

**LABORATORY EXERCISE 40  
BLOOD VESSEL STRUCTURE, ARTERIES, AND VEINS**

**Instructional Suggestions**

If live frogs are not available for the microscopic observation of blood vessels, you might want to provide small goldfish. The head of a fish can be wrapped loosely in wet cotton to keep its gills moist, and the fish can be placed on a glass plate on the stage of a microscope. If its tail is spread out beneath the microscope slide, the blood vessels can be observed with low- and high-power magnification. However, if the fish is not returned to water within a few minutes, it will likely die.

**Figure Labels**

**FIG. 40.1**

- |                   |                   |
|-------------------|-------------------|
| 1. Tunica interna | 3. Tunica externa |
| 2. Tunica media   |                   |

**FIG. 40.4**

- |                       |                       |                     |
|-----------------------|-----------------------|---------------------|
| 1. Superior vena cava | 3. Inferior vena cava | 5. Pulmonary artery |
| 2. Pulmonary trunk    | 4. Pulmonary veins    | 6. Aorta            |



**Critical Thinking Application Answer**

The left ventricle wall is thicker which provides a more powerful contraction to force the blood through the longer distance of the systemic circuit.

**FIG. 40.5**

- |                                |                               |
|--------------------------------|-------------------------------|
| 1. Right common carotid artery | 7. Right common iliac artery  |
| 2. Right subclavian artery     | 8. Left common carotid artery |
| 3. Brachiocephalic artery      | 9. Left subclavian artery     |
| 4. Aortic arch                 | 10. Coronary artery (left)    |
| 5. Ascending aorta             | 11. Abdominal aorta           |
| 6. Right renal artery          |                               |

**FIG. 40.6**

- |                                |                           |
|--------------------------------|---------------------------|
| 1. Superficial temporal artery | 5. Subclavian artery      |
| 2. Internal carotid artery     | 6. Facial artery          |
| 3. External carotid artery     | 7. Common carotid artery  |
| 4. Vertebral artery            | 8. Brachiocephalic artery |

**FIG. 40.7**

- |                         |                    |
|-------------------------|--------------------|
| 1. Subclavian artery    | 4. Brachial artery |
| 2. Axillary artery      | 5. Radial artery   |
| 3. Deep brachial artery | 6. Ulnar artery    |

**FIG. 40.8**

- |                          |                           |
|--------------------------|---------------------------|
| 1. Common iliac artery   | 6. Internal iliac artery  |
| 2. External iliac artery | 7. Femoral artery         |
| 3. Deep femoral artery   | 8. Anterior tibial artery |
| 4. Popliteal artery      | 9. Dorsalis pedis artery  |
| 5. Abdominal aorta       |                           |

**FIG. 40.9**

- |                          |                         |
|--------------------------|-------------------------|
| 1. External jugular vein | 4. Vertebral vein       |
| 2. Subclavian vein       | 5. Brachiocephalic vein |
| 3. Internal jugular vein |                         |

**FIG. 40.10**

- |                  |                        |
|------------------|------------------------|
| 1. Axillary vein | 3. Basilic vein        |
| 2. Cephalic vein | 4. Median cubital vein |

**FIG. 40.11**

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. Hepatic portal vein      | 4. Splenic vein             |
| 2. Superior mesenteric vein | 5. Inferior mesenteric vein |
| 3. Gastric vein (right)     |                             |

**FIG. 40.12**

- |                        |                         |
|------------------------|-------------------------|
| 1. Inferior vena cava  | 4. External iliac vein  |
| 2. Common iliac vein   | 5. Femoral vein         |
| 3. Internal iliac vein | 6. Great saphenous vein |

**Laboratory Report Answers**

**PART A**

- |                                |                                 |                |
|--------------------------------|---------------------------------|----------------|
| 1. Endothelium                 | 3. Outer layer (tunica externa) | 6. Capillaries |
| 2. Middle layer (tunica media) | 4. Vasoconstriction             | 7. Hydrostatic |
|                                | 5. Vasodilation                 | 8. Osmotic     |
|                                |                                 | 9. Valves      |

**PART B**

1. (sketches)
2. The inner and outer layers are similar in the artery and vein. The middle layer of the artery contains relatively greater amounts of smooth muscle and elastic tissue than that of the vein.



**Critical Thinking Application Answer**

Because arteries are under higher pressure than veins, the thicker arterial walls help to maintain the strength and elasticity necessary against their walls.

**PART C**

1. The blood in an arteriole moves with a pulsating rapid flow, but blood in a venule moves with a steady slower flow.
2. A capillary could be identified by its small diameter and the presence of blood cells moving in single file.
3. Blood moves fastest in arterioles, somewhat slower in venules, and slowest in capillaries.

**PART D**

- |      |       |
|------|-------|
| 1. d | 7. h  |
| 2. i | 8. j  |
| 3. c | 9. g  |
| 4. a | 10. e |
| 5. f | 11. k |
| 6. b |       |

**PART E**

- |      |      |
|------|------|
| 1. a | 5. h |
| 2. b | 6. c |
| 3. d | 7. g |
| 4. e | 8. f |

**PART F (FIG. 40.13)**

- |                          |                         |
|--------------------------|-------------------------|
| 1. Common carotid artery | 8. Subclavian vein      |
| 2. Brachiocephalic vein  | 9. Pulmonary vein       |
| 3. Superior vena cava    | 10. Inferior vena cava  |
| 4. Femoral vein          | 11. Aorta               |
| 5. Great saphenous vein  | 12. Common iliac vein   |
| 6. External jugular vein | 13. Common iliac artery |
| 7. Subclavian artery     | 14. Femoral artery      |

**LABORATORY EXERCISE 55  
CAT DISSECTION: CARDIOVASCULAR SYSTEM****Laboratory Report Answers****PART A**

1. The parietal pericardium forms a relatively thick, tough sac that encloses the heart. It is attached to the large blood vessels at the base of the heart and to the diaphragm.
2. The walls of the atria are much thinner than those of the ventricles. The wall of the left ventricle is much thicker than that of the right ventricle.
3. Wall thickness is related to the force of its contraction and the amount of pressure it imparts to the blood inside a heart chamber. The left ventricle has the thickest wall, contracts with the greatest force, and creates the greatest amount of blood pressure in the heart chambers. The left ventricle is the pump for the systemic circuit.
4. In the human, the right common carotid artery branches from the brachiocephalic artery, whereas the left common carotid artery comes directly from the aortic arch. In the cat, both common carotid arteries branch from the brachiocephalic artery.
5. In the human, the aorta divides to form the two common iliac arteries, which in turn give rise to external and internal iliac arteries. In the cat, the aorta divides to form the external iliac arteries, and the internal iliac arteries branch from the aorta independently.

**PART B**

1. In the human, the brachiocephalic vein is formed by the union of the internal jugular and the subclavian vein on each side. In the cat, the brachiocephalic vein is formed by the union of the external jugular and the subclavian vein on each side.
2. In the human, the internal jugular vein is somewhat larger than the external jugular vein. In the cat, the external jugular vein is larger.
3. Answers will vary as there are more than twelve correct answers. Most of the veins in the cats are also found in humans.