Laboratory Exercise 55

Cat Dissection: Cardiovascular System

Materials Needed

Preserved cat
Dissecting tray
Dissecting instruments
Disposable gloves
Human torso model

Safety

- Wear disposable gloves when working on the cat dissection.
- Dispose of tissue remnants and gloves as instructed.
- Wash the dissecting tray and instruments as instructed.
- Wash your laboratory table.
- Wash your hands before leaving the laboratory.

In this laboratory exercise, you will dissect the major organs of the cardiovascular system of the cat. As before, while you are examining the organs of the cat, compare them with the corresponding organs of the human torso model.

If the cardiovascular system of the cat has been injected, the arteries will be filled with red latex, and the veins will be filled with blue latex. This will make it easier for you to trace the vessels as you dissect them.

Purpose of the Exercise

To examine the major organs of the cardiovascular system of the cat and to compare them with the corresponding organs of the human torso model.

LEARNING OUTCOMES

After completing this exercise, you should be able to

1. Locate and identify the major organs of the cardiovascular system of the cat.
2. Compare the features of the cardiovascular system of the cat with those of the human.
3. Identify the corresponding organs in the human torso model.

EXPLORE

Procedure A—The Arterial System

1. Place the preserved cat in the dissecting tray with its ventral surface up.
2. Open the thoracic cavity, and expose its contents. To do this, follow these steps:
   a. Make a longitudinal incision passing anteriorly from the diaphragm along one side of the sternum. Continue the incision through the neck muscles to the mandible. Try to avoid damaging the internal organs as you cut.
   b. Make a lateral cut on each side along the anterior surface of the diaphragm, and cut the diaphragm loose from the thoracic wall.
   c. Spread the sides of the thoracic wall outward, and use a scalpel to make a longitudinal cut along each side of the inner wall of the rib cage to weaken the ribs. Continue to spread the thoracic wall laterally to break the ribs so that the flaps of the wall will remain open (figs. 55.1 and 55.2).
3. Note the location of the heart and the large blood vessels associated with it. Slit the outer *parietal pericardium* that surrounds the heart by cutting with scissors along the midventral line. Note how this membrane is connected to the *visceral pericardium* that is attached to the surface of the heart. Locate the *pericardial cavity*, the space between the two layers of the pericardium.
4. Examine the heart and closely associated blood vessels (figs. 55.1, 55.3, and 55.4). The arrangement of blood vessels coming off the aortic arch is different in the cat than in the human body. Locate the following:

right atrium
left atrium
right ventricle
left ventricle
pulmonary trunk
aorta
coronary arteries

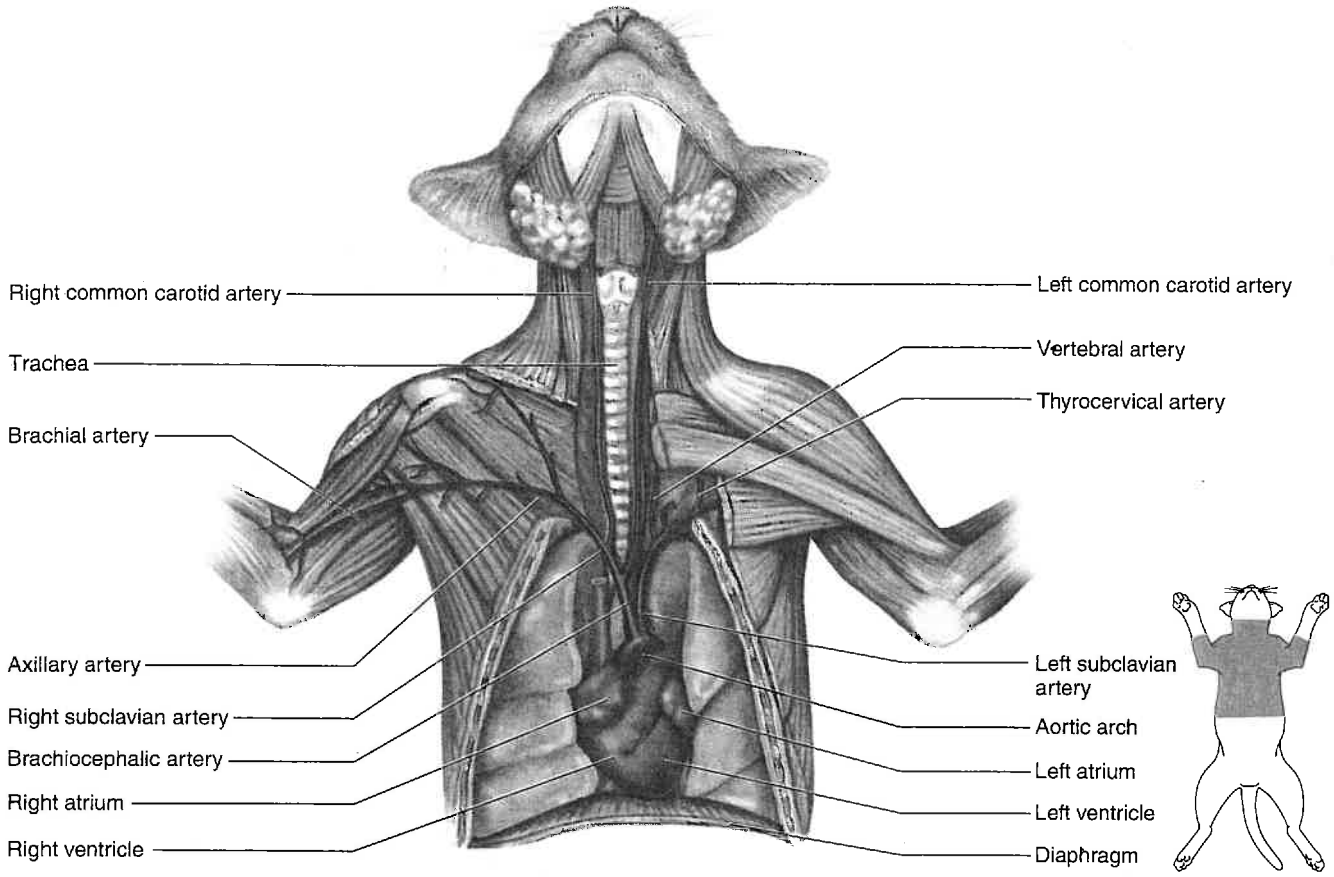


Figure 55.1 Arteries of the cat's thorax, neck, and forelimb.

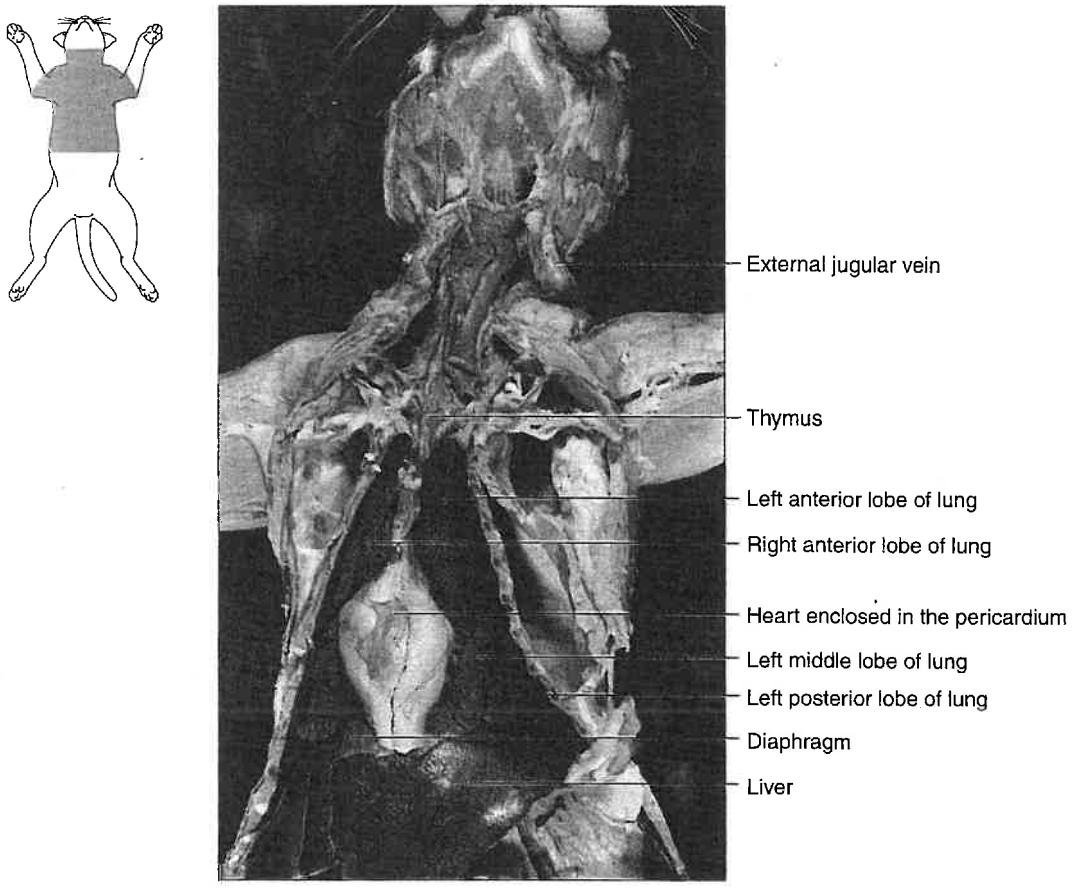


Figure 55.2 Features of the cat's neck and thoracic cavity.

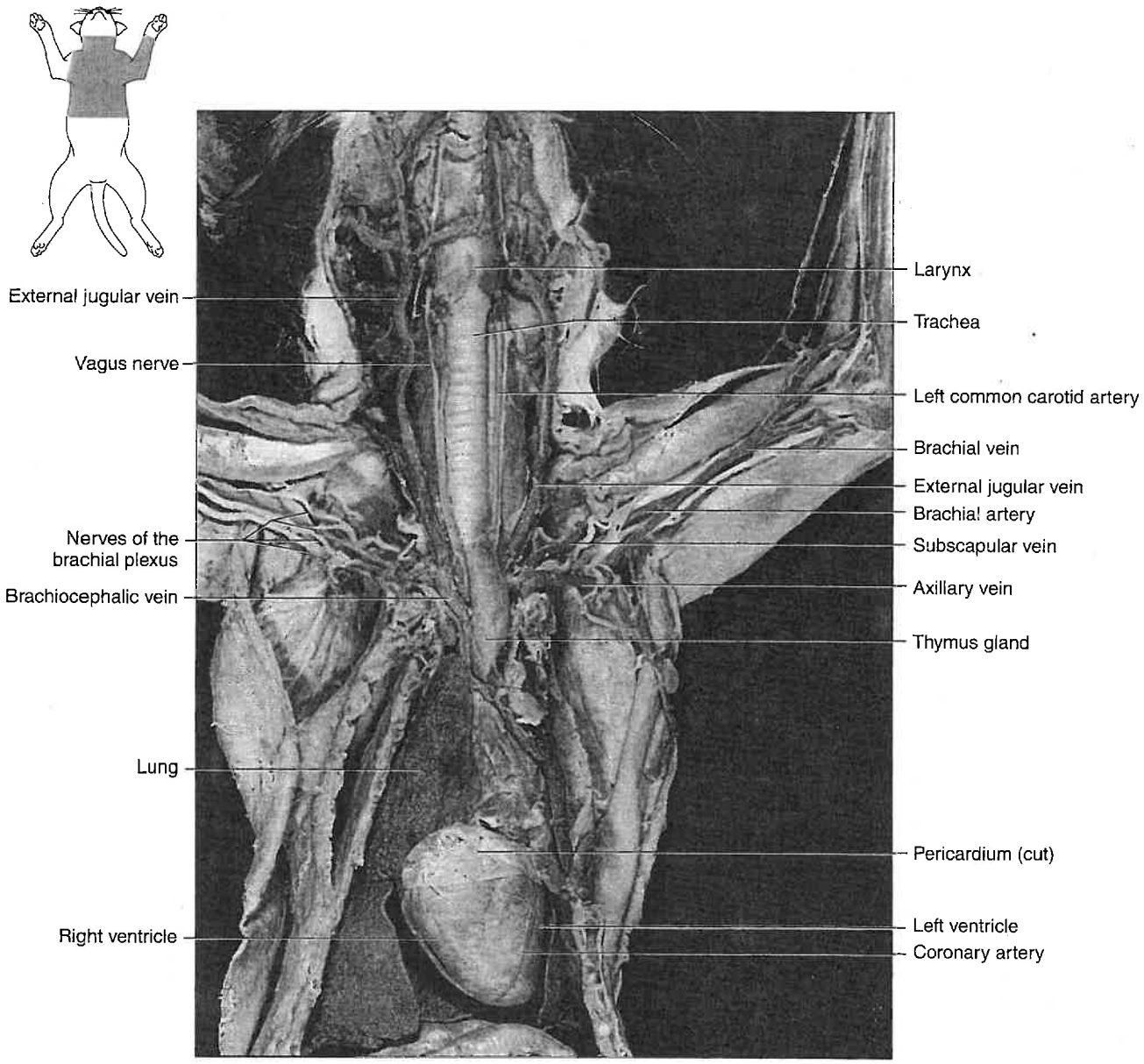


Figure 55.3 Blood vessels of the cat's upper forelimb and neck.

5. Use a scalpel to open the heart chambers by making a cut along the frontal plane from its apex to its base. Remove any remaining latex from the chambers. Examine the valves between the chambers, and note the relative thicknesses of the chamber walls (fig. 55.4). Do not remove the heart as it is needed for future examination of the relationship between major blood vessels.
6. Using figures 55.1, 55.3, and 55.4 as guides, locate and dissect the following arteries of the thorax and neck:

   aortic arch

   brachiocephalic artery (on right only; first branch of the aortic arch)

   right subclavian artery
   left subclavian artery
   right common carotid artery
   left common carotid artery

7. Trace the right subclavian artery into the forelimb, and locate the following arteries:

   vertebral artery
   thyrocervical artery
   subscapular artery
   axillary artery
   brachial artery

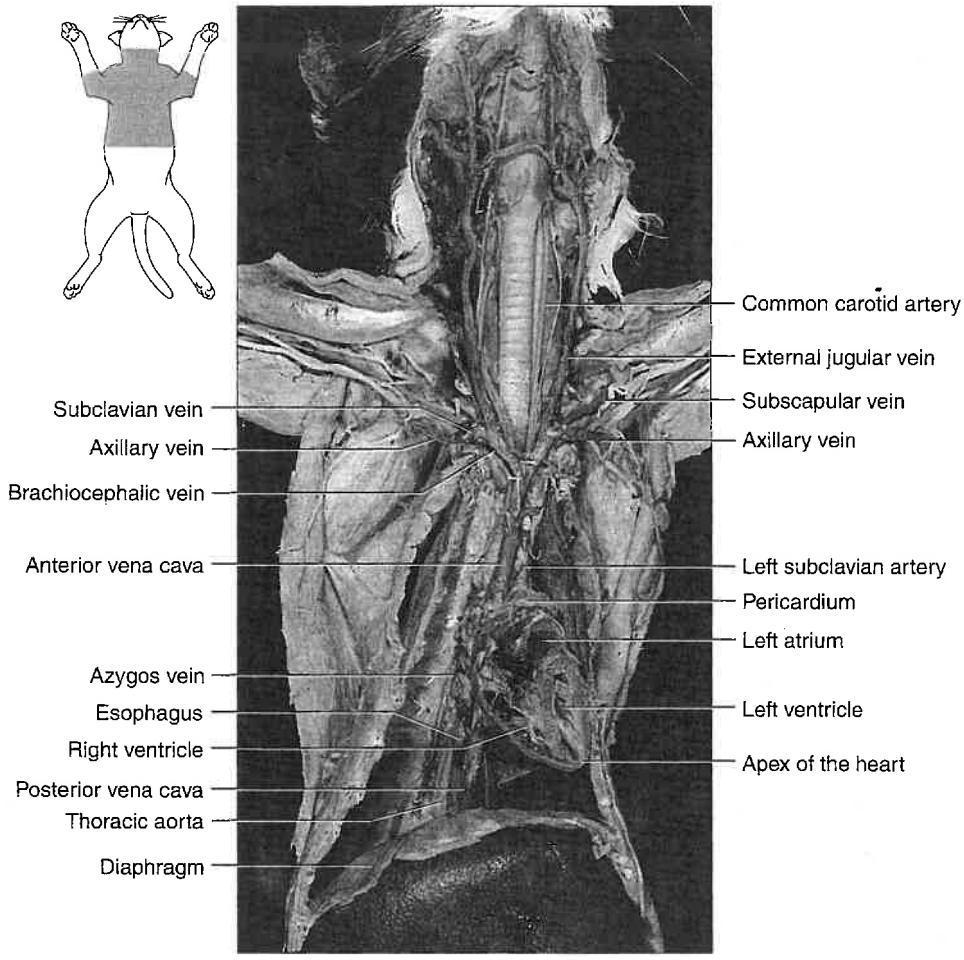


Figure 55.4 Blood vessels of the cat's neck and thorax.

8. Open the abdominal cavity. To do this, follow these steps:
   - **a.** Use scissors to make an incision through the body wall along the midline from the symphysis pubis to the diaphragm.
   - **b.** Make a lateral incision through the body wall along either side of the inferior border of the diaphragm and along the bases of the thighs.
   - **c.** Reflect the flaps created in the body wall as you would open a book, and expose the contents of the abdominal cavity.
   - **d.** Note the *parietal peritoneum* that forms the inner lining of the abdominal wall. Also note the *greater omentum*, a structure composed of a double layer of peritoneum that hangs from the border of the stomach and covers the lower abdominal organs like a fatty apron (fig. 55.5).
9. As you expose and dissect blood vessels, try not to destroy other visceral organs needed for future studies.

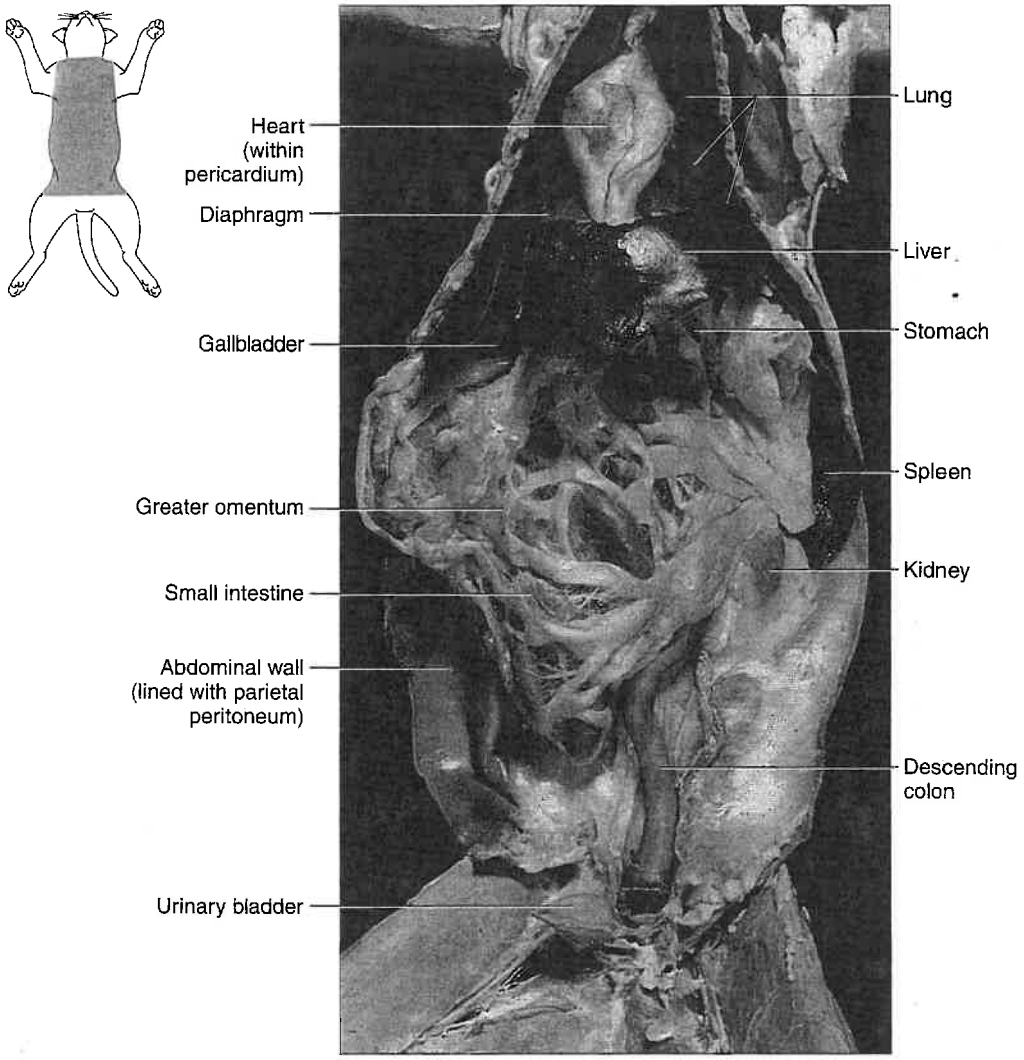


Figure 55.5 Organs of the cat's thoracic and abdominal cavities.

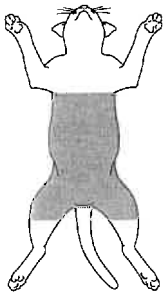
Using figures 55.6, 55.7, and 55.8 as guides, locate and dissect the following arteries of the abdomen:

abdominal aorta (unpaired)
celiac artery (unpaired)
hepatic artery (unpaired)
gastric artery (unpaired)
splenic artery (unpaired)
anterior mesenteric artery (corresponds to superior mesenteric artery)
renal arteries (paired)
adrenolumbar arteries (paired)
gonadal arteries (paired)
posterior mesenteric artery (corresponds to inferior mesenteric artery)
iliolumbar arteries (paired)
external iliac arteries (paired)
internal iliac arteries (paired)
caudal artery (unpaired)

10. Trace the external iliac artery into the right hindlimb (fig. 55.9), and locate the following:

    femoral artery
    deep femoral artery

11. Review the locations of the heart structures and arteries of the cat without the aid of the figures. 1
12. Examine the human torso model along with figures 55.1, 55.4, 55.6, and 55.8. Identify the arteries of the cat that correspond with those of the human. 3
13. Complete Part A of Laboratory Report 55.



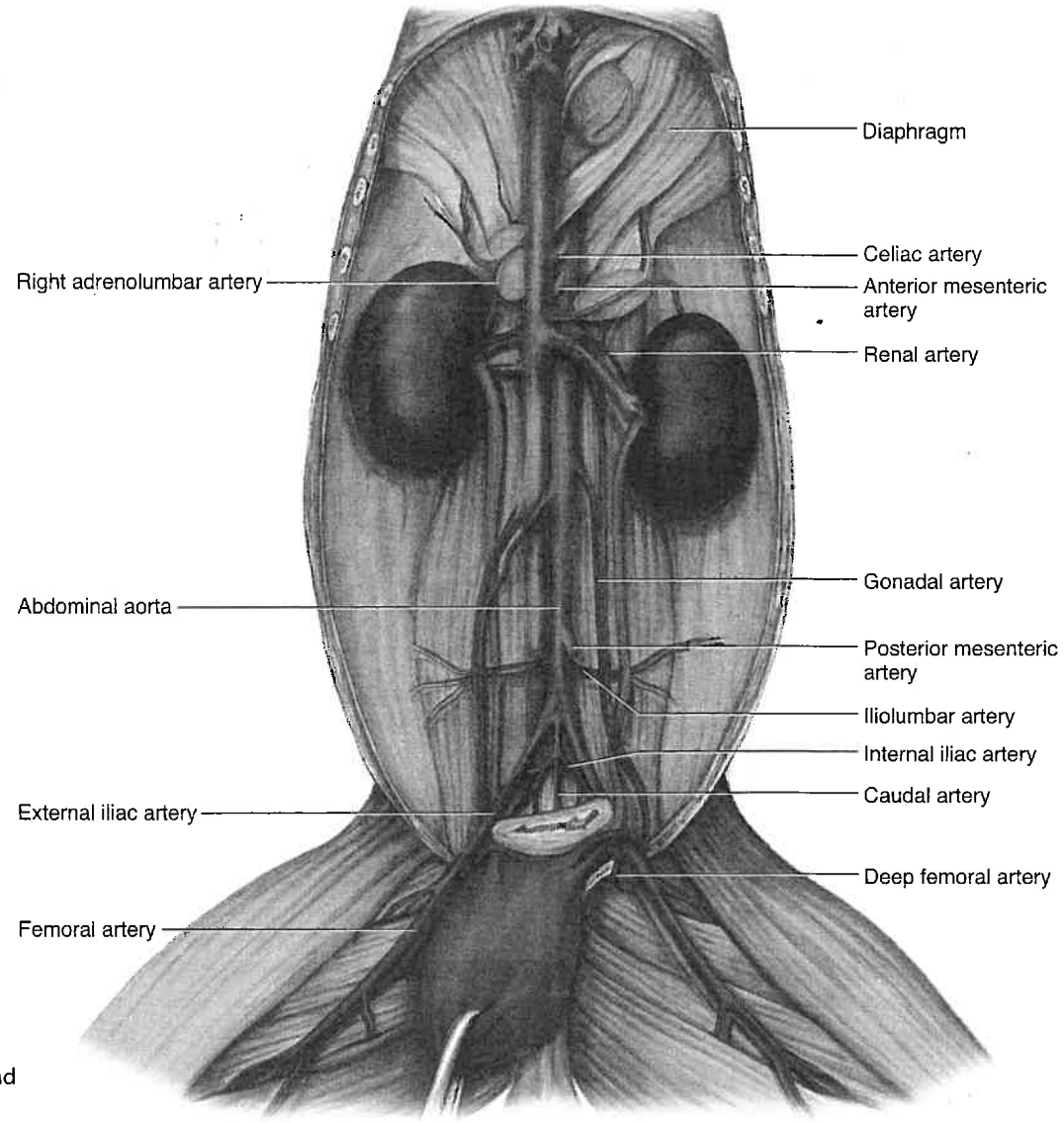


Figure 55.6 Arteries of the cat's abdomen and hindlimb.

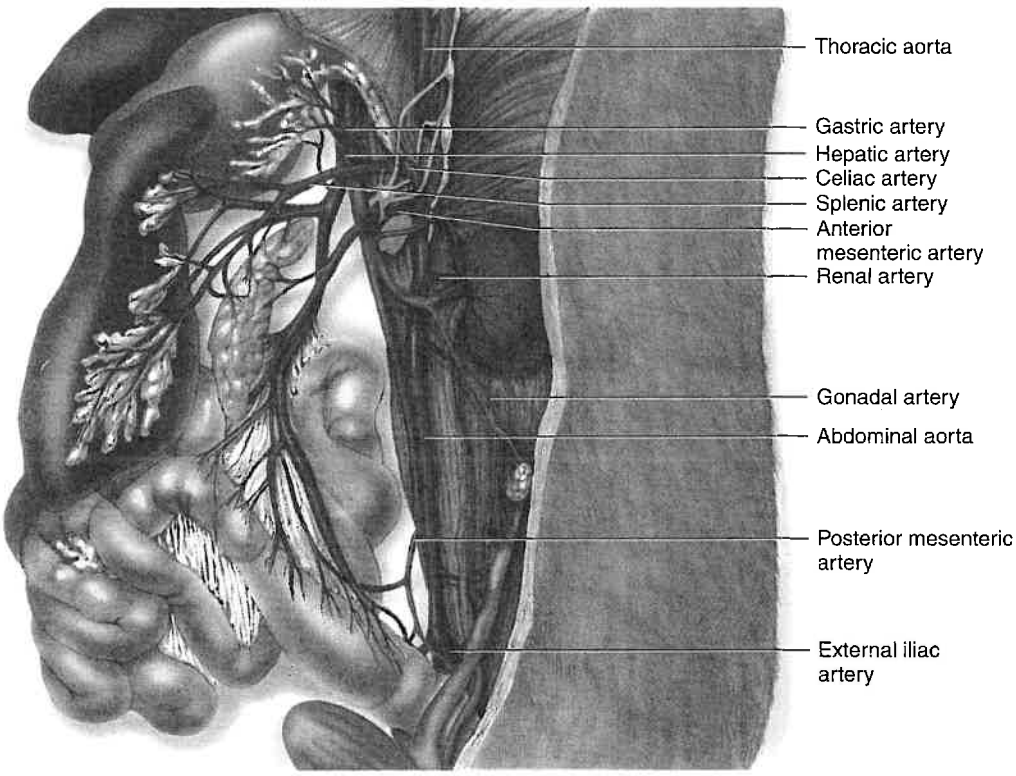


Figure 55.7 Arteries of the cat's abdomen, left lateral view.

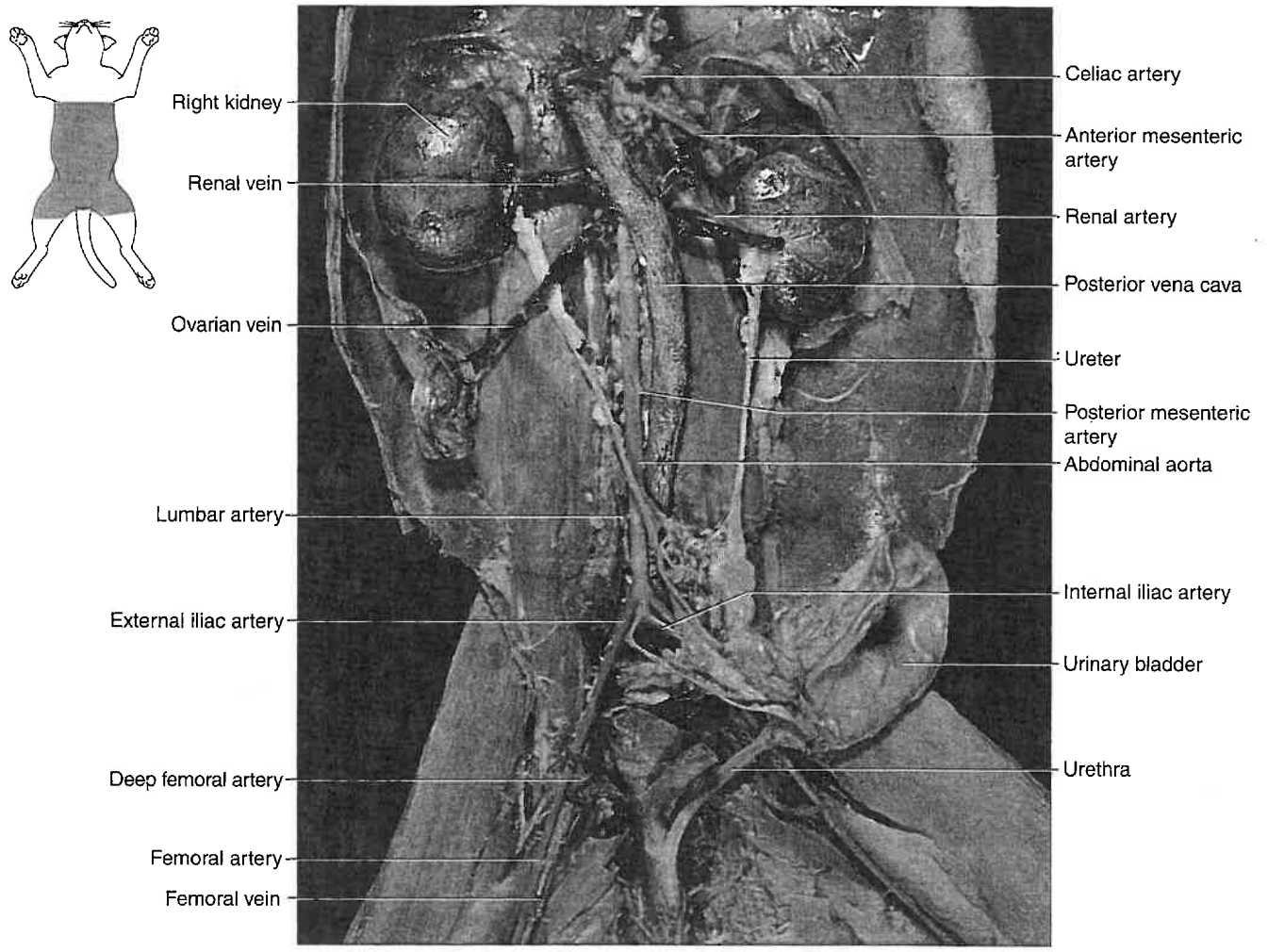


Figure 55.8 Blood vessels of the cat's abdominal cavity, with the digestive organs removed.

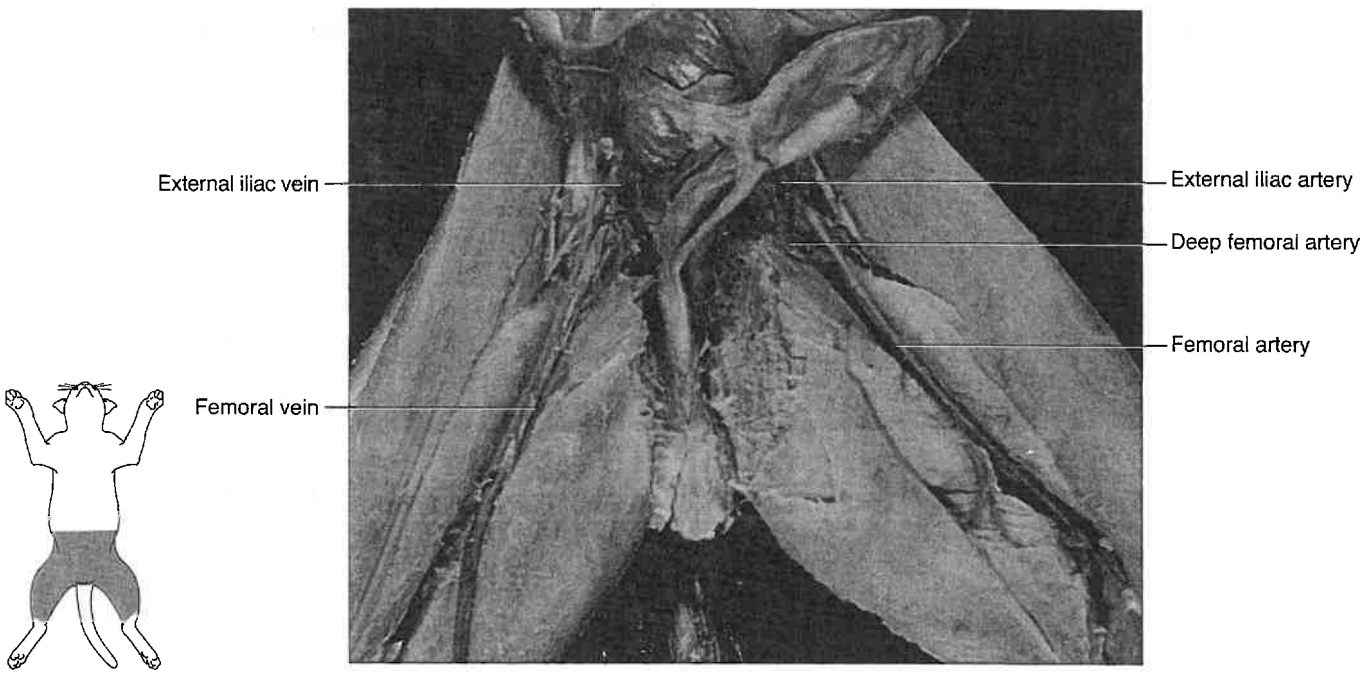


Figure 55.9 Blood vessels of the cat's upper hindlimb.

EXPLORE

Procedure B—The Venous System

1. Examine the heart again, and locate the following veins:

anterior vena cava (corresponds to superior vena cava)

posterior vena cava (corresponds to inferior vena cava)

pulmonary veins

2. Using figures 55.3, 55.4, and 55.10 as guides, locate and dissect the following veins in the thorax and neck:

right brachiocephalic vein
left brachiocephalic vein
right subclavian vein
left subclavian vein
internal jugular vein
external jugular vein

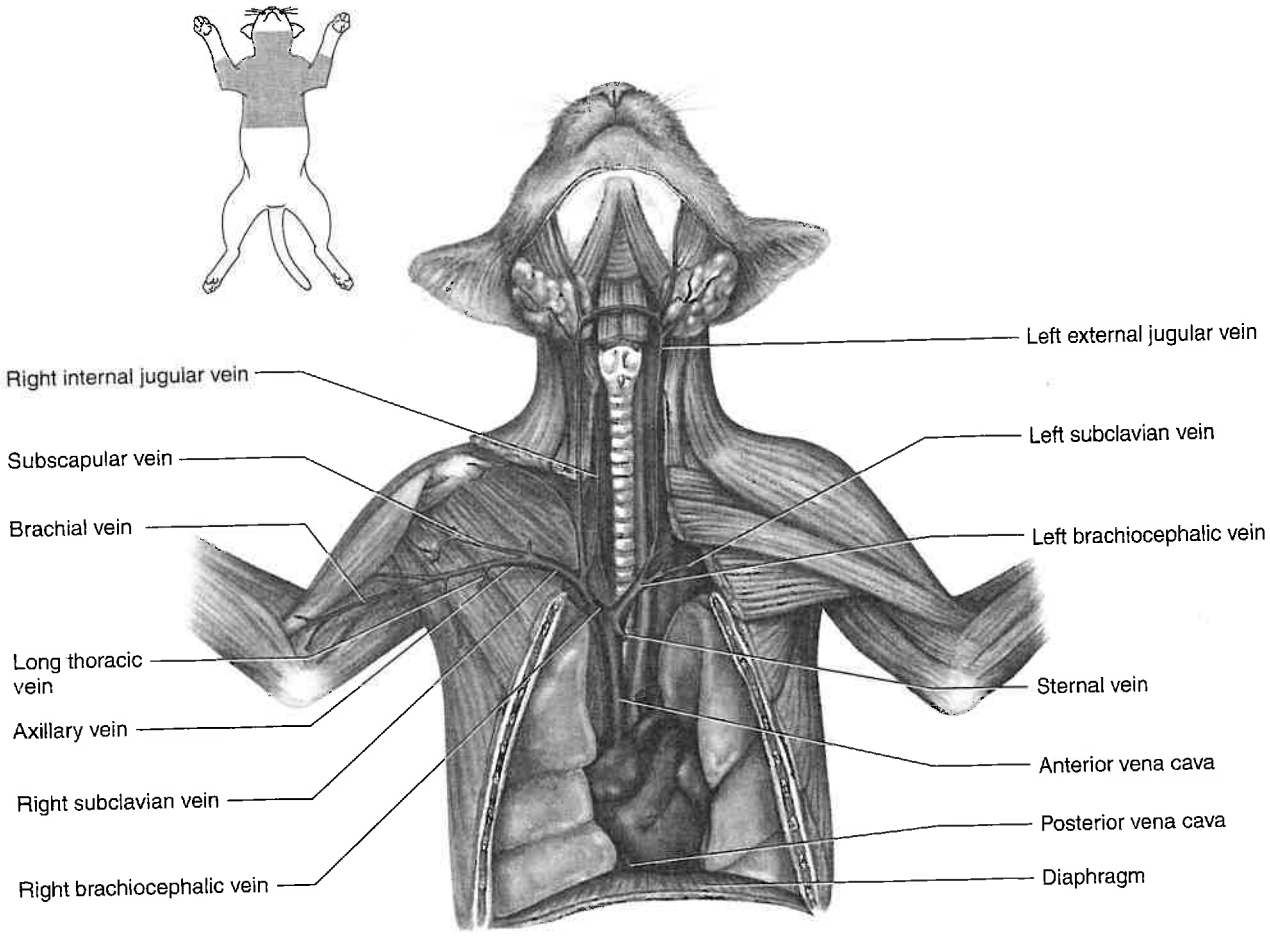


Figure 55.10 Veins of the cat's thorax, neck, and forelimb.

3. Trace the right subclavian vein into the forelimb, and locate the following veins:

   axillary vein
   subscapular vein
   brachial vein

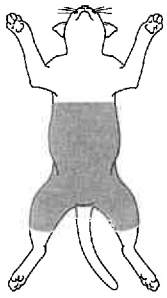
4. Using figures 55.8, 55.11, and 55.12 as guides, locate and dissect the following veins in the abdomen:

   posterior vena cava
   adrenolumbar vein
   anterior mesenteric vein (corresponds to superior mesenteric vein)
   posterior mesenteric vein (corresponds to inferior mesenteric vein)
   hepatic portal vein
   splenic vein
   renal vein
   gonadal vein
   iliolumbar vein
   common iliac vein
   internal iliac vein
   external iliac vein

5. Trace the external iliac vein into the hindlimb (fig. 55.9), and locate the following veins:

   femoral vein
   deep femoral vein

6. Review the locations of the veins of the cat without the aid of the figures. 1
7. Examine the human torso model along with figures 55.4, 55.8, 55.10, and 55.11. Identify the veins of the cat that correspond with those of the human. 3
8. Complete Part B of the laboratory report.



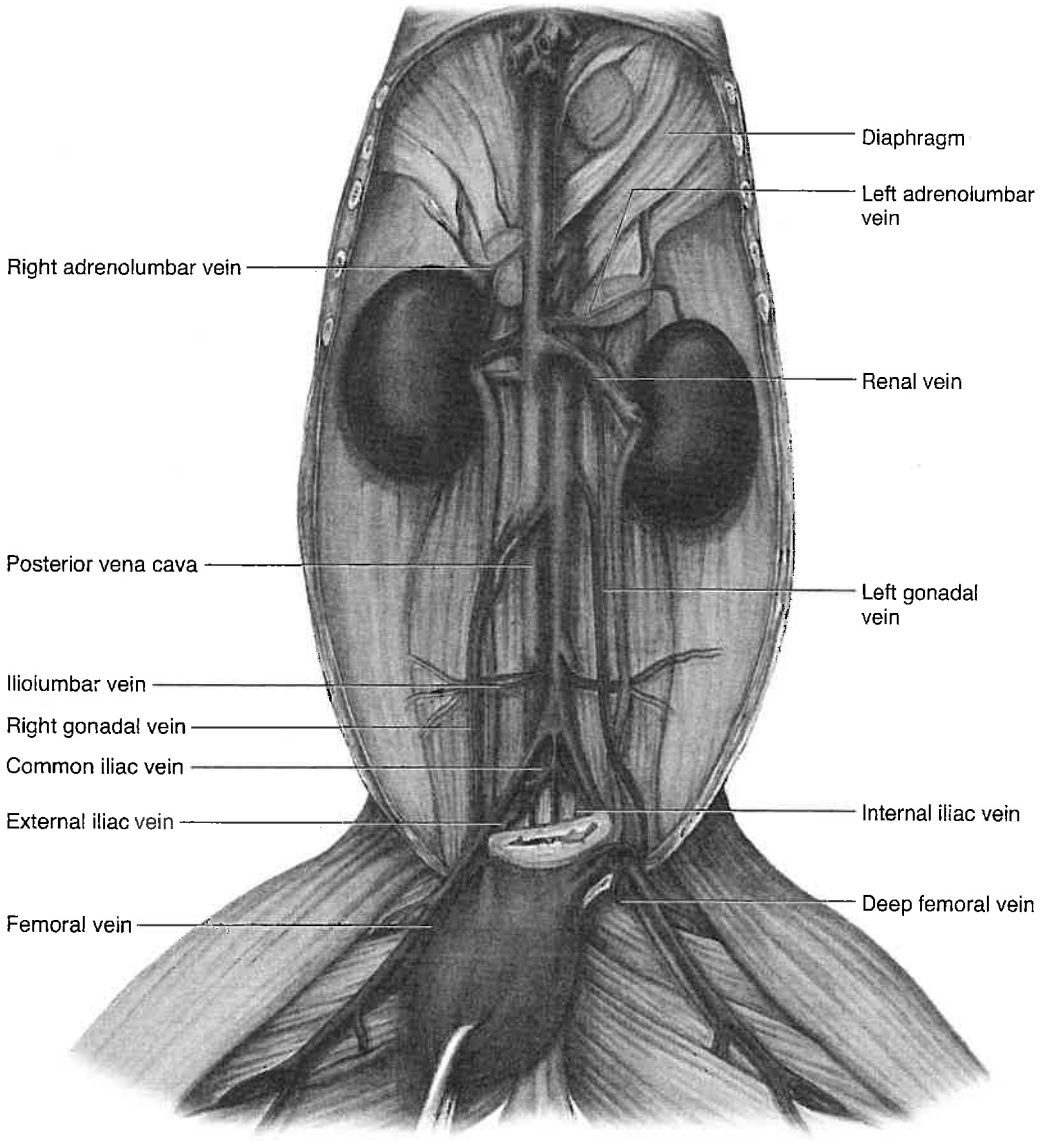


Figure 55.11 Veins of the cat's abdomen and hindlimb.

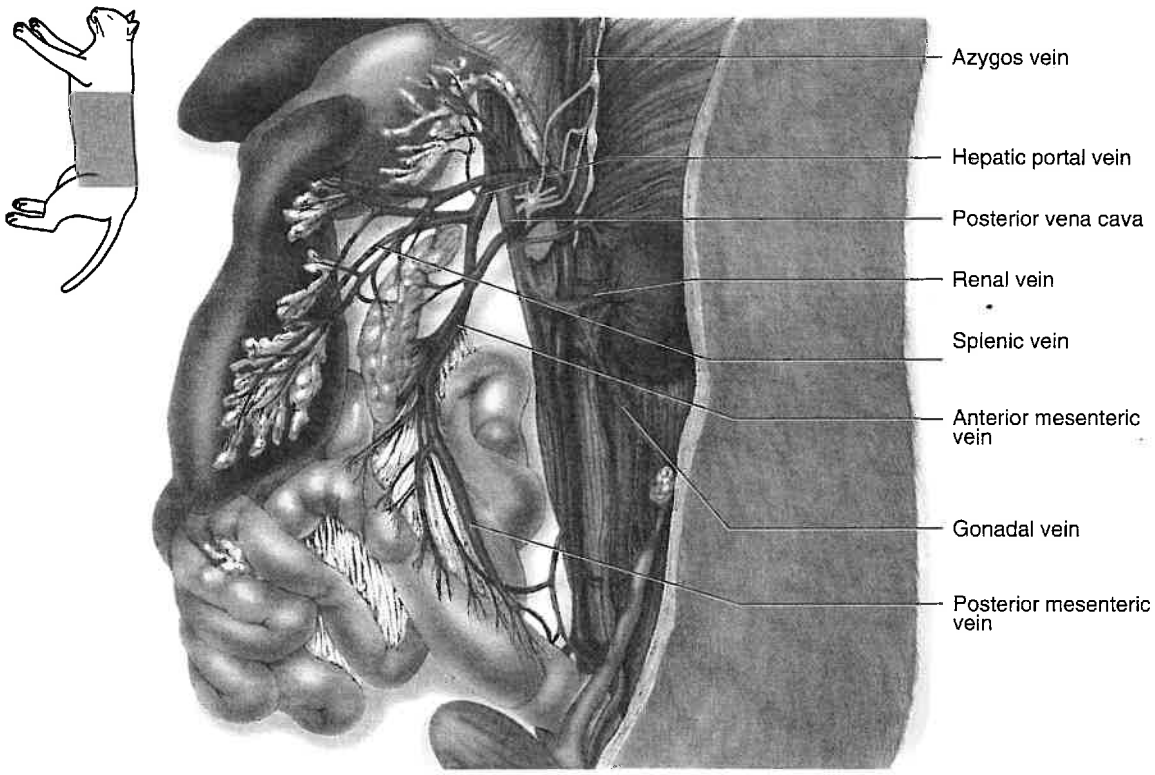


Figure 55.12 Veins of the cat's abdomen and hindlimb.