



Frog Dissection Procedure

Objective: To examine and identify the external and internal anatomy of the frog. To compare the anatomy of the frog to that of the human.

Materials: Preserved frog, dissecting tray, scissors, forceps and pins.

Procedure: You must take a digital photograph at each step of the procedure marked with an asterisk (*). You may occasionally need to take more than one photograph to show all of the structures.

External Anatomy

1. Place a frog in the dissecting tray. Find the eyes, the external nasal opening, the tympanic membranes and the webbed toes. *

A) *Describe the coloration of the ventral and dorsal surfaces.*

2. Frogs are carnivores that use their mouth to capture insects. Place the frog ventral side up on the dissecting tray. Use the scissors to cut the hinges on either side of the jaws. Open the mouth as far as possible. Touch the inside of the upper jaw with your finger tip. The small bumps you feel are the maxillary teeth. The two bumps on the roof of the mouth are the vomerine teeth. The maxillary and vomerine teeth are used to hold prey. Frogs swallow their prey whole without chewing. The bulges in the mouth are the eyes. *

B) *The eyes have no bony eye sockets. How does this help the frog to swallow its prey?*

3. Find the internal nasal openings on either side of the vomerine teeth. Air enters the mouth through these openings. Push a probe through the external nasal openings to show their connection to the inside of the mouth.

The holes behind the sides of the upper jaw are the openings of the Eustachian tubes. Each tube connects the tympanic membrane to the mouth. These tubes equalize the pressure on each side of the tympanic membrane. If your frog is a male, you may be able to locate two openings on the lower jaw just below the Eustachian tubes. These are the vocal sacs which allow the male to produce sounds to attract females.

At the back of the mouth, you will find the gullet, a large horizontal opening through which food passes from the mouth to the oesophagus. Beneath the gullet is a small vertical opening named the glottis. Air passes from the mouth to the trachea and then the lungs through the glottis. Examine the tongue and how it is attached to the mouth. The tongue of a live frog is covered with a sticky substance that enables frogs to trap their prey. *

C. Name the mouthparts on a photograph taken of the inside of the frog's mouth.

D. Why do you think the frog's tongue is forked?

4. With the ventral surface up, pick up the loose skin at the waist with the forceps. Insert the point of your scissors and cut the skin at the waist completely around the frog's body. Pushing the knees together, pull the skin down over the legs and off the body at the toes. The Skin will be inside out. You will have to cut a hole in the 'seat' where the cloaca is located. *

5. Examine the inner lining of the skin and note the pattern of blood vessels. Identify the major muscles exposed by the removal of the skin. Pick one hind leg and carefully remove the muscles (clip the tendons and remove the muscle bundles) to find the bones. *

E. Identify the bones of the posterior leg in a photograph.

F. Compare the leg of the frog to the leg of a human. How are they different?

Internal Anatomy

6. Still with the ventral side up and the head away from you, insert your scissors under the skin and cut along the mid-line to the anterior end of the lower jaw. Make lateral cuts to expose the muscle layer underneath. *

7. The dark line is the abdominal vein. Carefully cut through the exposed muscle layer, with the same cutting pattern as the skin. As you reach the area between the arms you will meet resistance. The resistance is the breastbone. With firm pressure cut through the bone. Note the muscle pattern. Above the breastbone, the muscle comes to a point, stop cutting. Now remove both side panels of the abdominal muscle to expose the internal organs. *

8. If your specimen happens to be a mature female, the body cavity may be filled with tiny black and white **eggs**. These eggs are produced in organs called **ovaries**. With forceps, remove eggs, if found. *

9. The large greenish-brown organ that is covering many of the abdominal organs is the **liver**. Spread the lobes apart with your probe and find a greenish sac, the **gall bladder**. It resembles a 'pea' if still intact. With scissors, carefully remove the liver and gall bladder. *

G. How many lobes does the liver have?

10. Locate the **heart**, a triangular-shaped organ anterior to the liver. The heart is surrounded by a thin membrane called the **pericardium**. Cut the pericardium away

from the heart. Notice that the heart has three chambers: two dark atria and one light brown ventricle. Between the two atria you should notice a large artery, the **conus arteriosus** coming out of the ventricle. With scissors, remove the heart from the frog. *

H. *Touch the atria and the ventricle with a probe. How are they different?*

I. *Compare the number of atria and ventricles of the frog heart with that of the human.*

11. Locate the lungs, two small spongy sacs on either side of where the heart was. Insert the tip of an empty eye dropper into the glottis in the frog's mouth. Squeeze the bulb and observe what happens to the lungs. Remove both lungs. Open one lung and look inside. *

12.

J. *Describe the interior of the frog's lung.*

K. *When comparing the size of the frog to the size of its lungs, we can see that its lungs are quite small. Does this interfere with the frog's ability to absorb oxygen? Explain.*

13. The long continuous tube you see is the digestive tract. Find the following: **oesophagus** (food tube), **stomach** (crescent shaped), the coiled **small intestine**, the short dark **large intestine** (colon). Remove the digestive tract by cutting through the anterior end of the oesophagus and the posterior end of the large intestine. As you cut away the **mesentery** (membranes) that holds the organs together, you should see a brown bean-shaped organ called the **spleen** (stores blood, fights disease) and probably an elongated light brown strip the **pancreas**. Recall the pancreas secretes enzymes into the small intestine while bile from the gall bladder also empties into the small intestine and helps to digest fats. Excess food is stored in yellow, flame-shaped **fat bodies**. *

L. *With your scissors, make an incision along the outer curve of the stomach and separate the walls of the stomach. Describe the stomach contents.*

N. *Describe the appearance of the inner lining of the stomach. How does it aid in breaking down food?*

O. *Unroll the small intestine. What is its length in cm?*

14. Now that the digestive tract has been removed, you should be able to see the excretory and reproductive systems, sometimes referred to as the **urogenital system**. Locate the long, brown **kidneys** on either side of the backbone. Urine from each kidney travels down the **urethra** to the **urinary bladder**. The urinary bladder looks like a transparent sac next to the large intestine. The bladder empties in the **cloaca** (a common cavity for the exit of food wastes, urine and reproductive cells.) Look closely between the kidneys to locate the **dorsal aorta**, **inferior vena cava** and the **renal arteries and veins**. *

O. Compare the shape of the frog kidneys to those of humans.

15. In a female frog, the **ovaries** produce the eggs which pass down coiled white **oviducts** to the cloaca. The cloaca releases them into the water where they are then fertilized. Immature ovaries are greyish lobbed structures lying close to the kidneys. If your frog is a male, the **testes**, which look like small cream coloured oval structures, are located ventral (on top of) to the kidneys. Sperm produced by the testes travel through the kidneys down the urethras, and out the cloacae.

16. To study the **brain** of a frog, remove the skin from the dorsal surface of the frog's head. With a razor blade, carefully shave away the bony skull between the eyes until you see the brain. Don't rush, use a steady hand and you may end up picking away at the bone piece by piece to expose the brain fully.

P. Compare the frog's brain to the human brain. Which region of the human brain shows the greatest increase in size relative the frog's brain?