

# *Circulatory system*

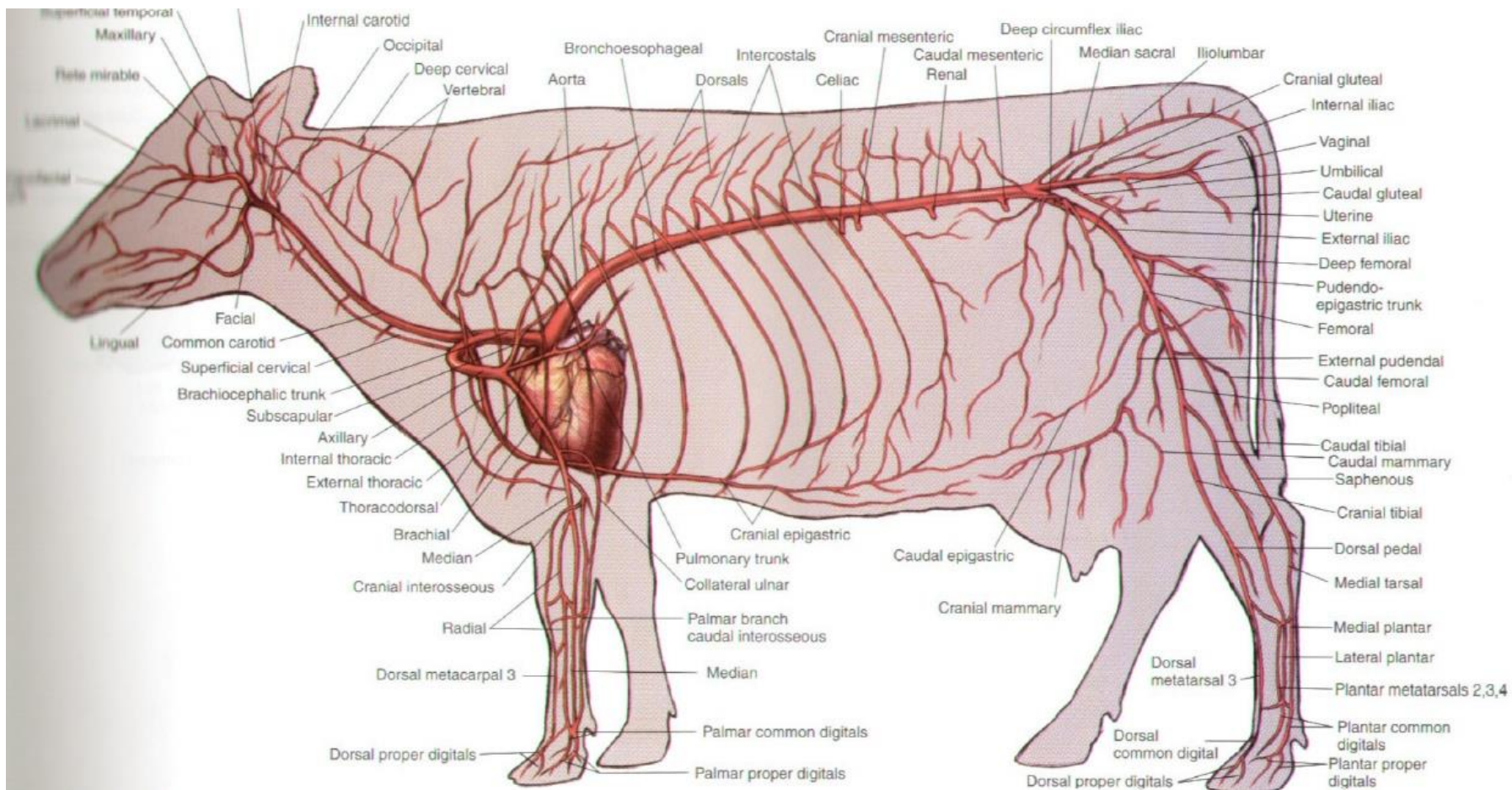
Cardiovascular system

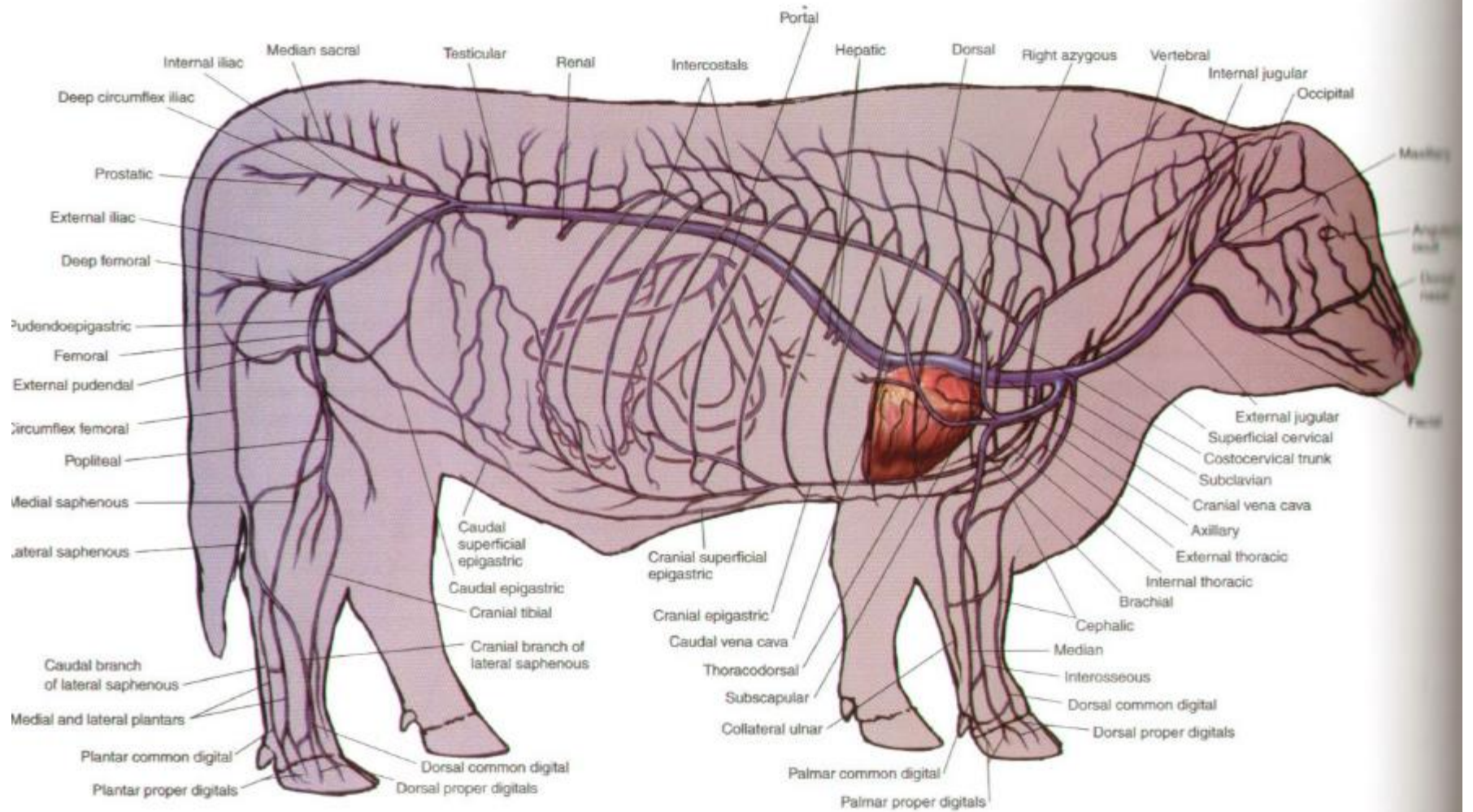
A-Heart

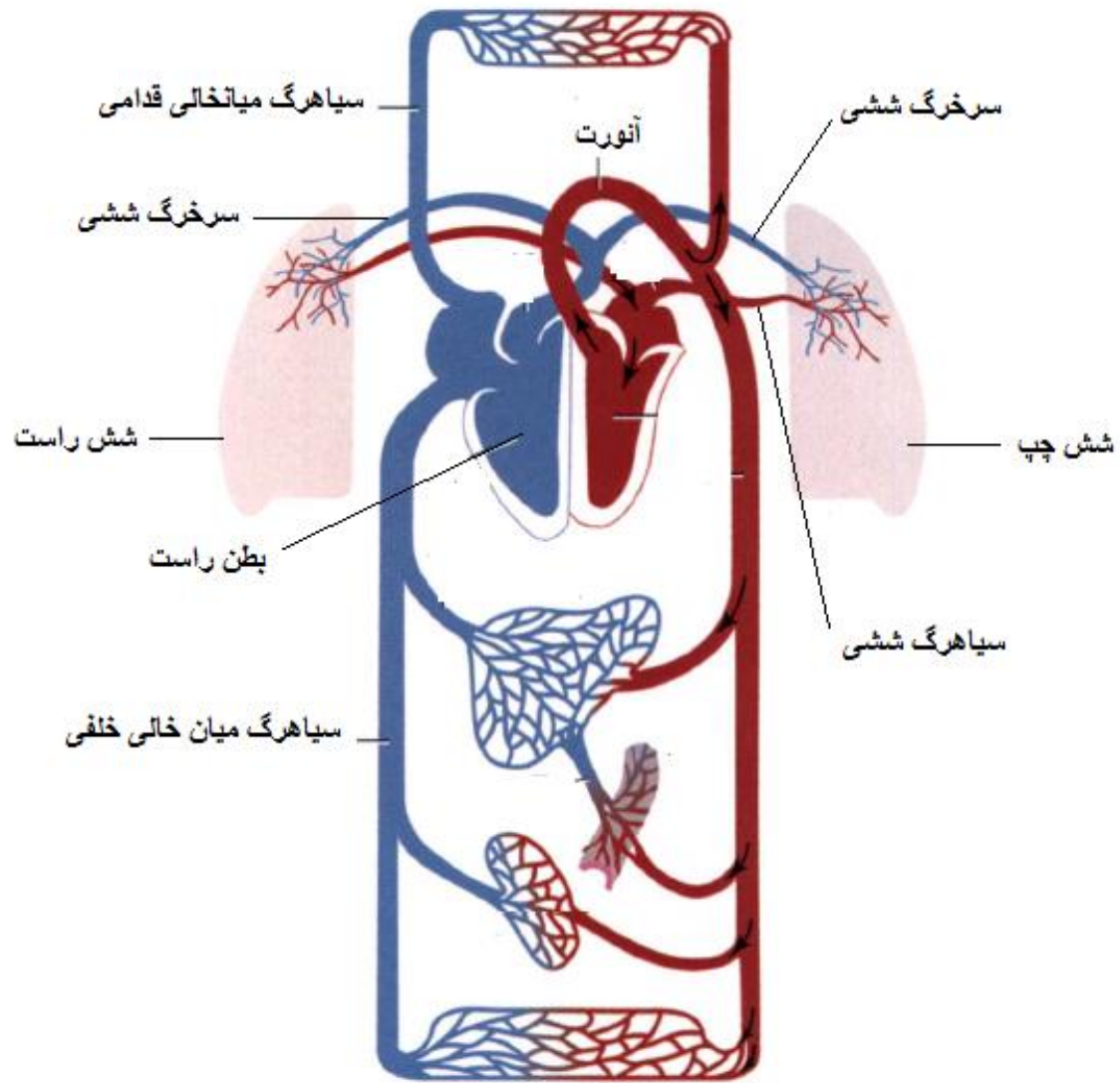
B-Blood vessels(Artery-Vein-Capillary)

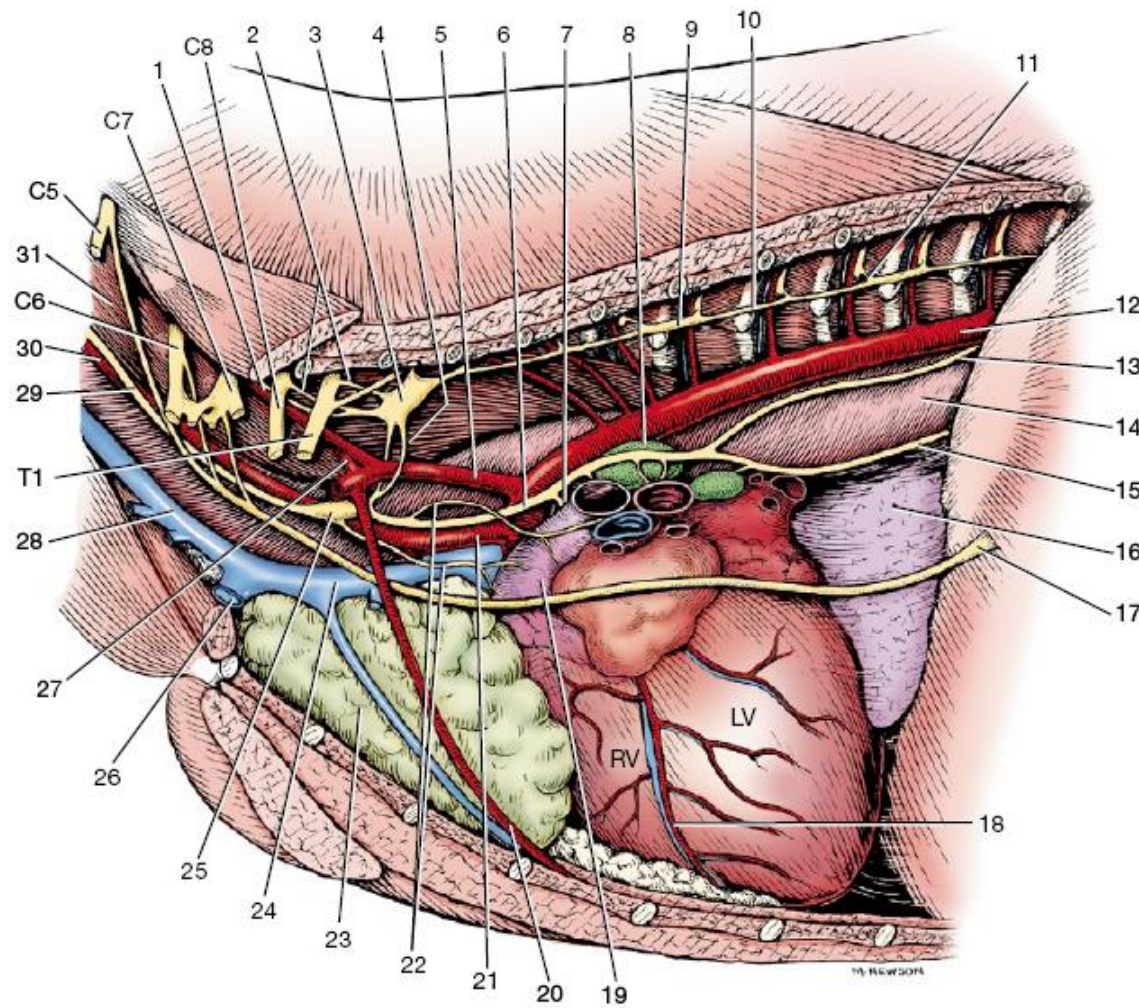
Lymphatic system



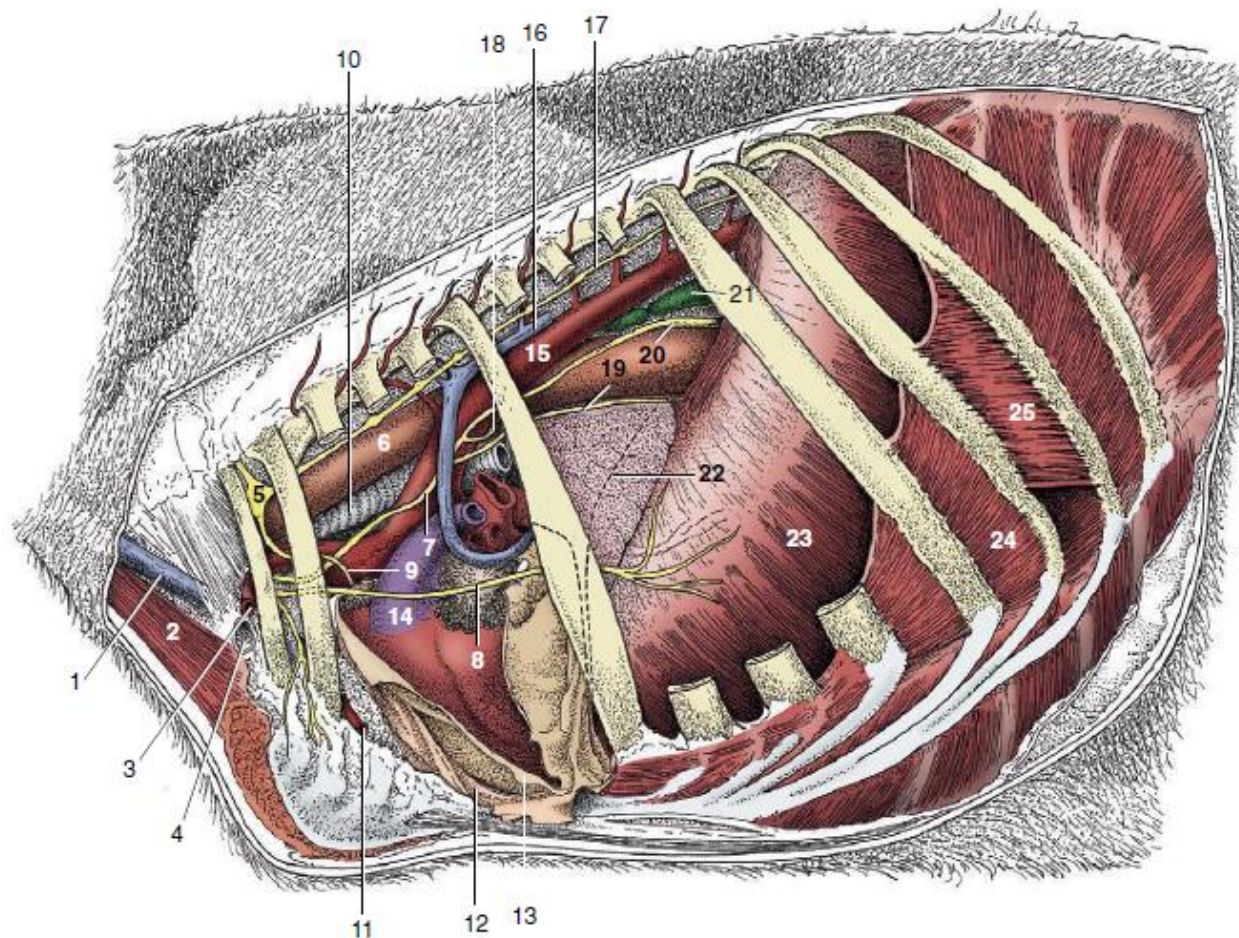




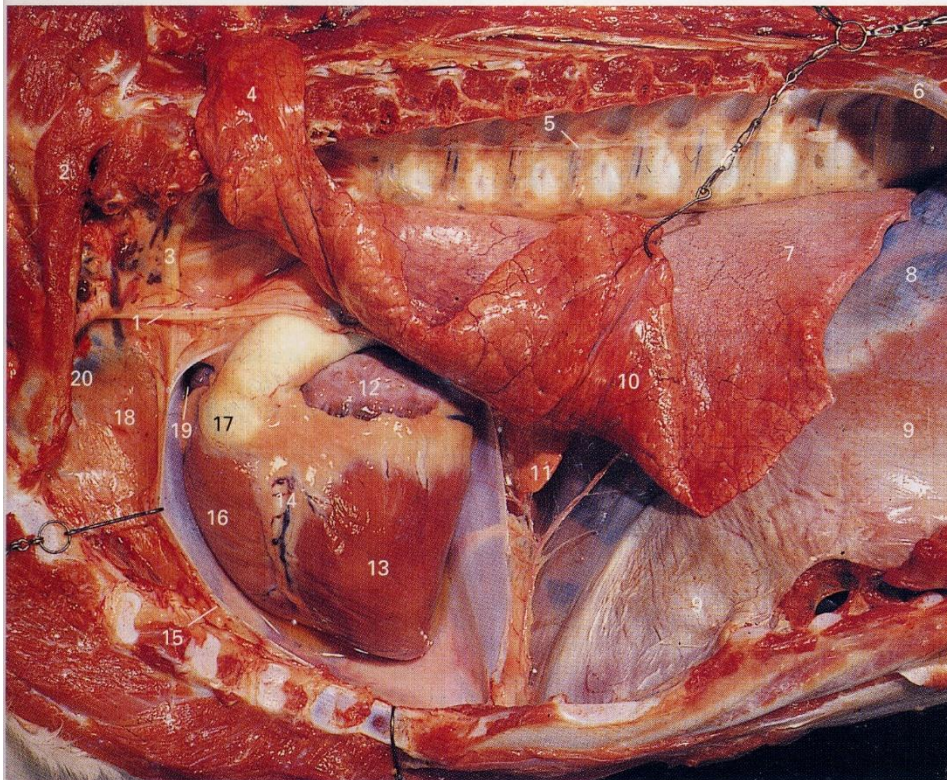




1. Vertebral artery and nerve
2. Communicating rami from cervicothoracic ganglion to ventral branches of cervical and thoracic nerves
3. Left cervicothoracic ganglion
4. Ansa subclavia
5. Left subclavian artery
6. Left vagus nerve
7. Left recurrent laryngeal nerve
8. Left tracheobronchial lymph node
9. Sympathetic trunk ganglion
10. Sympathetic trunk
11. Ramus communicans
12. Aorta
13. Dorsal branch of vagus nerve
14. Esophagus
15. Ventral trunk of vagus nerve
16. Accessory lobe of lung (through caudal mediastinum)
17. Phrenic nerve to diaphragm
18. Paraconal interventricular a., v., and groove
19. Pulmonary trunk
20. Internal thoracic artery and vein
21. Brachiocephalic trunk
22. Cardiac autonomic nerves
23. Thymus
24. Cranial vena cava
25. Middle cervical ganglion
26. Left subclavian vein
27. Costocervical trunk
28. External jugular vein
29. Vagosympathetic trunk
30. Common carotid artery
31. Longus colli muscle

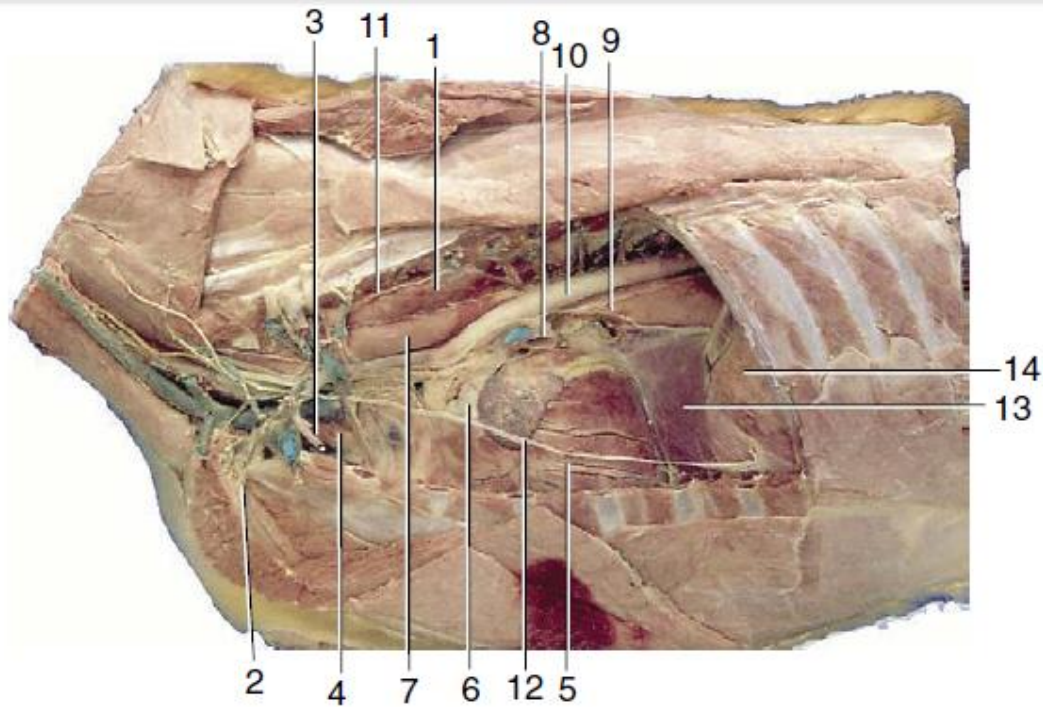


**Figure 27-3** Left lateral view of the bovine thoracic cavity. The left lung and part of the mediastinal pleura have been removed. 1, External jugular vein; 2, sternocephalicus; 3, axillary artery; 4, axillary vein; 5, cervicothoracic ganglion; 6, esophagus; 7, vagus; 8, phrenic nerve; 9, one of the cardiac nerves; 10, trachea; 11, internal thoracic artery; 12, mediastinal pleura; 13, pericardium, reflected; 14, pulmonary trunk; 15, aorta; 16, left azygous vein; 17, sympathetic chain; 18, recurrent laryngeal nerve; 19, ventral vagal trunk; 20, dorsal vagal trunk; 21, caudal mediastinal lymph nodes; 22, cranial extent of diaphragm; 23, diaphragm; 24, internal intercostal muscle; 25, external intercostal muscle.



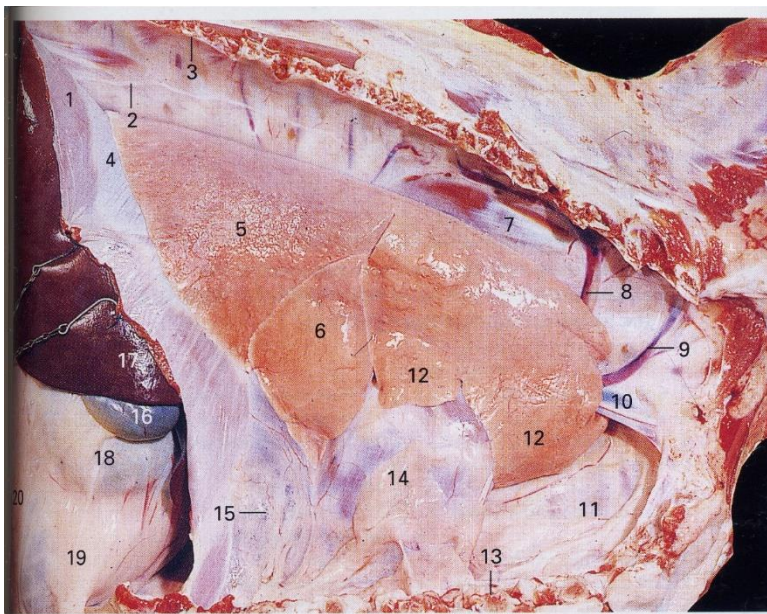
**237. Left view of the thorax of a horse. Ribs 2–12 and the associated soft tissues have been removed to expose the thoracic viscera. The left side of the pericardial sac has been removed and the lung has been reflected dorsally.**

- |  |   |
|--|---|
| 1 Vagosympathetic trunk  | 11 Accessory lobe of the right lung seen through the caudal mediastinum |
| 2 Rib 1  | 12 Left auricle   |
| 3 Costocervical trunk  | 13 Left ventricle   |
| 4 Reflected cranial lobe of the left lung                            | 14 Paraconal interventricular groove                                    |
| 5 Sympathetic trunk  | 15 Cut edge of the pericardial sac                                      |
| 6 Rib 13   | 16 Right ventricle  |
| 7 Caudal lobe of the left lung                                       | 17 Beginning of the pulmonary trunk                                     |
| 8 Tendinous centre of the diaphragm                                  | 18 Thymus   |
| 9 Costal part of the diaphragm                                       | 19 Left extremity of the right auricle                                  |
| 10 Mediastinal surface of the reflected caudal lobe of the left lung | 20 Cranial vena cava  |



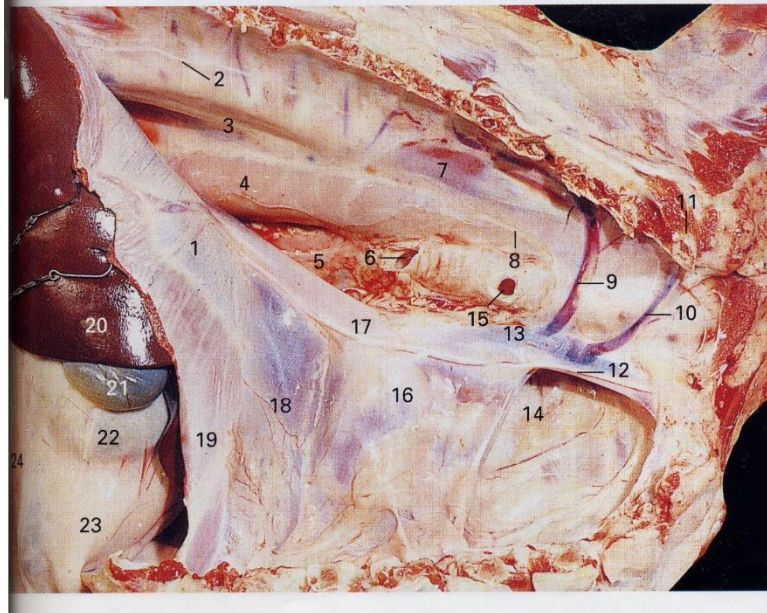
**Figure 13–14** Left lateral view of the canine thoracic cavity; the lung and much of the pericardium have been removed. 1, Longus colli; 2, left subclavian artery; 3, internal thoracic vessels; 4, thymus; 5, vessels in paraconal interventricular groove; 6, pulmonary trunk; 7, esophagus; 8, pulmonary veins entering left atrium; 9, left principal bronchus and dorsal and ventral vagal trunks; 10, aorta; 11, sympathetic trunk; 12, phrenic nerve; 13, caudal mediastinum; 14, diaphragm.





**240. Right view of the thorax of the sheep. The thoracic wall has been completely removed.**

- |  |   |
|--|---|
| 1 Peripheral muscle of the diaphragm   | 12 Cranial and caudal divisions of the cranial lobe of the right lung |
| 2 Sympathetic trunk  | 13 Cut distal end of the cartilage of rib 4                           |
| 3 Cut proximal end of rib 10   | 14 Pericardium  |
| 4 Tendinous centre of the diaphragm  | 15 Caval fold of the pleura   |
| 5 Caudal lobe of the right lung  | 16 Gall bladder   |
| 6 Middle lobe of the right lung  | 17 Right lobe of the liver  |
| 7 M. longus colli  | 18 Omasum covered by the lesser omentum                               |
| 8 Right azygos vein  | 19 Reticulum covered by the lesser omentum                            |
| 9 Costocervical trunk  | 20 Duodenum   |
| 10 Cranial vena cava   |   |
| 11 Cranial mediastinum lying against the medial aspect of the left thoracic wall |   |



**241. Right view of the thorax of the sheep. The thoracic wall and the right lung have been completely removed.**

- |  |   |
|--|---|
| 1 Tendinous centre of the diaphragm  | 15 Cut tracheal bronchus supplying the cranial lobe of the right lung |
| 2 Sympathetic trunk  | 16 Pericardium  |
| 3 Thoracic duct  | 17 Caudal vena cava accompanied by the right phrenic nerve            |
| 4 Oesophagus   | 18 Caval fold of the pleura   |
| 5 Left lung visible through the caudal mediastinum                               | 19 Costal part of the diaphragm                                       |
| 6 Cut right principal bronchus   | 20 Right lobe of the liver  |
| 7 M. longus colli  | 21 Gall bladder   |
| 8 Dorsal trunk of vagus nerve  | 22 Omasum covered by the lesser omentum                               |
| 9 Right azygos vein  | 23 Reticulum covered by the lesser omentum                            |
| 10 Costocervical trunk   | 24 Duodenum   |
| 11 Cut proximal end of rib 1   |   |
| 12 Right phrenic nerve   |   |
| 13 Cranial vena cava   |   |
| 14 Cranial mediastinum lying against the medial aspect of the left thoracic wall |   |

Pericardial cavity

Fibrous layer

Parietal layer

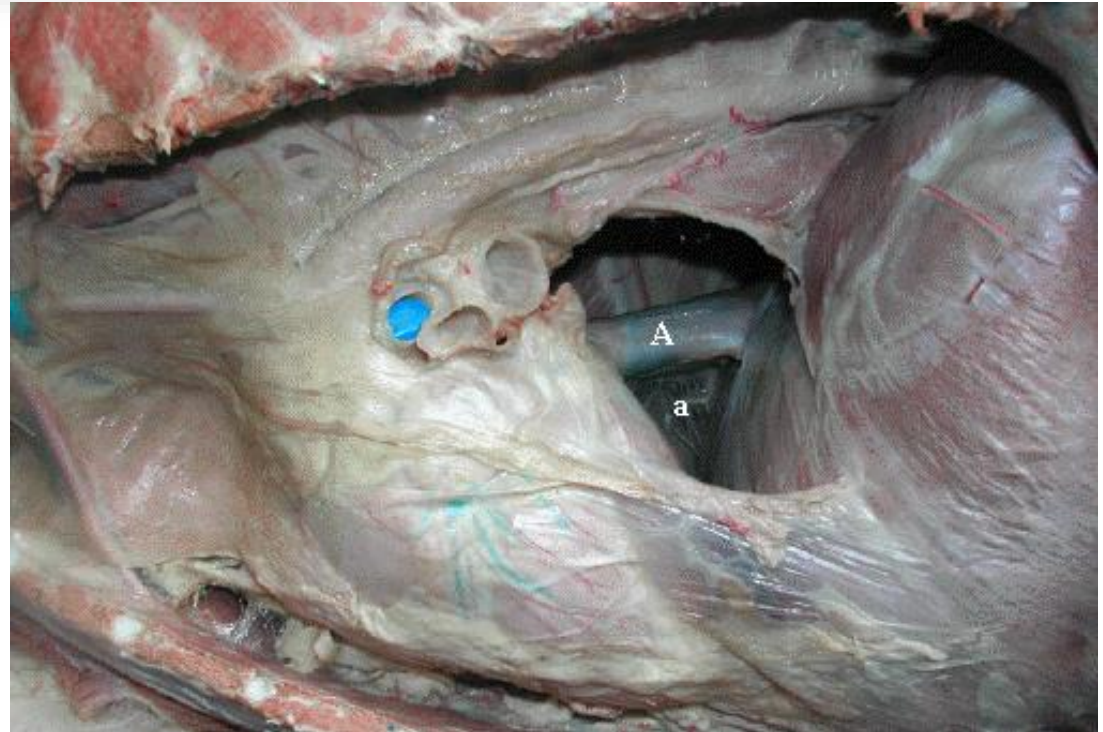
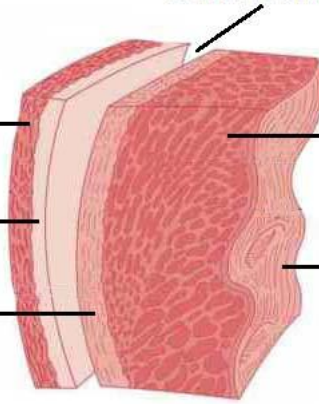
*(outer serous layer)*

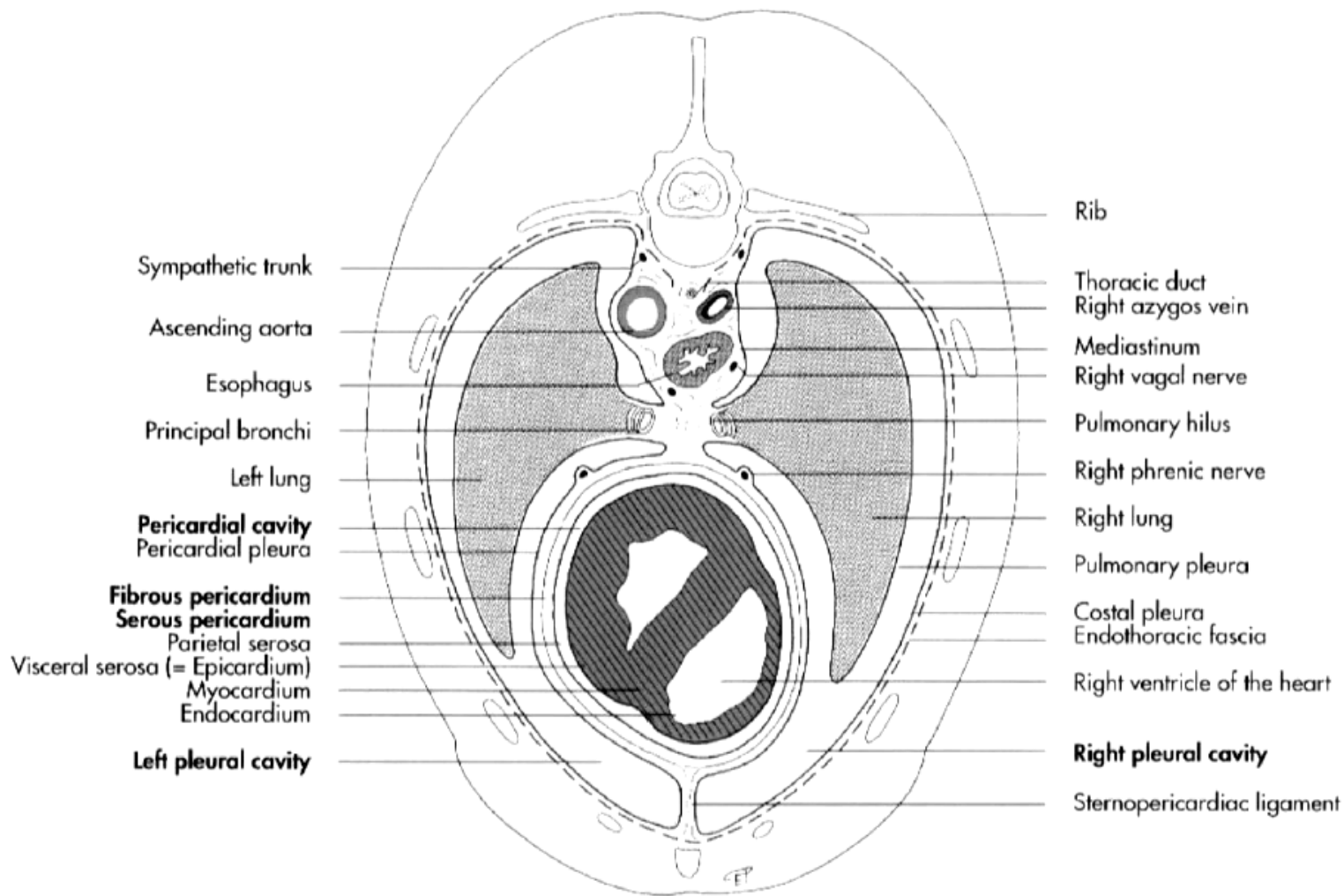
Visceral layer

*(inner serous layer)*

Myocardium

Endocardium





Sympathetic trunk

Ascending aorta

Esophagus

Principal bronchi

Left lung

**Pericardial cavity**

Pericardial pleura

**Fibrous pericardium**

**Serous pericardium**

Parietal serosa

Visceral serosa (= Epicardium)

Myocardium

Endocardium

**Left pleural cavity**

Rib

Thoracic duct

Right azygos vein

Mediastinum

Right vagal nerve

Pulmonary hilus

Right phrenic nerve

Right lung

Pulmonary pleura

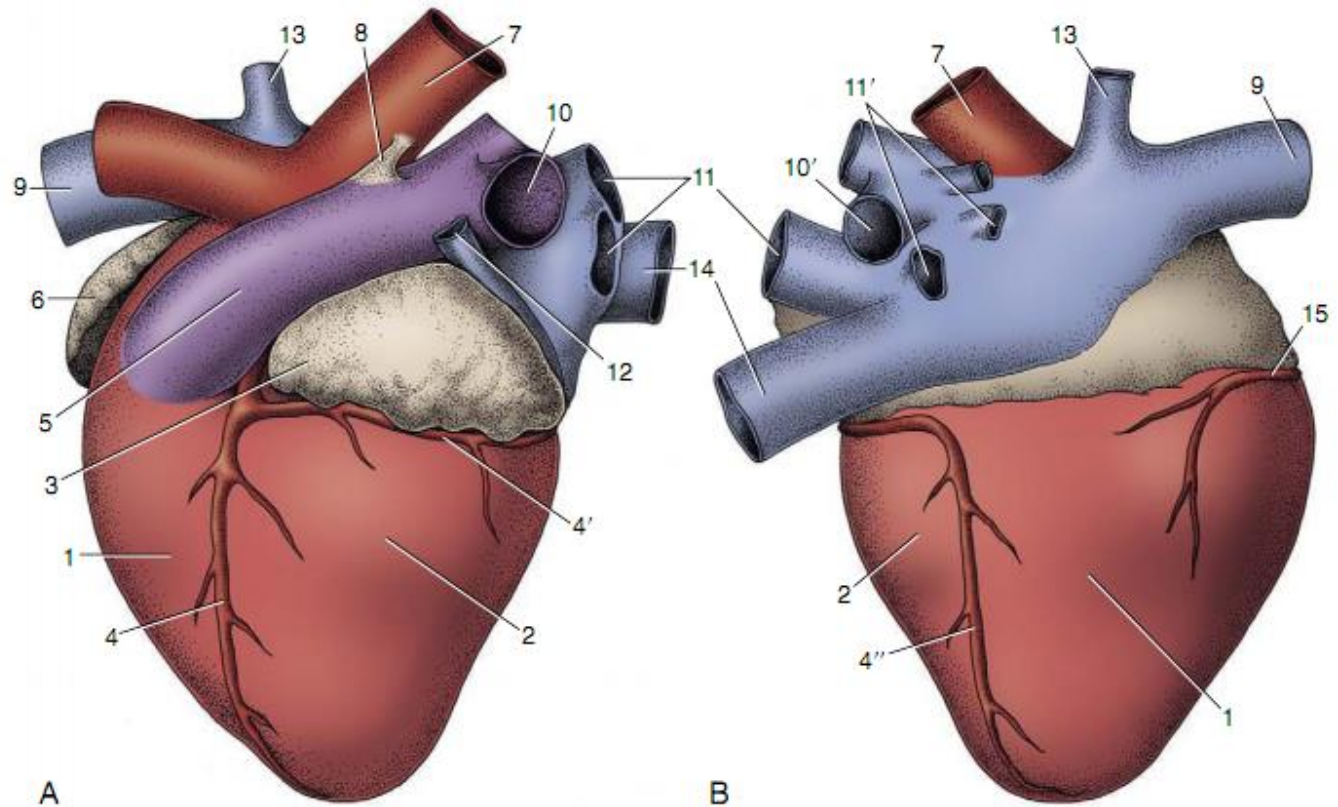
Costal pleura

Endothoracic fascia

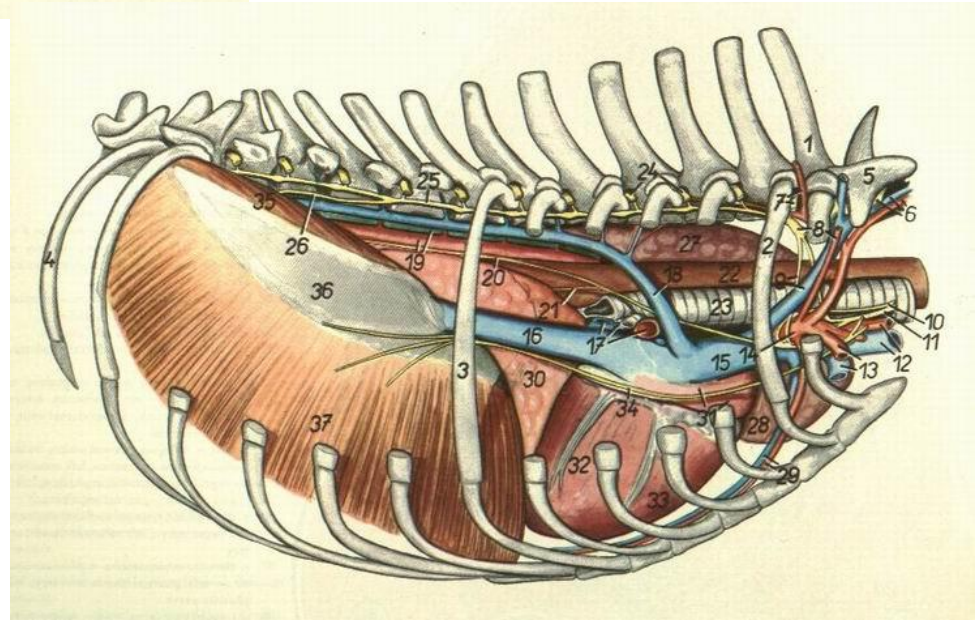
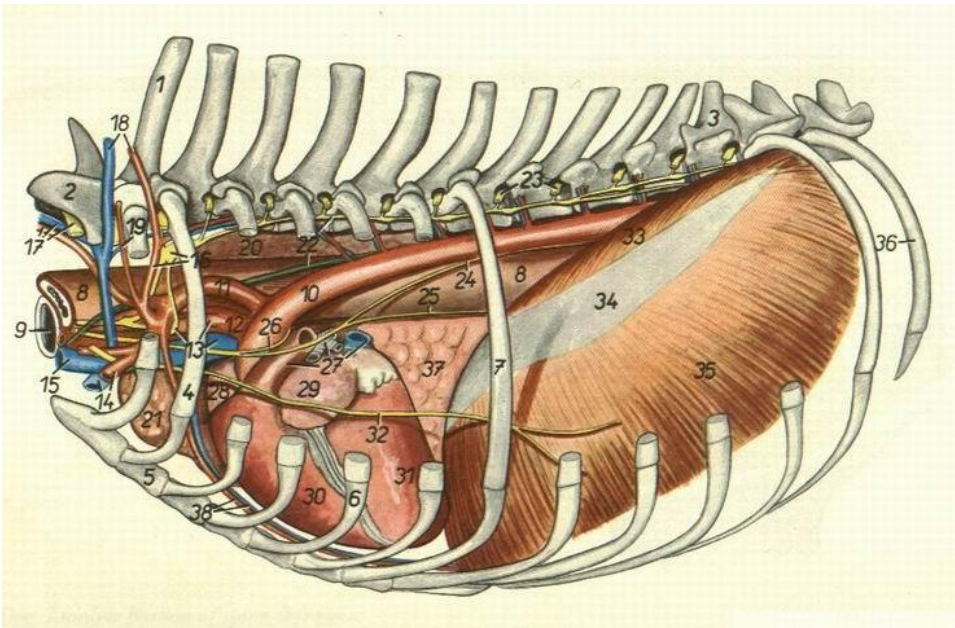
Right ventricle of the heart

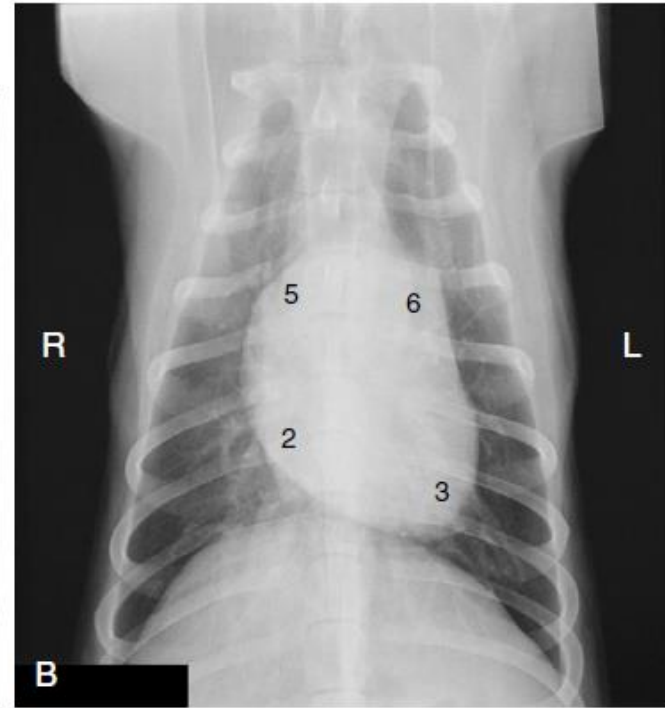
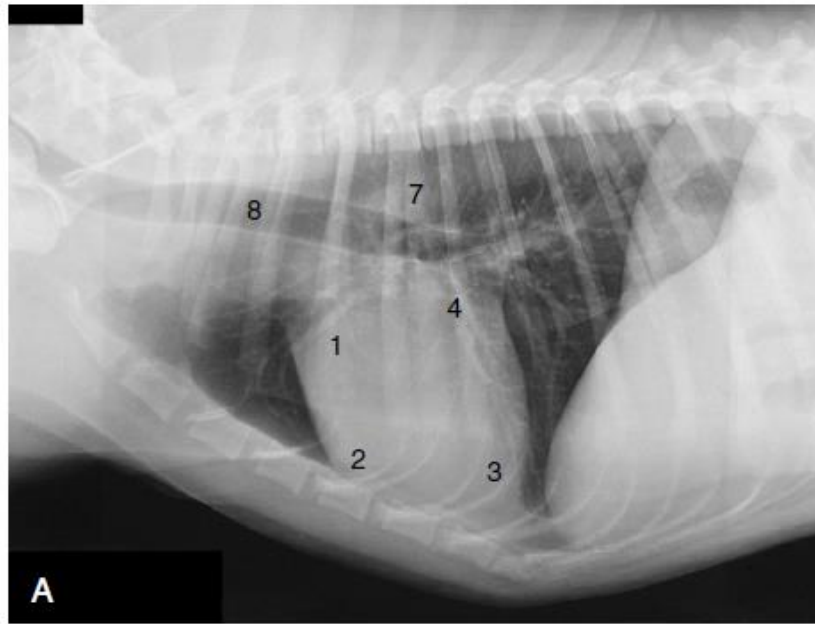
**Right pleural cavity**

Sternopericardiac ligament

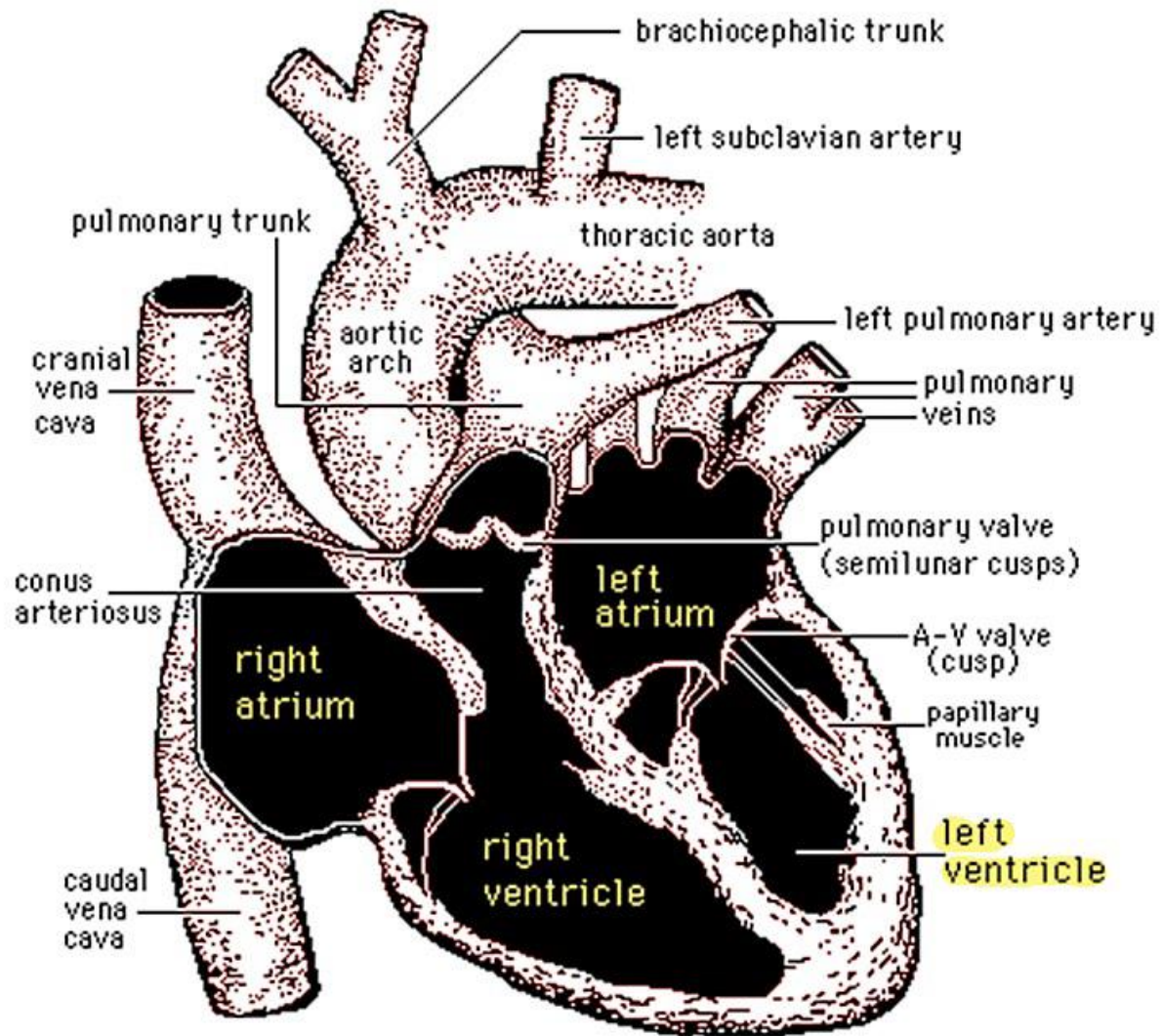


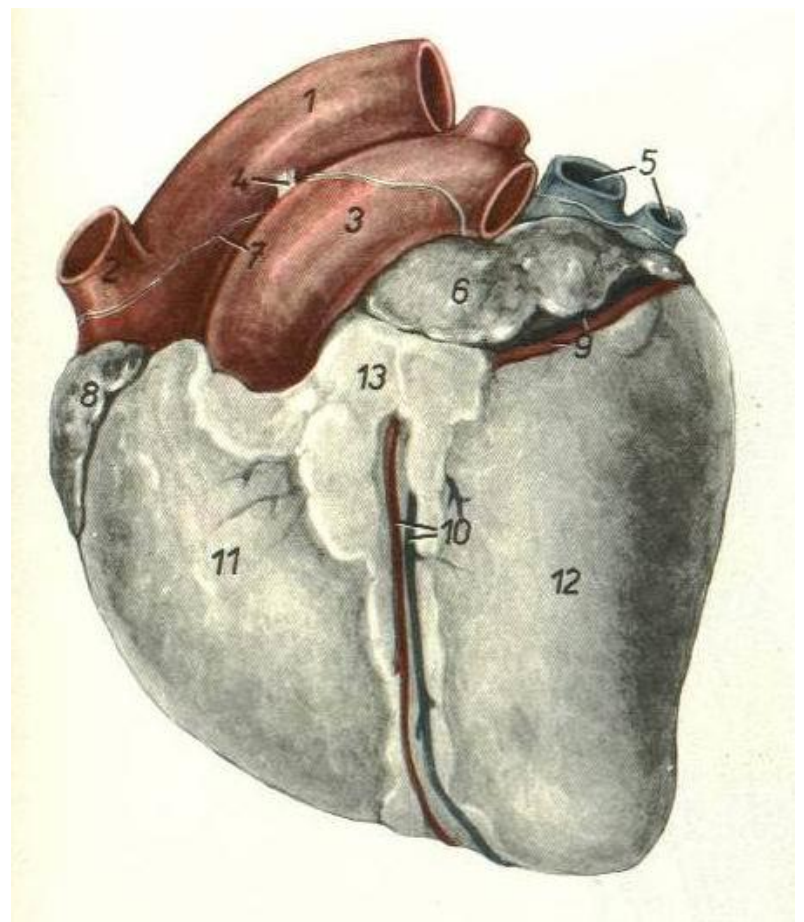
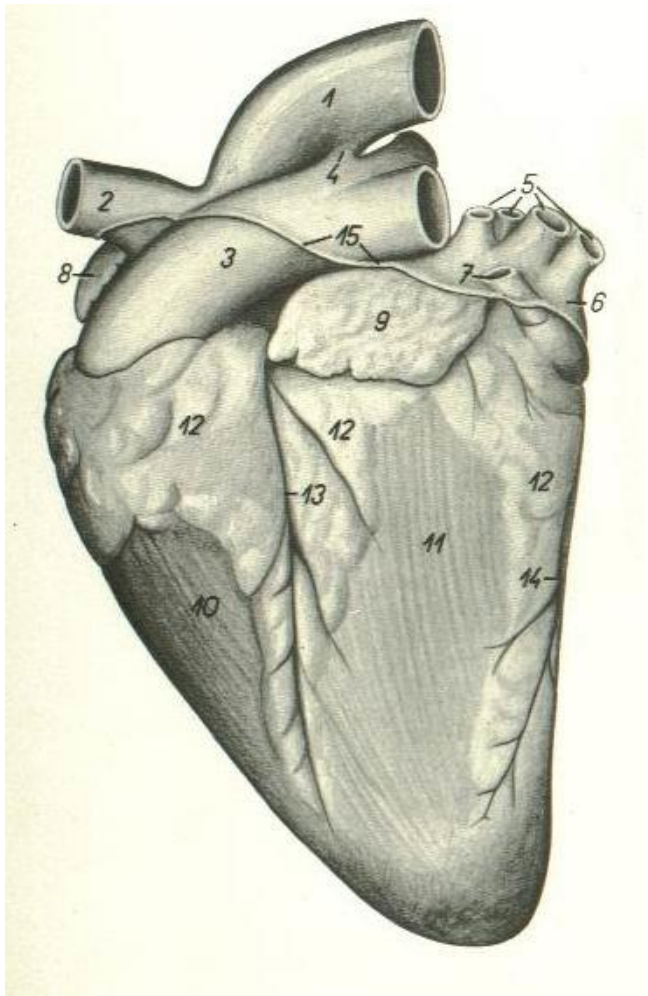
**Figure 7-9** Left (A) and right (B) views of the bovine heart. 1, Right ventricle; 2, left ventricle; 3, left auricle; 4, paraconal interventricular branch of left coronary artery; 4', circumflex branch of left coronary artery; 4'', subsinuosal interventricular branch of left coronary artery; 5, pulmonary trunk; 6, right auricle; 7, aorta; 8, ligamentum arteriosum; 9, cranial vena cava; 10, 10', left and right pulmonary arteries; 11, 11', left and right pulmonary veins; 12, left azygous vein; 13, right azygous vein; 14, caudal vena cava; 15, right coronary artery.



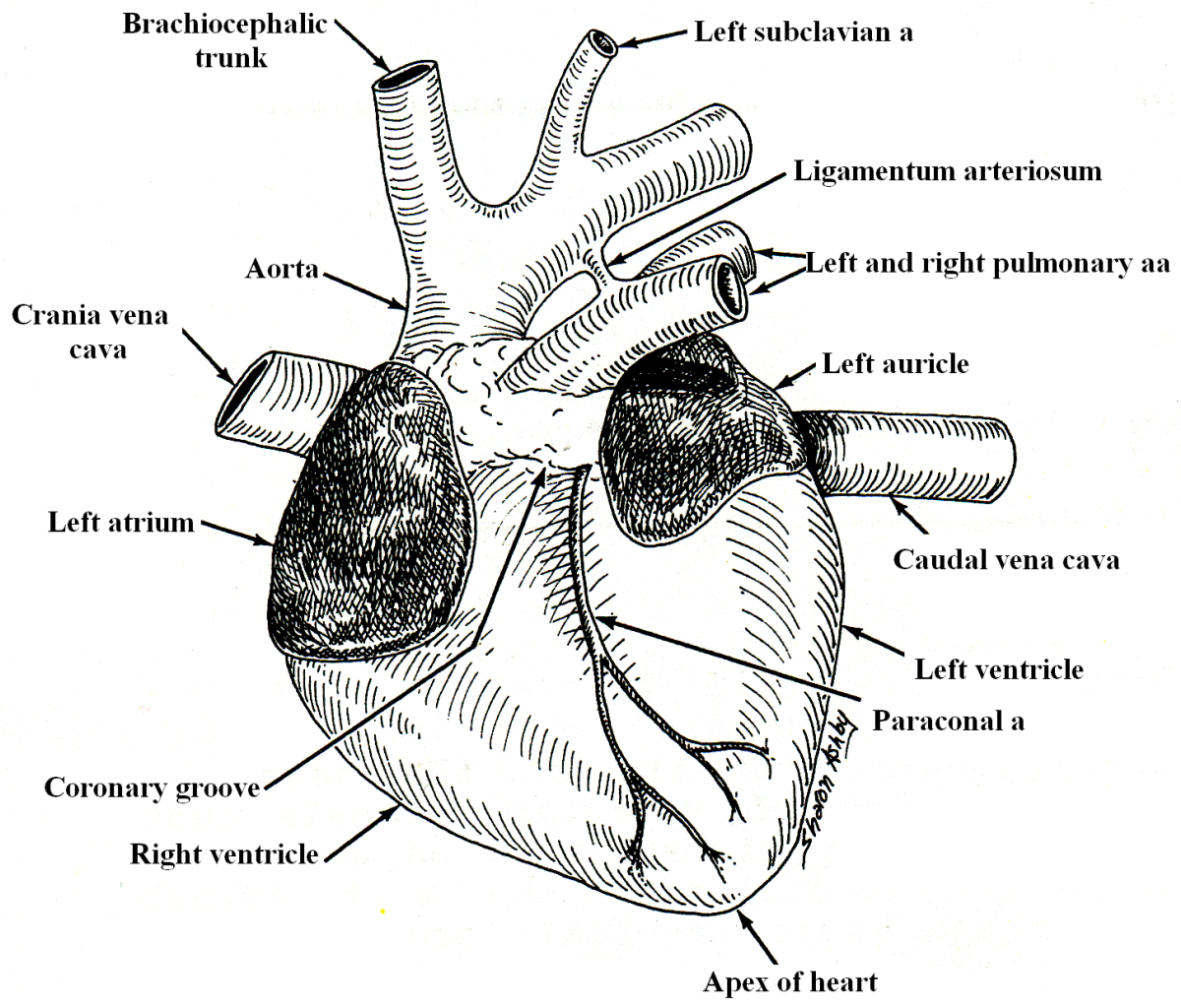


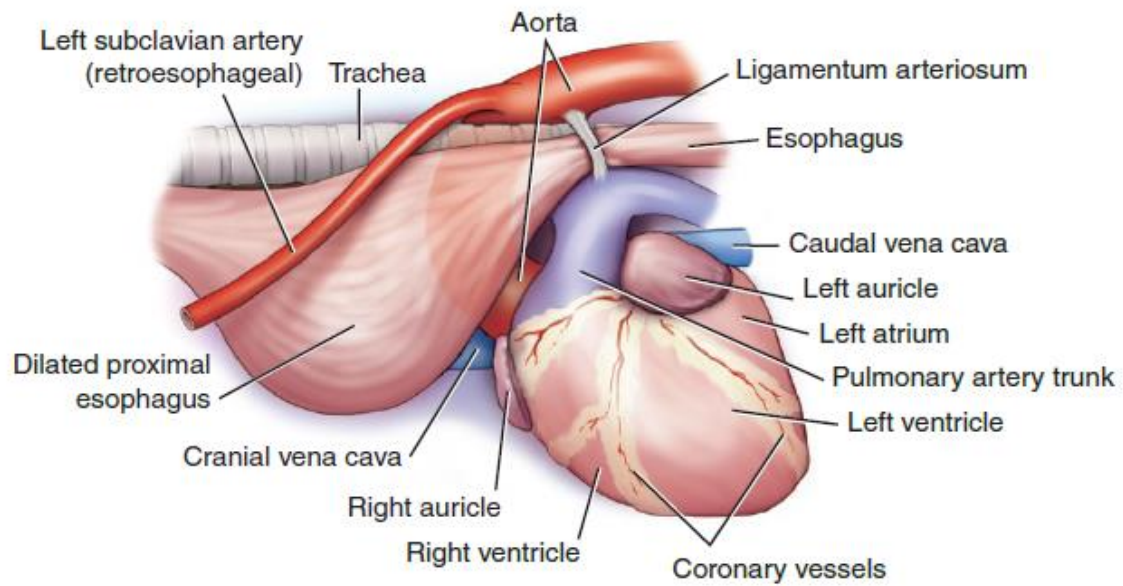
**Figure 13–17** Lateral (A) and ventrodorsal (B) views of the position of the canine heart. 1, Right auricle; 2, right ventricle; 3, left ventricle; 4, left atrium; 5, right atrium; 6, pulmonary trunk; 7, aorta; 8, trachea.



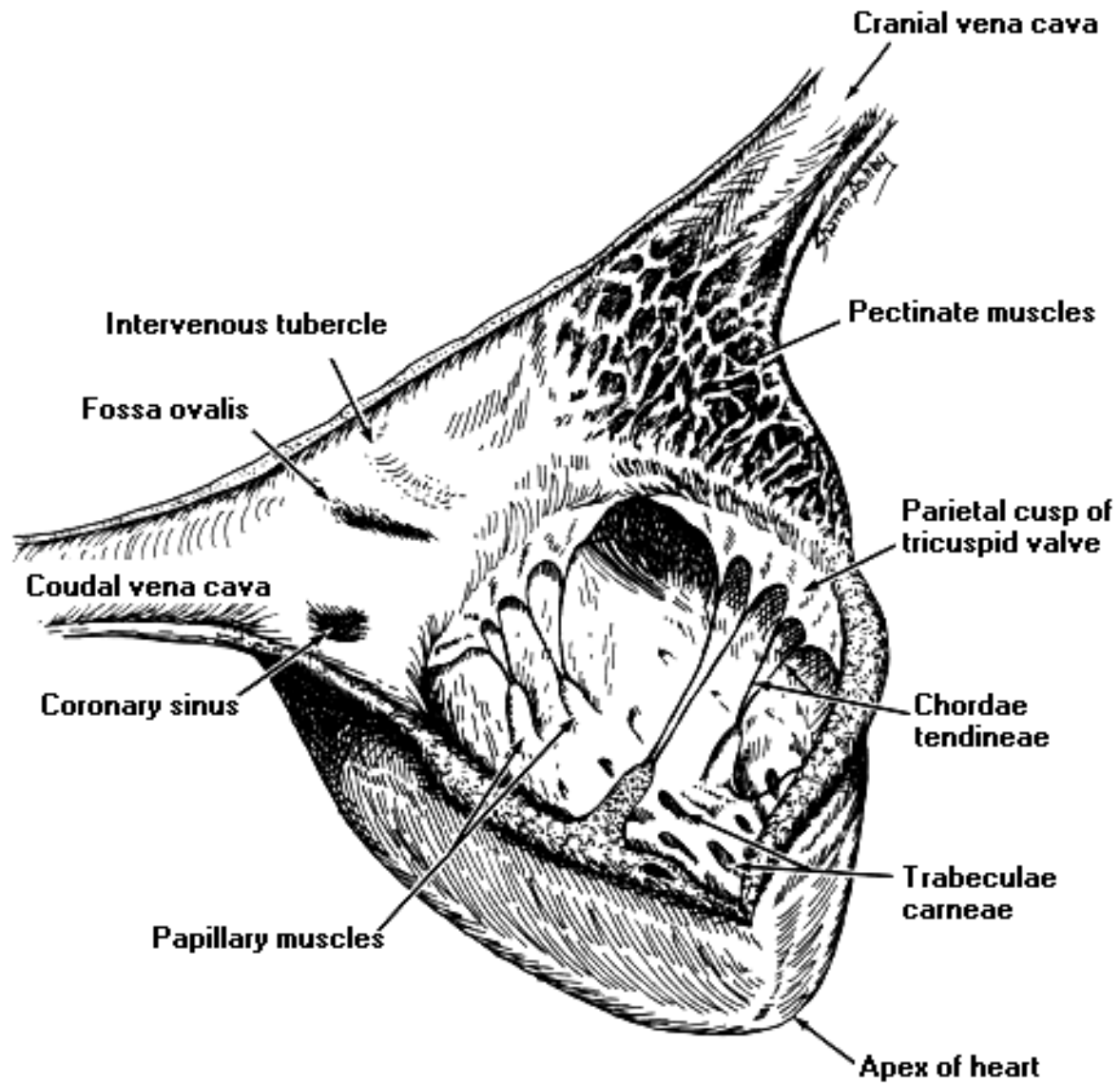


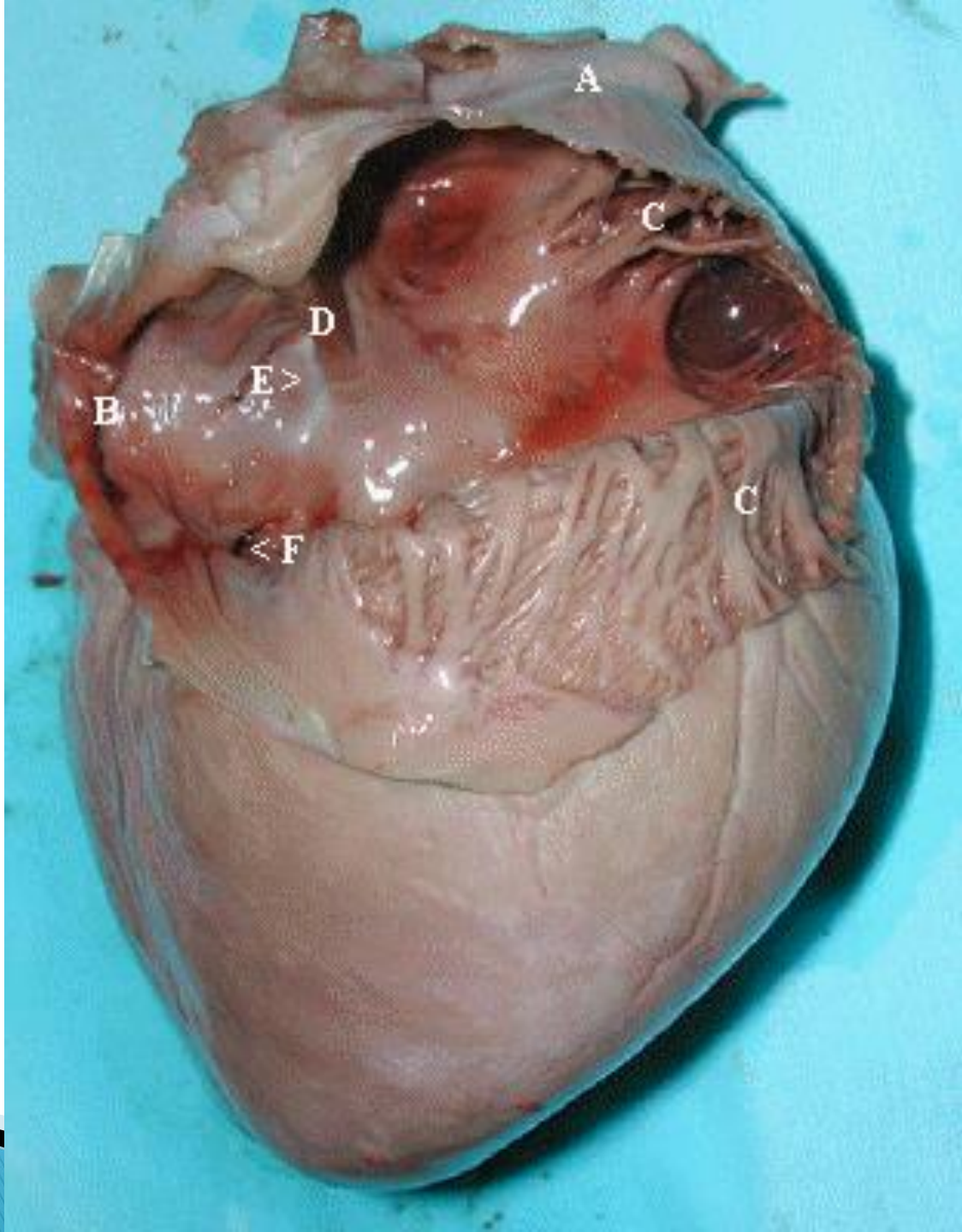


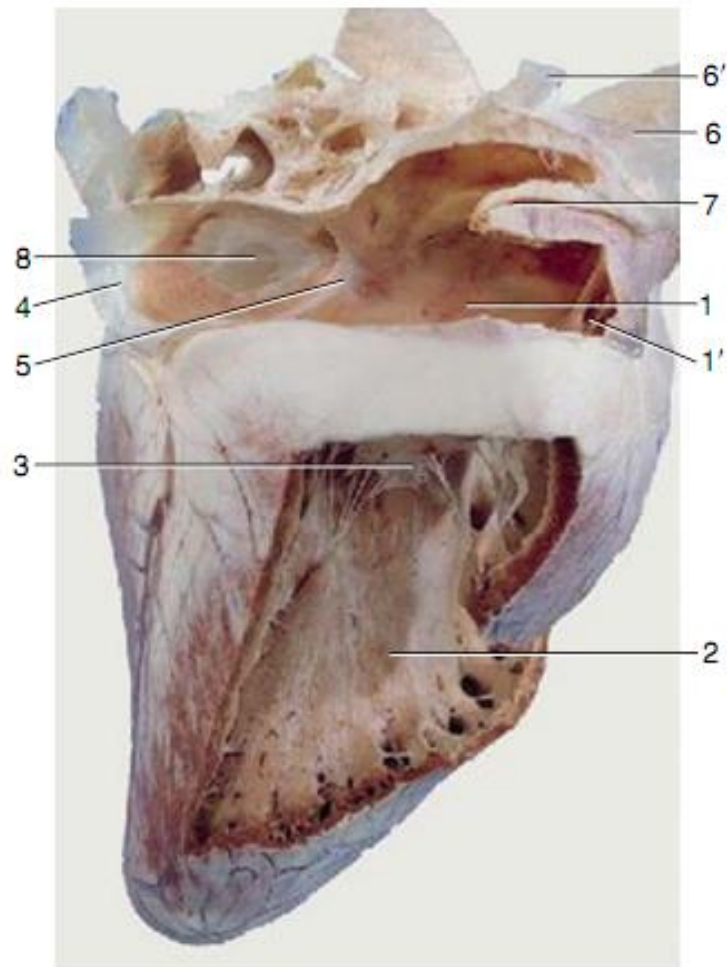




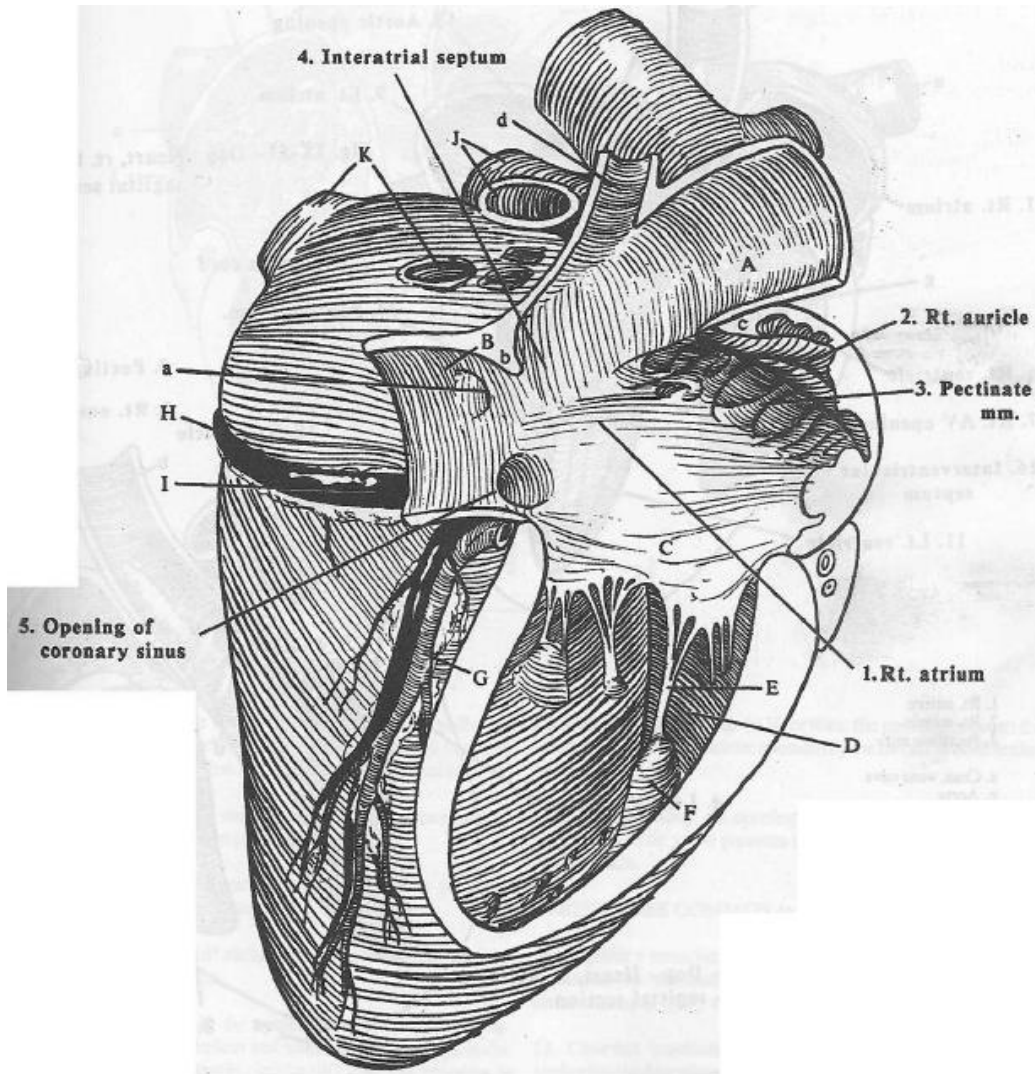
**FIGURE 4.5-3** Persistent right aortic arch. The esophagus is trapped between the right aortic arch on the right, the ligamentum arteriosum on the left, and the heart base and pulmonary arteries ventrally.





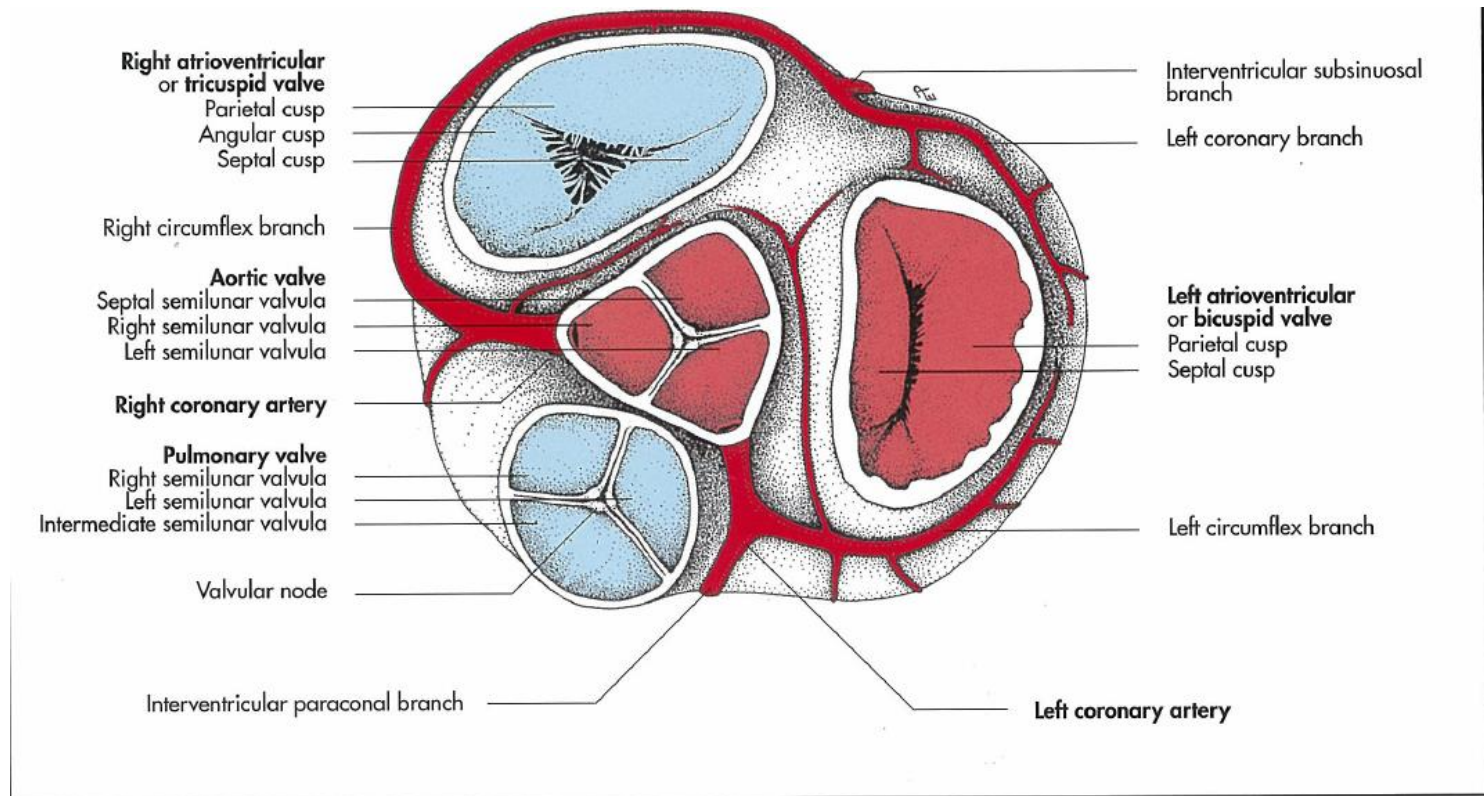


**Figure 7–8** Overview of the interior of the right atrium and right ventricle of the equine heart. *1*, Right atrium; *1'*, right auricle; *2*, right ventricle; *3*, right atrioventricular valve; *4*, caudal vena cava; *5*, intervenous tubercle; *6*, cranial vena cava; *6'*, right azygous vein; *7*, terminal crest; *8*, fossa ovalis.



- A. Cran. vena cava
- B. Caud. vena cava
- C. Rt. AV valve
- D. Rt. ventricle
- E. Chordae tendinae
- F. Papillary mm.
- G. Subsinoasal interventricular br.
- H. Great cardiac v.
- I. Coronary sinus
- J. Pulmonary aa.
- K. Pulmonary vv.

- a. Oval fossa
- b. Intervenous tubercle
- c. Terminal crest
- d. Rt. azygos v.



**Fig. 12-9.** Interior of the heart of a horse, transverse section through the atria, schematic.

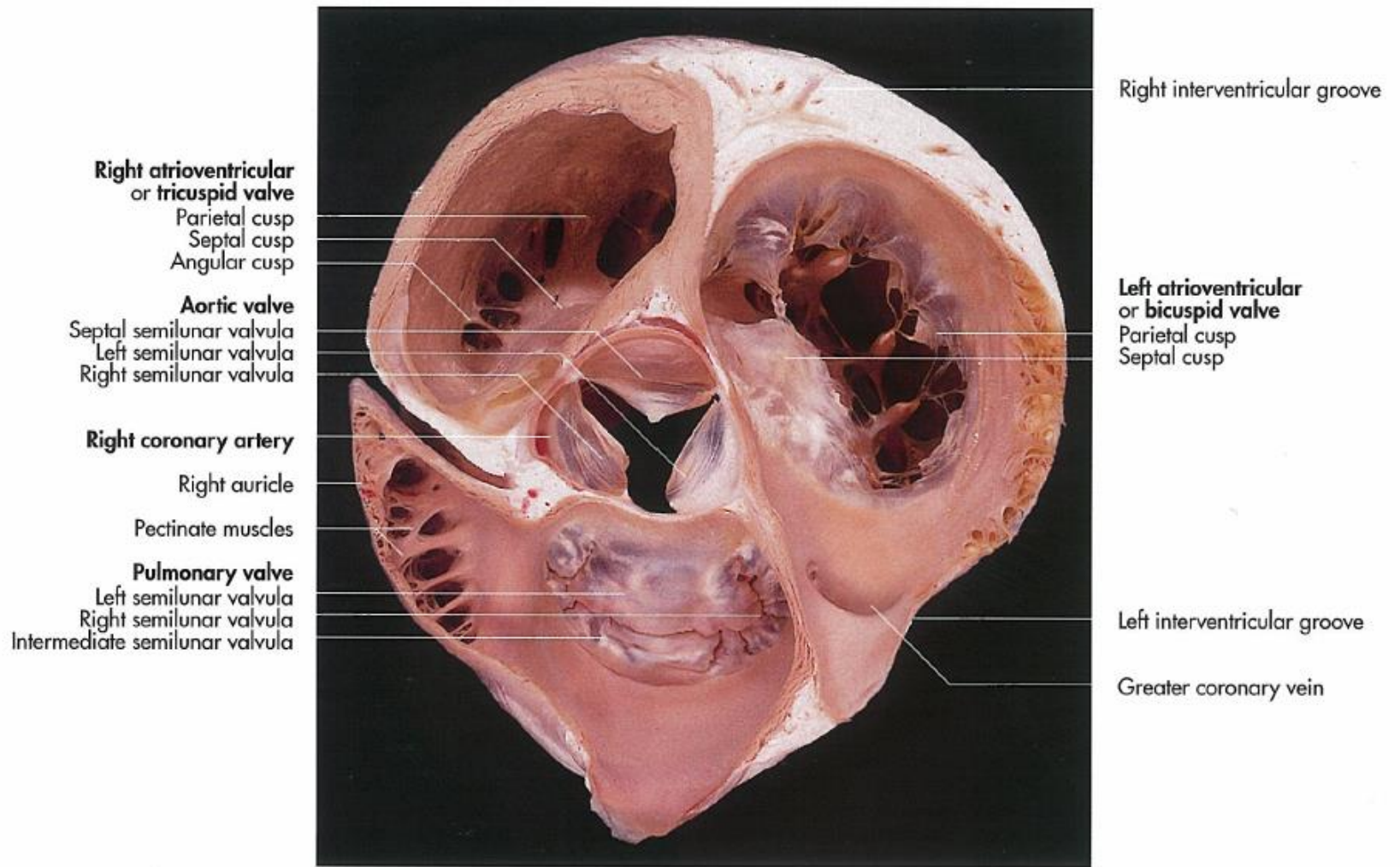
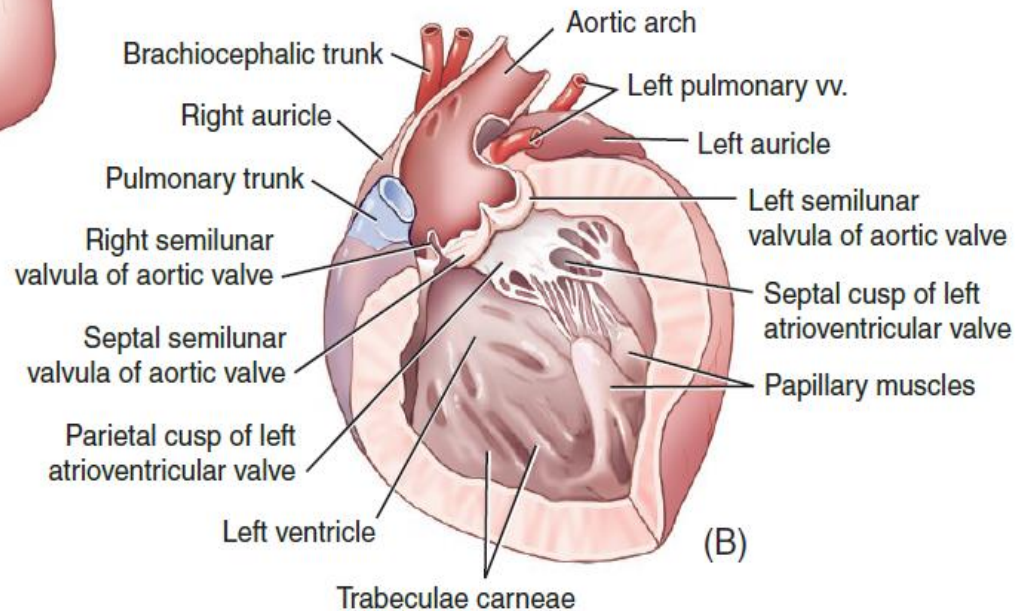
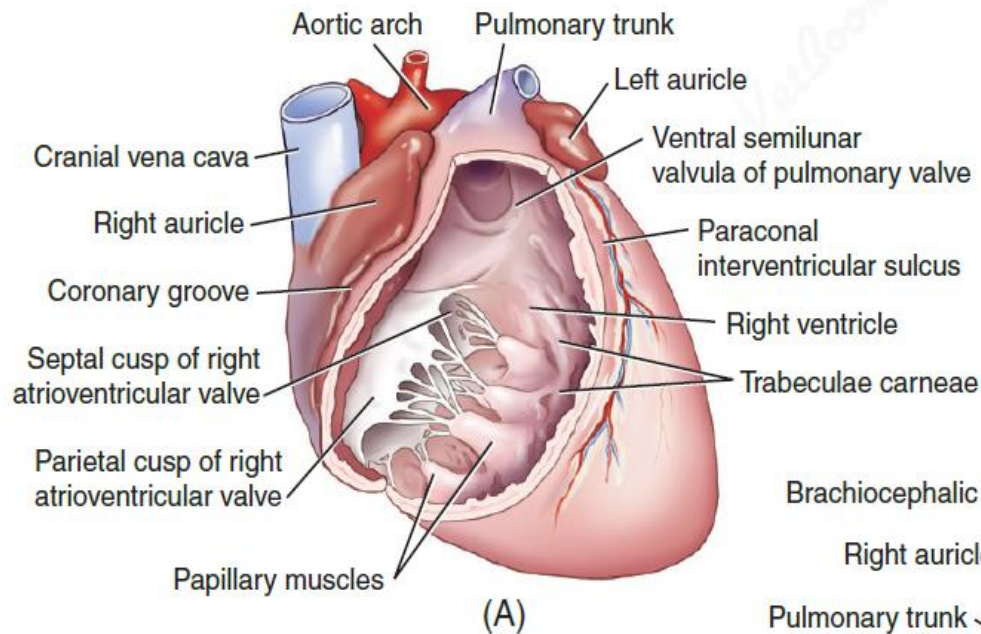
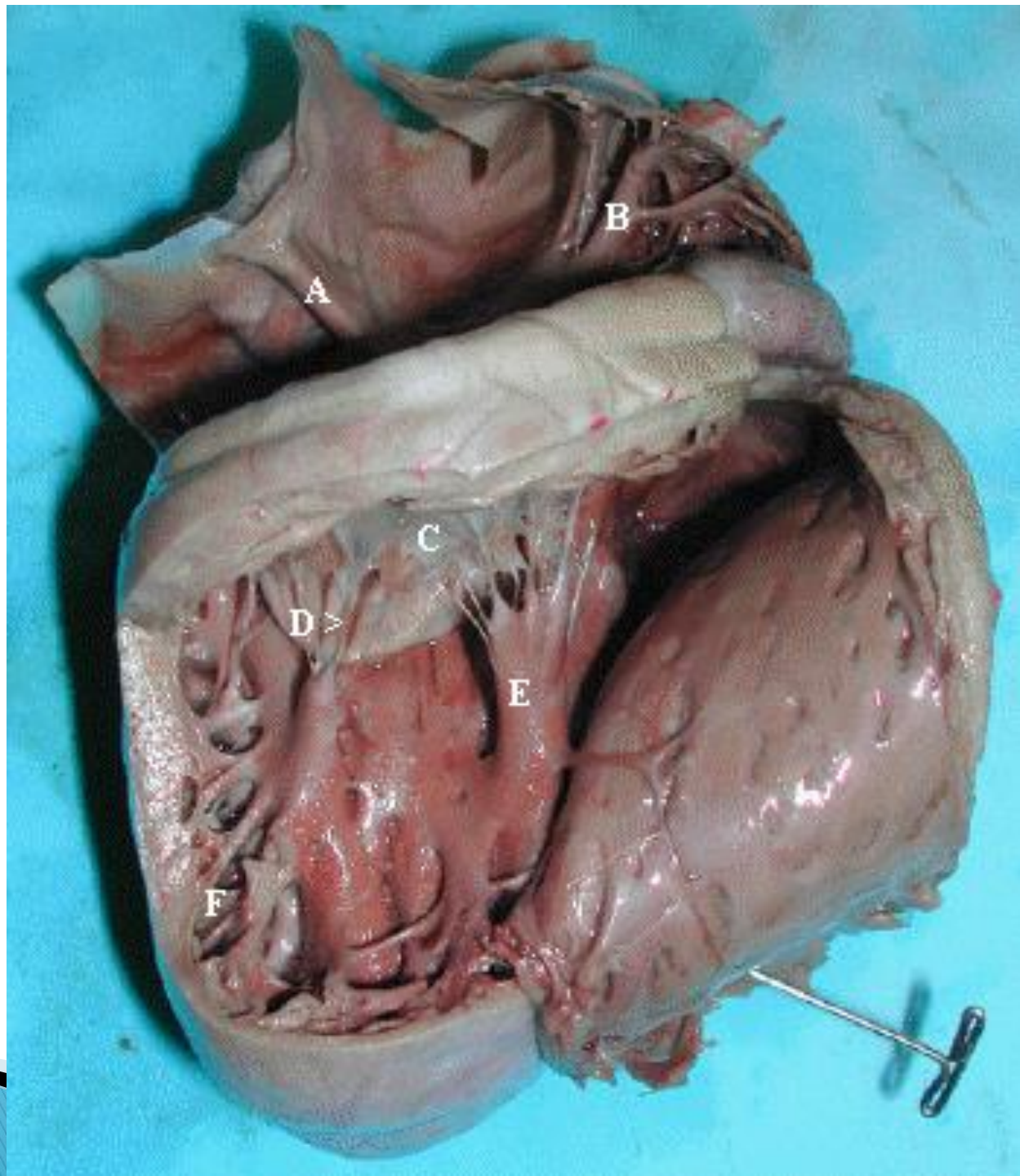


fig. 12-8. Interior of the heart of a horse, transverse section through the atria (courtesy of PD Dr. J. Maierl, Munich).





**FIGURE 4.7-5** (A) Right side of the canine heart, highlighting the right ventricular outflow tract. (B) Left side of the canine heart, highlighting the left ventricular outflow tract.



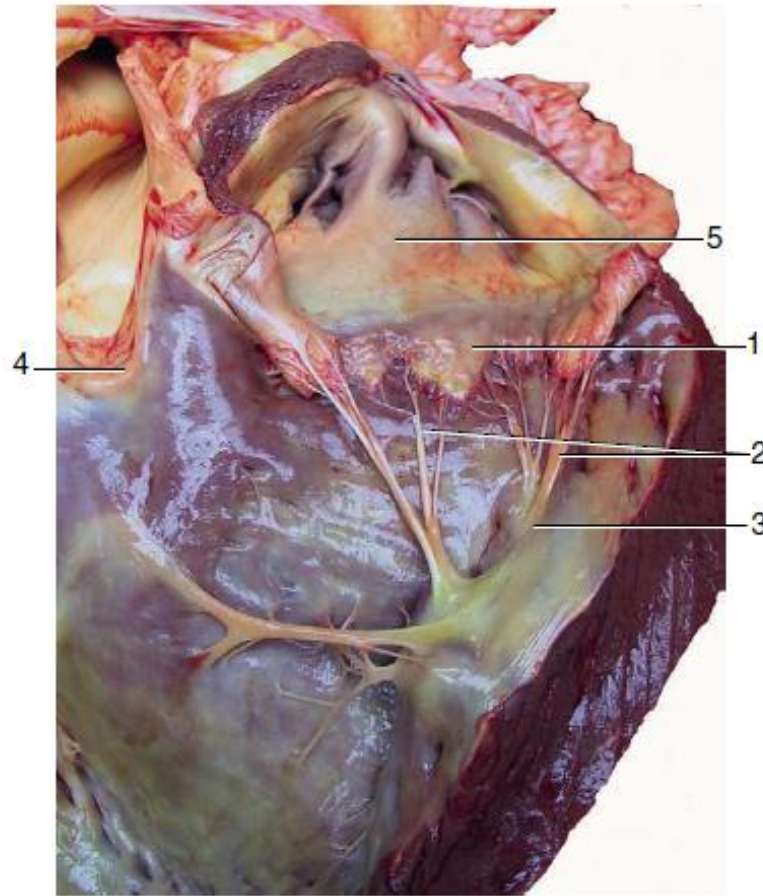


Figure 7-12 Cranioventral view of the interior of the right ventricle. 1, Cusp of right atrioventricular valve; 2, chordae tendineae; 3, papillary muscles; 4, pulmonary valve; 5, right auricle.

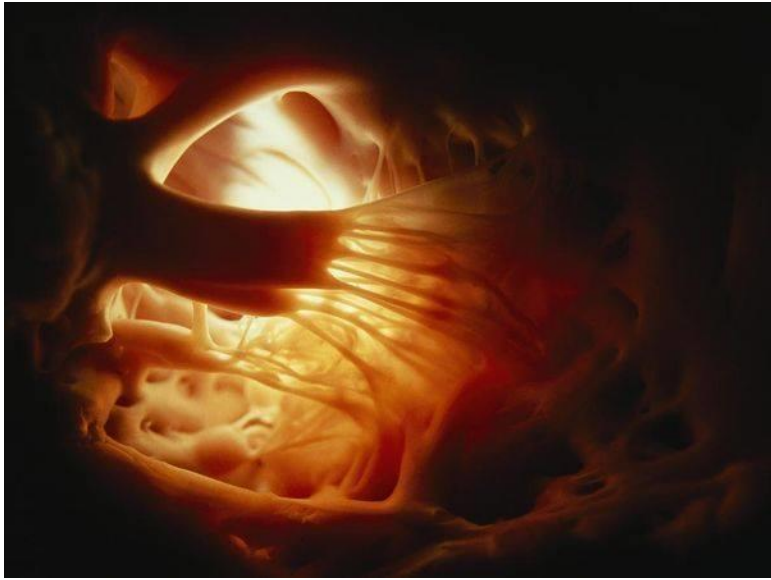


Fig. IX-30 - Dog - Heart,  
rt. atrium opened

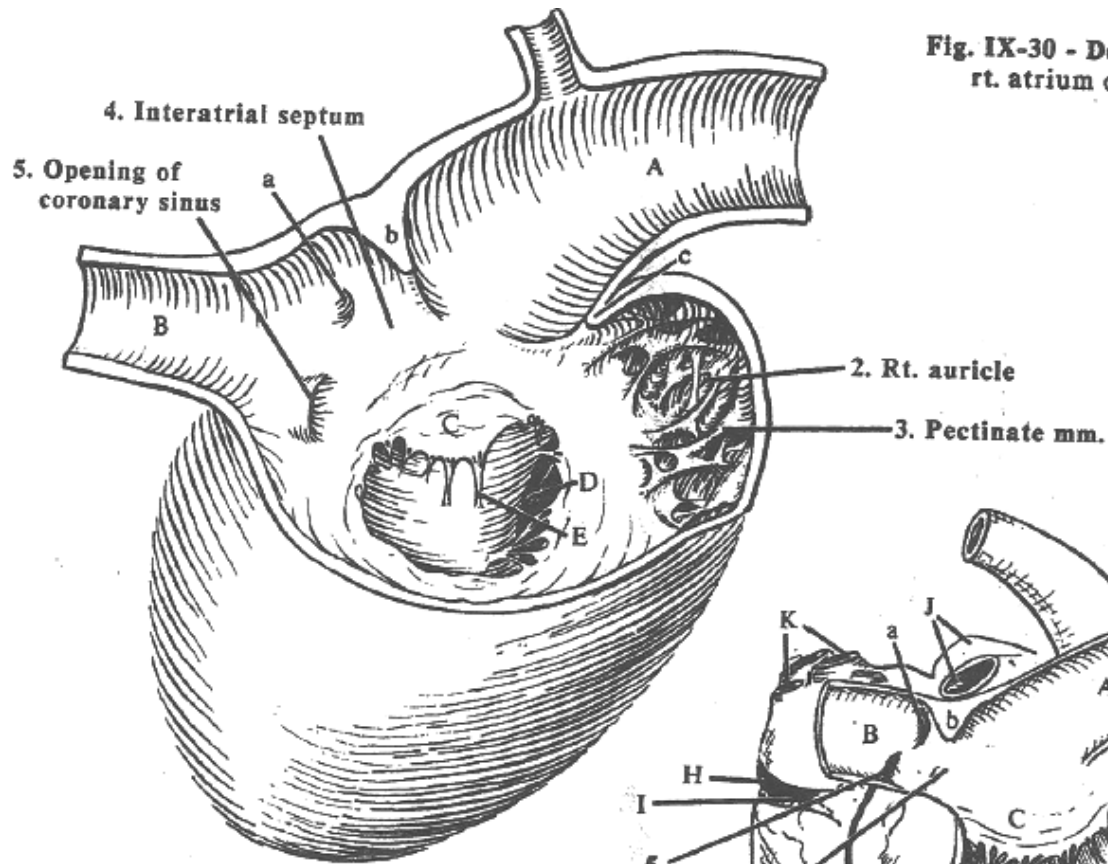
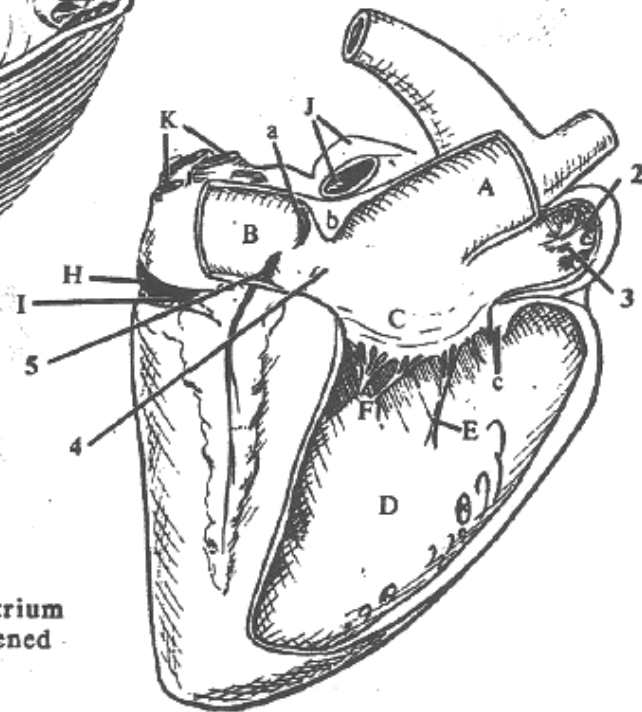
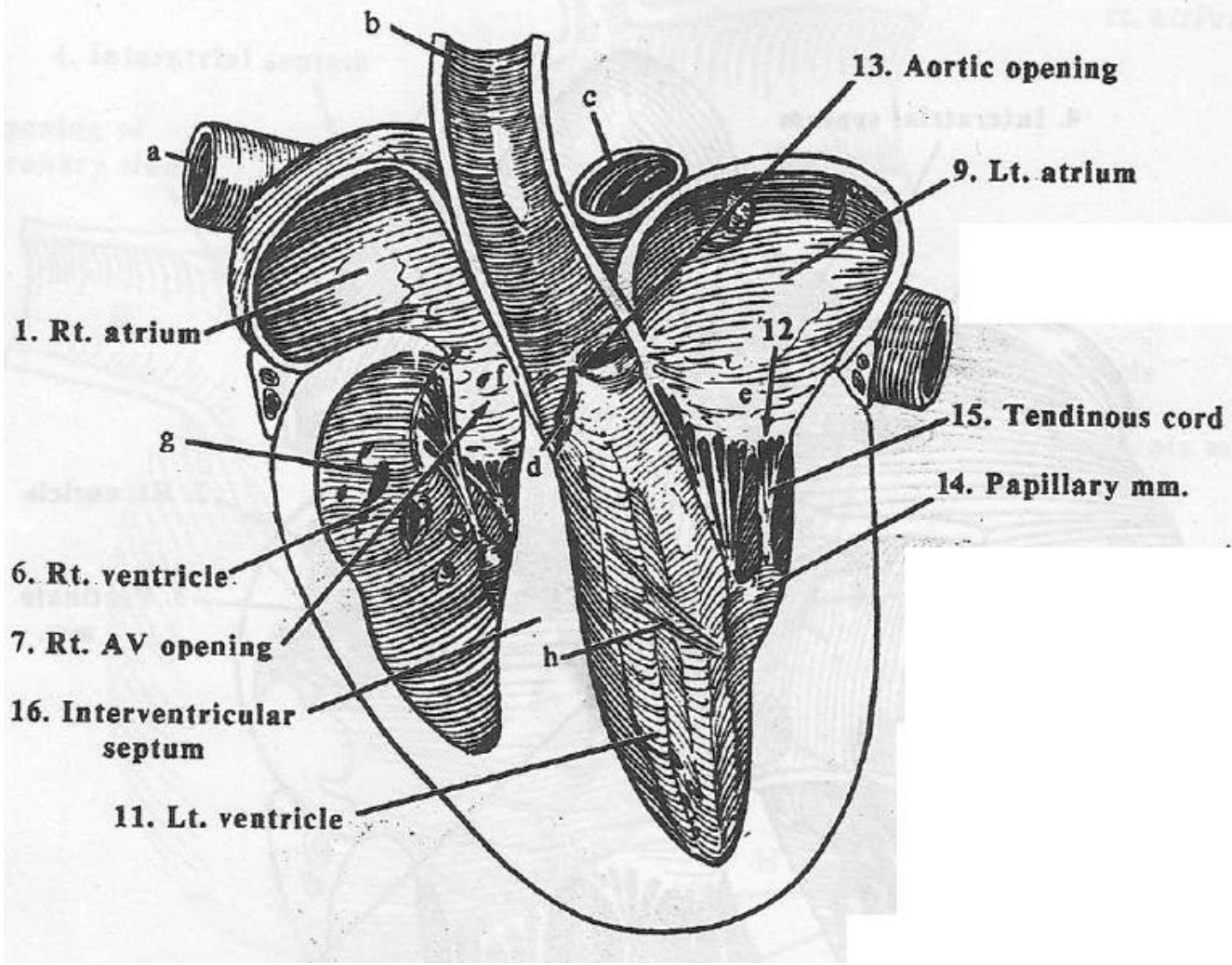
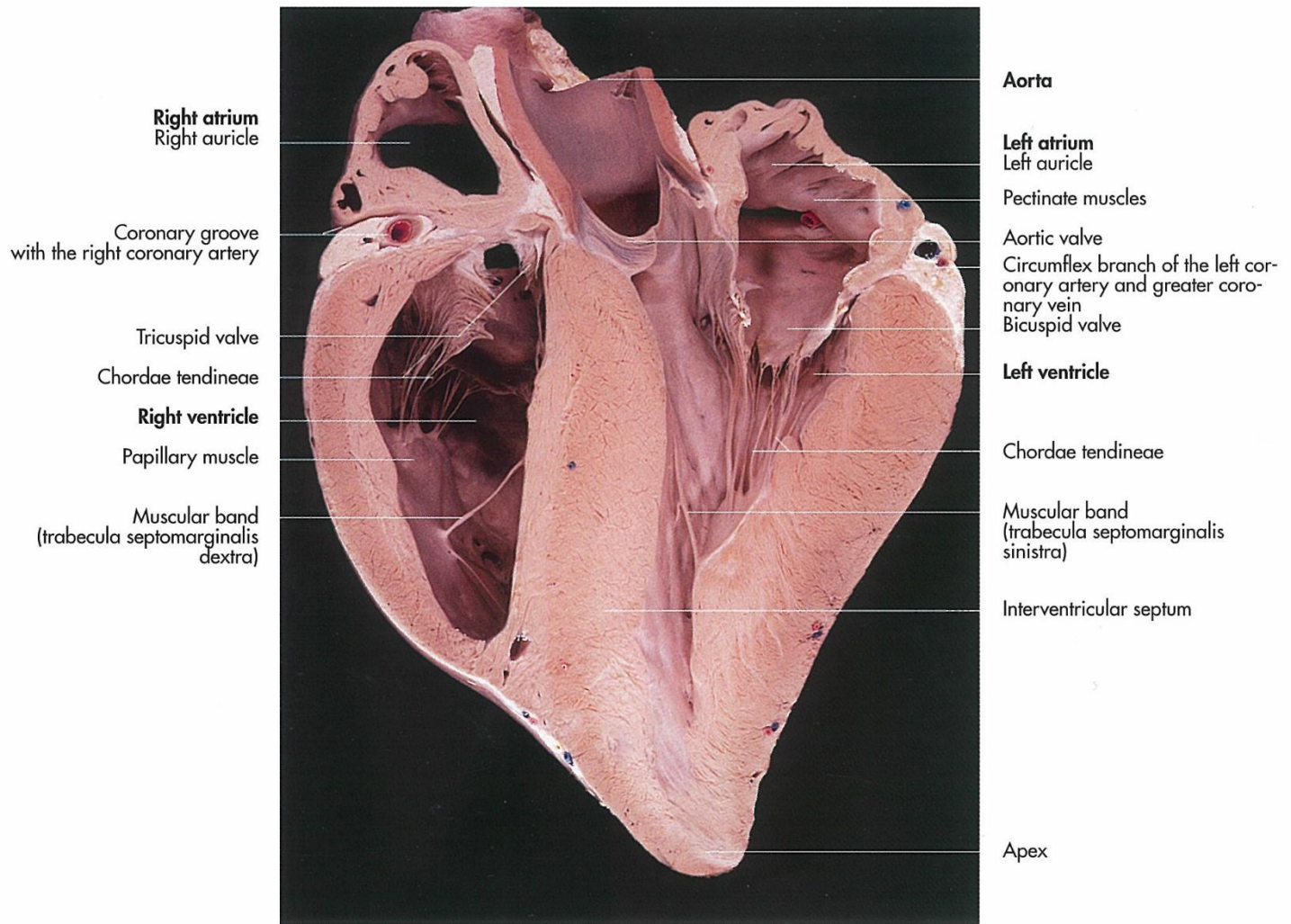


Fig. IX-31 - Ox - Heart, rt. atrium  
& rt. ventricle opened







**Fig. 12-6.** Interior of a heart of a horse, longitudinal section (courtesy of PD Dr. J. Maierl, Munich).

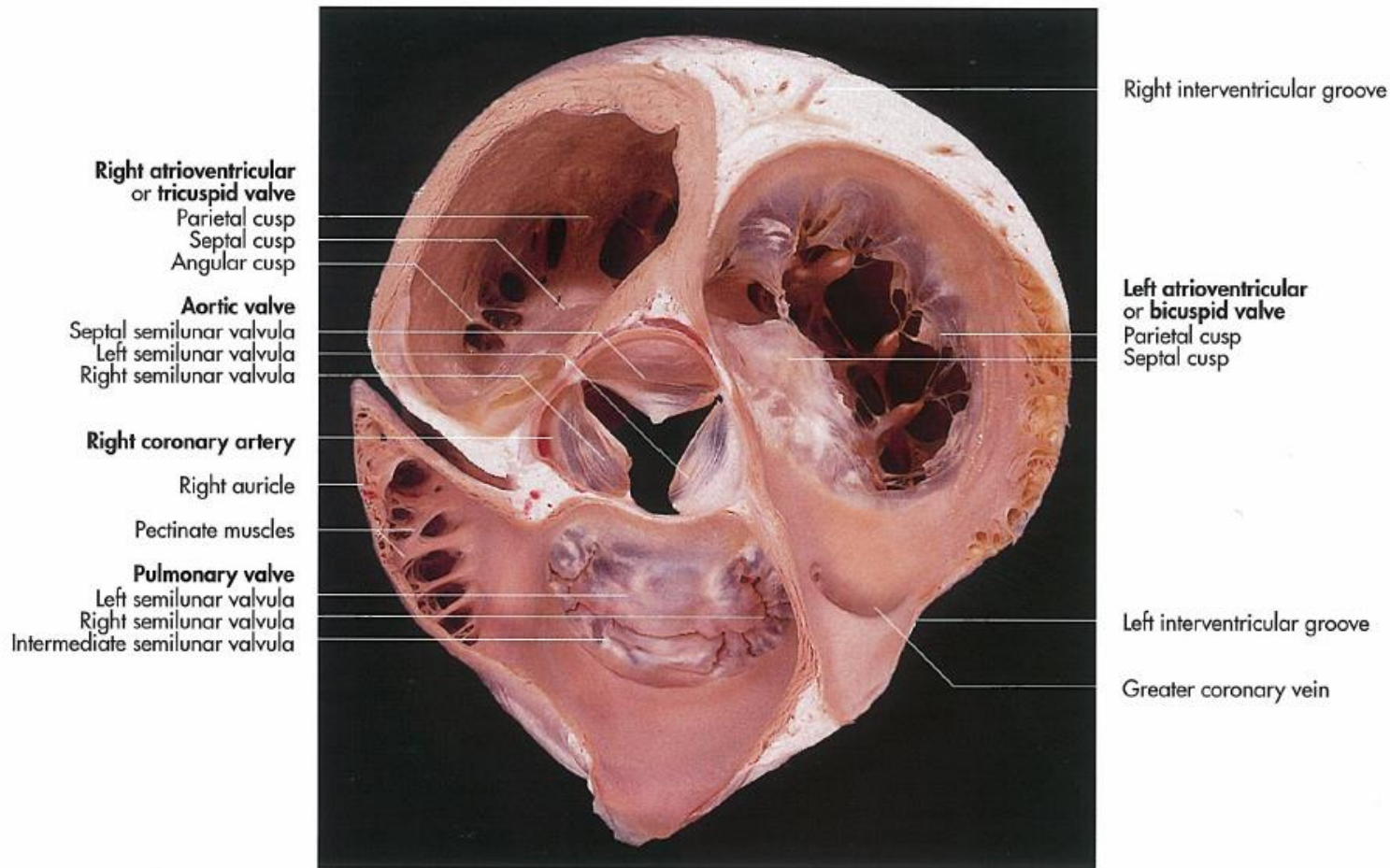
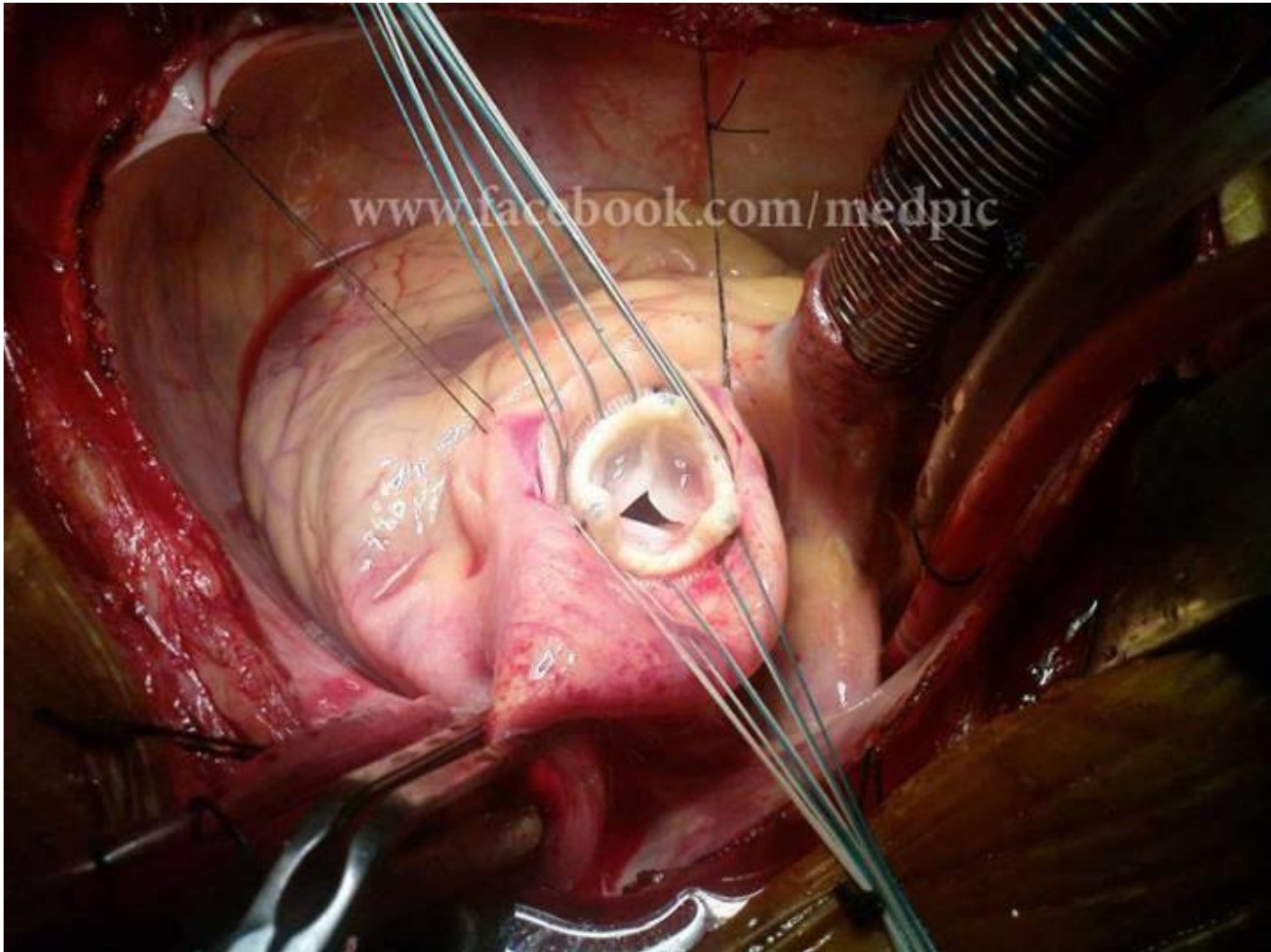
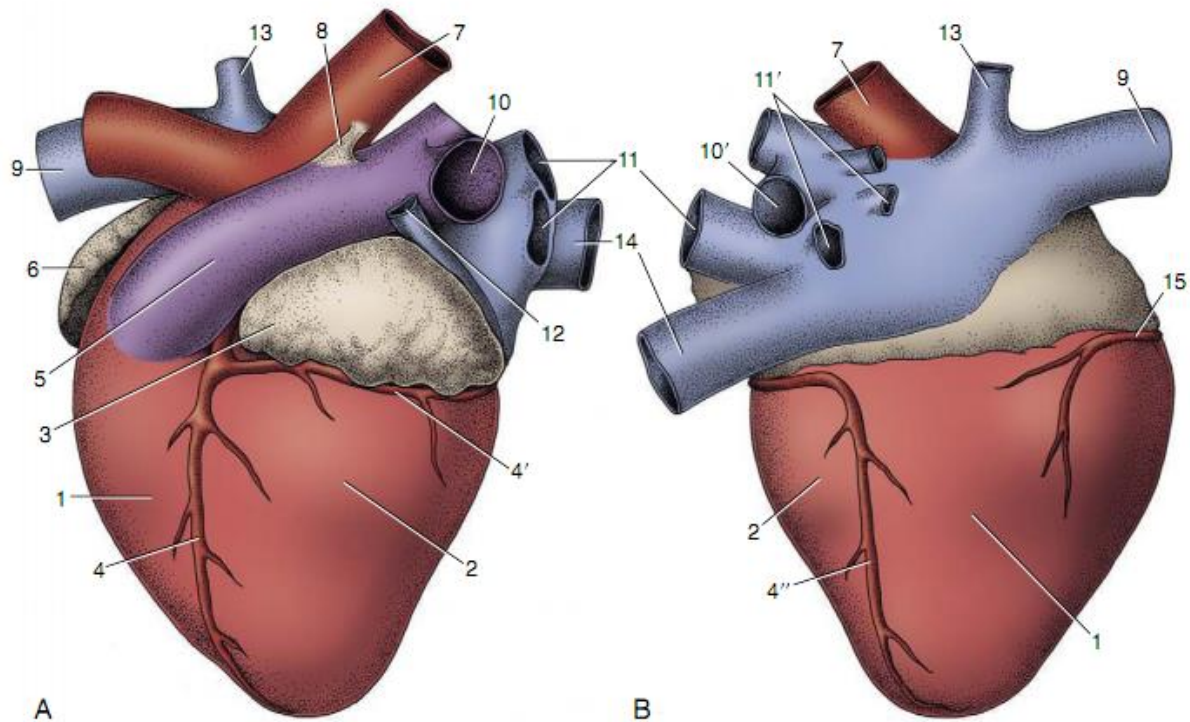


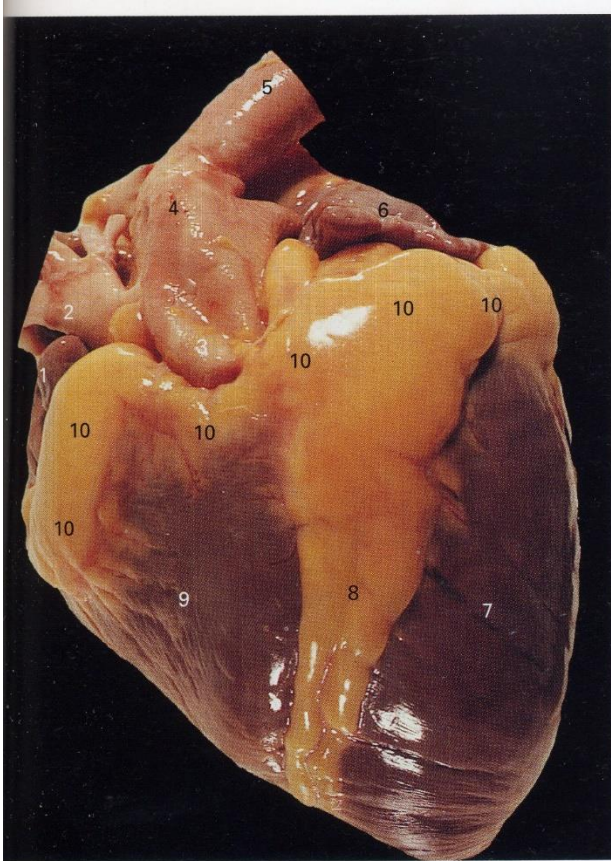
fig. 12-8. Interior of the heart of a horse, transverse section through the atria (courtesy of PD Dr. J. Maielr, Munich).





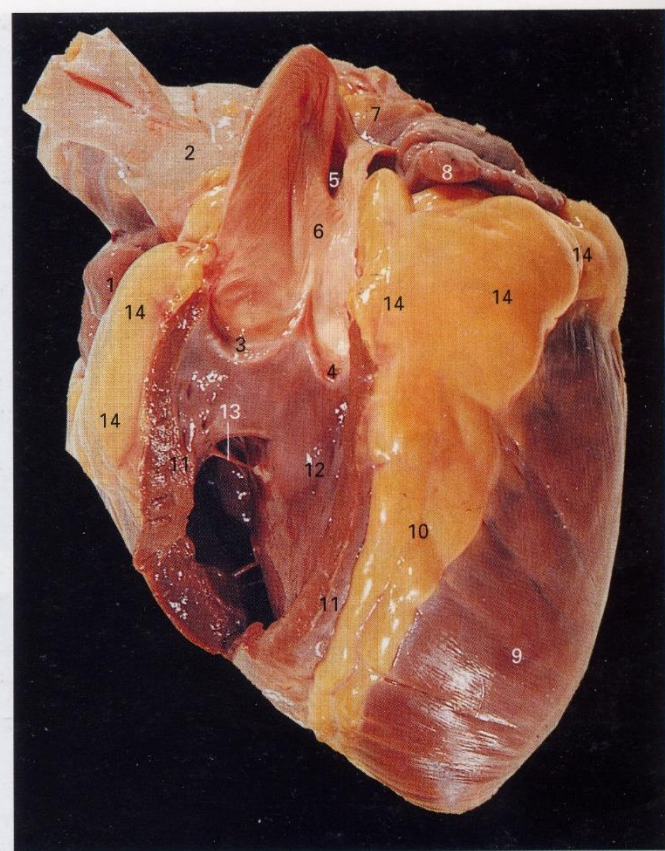


**Figure 7-9** Left (A) and right (B) views of the bovine heart. 1, Right ventricle; 2, left ventricle; 3, left auricle; 4, paraconal interventricular branch of left coronary artery; 4', circumflex branch of left coronary artery; 4'', subsinuosal interventricular branch of left coronary artery; 5, pulmonary trunk; 6, right auricle; 7, aorta; 8, ligamentum arteriosum; 9, cranial vena cava; 10, 10', left and right pulmonary arteries; 11, 11', left and right pulmonary veins; 12, left azygous vein; 13, right azygous vein; 14, caudal vena cava; 15, right coronary artery.



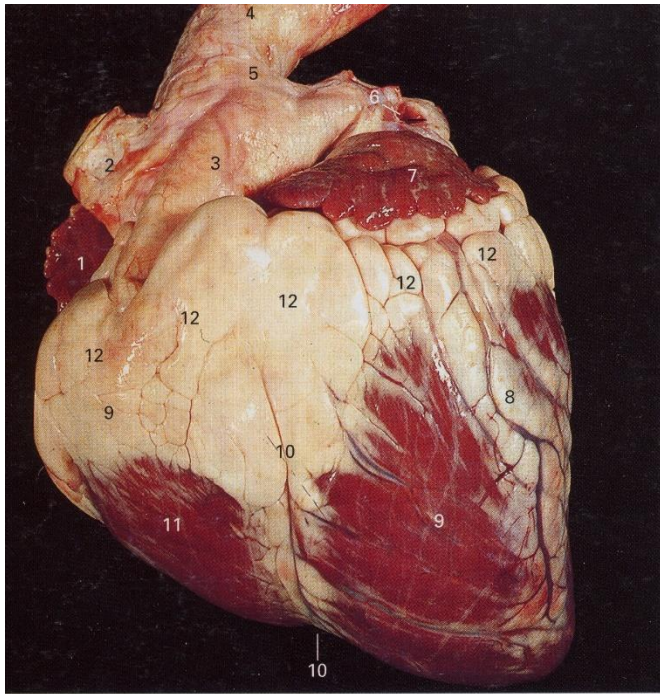
244. Left view of the equine heart.

- |                         |                                     |
|-------------------------|-------------------------------------|
| 1 Right auricle         | 7 Left ventricle                    |
| 2 Brachiocephalic trunk | 8 Paraconal interventricular groove |
| 3 Pulmonary trunk       | 9 Right ventricle                   |
| 4 Arterial ligament     | 10 Coronary groove                  |
| 5 Aorta                 |                                     |
| 6 Left auricle          |                                     |



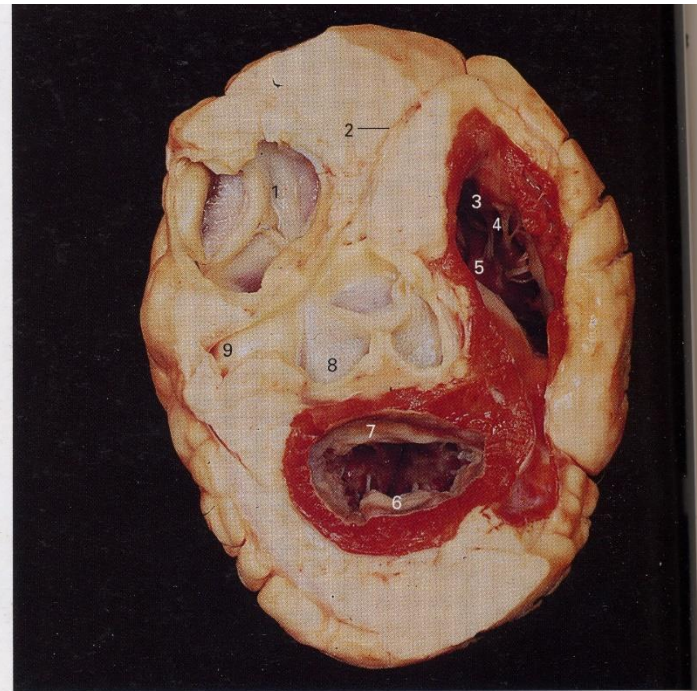
245. Left view of the equine heart with part of the wall of the right ventricle removed.

- |   |                                      |
|---|--------------------------------------|
| 1 Right auricle   | 6 Pulmonary trunk                    |
| 2 Brachiocephalic trunk   | 7 Part of the left atrium            |
| 3 Intermediate cusp of the pulmonary valve  | 8 Left auricle                       |
| 4 Right cusp of the pulmonary valve   | 9 Left ventricle                     |
| 5 Depression marking the attachment of the arterial ligament to the outside of the vessel | 10 Paraconal interventricular groove |
|   | 11 Wall of the left atrium           |
|   | 12 Interventricular septum           |
|   | 13 Septomarginal band                |
|   | 14 Coronary groove                   |



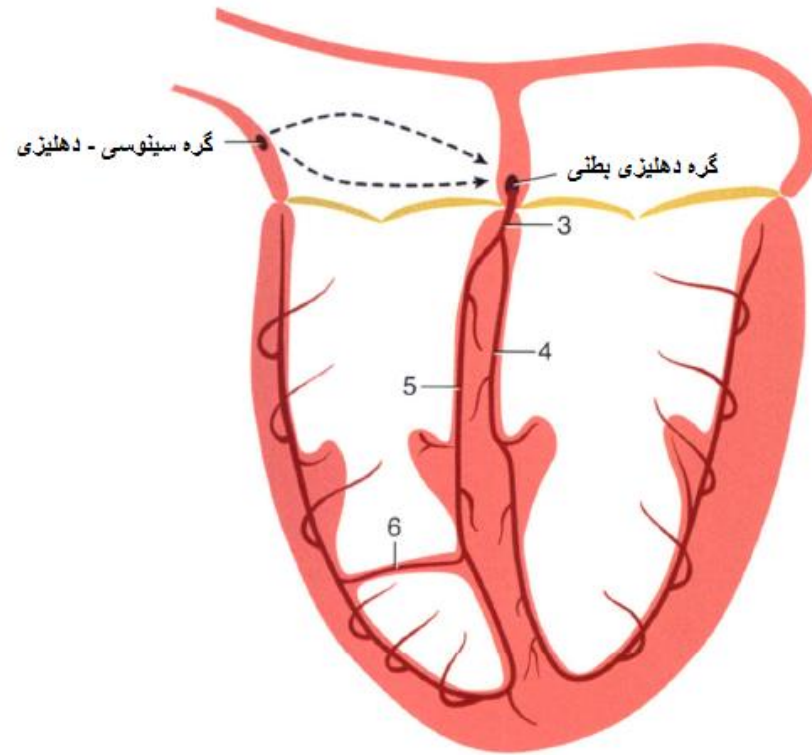
**247. Left view of the bovine heart.**

- |                          |                       |
|--------------------------|-----------------------|
| 1 Right auricle          | 8 Intermediate groove |
| 2 Brachiocephalic trunk  | 9 Left ventricle      |
| 3 Pulmonary trunk        | 10 Paraconal          |
| 4 Aorta                  | interventricular      |
| 5 Arterial ligament      | groove                |
| 6 One of many            | 11 Right ventricle    |
| pulmonary veins          | 12 Coronary groove    |
| entering the left atrium |                       |
| 7 Left auricle           |                       |

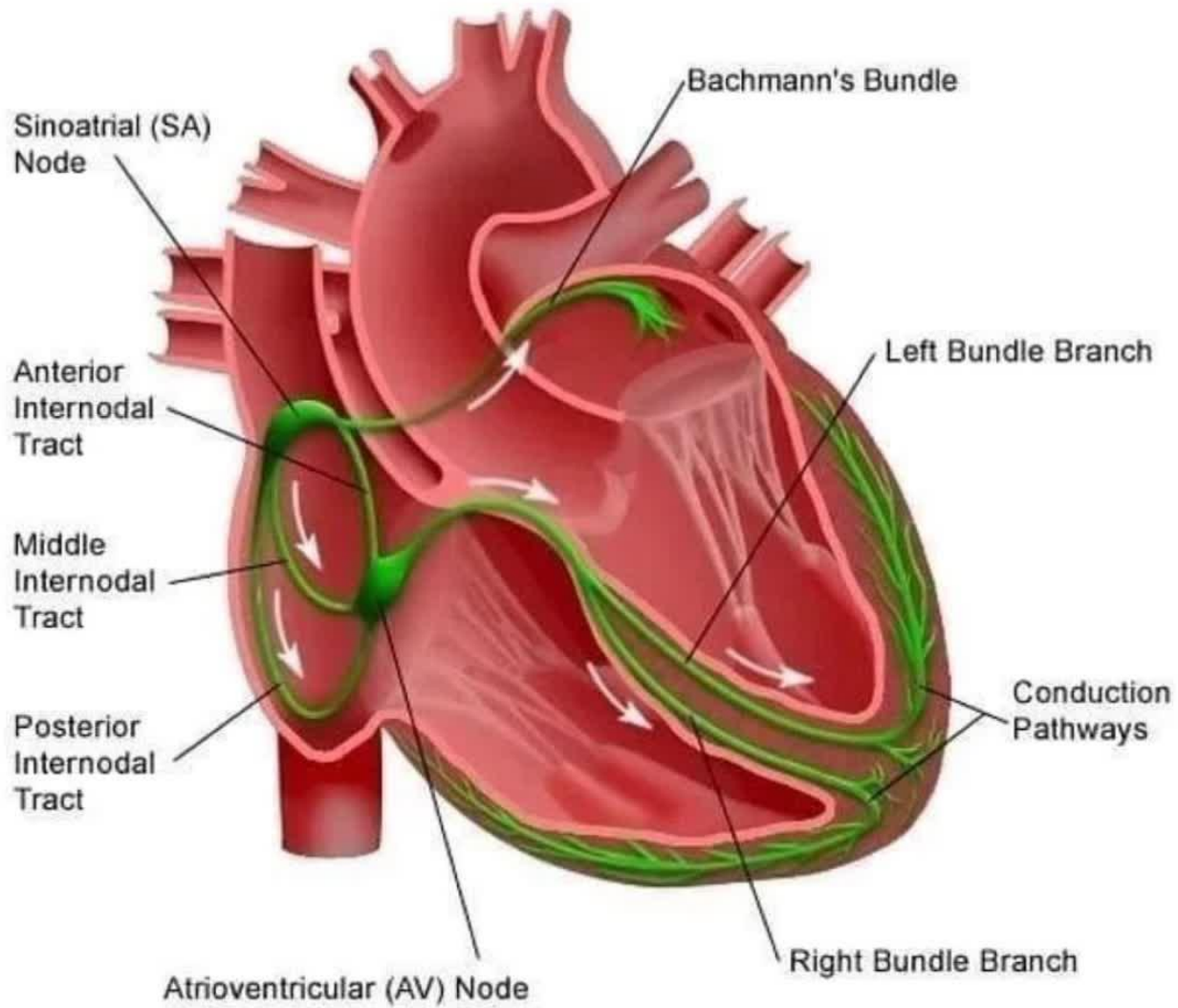


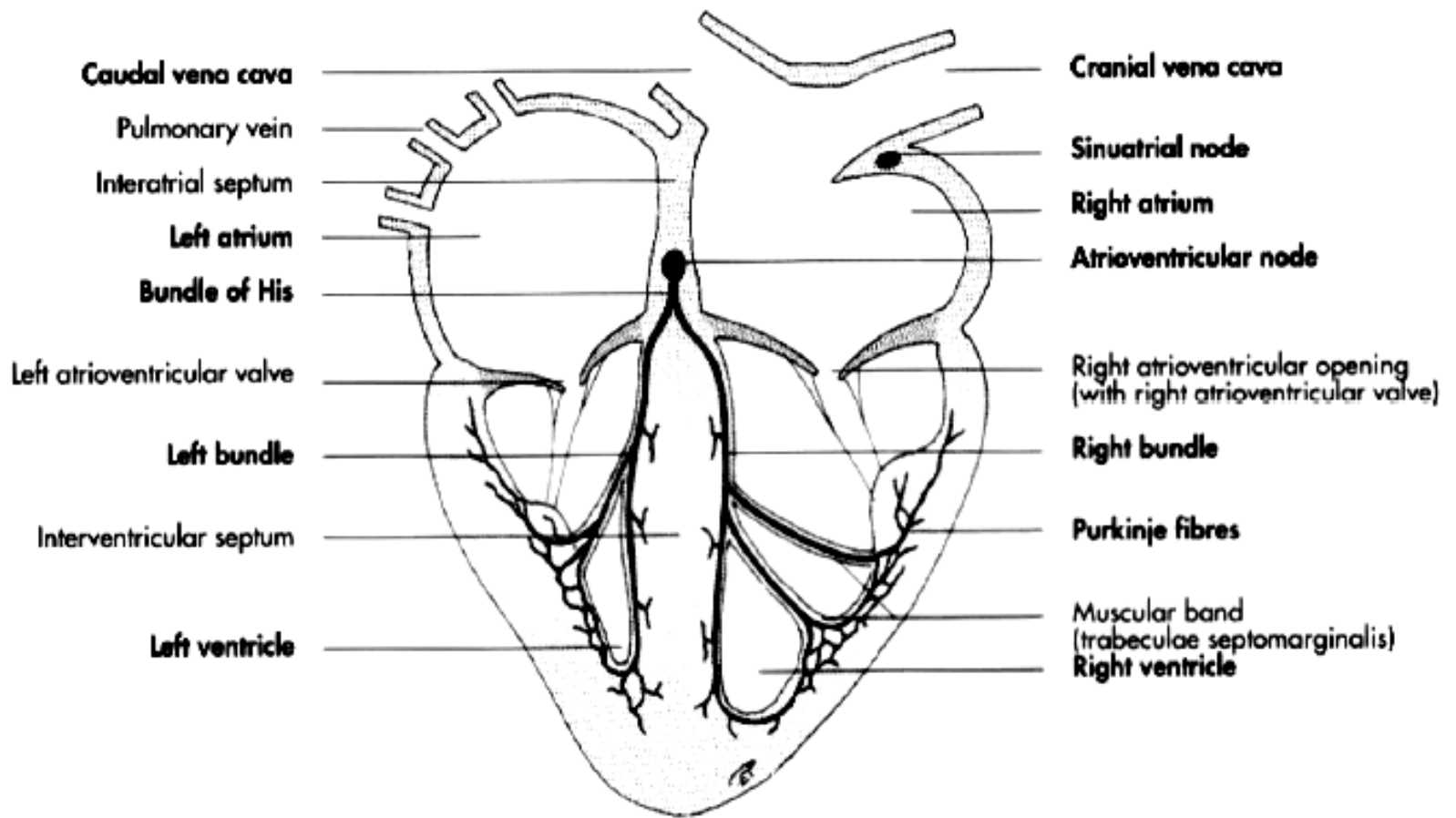
**248. Dorsal view of the base of the bovine heart. The atria and great vessels have been removed. The cranial aspect is towards the top of the page.**

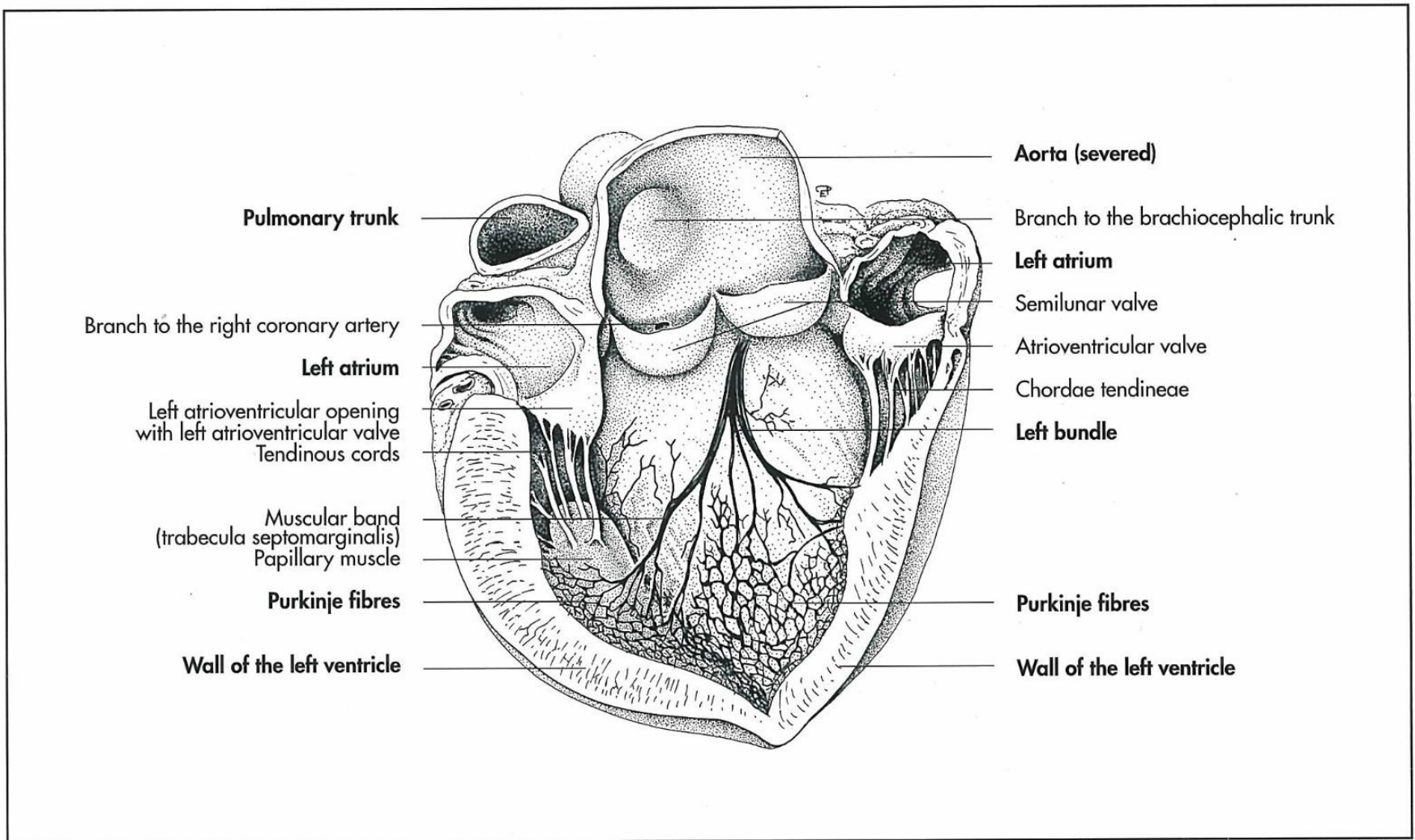
- |                          |                         |
|--------------------------|-------------------------|
| 1 Pulmonary valve        | 6 Left atrioventricular |
| 2 Right coronary artery  | valve, parietal cusp    |
| 3 Right atrioventricular | 7 Left atrioventricular |
| valve                    | valve, septal cusp      |
| 4 Tendinous cords        | 8 Aortic valve          |
| 5 Papillary muscle       | 9 Left coronary artery  |



# Electrical System of the Heart

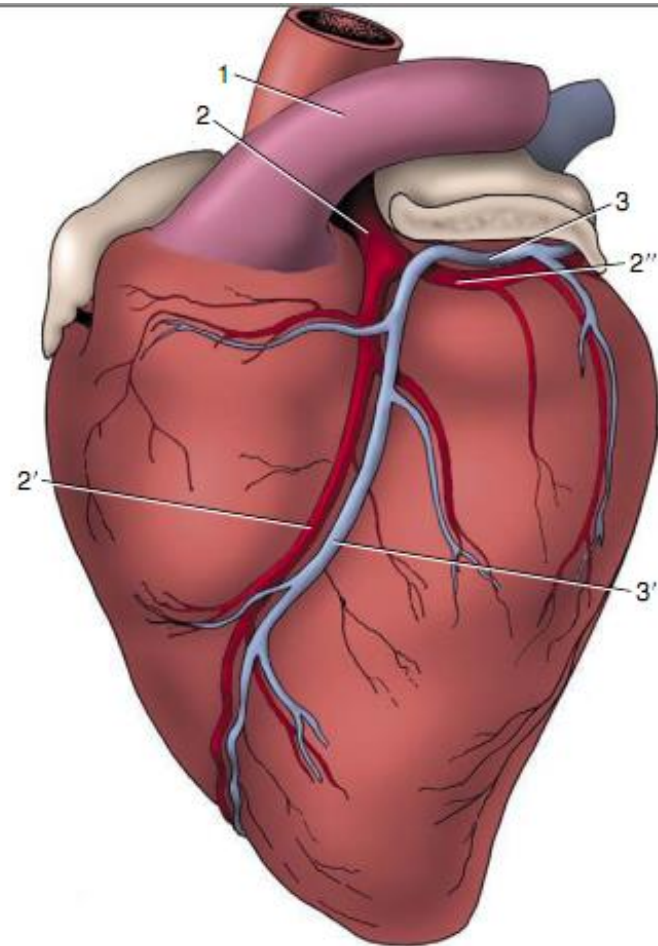
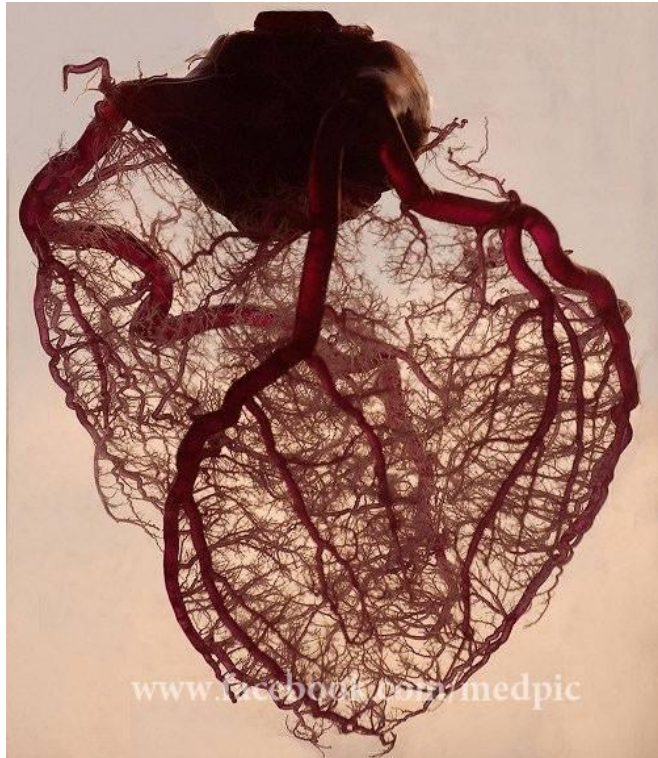




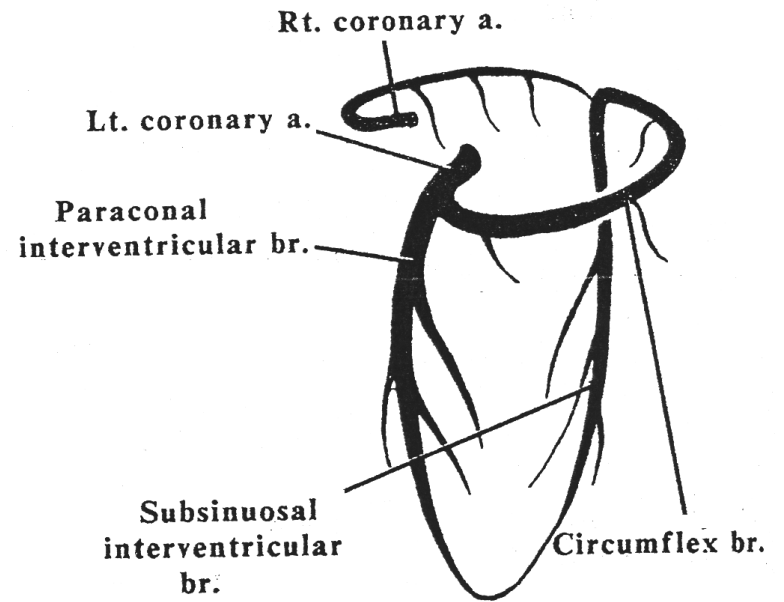
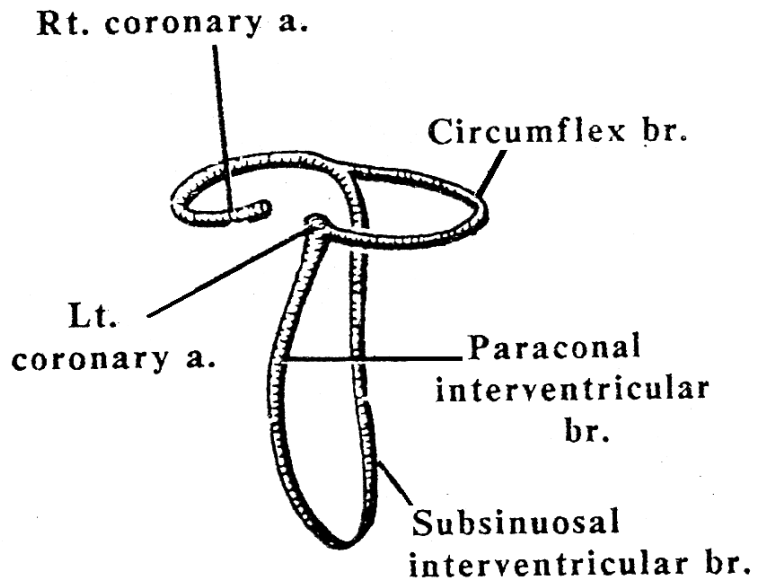


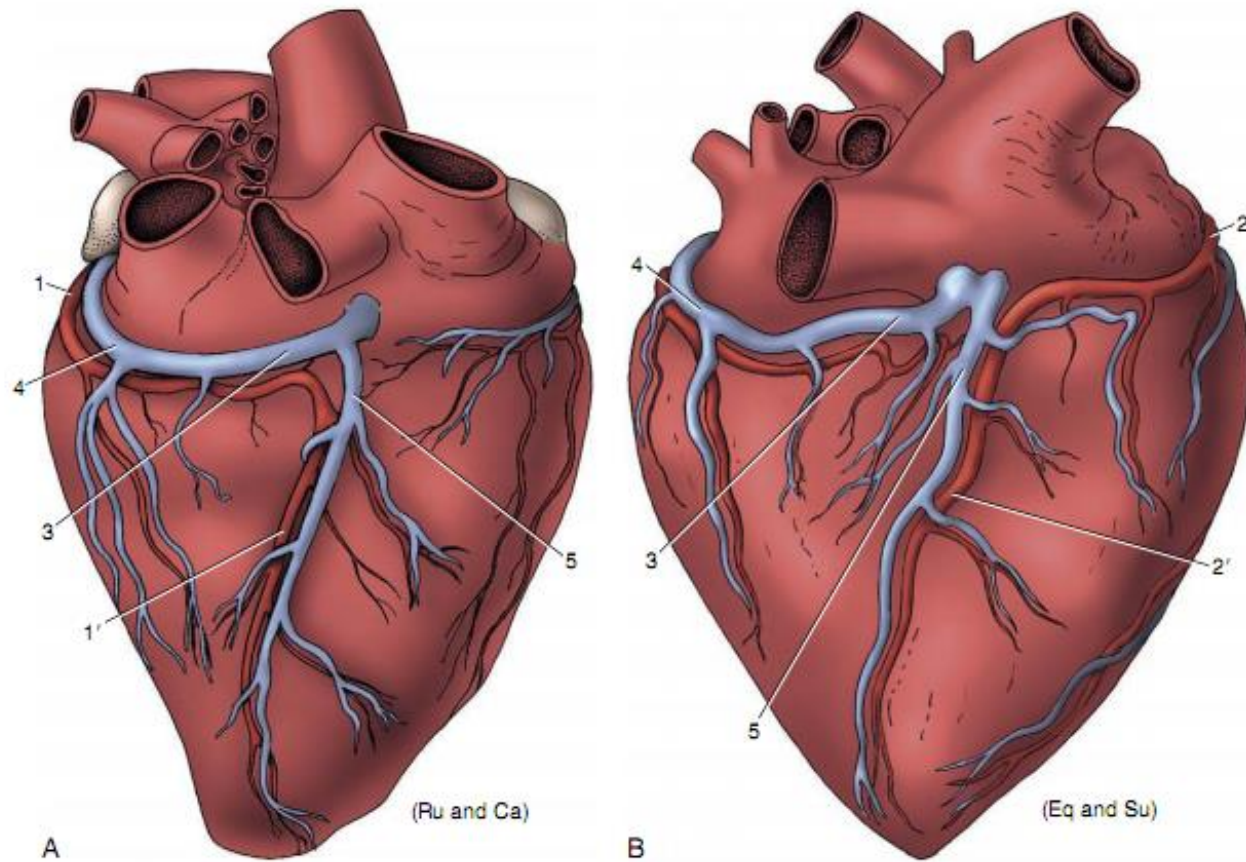
**Fig. 12-12.** Conducting system of the left atrium and ventricle, schematic.



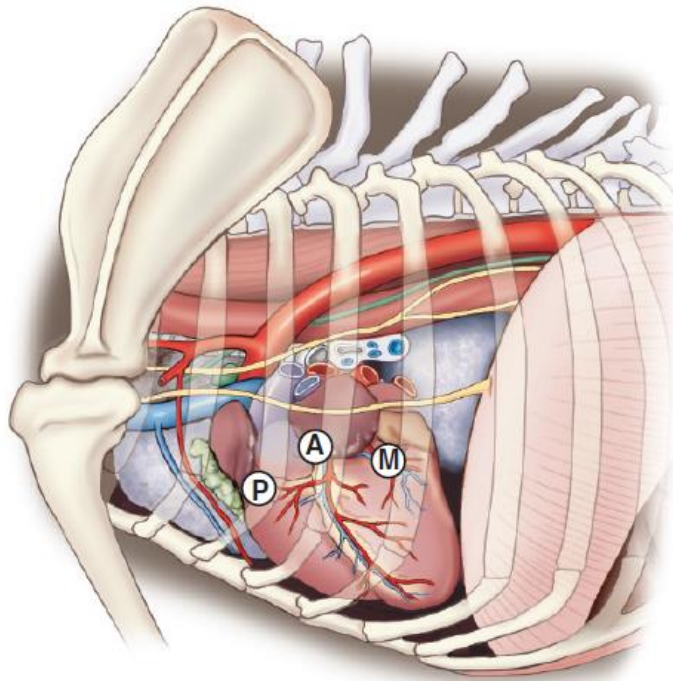


**Figure 7-18** Branching of the left coronary artery of the heart, viewed from the left. The left auricle has been shortened. 1, Pulmonary trunk; 2, left coronary artery; 2', paraconal interventricular branch; 2'', circumflex branch; 3, great cardiac vein (continued by the coronary sinus on the right side of the heart); 3', paraconal interventricular tributary of 3.



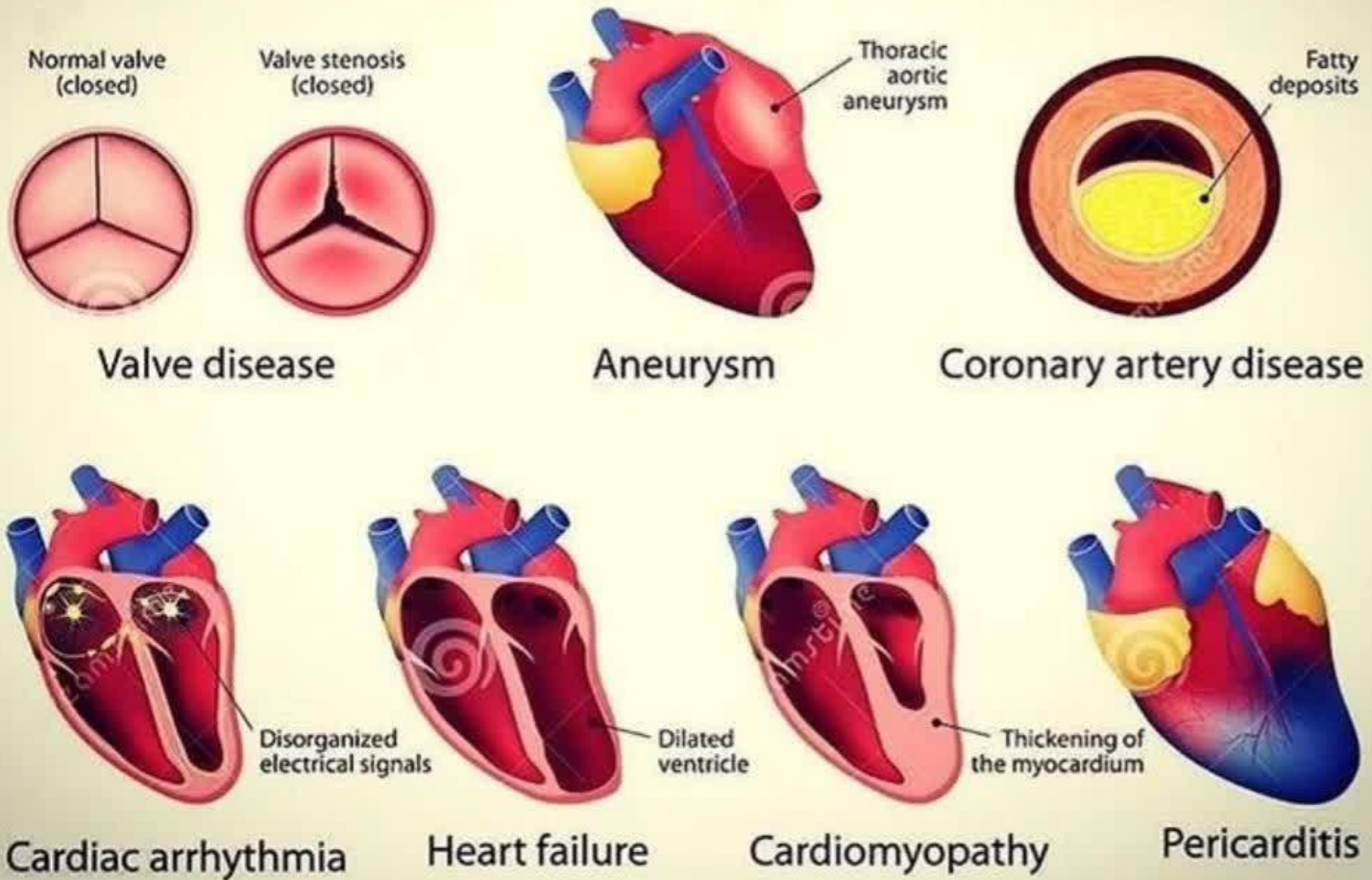


**Figure 7–19** Patterns of coronary circulation of the heart viewed from the right. **A**, Situation in ruminants and carnivores; the right (subsinoosal) interventricular branch (*1'*) is a continuation of the left coronary artery. **B**, Situation in the horse and pig; the right (subsinoosal) interventricular branch (*2'*) is a continuation of the right coronary artery. *Ru* (ruminants), *Ca* (cat), *Su* (pig), *Eq* (horse). *1*, Circumflex branch of left coronary artery; *1'*, right (subsinoosal) interventricular branch; *2*, right coronary artery; *2'*, right (subsinoosal) interventricular branch; *3*, coronary sinus; *4*, great cardiac vein; *5*, middle cardiac vein.

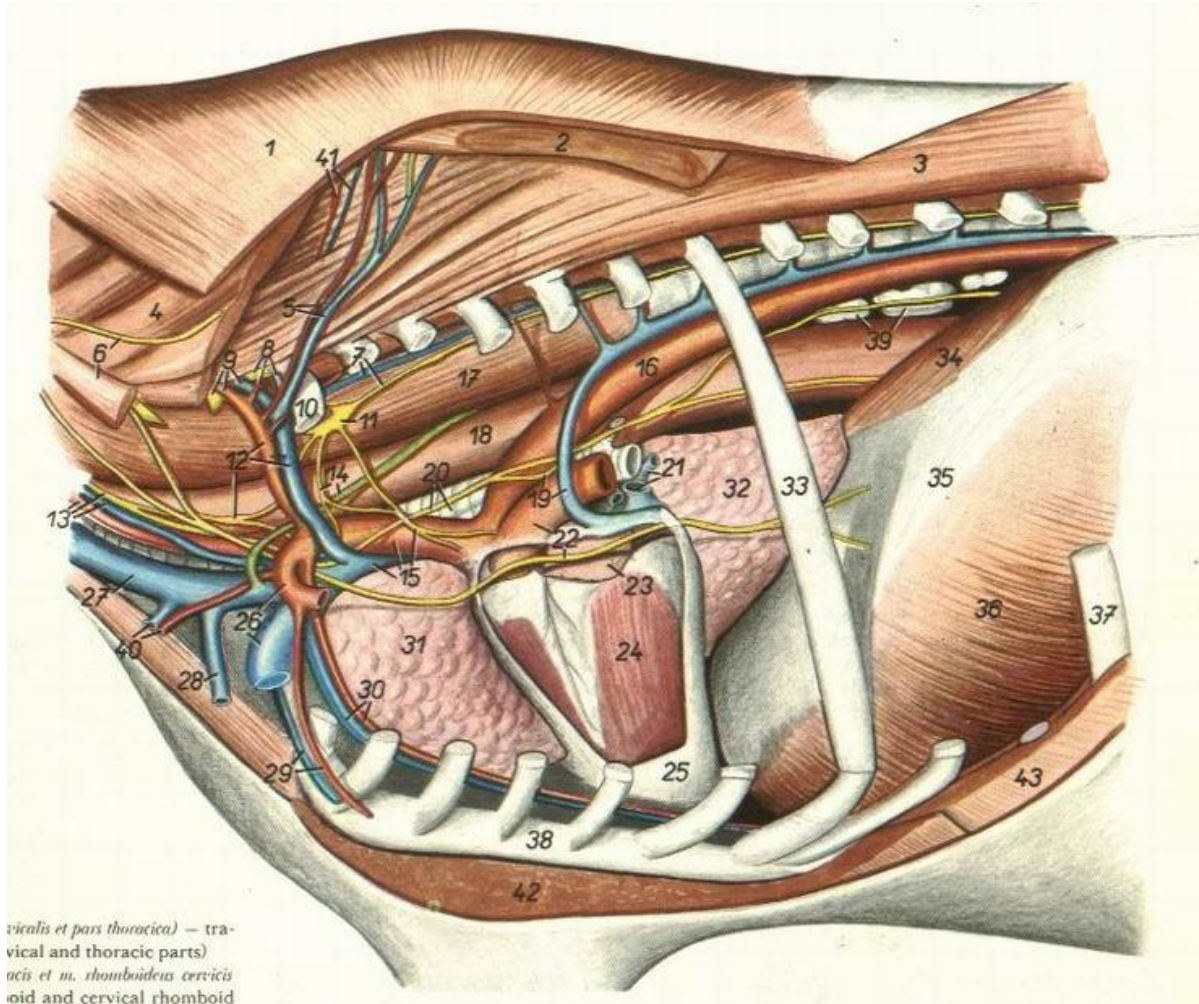


**FIGURE 4.7-1** Location of heart valves on auscultation of the left side of the thorax in a dog or cat. A, aortic valve; M, mitral valve; P, pulmonary valve.

# Types of heart disease

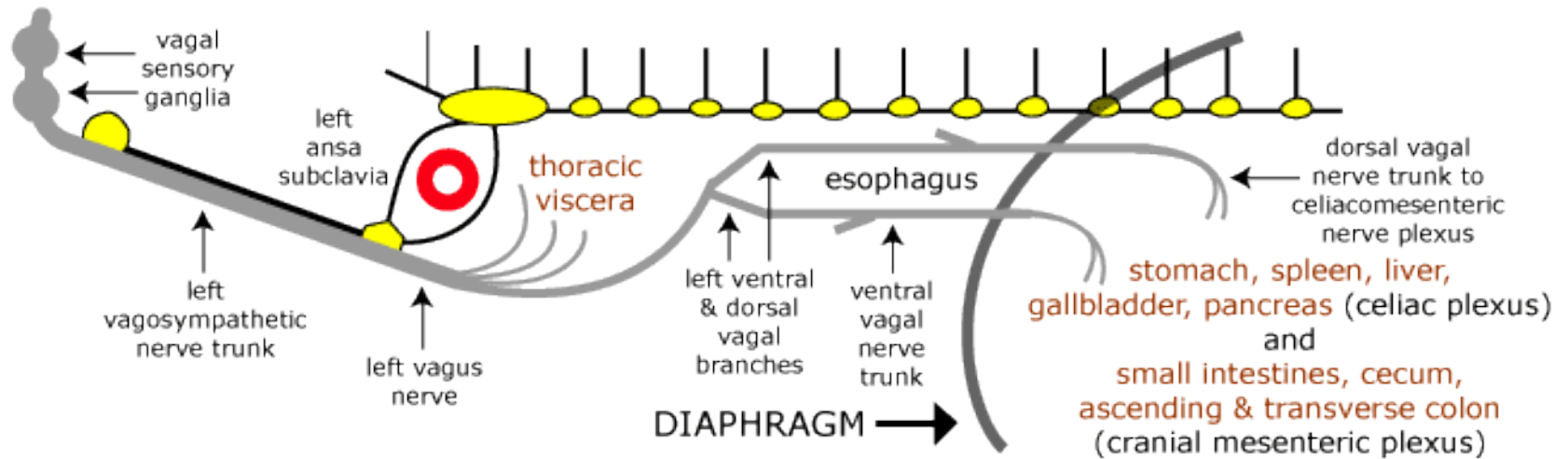


# Cardiac Nerves

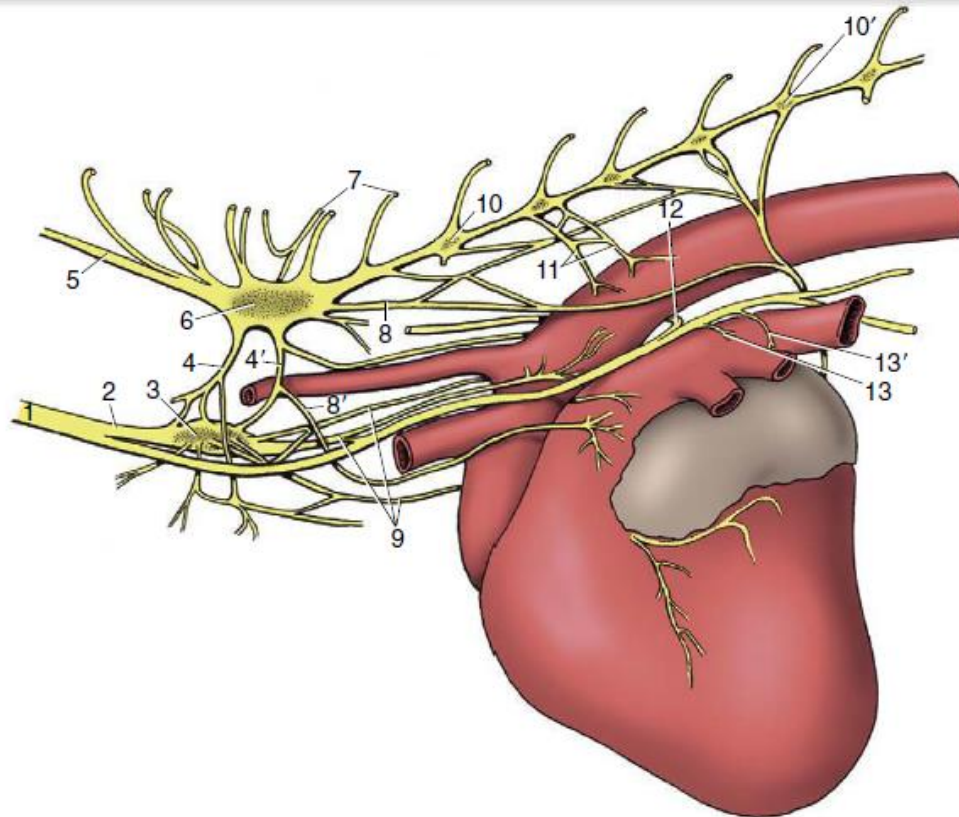


*vicalis et pars thoracica) – tra-  
vical and thoracic parts)  
acis et m. rhomboideus cervicis  
oid and cervical rhomboid*

## Schematic of Parasympathetic VE Innervation to Thoracic & Abdominal Viscera

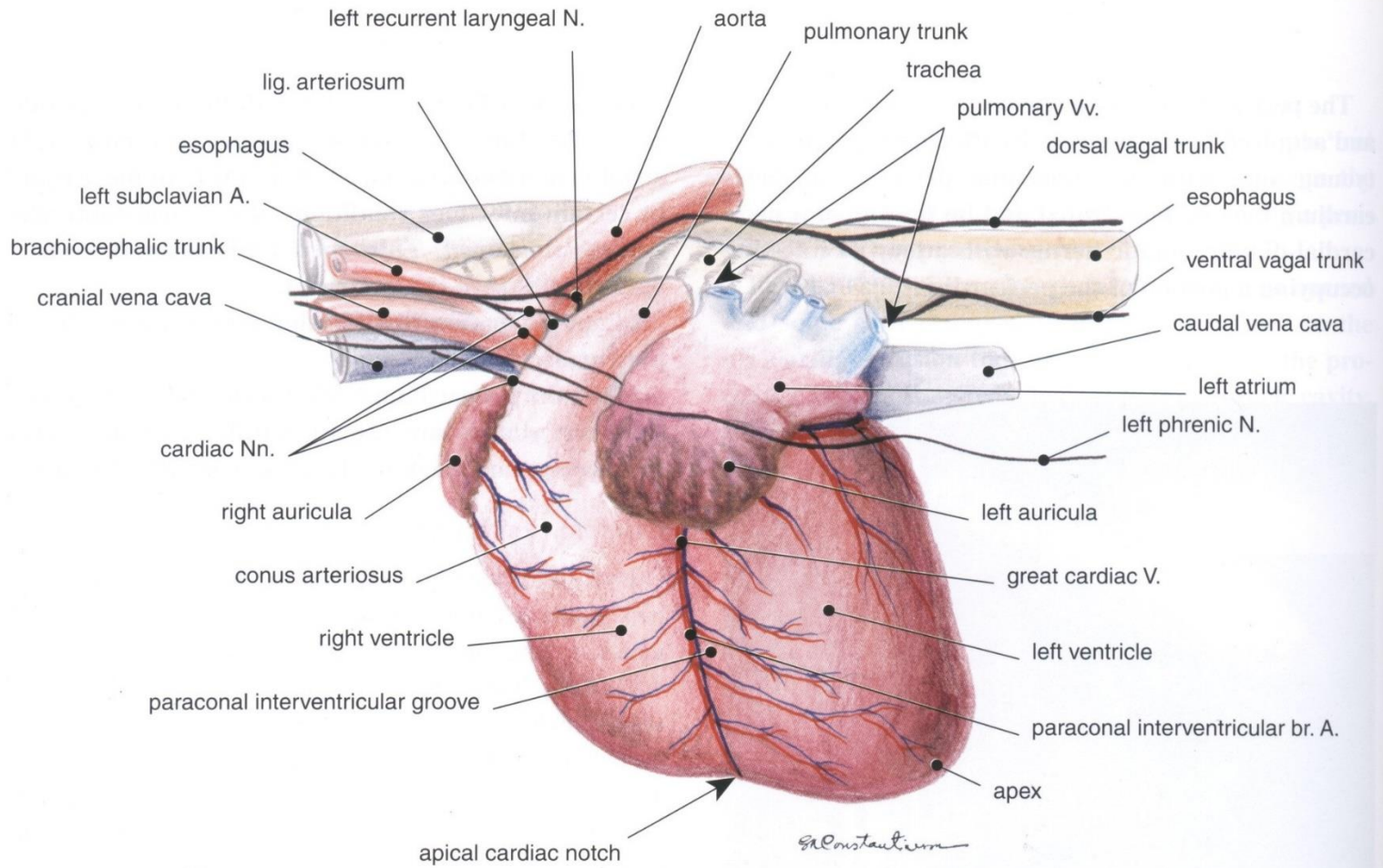


NOTE: Postganglionic neurons are in terminal ganglia located within submucosal & myenteric nerve plexuses

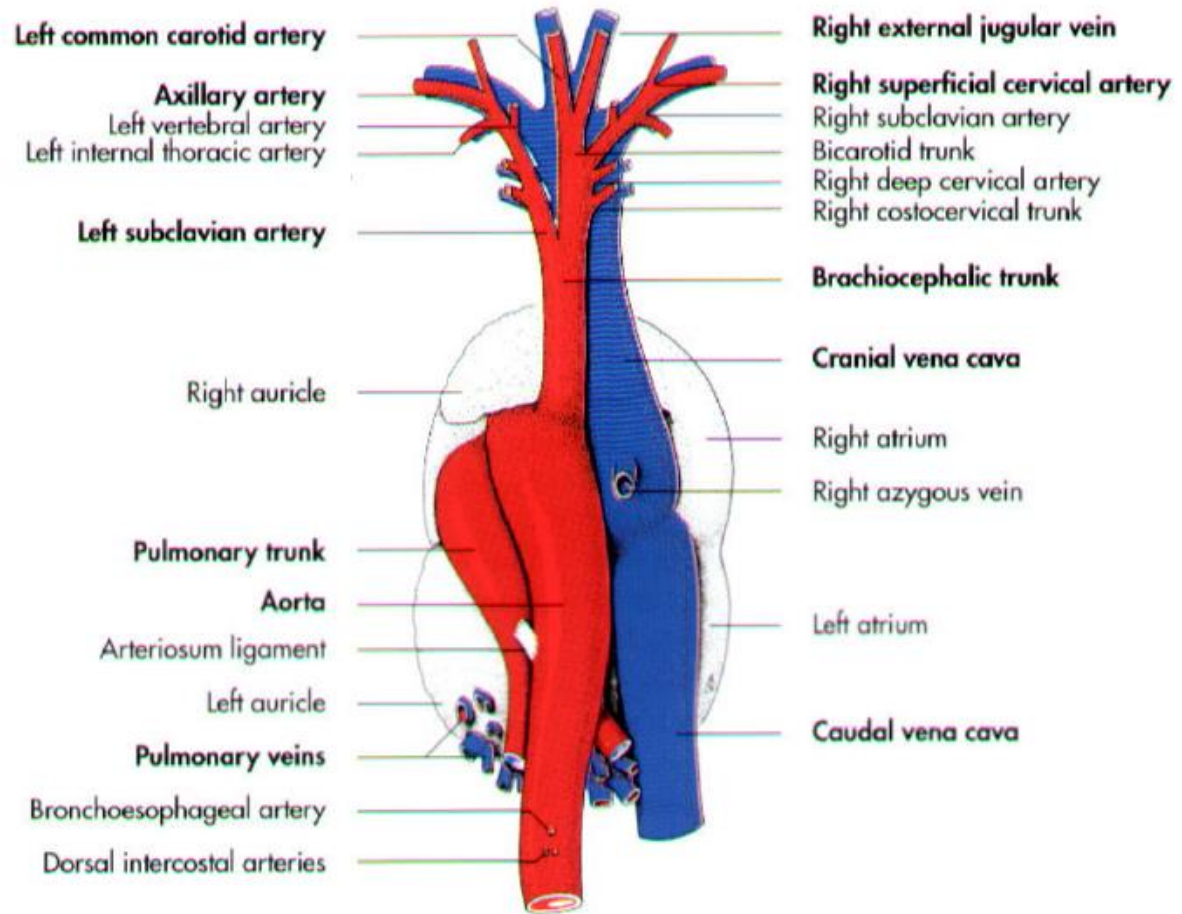


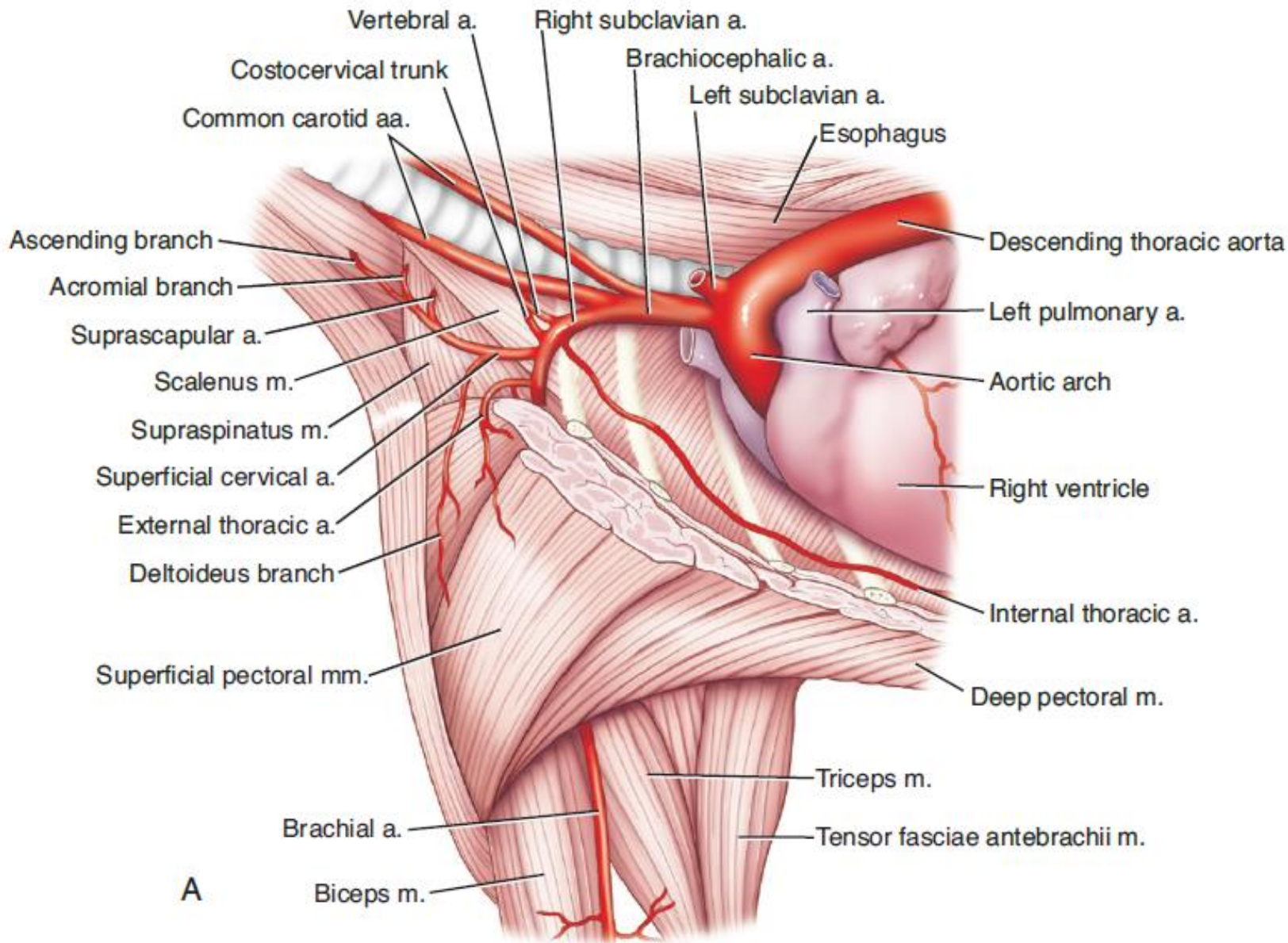
**Figure 7–22** Cardiac nerves and related ganglia of the dog; left lateral view. 1, Vagosympathetic trunk; 2, sympathetic trunk; 3, middle cervical ganglion; 4, 4', cranial and caudal limbs of ansa subclavia; 5, vertebral node; 6, cervicothoracic ganglion; 7, communicating branches; 8, 8', caudodorsal and caudoventral cervicothoracic cardiac nodes; 9, vertebral cardiac nodes; 10, 10', third and seventh thoracic ganglia; 11, thoracic cardiac nodes; 12, left recurrent laryngeal node; 13, 13', cranial and caudal vagal cardiac nodes.

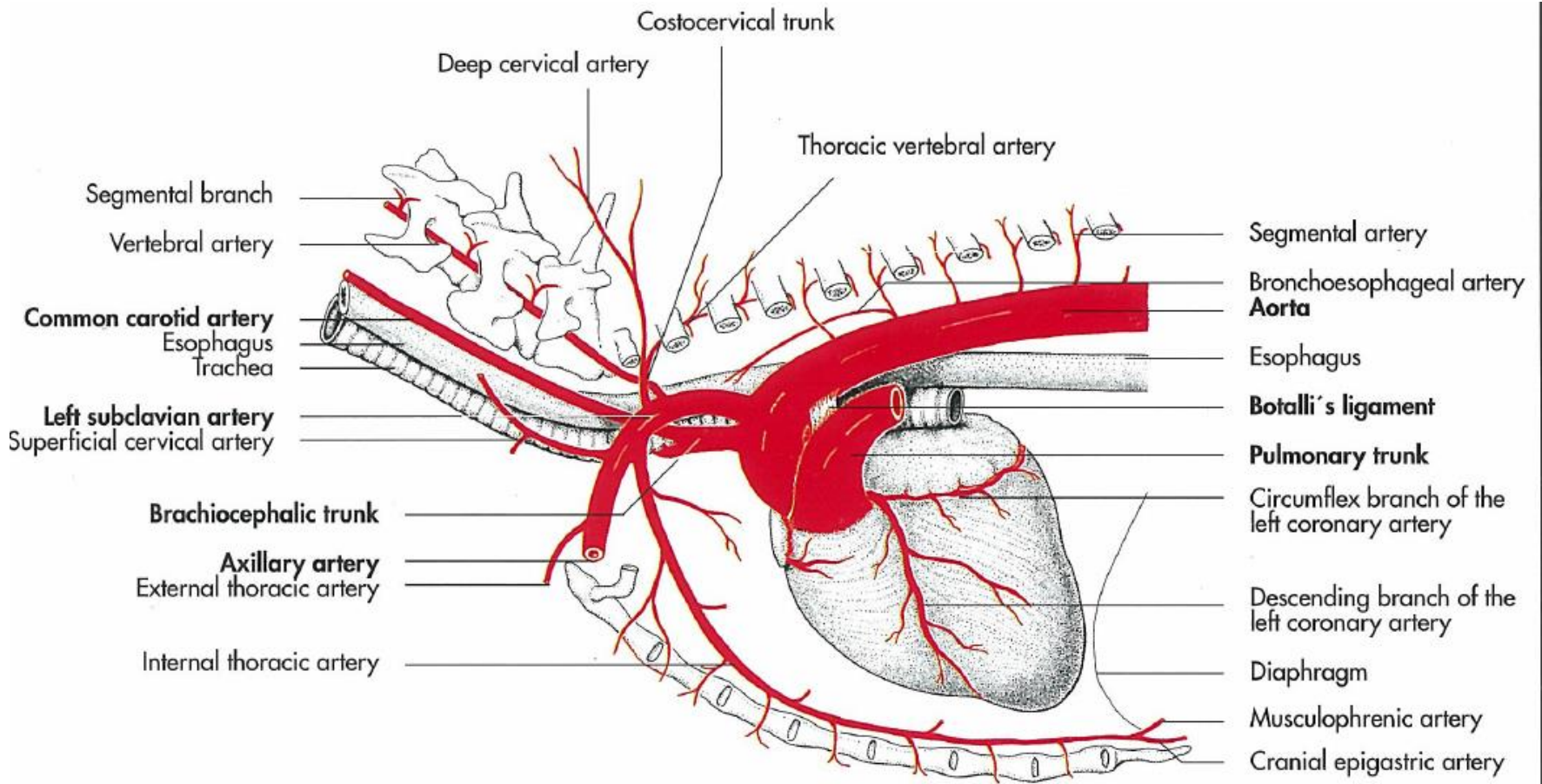




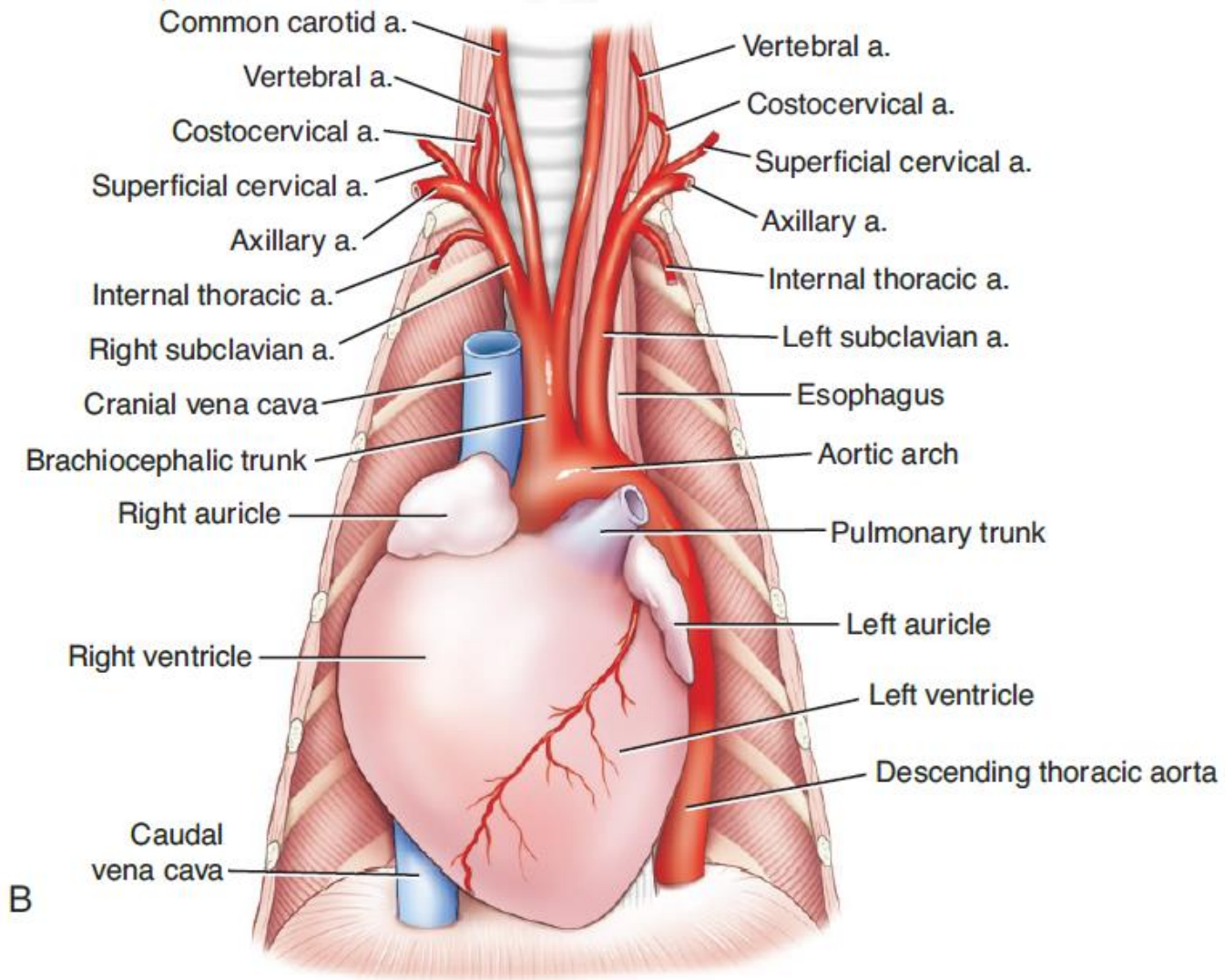
# *Vessels of thoracic cavity*



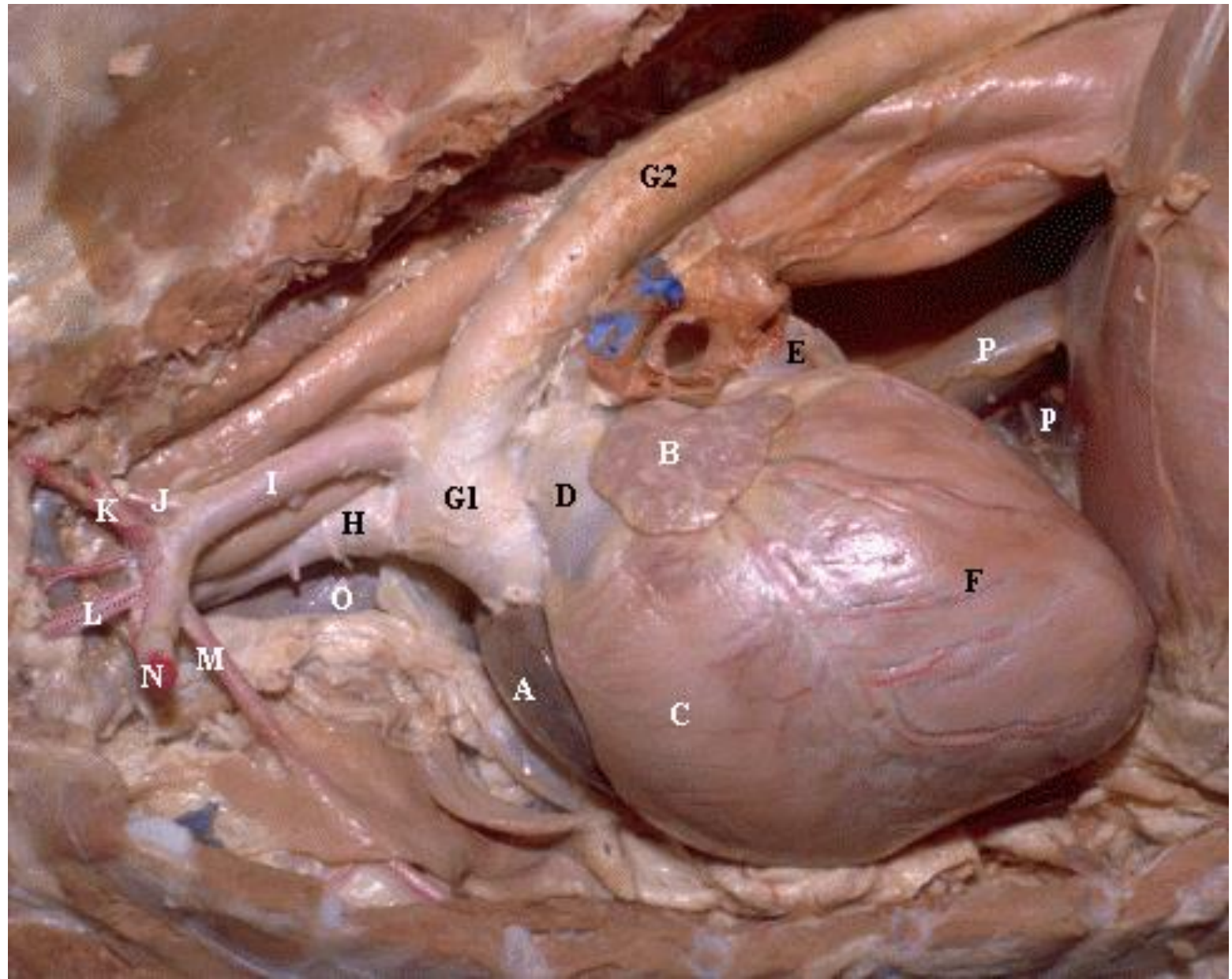


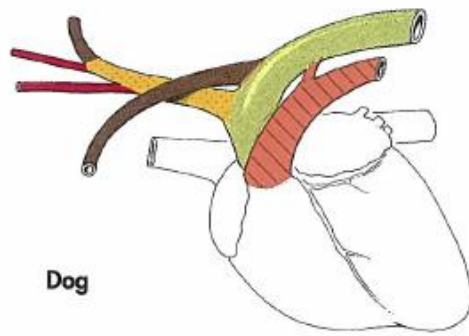


-21. Arteries of the base of the heart and the cranial mediastinum of the dog, schematic, left lateral aspect

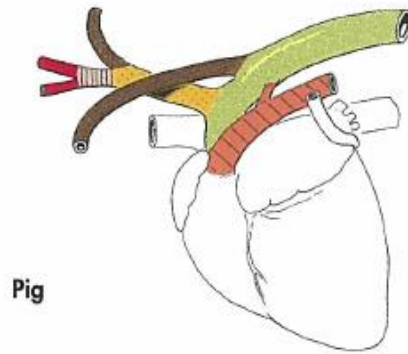


**FIGURE 4.5-4** Normal anatomy and branches of the thoracic aorta.

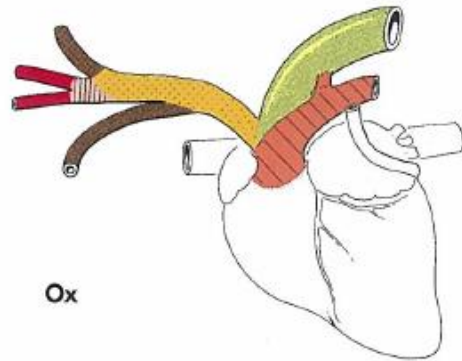




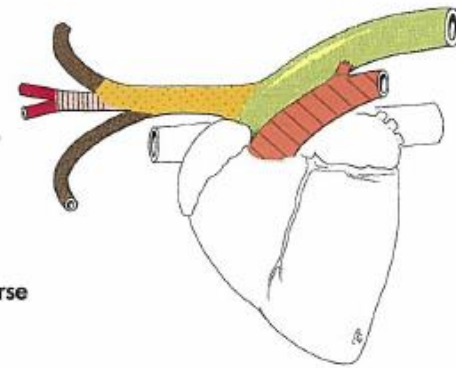
Dog




Pig






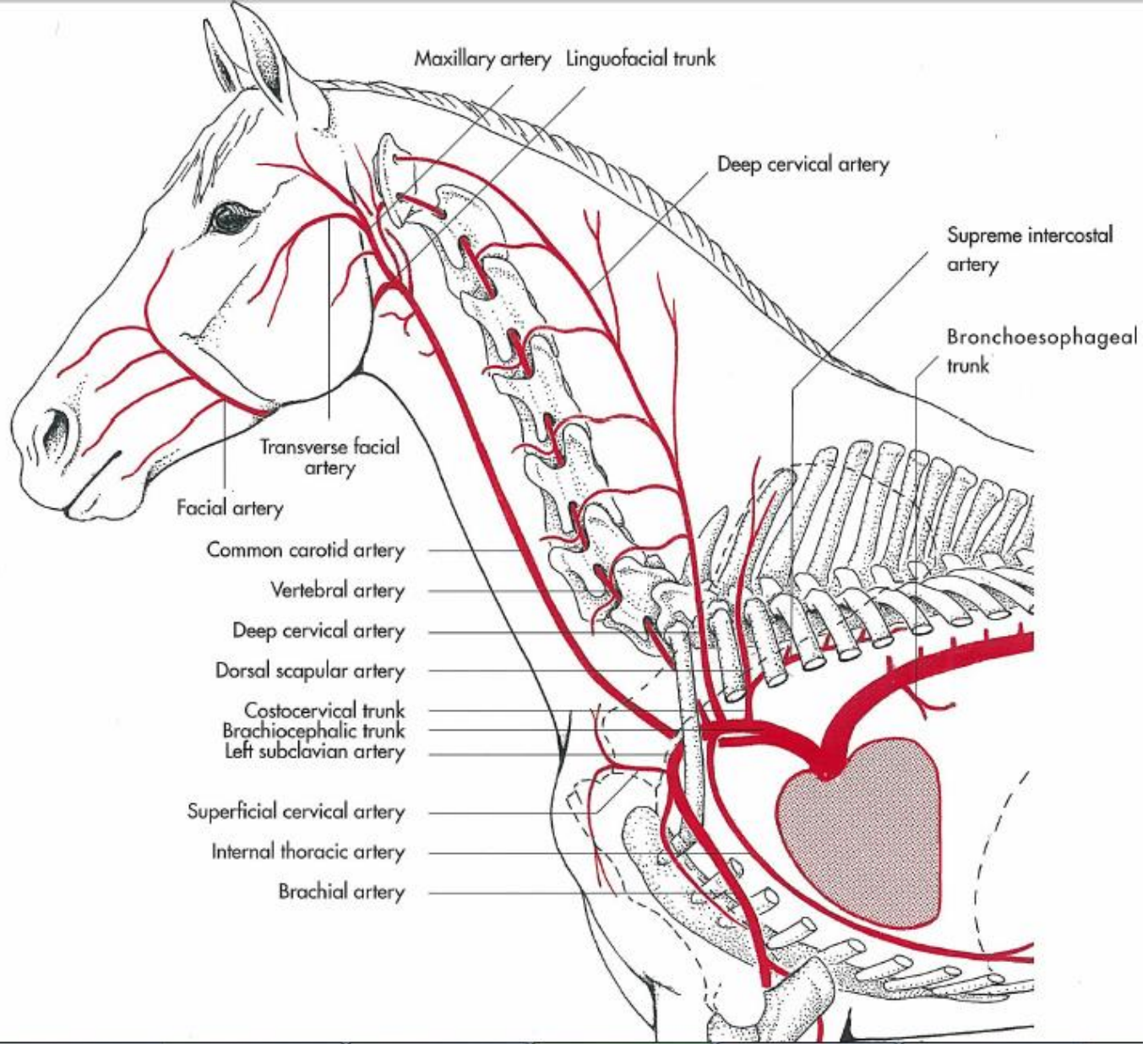
Ox



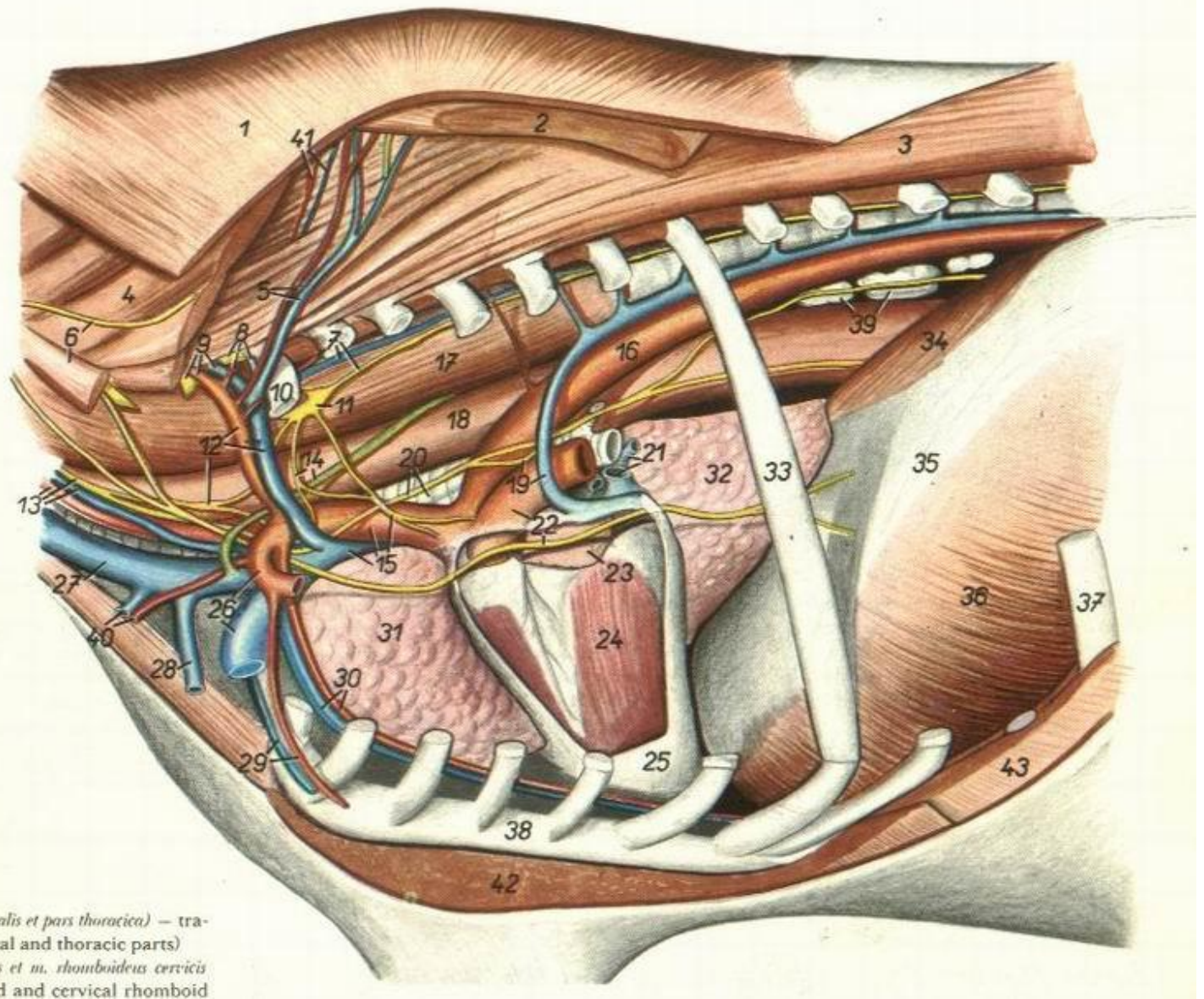
Horse

-  Aorta
-  Brachiocephalic trunk
-  Subclavian artery
-  Bicarotid trunk

-  Common carotid artery
-  Pulmonary trunk
-  Cranial vena cava, caudal vena cava with the left azygous vein

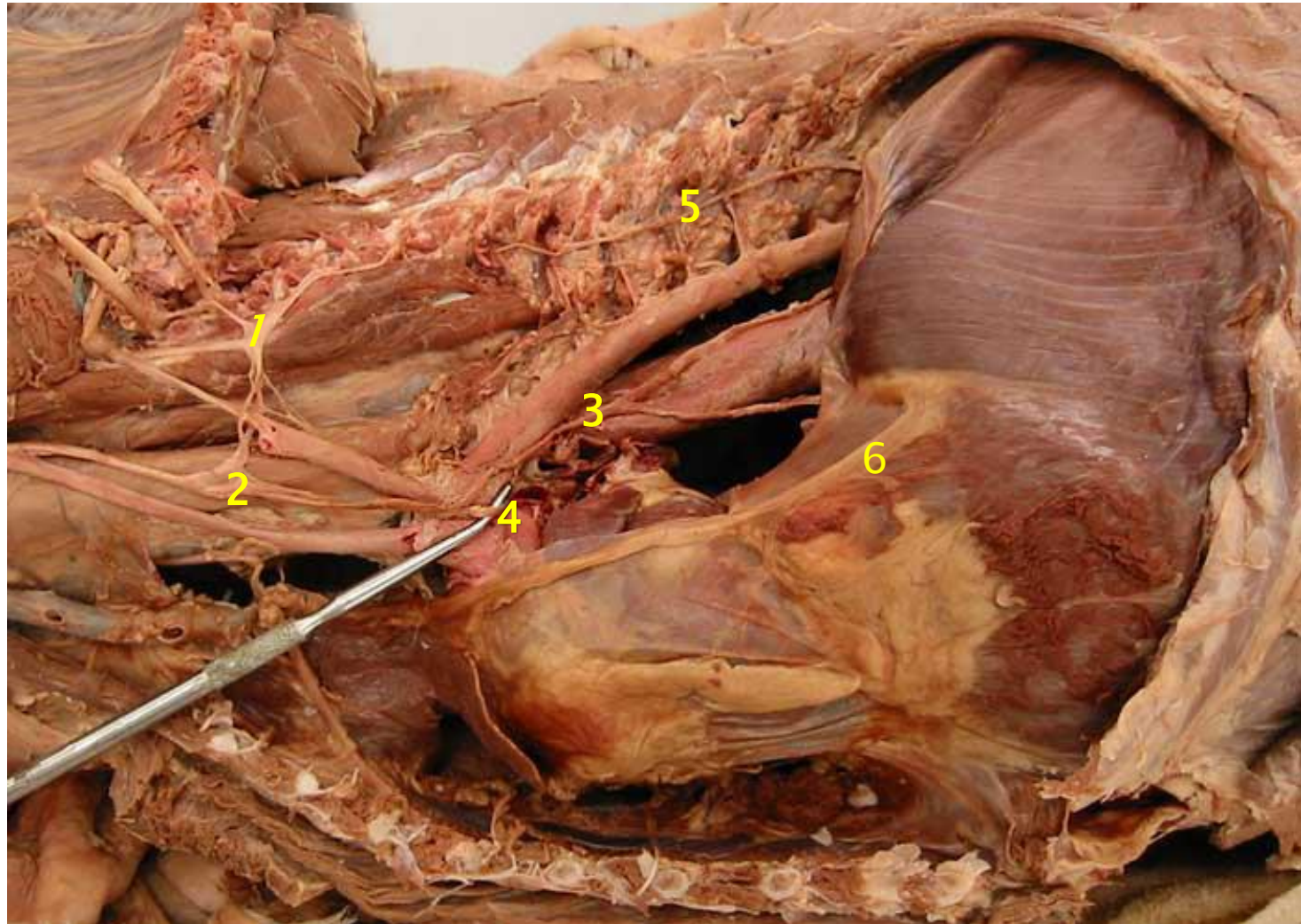






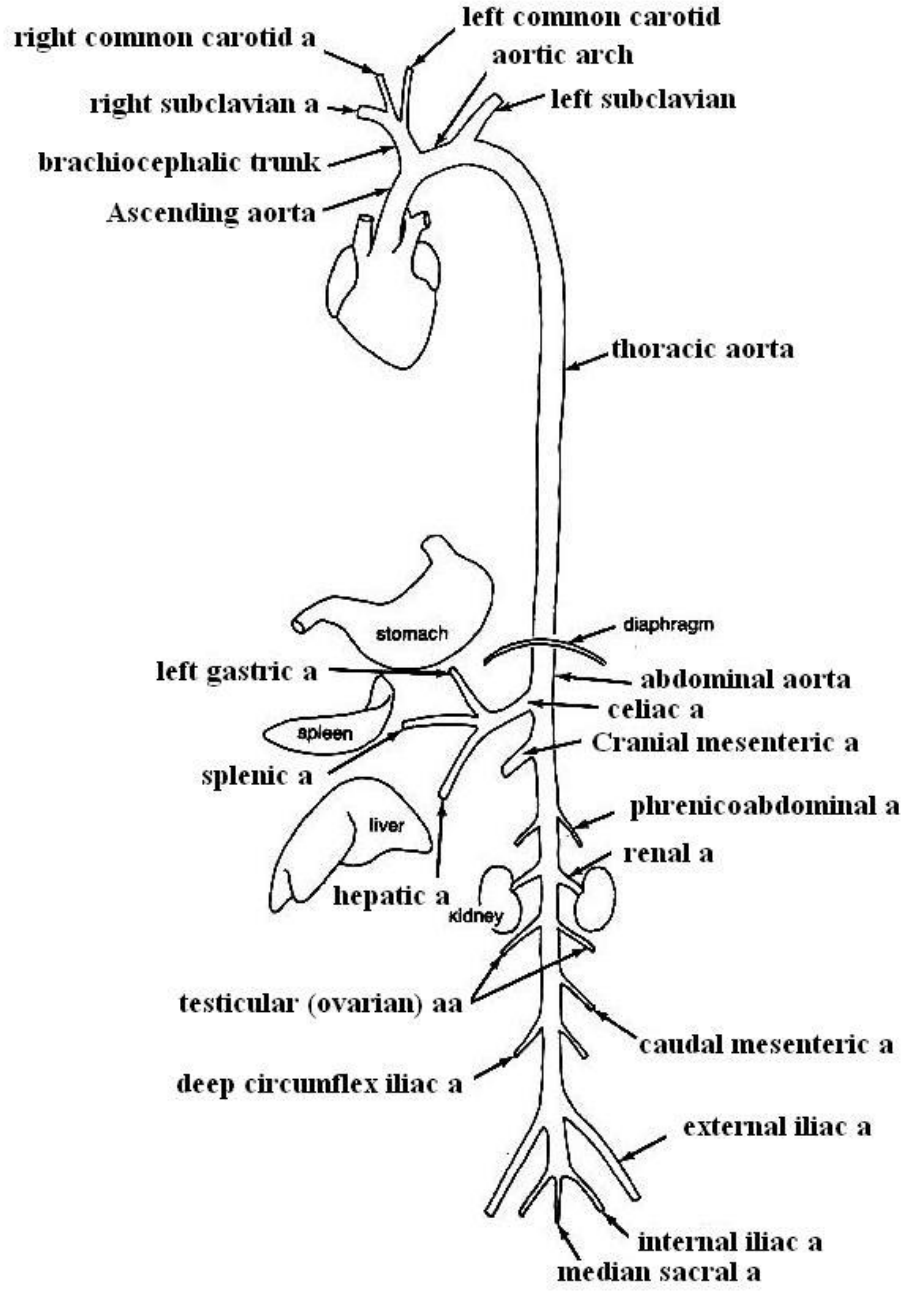
***Vessels of thoracic cavity in Ox***

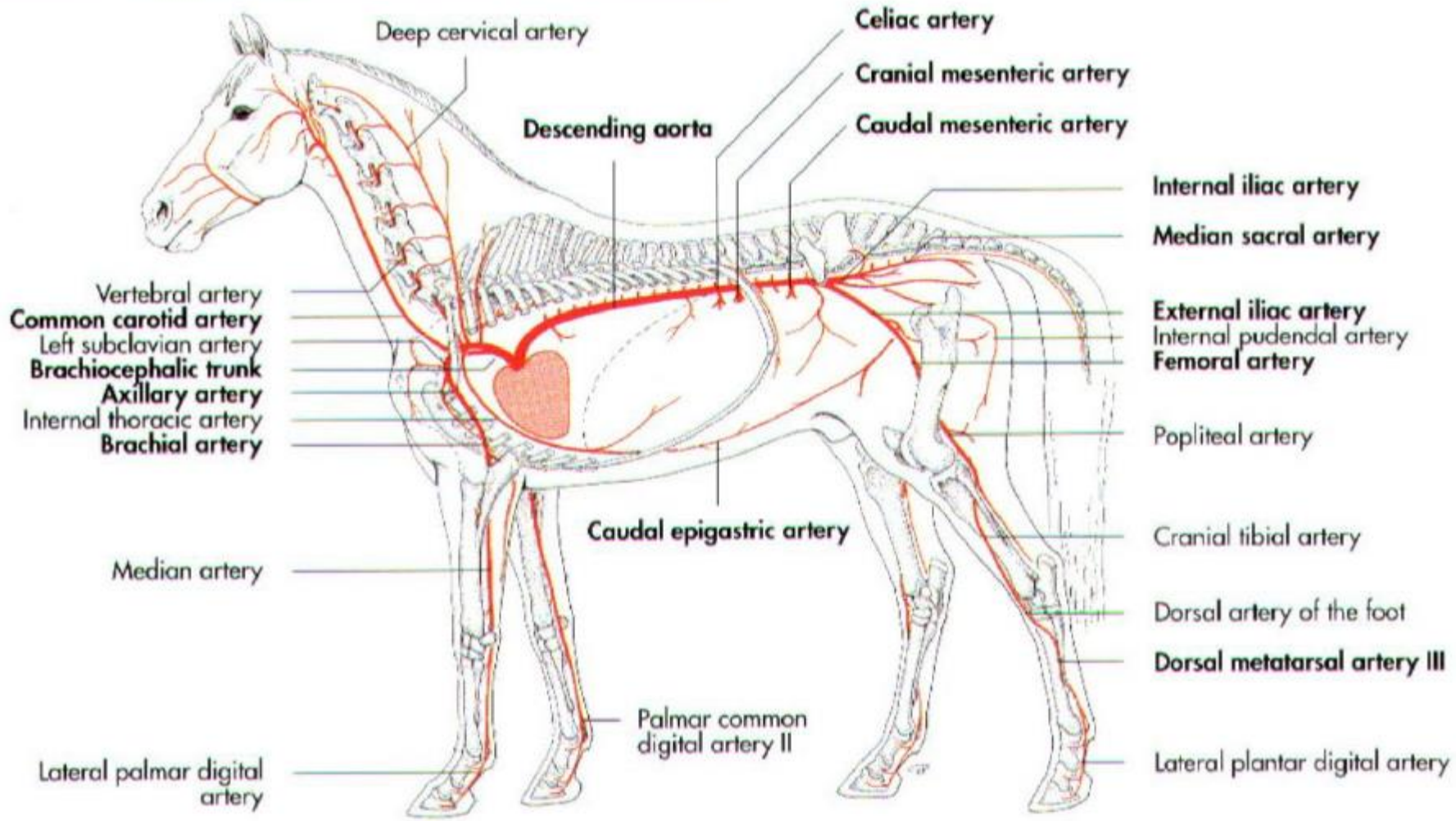
- 1.Stellate ganglion
- 2.Middle cervical ganglion
- 3.Vagus nerve
- 4.Recurrent laryngeal nerve
- 5.Sympathetic chain
- 6.Phrenic nerve



***Nerves of thoracic cavity in dog***

# Vessels Of Abdominal Cavity





## Abdominal aorta

- Phrenicoabdominal aa. *(supply the diaphragmatic structures and the abdominal wall)*
- Lumbar aa. *(supply the tissue and structures of the back)*
- Celiac a. *(supplies the liver, spleen, and stomach with the named arteries)*
  - Left gastric a.
  - Hepatic a.
    - Hepatic branches
    - Right gastric a.
    - Gastroduodenal a.
    - Cranial pancreaticoduodenal a.
    - Right gastroepiploic a.
  - Splenic a.
    - Pancreatic branches
    - Short gastric aa.
    - Left gastroepiploic a.
- Cranial mesenteric a. *(supplies intestinal tract)*
  - Caudal pancreaticoduodenal a.
  - Jejunal aa.
  - Ileal aa.
  - Ileocolic a.
    - Middle colic a.
    - R. colic a.
    - Cecal aa.
- Renal aa. *(supply the kidneys)*
- Testicular (ovarian) aa. *(supply testes or ovaries)*
- Caudal mesenteric a. *(supplies intestinal tract)*
  - Left colic a.
  - Cranial rectal a.
- Deep circumflex iliac aa. *(supply flank region)*
- External iliac aa. *(supply hindlimb)*
- Internal iliac aa. *(supply pelvic wall and pelvic viscera)*
- Median sacral a. *(supplies tail)*
  - Lumbar a. VI
- Median caudal a.

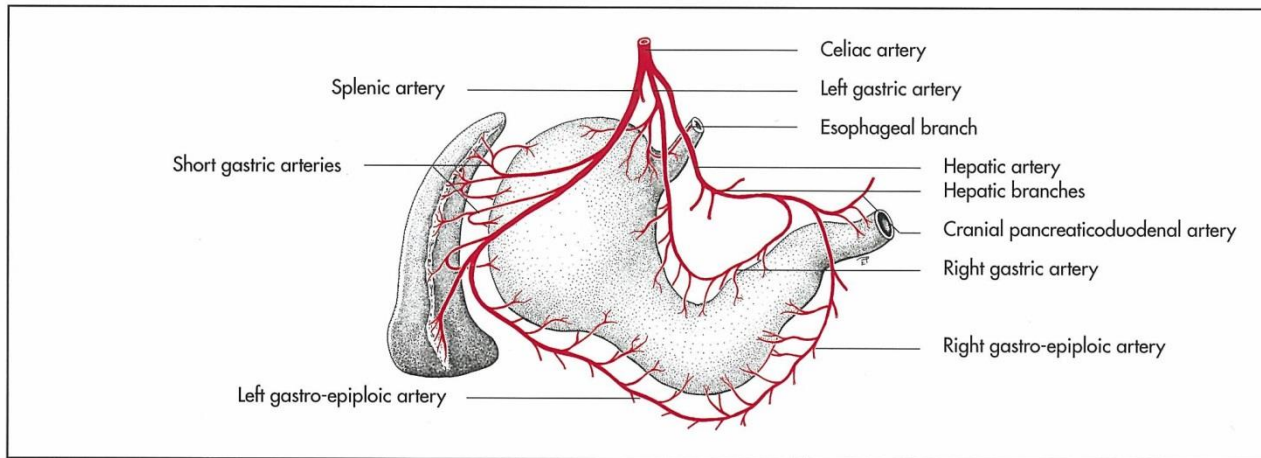


Fig. 12-33. Celiac artery of the dog, schematic.

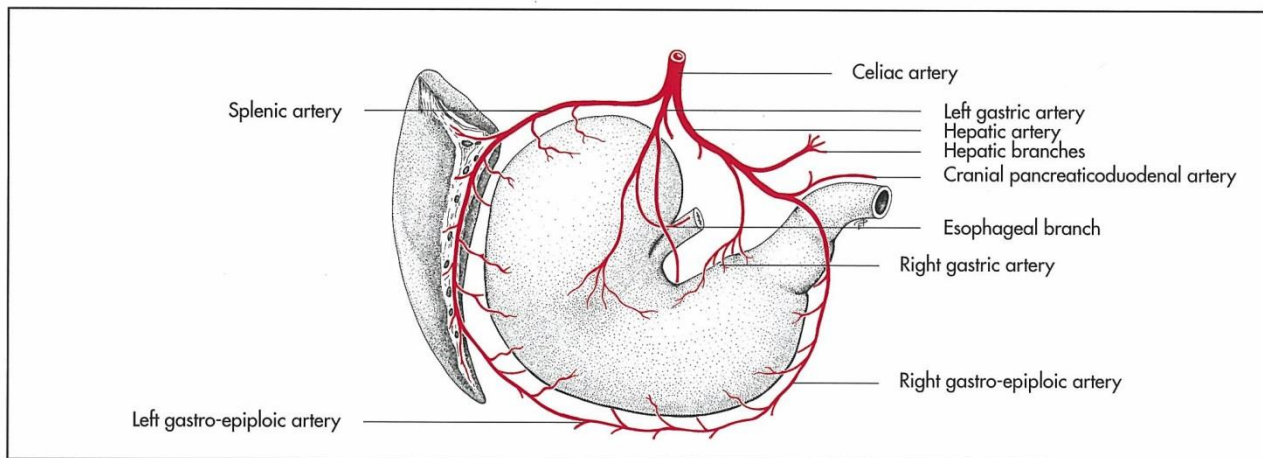
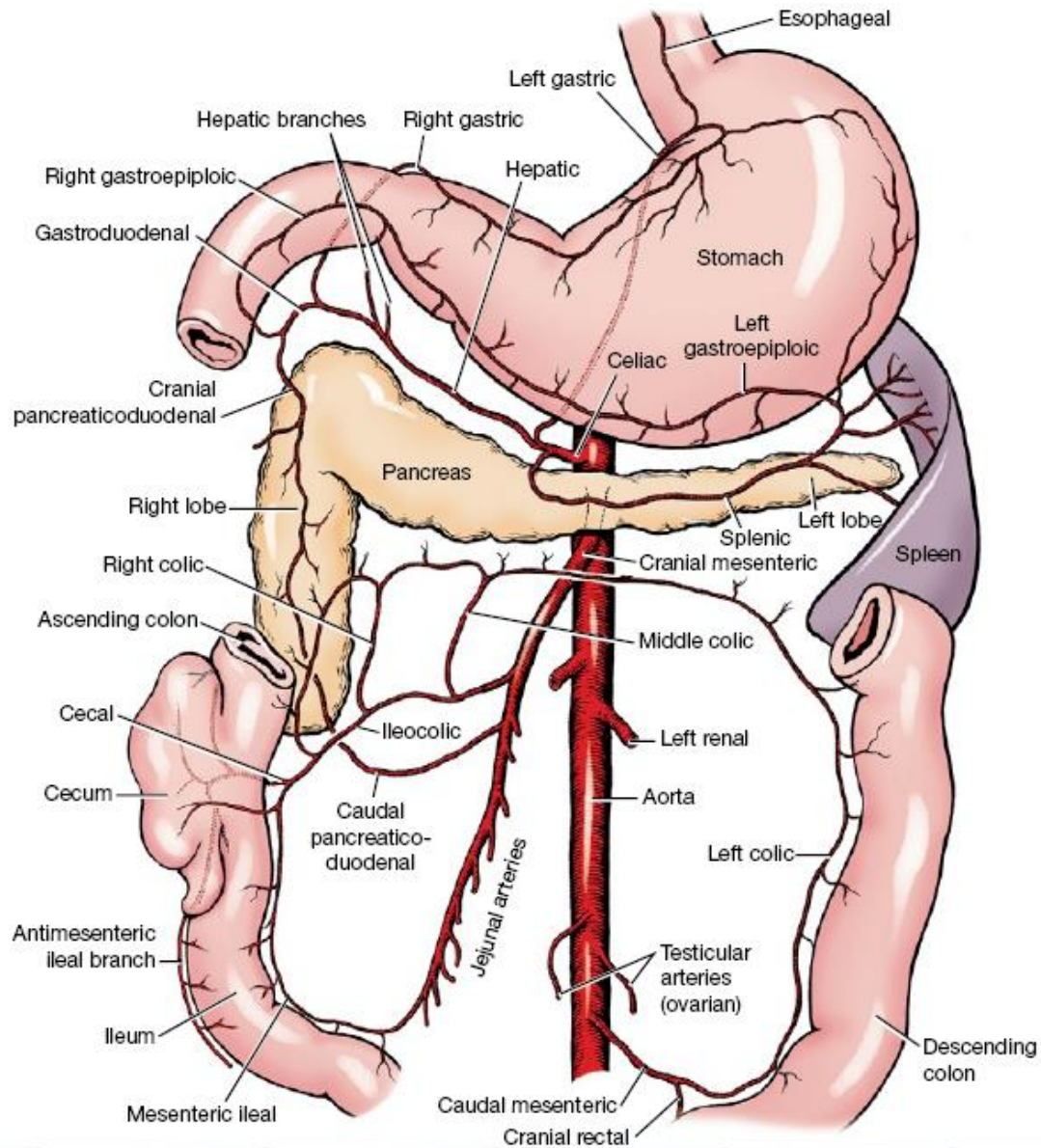
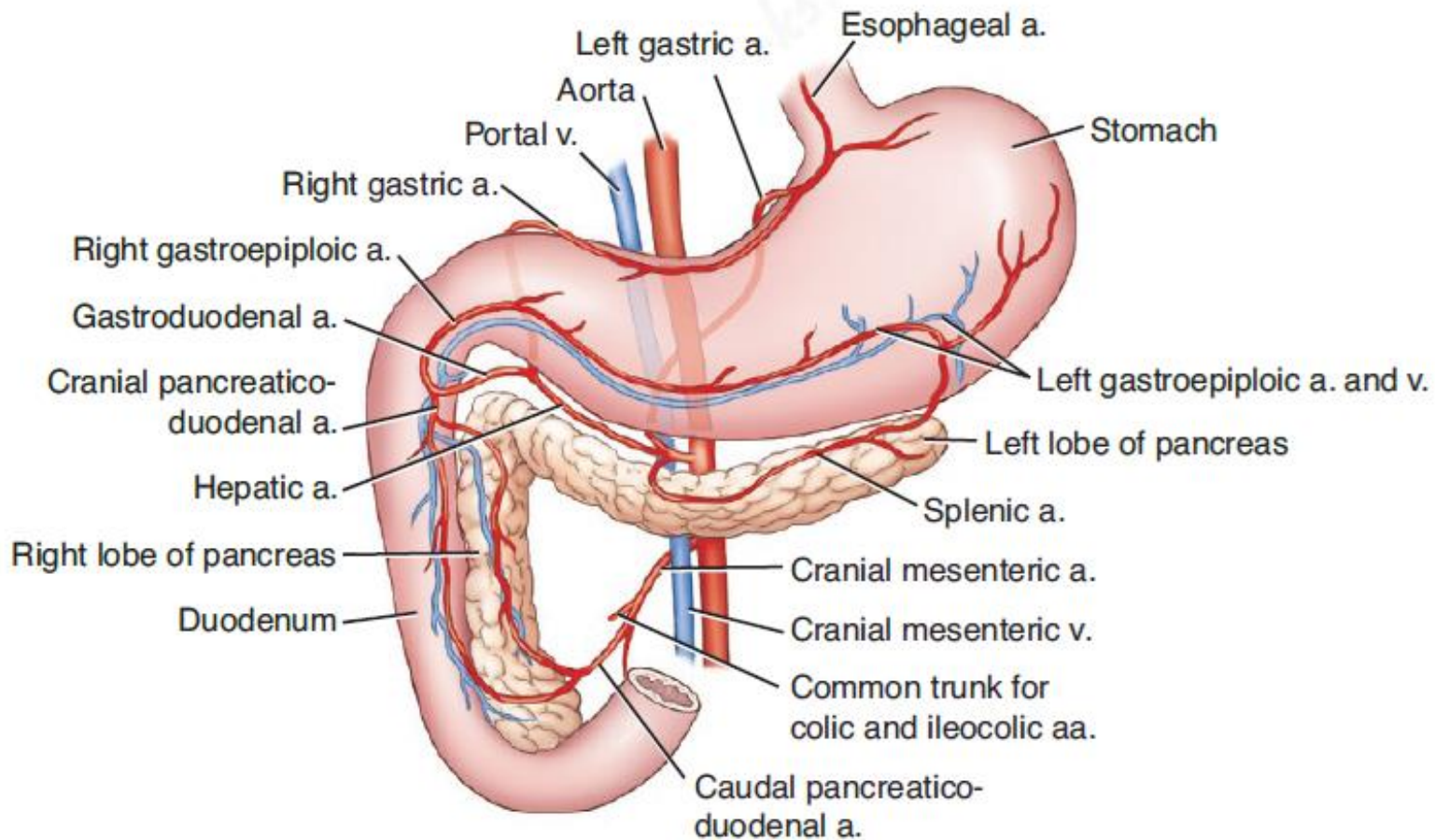


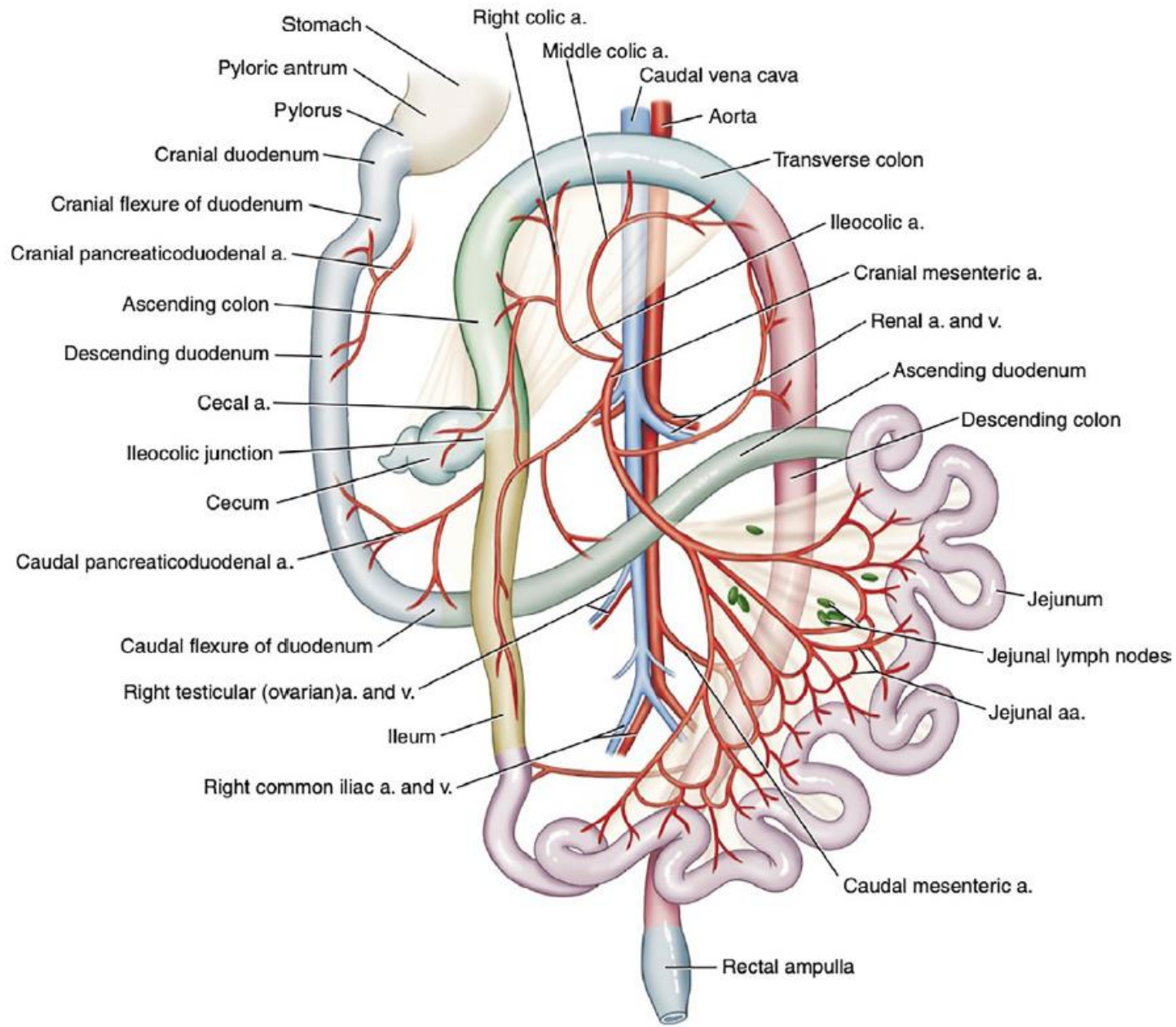
Fig. 12-34. Celiac artery of the horse, schematic.



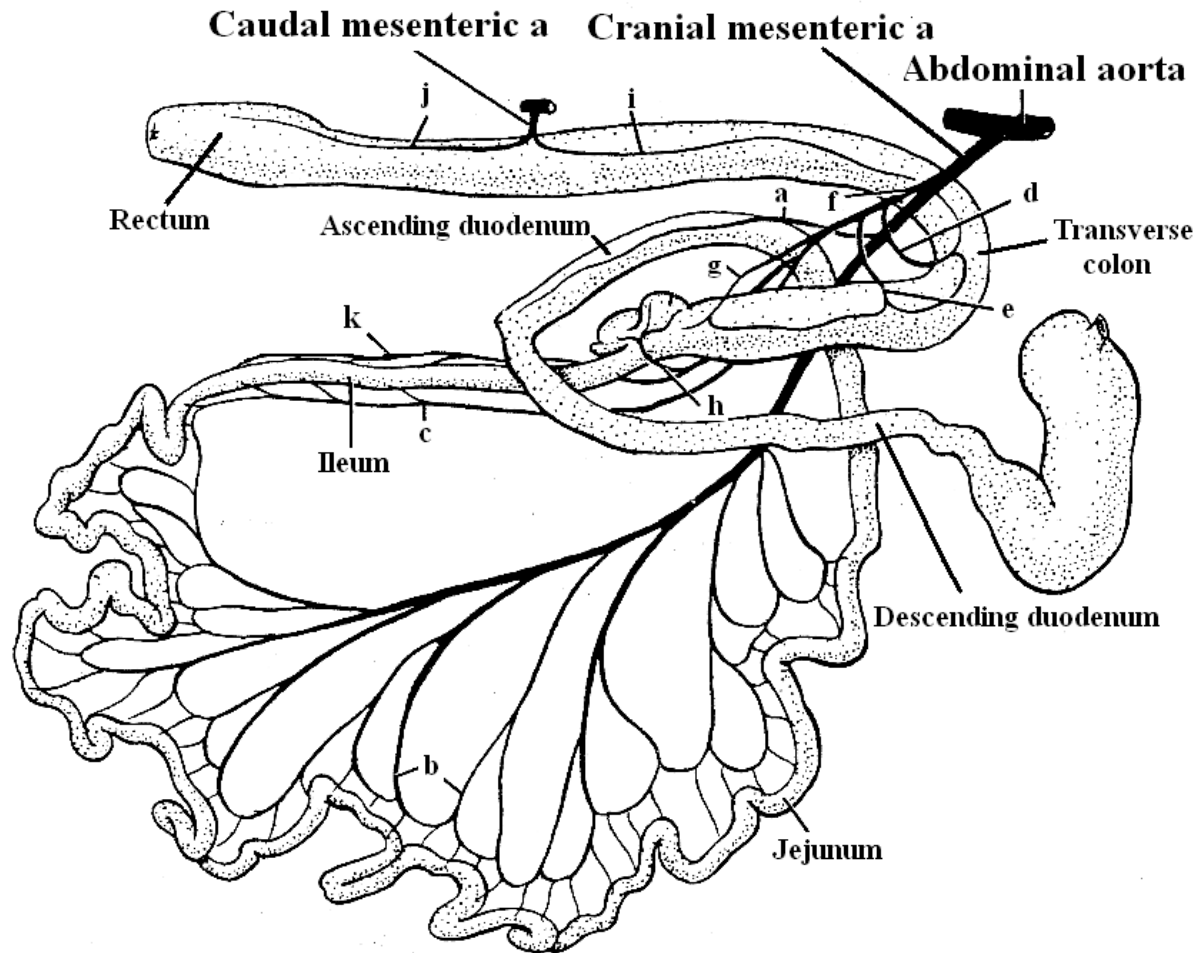


**FIGURE 5.2-4** Blood supply of the pancreas.

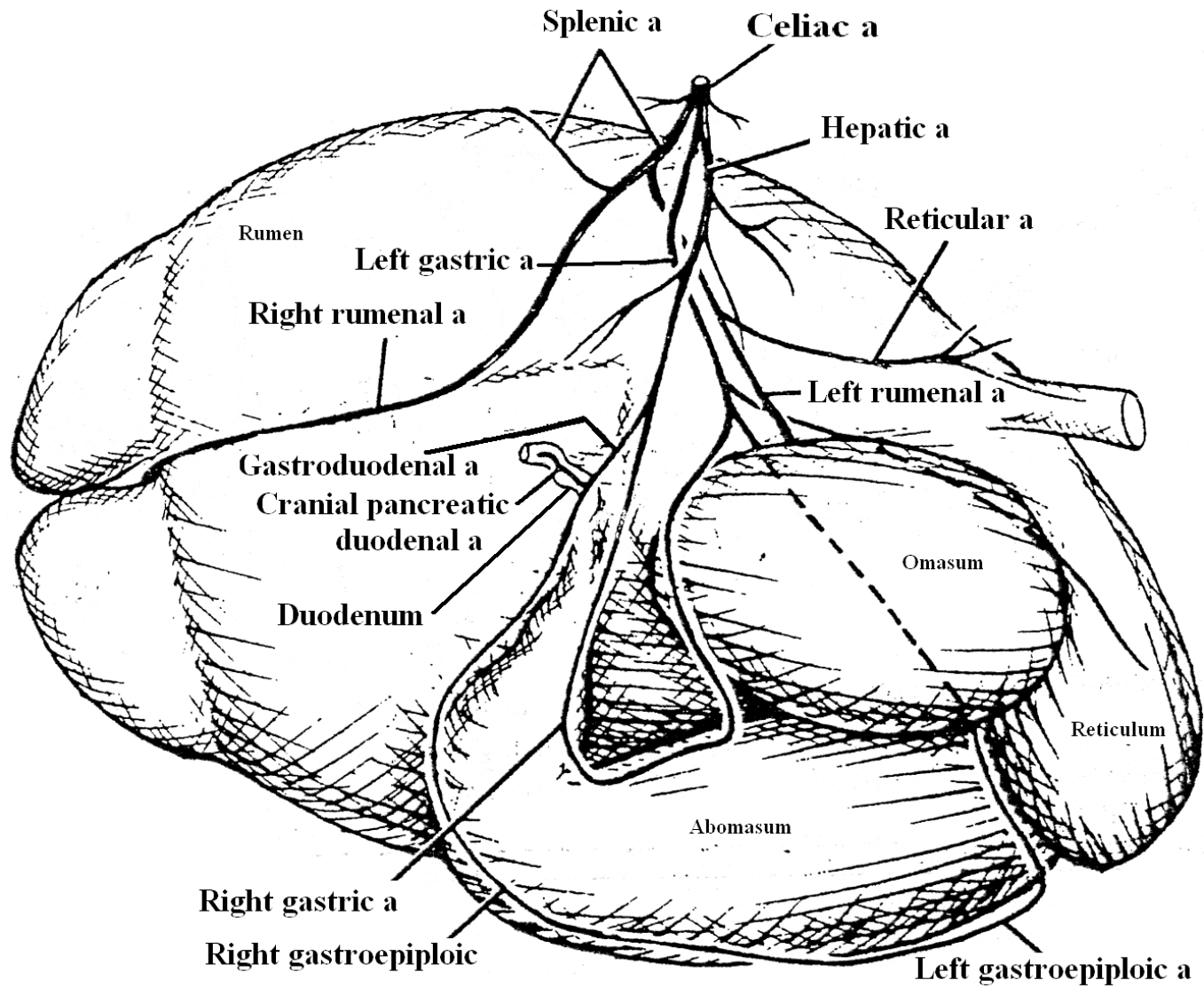


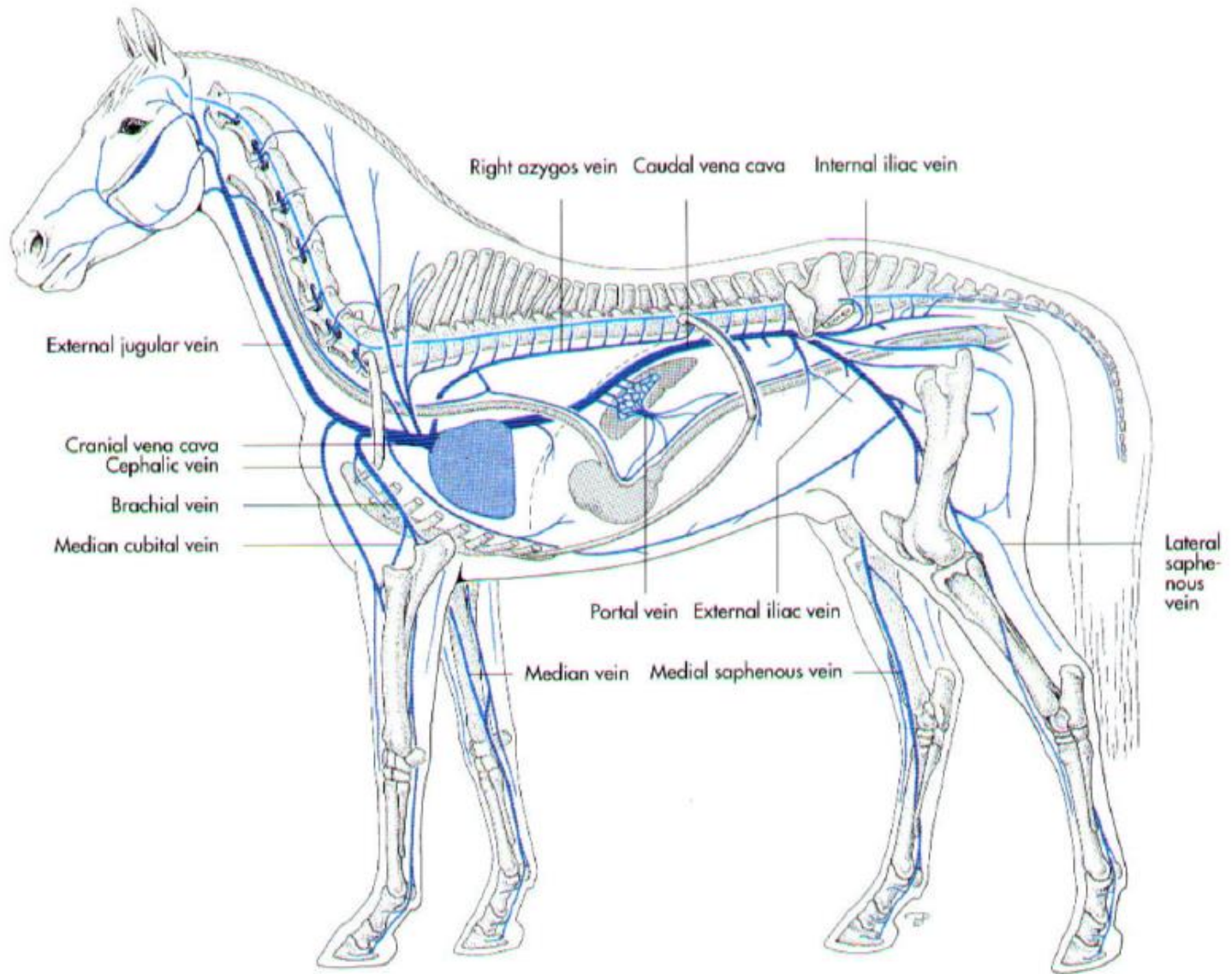


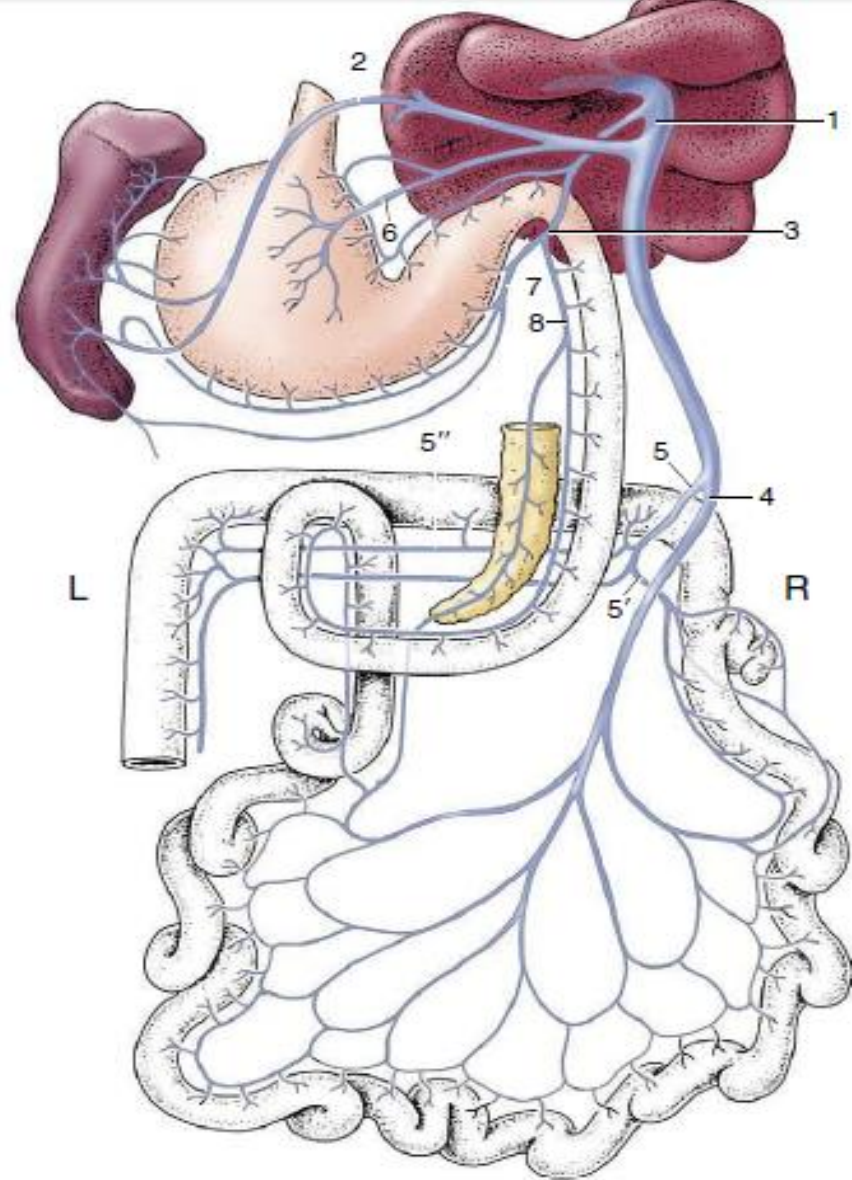
**FIGURE 5.6-2** Dog intestinal tract demonstrating arterial supply, formation of the caudal vena cava, and the various segments comprising the gastrointestinal tract (each a different color to highlight the various sections).



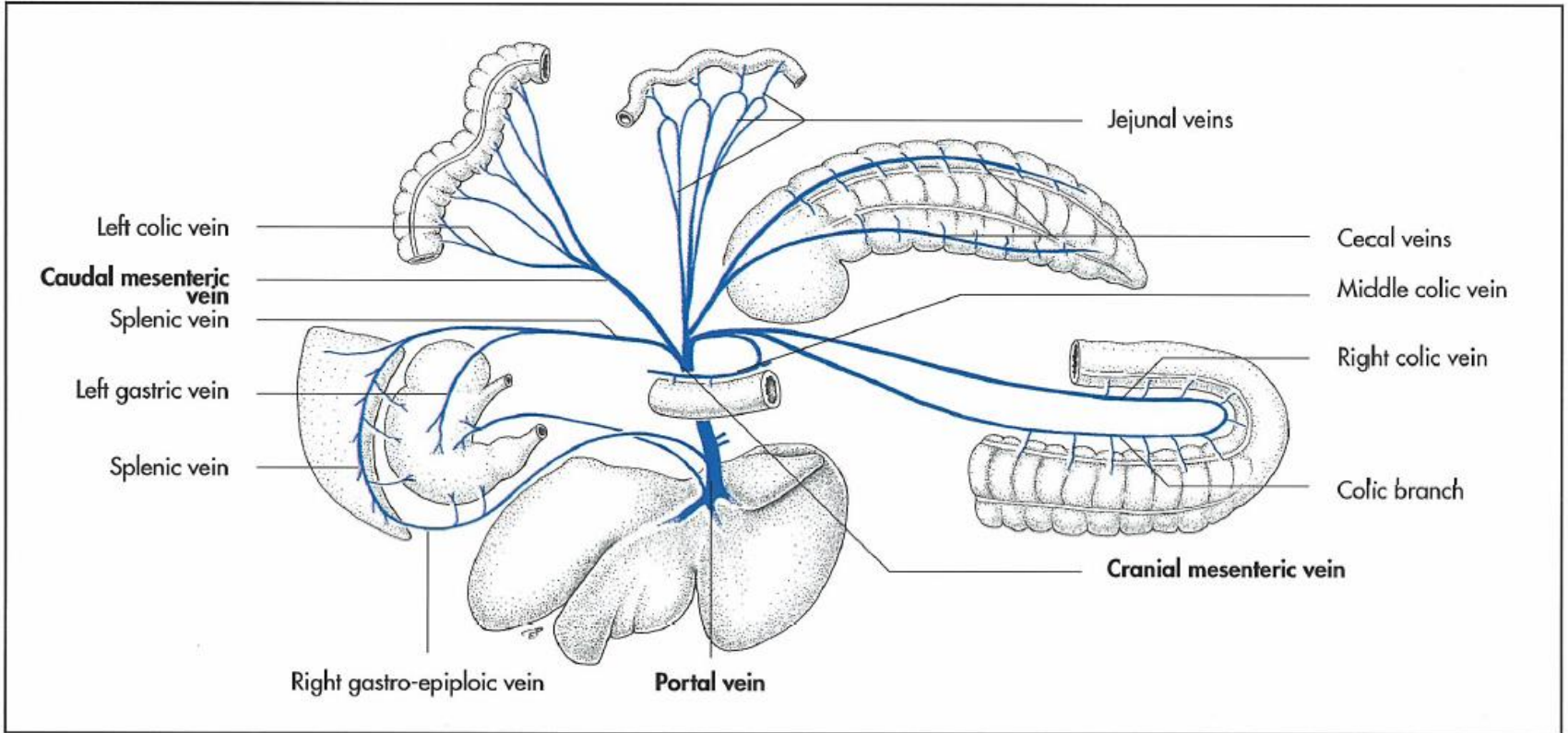
a)Caud. pancreatico duodenal a. b)Jejunal a. c)Ileal a. d)Middle colic e)Rt.colic a  
 f)Ileocolic a g)colic branch h)cecal branch i)Lt. colic a. j)Cran. rectal a  
 k)Antimesenteric a



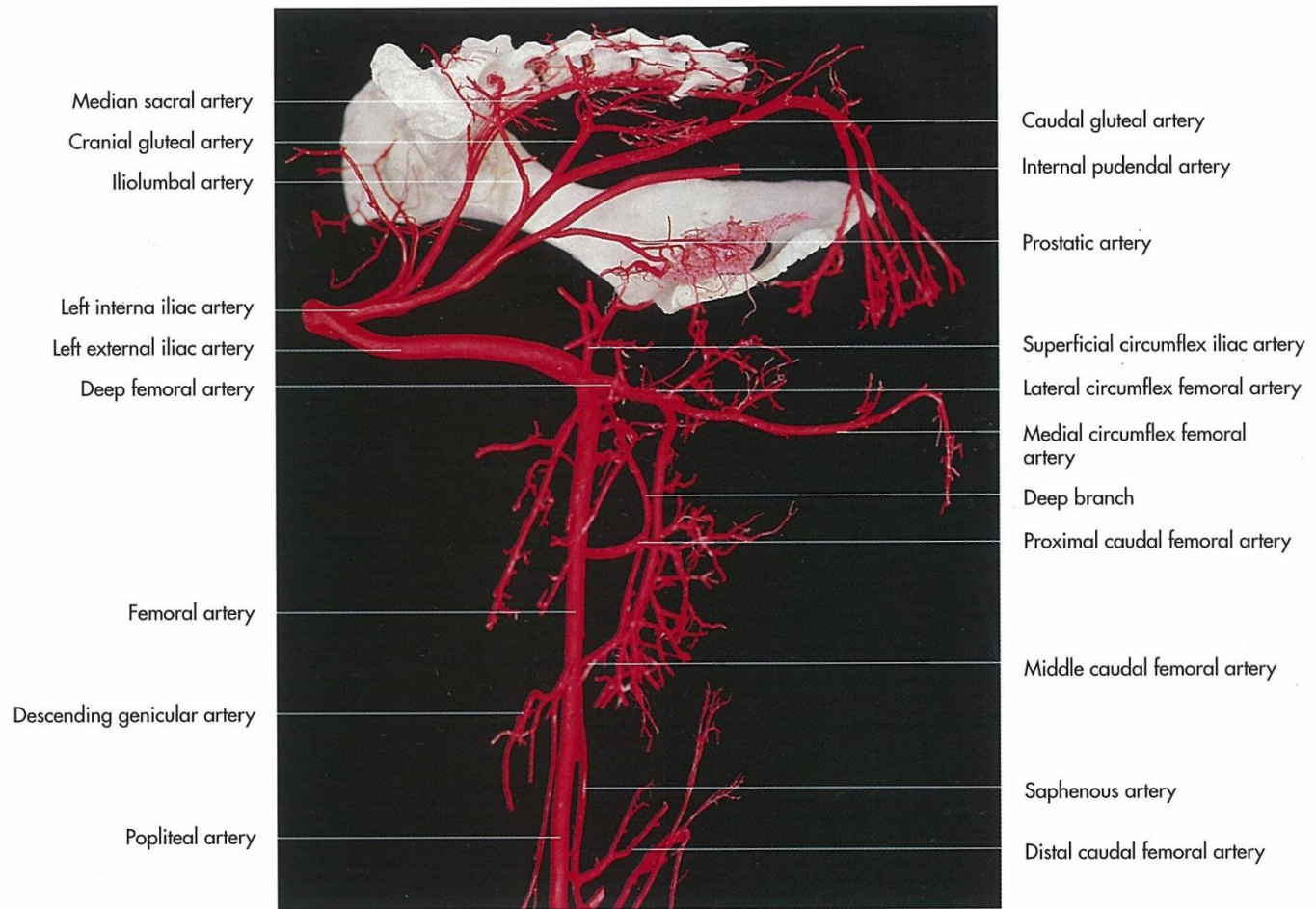




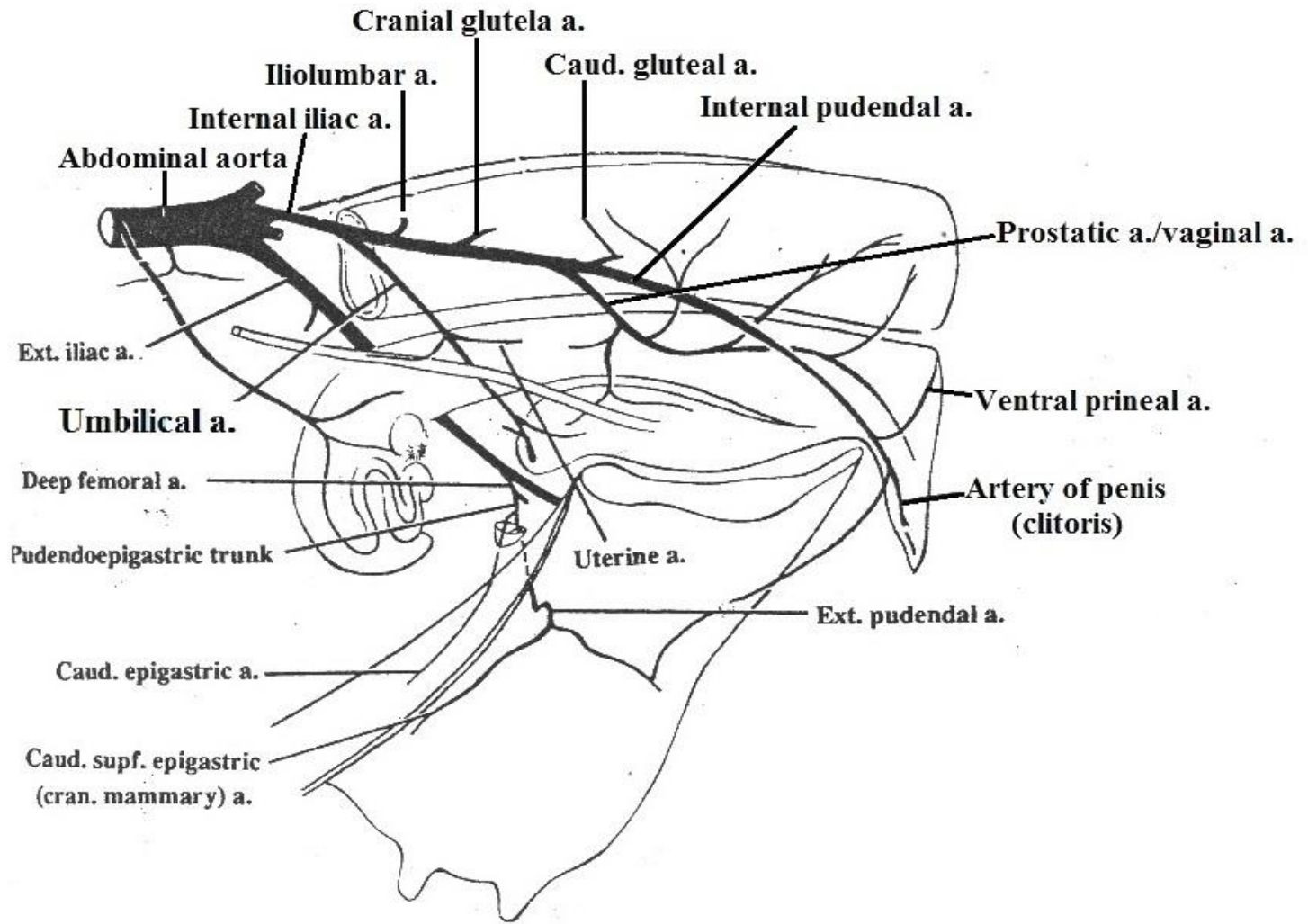
**Figure 3–50** Semischematic dorsal view of the formation of the portal vein (dog). 1, Portal vein; 2, splenic vein; 3, gastro-duodenal vein; 4, cranial mesenteric vein; 5, caudal mesenteric vein; 5', ileocolic vein; 5'', middle colic vein; 6, left gastric vein; 7, right gastroepiploic vein; 8, cranial pancreaticoduodenal vein.



**Fig. 12-46.** Hepatic portal system of the horse (Ghetie, 1955).



**Fig. 12-38.** Arteries of the pelvic cavity and the thigh of a dog, corrosion cast (courtesy of Prof. M. Navarro and A. Oliver, Barcelona).



انشعابات سرخرگ خاصره ای داخلی در گاو



### **Internal iliac a.**

- Umbilical a. (*unimportant vestige*)
- Caudal gluteal a. (*through its branches supplies muscles about lumbosacral junction and gluteal and proximocaudal femoral area*)
  - Iliolumbar a.
  - Cranial gluteal a.
- Internal pudendal a. (*supplies pelvic viscera*)
  - Prostatic (*vaginal*) a. (*supplies parts of rectum, urethra, ureter, bladder and prostate (vagina and uterus in female)*)
    - A. of deferent duct
    - Caudal vesicle a.
    - Middle rectal a.
  - Urethral artery (*supplies caudal part of urethra*)
  - Ventral perineal a.
    - Caudal rectal a. (*supplies last part of rectum and to scrotum*)
  - Artery of penis (*clitoris*) (*supplies bulbus glandis*)
    - Artery of bulb (*supplies bulb of penis*)
    - Deep artery (*supplies corpus cavernosum*)
    - Dorsal artery (*supplies corpus spongiosum and pars longa glandis*)

**Branches of iliac artery in dog**