

JSD AMPHIBIAN CURRICULUM

Science Activity: **Hands-On Frog Dissection**

Objectives:

1. Students will learn the different body systems and organs of the frog
2. Students will practice a method of scientific investigation known as dissection
3. Students will learn and utilize safe dissection techniques and tools.

Materials:

- 1 Preserved frogs (look for mail order sources at the end of this activity)
2. Frog Dissection Lab Key (included)
3. Dissection trays, and kits with scissors, pins, scalpels, tweezers and probes
4. Rubber gloves, goggles, plastic bag aprons
5. Frog Dissection Lab Vocabulary worksheet (included)
6. Your school may have a digital microscope that can be used with a computer and projector to provide a more detailed view of organs.

Suggested Procedure:

1. The day before dissection, make dissecting aprons with students. Using completed Frog Sandwiches for reference, have students draw a system of their choice onto white garbage bags (with the open end at the bottom). Cut holes for head and arms on sealed edges to use bags as lab coats or aprons during dissection.
2. Using Frog Sandwiches and a virtual dissection website, review frog organs, anatomy, systems and their functions, with students.
3. Review and model appropriate handling of dissection tools. Encourage students to work carefully and respectfully of one another and their specimens.
4. Distribute frogs and Frog Dissection Lab Key to student groups (groups of 2 or 3 students work best). Review the instructions with class.
5. Monitor and observe student groups as they work through dissections.
6. If you have a dissecting microscope and projector, take a closer look at internal organs as a class.

7. Upon completion of dissection, work with students to complete Frog Dissection Lab Vocabulary worksheet.

Assessment:

1. Students work through dissections cooperatively and respectfully.
2. Students are able to identify the internal and external anatomy of a frog.
3. Students can compare the anatomy of a frog to the anatomy of a human.
4. Students can articulate similarities and differences frog/human anatomy.

National Science Education Standards:

Content Standard C:

- Develop understanding of structure and function in living systems

Alaska Content Standards:

Science C(2)

Juneau School District Core Content:

Science

Life & Human Biology (6th-8th):

Systems: How can we understand a complex world through its systems?

- Describe the parts and functions of the major human body systems.

Structure & Function: How are structure and function interdependent?

- Explain the structure of cells, tissues, organs, and body systems.

Extension:

Clay Models

This activity was adapted from the [Home School in the Woods, Deserts and Rainforests: Lesson 4](#) web site (see *References* section for full website listing).

Clay is always fun to use and making models is a good kinesthetic activity. Because not every student may be enthusiastic about dissecting a real frog to learn about its anatomy, you may try making clay models instead.

1. Using bake-able salt dough or other oven-proof clay, have students make a flat frog sitting on its stomach with a big cavity in its back. Other students may make a frog lying on its back with a big cavity in its stomach.

2. Color remaining dough with several different colors.
3. Make organs from colored clay using pictures from books, models, posters, or other resources. Create a color code / organ list.
4. Bake frogs and the organs and assemble them inside the cavity. Glue organs in place or leave them loose to be removed and reassembled.

Your clay frog might look something like this:



References:

Deserts and Rainforests: Lesson 4-6. 16 March 2004 <<http://www.homeschoolinthewoods.com/UnitStudies/desert-rainforestL4-6.htm>>.

Frog Lab Key. 16 March 2004 <<http://www.howe.k12.ok.us/~jimaskew/frogkey.htm>>.



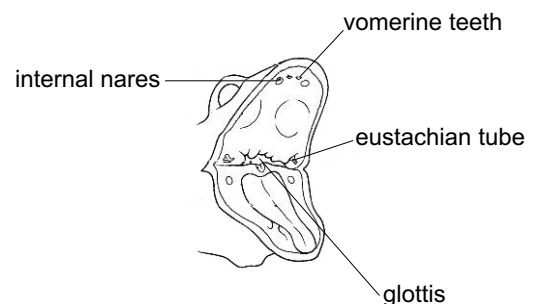
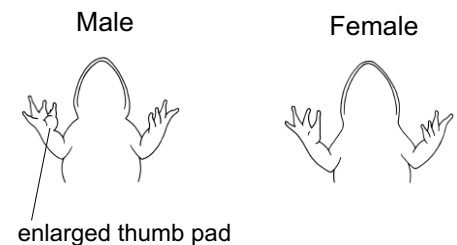
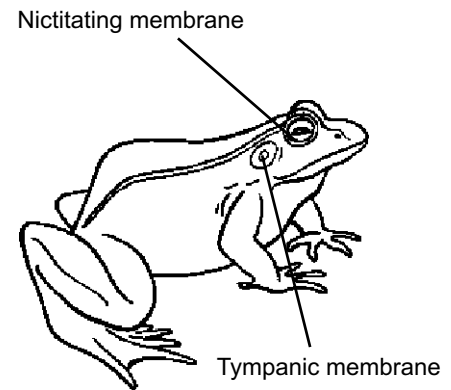
HANDS-ON FROG DISSECTION

Lab Key

1. First, visit <http://curry.edschool.virginia.edu/go/frog> to see a virtual frog dissection. You'll be doing many of the same things in your actual dissection.
2. Next, study the directions, diagrams and pictures in this lab key.
3. Now you're ready to begin!

External Anatomy

- ✓ Look at the overhead transparencies showing Figure 1 and 2. **Figure 1** shows the dorsal view of a frog. **Figure 2** shows the ventral view. Now look at your frog.
- ✓ Verify your frog has both a nictitating membrane and a tympanic membrane. The nictitating membrane is a transparent lower eyelid that cleans and protects the eye. The tympanic membrane is an eardrum that receives sound waves.
- ✓ Verify only the back feet are webbed.
- ✓ Verify the sex of your frog by looking at the thumb pads on its front feet. Males' thumb pads are bigger at the base, just like in the diagram to the right.
- ✓ Now verify there are no teeth on the lower jaw. Find the vomerine teeth on the upper jaw. They are used for holding food or prey.
- ✓ Next, look for openings in the mouth that lead to eustachian tubes, which connect to the middle ear and equalize pressure.
- ✓ Now find the glottis. The glottis is the opening from the mouth to the respiratory system.
- ✓ Now see if you can find the tongue.





Wait! Please read this before you begin the actual dissection:

Your frog has probably been “double injected,” which means that arteries have been injected with red plastic and veins with blue. If it was done well, blood vessels will be easy to see and internal organs will have some color to them.

Unlike humans, frogs don’t store fat next to the skin. Frogs store winter fat in fat bodies, found inside the body cavity. Take a look at the overhead transparency **Figure 3** to see what fat bodies look like. If your frog was collected late in the year, the body cavity might be full of orange fat bodies.

Now you’re ready to begin the actual dissection. Please be respectful of your lab partners and of the specimen you are about to explore, observe, and learn from.

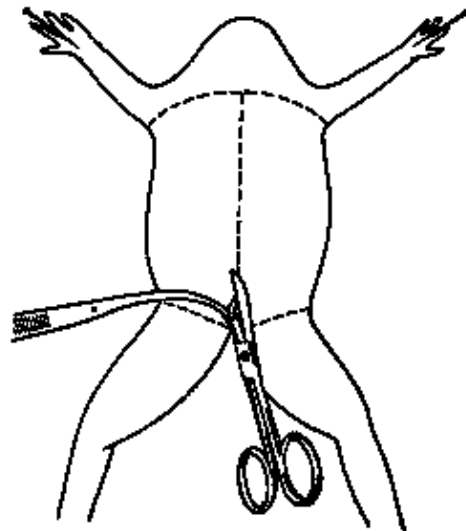
Take extra care with your dissection tools. Your scissors are your most important tool, but be sure to handle them carefully and always double check before cutting.

Internal Anatomy

1. Begin by pinning your frog on its back to the dissecting pan.
2. Follow the diagram on the right, and make the cuts shown through the thin belly skin.

You’ll notice that skin is paper thin, and not tightly attached to the muscle underneath.

You will also find hard abdominal muscles right under the skin.

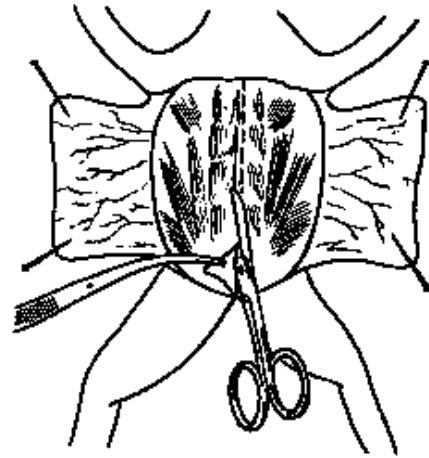


Ventral view

3. Pin back the skin and open the body cavity the same way you opened the skin.

4. Now pin back the abdominal muscles to expose internal organs.

5. Push the 3-lobed liver to the left to expose the esophagus, which runs back from the mouth to the large, J-shaped stomach. Look at overhead transparency **Figure 3** for reference.



6. Now cut the esophagus as close to the mouth as possible.

7. Look for the stomach, which consists of a large, anterior cardiac portion and a smaller, posterior pyloric portion that ends at the pyloric sphincter. This circular muscle opens and closes the bottom of the stomach.

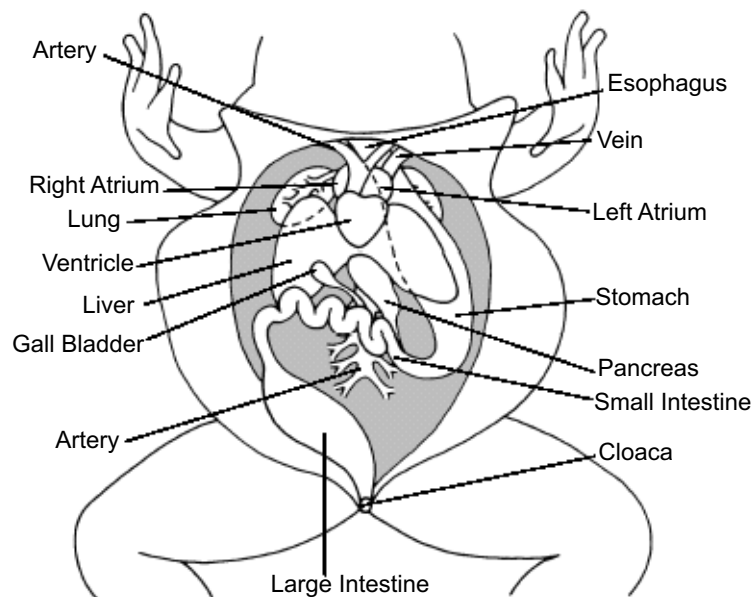
8. Now look for the first part of the small intestine. Called the duodenum, it is directly below the pyloric sphincter.

9. Behind the duodenum is the elongated and coiled ileum, which connects the small intestine to the large one.

10. Find the large intestine by looking for an obvious expansion of the alimentary canal in the posterior region of the body cavity.

11. Look for the gall bladder on the dorsal surface of the right lobe of the liver.

12. Now find the spleen. It is a dark, spherical organ in the intestinal mesentery, below the kidneys. Look at overhead transparency **Figure 4** for reference.



13. Now cut the large intestine as close to the anus as you can. Both end of the alimentary canal should now be cut.
14. Remove the alimentary canal in one piece and carefully measure the length of each organ in the canal. After taking measurements, cut open the stomach to examine its contents.
15. Next, you are going to examine the heart.

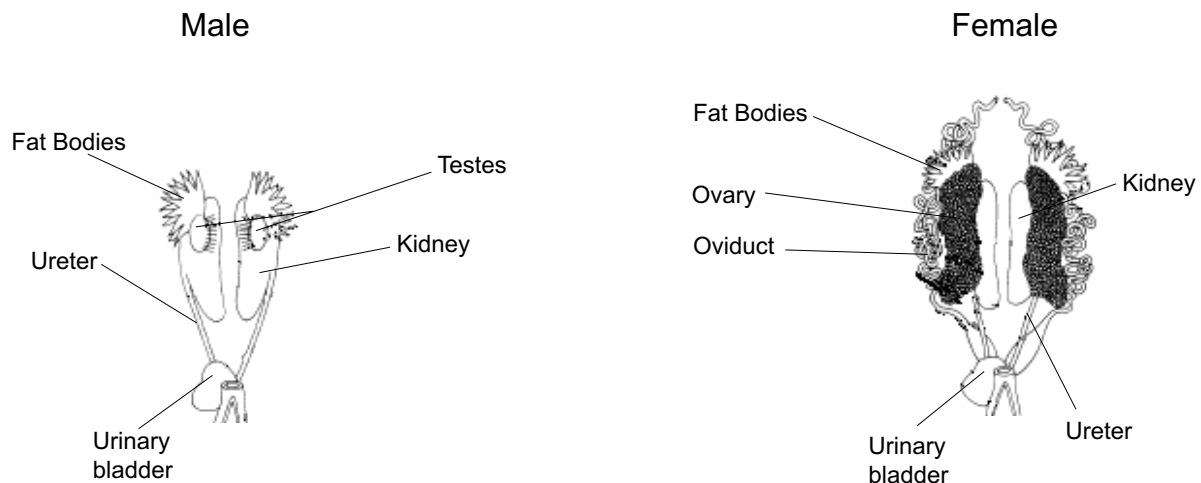
The adult frog heart has three chambers. See overhead transparency **Figure 5** for reference. While it's more efficient than the two chambered heart of a fish or tadpole, it's less efficient than the four chambered heart of warm-blooded vertebrates.

The three chambers of your frog's heart are the right atrium, left atrium and ventricle. The blood returning from the body full of carbon dioxide is pumped by the same chamber as oxygen rich blood coming from the lungs. This means that blood going to the body has carbon dioxide diluting the oxygen.

16. Now look for your frog's lungs small, spongy lungs on each side of the heart. Look at overhead transparency **Figure 6** for reference. There is no diaphragm, or breathing muscle, dividing the coelom or body cavity of the frog.
17. If you haven't already done this, remove the digestive, circulatory and respiratory systems. Only the kidneys and reproductive system are left. The first drawing shows the testes of a male frog. The testes are found just below each kidney.

The second drawing shows the dark ovaries and coiled oviduct of a female. In a female, these organs cover each kidney. If your frog was a female collected in the spring, the body cavity may be full of ovaries and oviducts.

18. Now examine your frog's brain, which is located in the top center of its skull. The dorsal view on the right shows the two bones that make up the top of the skull. Look at overhead transparency **Figure 7** for reference.



19. Remove the skin and muscle first. Then use a scalpel to shave off thin layers of bone (shown in the diagram at right with arrows) to expose the brain. Be sure to start at the front of the bones and shave backward.
20. If you have completed your dissection, place your dissected specimen and internal organs into a plastic bag for proper disposal. If you have not finished, cover your specimen with plastic until you are ready to work again.

