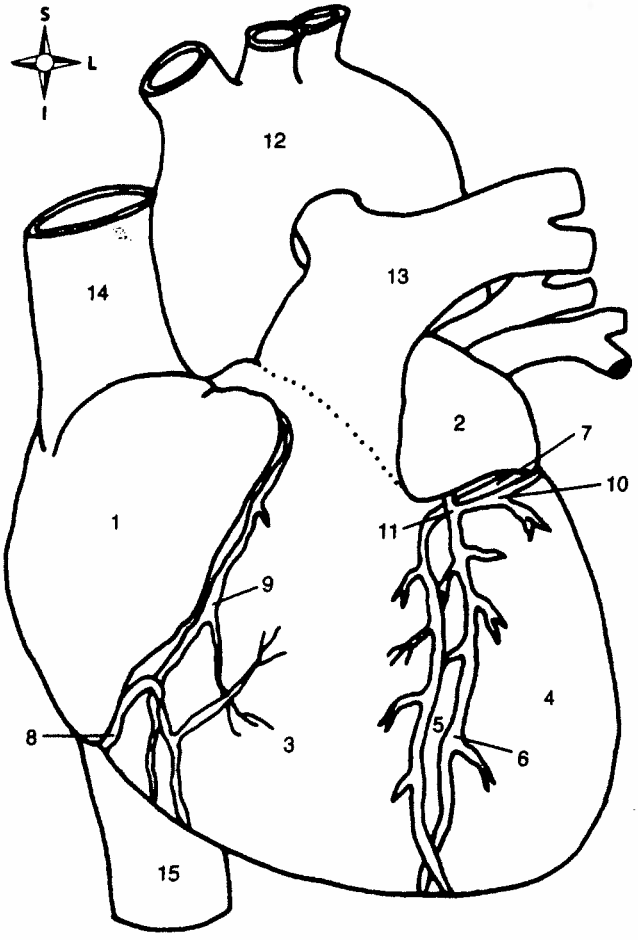
COLORING EXERCISE
Using colored pens or pencils, shade in the figure and accompanying labels in contrasting colors of your choice as indicated by the red numerals.

.e Heart

RIGHT ATRIUM **1**
LEFT ATRIUM **2**
RIGHT VENTRICLE **3**
LEFT VENTRICLE **4**
INTERVENTRICULAR SULCUS **5**
ANTERIOR INTERVENTRICULAR ARTERY **6**
GREAT CARDIAC VEIN **7**
SMALL CARDIAC VEIN **8**
RIGHT CORONARY ARTERY **9**
CIRCUMFLEX ARTERY **10**
LEFT CORONARY ARTERY **1**
AORTA **12**
PULMONARY ARTERY **13**
SUPERIOR VENA CAVA **14**
INFERIOR VENA CAVA **15**
INTERVENTRICULAR SEPTUM **16**
MYOCARDIUM **17**
EPICARDIUM **18**
MITRAL VALVE **19**
TRICUSPID VALVE **20**
CHORDAE TENDINEAE **21**
PAPILLARY MUSCLE **22**
AORTIC SEMILUNAR VALVE **23**
PULMONARY SEMILUNAR VALVE **24**



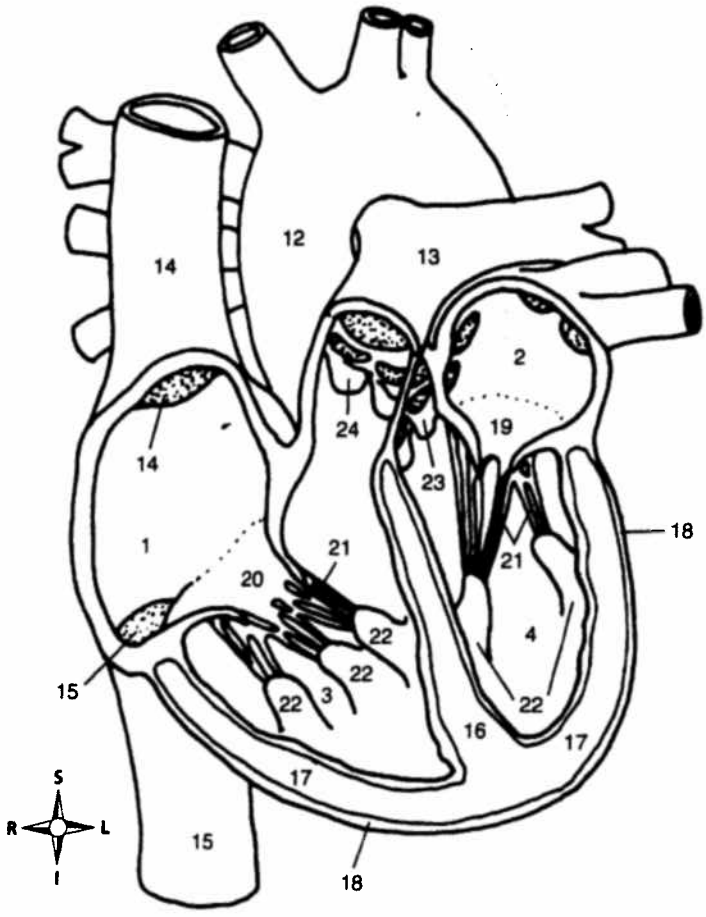


Figure 35-3 Structures of the heart.

COLORING EXERCISE
Using colored pens or pencils, shade in the figure and accompanying labels in contrasting colors of your choice as indicated by the red numerals.

Wall of the Heart

ENDOCARDIUM **1**
MYOCARDIUM **2**
EPICARDIUM **3**

Coverings of the Heart

SEROUS PERICARDIUM **4**
  VISCERAL PERICARDIUM **3**
  PERICARDIAL SPACE **5**
  PARIETAL PERICARDIUM **6**
FIBROUS PERICARDIUM **7**
DIAPHRAGM **8**

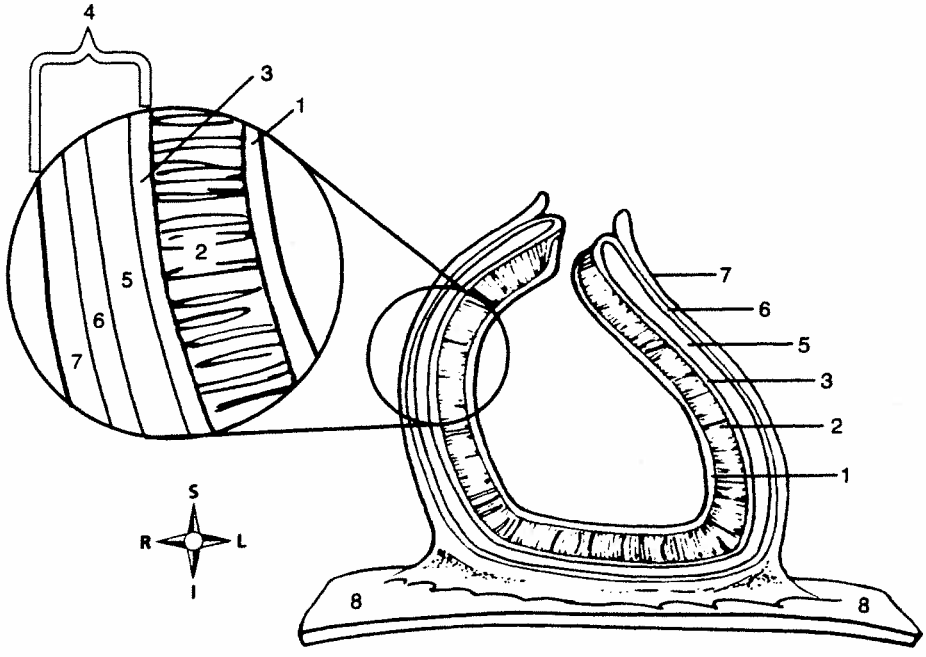


Figure 35-4 The wall and coverings of the heart.

Name:_____ **Date:**_____ **Section:**_____

LAB REPORT 35

Structure of the Heart

Use this table as a checklist for your study of the heart. Do not forget to fill in the function column.

Structure	Sheep	Human	Dissectible Human	Function(s)
Right atrium 1	❑	❑	❑	
Left atrium 2	❑	❑	❑	
Right ventricle 3	❑	❑	❑	
Left ventricle 4	❑	❑	❑	
Interventricular sulcus 5	❑	❑	❑	
Anterior interventricular artery 6	❑	❑	❑	
Great cardiac vein 7	❑	❑	❑	
Small cardiac vein 8	❑	❑	❑	
Right coronary artery 9	❑	❑	❑	
Circumflex artery 10	❑	❑	❑	
Left coronary artery 11	❑	❑	❑	
Aorta 12	❑	❑	❑	
Pulmonary artery 13	❑	❑	❑	
Superior vena cava 14	❑	❑	❑	
Inferior vena cava 15	❑	❑	❑	
Interventricular septum 16	❑	❑	❑	
Myocardium 17	❑	❑	❑	
Epicardium 18	❑	❑	❑	
Parietal pericardium 19	❑	❑	❑	
Pericardial space 20	❑	❑	❑	
Fibrous pericardium 21	❑	❑	❑	
Mitral valve 22	❑	❑	❑	
Tricuspid valve 23	❑	❑	❑	
Chordae tendineae 24	❑	❑	❑	
Papillary muscle 25	❑	❑	❑	
Aortic semilunar valve 26	❑	❑	❑	
Pulmonary semilunar valve 27	❑	❑	❑	

Put in order

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Fill-in

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Put in Order (arrange these structures in the order in which blood passes through them—assume that the blood is about to leave the right atrium)

aorta
aortic semilunar valve
left ventricle
left atrium
lungs
mitral valve
pulmonary semilunar valve
pulmonary artery
right ventricle
superior/inferior vena cava
tissues of the body
tricuspid valve

Fill-in (complete each statement with the correct term)

1. The flaplike lateral wall of each atrium is called the __?__.
2. The __?__ valve is also known as the *mitral valve* or *left AV valve.*
3. The right AV valve is also known as the __?__ valve.
4. The aortic semilunar valve has __?__ pocketlike flaps of tissue.
5. The __?__ are fibrous structures that prevent the cuspid valves from prolapsing (bending backward).
6. One-way flow of blood from the right ventricle is ensured by the presence of the __?__ valve.
7. Mitral valve prolapse, which is abnormal, may allow blood to enter the __? during contraction of the left ventricle.
8. The small cardiac vein and right coronary artery can be found along the rig... __?__ sulcus.
9. The great cardiac vein and anterior interventricular artery can be found along the anterior __?__ sulcus.
10. The __?__ is a muscular wall between the left and right ventricles.
11. The myocardium of the __?__ ventricle is thicker than the other ventricle.
12. The wall of the aorta is *thicker/thinner* than the wall of the superior vena cava.
13. The __?__ are beamlike processes of the inner face of the myocardium.
14. The "point" of the heart is called the __?__.
15. In the sheep heart, the right atrium is __?__ to the right ventricle.

Structure of the Heart

*CLASS SET!

The **heart** is a four-chambered, hollow organ composed primarily of cardiac muscle tissue. It contracts rhythmically, pumping blood into the **arteries.** After passing through tissues, blood returns to the heart by way of the **veins** and is pumped again. This exercise challenges you to explore the anatomy of the heart through the use of models and preserved specimens.

Before you begin

- ❑ Read the appropriate chapter in your textbook.
- ❑ Set your learning goals. When you finish this exercise, you should be able to:
  - describe the structure of the heart
  - locate anatomical features of the heart in models and in preserved mammalian specimens
  - explain the function of major heart structures
- ❑ Prepare your materials:
  - dissectible models of the human heart
  - preserved sheep heart
  - dissection tools and trays
  - wooden dowels (1 cm diameter × 12 cm), pencils, or dull probes
  - computer setup with DISSECTIBLE HUMAN or similar human dissection program (optional)
- ❑ Read the directions and safety tips for this exercise *carefully* before starting any procedure.

HINT

Using the DISSECTIBLE HUMAN or similar computerized human dissection program, explore the human body and try to find the structures listed in this activity. Check them off in your Lab Report as you find them.

A. Human heart anatomy

Using dissectible models and the aid given in this exercise, find these features of the heart:

❑ 1 Identify these structures on the external aspect, ventral surface:

- **Interventricular sulcus**—This diagonal groove is located between the walls of the two lower heart chambers **(ventricles).** Along this groove lie the **anterior interventricular artery** and the **great cardiac vein.**
- **Auricles**—These are the flaplike outpouchings of the left and right **atria** (the upper heart chambers).
- **Atrioventricular sulci**—These are grooves between the walls of the atria above and the ventricles below. Locate the **small cardiac vein** and **right coronary artery** on the right and the **great cardiac vein** and **circumflex artery** on the left.
- **Aorta**—The largest artery of the body, it forms the **aortic arch** above the heart.
- **Pulmonary artery**—Somewhat smaller than the aorta, this vessel leaves the heart as a single **trunk** but soon branches to become the **left** and **right pulmonary arteries.**
- **Superior and inferior vena cava**—These two large veins communicate with the right atrium.
- **Apex**—The apex is the lower "point" of the heart.

❑ 2 Identify these features of the heart on the external aspect, dorsal surface:

- **Atria**—These are the upper left and right chambers. They have relatively thin walls.
- **Ventricles**—These are the lower left and right chambers. They have relatively thick walls.
- **Interventricular sulcus**—It is similar to that on the ventral surface. Locate the **middle cardiac vein** and the **posterior ventricular artery.**
- **Pulmonary veins**—These veins communicate with the atria.

❑ 3 Identify these features visible on the internal aspect:

- **Atria**—They are distinguished by their position and thin walls.
- **Ventricles**—They are thick-walled lower chambers. Note that one ventricle has thicker walls than the other. What functional adaptation does this represent?
- **Interventricular septum**—This heart wall separates the left and right ventricles from each other.
- **Cuspid valves**—Also called **atrioventricular (AV) valves,** these valves ensure one-way flow of blood from the atria into the ventricles. The left AV valve, or **mitral (bicuspid)** valve, is composed of two cusps (flaps). The right AV valve, or **tricuspid valve,** has three cusps. Each cusp is attached to the wall of the ventricle below by means of fibrous **chordae tendineae** connected to fingerlike projections of the ventricular myocardium called **papillary muscles.**

- ❑ **Semilunar (SL) valves**—The right SL valve, or **pulmonary semilunar valve,** ensures one-way flow from the right ventricle into the pulmonary artery. The left SL valve, or **aortic semilunar valve,** is at the entrance of the aorta. SL valves are each composed of thin-walled bags that hang from the walls of the vessel.
- ❑ **Myocardium**—This is the muscular layer of the heart wall.
- ❑ **Endocardium**—The thin endothelial lining of the heart chambers, it covers the beamlike **trabeculae** on the inner face of the myocardium.

❑ 4 Locate these structures of the heart coverings:

- ❑ **Serous pericardium**—The thin, serous membrane that covers the outside of the heart reflects (folds) on itself to form two layers. The inner layer is the **visceral pericardium** and also serves as the outer wall of the heart or **epicardium.** The outer layer is the **parietal pericardium.** Between the two layers of the serous pericardium is the **pericardial space,** which contains lubricating **pericardial fluid.**
- ❑ **Fibrous pericardium**—The tough, fibrous outer covering of the heart and the serous pericardium, it adheres to the outer surface of the parietal pericardium and thus forms a flexible, protective pouch around the heart. The fibrous pericardium rests on the superior surface of the diaphragm.

SAFETY FIRST!

Observe the usual precautions when dissecting your specimen. Heed the safety advice accompanying the preservative used, and avoid cuts and punctures when using the dissecting tools. Use safety goggles to avoid injury during dissections. As always, dispose of your specimen as instructed.

B. Sheep heart dissection

The sheep heart is very similar in structure to the human heart. It is nearly the same size, so it makes an ideal study specimen.

❑ 1 Orient yourself to the specimen. Using the photos a a guide, locate the dorsal and ventral surfaces. The shape of your specimen may have become distortec in shipping, so don't rely on shape as a guide. Reca that directions for the sheep heart are based on the fact that the sheep is a four-legged animal, so its *hea is oriented differently than in the human.*

❑ 2 Identify the structures of the external aspect of the sheep heart as you did for the human heart. Some adipose tissue may have to be removed so that you can see all the structures clearly. You may not be abl to locate all of the *coronary vessels* because they are buried under fat. Many of the large heart vessels may have been cut very closely to the heart wall, so they appear as holes or short stubs. Use a wooden dowel or pencil to open the vessels for better viewing (Figure 35-1, *A*). Some identifications of external structures will be tentative until you open the heart and verify your observations.

❑ 3 Use a long knife or your scalpel and scissors to cut a frontal section in your specimen (Figure 35-2). Try tc identify the internal heart features as you did with the human heart model.

HINT

LABORATORY REFERENCE Plates 70 and 71 show color photographs of a preserved sheep heart.