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Biology 2108K

FROG DISSECTION

Part I. External Anatomy

1. Obtain a dissecting tray and a set of dissecting instruments.
2. Lay the frog dorsal surface up in the dissecting tray.
3. Notice the thinness of the frog's skin. Note the absence of scales, hair, or any other covering.

Q1. Why is the skin of a frog thin, smooth, and moist?

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b/c even though it has lungs and take in air through nostrils & mouth, they absorb additional oxygen through their pores in their skin directly into the bloodstream, especially when they are underwater

4. The eyes are easy to find. Examine each eye closely and locate the **nictitating membrane**, a third eyelid. In a living frog, the nictitating membranes are transparent and cover the eyes when the frog is underwater. Locate the **external nares**, or nostrils.

Q2. Provide one reason to explain why an adult frog will go underwater.

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to absorb the water to keep their skin moist, for they get water through their skin rather than their mouth.

5. Just posterior to the eyes are large, circular areas known as **tympanic membranes**, or eardrums. Near the center of each tympanic membrane is a raised area. This marks the attachment of a small bone, the columella, to the membrane. This bone transmits vibrations to the auditory nerve.

Q3. Why is the tympanic membrane an important adaptation for living on land?

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b/c it allows the frog to hear while on land

6. Locate the shoulder joints, elbow joints, and wrist joints of the **forelimbs**. Count the digits on each forelimb. The innermost digit of male frogs has a swollen pad during the breeding season.

Q4. How many digits are on each forelimb? 4

Q5. The presence of four, jointed limbs is a shared derived characteristic of which major animal group? tetrapods

7. Near the end of the body is the opening of the cloaca. Feces, urine, and reproductive cells are expelled through the cloaca.

8. Examine the muscular **hind limbs**. Locate the hip joints, knee joints, and ankle joints. Examine the webs of each foot. Count the digits on each hind limb.
Q6. How many digits are on each hindlimb? 5
9. Gently pry the mouth open and use scissors to cut the jaws at the joints. Examine the inside of the mouth. **Refer to figure 1 below.**
10. Find the **tongue**. **Note any unusual characteristics you observe.**
loose in the back and stuck around the tip of the
snout
11. Directly behind the tongue, locate a raised structure with a slit in it. This is the **glottis**, the opening of the air passageway that leads from the mouth to the lungs.
Q7. What is the scientific term for the air passageway that leads from the mouth to the lungs? trachea
Q8. What is the primary purpose of an **epiglottis**?
to prevent food/water from getting into the airway
12. Behind the glottis is the opening of the **esophagus**.
13. Find two bony knobs projecting from the upper surface of the mouth. These are the **vomerine teeth**. If you rub your finger along the inside of the jaw, you will feel the **maxillary teeth**.
Q9. Being that food is swallowed whole by the frog, what do you suppose these two sets of teeth are used for?
hold the prey in place to assist in swallowing
14. Near the vomerine teeth are the **internal nares**, the internal openings of the nostrils.
15. The openings of the **Eustachian tubes** are located near the corners of the mouth. Insert a dissecting needle into one opening and push carefully. Observe where the needle comes out.
16. Two large pads are found on the roof of the mouth. The frog retracts its eyes into these pads when it blinks.

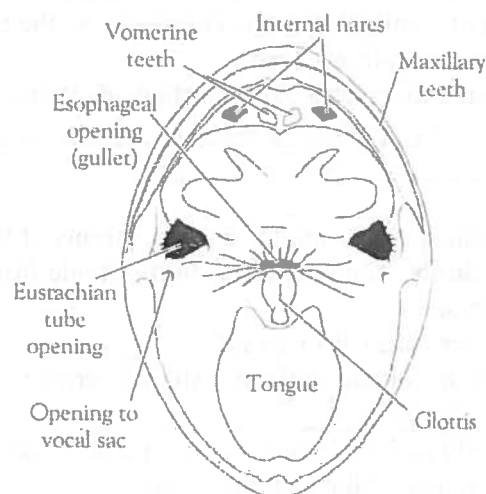


Figure 1

Part II. Muscular System

Refer to the Frog Anatomy (reference books on display) during the following activity.

1. With forceps, lift the skin over the frog's abdomen, insert the point of a pair of scissors, and make the cuts shown in **Figure 2**.

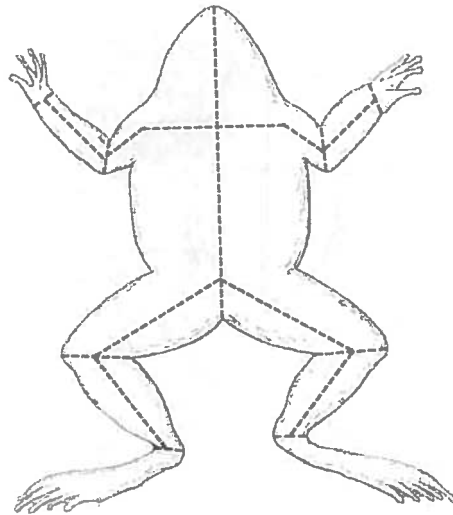


Figure 2

2. When the cuts are made, lift one corner of the skin with forceps and use the scalpel and scissors to separate the skin from the underlying muscles. Completely remove the skin from the ventral surface, leaving the skin intact only on the fore and hind feet.
3. Turn the frog over and remove the skin from the dorsal surface. Leave the skin intact from the eyes anteriorly to the tip of the head. Cut around each tympanic membrane and cloaca.
4. Identify the muscles, using the following review sheets as a guide.
5. Muscles are covered by a thin sheet of connective tissue, which often obscures the divisions between the muscles. Remove this connective tissue by pulling it away with forceps and then cutting it off with a scalpel. Be very careful not to scrape or tear the muscle tissue.

Q10. Which muscle type are you observing here, **skeletal, smooth, or cardiac muscle?** Skeletal

Q11. What type of body movements are these muscles responsible for?

locomotion, protection of major organ

Part III. Digestive system.

Refer to the Frog Anatomy (Digestive System) during the following activity.

1. With forceps, lift the muscles and make an incision just to the side of the midline. Use the point of a pair of scissors to make the cuts shown in **figure 3**.

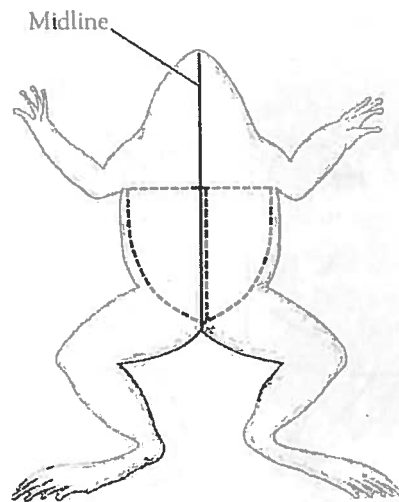


Figure 3

2. Reflect the body wall and cut it off. (Notice that a large vein, the abdominal vein, is attached to the body wall.) This will expose the digestive organs.
3. If your frog is a female, the oviduct may be enlarged with eggs and may partially cover the digestive organs. (The eggs look like small black and white spheres.) If this is the case, carefully cut away the oviduct and remove enough of the eggs to clearly see and identify the digestive organs.
4. At the anterior of the abdominal cavity is the **liver**, a large, brown gland of three lobes. Lift the lobes of the liver and search for a dark, greenish sac. This is the **gallbladder**. The green color results from a pigment in the **bile**. Bile is a secretion of the liver that is stored in the gallbladder.

Review
digestive
system,
Pages
1026 -
1032

Q12. What is the primary function of the liver?

To break down the foods that are consumed

Q13. What is the primary function of the gallbladder?

is to store the bile that the liver produces

6. The J-shaped muscular sac partially beneath the liver on the left side of the frog's body is the **stomach** (left and right refers the frog's left and right). The lower end of the stomach attaches to the **small intestine**. Two divisions make up the small intestine; the **duodenum** is the less folded portion that attaches to the lower end of the stomach and the **ileum** is the highly folded portion. The small intestine and the other internal organs are held in place by membranes called the **mesenteries**.

Notice that the digestive organs are attached to numerous blood vessels, why?

b/c the nutrients absorption takes place in the small intestines, and goes to blood vessels

Q14. What is the primary function of the stomach?

to digest and store food that is consumed into the body before it goes to the intestines.

Q15. What is the primary function of the small intestine?

digest food into nutrients into the bloodstream, it digests proteins, minerals, sugars, and vitamins the frog needs.

6. Look between the stomach and the duodenum to find the **pancreas**, a long and thin mass of tissue in the mesentery between the two organs.

Q16. What is the primary function of the pancreas?

to produce enzymes that are sent to the small intestine to help with digestion.

7. Lift the ileum and find the **spleen**, a somewhat round organ that is brown in color. Follow the ileum until it runs into a much wider part of the digestive tract, the **large intestine**.

Q17. What is the primary function of the spleen? to store RBC and get rid of worn out RBC

Q18. What is the primary function of the large intestine?

absorb water and small amount of remaining nutrient before expelling waste.

Part IV. Circulatory System

Refer to the Frog Anatomy (Blood Vascular System) during the following activity.

1. Make the cuts shown in **figure 4**. Cut the bones of the pectoral girdle with scissors and lift the body wall with forceps. Use a scalpel to cut the body wall away, and then lay the body wall aside. In the center of the chest area is the **heart**.

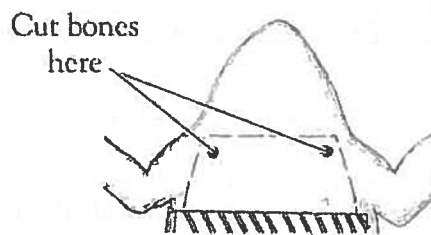


Figure 4

2. A tough membrane called the **pericardium** covers the heart. Lift the pericardium with forceps and begin cutting it away.

See amphibian
circulatory
system on page
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3. The large, lower chamber of the heart is the **ventricle**. As you work forward to uncover the top of the heart, you will find two other chambers, the **left atrium** and the **right atrium**.

Q19. Is cardiac muscle and involuntary or voluntary muscle? Explain.

Involuntary b/c it is something that needs to be active every when asleep.

Q20. What is the primary function of the ventricle?

is to pump blood to the systemic and pulmocutaneous circuit.

Q21. Does the **left atrium** receive **oxygenated** or **deoxygenated** blood? Where does this blood come from in the body of a frog?

Oxygenated blood, comes from the lungs and skin

Q22. Does the **right atrium** receive **oxygenated** or **deoxygenated** blood?

Where does this blood come from in the body of a frog?

deoxygenated blood, comes from the rest of the body

4. A large **artery**, the **bulbus arteriosus**, emerges from the top, right side of the ventricle and runs across the atria where it becomes the **truncus arteriosus**.
(Arteries carry blood away from the heart.)
5. The truncus arteriosus divides into a left and a right branch. Follow one of the branches deep into the neck. You will find that it gives rise to three arteries. The most anterior of these is the **carotid arch**.
6. Just posterior to the carotid arch is another major artery, the **aortic arch**.
7. Posterior to the aortic arch is the **pulmocutaneous artery**. This branches into two parts, the **cutaneous artery**, which is the more anterior branch, and the **pulmonary artery**, which is the more posterior branch.

Q23. Frogs have a circulation system with two circuits, a systemic circuit and a pulmocutaneous circuit.

a. Where does the systemic circuit deliver blood, and why?

to most tissues and cells of body, b/c systemic circuit is where the ventricle pumps most of the oxygenated blood.

b. Where does the pulmocutaneous circuit deliver blood, and why?

to the lungs and skin b/c that is where the deoxygenated blood enters where O_2 is released and CO_2 is picked up.

8. Gently press the heart on one side until you can see its dorsal surface. Carefully cut away the pericardium. You will find a thin-walled sac, the **sinus venosus**, attached to the dorsal surface of the heart.
9. Find at least one of the two **precaval veins**, which attach to the upper part of the sinus venosus. The large vein attached to the bottom of the sinus venosus is the **postcaval vein**. **(Veins carry blood back to the heart.)**
10. Carefully cut away the lobes of the liver, but leaves the veins associated with the lobes intact. Locate a vein coming from the liver that gives rise to the many

branches that connect to the stomach and intestines. This is the *hepatic portal vein*.

11. Find a large artery, the *dorsal aorta*, which lies along the backbone. Follow the dorsal aorta anteriorly until you find its point of origin from the fusion of the two aortic arches.
12. Branching off the dorsal aorta near this point is a large artery, the *celiacomesenteric artery*, which runs ventrally.
13. Follow the dorsal aorta to the posterior of the abdominal cavity where it branches into two *iliac arteries*.
14. Blood returning from the legs and kidneys to the heart flows through the *abdominal vein*.
15. Locate the lungs. **Note any characteristics you observe.**

Deflated, Right, Left - not deflated bigger than the right, spongy

16. Please feel free to further examine your specimen!

***Please follow the posted directions for the proper disposal of your specimen.**

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