

## Sheep Heart Dissection

### What are the chambers, valves, and blood vessels of the heart? What path does blood take through the heart?

The heart is a fist-sized muscle located to the left of the center of the chest. The heart contains **four chambers**. The upper chambers are called **atria**. The lower chambers are called **ventricles**. Between each chamber, there are **valves** that prevent the backflow of blood.

Blood is carried **away from the heart** by blood vessels called **arteries** and carried back **toward the heart** by blood vessels called **veins**. Arteries and veins are connected by **capillaries**. Arteries have muscular, elastic walls to help move the blood through the body. **Veins** have **one-way valves** to prevent the backflow of blood on its return to the heart.

**Oxygen-poor** blood from cells of the body **enters** the heart through the **right atrium** and is pumped into the **right ventricle**. The blood then travels into the **pulmonary artery**, which goes into the **lungs**. In the lungs, the blood gives off carbon dioxide and picks up oxygen. The **oxygen-rich blood** returns to the heart by way of the **pulmonary vein**.

The blood enters the **left atrium** and is pumped into the **left ventricle**. The blood is pumped out of the heart through the **aorta** to cells in the rest of the body.

The muscular **wall of the left ventricle** is **thicker** than the wall of the right ventricle because it has to pump the blood to the entire body. Blood leaving the right ventricle only goes to go to the lungs.

Each time the **ventricles contract**, blood is forced through the **arteries**. This force causes a beat, or **pulse**, that is felt in arteries at the wrist, neck, and temple. The pulse is exactly the same as the heartbeat.

In this investigation you will examine the chambers, valves, and blood vessels of the heart. You will also trace the path of blood through the heart. Use the above information, your PowerPoint notes, and the textbook to help you answer the questions in this lab.

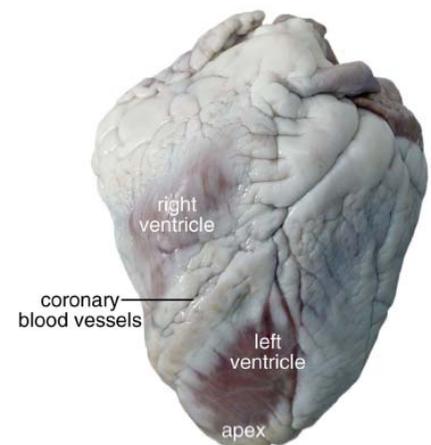
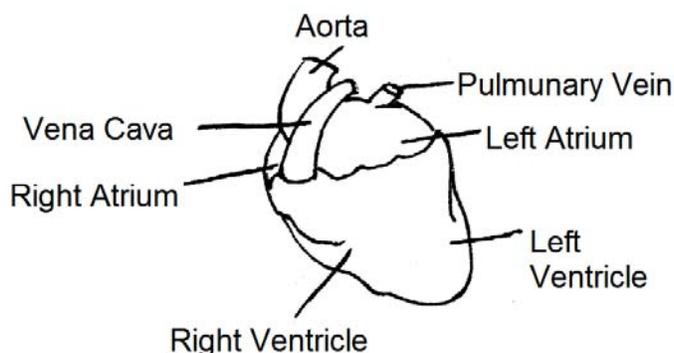
#### Materials

- sheep heart
- dissection tray
- probe
- metric ruler
- scissors/scalpel
- tweezers

#### Procedure (Day 1) You will not cut the heart open today! You do NOT need to write in complete sentences.

##### Identify the right and left sides of the heart

Obtain a sheep heart and place the heart in a dissecting tray. Imagine the heart in the body of a person facing you. The left side of their heart is on their left, but since you are facing them, it is on your right. Position your heart in the tray so that it matches the diagram below.



1. Find the **apex** of the heart. Is this at the top or bottom point of the heart? \_\_\_\_\_  
Only the **left ventricle** extends or goes all the way to the apex.
2. Measure the length of the heart from top to bottom in cm. \_\_\_\_\_

### Find the arteries

Place the heart in your pan with the apex toward you and the smooth round side facing the ceiling.

There will be a groove with a blood vessel in it. This is called the **coronary artery**. As you are looking at the heart, this blood vessel runs diagonally from the right side of the wide end of the heart to a point above and to the left of the apex.

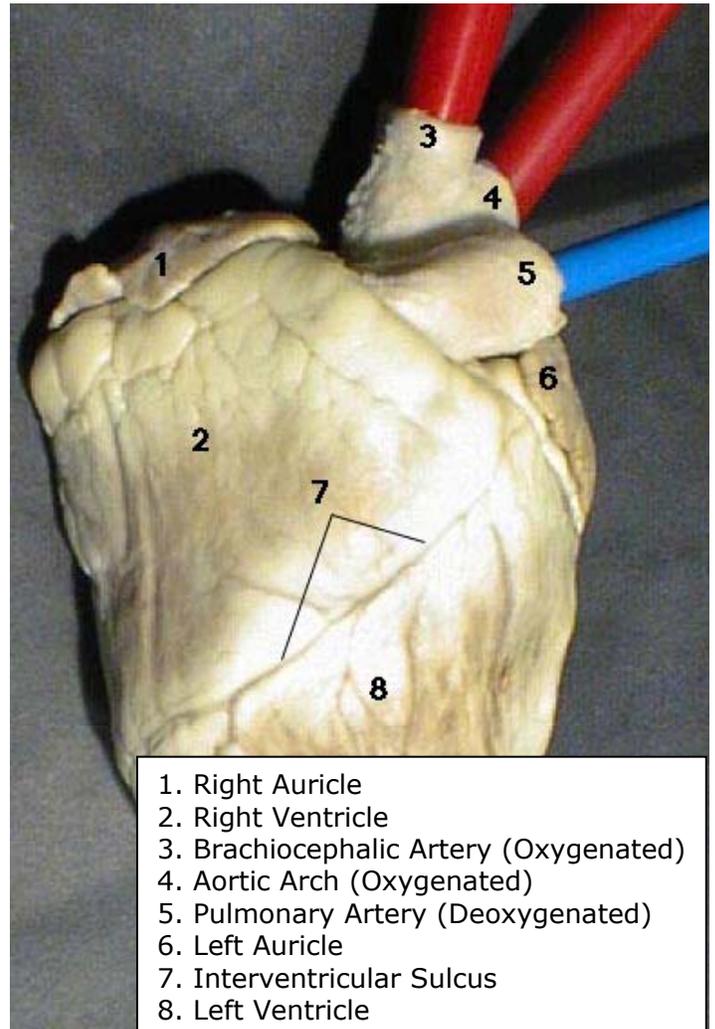
The **pulmonary artery** should be towards to the top at the wide end of the heart. .

The **right ventricle** now lies to your left and toward the wider end of the heart from the coronary artery. The pulmonary artery to the lungs can be seen curving out of the right ventricle toward the left side of the heart (toward your right).

### Locate the superior and inferior vena cava

Locate the two large **blood vessels** that enter the right atrium. These are the **superior** and **inferior vena cava**. You will need to pick up the heart and look at the back side of it to find the vena cava.

Stick your finger into the superior vena cava (or top one) and have it come out of the inferior vena cava (or bottom one). Both vena cava enter the right atrium.



### Review

3. Go back to your pulmonary artery. Look at the back side of the heart and see the pulmonary artery branches into two holes. You may not see this because of the fat on the heart. These blood vessels (**the pulmonary arteries**) leave the right ventricle and lead to the \_\_\_\_\_ . (2 pts.)
4. Below the pulmonary arteries are two larger holes. They may be covered in fat where they would be hard to see. These are the pulmonary veins. What part of the heart do the pulmonary veins go into? \_\_\_\_\_ (2 pts.)
5. What part of your body is blood coming from to enter the pulmonary veins to go back into your heart? \_\_\_\_\_ (2 pts.)
6. Find the aorta. When you're looking at back of the heart, it is the largest hole just above the pulmonary artery. Stick your pinky finger into the aorta and see how far down it goes. Be careful not to get your finger stuck. What **chamber** does blood come **from** to enter the **aorta**? \_\_\_\_\_ (2 pts.)

**STOP FOR TODAY! You should NOT have cut open the heart!**

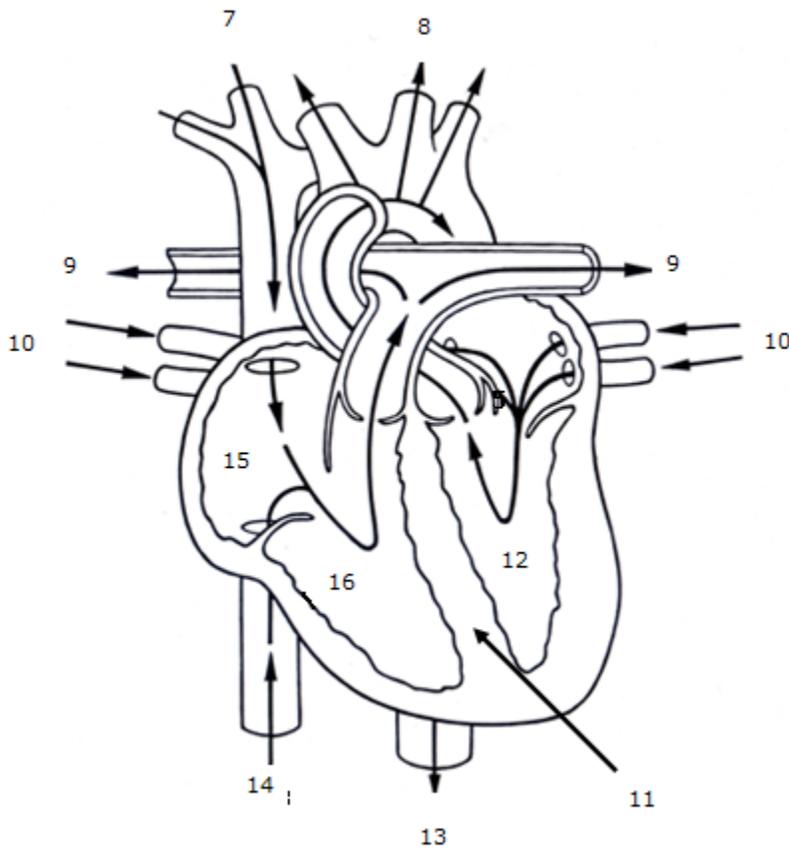
## Sheep Heart Dissection

### Procedure (Day 2) – you will be cutting the heart open today!

- a. Review the outer part of the heart and make sure you know where these structures are: left and right ventricle, left and right atrium, pulmonary artery, pulmonary veins, aorta, coronary artery, apex, superior and inferior vena cava.
- b. Locate the **pulmonary artery**. Put your scissors inside of it and cut through the front side of this blood vessel and continue cutting down through the muscular wall of the right ventricle. This diagonal cutting line should be above and parallel to the coronary artery. Remember the coronary artery is embedded between the right and left ventricles. Stop cutting when you reach the end of the cavity of the right ventricle.
- c. You have now cut through the right ventricle. Notice at the beginning of the pulmonary artery you will find a valve. This valve is called the **pulmonary valve**. Notice that the valve is arranged so that blood can pass from the ventricle out into the pulmonary artery but not in the reverse direction.
- d. Look inside the heart. In the upper left of the right ventricle, notice a flap of tissue made of 3 leaflets. This tissue is connected by a bunch of tendons. This is the **tricuspid valve**. The tricuspid valve sends blood from the right atrium to the right ventricle.
  1. Can blood go backwards from the right ventricle to the right atrium? \_\_\_\_\_
- e. Find the **superior vena cava** on the back side of the heart again. Cut from the superior vena cava straight down about 3 cm. You will be cutting into the right atrium. Be careful not to cut into the right ventricle.
- f. Peek into the right atrium and notice the **tricuspid valve** (from the other side). Stick your finger into the superior vena cava and through the tricuspid valve. Look through the opening in the right ventricle that you made your first cut into.
- g. Find the aorta again. Cut through the aorta until you reach the **aortic valve**.
  2. This valve transports blood from the left ventricle into the \_\_\_\_\_.  
With your scissors you will be making a big cut here! Cut through the aorta and continue to cut down through the thick muscular wall of the left ventricle.
  3. Compare the thickness of the walls of the left and right ventricle. Which one has thicker walls?  
\_\_\_\_\_
  4. Measure the thickness of the wall of the right ventricle in cm. \_\_\_\_\_
  5. Measure the thickness of the wall of the left ventricle in cm. \_\_\_\_\_
- h. At the base of the aorta, look at the aortic valve again.
- i. Find the **mitral valve** between the left atrium and the left ventricle. Pass a finger or a probe through it from the left ventricle. Your fingers will be in the left atrium at this point. Try to find the openings of the pulmonary veins which open into the left atrium.
- j. Quiz your partner on the interior and exterior anatomy of the heart.
- k. Once you are confident that you know the structures, clean up your lab station. Make sure your dissection tools are washed thoroughly and dried completely. Make sure the tray, kit, counter, sink, and floor are free of heart tissue and fat.
  6. \_\_\_\_\_ **Clean-up – 2 points** – if the teacher does **not** have to **remind** you what to do.  
Points will be deducted if others have to clean your area up. \_\_\_\_\_

**Analysis and Conclusions**

In the picture below, write where the blood should be blue and where it should be red. Fill this in using the blanks to the right. **All you have to write is red or blue.**



- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. red (muscle)
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_
- 16. \_\_\_\_\_

- 17. What chambers of the heart receive blood from the body, ventricles or atria? \_\_\_\_\_
- 18. What chambers of the heart pump blood out of the heart, ventricles or atria? \_\_\_\_\_
- 19. Which heart chamber has the thickest muscle wall? \_\_\_\_\_
- 20. Why is it necessary for the chamber in the above question to have a thicker muscle wall?  
\_\_\_\_\_
- 21. Which blood vessel brings oxygen poor blood to the heart from the rest of the body?  
\_\_\_\_\_
- 22. Which blood vessel takes blood from the heart and sends it to the lungs? \_\_\_\_\_
- 23. Which blood vessel takes oxygen-rich blood from the lungs and brings it back to the heart?  
\_\_\_\_\_
- 24. Which blood vessel sends oxygen-rich blood from the heart to the rest of the body?  
\_\_\_\_\_
- 25. How do the valves control the flow of blood through the heart? \_\_\_\_\_  
\_\_\_\_\_