

Skills Practice Lab

Frog Dissection

Amphibians, such as frogs, are examples of animals that have structural adaptations for living in or near water and for living on land. As tadpoles, they have gills, but adult frogs have lungs. Tadpoles have tails, but adult frogs have legs. Many changes occur in the metamorphosis of a tadpole. The structures that frogs have depend on the stage of the frog's life cycle. In this lab, you will dissect a frog in order to observe the external and internal structures of frog anatomy.

MATERIALS

- dissecting pins (6–10)
- dissecting tray
- dull probe or dissecting needle
- felt-tip marker
- forceps
- gloves
- lab apron
- paper towels
- plastic storage bag and twist tie
- preserved frog
- safety goggles
- scissors



OBJECTIVES

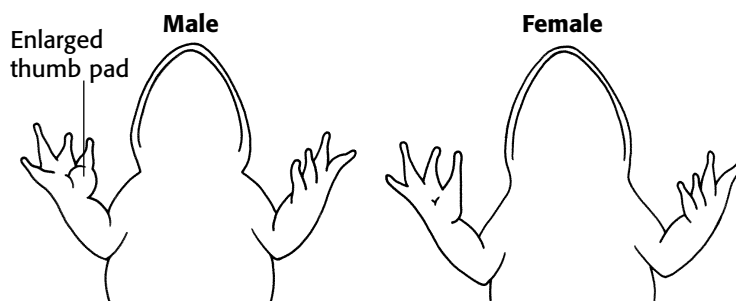
Describe the appearance of various organs found in a frog.

Name the organs that make up various systems of a frog.

Procedure

1. Put on safety goggles, gloves, and a lab apron.
2. Rinse and place a frog on a dissection tray with its dorsal side down. To determine the frog's sex, look at the hand digits, or fingers, on its forelegs. A male frog usually has thick pads on its "thumbs," which is one external difference between the sexes, as shown in **Figure 1**. Male frogs are also usually smaller than female frogs. Observe several frogs to see the difference between males and females.

FIGURE 1 HAND DIGITS OF MALE AND FEMALE FROG



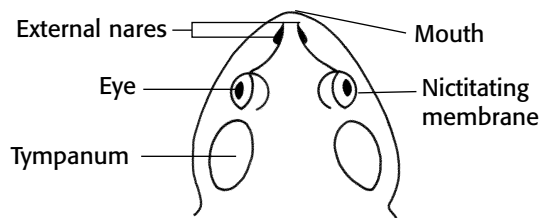
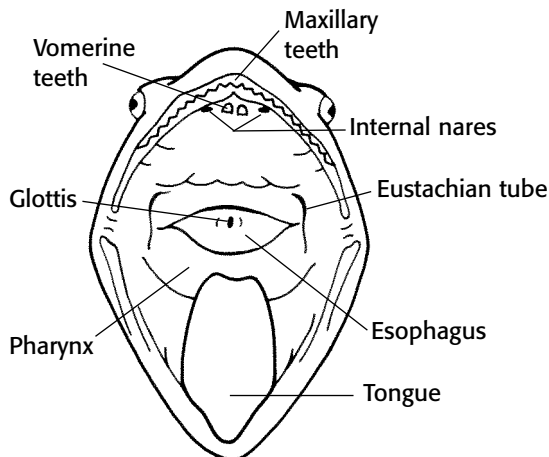
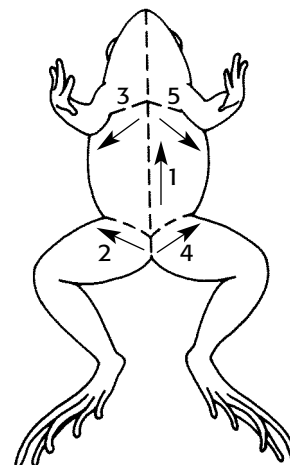
Frog Dissection *continued***3.** Review the following information about the frog's head.

On the outside of the frog's head are two *external nares*, or nostrils; two *tympani*, or eardrums; and two eyes, each of which has three lids. The third lid, called the *nictitating membrane*, is transparent.

4. Use **Figure 2** to locate and identify the external features of the head. Find the mouth, external nares, tympani, eyes, and nictitating membranes.**5.** Review the following information about the frog's mouth.

Inside the mouth are two *internal nares*, or openings into the nostrils; two *vomerine teeth* in the middle of the roof of the mouth; and two *maxillary teeth* at the sides of the mouth. Also inside the mouth behind the tongue is the *pharynx*, or throat.

In the pharynx, there are several openings: one into the *esophagus*, the tube into which food is swallowed; one into the *glottis*, through which air enters the *larynx*, or voice box; and two into the *Eustachian tubes*, which connect the pharynx to the ear.

FIGURE 2 EXTERNAL FEATURES OF FROG HEAD**6.** Turn the frog on its back, and pin down the legs. Cut the hinges of the mouth, and open it wide. Use **Figure 3** to locate and identify the structures inside the mouth. Use a dull probe to help find each part: the vomerine teeth, the maxillary teeth, the internal nares, the tongue, the openings to the Eustachian tubes, the esophagus, the pharynx, and the slitlike glottis.**7.** Look for the opening to the frog's cloaca, located between the hind legs. Use forceps to lift the skin, and use scissors to cut along the center of the body from the cloaca to the lip. Turn back the skin, cut toward the side at each leg, and pin the skin flat. **Figure 4** shows how to make these cuts.**FIGURE 3 STRUCTURES OF FROG MOUTH****FIGURE 4 INCISIONS FOR DISSECTION**

Frog Dissection *continued*

8. Lift and cut through the muscles and breastbone to open up the body cavity. If your frog is a female, the abdominal cavity may be filled with dark-colored eggs. If so, remove the eggs on one side so you can see the organs beneath them.

9. Review the following information about the frog's 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*. 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.

10. Use **Figure 5** to locate and identify the organs of the digestive system: esophagus, stomach, small intestine, large intestine, cloaca, liver, gallbladder, and pancreas.

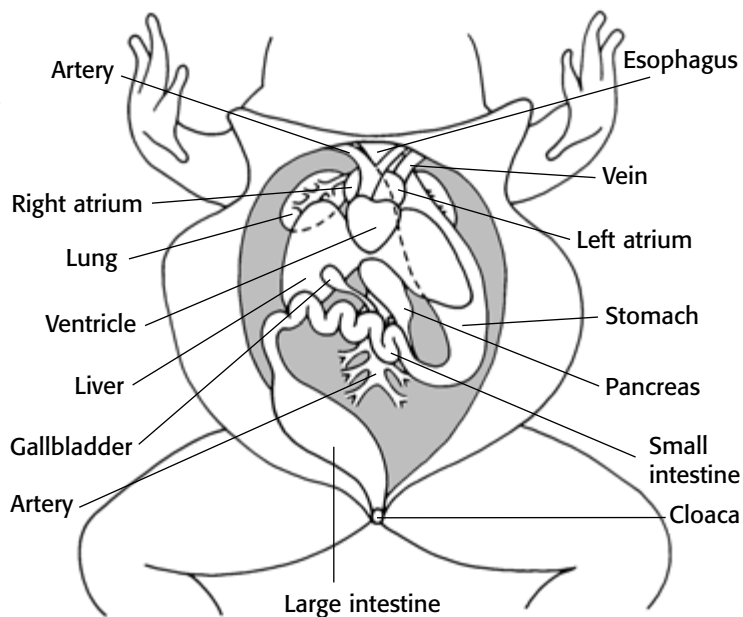
11. Review the following information about the frog's respiratory and circulatory systems.

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. 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.

12. Use **Figure 5** to locate and identify the left atrium, right atrium, and ventricle of the heart. Find an artery attached to the heart and another artery near the backbone. Find a vein near one of the shoulders. Find the two lungs.

FIGURE 5 ABDOMINAL AND CHEST CAVITIES OF FROG



Frog Dissection *continued*

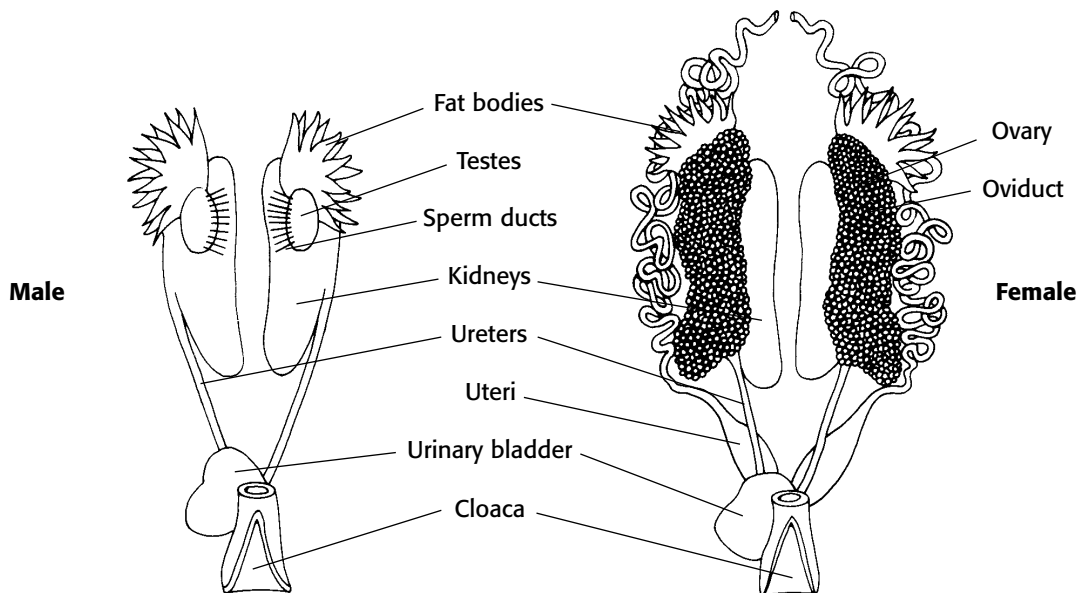
- 13.** Review the following information about the frog's urinary and reproductive systems.

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

- 14.** Use a probe and scissors to lift and remove the intestines and liver. Use **Figure 6** to identify the parts of the urinary and reproductive systems.
- 15.** Remove the peritoneal membrane, which is connective tissue that lies on top of the red kidneys. Observe the yellow fat bodies that are attached to the kidneys. Find the ureters and the urinary bladder. Find the testes and sperm ducts in the male and the ovaries, oviducts, and uteri in the female.

FIGURE 6 URINARY AND REPRODUCTIVE SYSTEMS OF THE FROG



- 16.** Remove the kidneys and look for threadlike spinal nerves that extend from the spinal cord. Dissect a thigh, and trace one nerve into a leg muscle. Note the size and texture of the leg muscles.
- 17.** Dispose of your materials according to your teacher's instructions.
- 18.** Clean up your work area, and wash your hands thoroughly before leaving the lab.

Frog Dissection *continued*

Analysis

- 1. Identifying Relationships** What do you think is the function of the nictitating membrane? Why?

- 2. Analyzing Data** A frog does not chew its food. What do the positions of its teeth suggest about how the frog uses them?

- 3. Organizing Data** Through which structures does food pass as it moves through a frog's digestive tract?

- 4. Organizing Data** List the structures, in order, through which sperm pass in a male and eggs pass in a female.

- 5. Organizing Data** Through which structures does urine pass in a frog?

- 6. Examining Data** Which parts of the frog's nervous system can be observed in its abdominal cavity and hind leg?

- 7. Making Inferences** The abdominal cavity of a frog at the end of the hibernation season would contain very small fat bodies or none at all. What is the function of the fat bodies?

Frog Dissection *continued*

8. Analyzing Data What features did you notice in the frog that have helped it adapt to living on land?

9. Explaining Events Why did you dissect the nerves last?

Conclusions

1. Making Predictions Structures of an animal's body that help it survive in its environment are adaptations. How do the frog's powerful hind legs help it survive both in water and on land?

2. Applying Conclusions Suppose in a living frog the spinal nerve extending to the leg muscle was cut. What ability would the frog lose? Why?

3. Drawing Conclusions Think about the skin of the frog you dissected. A frog can respire through its skin, but a fish cannot. Why do you think this is so?

Extensions

1. Designing Experiments Before disposing of your frog, expose the brain and spinal cord, under your teacher's guidance. Use a textbook illustration to identify the parts of the brain and the spinal cord.

2. Research and Communications Investigate the decline of populations of frogs in some areas of the United States. Discuss the reported increase in frog deformities.