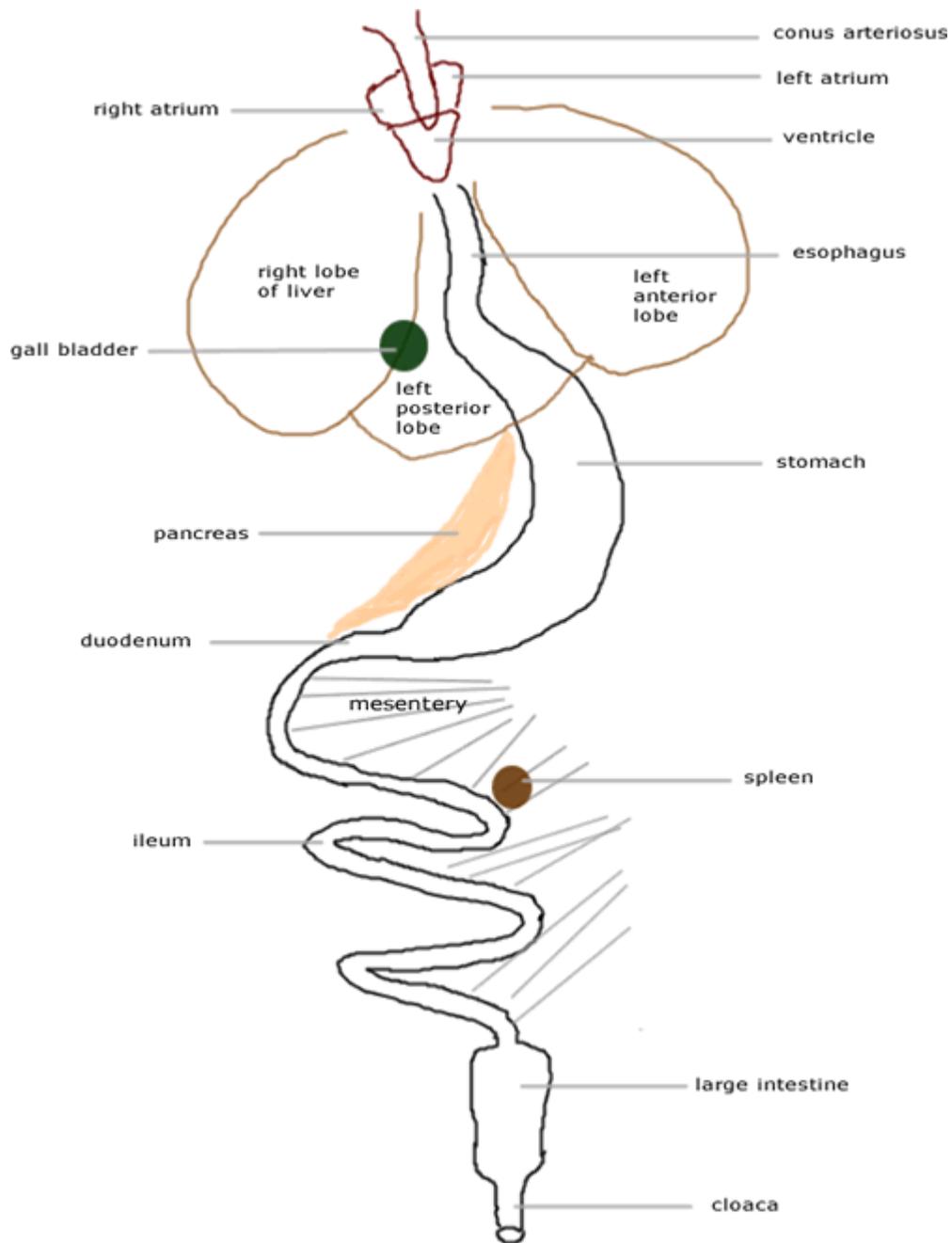
Glottis : Tube leading to the lungs

Esophagus: Tube leading to the stomach

Tongue: Front attached, aids in grabbing prey

Tympanic Membrane: eardrum, located behind eyes

Nictitating Membrane: clear eyelid, protects the eye



Peritoneum: Spiderweb like membrane that covers organs

Stomach: First site of chemical digestion, breaks down food

Liver: Makes bile (aids in digestion)

Gall bladder: Stores bile

Esophagus: Tube that leads to the stomach

Pancreas: Makes insulin (aids in digestion)

Small Intestine (duodenum and ileum): absorb nutrients from food

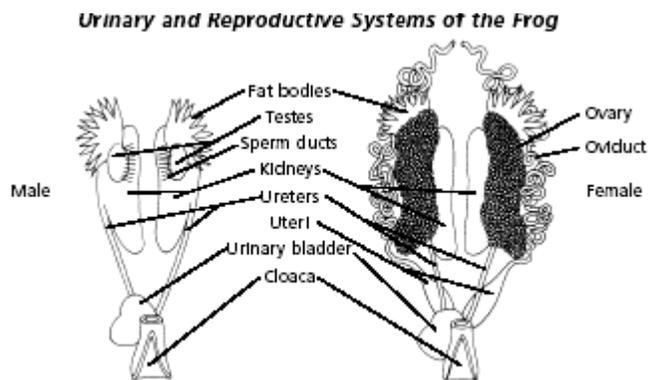
Mesentery: Holds coils of the small intestine together

Large Intestine: Collects waste, absorbs water

Cloaca: "Sewer": eggs, sperm, urine and feces enter this area

Spleen: Part of circulatory system, stores blood

Urogenital System



Kidneys: Filter Blood

Ureters: Carry urine from kidneys to bladder

Testes: Make sperm

Oviducts: eggs travel through these

Ovary: makes egg (usually not visible on frog)

Urinary Bladder: Stores Urine

Cloaca: Where sperm, eggs, urine, and feces exit. The "Sewer"