

Biology Lab Activities: Frog

How to use this manual

This lab manual is intended for use with the [Visible Biology](#) product.

Where to find 3D models

Units Study My Library

Flashcard Decks Flashcards Quizzes **Lab Activities**

Lab activities that correspond to the following views are available as PDFs.

Get Labs

Prokaryotic and Eukaryotic Cells Lab

1. Bacterial Cell 2. Animal Cell 3. Plant Cell

Under the Study section of Visible Biology, there is a Lab Activities tab.

Select "Get Labs" to download the lab activities.

Find the row of 3D views that corresponds to each lab manual and use the views to investigate and find answers.

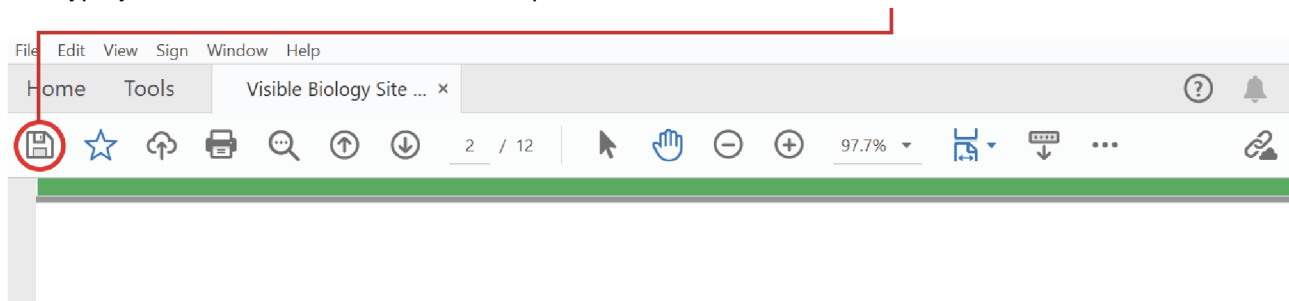
How to save answers

1. Have Adobe Reader installed on your computer.
Windows: <https://get.adobe.com/reader/>
Mac: <https://helpx.adobe.com/acrobat/kb/install-reader-dc-mac-os.html>

2. Download each lab file to your computer.



3. Open the downloaded file in Adobe Reader.
Right-click on the file. In the menu that appears, go to "Open with..." and select Adobe Reader from the submenu.
4. Type your answers into the boxes to complete the lab and select the "Save" icon to save the lab.



5. Submit your saved version of the lab to your instructor via email, dropbox, Google Drive, or however your instructor has requested.

Any questions? visiblebiology.com

Name:

Date:

Biology Lab Activities: Frog

Last updated: 5/18/2023

Background Questions

Based on what you've learned in class, in your textbook, and from using Visible Biology, answer the following questions about the frog.

1. What type of body symmetry is present in frogs?
2. Frogs are terrestrial and aquatic vertebrates. They breathe through their _____ when they are on land and through their _____ when they are in the water. Their skin is _____, which means they can absorb oxygen and water from the environment. Frogs can also release _____ from their skin to protect against predators.
3. The frog's feet have adapted to help it escape predators and catch prey. The bones of the frog's digits are elongated to help the frog jump farther. Also, the frog's hind feet are _____, which helps it swim faster.
4. Frogs are part of the phylum Chordata. In 1–2 sentences, explain the characteristics the frog shares with other animals in this phylum.

For the text that's underlined in the following question, circle the correct answer.

5. Frogs reproduce asexually/sexually. Both male and female frogs release their gametes through the _____ into the environment, where they are externally fertilized.

Name:

Date:

Lab 1: Frog Structure and Function

Activity 1: Label the frog

1. Launch the view
 - Launch Visible Biology.
 - Navigate to Study/Lab Activities, and find the Animal Structure and Function Lab section.
 - Select view 3. Frog.
2. Label the image below
 - Explore the 3D model of the frog to find the structures you need to label. You can use the Systems Tray, located on the left side of the screen, to isolate specific body systems in the frog model.
 - Fill in the blanks to label the structures from the list below.

Part A: Label the structures of the frog's exterior and its head region.

Word List:

Digits, webbed

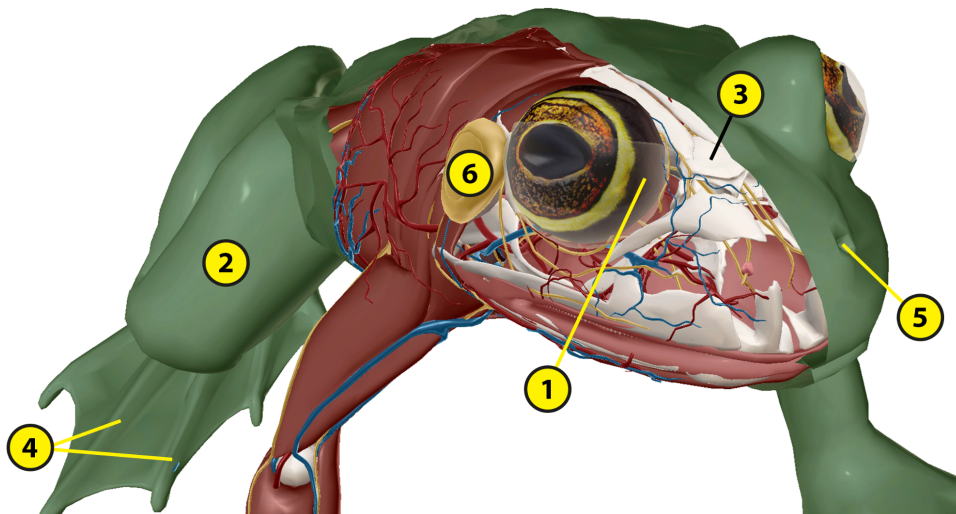
Epidermis and dermis

Nictitating membrane

Nostrils (external nares)

Skull

Tympanic membrane



Part B: Label the structures of the frog's circulatory and respiratory systems.

Word List:

Anterior vena cava

Aortic arches

Arteries

Dorsal aorta

Glottis

Larynx

Lungs

Posterior vena cava

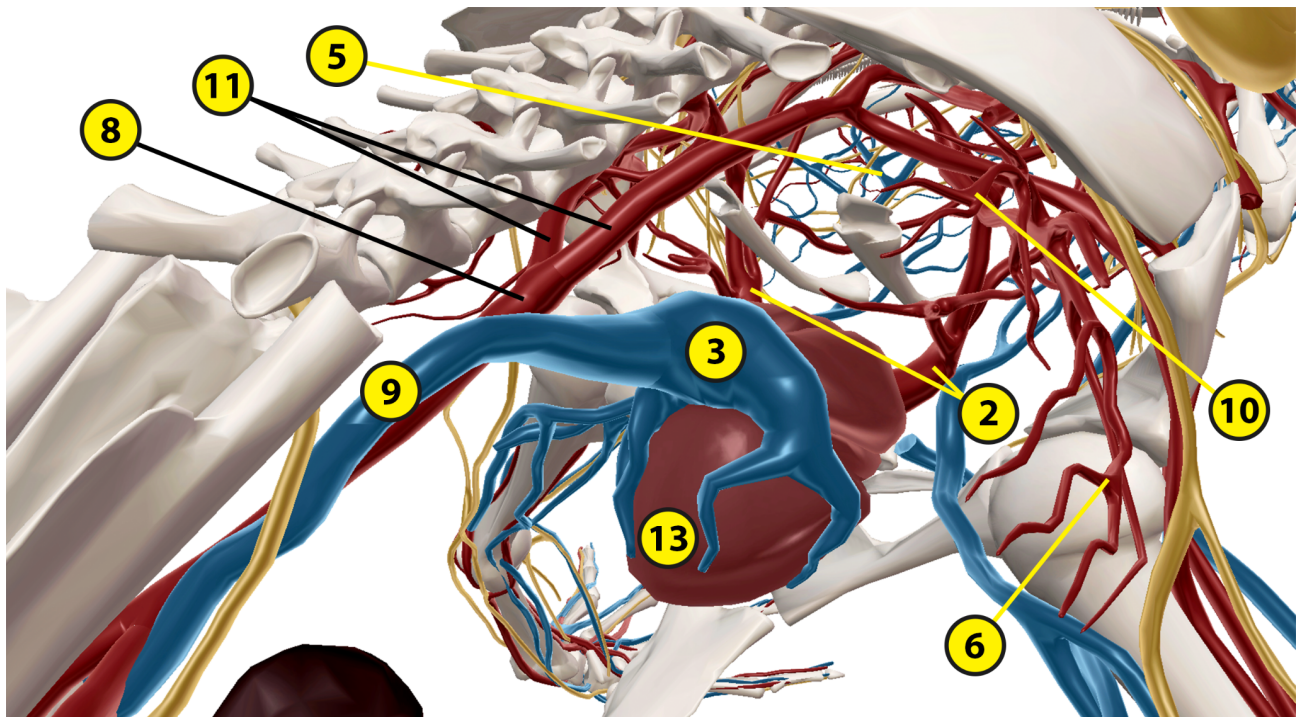
Pulmonary vessels

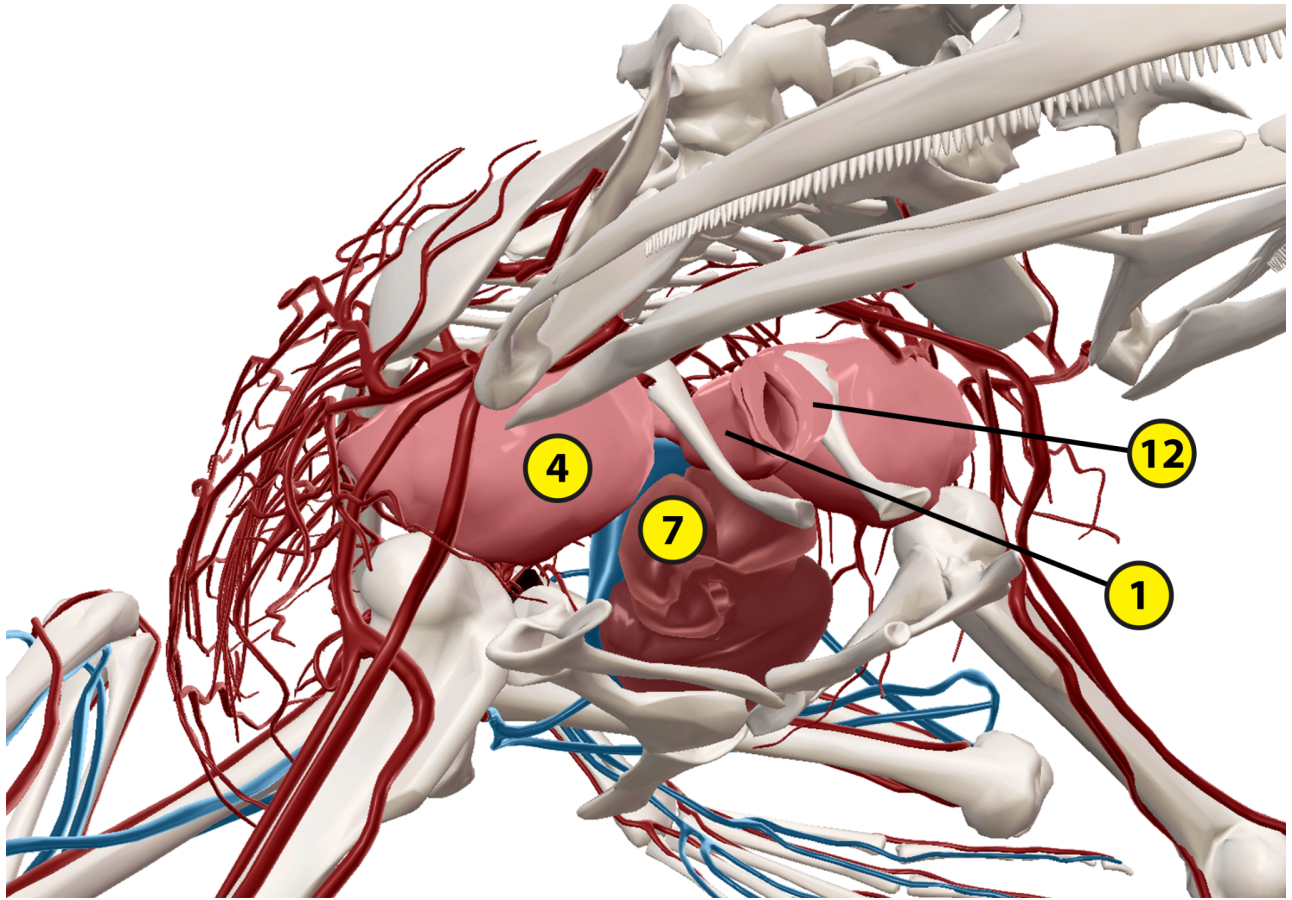
Right atrium

Systemic arches

Veins

Ventricle

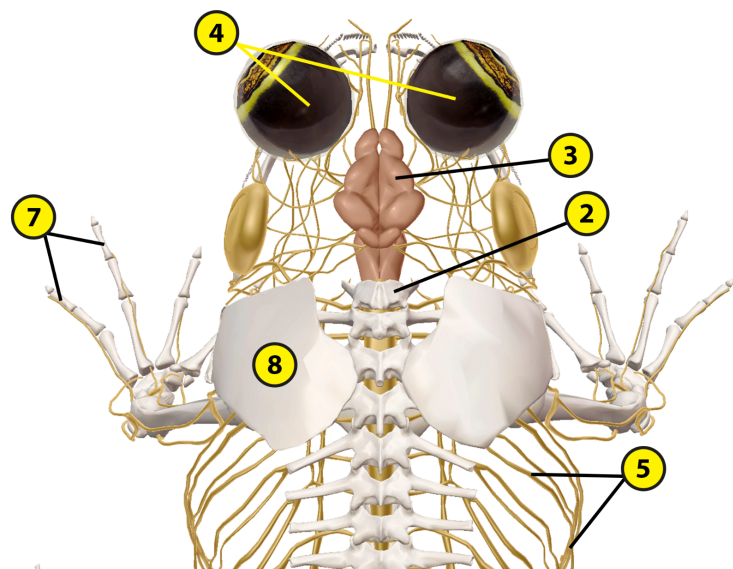
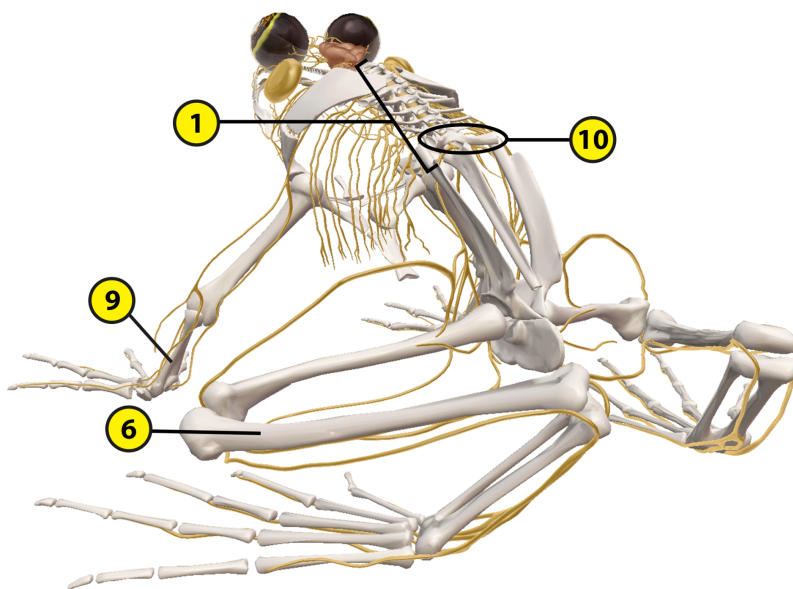




Part C: Label the structures of the frog's support and nervous systems.

Word List:

Brain
Cervical vertebra
Eyes
Nerves
Phalanges
Sacral vertebra
Radio-ulna
Spinal cord
Suprascapula
Tibio-fibula



Part D: Label the structures of the frog's digestive system.

Word List:

Esophagus

Fat bodies

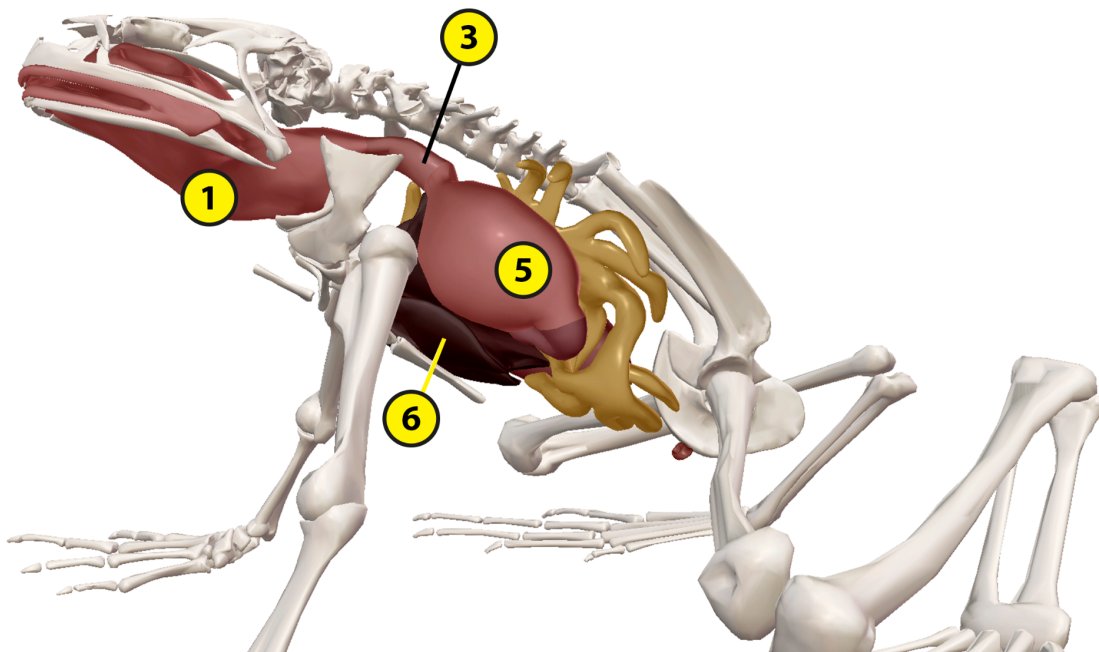
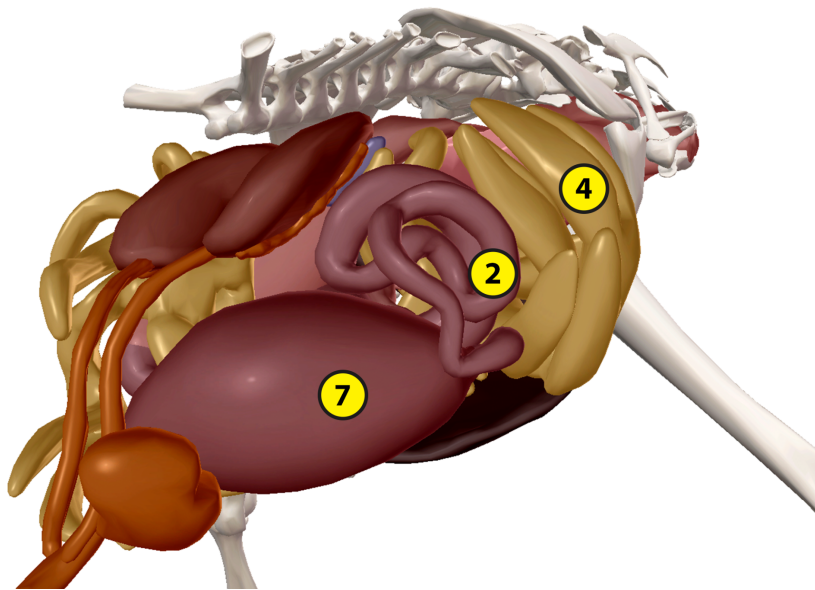
Large intestine (colon)

Liver

Oral cavity

Small intestine

Stomach



Part E: Label the structures of the frog's reproductive and excretory (urogenital) systems.

Word List:

Adrenal glands

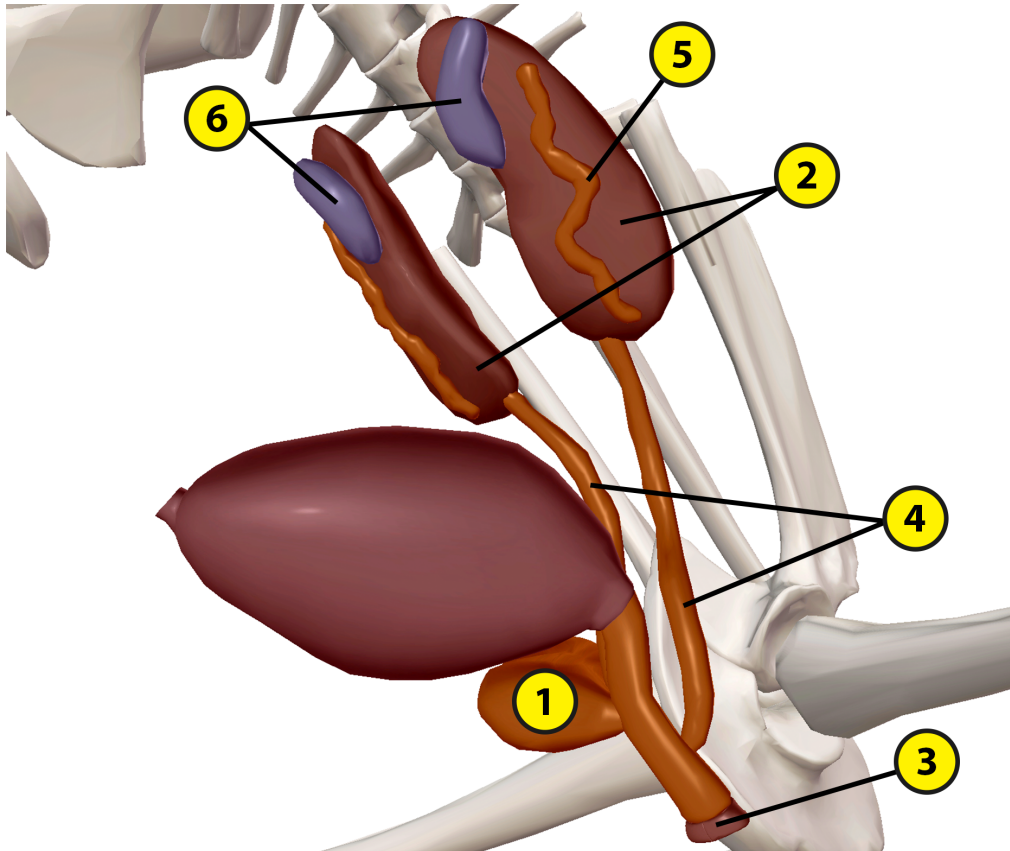
Bladder

Cloaca

Kidneys

Testes

Ureters



Name:

Date:

Lab 1: Frog Structure and Function

Activity 2: Explore the structures of the frog and their functions

Refer to your labeled frog images from Activity 1 and the content in Visible Biology. Based on what you've learned, match each of the following structures with the brief description of its function.

Part A: Circulatory, Nervous, and Respiratory Systems

Structures:

- a. Anterior vena cava
- b. Aortic arches
- c. Brain
- d. Dorsal aorta
- e. Larynx
- f. Lungs
- g. Pulmonary vessels
- h. Right atrium
- i. Spinal cord
- j. Systemic arches
- k. Tympanic membranes
- l. Ventricle

Descriptions:

- ___ This structure pumps oxygenated blood from the lungs to the rest of the body.
- ___ This structure processes sensory information and generates motor commands.
- ___ This structure pumps oxygenated blood through the aorta to the body.
- ___ This structure processes the frog's reflexes.
- ___ The truncus arteriosus divides into these structures, named by their locations within the circulatory system.
- ___ This structure branches from the sinus venosus attached to the right atrium.
- ___ The vocal cords are located within this structure.
- ___ These structures transmit sound vibrations to the inner ear.
- ___ This structure receives deoxygenated blood from the veins.
- ___ The dorsal aorta forms where these structures meet.
- ___ These structures allow the frog to breathe while on land.
- ___ The ventricle pumps deoxygenated blood through these structures to be carried to the lungs.

Part B: Digestive, Reproductive, and Excretory Systems

Structures:

- a. Adrenal glands
- b. Bladder
- c. Cloaca
- d. Fat bodies
- e. Kidneys
- f. Liver
- g. Stomach
- h. Testes

Descriptions:

___ These structures provide extra nourishment for the frog during periods of hibernating or the breeding season.

___ These structures secrete hormones that help regulate water balance and overall homeostasis.

___ This structure contains digestive enzymes that break down food into nutrients.

___ This structure stores urine before it is excreted.

___ This structure produces bile to help fully break down food into absorbable nutrients.

___ These structures produce sperm cells.

___ This structure excretes urine and feces and receives sperm from the testes.

___ This structure produces urine by filtering urea and other waste products out of the blood.

Part C: Exterior of the Frog and Support System

Structures:

- a. Cervical vertebra
- b. Epidermis and dermis
- c. Nictitating membranes
- d. Phalanges
- e. Radio-ulna
- f. Sacral vertebra
- g. Tibio-fibula

Descriptions:

___ This fused structure makes the frog's forelimb strong.

___ This structure connects to the back of the frog's skull and is also known as the atlas.

___ These structures cover the eyes to protect them from debris and prevent them from drying out when the frog is on land.

___ This fused structure helps power the frog's jumps.

___ These structures connect to the metacarpals in the hands and the metatarsals in the feet.

___ These structures cover the frog's surface, allowing it to absorb oxygen and water from its environment.

___ This structure is the frog's last vertebra.

Name:

Date:

Lab 2: Frog Dissection

Introduction

Frogs are terrestrial and aquatic vertebrates with bilateral symmetry. These amphibians are part of the phylum Chordata, which is characterized by a notochord, a dorsal nerve cord, an endostyle or thyroid gland, pharyngeal slits, and a post-anal tail. Several adaptations help frogs catch prey and escape predators, including webbed hind feet, strong hind legs, camouflage, and the ability to produce toxins. A key adaptation that helps frogs survive on land and in the water is their ability to breathe through both their lungs and skin. They can move through their environment by jumping, swimming, climbing, crawling, and digging. Frogs eat live prey, which passes into the stomach, where it dissolves in stomach acid. Nutrients and water are absorbed in the intestines, and waste is excreted through the cloaca (vent). Frogs reproduce sexually, with the female releasing her eggs and the male releasing his sperm for external fertilization. Frogs are deuterostomes, meaning their embryos develop the anus before the mouth. They hatch from eggs as tadpoles before developing into mature frogs. Frogs are small and accessible, so they often serve as a representative sample for studying complex vertebrate body systems.

In this activity, you will examine a frog and learn about its external and internal structures.

Materials

- Frog (virtual or preserved)
- Dissecting scissors or scalpels
- Dissecting pins and probes
- Dissecting tray
- Hand lens
- Lab gloves

Dissection

Observe the external structures of the frog

Observe the frog's external surface. Many of its adaptive features help it move throughout its environment and protect itself against predators.

1. Observe the following external structures:
 - a. Anus
 - b. Epidermis and dermis (skin)
 - c. External nares (nostrils)
 - d. Eyes
 - e. Nictitating membranes
 - f. Webbed hind digits and non-webbed front digits

If using the Visible Biology virtual frog, follow these steps

Note: Use the Hide button to hide individual structures. You can use the Systems Tray to toggle individual body systems on or off in the view. Within the view, you can zoom in/out or rotate the model as needed to observe the frog's structures.

1. First, select the epidermis and dermis and use the book icon to learn more about the frog's skin. Then, use the Systems Tray to remove the entire integumentary system from the view.
2. Next, observe some of the frog's muscles, including its forelimb and hindlimb muscles that help the frog with its powerful leaps and swimming. Then, rotate the frog as necessary to observe the following muscles, using the book icon to read about them as you go. Once you have examined each muscle, use the Systems Tray to remove the entire muscular system from the view.
 - a. Dorsalis scapulae (r, l)
 - b. Latissimus dorsi (r, l)
 - c. Longissimus dorsi (r, l)
 - d. Masseter (r, l)
 - e. Pectoralis (r, l)
 - f. Submaxillary (or mylohyoid)
3. Then, observe the following support/skeletal system structures. Select each of the following structures below and use the book icon to learn more about it. Once you have examined each support structure, use the Systems Tray to remove the entire support system from the view.
 - a. Cervical vertebra
 - b. Clavicle (r, l)
 - c. Episternum
 - d. Femur (r, l)
 - e. Humerus (r, l)
 - f. Maxillary teeth
 - g. Pelvic bones
 - h. Radio-ulna (r, l)
 - i. Sacral vertebra
 - j. Skull
 - k. Sternum
 - l. Tibio-fibula (r, l)
 - m. Vertebrae
4. Next, observe the nervous system structures. Select each of the following structures and use the book icon to learn more about it. Once you have examined each nervous structure, use the Systems Tray to remove the entire nervous system from the view.
 - a. Brain
 - b. Eyes
 - c. Nerves
 - d. Spinal cord
 - e. Tympanic membranes
5. Then, observe the circulatory and respiratory system structures. The first structures you will notice are the veins and arteries. Click on these, read their definitions, and use the Hide button to remove as many as necessary to create a clear view of the other internal structures. Select each of the following structures below and use the book icon to learn more about it. Once you have examined each circulatory and respiratory structure, use the Systems Tray to remove the entire circulatory and respiratory systems.
 - a. Aortic arches
 - b. Dorsal aorta

- c. Larynx
 - d. Left atrium
 - e. Lungs
 - f. Pulmonary vessels
 - g. Right atrium
 - h. Systemic arches
 - i. Ventricle
6. Finally, observe the following digestive, excretory, and reproductive system structures. One of the first structures you will see are the fat bodies. Select them and use the book icon to read their definition. Then, use the Hide button to hide them and get a clearer view of the other internal organs. Select each of the following structures below and use the book icon to learn more about it.
- Note: If you want to view these internal organs in context, you can use the Systems Tray to add back any of the systems you removed in previous steps. You can also hide individual structures on the list below after you have examined them to get a clearer view of specific structures.*
- a. Adrenal glands
 - b. Anus
 - c. Bladder
 - d. Cloaca (vent)
 - e. Esophagus
 - f. Gallbladder
 - g. Kidneys
 - h. Large intestine (colon)
 - i. Liver
 - j. Oral cavity
 - k. Small intestine
 - l. Stomach
 - m. Testes
 - n. Tongue

If using a preserved specimen, cut into your frog to observe its internal structures

1. Place the frog on the dissecting tray with its dorsal side facing up. Observe the frog's external structures, such as its four limbs, its large eyes, the nictitating membranes that cover them, the external nares, and the anus.
2. To view inside the frog's oral cavity, use your dissecting scissors to cut near the frog's jaw on both sides to open the frog's mouth wider.
3. Observe the following structures:
 - a. Support System: Mandible and maxillary teeth
 - b. Digestive System: Tongue and esophagus
 - c. Respiratory System: Glottis
 - d. Muscular System: Masseter and submaxillary (or mylohyoid)
4. Place the frog with its ventral side (belly or abdomen) facing up. Use dissecting pins to secure each of the frog's limbs on the tray.
5. Make a vertical cut through the skin only, from the mouth to where the lower limbs begin.
6. Make two more horizontal incisions. Start from the center of the sternum and cut to where the forelimbs attach to the body. These incisions should allow you to open the skin and peel it back from the underlying muscle layer.
7. Carefully make the same cuts from steps 5 and 6 to cut through the muscle layers underneath the dermis. This incision also cuts through the sternum.

8. Pin back the resulting flaps of skin and muscle to reveal the internal organs. This opens up the frog's ribcage.
9. Observe the following internal structures:
 - a. Excretory System: Liver and gallbladder
 - b. Digestive System: Fat bodies, stomach, small intestine, and large intestine (colon)
 - c. Circulatory System: Heart (ventricle, right atria, and left atria)
 - d. Respiratory System: Lungs
10. Once you have observed the structures above, cut around the stomach to remove it from the body cavity. This will reveal organs of the excretory and reproductive systems.
11. Observe the following internal structures:
 - a. Excretory System: Kidneys, bladder, and cloaca (vent)
 - b. Reproductive System: Testes and cloaca (vent)

Note: If observing a female frog, you will look for the ovary and the oviduct instead of the testes.

Questions

Based on your observations during this lab activity and what you've learned about the frog's structures and their functions, answer the following questions.

1. Which structures help power the frog's jumps?
2. Why do you think animals like the frog have nictitating membranes? Explain your answer in 3–5 sentences.
3. The human heart has four chambers. What main difference did you notice about the frog's heart, in comparison to a human's?
4. Describe how frogs are able to process stimuli from the environment.