



ANGIOLOGIA



- Prof. dr Miloš Blagojević
- Katedra za anatomiju
- Fakultet veterinarske medicine
- Beograd, Republika Srbija
- mblagojevic@vet.bg.ac.rs

- 
-
- **Systema cardiovasculare**
 - **Systema lymphaticum**



Systema cardiovasculare

- **SRCE**
- **KRVNI SUDOVI: ART., VENE, KAPILARI**

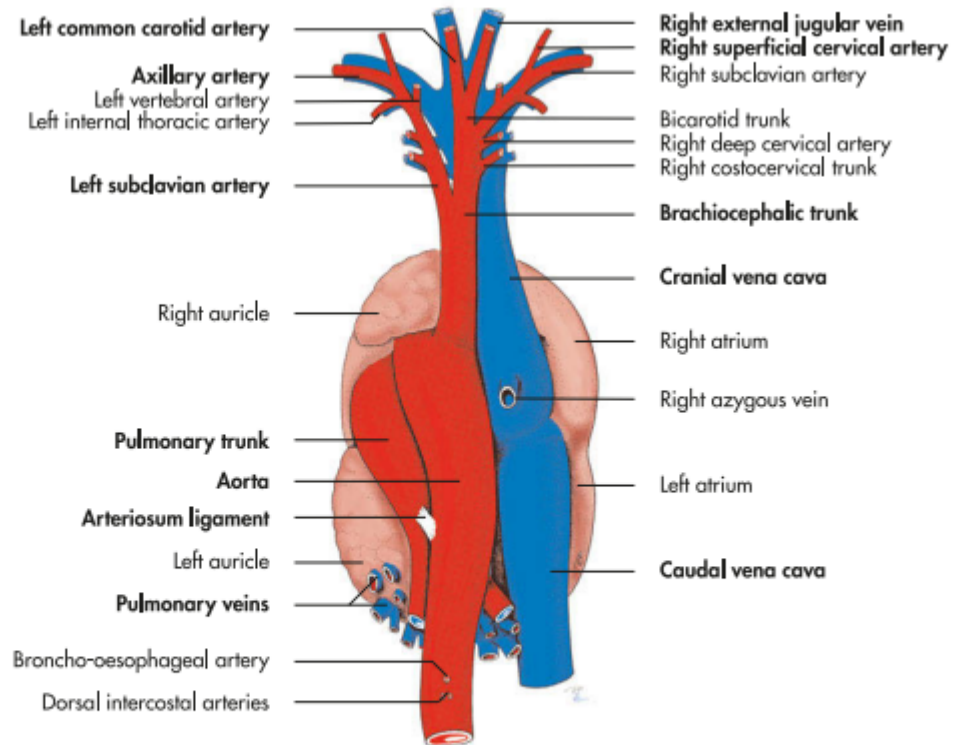


Fig. 13.16 Blood vessels at the base of the heart of the horse (schematic, dorsal aspect); fig. based on data from Ghetie, 1967.

- 
-
- Zid krvnih sudova:
 - **Tunica intima**
 - **Tunica media**
 - **Tunica externa (adventitia)**

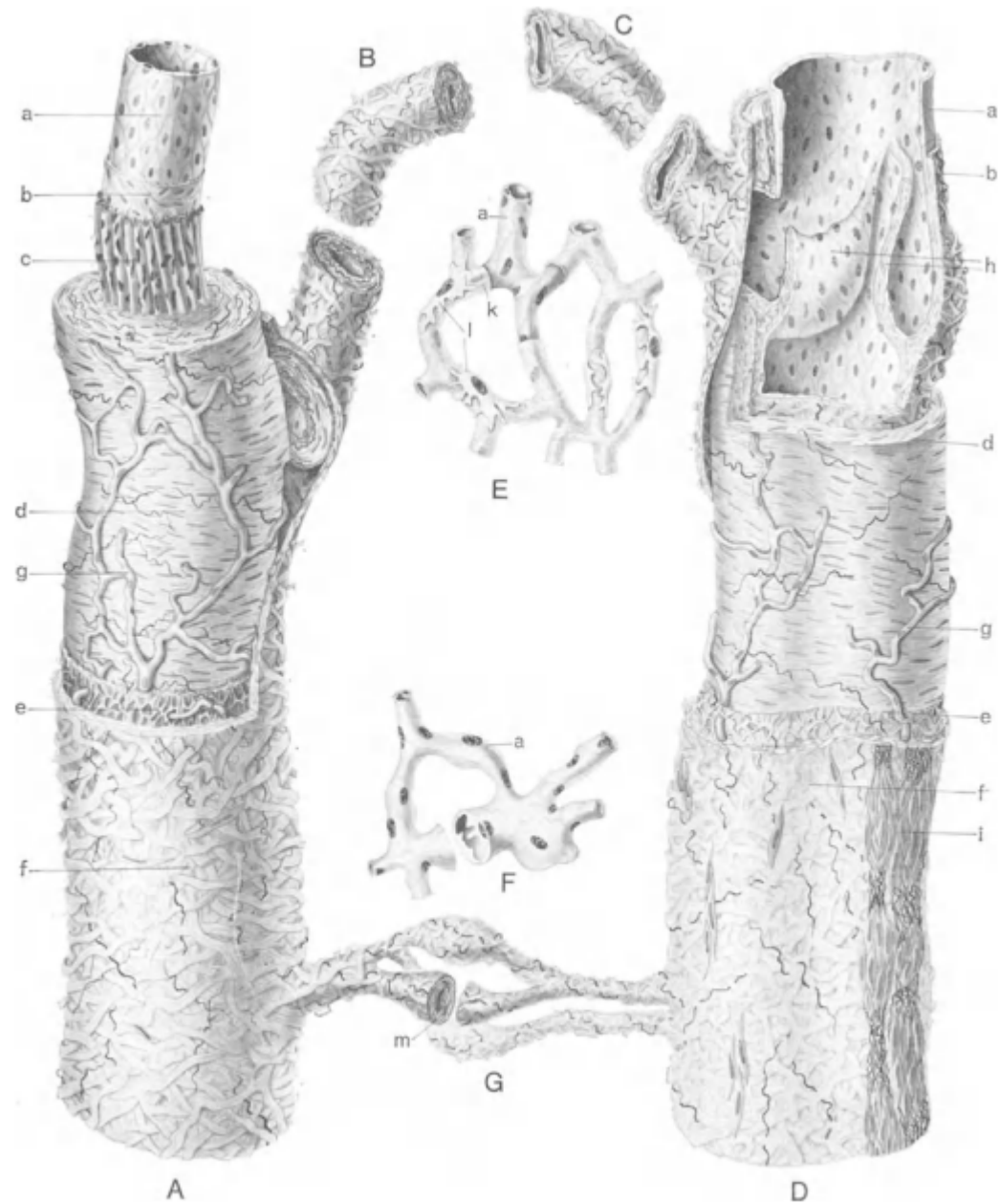


Fig. 2. Structure of the walls of blood vessels.
(After Grau and Walter, 1967.)

Arteriae

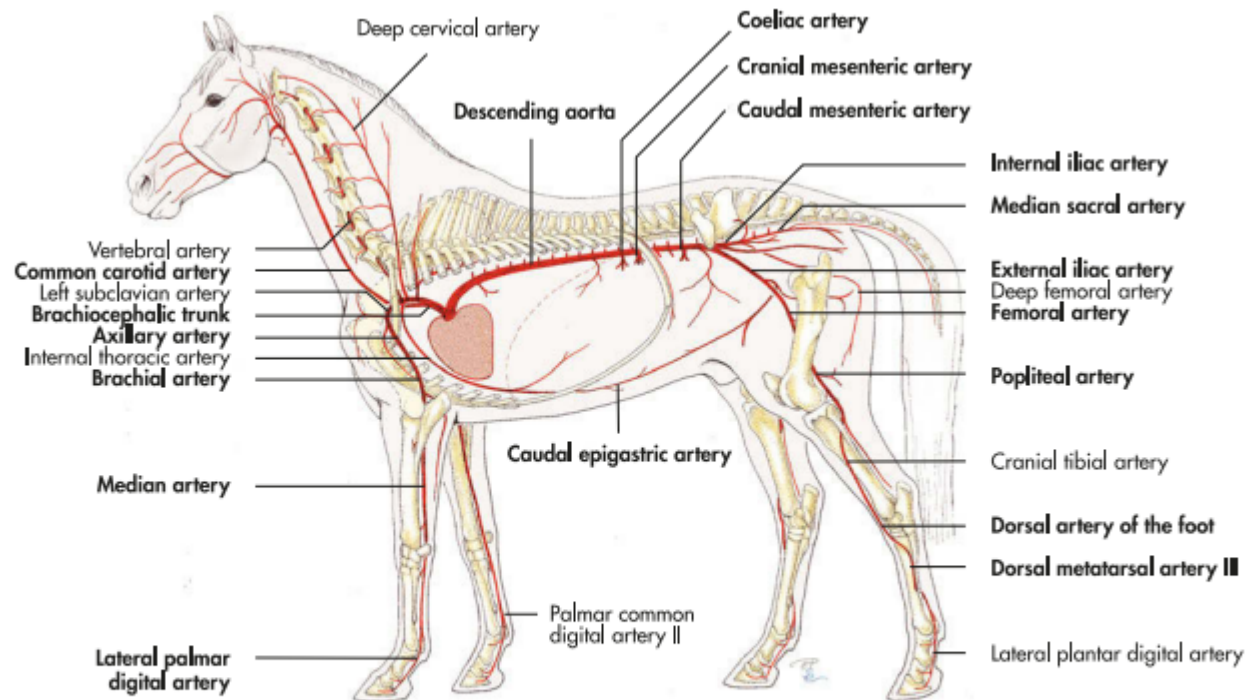


Fig. 13.20 Main branches of the aorta of the horse (schematic).

Venae

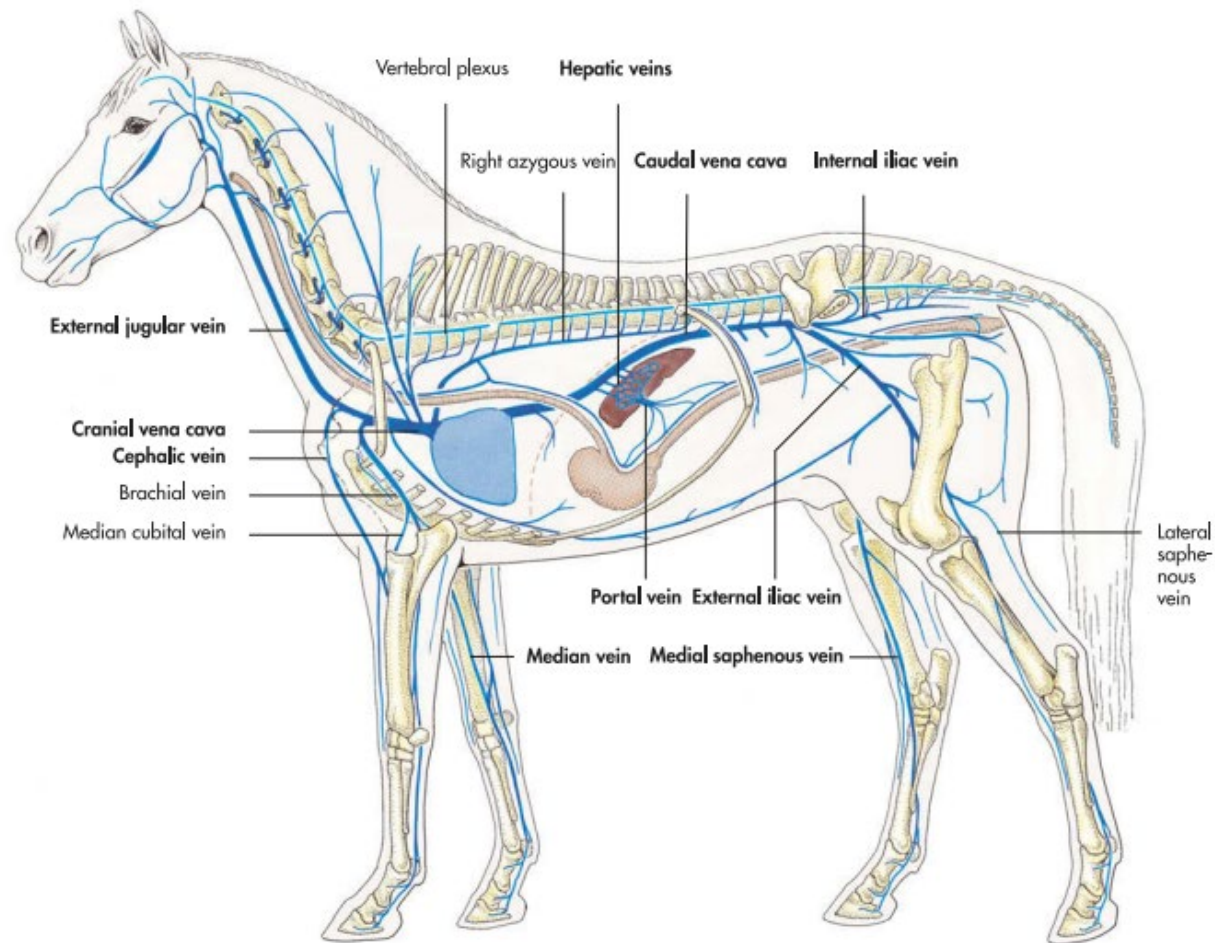
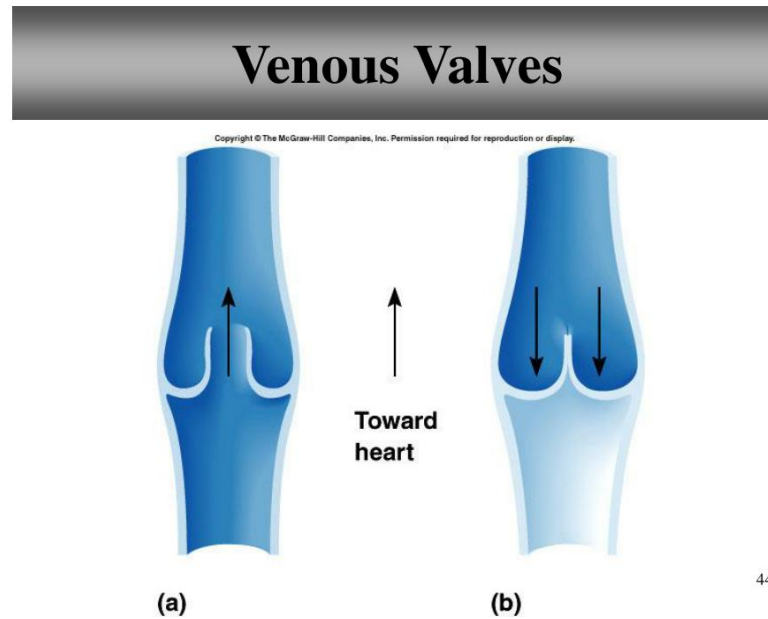


Fig. 13.28 Venous system of the horse (schematic).

○ **Valvulae venarum**



44

○ www.slideserve.com



Krvotok

- Krvni sudovi **velikog krvotoka: AORTA, V. CAVA CRANIALIS, V. CAVA CAUDAL.**
- Krvni sudovi **malog krvotoka: TRUNCUS PULMONALIS, VENAE PULMONALES**



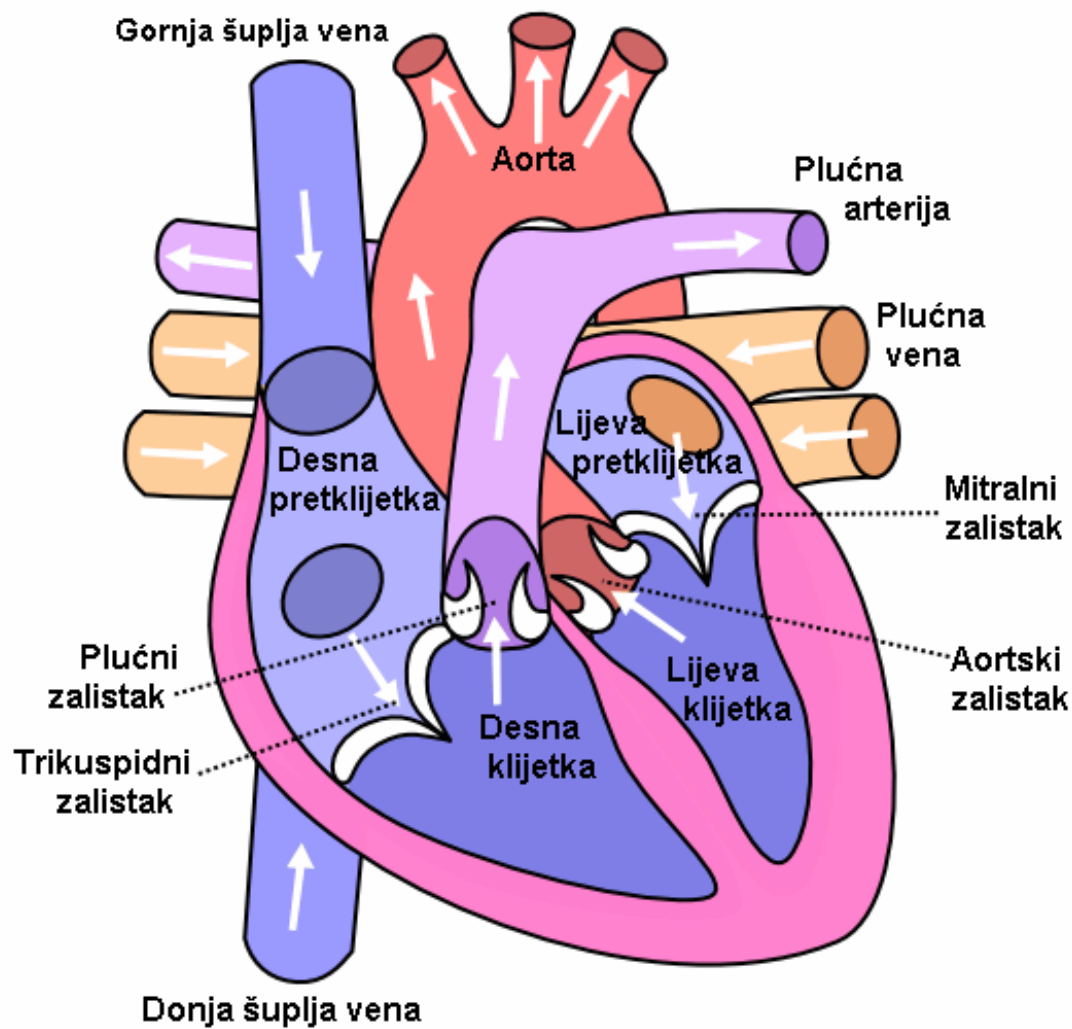
Veliki krvotok

- **Atrium sinistrum**
- **Ventriculus sinister**
- **Aorta**
- **V. cava cranialis et caudalis**
- **Atrium dextrum**

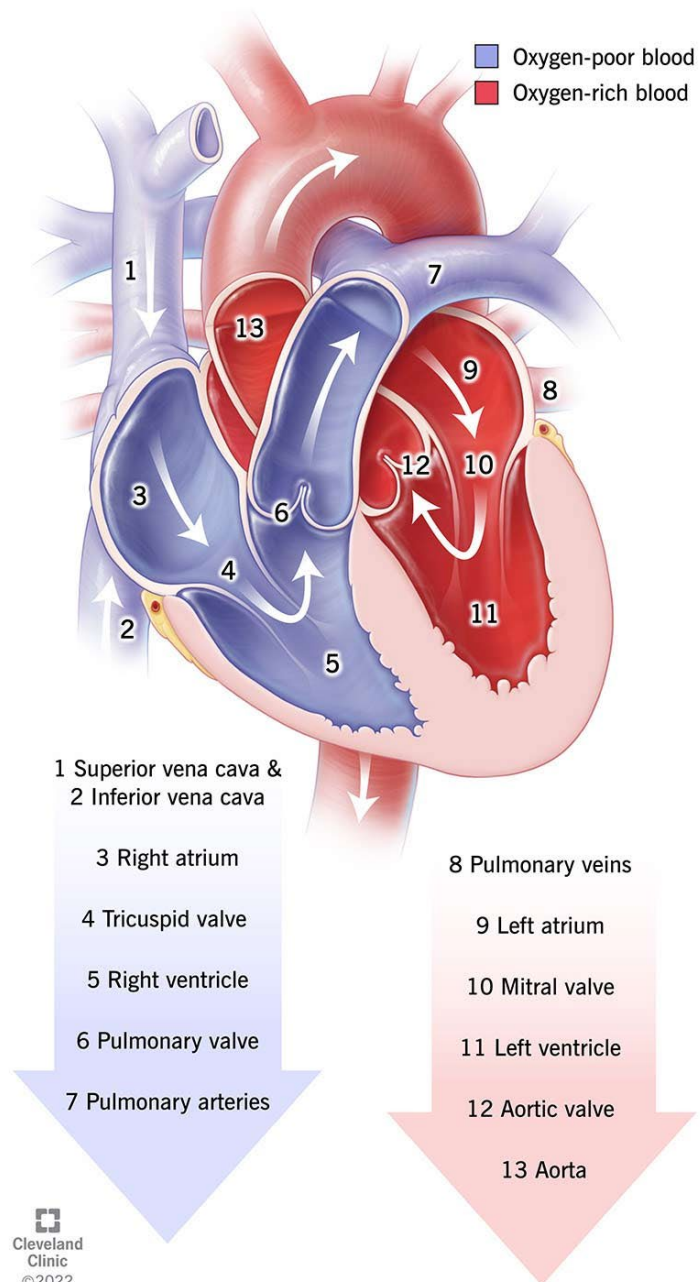


Mali krvotok

- **Atrium dextrum**
- **Ventriculus dexter**
- **Truncus pulmonalis**
- **Vv. pulmonales**
- **Atrium sinistrum**



Blood Flow Through the Heart



Cor, Cardia

○ Spatium mediastini cardiale

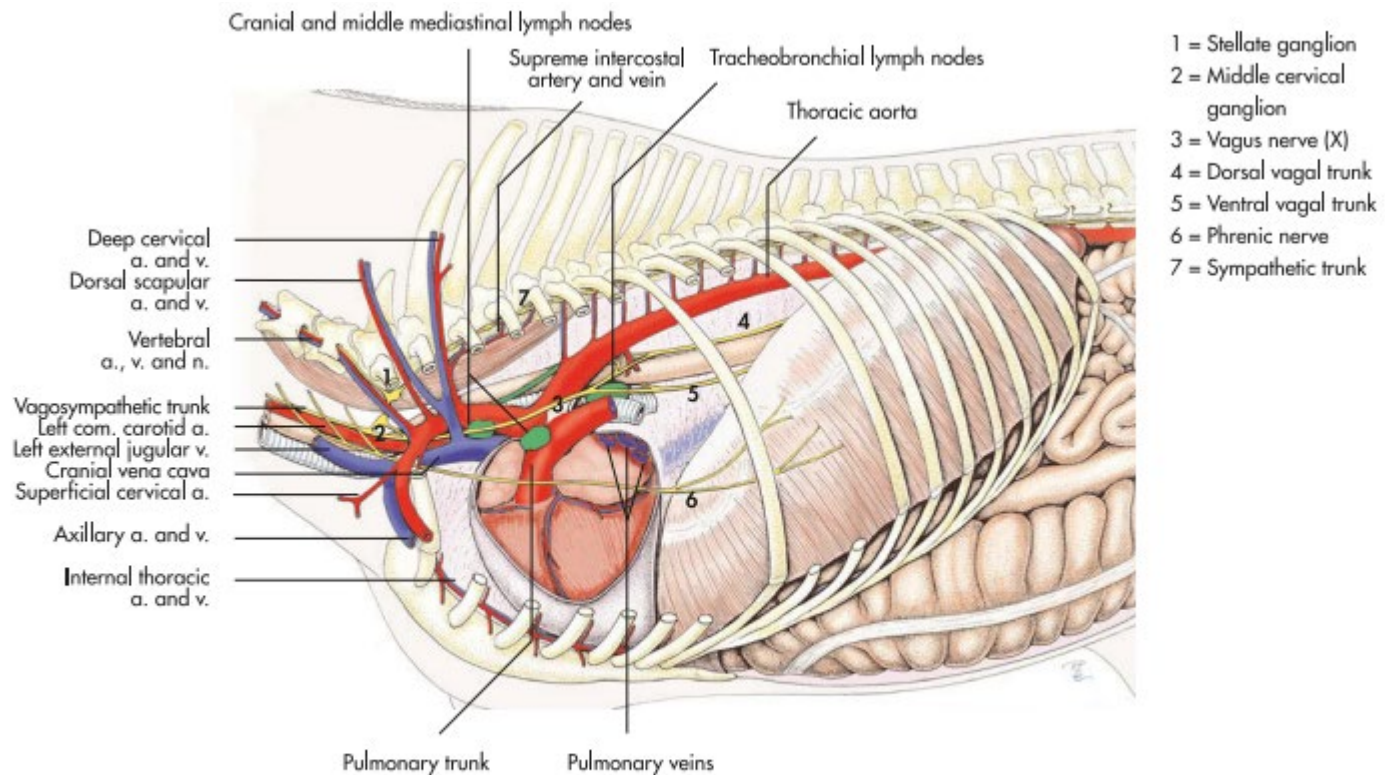


Fig. 20.26 Topography of the organs and structures of the opened thorax in the horse (schematic, view from the left).

○ Pericardium

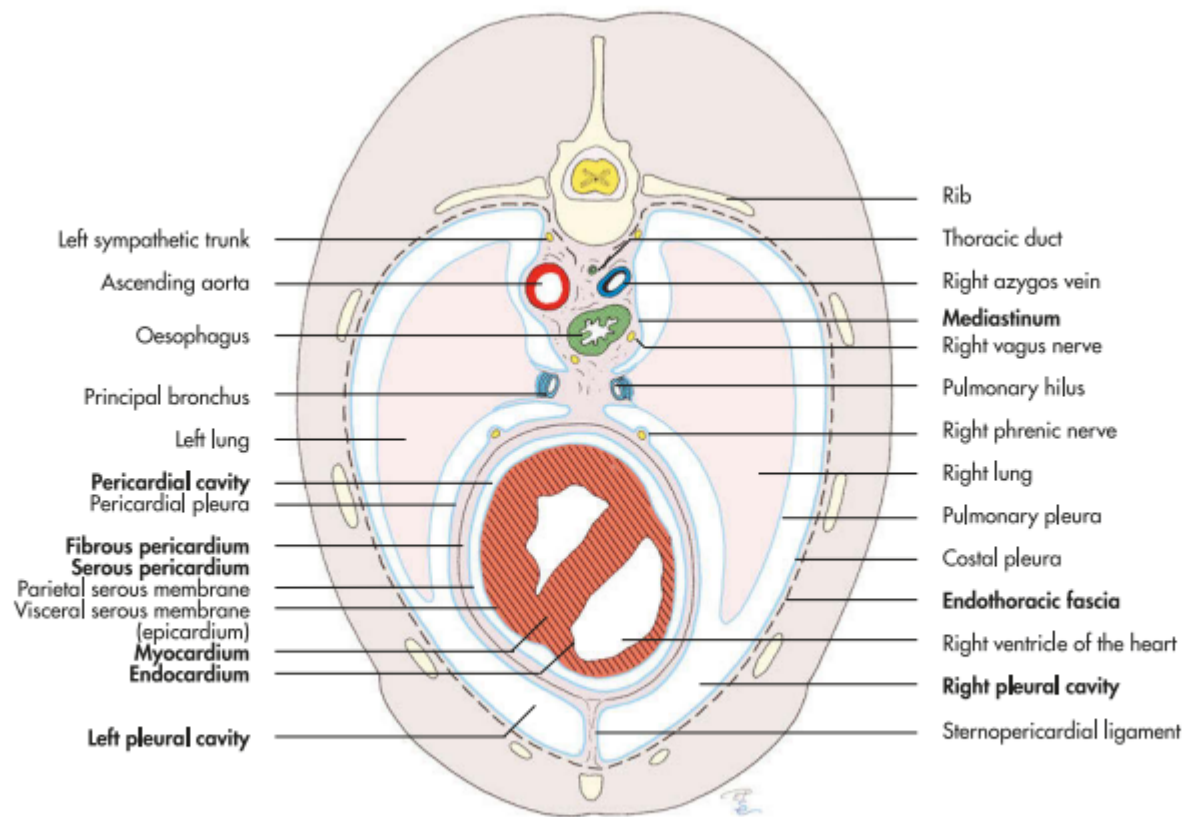
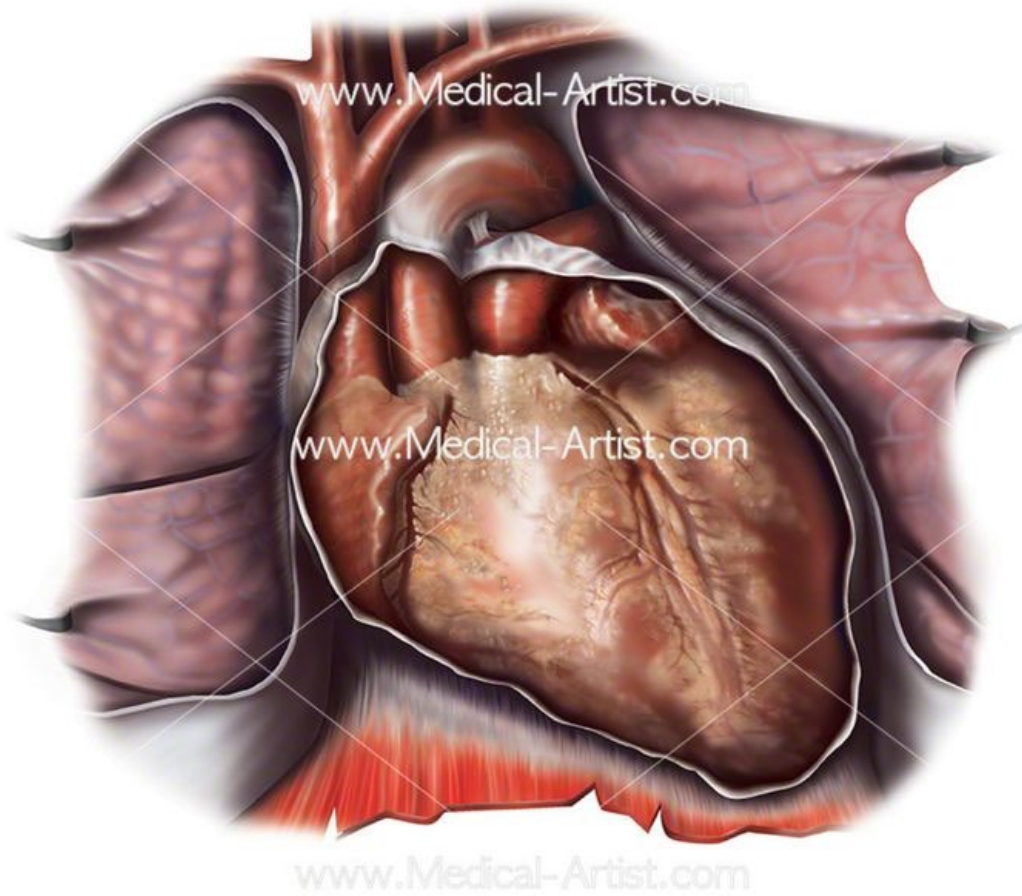


Fig. 7.2 Transverse section of the canine pleural cavity at the level of the middle mediastinum (schematic, caudal aspect, serous spaces enlarged).



○ www.medical-artist.com

- 
-
- **Basis cordis**
 - **Apex cordis**

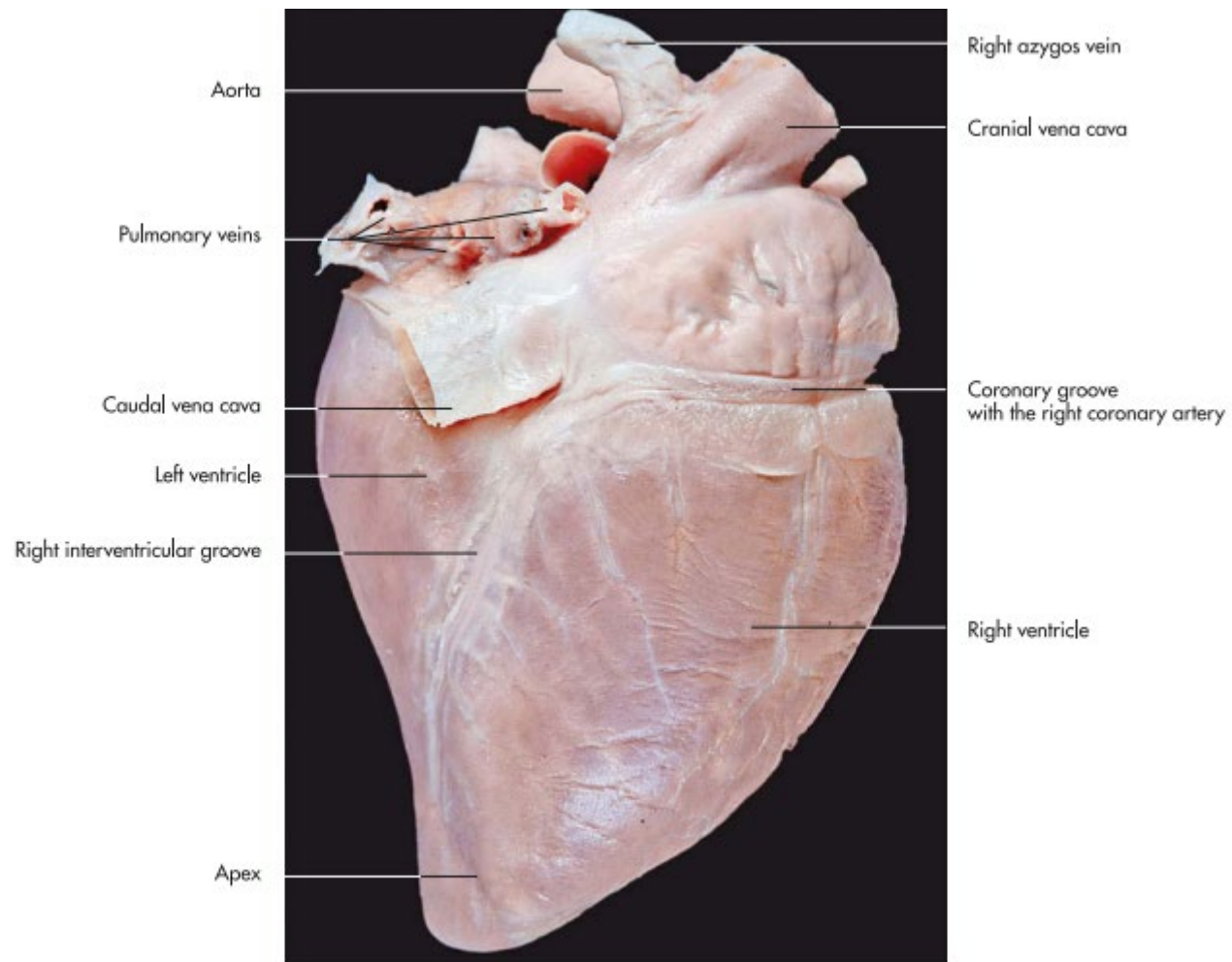


Fig. 13.3 Heart of a horse (arterial surface); preparation H. Dier, Vienna.

- 
-
- **3/5 levo, a 2/5 desno** od med. ravni.

- 
-
- **Eq** od 3-6. rebra
 - **Ru/su** od 3-5. rebra
 - **Car** od 3-7. rebra

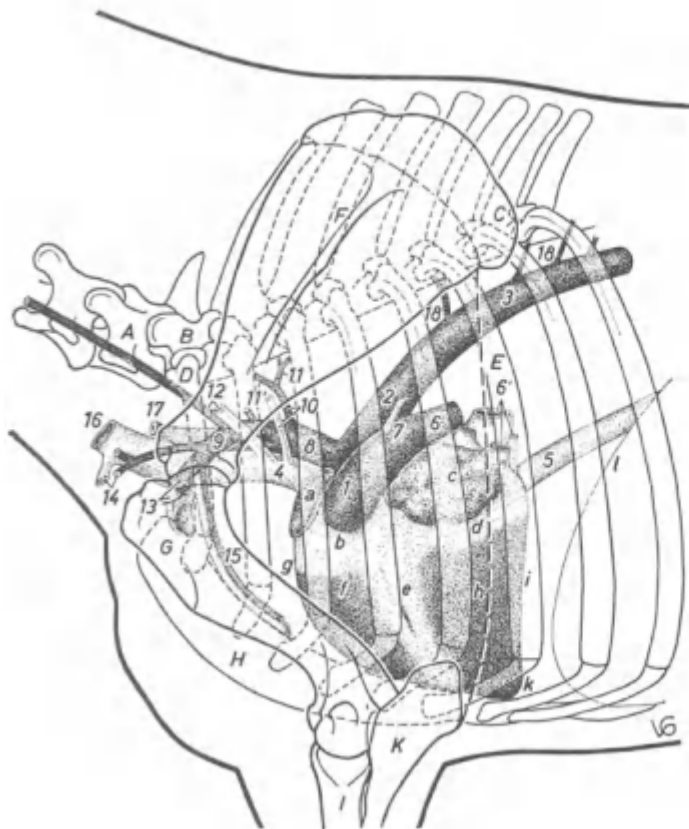


Fig. 7. Position of the heart in a formalin-preserved horse in the erect posture. Left view.

A 7th cervical vertebra; B, C 1st and 6th cervical vertebrae; D, E 1st and 6th ribs; F scapula; G humerus; H sternum; I radius; K ulna

a right auricle; b conus arteriosus; c left atrium with its auricle; d sulcus coronarius; e sulcus interventricularis paraconalis; f ventriculus dext., g its margo ventricularis dext.; h ventriculus sin., i its margo ventricularis sin.; k apex cordis; l contour of the diaphragm

1 truncus pulmonalis; 2 arcus aortae; 3 aorta thoracica; 4 v. cava cran.; 5 v. cava caud.; 6 a. pulmonalis sin.; 6' vv. pulmonales; 7 lig. arteriosum; 8 truncus brachiocephalicus; 9 a. subclavia sin.; 10 arterial and venous truncus costocervicalis; 11 a. intercostalis suprema; 11' a. scapularis dors.; 12 a. and v. vertebrales; 13 a. and v. axillaris; 14 a. and v. cervicalis superficialis; 15 a. and v. thoracica int.; 16 v. jugularis ext. sin.; 17 a. carotis comm. sin.; 18, 18 aa. intercostales dors. Interrupted line represents the caudal border of the *m. triceps brachii*

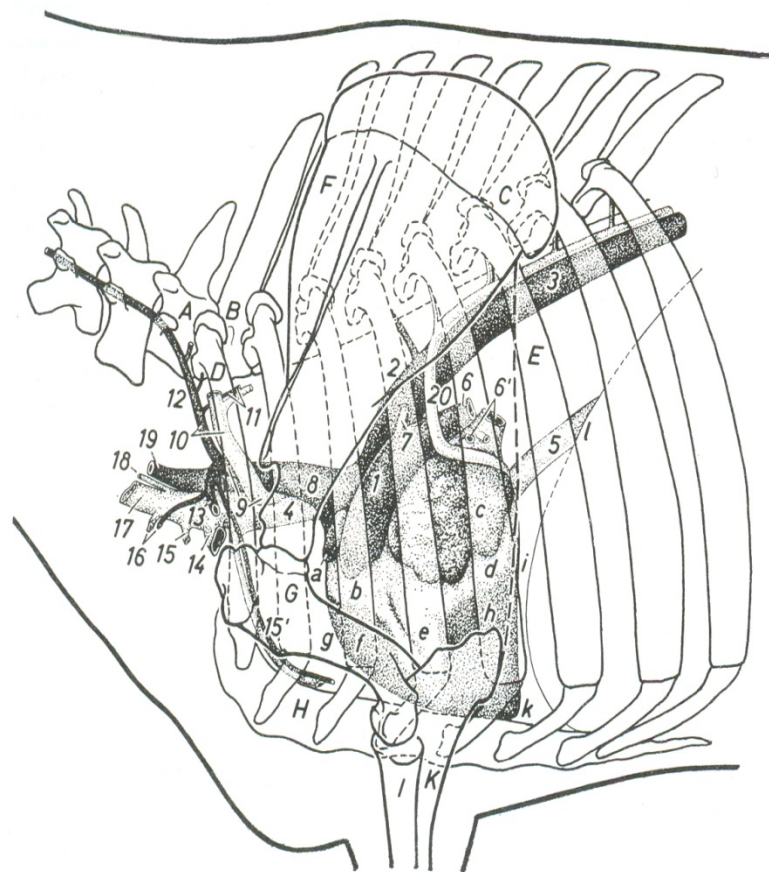


Fig. 6. Position of the heart in a formalin-preserved ox in the erect posture. Left aspect.

A 7th cervical vertebra; *B*, *C* 1st and 6th thoracic vertebrae; *D*, *E* 1st and 6th ribs; *F* scapula; *G* humerus; *H* sternum; *I* radius; *K* ulna

a right auricle; *b* conus arteriosus; *c* left atrium with its auricle; *d* sulcus coronarius; *e* sulcus interventricularis paraconalis; *f* ventriculus dext., *g* its margo ventricularis dext.; *h* ventriculus sin., *i* its margo ventricularis sin.; *k* apex cordis; *l* contour of the diaphragm

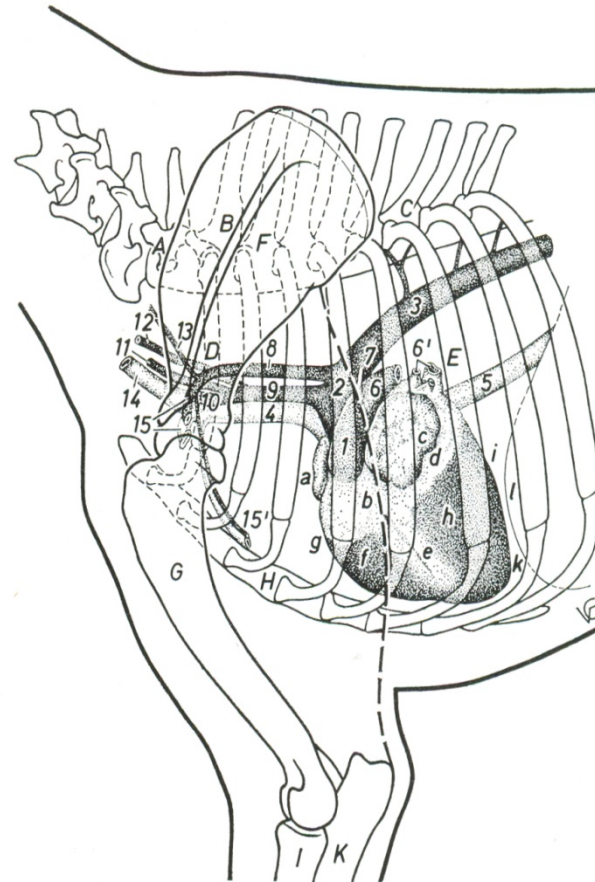
1 truncus pulmonalis; *2* arcus aortae; *3* aorta thoracica with aa. intercostales dors.; *4* v. cava cran.; *5* v. cava caud.; *6* a. pulmonalis sin.; *6'* vv. pulmonales; *7* lig. arteriosum; *8* truncus brachiocephalicus; *9* a. and v. subclavia sin.; *10* arterial and venous truncus costocervicalis; *11* a. and v. intercostalis suprema; *12* a. vertebralis; *13* a. axillaris; *14* v. axillaris; *15* v. cephalica; *15'* a. and v. thoracica int.; *16* a. and v. cervicalis superfic.; *17* v. jugularis ext. sin.; *18* v. jugularis int.; *19* a. carotis comm. sin.; *20* v. azygos sin. with vv. intercostales dors. Interrupted line represents the caudal border of the m. triceps brachii

Fig. 5. position of the heart in a formalin-preserved dog in the erect posture.

A 7th vertebra; *B* 1st thoracic vertebra; *C* 6th thoracic vertebra; *D* 1st rib; *E* 6th rib; *F* scapula; *G* humerus; *H* sternum; *I* radius; *K* ulna

a right auricle; *b* conus arteriosus; *c* left atrium with its auricle; *d* sulcus coronarius; *e* sulcus interventricularis paracanal; *f* right ventricle, *g* its margo ventricularis dext.; *h* left ventricle, *i* its margo ventricularis sin.; *k* apex cordis, *l* contour of the diaphragm

1 truncus pulmonalis; *2* arcus aortae; *3* aorta thoracica with aa. intercostales dors.; *4* v. cava cran.; *5* v. cava caud.; *6* a. pulmonalis sin., *6'* vv. pulmonales; *7* lig arteriosum (Botalli); *8* a. subclavia sin., *9* a. brachiocephalica; *10* a. subclavia dext., *11* a. carotis comm. dext.; *12* a. carotis comm. sin.; *13* a. vertebralis; *14* v. jugularis ext. sin.; *15* a. and v. axillaris sin.; *15'* a. and v. thoracica int. The interrupted line represents the caudal border of the m. triceps brachii (linea anconaea)



Pericardium

- Fibrozno serozna kesa

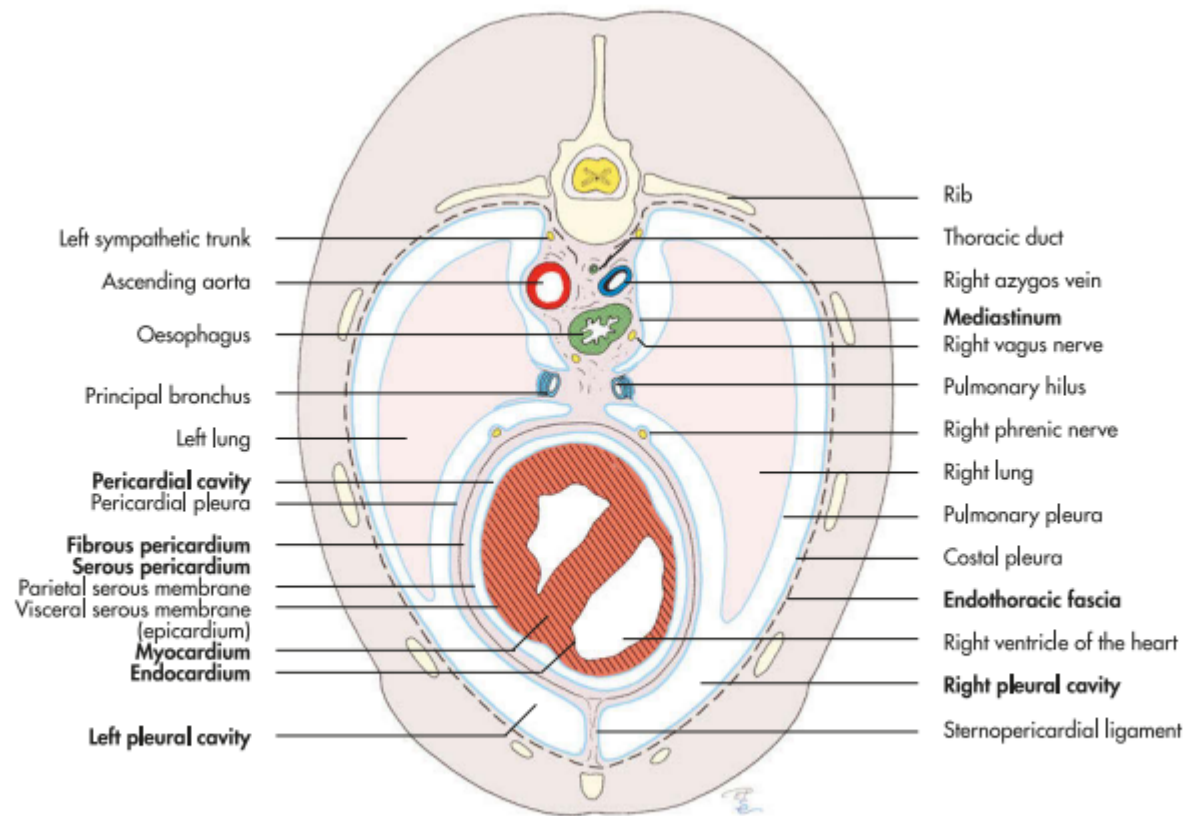
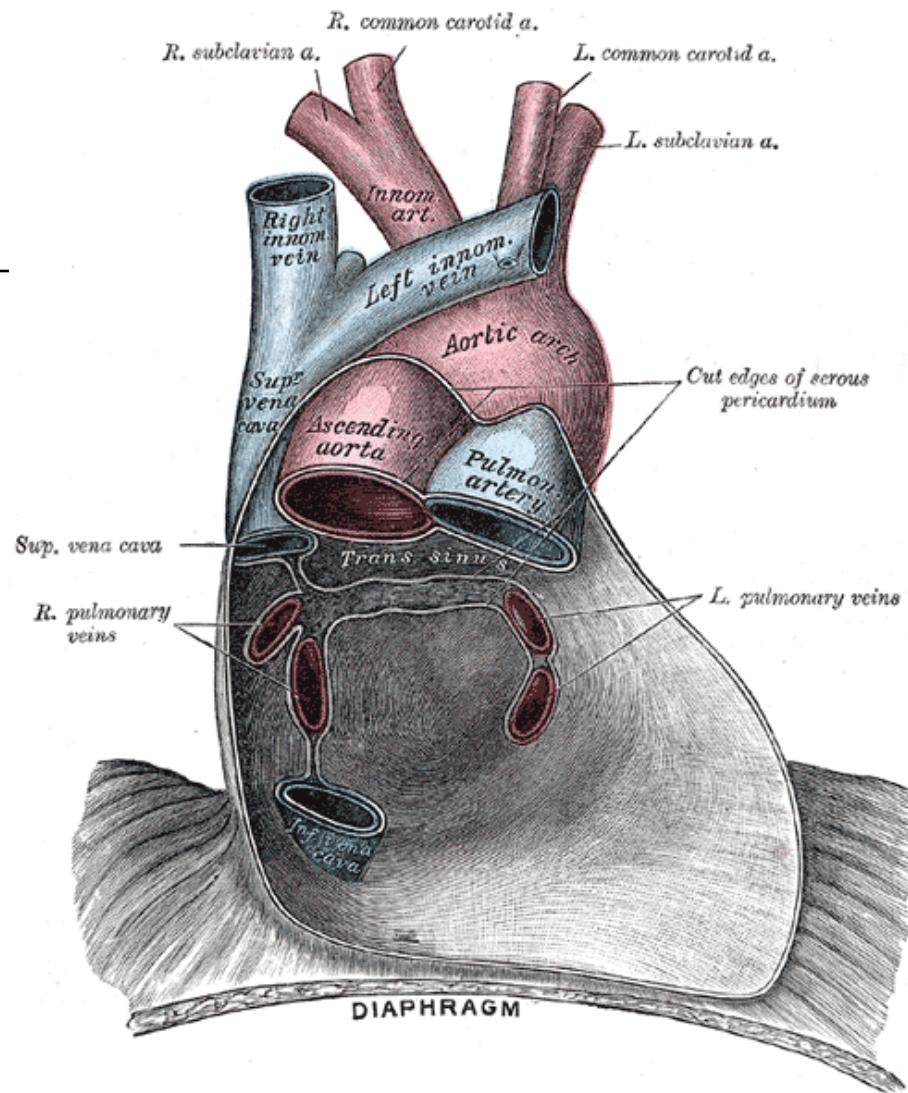


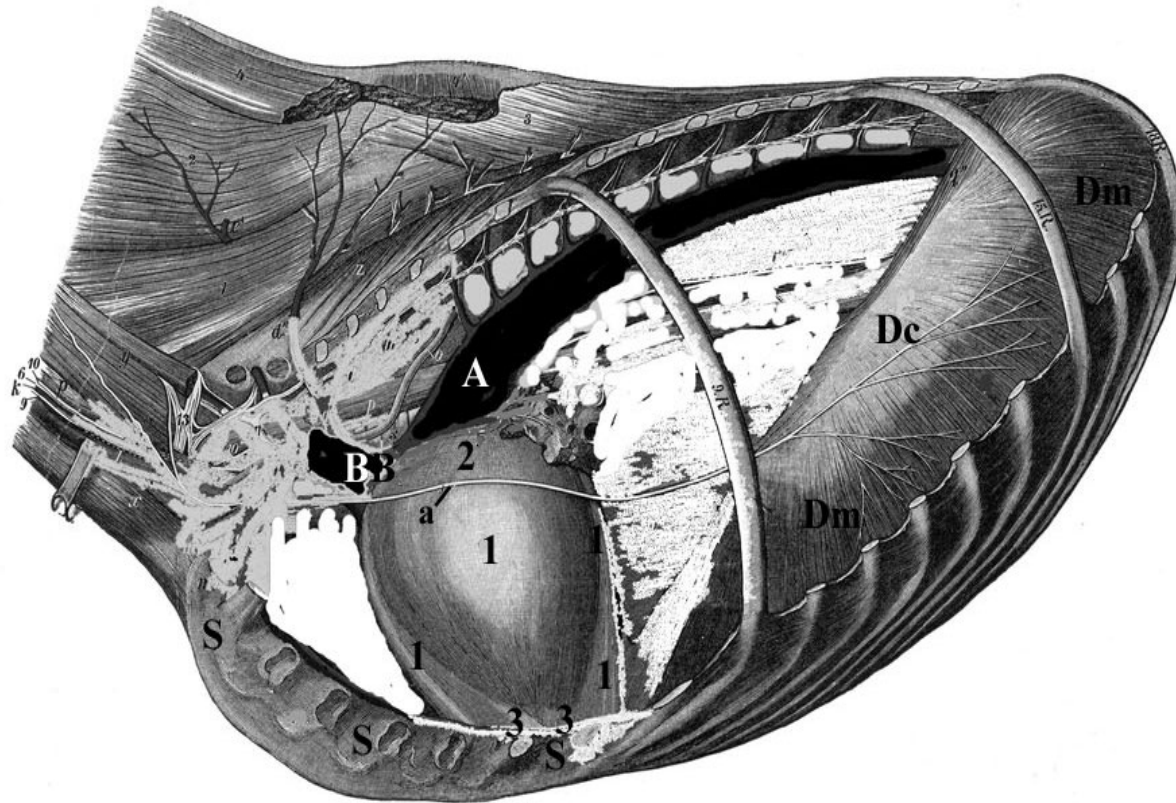
Fig. 7.2 Transverse section of the canine pleural cavity at the level of the middle mediastinum (schematic, caudal aspect, serous spaces enlarged).

- 
-
- **Basis pericardii** - Aorta, Truncus pulmonalis, V. cava cranialis et caudalis, Vv. pulmonales
 - **Apex pericardii** – Sternum/diaphragma

- 
-
- **Eq/Ru - Lig. sternopericardiacum**
 - **Su - Lig. sternophrenicopericardiacum**
 - **Car - Lig. phrenicopericardiacum**



SRCE U PERIKARDU U GRUDNOJ DUPLJI KONJA. Leva strana

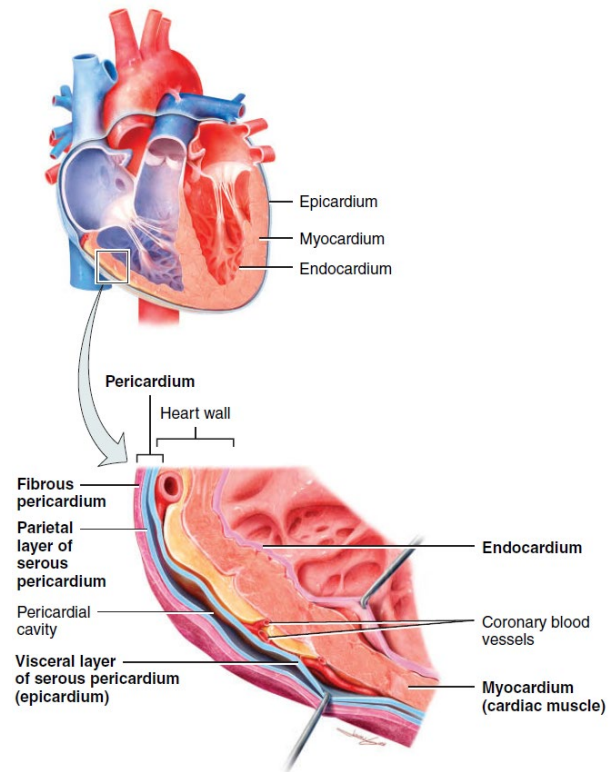


○ www.wikidoc.org

- 
-
- **Pericardium fibrosum**
 - **Pericardium serosum**

- 
-
- **Pericardium serosum:**
 - **Lamina parietalis**
 - **Lamina visceralis s. Epicardium**

○ Cavum pericardii (liquor pericardii)



○ www.slideshare.com



Spoljašnji izgled srca

- **Basis cordis**
- **Apex cordis**

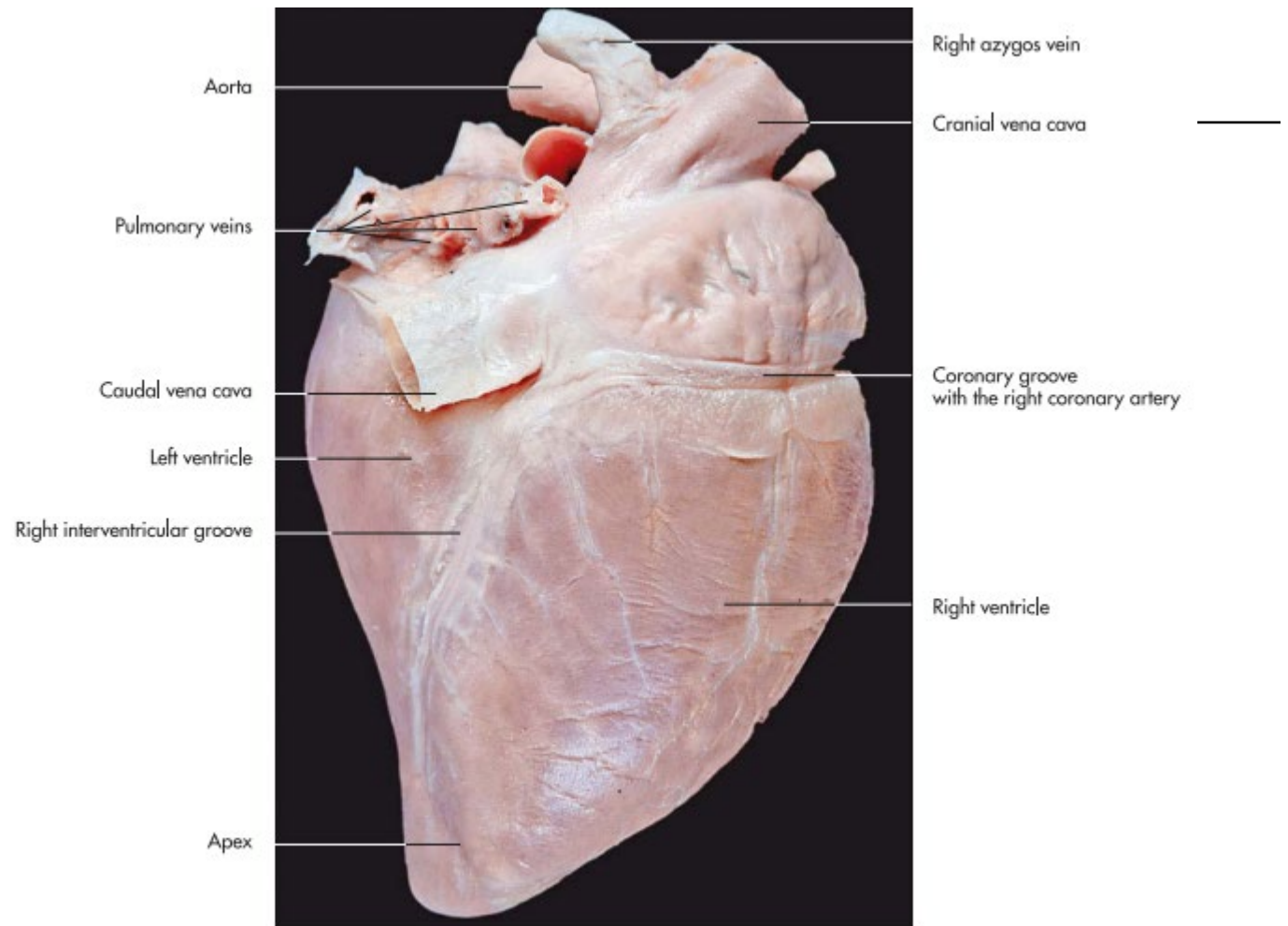


Fig. 13.3 Heart of a horse (arterial surface); preparation H. Dier, Vienna.

- 
-
- **Facies dextra (atrialis)**
 - **Facies sinistra (auricularis)**

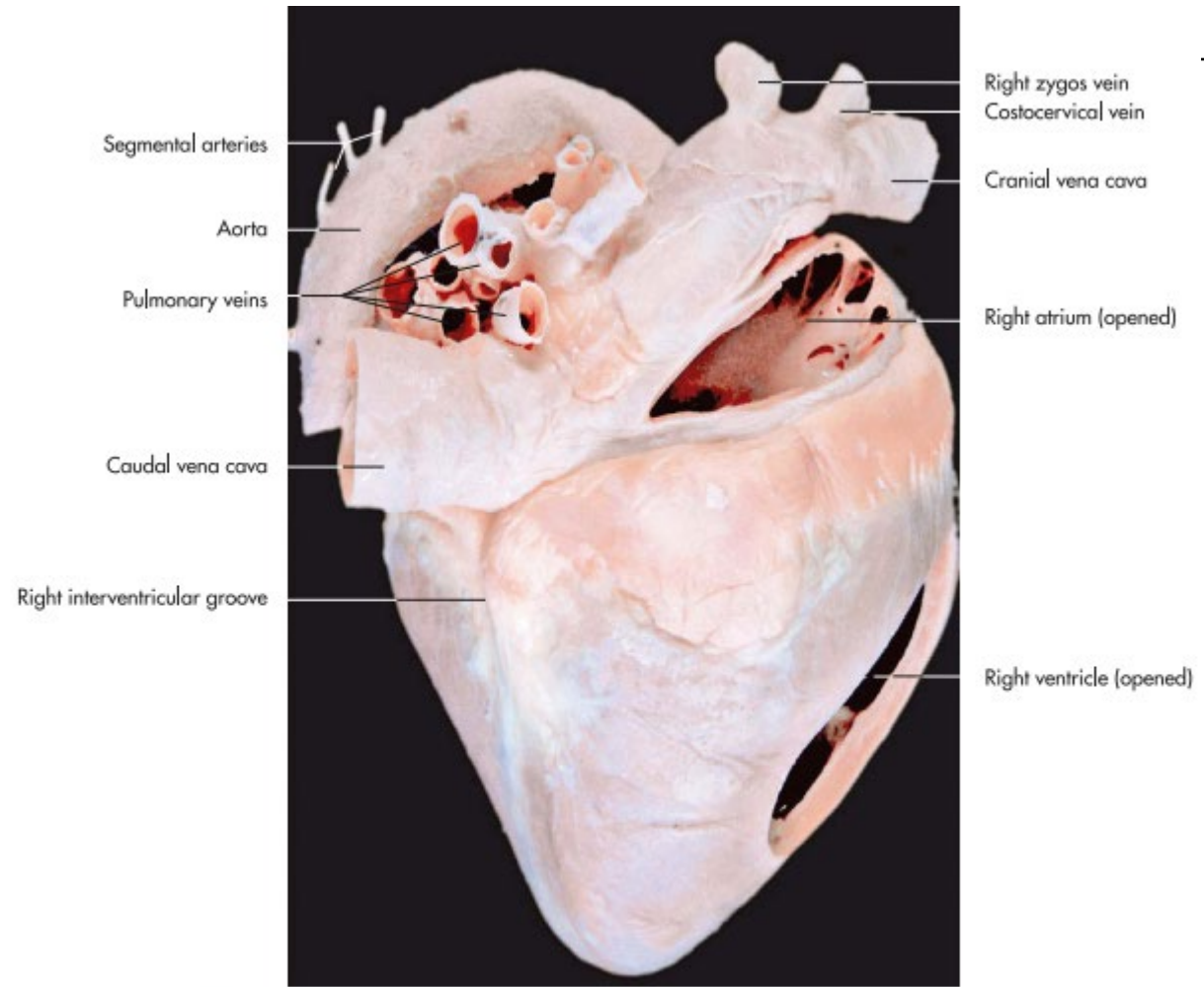


Fig. 13.4 Heart of a horse (atrial face); preparation H. Dier, Vienna.

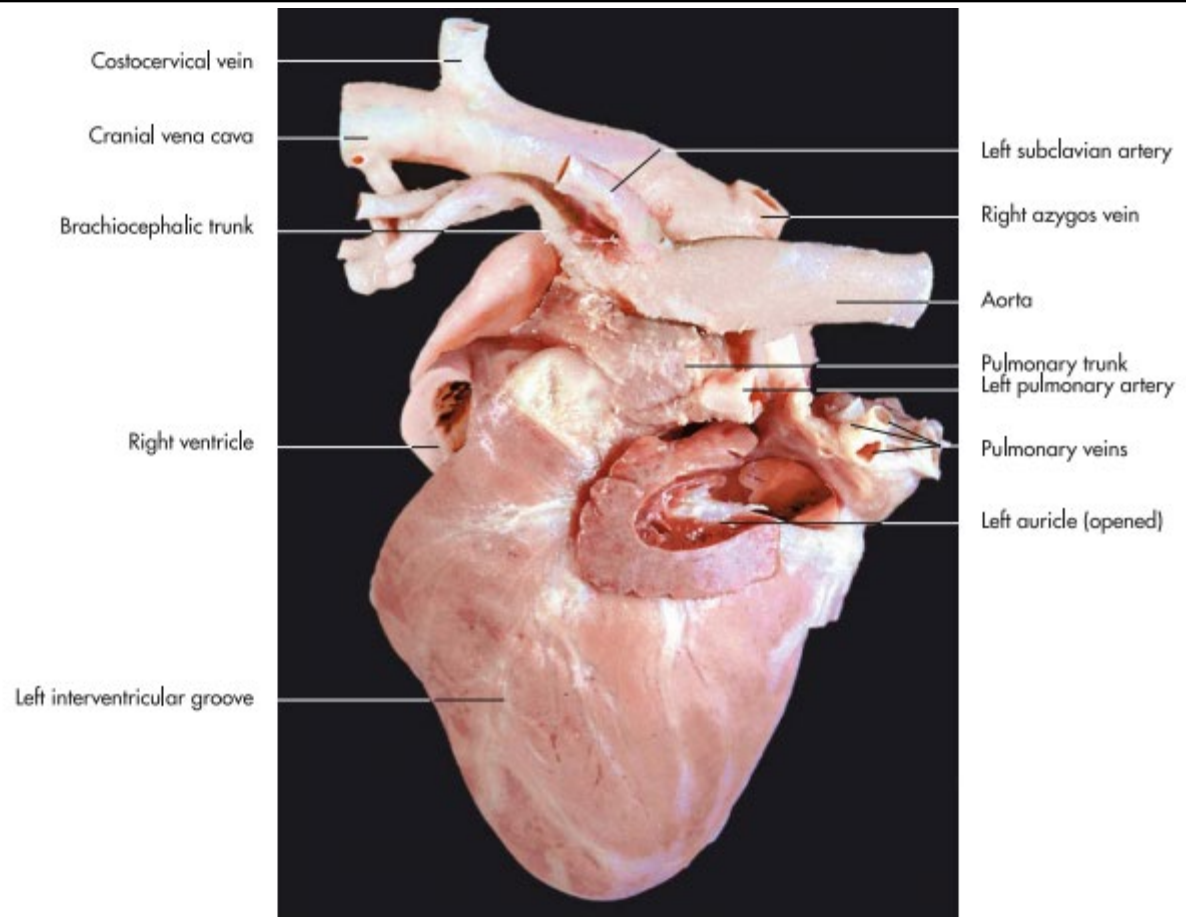


Fig. 13.1 Heart of a dog (auricular surface); preparation H. Dier, Vienna.

- 
-
- **Margo cranialis (Margo ventricularis dexter)**
 - **Margo caudalis (Margo ventricularis sinister)**

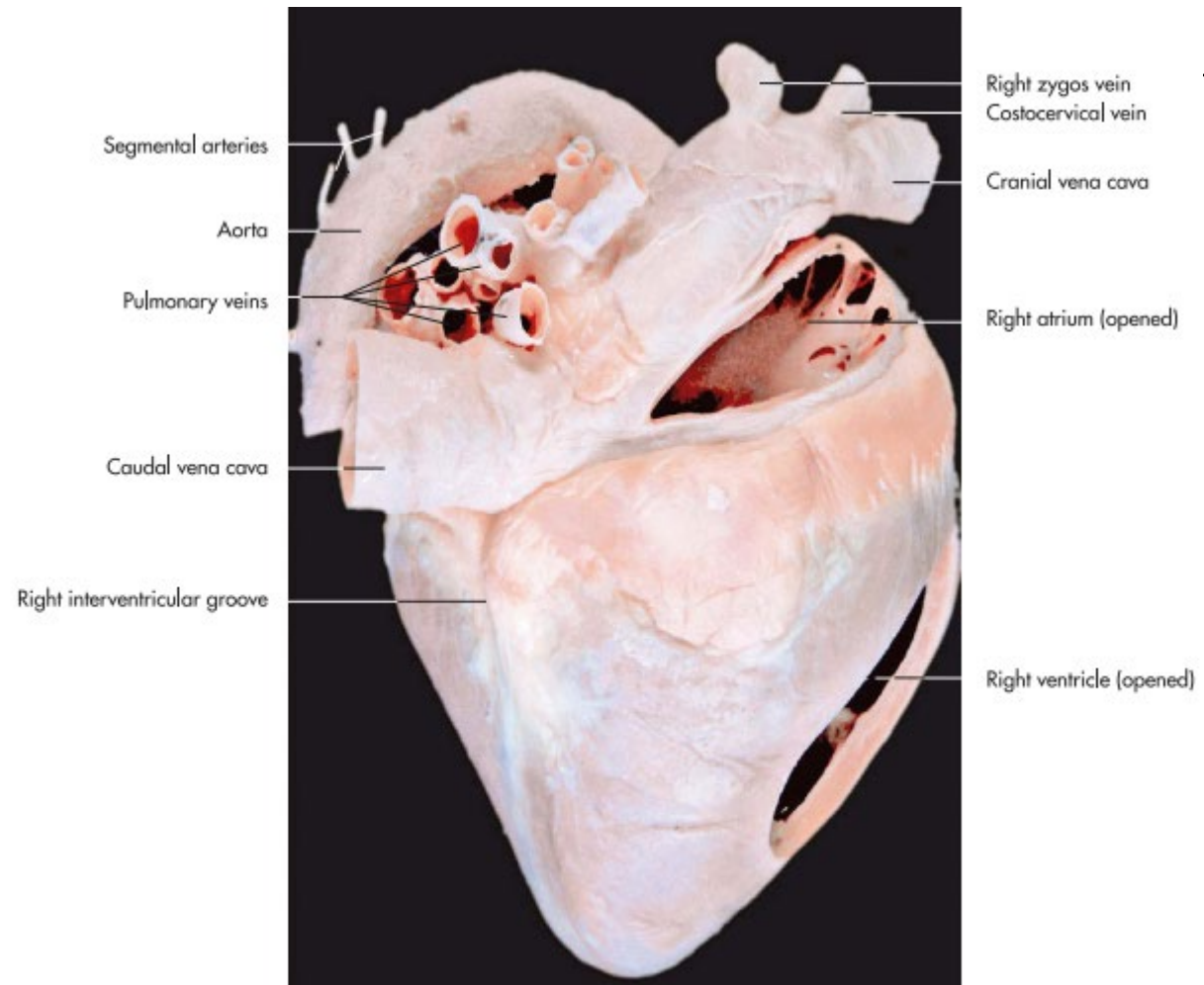
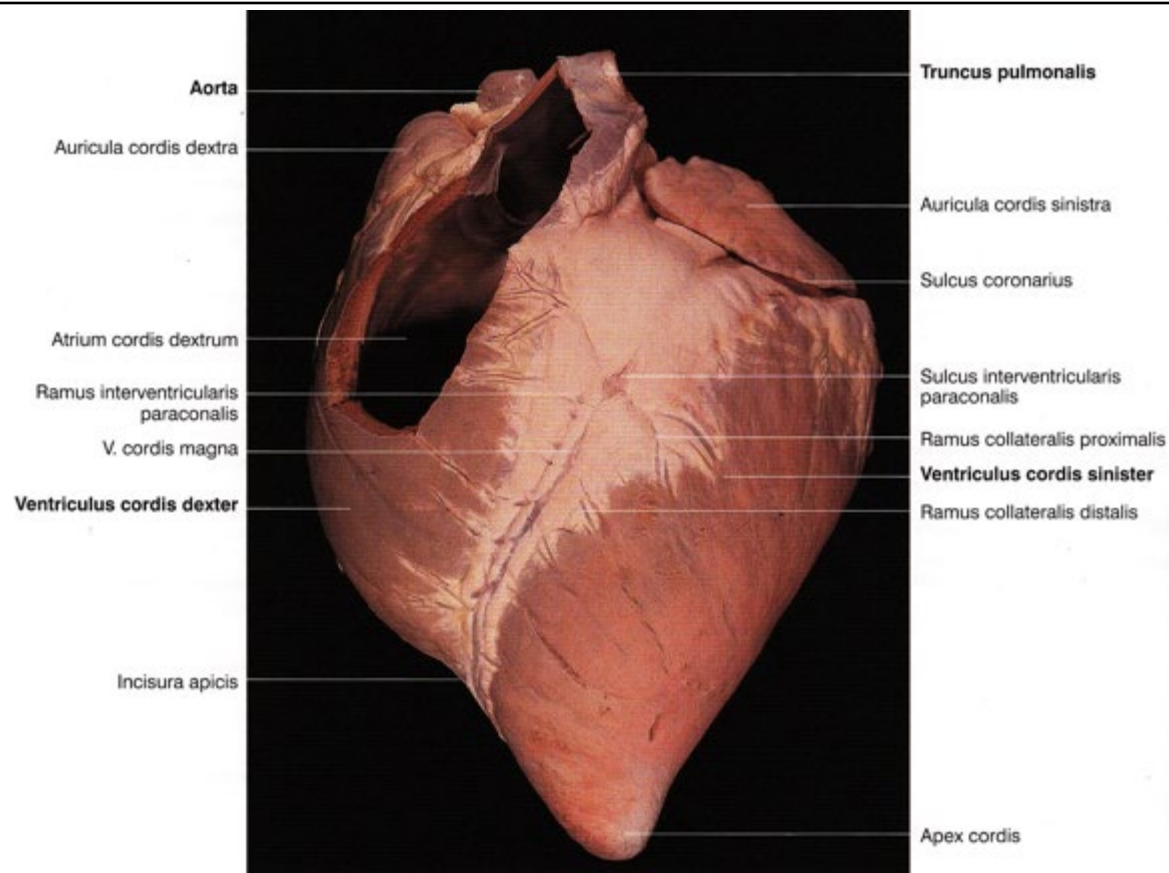


Fig. 13.4 Heart of a horse (atrial face); preparation H. Dier, Vienna.

- 
-
- **Sulcus coronarius**
 - **Sulcus interventricularis paraconalis**
 - **Sulcus interventricularis subsinuosus**



Slika 12-3. Srce konja (facies auricularis), snimio dr. J. Maierl, München.

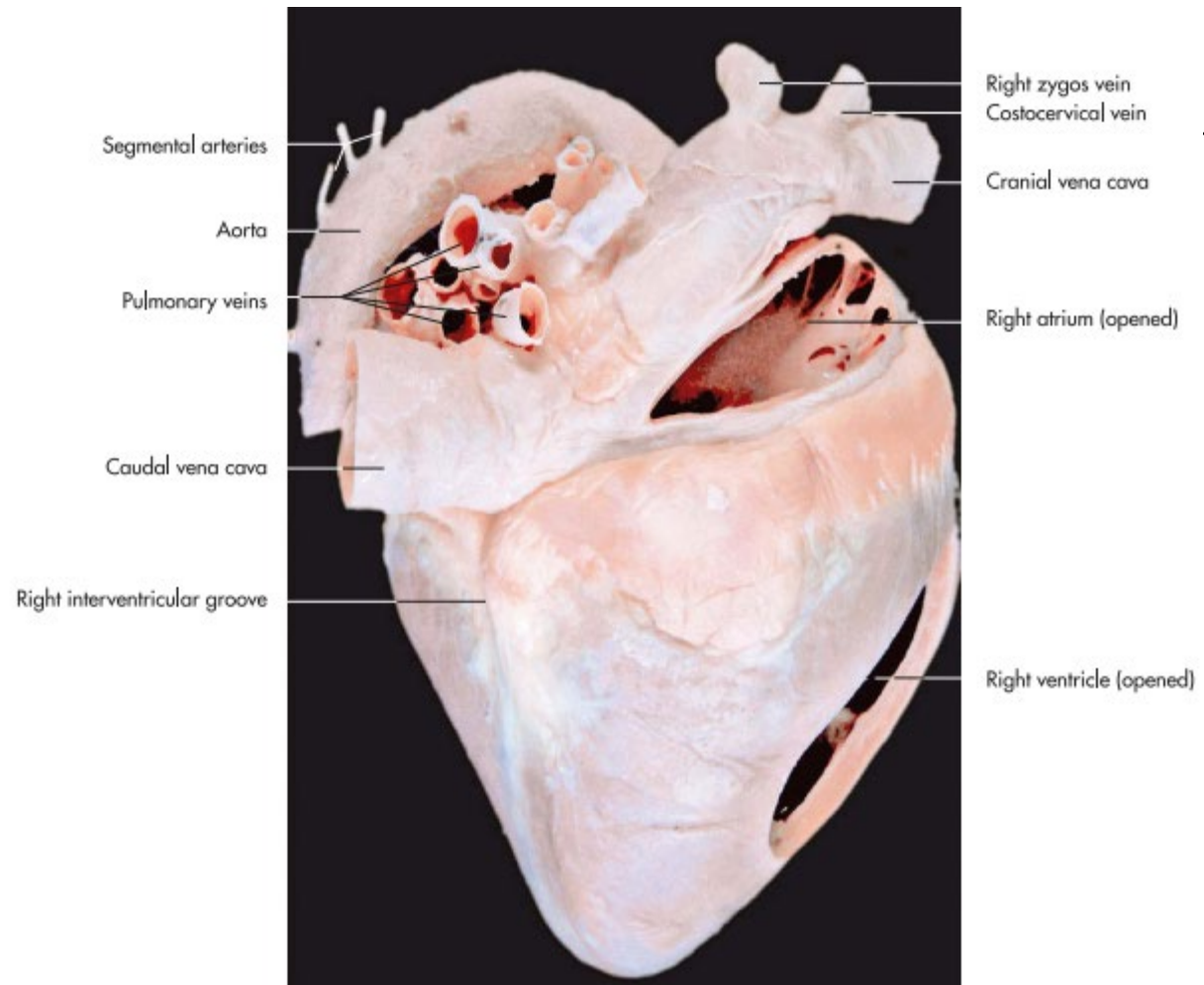


Fig. 13.4 Heart of a horse (atrial face); preparation H. Dier, Vienna.

- 
-
- **Atrium dextrum**
 - **Ventriculus dexter**
 - **Atrium sinistrum**
 - **Ventriculus sinister**

Atrium dextrum

○ Auricula dextra

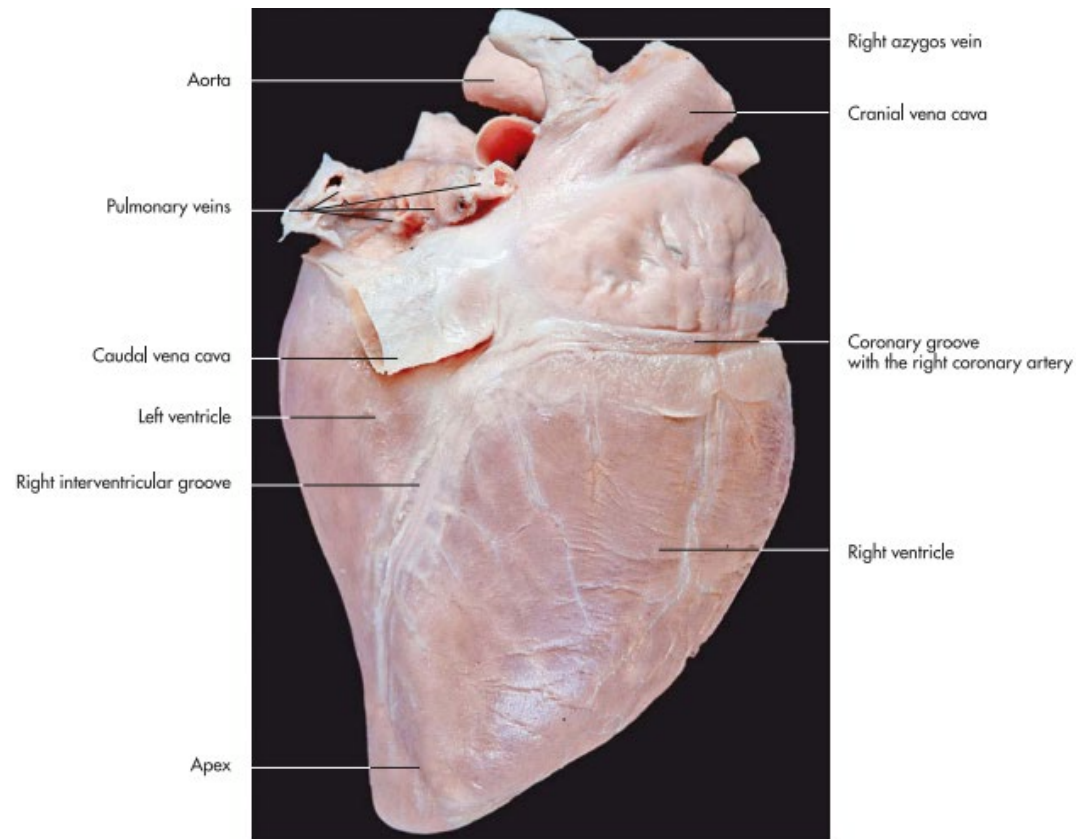


Fig. 13.3 Heart of a horse (atrial surface); preparation H. Dier, Vienna.

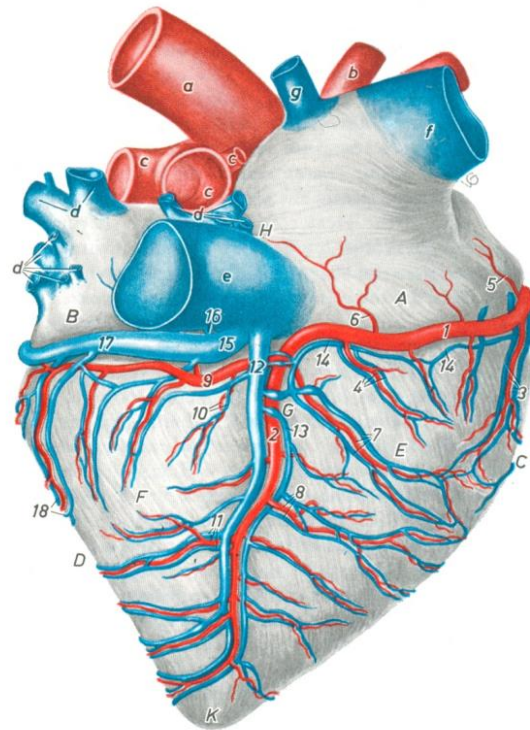
○ V. cava cranialis et caudalis (Sinus venarum cavarum)

Fig. 48. Arteries and veins of the facies atrialis of the heart of the horse. (After Hoffmann, Diss. med. vet., Giessen, 1960.)

A atrium dext.; *B* atrium sin.; *C* margo ventricularis dext.; *D* margo ventricularis sin.; *E* ventriculus dext.; *F* ventriculus sin.; *G* sulcus interventricularis subsinuus; *H* sinus venarum cavarum; *I* sulcus coronarius, pars dext.; *K* apex cordis

a arcus aortae; *b* truncus brachiocephalicus communis; *c, c* aa. pulmonales; *d* vv. pulmonales; *e* v. cava caud.; *f* v. cava cran.; *g* v. azygos dext.

1 r. circumflexus of the a. coronaria dext., *2* its r. interventricularis subsinuus; *3* r. marginis ventricularis dext. and vv. cordis parvae; *4* r. dist. ventriculi dext. and vv. cordis parvae; *5* r. intermed. atrii dext.; *6* r. dist. atrii dext.; *7* r. collateralis dext. prox. and branch of the v. cordis media; *8* r. collateralis dext. dist. and branch of the v. cordis media; *9* r. coronarius sin. and branch of the v. cordis media; *10* v. paracoronaria; *11* r. and v. collateralis ventriculi sin.; *12* v. cordis media, *13* its parallel branch; *14* bypass vein of the vv. cordis parvae; *15* sinus coronarius; *16* v. obliqua atrii sin.; *17* v. cordis magna and transition into its pars circumflexa; *18* v. dist. ventriculi sin.



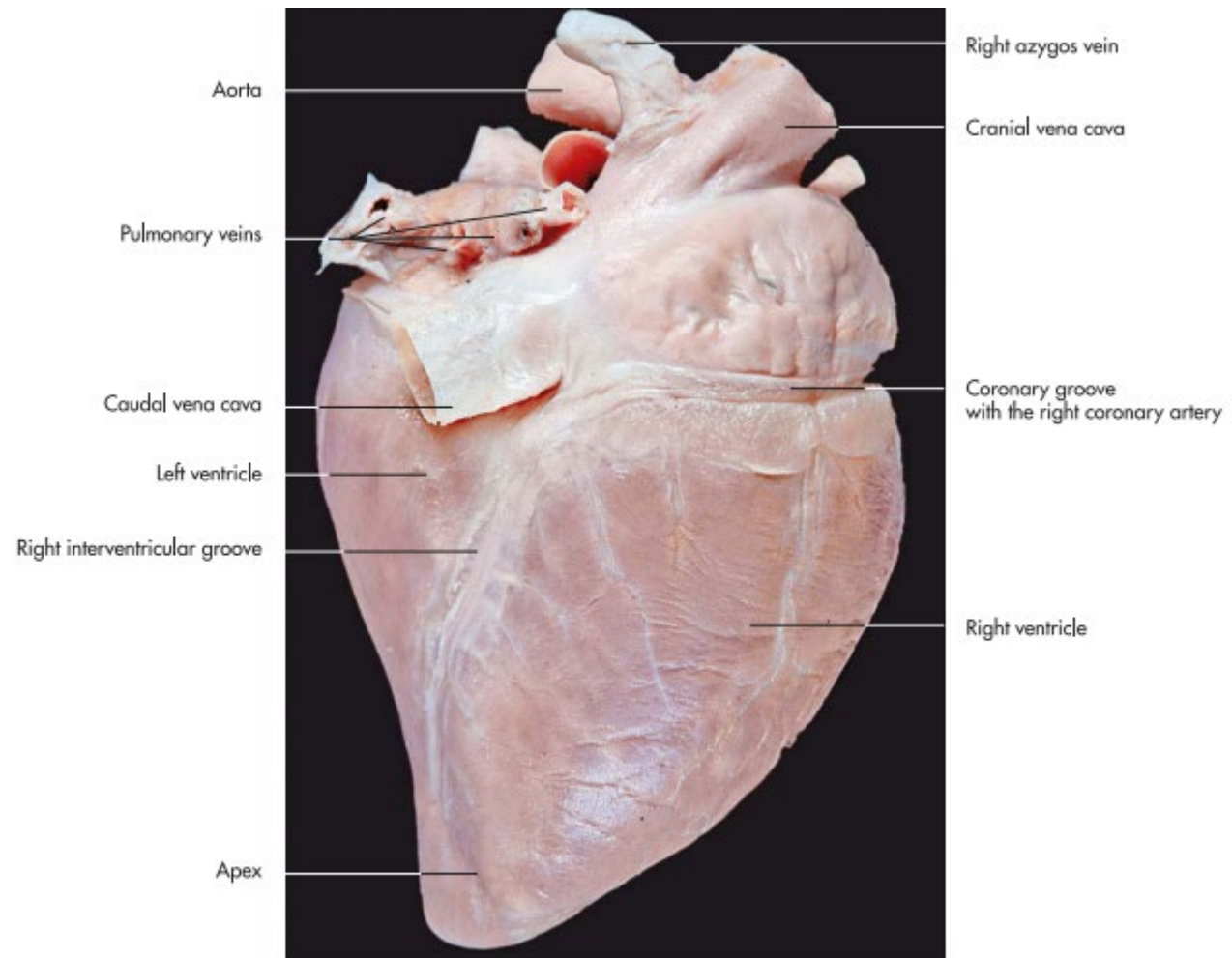


Fig. 13.3 Heart of a horse (arterial surface); preparation H. Dier, Vienna.

Ventriculus dexter

○ Conus arteriosus

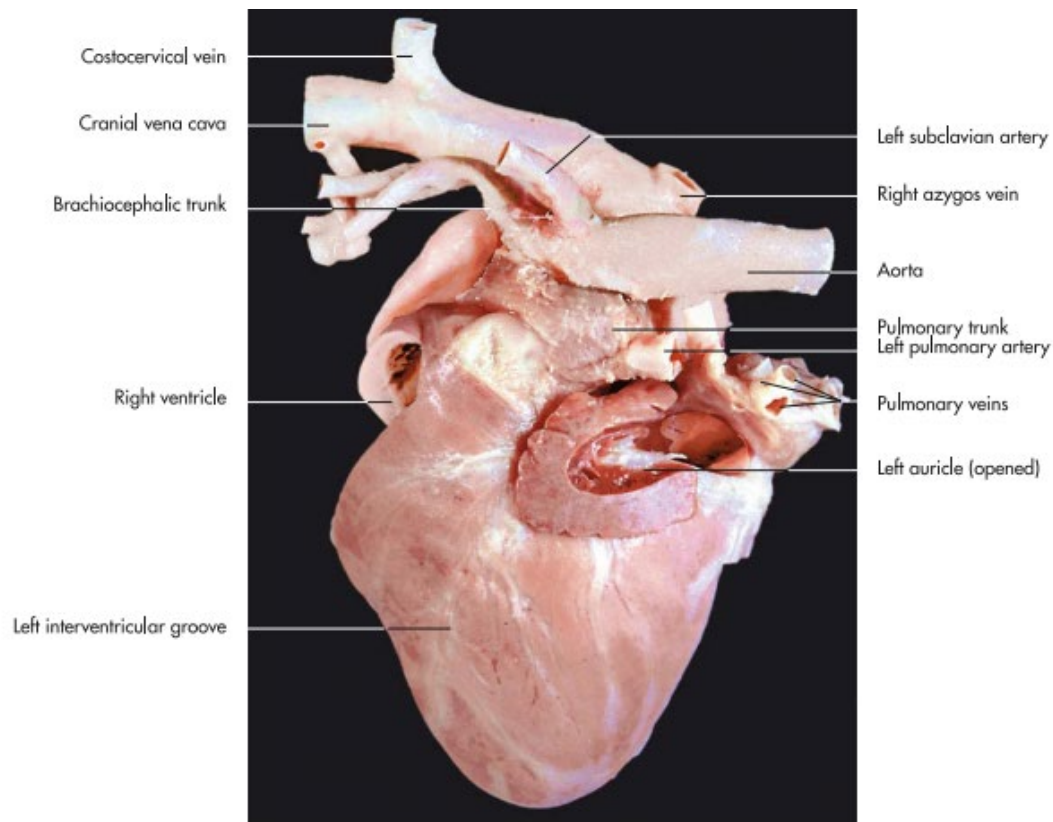
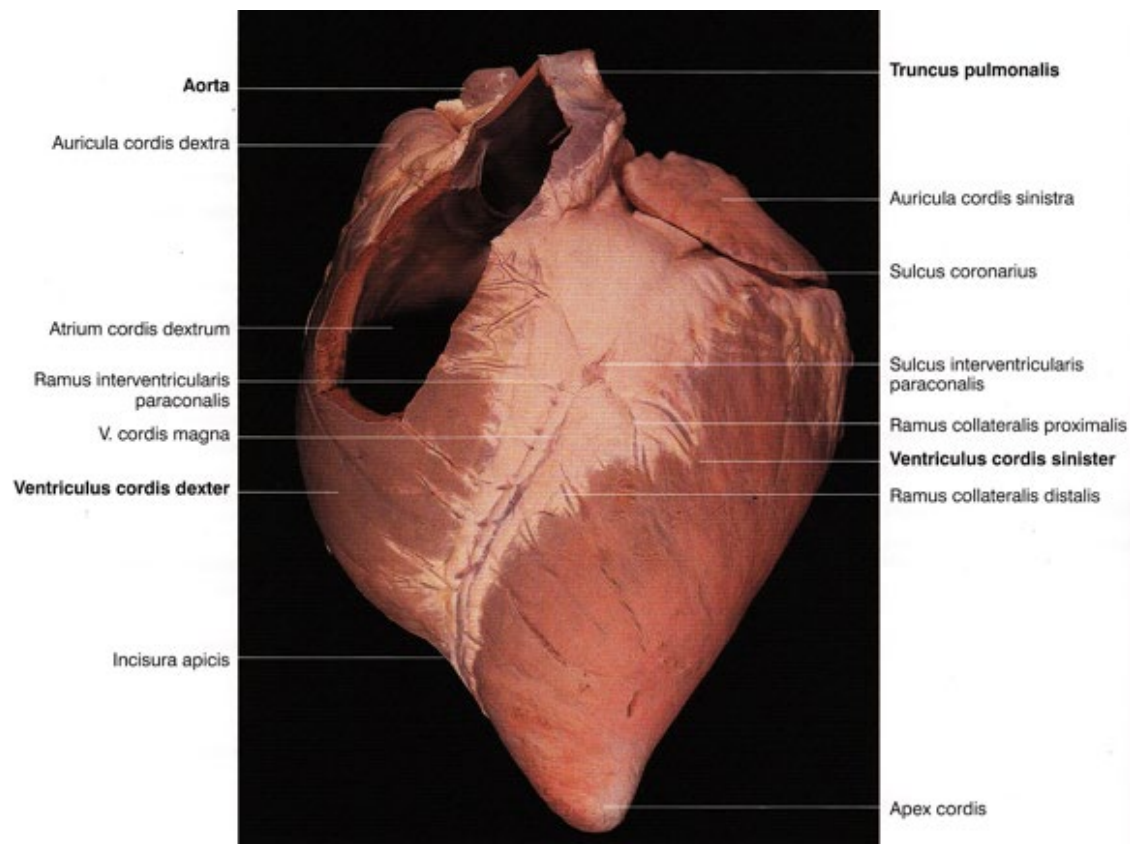


Fig. 13.1 Heart of a dog (auricular surface); preparation H. Dier, Vienna.

Atrium sinistrum

○ Auricula sinistra



Slika 12-3. Srce konja (facies auricularis), snimio dr. J. Maierl, München.

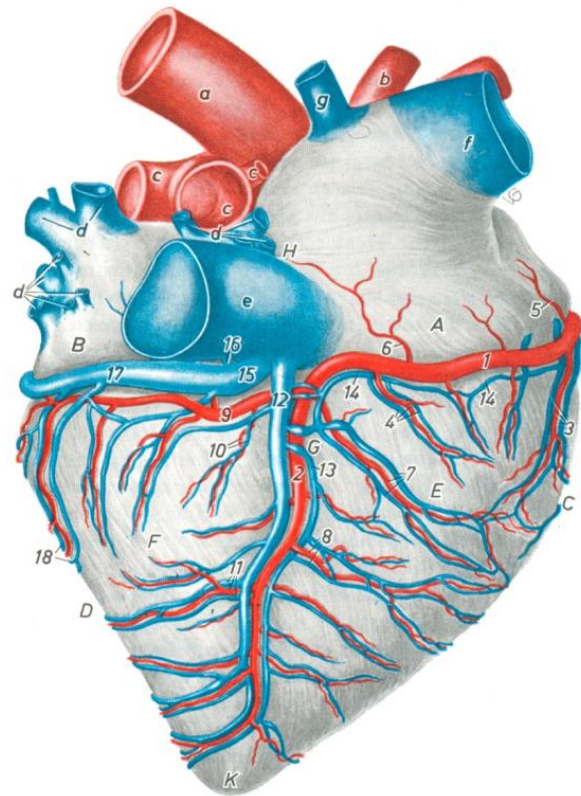
○ Vv. pulmonales

Fig. 48. Arteries and veins of the facies atrialis of the heart of the horse. (After Hoffmann, Diss. med. vet., Giessen, 1960.)

A atrium dext.; *B* atrium sin.; *C* margo ventricularis dext.; *D* margo ventricularis sin.; *E* ventriculus dext.; *F* ventriculus sin.; *G* sulcus interventricularis subsinuosus; *H* sinus venarum cavarum; *J* sulcus coronarius, pars dext.; *K* apex cordis

a arcus aortae; *b* truncus brachiocephalicus communis; *c, c* aa. pulmonales; *d* vv. pulmonales; *e* v. cava caud.; *f* v. cava cran.; *g* v. azygos dext.

1 r. circumflexus of the a. coronaria dext., *2* its r. interventricularis subsinuosus; *3* r. marginis ventricularis dext. and vv. cordis parvae; *4* r. dist. ventriculi dext. and vv. cordis parvae; *5* r. intermed. atrii dext.; *6* r. dist. atrii dext.; *7* r. collateralis dext. prox. and branch of the v. cordis media; *8* r. collateralis dext. dist. and branch of the v. cordis media; *9* r. coronarius sin. and branch of the v. cordis media; *10* v. paracoronaria; *11* r. and v. collateralis ventriculi sin.; *12* v. cordis media, *13* its parallel branch; *14* bypass vein of the vv. cordis parvae; *15* sinus coronarius; *16* v. obliqua atrii sin.; *17* v. cordis magna and transition into its pars circumflexa; *18* v. dist. ventriculi sin.



Ventriculus sinister

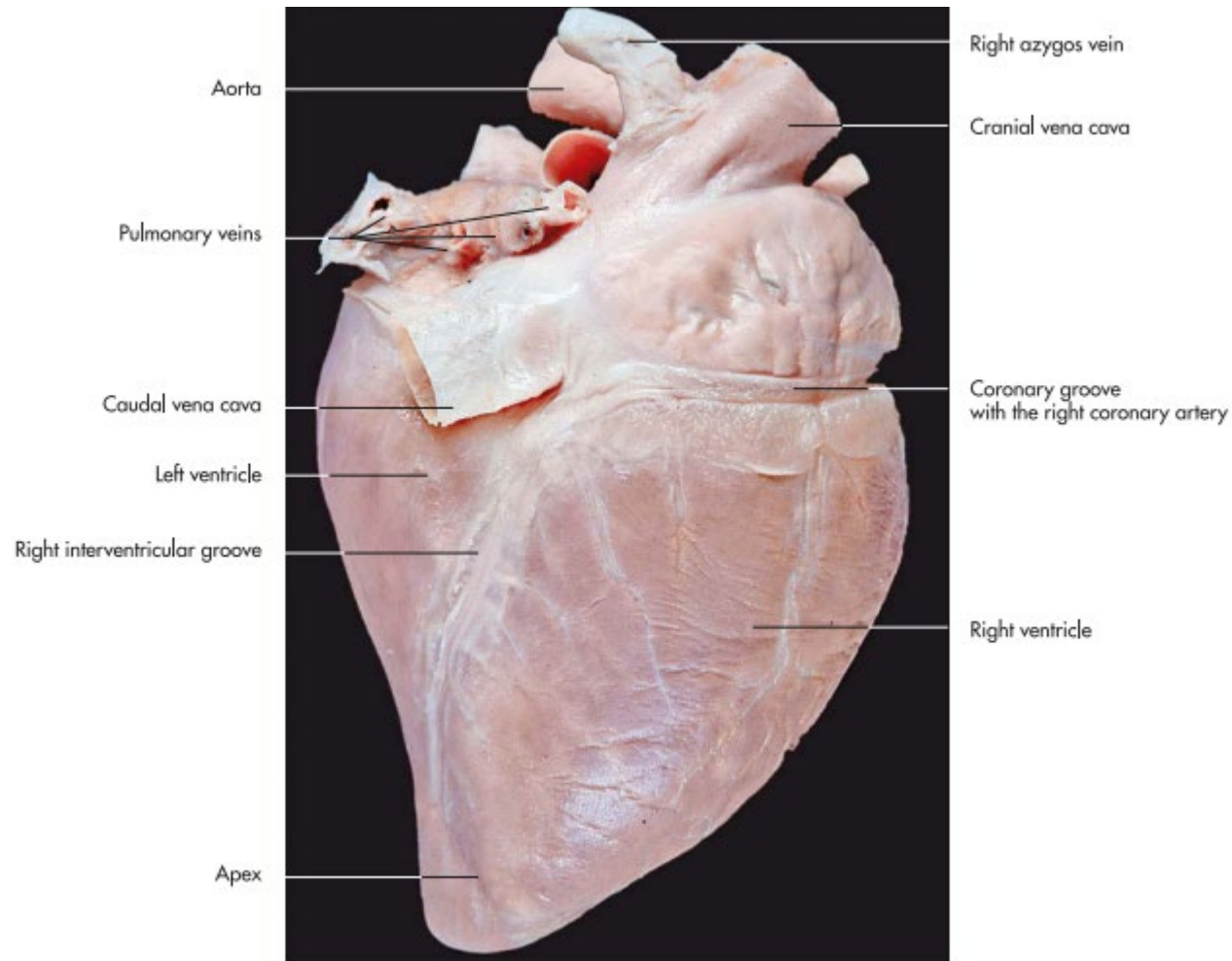


Fig. 13.3 Heart of a horse (arterial surface); preparation H. Dier, Vienna.

- 
-
- **Leva polovina srca: lpk i lk**
 - **Desna polovina srca: dpk i dk**

- 
-
- **Leva strana srca:** veći deo **lpk**, veći deo **lk**, manji deo **dpk** i manji deo **dk**.

- 
-
- **Desna strana srca:** veći deo **dpk**, veći deo **dk**, manji deo **lpk** i manji deo **lk**.

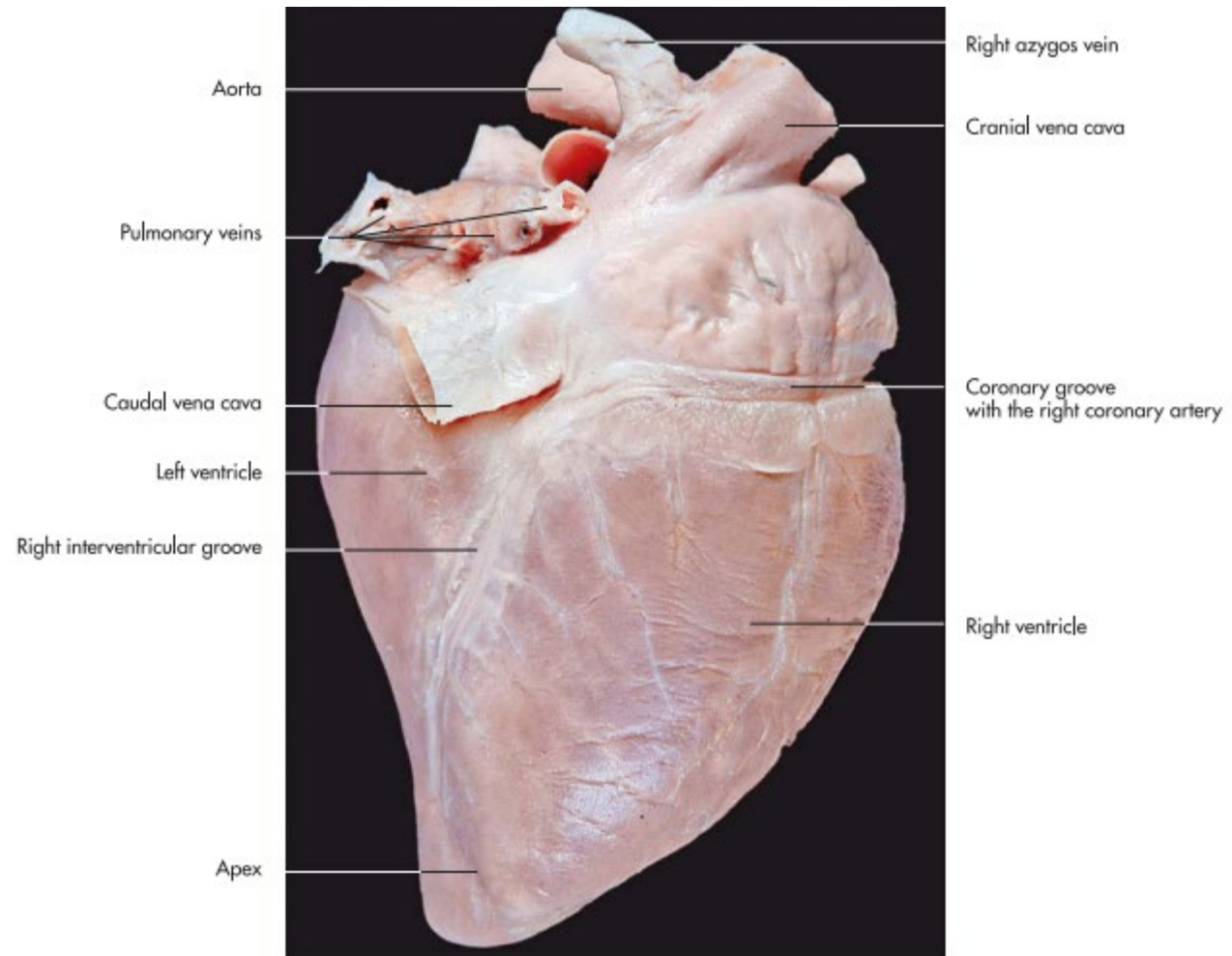


Fig. 13.3 Heart of a horse (arterial surface); preparation H. Dier, Vienna.

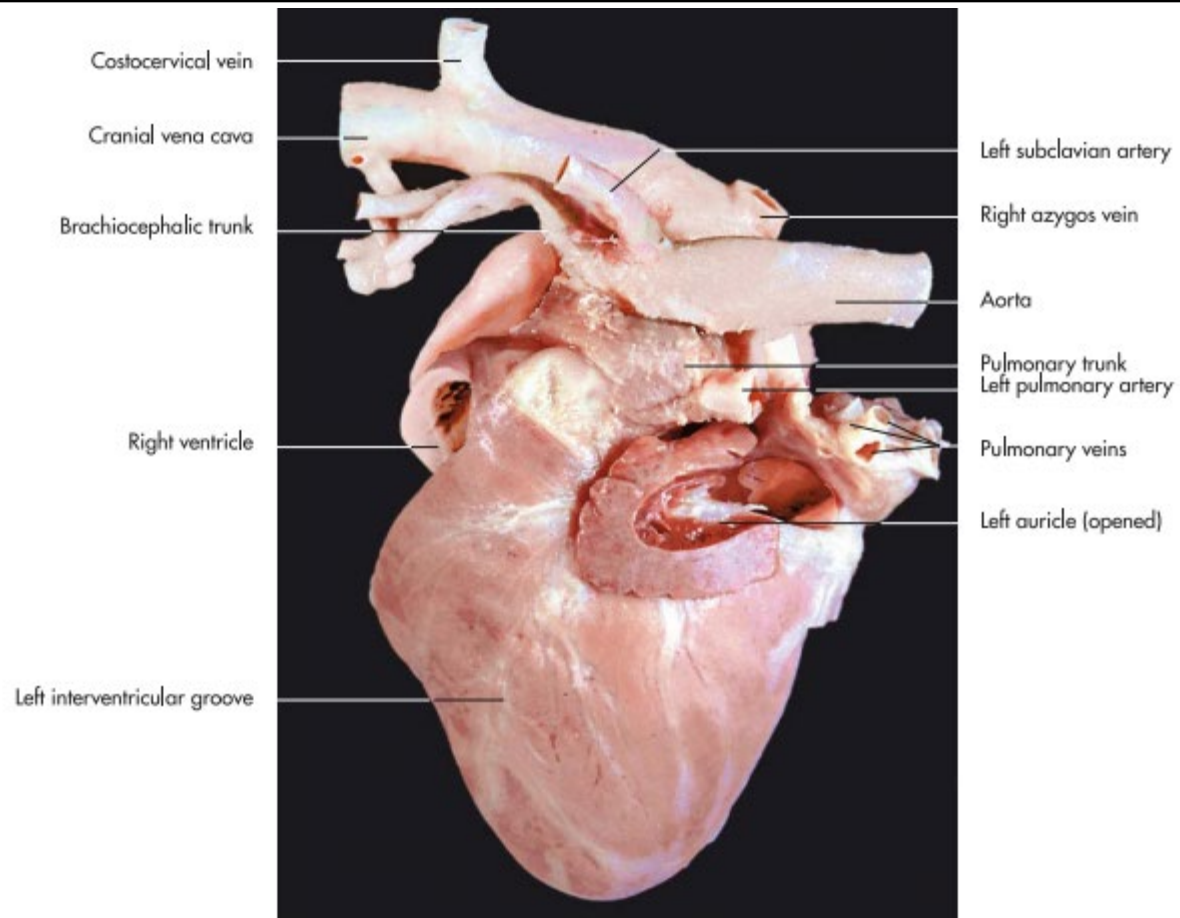


Fig. 13.1 Heart of a dog (auricular surface); preparation H. Dier, Vienna.



Atrium dextrum

- **Septum interatriale**
- **Foramen ovale**
- **Fossa ovalis**

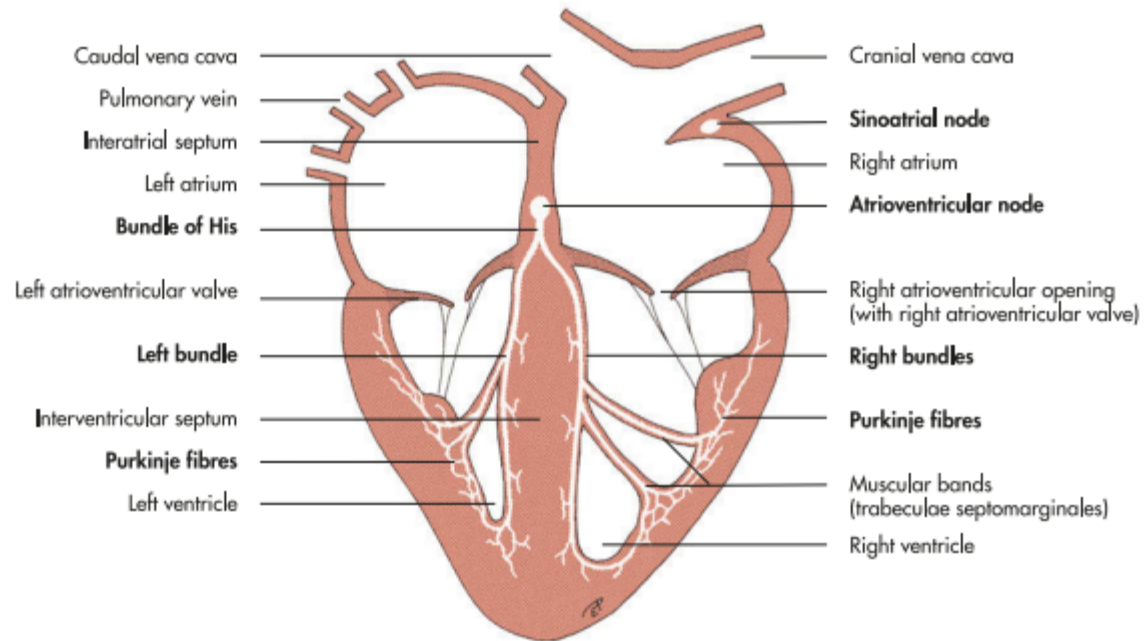


Fig. 13.12 Conducting system of the right and left ventricle (schematic).

- 
-
- **Ostium venae cavae cranialis**
 - **Ostium venae cavae caudalis**
 - **Tuberculum intervenosum**

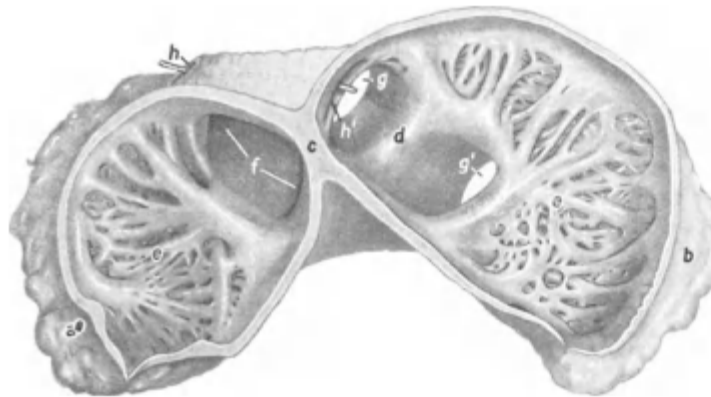


Fig. 14. View into the atria of the heart of a pig which has been transected at the coronary groove.
(After Steger, 1927.)

a left, *b* right atrium; *c* septum interatriale; *d* tuberculum intervenosum; *e*, *e* mm. pectinati; *f* ostia of the vv. pulmonales; *g*, *g'* ostia of the v. cava cran. and caud.; *h* v. azygos sin. (hemiazygos), *h'* its mouth

- 
-
- **Ostium atrioventriculare dextrum**
 - **Foramina venarum minimarum (Mm. pectinati)**

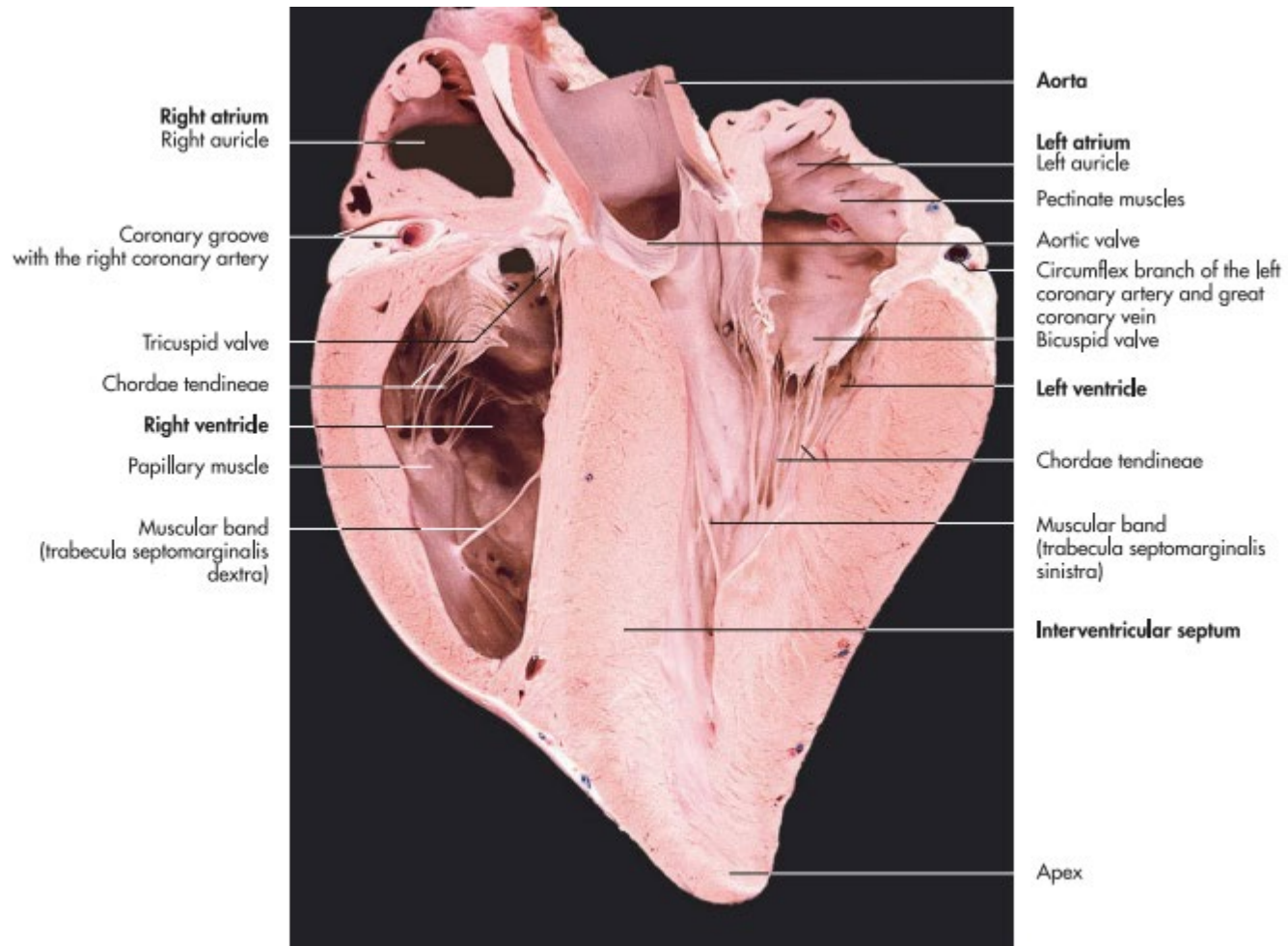


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)



Fig. 13.7 Interior of the heart of a horse (transverse section through the atrias). (source: courtesy of Prof. Dr. J. Maierl, Munich)

Ventriculus dexter

○ Septum interventriculare

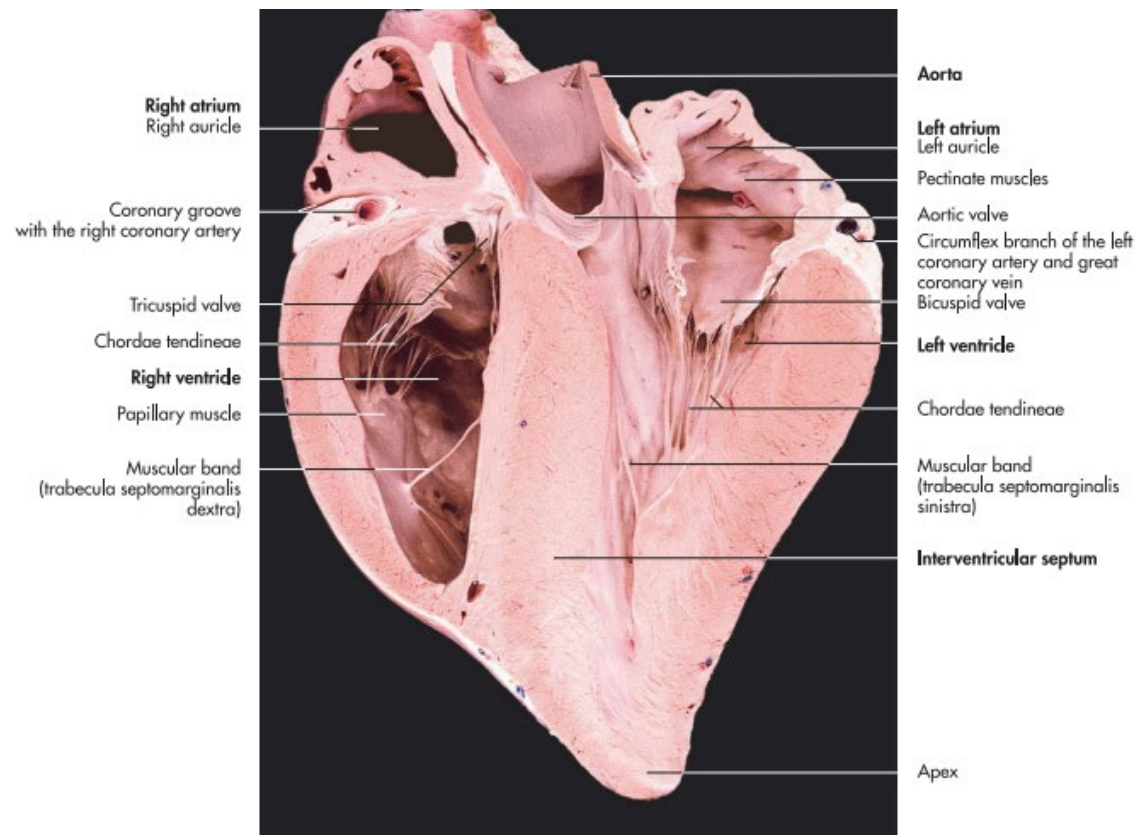


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

- 
-
- **Ostium atrioventriculare dextrum**
 - **Annulus fibrosus**

- 
-
- **Valva atrioventricularis dextra (tricuspidalis):
Cuspis septalis, parietalis et angularis**



Fig. 13.7 Interior of the heart of a horse (transverse section through the atrias). (source: courtesy of Prof. Dr. J. Maierl, Munich)

○ Chordae tendineae

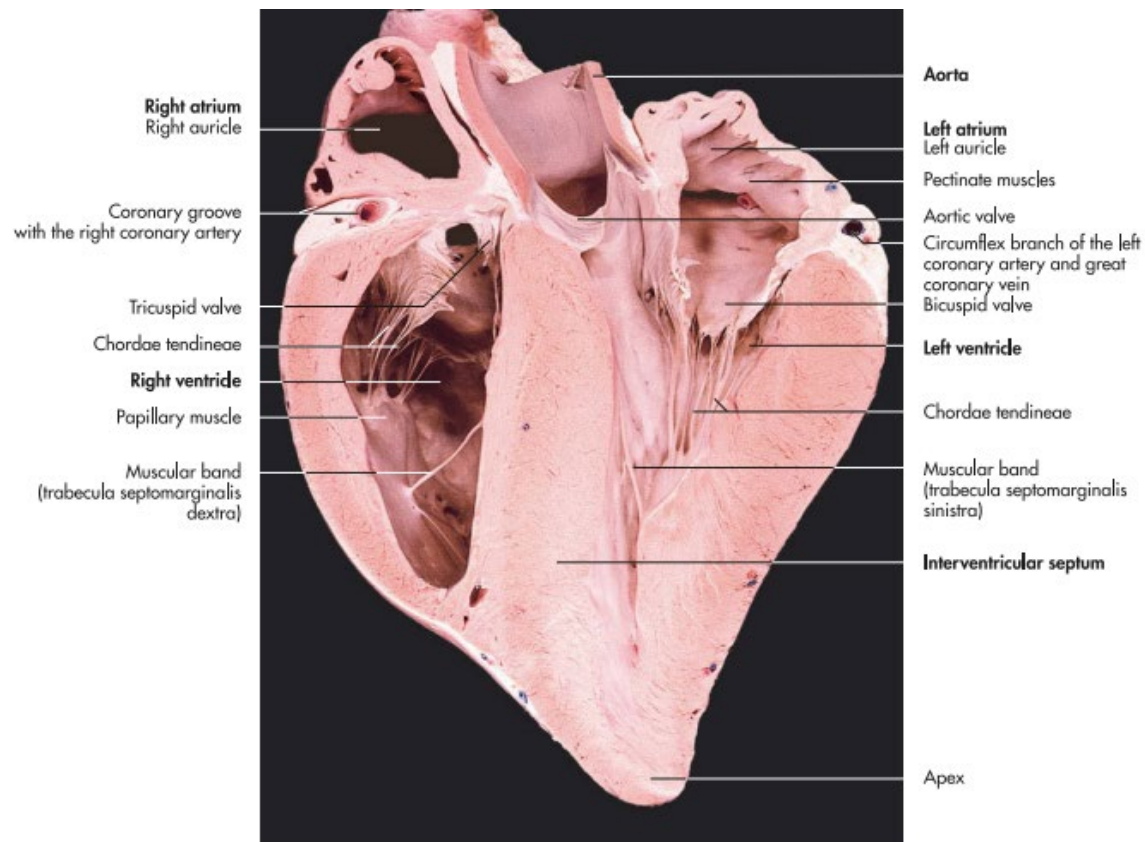
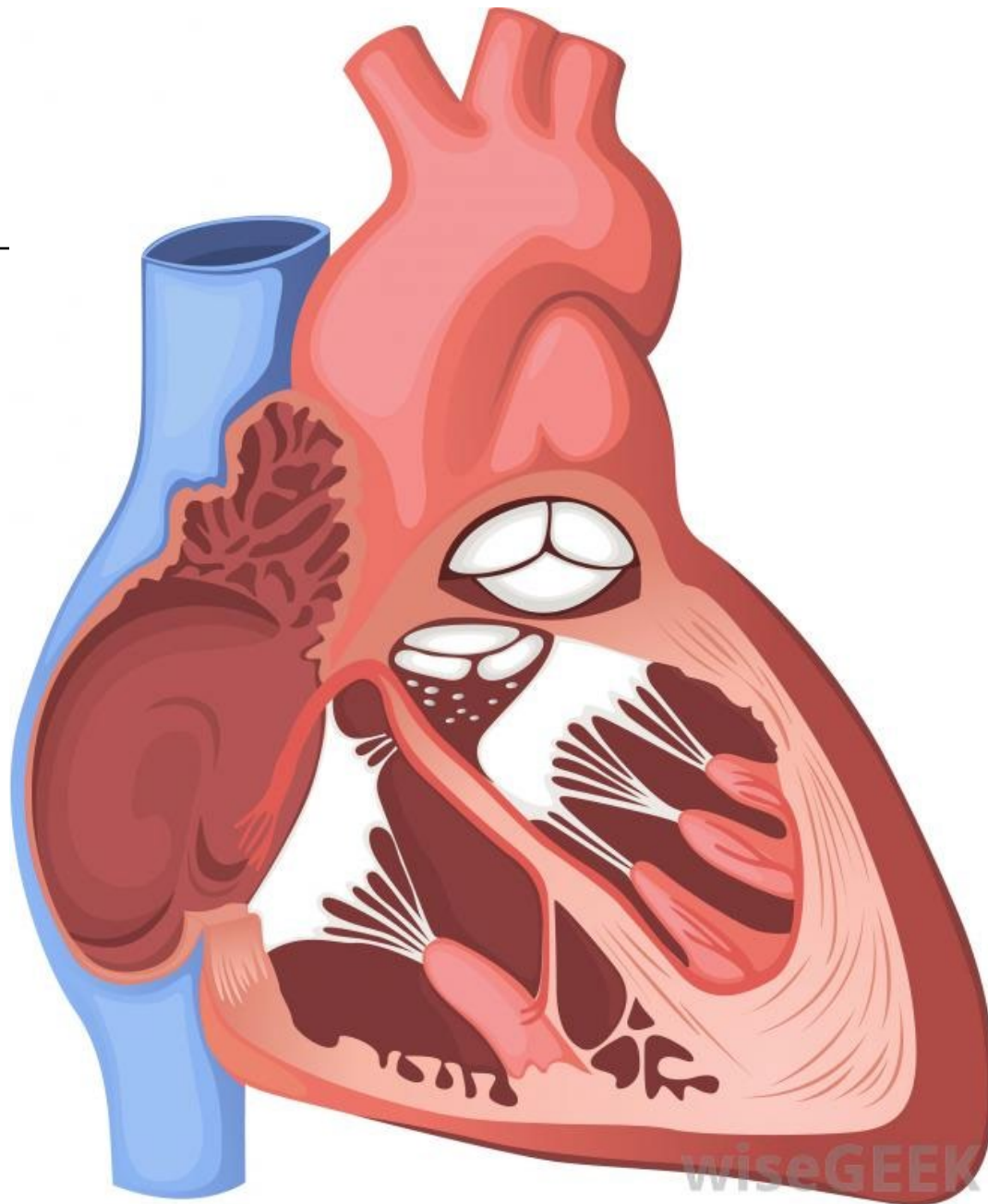


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)



wiseGEEK

○ Mm. papillares

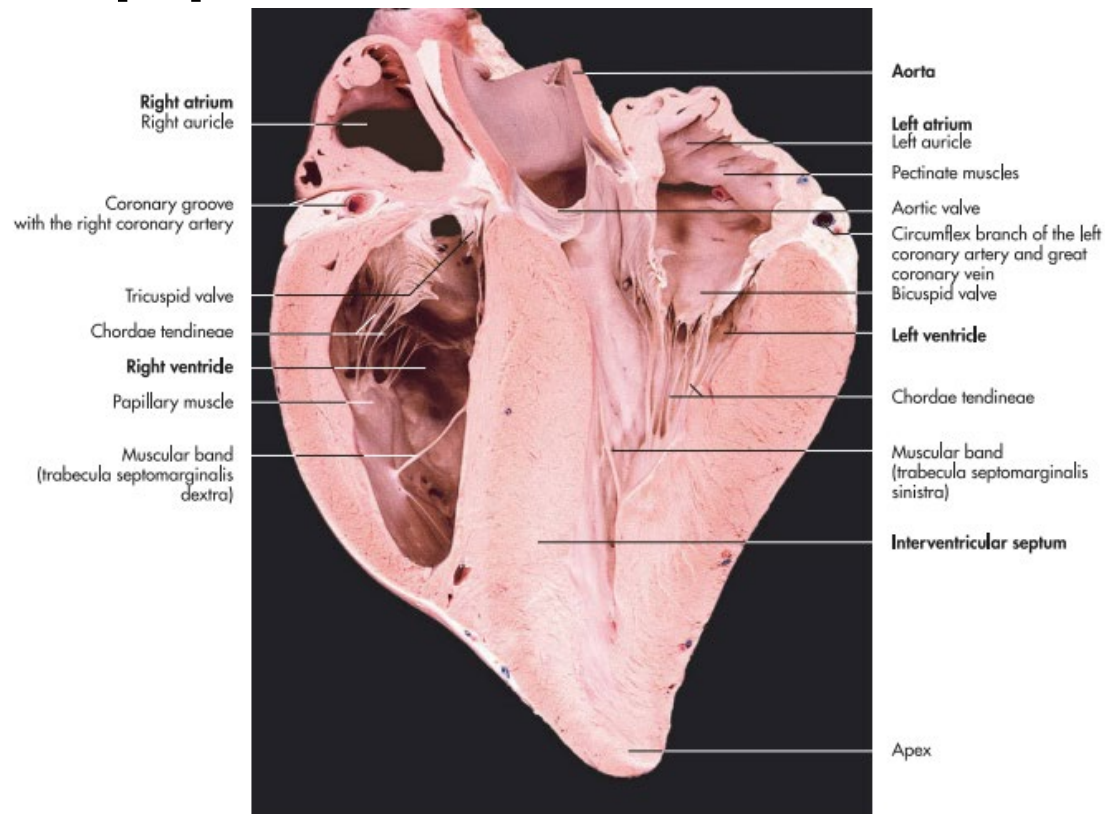
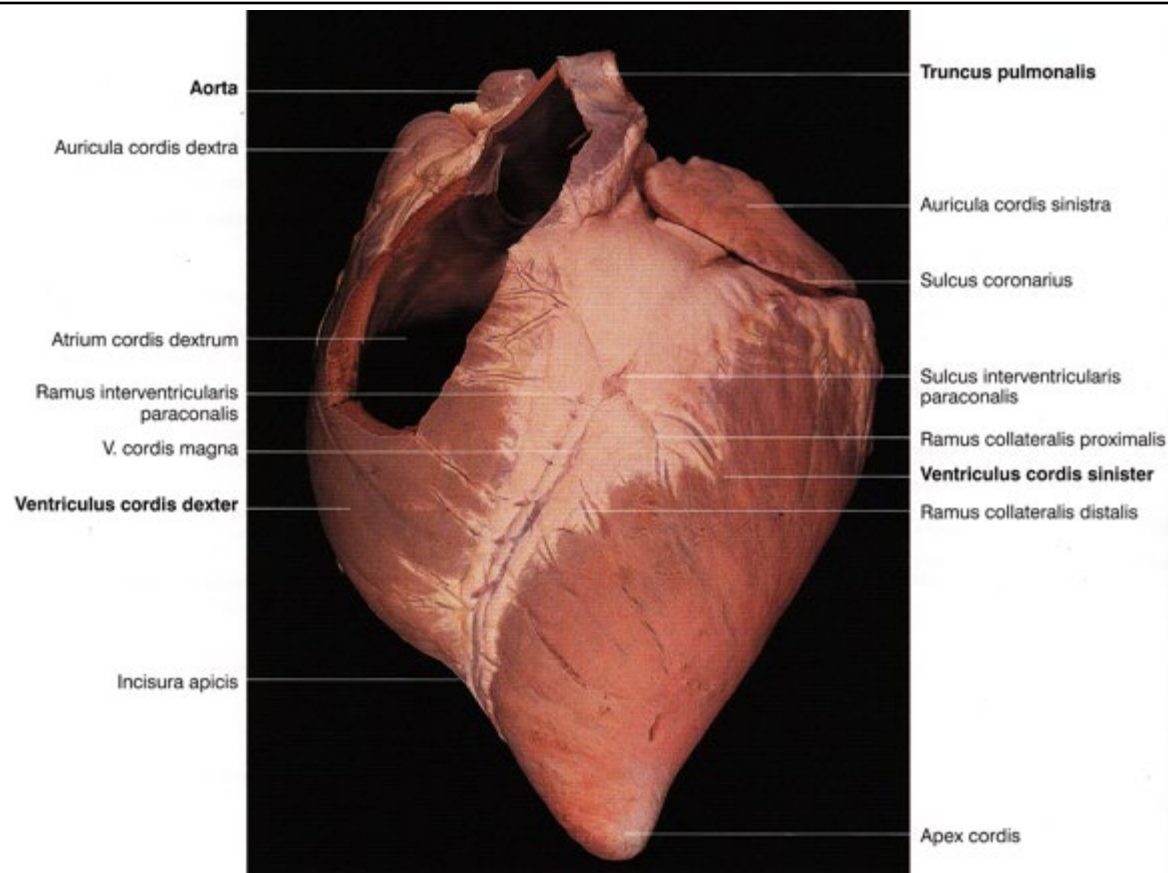


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

- 
-
- **Conus arteriosus**
 - **Truncus pulmonalis (Ostium trunci pulmonalis)**



Slika 12-3. Srce konja (facies auricularis), snimio dr. J. Maierl, München.

- 
-
- Annulus fibrosus - **Valvulae semilunares**
 - **Noduli valvarum semilunarium**

- 
-
- **Trabeculae carneae**
 - **Trabeculae septomarginales**

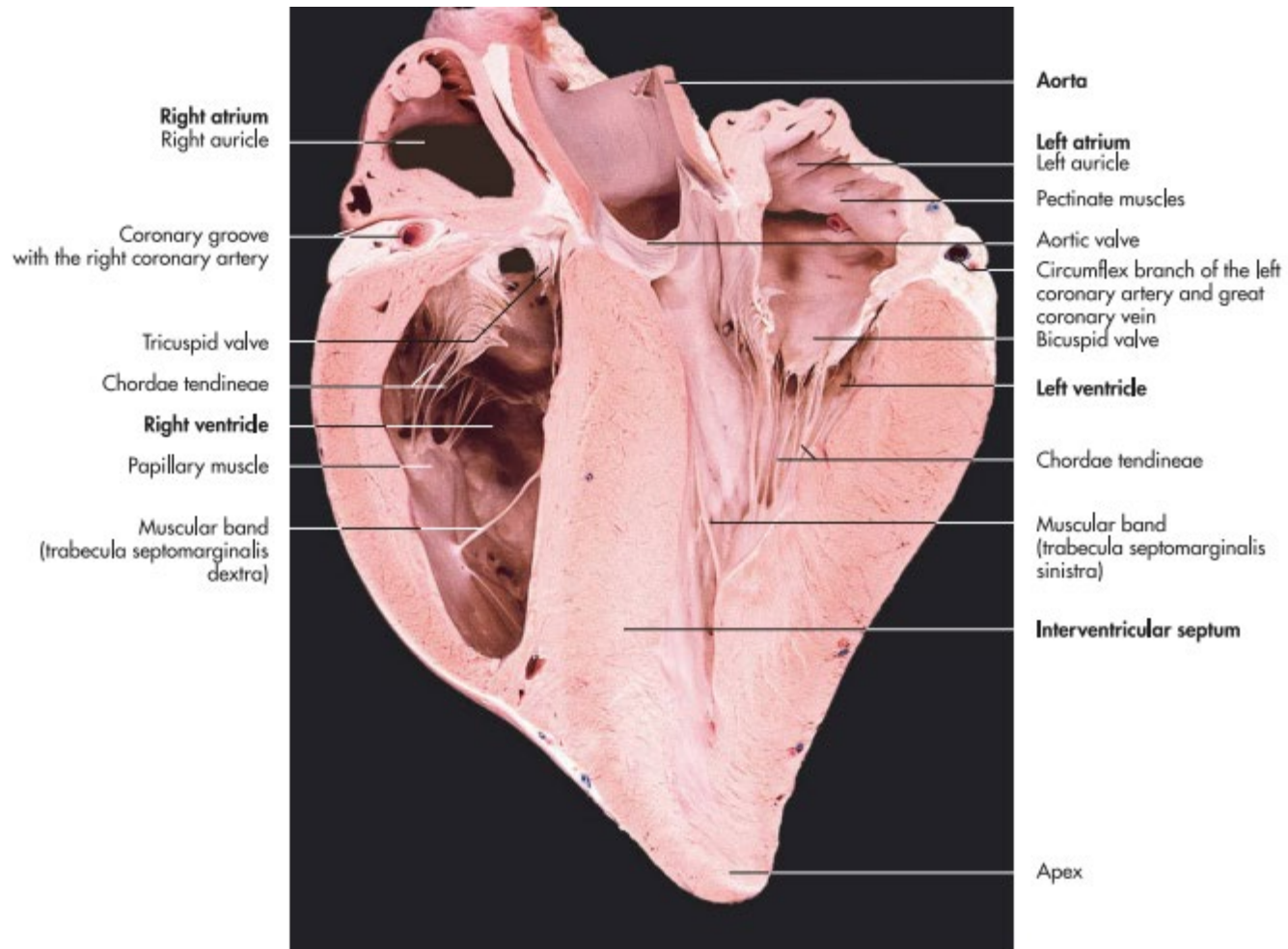


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

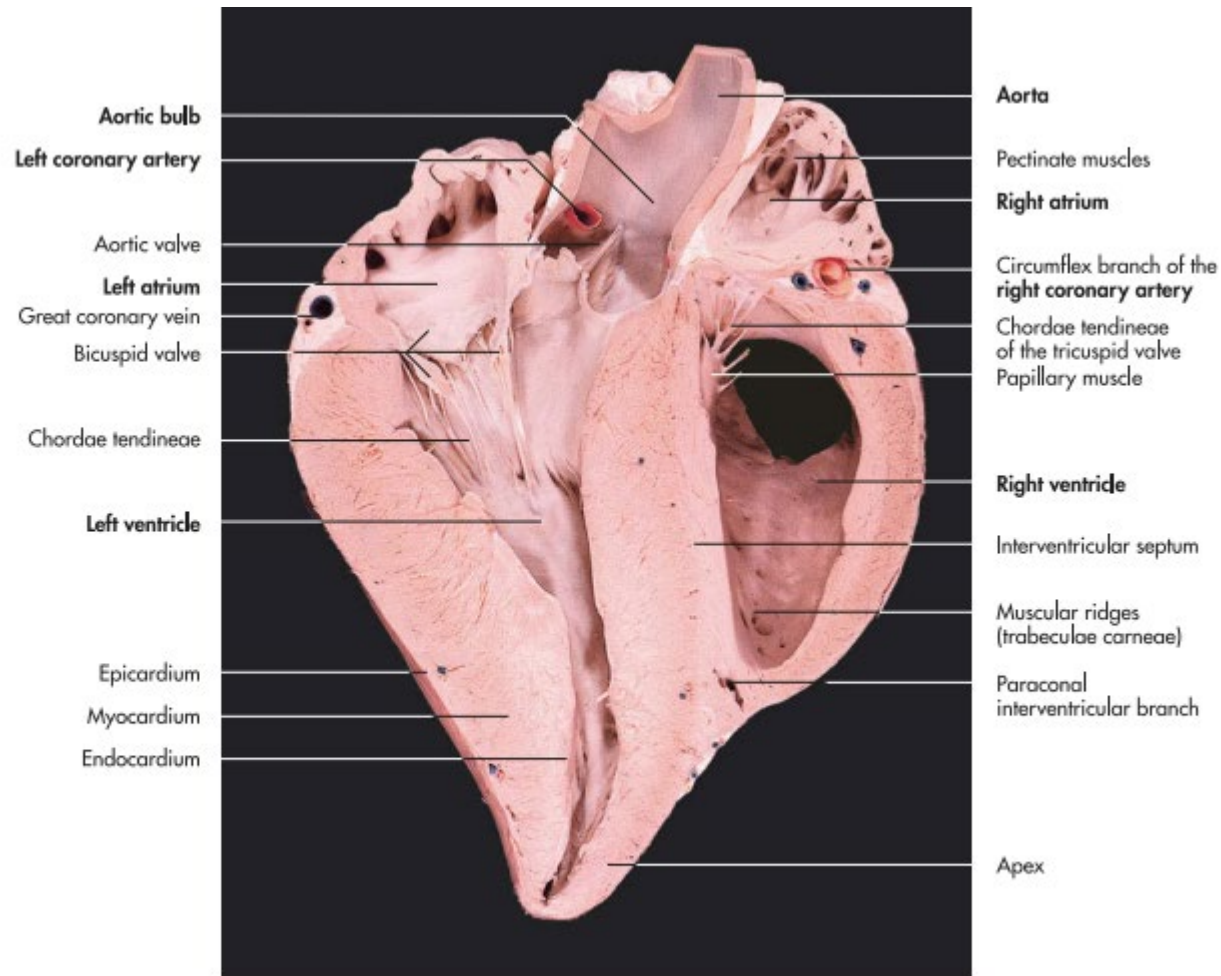
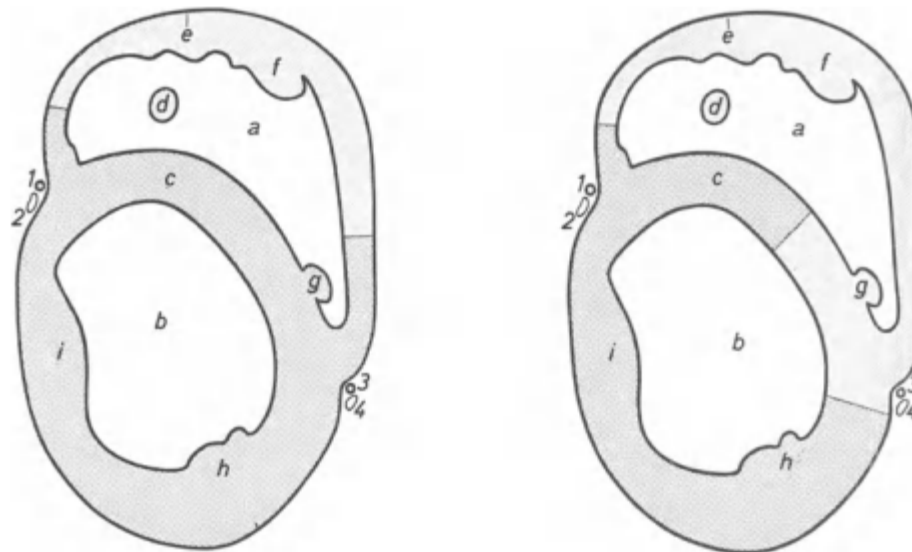


Fig. 13.6 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

- Na poprečnom preseku polumesečasta.



Figs 25, 26. Cross section through the ventricles of the heart. This is a diagrammatic representation of the species difference in the supply regions of the coronary arteries. The stippled parts of the wall are supplied by the left coronary artery while the hatched portions are supplied by the right coronary artery.
a ventriculus dext.; *b* ventriculus sin.; *c* septum interventriculare; *d* trabecula septomarginalis; *e* margo ventricularis dext.; *f* m. papillaris magnus; *g* mm. papillares parvi; *h*, *i* m. papillaris subatrialis or subauricularis;

Fig 25. 1 r. interventricularis paraconalis of the a. coronaria sin.; 2 v. interventricularis paraconalis of the v. cordis magna in the sulcus interventricularis paraconalis; 3 r. interventricularis subsinuosus of the a. coronaria sin.; 4 v. cordis media in the sulcus interventricularis subsinuosus. Left-coronary type of supply in the dog and ruminants.

Atrium sinistrum

- **Ostia venarum pulmonalium**
- **Mm. pectinati**

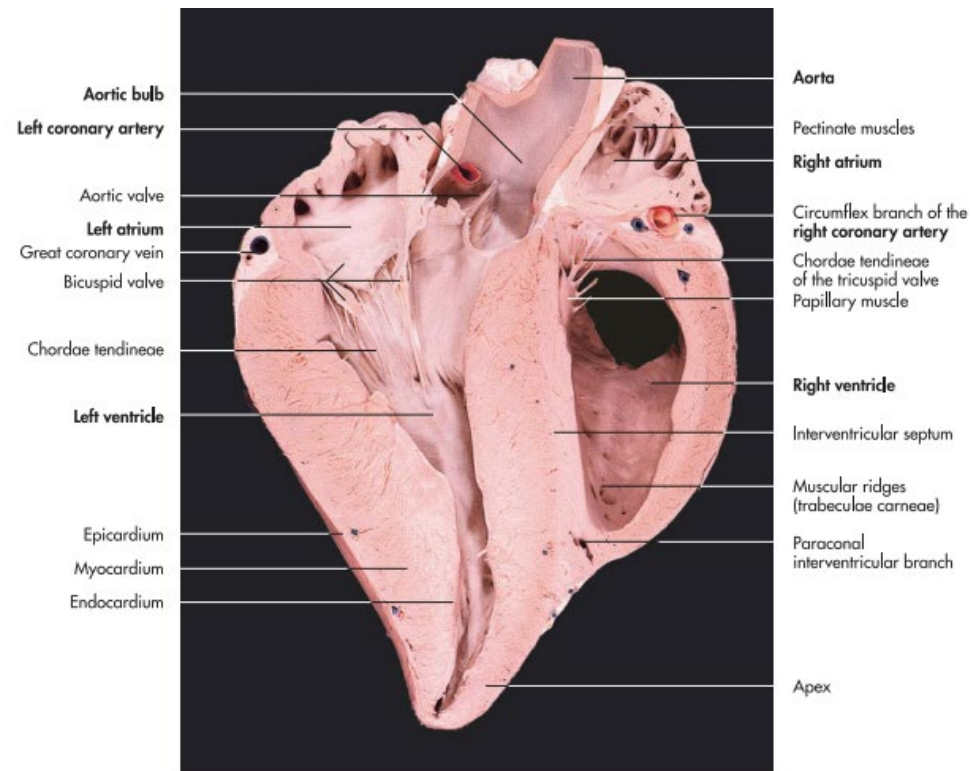
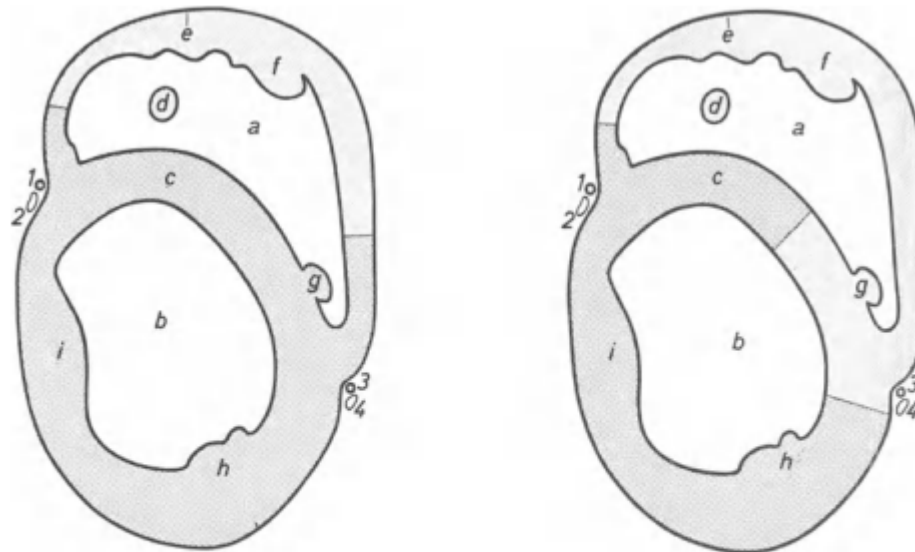


Fig. 13.6 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

Ventriculus sinister

- Na poprečnom preseku okrugla.



Figs 25, 26. Cross section through the ventricles of the heart. This is a diagrammatic representation of the species difference in the supply regions of the coronary arteries. The stippled parts of the wall are supplied by the left coronary artery while the hatched portions are supplied by the right coronary artery.
a ventriculus dext.; *b* ventriculus sin.; *c* septum interventriculare; *d* trabecula septomarginalis; *e* margo ventricularis dext.; *f* m. papillaris magnus; *g* m. papillares parvi; *h*, *i* m. papillaris subatrialis or subauricularis;

Fig 25. 1 r. interventricularis paraconalis of the a. coronaria sin.; 2 v. interventricularis paraconalis of the v. cordis magna in the sulcus interventricularis paraconalis; 3 r. interventricularis subsinuosis of the a. coronaria sin.; 4 v. cordis media in the sulcus interventricularis subsinuosis. Left-coronary type of supply in the dog and ruminants.

- 
-
- **Ostium atrioventriculare sinistrum**
 - **Annulus fibrosus**

- 
-
- **Valva atrioventricularis sinistra (bicuspidalis s. mitralis): Cuspis septalis et parietalis**

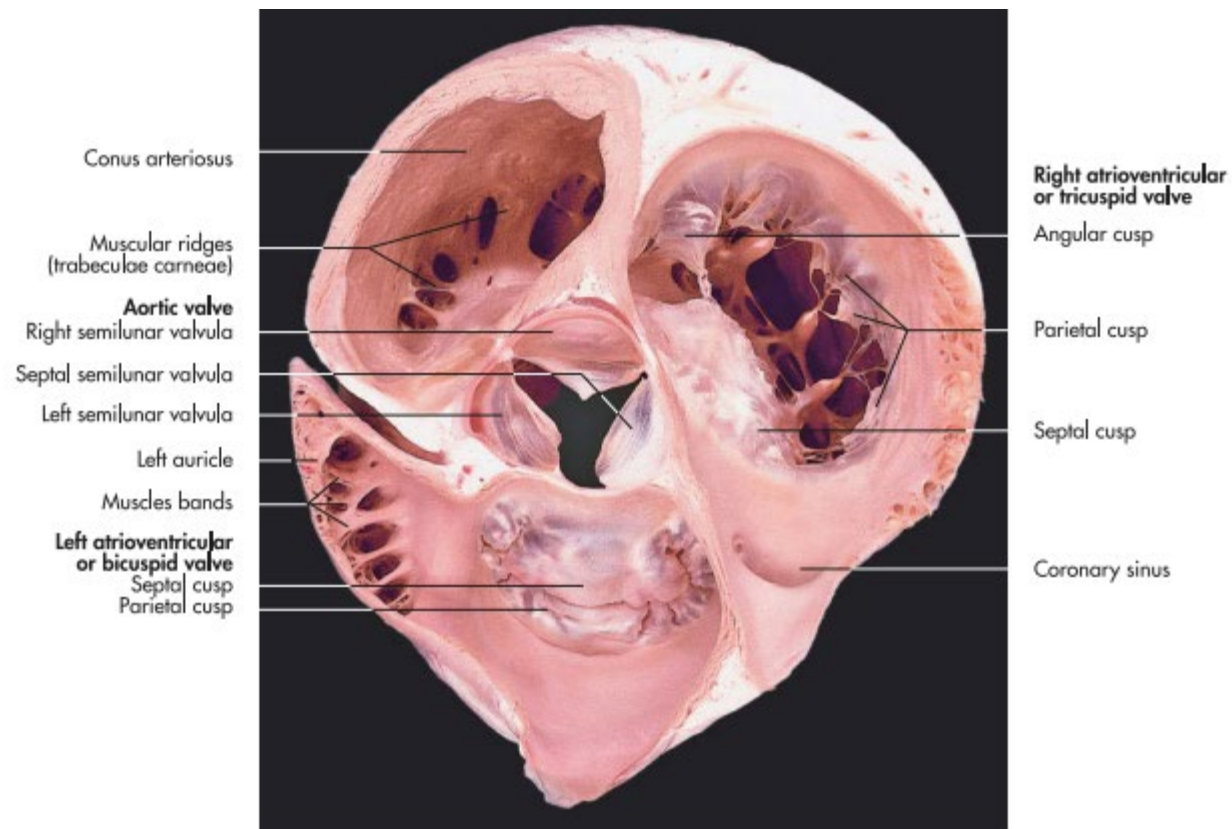


Fig. 13.7 Interior of the heart of a horse (transverse section through the atrias). (source: courtesy of Prof. Dr. J. Maierl, Munich)

- 
-
- **Chordae tendineae**
 - **Mm. papillares**

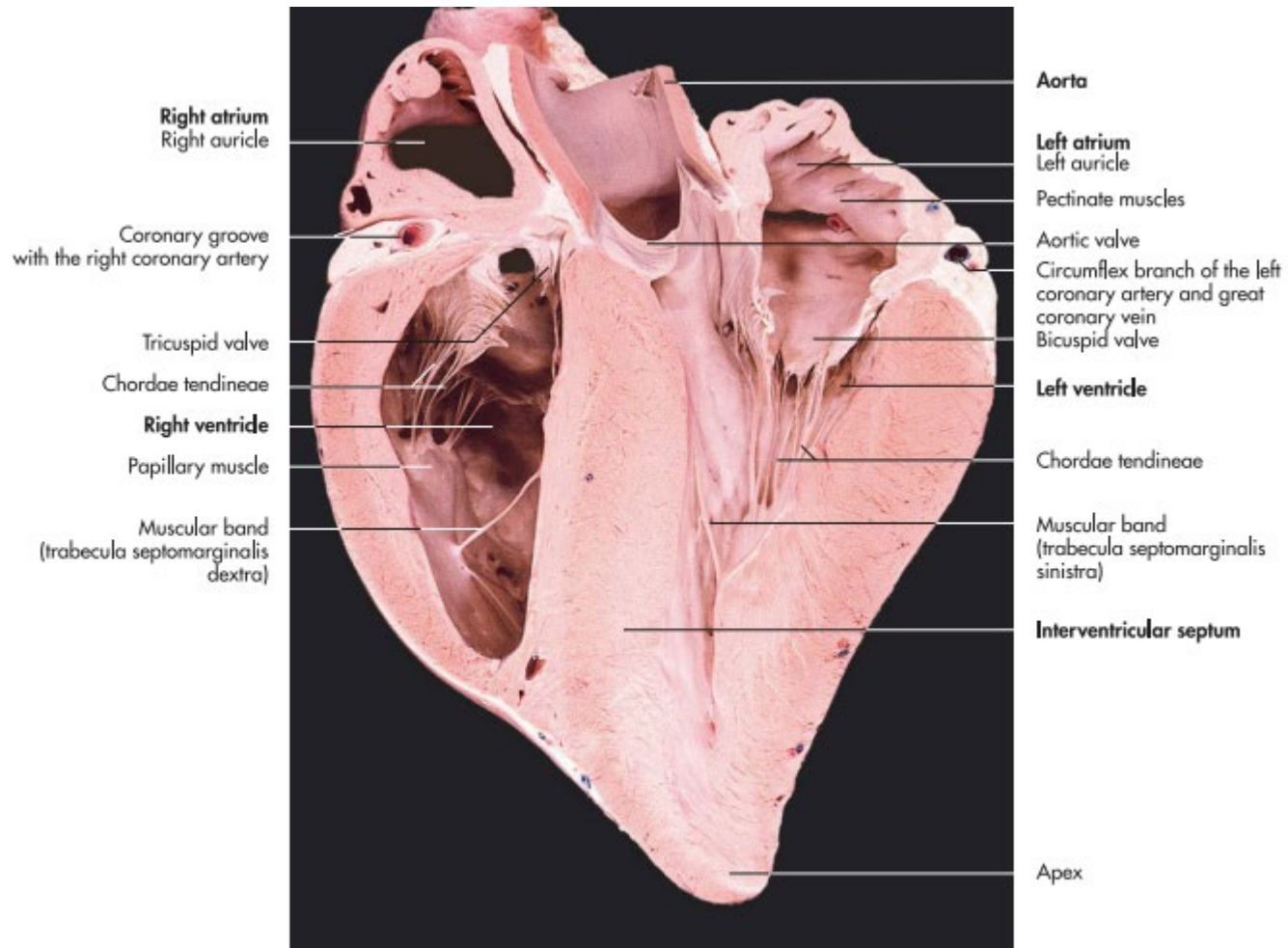


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)

- 
-
- **Ostium aortae**
 - **Annulus fibrosus - Valvulae semilunares**
 - **Nodulus valvulae semilunaris**

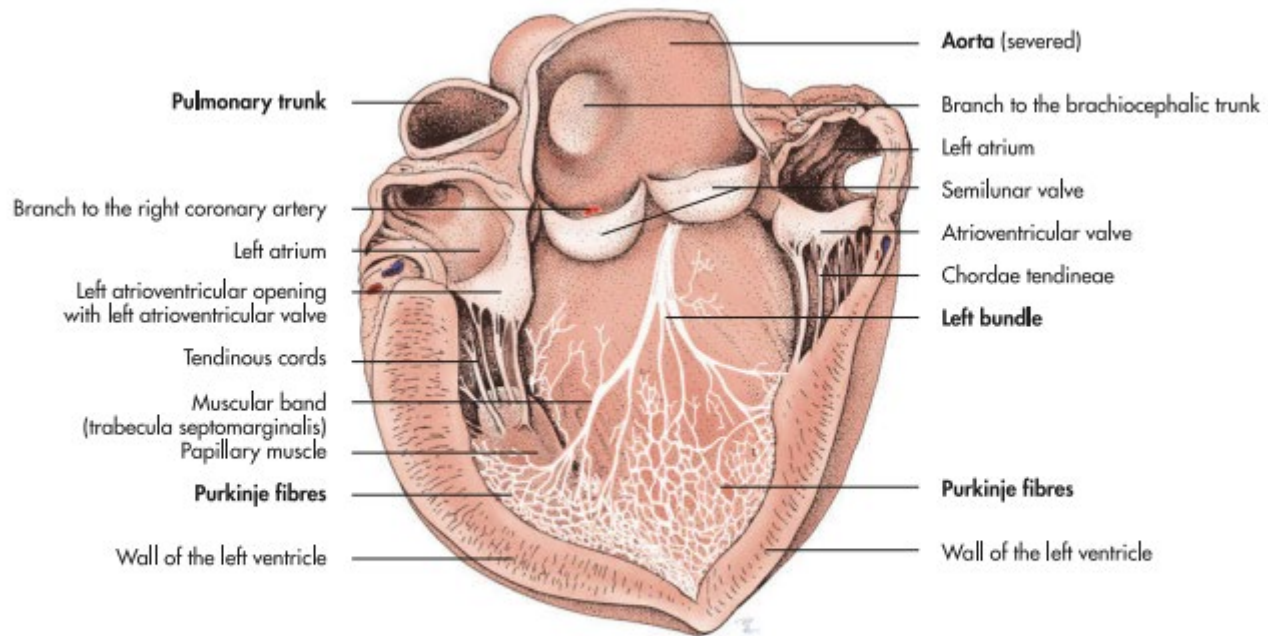


Fig. 13.11 Conducting system of the left atrium and ventricle (schematic).

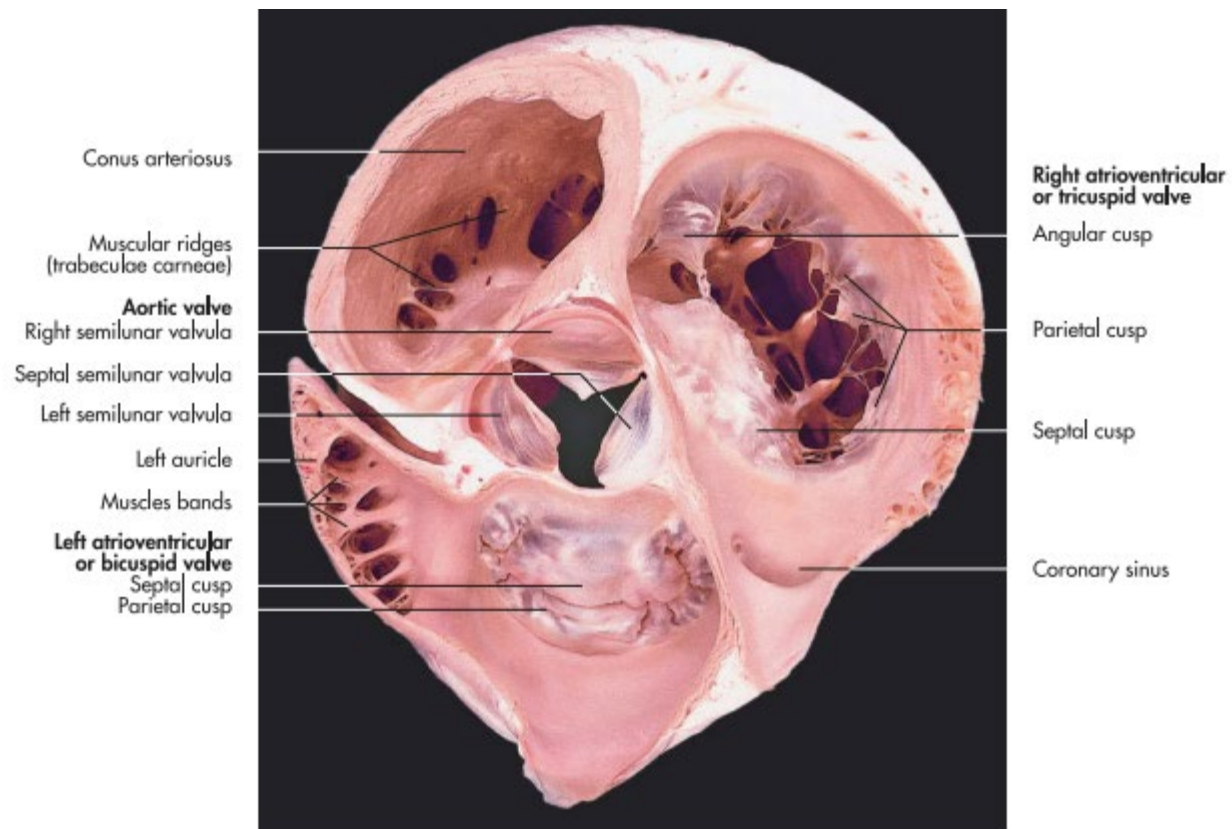


Fig. 13.7 Interior of the heart of a horse (transverse section through the atrias). (source: courtesy of Prof. Dr. J. Maierl, Munich)

○ Trabeculae septomarginales

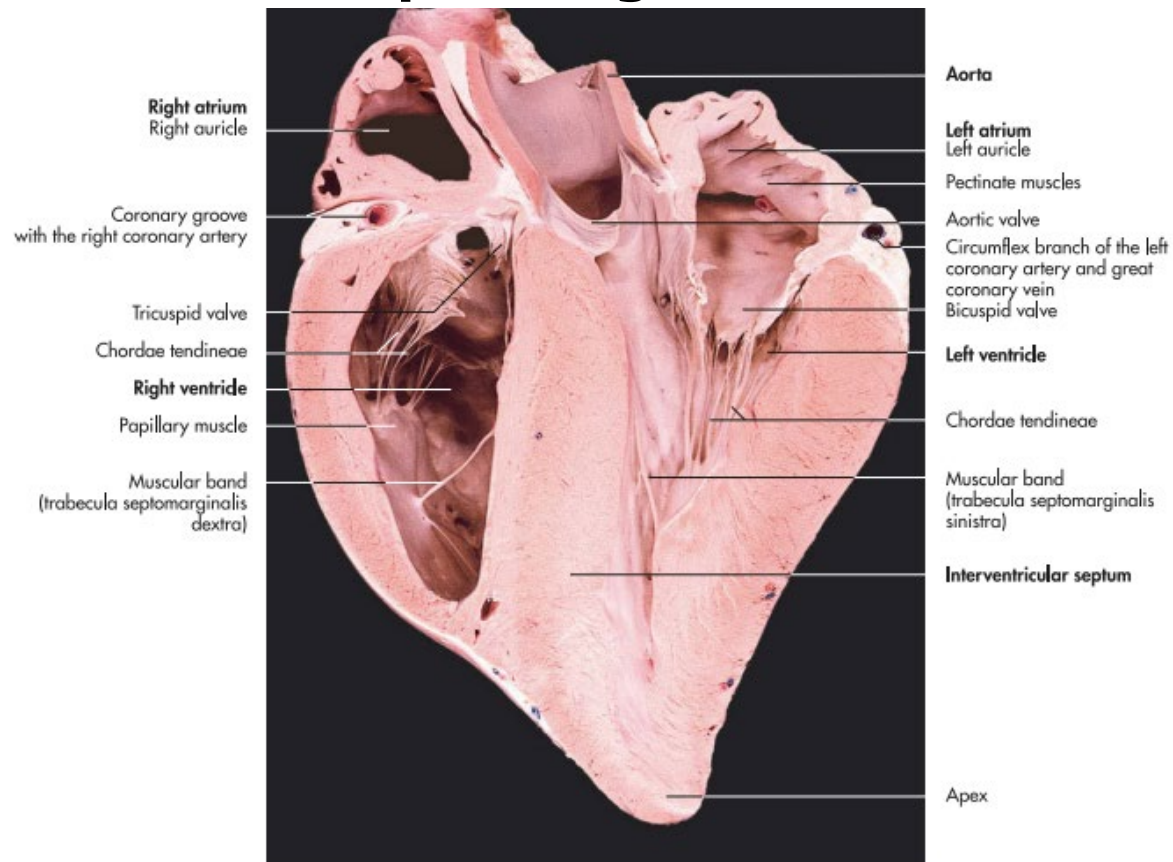


Fig. 13.5 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)



Grada srca

- **Epicardium**
- **Myocardium**
- **Endocardium**

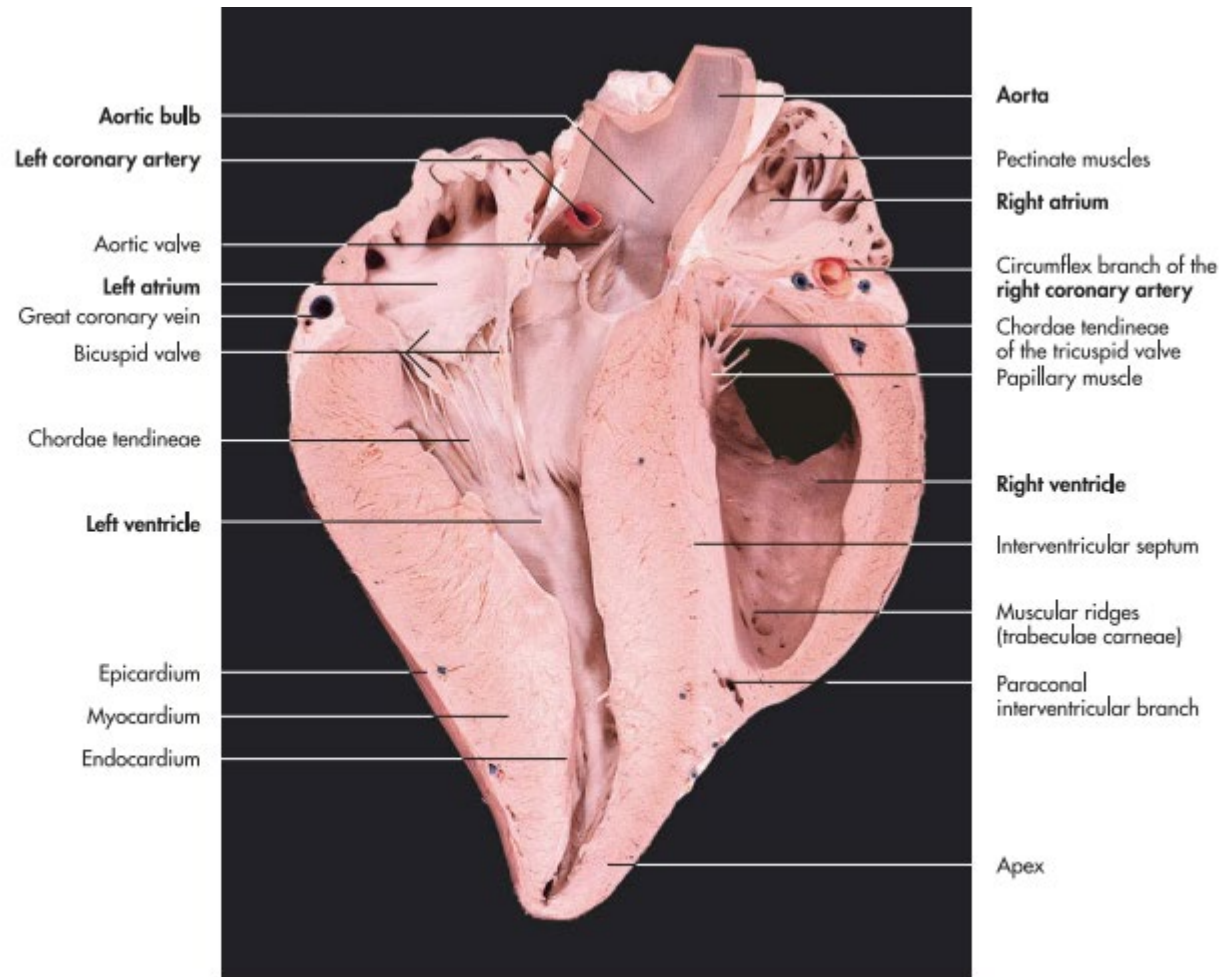
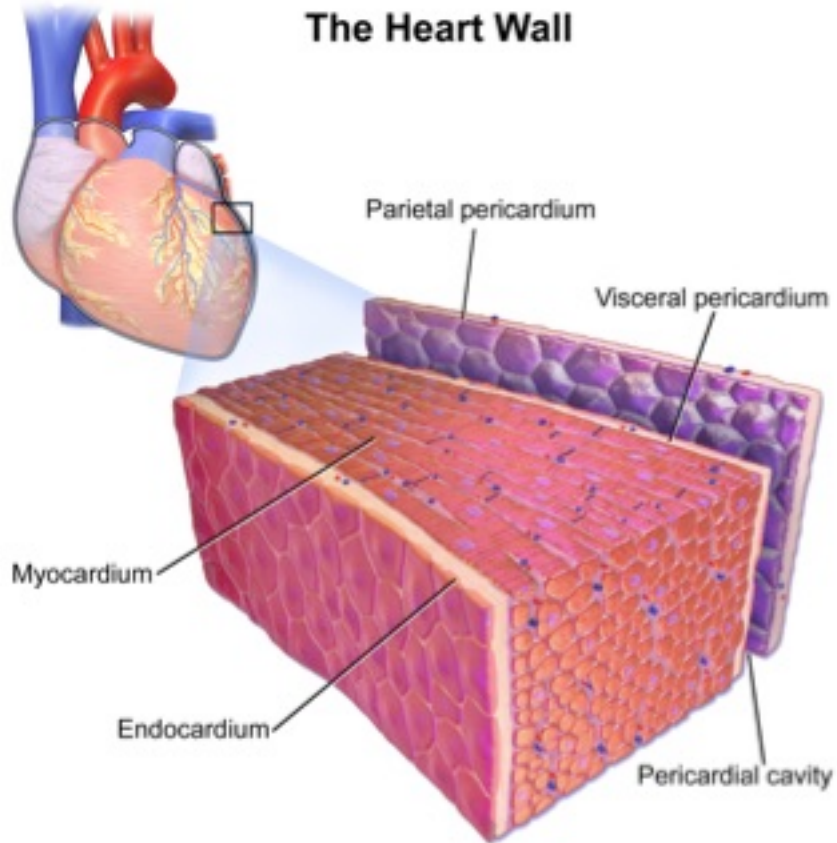


Fig. 13.6 Interior of the heart of a horse (longitudinal section). (source: courtesy of Prof. Dr. J. Maierl, Munich)



○ www.cram.com