Frog Dissection

Pictures: Modern Biology, Holt

 

**Objectives**

• Describe the appearance of various organs found in the frog.

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

**Materials**

•safety goggles, gloves **•**plastic storage bag

**•**scissors •dissectingprobe

**•**preserved frog •dissecting tray and paper towels

•dissecting pins (6–10) •forceps

**Purpose**

In this lab, you will dissect a frog in order to observe the external and internal structures of frog anatomy.

**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. Eggs are laid and fertilized in water. 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. 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. 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. 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. 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**. 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. 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. 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.

**Procedure**

**1.** Put on safety goggles, gloves, and a lab apron.

**2.** Place a frog on a dissection tray. 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 the diagram below. Male frogs are also usually smaller than female frogs. Observe several frogs to see the difference between males and females.

  

Do you have a male or female frog? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3.** Use the diagram below to locate and identify the external features of the head. Find the

mouth, external nares (nostrils), tympani (eardrum), eyes, and nictitating membranes (third eye lid-transparent).



**Frog External Anatomy**

**A.** Observe the dorsal and ventral sides of the frog.
Dorsal side color \_\_\_\_\_\_\_\_\_\_\_ Ventral side color \_\_\_\_\_\_\_\_\_\_\_\_

**B.** Examine the hind legs. How many toes are present on each foot? \_\_\_\_\_\_\_\_
Are the toes webbed? \_\_\_\_\_\_

**C.** Examine the forelegs.
How many toes are present? \_\_\_\_\_\_\_\_\_Are the toes webbed? \_\_\_\_\_\_\_

**D.** 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\_\_\_\_\_

**E.** 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? \_\_\_\_\_\_\_\_\_

 **F.** 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

**G.** Feel the frog's skin. Is it scaley or is it slimey? \_\_\_\_\_\_\_\_\_\_\_\_

**4.** Turn the frog on its back and pin down the legs. Cut the hinges of the mouth and open it

wide. Use the diagram below to locate and identify the structures inside the mouth. Use a

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 slit-like

glottis.



**Anatomy of the Frog's Mouth**

**A.** Locate the tongue. Play with the tongue. Does it attach to the front or the back of the mouth? \_\_\_\_\_\_\_\_\_\_ (You may remove the tongue)

**B.** 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.

**C.** 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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**D.** 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.

**E.** 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.

How many vomerine teeth does your frog have?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**F.** 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 nares (nostrils).

**5.** 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. The diagram above

shows how to make these cuts.

**6.** Lift and cut through the muscles and breast bone 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 underlying them.

**7.** Use the diagram on the next page to locate and identify the organs of the digestive system:

esophagus, stomach, small intestine, large intestine, cloaca, liver, gallbladder, and pancreas.

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

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

What color is the esophagus? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What color is the pancreas? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What 2 major parts of the digestive system is the pancreas attached to?

What color is the liver? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How many parts, or lobes, does the liver have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What organ of the frog’s body is located directly above the middle part of the liver?

What color is the gall bladder? **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Open up the gall bladder. Was it filled with liquid? \_\_\_\_\_\_\_

What organ was the gall bladder found under? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What color is the stomach? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What 2 parts of the digestive system is the stomach connected to?

Draw the shape of the frog’s stomach.

Touch the stomach. Describe how it feels. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*\*Using the scissors cut the stomach open lengthwise. Spread it open and pin it down on*

 *the dissecting tray.*

Does the stomach have anything in it? If yes, what did you find?

What does the internal lining of the stomach look like? \_\_\_\_\_\_\_\_\_\_\_\_\_

Where does the food go after the stomach? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



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

*\*Remove the small intestine from the frog. DON’T REMOVE THE LARGE INTESTINE YET. Stretch the small intestine out so it is straight and pin it down.*

How long, in centimeters, is the small intestine? \_\_\_\_\_\_\_cm

*\*Cut the small intestine open lengthwise*.

Was there anything in the small intestine? \_\_\_\_\_\_ If yes, what did you find? \_\_\_\_\_\_

Where does the digested food go after the small intestine? \_\_\_\_\_\_\_\_\_\_\_

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

 \**Remove the large intestine from the frog.*

 *\*Cut the large intestine open lengthwise and pin it down.*

Was there anything in the large intestine? \_\_\_\_\_\_ If yes, what did you find?

Where is the cloaca located? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The cloaca is a chamber for receiving 3 things: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_,

 and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**8.** Again refer to the diagram to identify the parts of the circulatory and respiratory systems that are in the chest cavity. Find 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.

 Draw the heart as you see it in the frog.

**9a.** Use a probe and scissors to lift and remove the liver. Use the diagram below to identify the parts of the urinary and reproductive systems. Remove the peritoneal membrane, which is connective tissue that lies on top of the red kidneys.



**9b.** Observe the yellow fat bodies that are attached to the kidneys. Find the ureters; the urinary bladder; the testes and sperm ducts in the male; and the ovaries, oviducts, and uteri in the female.

Does your frog have fat bodies? \_\_\_\_\_\_ If yes, what color are they? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 After looking at the amount of fat bodies in your frog, what season of the year do you

 think your frog died? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 What are fat bodies used for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Where are the fat bodies attached in your frog? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10.** 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.

**11.** Dispose of your materials according to the directions from your teacher.

**12.** Clean up your work area and wash your hands before leaving the lab.

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| **INTERNAL ANATOMY****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.  http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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. Bile is emptied into the gall bladder which then empties into the duodenum. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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 that extends out from the heart is the **conus arteriosis**. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **Lungs** - Locate the lungs by looking underneath and behind the heart and liver. They are two spongy organs. Lungs attach to the **trachea** via tubes called bronchi. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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.) The gall bladder stores bile and then releases it into the duodenum via the **bile duct**. The bile duct may be too small to see. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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 food from the stomach. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **Pancreas –** This glandular organ is located within the curve of the stomach. On preserved frogs it may not be easy to find, as the gland breaks down. It secretes insulin, which is needed for the proper breakdown of sugar. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **Small Intestine**--Leading from the stomach.  The first straight portion of the small intestine is called the **duodenum**, the curled portion is the **ileum**.  A membrane called the **mesentery** holds the ileum together.  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. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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.) Locate the **anus.** http://www.biologycorner.com/worksheets/resources/image001.gif |
| **Spleen**--Return to the folds of the mesentery, this dark red spherical object serves as a holding area for blood, where harmful particles can be filtered out for the immune system. http://www.biologycorner.com/worksheets/resources/image001.gif |
| **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 frog’s mouth and find the esophagus, poke your probe into it and see where it leads. http://www.biologycorner.com/worksheets/resources/image001.gif |