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 11
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.

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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.
# 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.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Sheep</th>
<th>Human</th>
<th>Dissectible Human</th>
<th>Function(s)</th>
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<td>Right atrium</td>
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<td>Right ventricle</td>
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<td>Anterior interventricular artery</td>
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<td>Great cardiac vein</td>
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<tr>
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<tr>
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<tr>
<td>Aortic semilunar valve</td>
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<tr>
<td>Pulmonary semilunar valve</td>
<td>27</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Lab Exercise 35 • Structure of the Heart

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)

1. aorta
2. aortic semilunar valve
3. left ventricle
4. left atrium
5. lungs
6. mitral valve
7. pulmonary semilunar valve
8. pulmonary artery
9. right ventricle
10. superior/inferior vena cava
11. tissues of the body
12. 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 right ___ 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:
  - dissectable 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.

**4. 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 outpuffings 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.

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 as a guide, locate the dorsal and ventral surfaces. The shape of your specimen may have become distorted in shipping, so don’t rely on shape as a guide. Recall that directions for the sheep heart are based on the fact that the sheep is a four-legged animal, so its head 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 able 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 to identify the internal heart features as you did with the human heart model.

S A F E T Y  F I R S T

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.

H I N T

Laboratory Reference Plates 70 and 71 show color photographs of a preserved sheep heart.