

Gross Anatomy

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Introduction

Although this book does not aim to provide a comprehensive description of rat anatomy, this chapter presents illustrations of areas likely to be of practical importance to those working with laboratory rats. These areas include body surface, body regions, muscles, and dissection of the neck, thorax and abdomen with pelvic cavity.

For further anatomical details, readers are referred to Chapter 15 and the excellent works of Green (1963), Hebel and Stromberg (1986) and Popesko *et al.* (1990).

The terminology used here is based on the international veterinary anatomical nomenclature published by Schaller *et al.* (1992). In the figure captions, XY denotes male and XX female.

Acknowledgement

With her kind consent, some of the figures presented in this chapter were drawn following the concept of Professor Dr Viera Rajtova (Popesko *et al.*, 1990).

References

- Green, E.C. (1963) *Anatomy of the Rat*. New York: Hafner Publishing.
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- Schaller, O., Constantinescu, G.M., Habel, R.E., Sack, W.O., Simoens, P. and de Vos, N.R. (1992) *Illustrated Veterinary Anatomical Nomenclature*. Stuttgart: Enke Verlag.

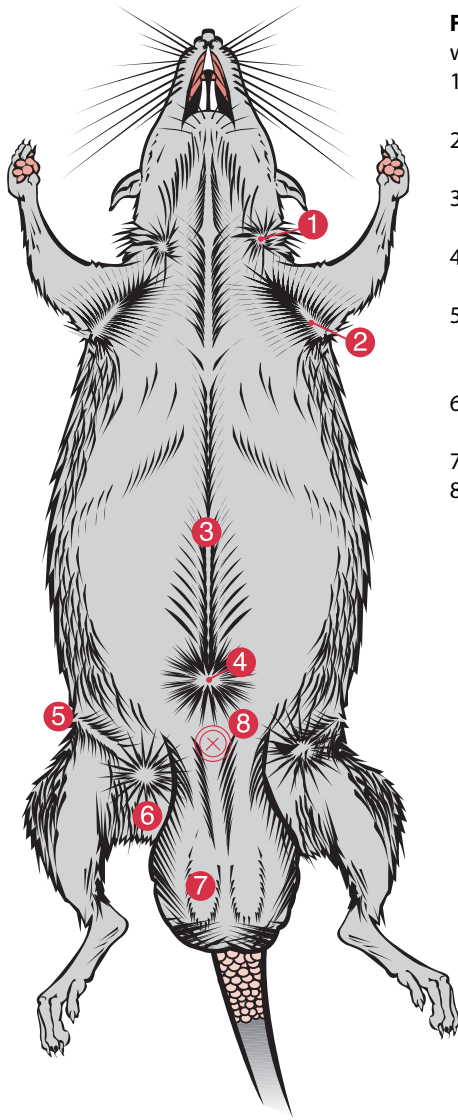


Figure 13.1 The hair coat, ventral view (XY). The rat hair is arranged to form whirls and streams (vortices et flumina pilorum).

- 1 at the level of arm joints there are divergent whirls (vortices pilorum divergentes)
- 2 in the axillary region there is divergent stream (flumen pilorum divergens axillaris)
- 3 in the ventromedial area there is a convergent stream (flumen pilorum convergens trunci).
- 4 in the umbilical area there is convergent umbilical whirl (vortex pilorum convergens umbilicalis)
- 5 the inner surface of the thigh is separated from the caudal abdomen (inguinal region) by divergent inguinal stream (flumen pilorum divergens inguinalis)
- 6 at the caudal end of the above stream there is a whirl (vortex pilorum divergens inguinalis)
- 7 the ventral surface of scrotum is hairless (planum depilatum)
- 8 preputium, penis

Figures 13.2a, b, (XY) and c (XX): The regions of rat body (regiones corporis).

Regions of the face (regiones faciei)

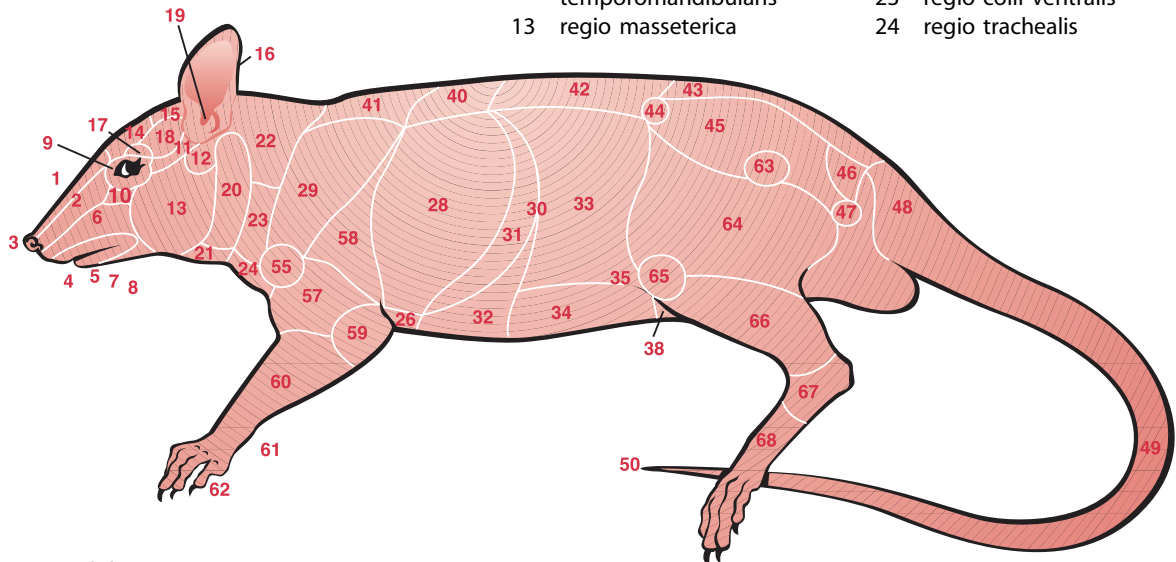
- 1 regio dorsalis nasi
- 2 regio lateralis nasi
- 3 regio naris et apex nasi
- 4 regio oralis
- 5 regio mentalis
- 6 regio buccalis
- 7 regio mandibularis
- 8 regio intermandibularis
- 9 regio orbitalis
- 10 regio infraorbitalis
- 11 regio zygomatica
- 12 regio articulationis temporomandibularis
- 13 regio masseterica

Regions of the skull (regiones cranii)

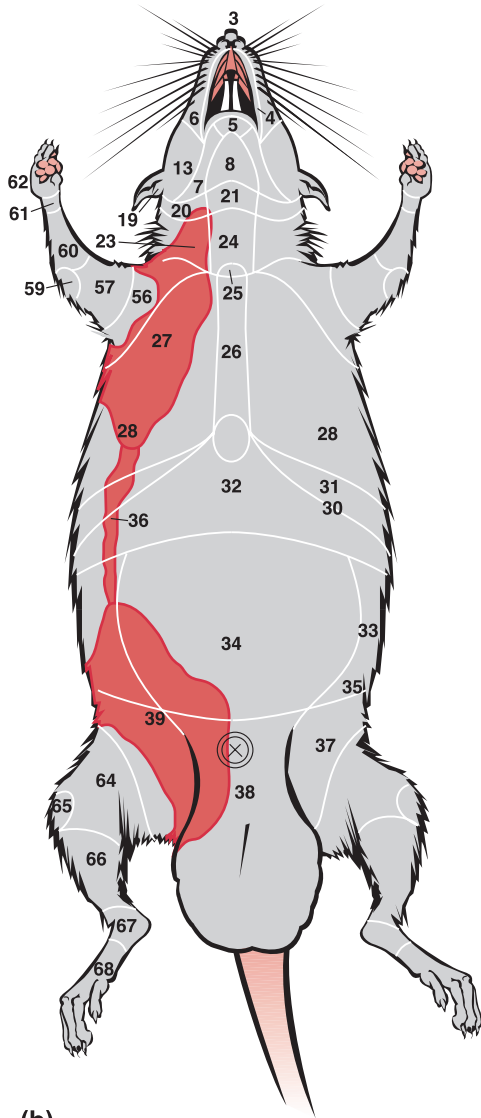
- 14 regio frontalis
- 15 regio parietalis
- 16 regio occipitalis
- 17 regio supraorbitalis
- 18 regio temporalis
- 19 regio auricularis et auricula

Regions of the neck (regiones colli)

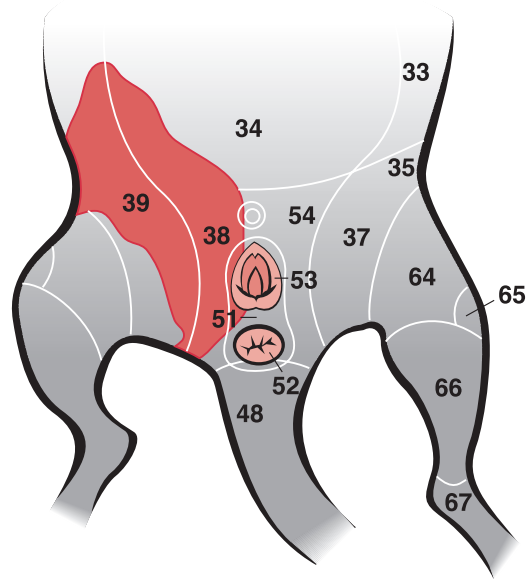
- 20 regio parotides
- 21 regio subhyoidea et laryngea
- 22 regio colli dorsalis
- 23 regio colli ventralis
- 24 regio trachealis



(a)



(b)



(c)

Figures 13.2a, b, c (continued)

Regions of the breast (regiones pectoris)

- 25 regio presternalis
- 26 regio sternalis
- 27 regio mammaria thoracica
- 28 regio costalis
- 29 regio scapularis
- 30 arcus costalis

Cranial abdominal regions (regiones abdominis craniales)

- 31 regio hypochondriaca
- 32 regio xiphoidea

Median abdominal regions (regiones abdominis mediae)

- 33 regio abdominis lateralis
- 34 regio umbilicalis
- 35 regio plicae genus
- 36 regio mammaria abdominalis

Caudal abdominal regions (regiones abdominis caudales)

- 37 regio inguinalis
- 38 regio pubica (scroti et preputialis in XY)
- 39 regio mammaria inguinalis

Dorsal regions (regiones dorsi)

- 40 regio vertebralis thoracis
- 41 regio interscapularis
- 42 regio lumbalis

Pelvic regions (regiones pelvis)

- 43 regio sacralis
- 44 regio tuberis coxae
- 45 regio glutea
- 46 regio clunis
- 47 regio tuberis ischiadici
- 48 regio radices caudae
- 49 regio corporis caudae
- 50 regio apicis caudae
- 51 regio perinealis
- 52 regio analis
- 53 regio vulvae (XX)
- 54 regio clitoridis (XX)

Regions of the thoracic extremity (regiones membri thoracici)

- 55 regio articulationis humeri
- 56 regio axillaris
- 57 regio brachii
- 58 regio tricipitalis
- 59 regio cubiti
- 60 regio antebrachii (cranialis, lateralis, caudalis, medialis)
- 61 regio carpi (cranialis, lateralis, caudalis, medialis)
- 62 regio manus (metacarpi et digiti, dorsalis, lateralis, volaris/palmaris, medialis)

Regions of the pelvic extremity (regiones membri pelvini)

- 63 regio articulationis coxae
- 64 regio femoris (cranialis, lateralis, caudalis, medialis)
- 65 regio genus
- 66 regio cruris (cranialis, lateralis, caudalis, medialis)
- 67 regio tarsi (cranialis, lateralis, caudalis, medialis)
- 68 regio pedis (metatarsi et digiti, dorsalis, lateralis, plantaris, medialis)

Figure 13.3 Palmar (volar) surface of the right frontal paw (facies palmaris (volaris) manus dextri).

- 1 regio carpi palmaris (volaris)
- 2 regio antebrachii
- 3 regio cubiti
- 4 regio metacarpi palmaris (volaris)
- 5 regio metacarpophalangea
- 6 regio phalangis proximalis
- 7 regio interphalangea proximalis
- 8 regio phalangis mediae
- 9 regio unguiculae et regio interphalangea distalis
- 10 spatia interdigitalia
- 11 toruli digitales
- 12 tori metacarpales
- 13 tori carpales
- 14 flexus cutis (in thoracic extremities occuring about five times)
- I-V digitus primus, secundus, tertius, quartus, quintus

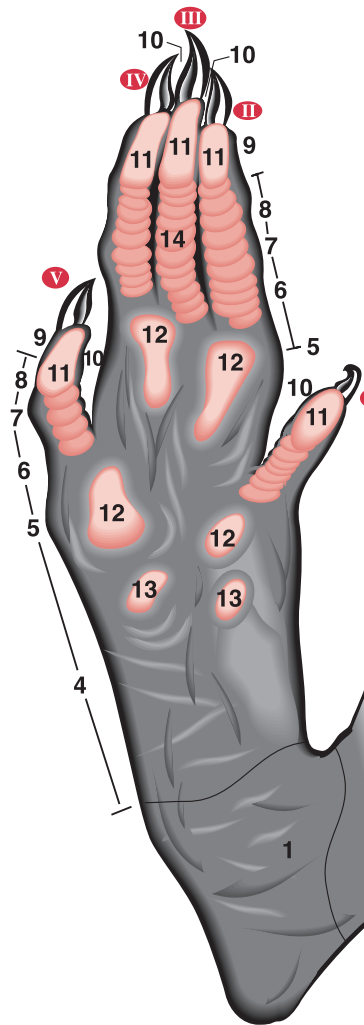
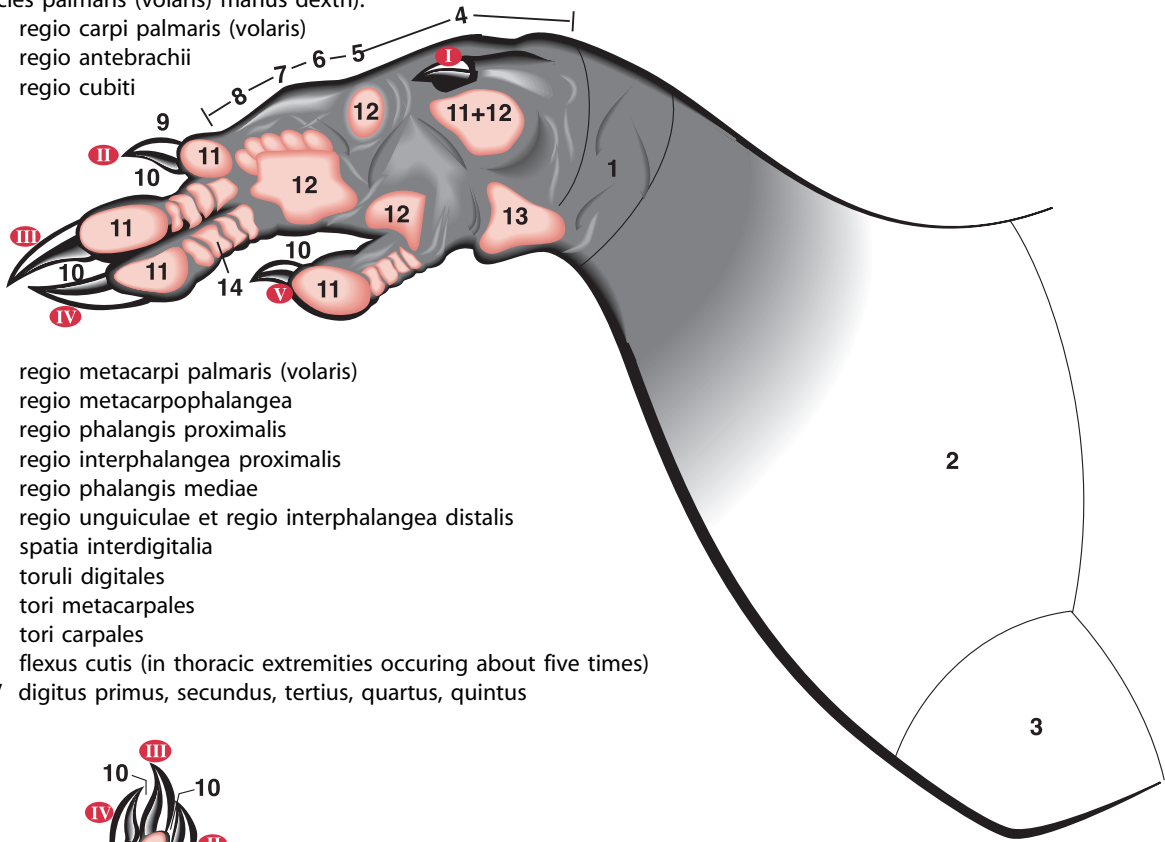


Figure 13.4 Plantar surface of the right caudal paw (facies plantaris pedis dextri).

- 1 regio tarsi plantaris
- 2 regio cruris
- 3 regio genus
- 4 regio metatarsi plantaris
- 5 regio metatarsophalangea
- 6 regio phalangis proximalis
- 7 regio interphalangea proximalis
- 8 regio phalangis mediae
- 9 regio unguiculae
- 10 spatia interdigitalia
- 11 toruli digitales
- 12 tori metatarsales
- 13 tori tarsales
- 14 flexus cutis
- I-V digitus primus, secundus, tertius, quartus, quintus

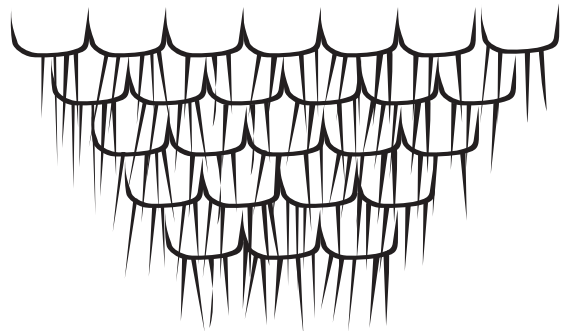


Figure 13.5 Scales on the tail. The tail is covered by square scales, underneath which grow two to six straight hairs, extending over the next row of scales.

Figure 13.6 The mammary gland (XX). The mammary tissue is distributed bilaterally, reaching from the neck to the anus. In males the nipples do not develop well.

- 1 cervical mammary gland, devoid of nipples
- 2 thoracic mammary gland usually has three pairs of nipples; it does not cover the sternum, but fills the axillary region, surrounds partly the basis of forelimbs and extends towards the costal region
- 3 abdominal mammary gland has only little, irregularly developed tissue
- 4 inguinal mammary gland usually has three pairs of nipples and is located in the inguinal region, partly surrounding the basis of hindlimbs
- 5 clitoral preputium is equipped with a paired clitoral gland. In female rats the urethra opens at the clitoris so that there is no vaginal vestibulum
- 6 vaginal entrance (vulva) has small labia
- 7 anus

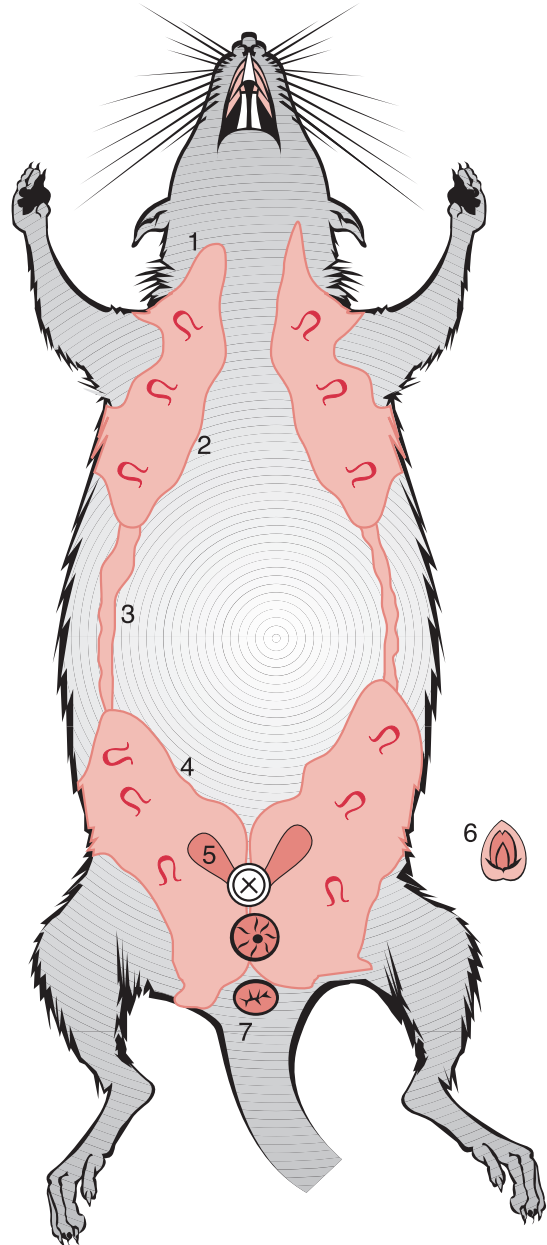


Figure 13.7 The superficial muscles. (See also Colour Plate 1.)

- 1 muscoli faciales
- 2 musculus temporalis
- 3 musculus masseter
- 4 glandula lacrimalis extraorbitalis
- 5 glandula parotidea with the ventral auricular muscle
- 6 glandula mandibularis
- 7 musculus sternocephalicus, pars mastoidea
- 8 musculus brachiocephalicus, pars occipitalis
- 9 musculus deltoideus, pars acromialis
- 10 musculus deltoideus, pars scapularis
- 11 musculus trapezius, pars cervicalis
- 12 musculus trapezius, pars thoracica
- 13 musculus cervicoauricularis
- 14 musculus latissimus dorsi
- 15 musculus cutaneus trunci
- 16 musculus serratus ventralis thoraci
- 17 musculus obliquus externus abdominis
- 18 musculus tensor fasciae latae
- 19 musculus quadriceps femoris, musculus rectus
- 20 musculus gluteus superficialis
- 21 musculus biceps femoris, portio cranialis et caudalis
- 22 musculus semitendinosus
- 23 musculus gastrocnemius, caput laterale
- 24 musculus tibialis cranialis
- 25 musculus extensor digitorum longus
- 26 musculus triceps brachii, caput laterale
- 27 musculus triceps brachii, caput longum
- 28 musculus biceps brachii
- 29 musculus brachialis
- 30 musculi extensores carpi et digitorum

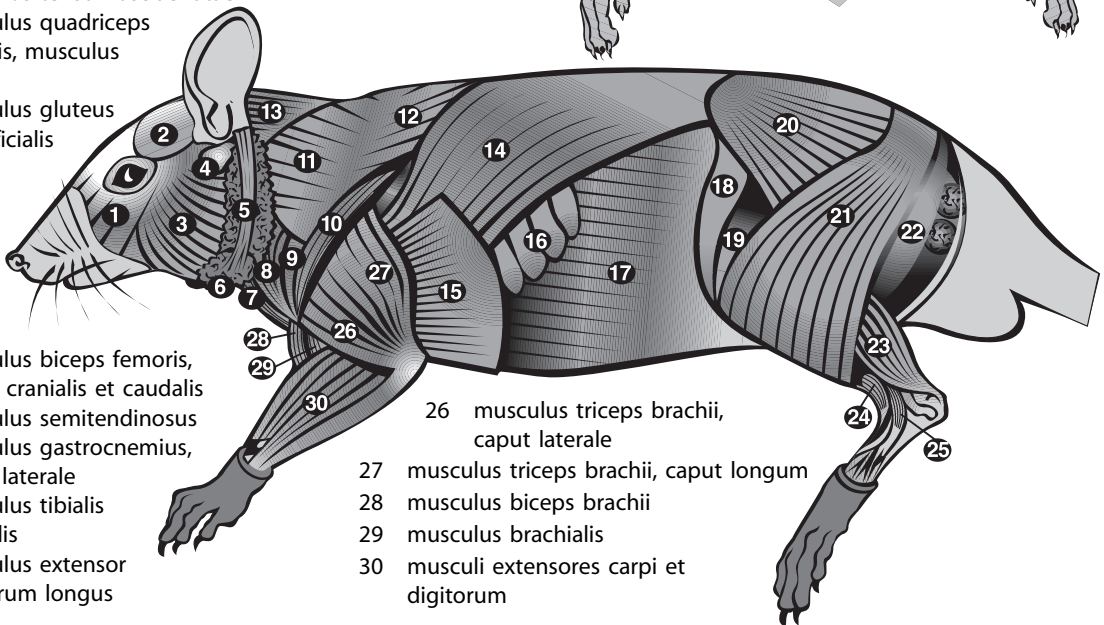
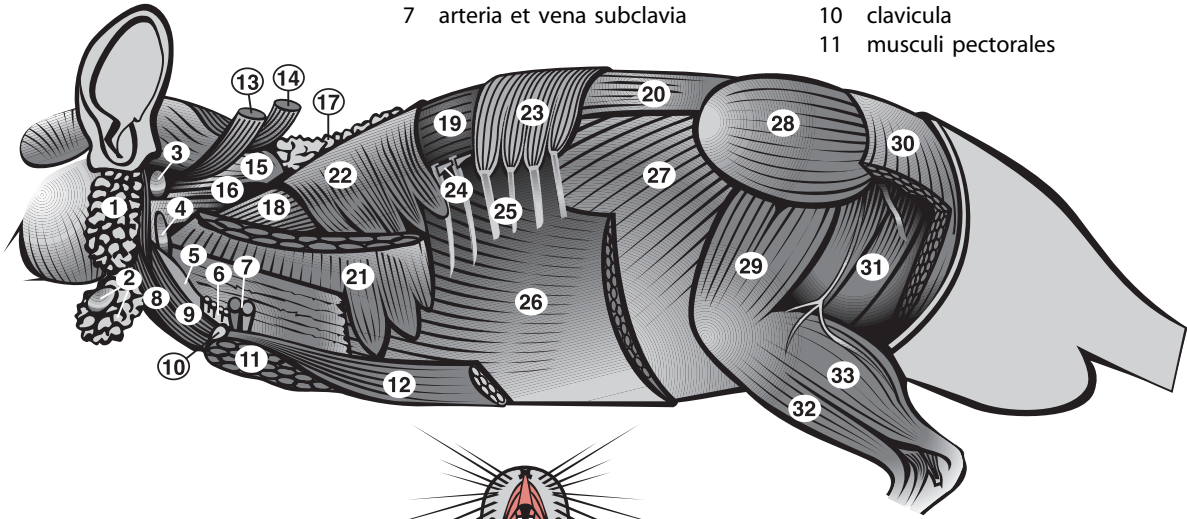


Figure 13.8 The deep muscles, forelimb removed. (See also Colour Plate 2.)

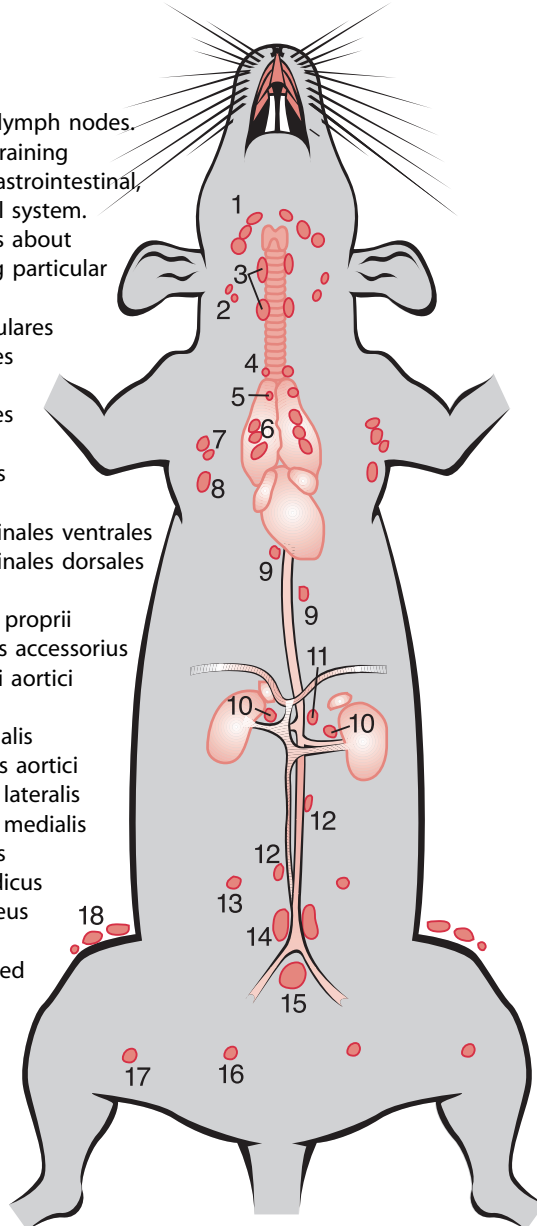
- | | | |
|---|------------------------------------|--|
| 1 glandula parotidea | 4 lymphonodus cervicalis profundus | 8 musculus sternocephalicus, pars mastoidea |
| 2 glandula and lymphonodus mandibularis | 5 vena jugularis | 9 musculus brachiocephalicus, pars occipitalis |
| 3 lymphonodus retropharyngeus | 6 plexus brachialis | 10 clavicula |
| | 7 arteria et vena subclavia | 11 musculi pectorales |

**Figure 13.9** Locations of lymph nodes.

Does not include those draining specific viscera such as gastrointestinal, respiratory and urogenital system. See Chapter 28 for details about the lymph nodes draining particular body areas.

- | | |
|---|---|
| 1 lymphonodi mandibulares | 12 musculus rectus thoracis et abdominis |
| 2 lymphonodi cervicales superficiales | 13 musculus rhomboideus capitis |
| 3 lymphonodi cervicales profundi | 14 musculus rhomboideus cervicis |
| 4 lymphonodi sternales craniales | 15 musculus splenius |
| 5 lymphonodi mediastinales ventrales | 16 musculus longissimus capitis et atlantis |
| 6 lymphonodi mediastinales dorsales (et thymus) | 17 corpus adiposum nuchae (multivesiculare s. plurivacuolare s. hiberneticum) |
| 7 lymphonodi axillares proprii | 18 musculus longissimus cervicis |
| 8 lymphonodus axillaris accessorius | 19 musculus longissimus thoracis |
| 9 lymphonodi thoracici aortici | 20 musculus longissimus lumborum |
| 10 lymphonodi renales | 21 musculus serratus ventralis (cervicis et thoracis) |
| 11 lymphonodus cisternalis | 22 musculus serratus dorsalis cranialis |
| 12 lymphonodi lumbales aortici | 23 musculus serratus dorsalis caudalis |
| 13 lymphonodus iliacus lateralis | 24 musculus iliocostalis |
| 14 lymphonodus iliacus medialis | 25 musculi intercostales externi |
| 15 lymphonodus sacralis | 26 musculus obliquus externus abdominis |
| 16 lymphonodus ischiadicus | 27 musculus obliquus internus abdominis |
| 17 lymphonodus popliteus | 28 musculus gluteus medius |
| 18 lymphonodi subiliaci | 29 musculus quadriceps femoris |

The trachea is accompanied by truncus trachealis and the (abdominal) aorta by truncus lumbalis, which joins with truncus intestinalis, producing cisterna chyli, from which truncus thoracicus leads towards the heart.



- | | |
|---|---|
| 29 musculus quadriceps femoris | 30 musculus biceps femoris |
| 30 musculus biceps femoris | 31 musculus semimembranosus et semitendinosus |
| 31 musculus semimembranosus et semitendinosus | 32 musculus tibialis cranialis |
| 32 musculus tibialis cranialis | 33 musculus triceps surae |

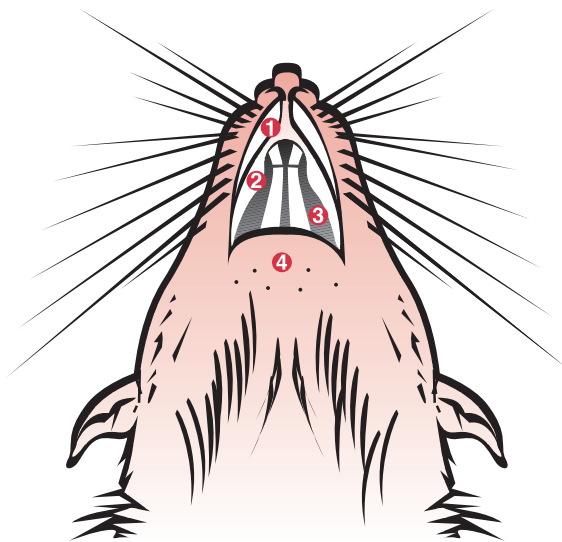


Figure 13.10 Ventral view of the head.

- 1 labium maxillare pars externa
- 2 labium maxillare pars interna
- 3 palatum durum
- 4 glandulae mentales

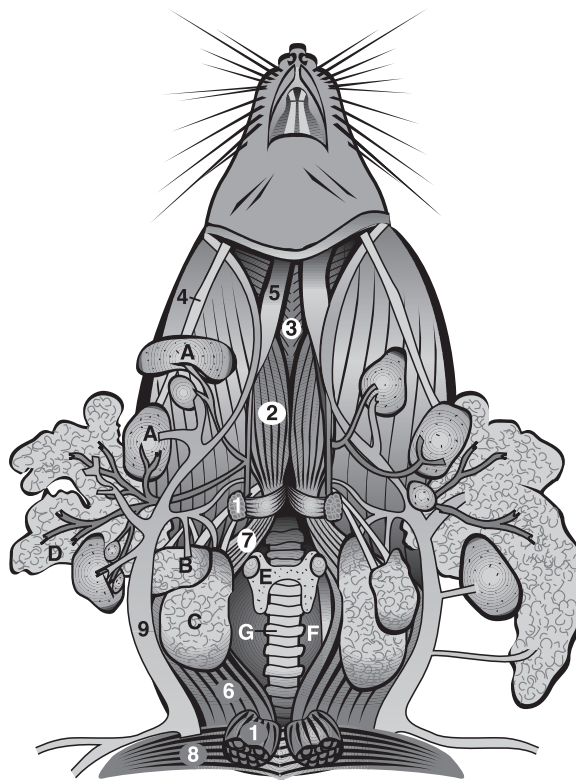


Figure 13.12 Organs of the ventral neck, ventral view, deep layer (organa colli ventralis, norma ventralis, stratum profundum). (See also Colour Plate 4.)

- A lymphonodi mandibulares
- B glandula sublingualis
- C glandula mandibularis (submandibularis)
- D glandula parotis et lymphonodus cervicalis superficialis
- E glandula thyreoidea et parathyreoidea
- F esophagus
- G trachea
- 1 musculus sternohyoideus et sternothyreoideus (resectus)
- 2 musculus digastricus, venter rostralis
- 3 musculus mylohyoideus
- 4 musculus masseter et ductus parotideus
- 5 mandibula
- 6 musculus sternomastoideus
- 7 musculus omohyoideus
- 8 musculus pectoralis major
- 9 vena jugularis externa

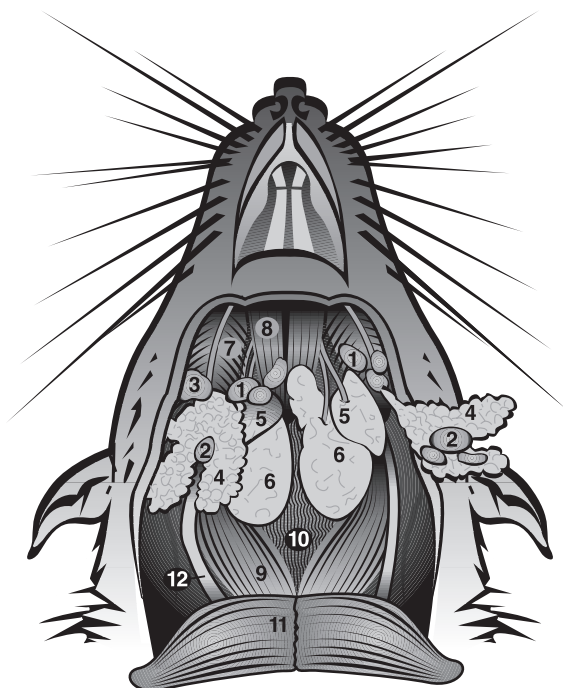


Figure 13.11 Subcutaneous organs of the ventral neck, ventral view (organa subcutanea colli ventralis, norma ventralis). (See also Colour Plate 3.)

- 1 lymphonodi mandibulares and deep underneath, close to the atlas lymphonodi retropharyngei
- 2 lymphonodi cervicales superficiales
- 3 glandula lacrimalis extraorbitalis
- 4 glandula parotis
- 5 glandula sublingualis major et ductus glandulae sublingualis and deep underneath glandula thyreoidea et parathyreoidea. Caudally to them lymphonodi cervicales craniales
- 6 glandula mandibularis et ductus glandulae mandibularis (also called submandibular)
- 7 musculus masseter et ductus parotideus
- 8 venter rostralis musculi digastrici
- 9 musculus sternomastoideus
- 10 musculus sternohyoideus
- 11 musculus pectoralis major
- 12 vena jugularis externa dextra

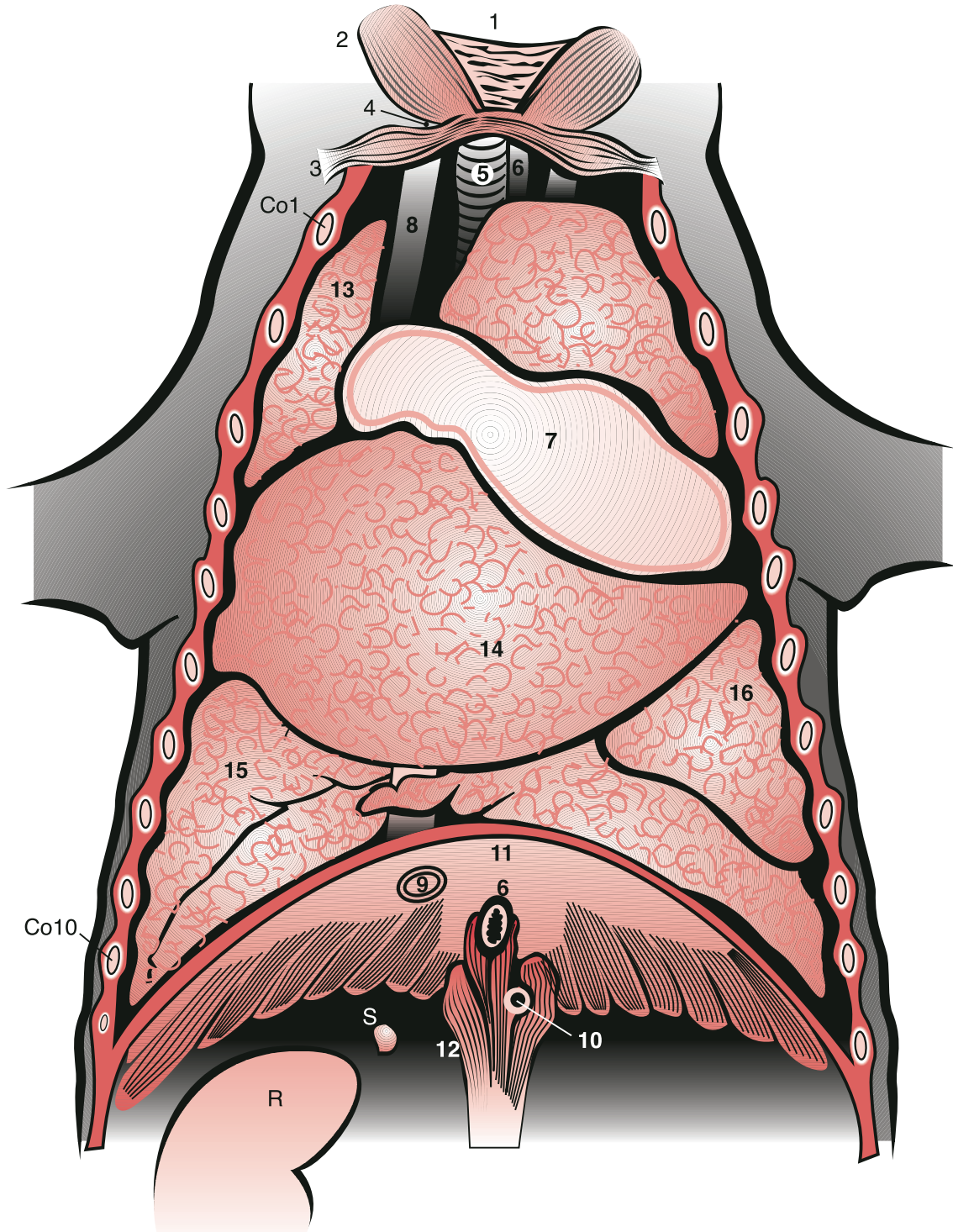


Figure 13.13 Ventral view at the thorax, after removal of the sternum and portions of the ribs.

- | | | | |
|----|---|-------|--|
| 1 | platysma colli | 11 | diaphragma, centrum tendineum |
| 2 | musculus sternomastoideus | 12 | pars lumbalis diaphragmae |
| 3 | musculus pectoralis transversus | 13 | lobus cranialis pulmonis dextri |
| 4 | clavicula grown into musculus cleidobrachialis | 14 | lobus accessorius pulmonis dextri |
| 5 | trachea | 15 | lobus caudalis pulmonis dextri |
| 6 | esophagus et hiatus esophageus | 16 | pulmo sinister (pars caudalis) |
| 7 | open pericardium, adhering to the thoracic wall | Co 1 | costa prima |
| 8 | vena cava cranialis dextra | Co 10 | costa decima (other ribs are out of the section level) |
| 9 | vena cava caudalis et foramen venae caevae caudalis | R | ren dexter |
| 10 | hiatus aorticus | S | glandula adrenalis dextra |

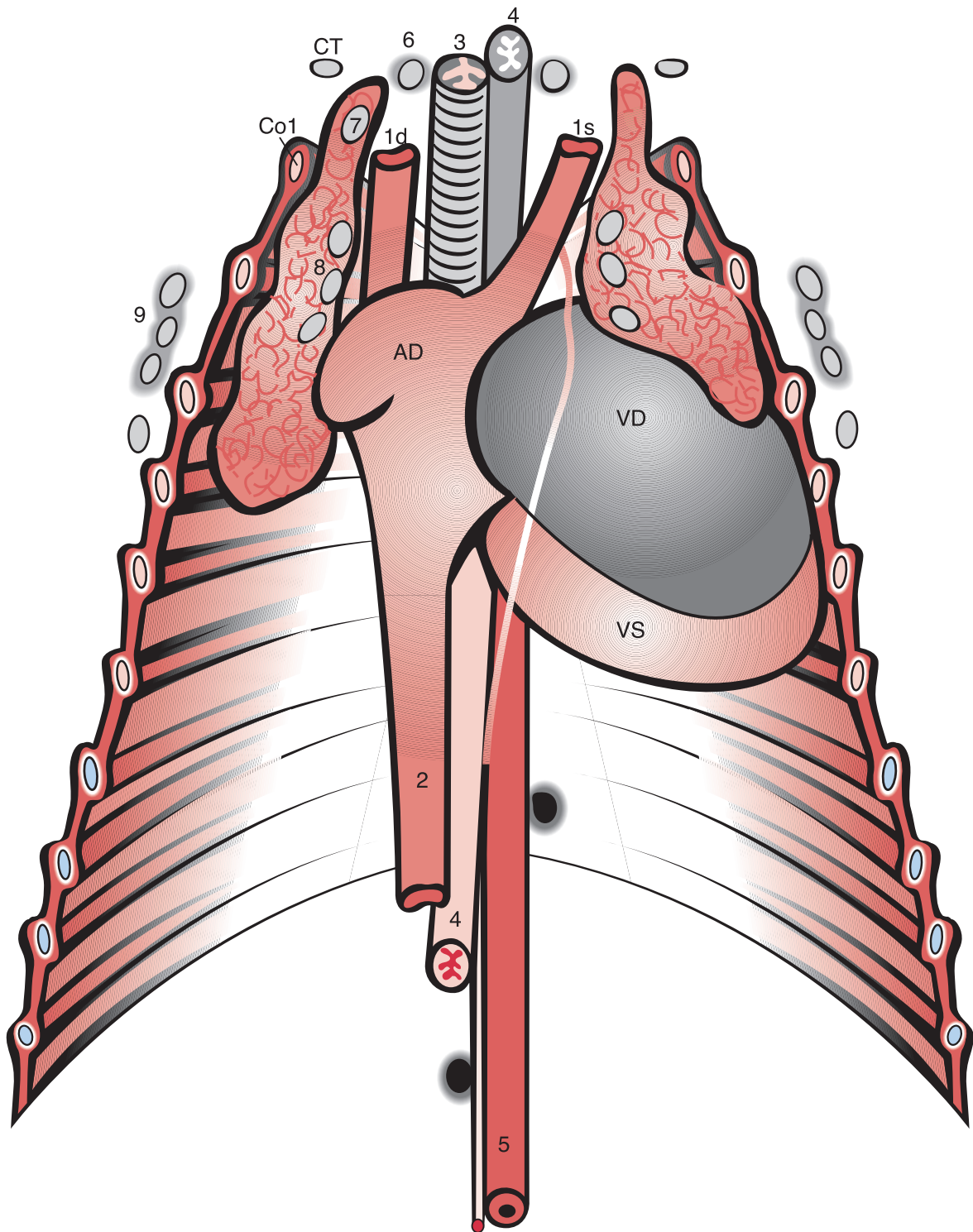


Figure 13.14 The position of the heart in the thoracic cavity, the lung removed.

- | | | | |
|-------|--|----|---|
| Co 1 | costa prima | 7 | lymphonodi mediastinales ventrales |
| CT | clavicula | 8 | thymus et lymphonodi mediastinales dorsales (the thymus and the lymph nodes are displaced laterally, to uncover the heart basis over which they are normally located) |
| 1 d,s | vena cava cranialis dextra et sinistra | 9 | lymphonodi axillares proprii et accessorii |
| 2 | vena cava caudalis | AD | atrium dextrum |
| 3 | trachea | VD | ventriculus dexter |
| 4 | esophagus | VS | ventriculus sinister |
| 5 | aorta descendens et ductus thoracicus (leading to vena cava sinistra), lymphonodi aortici, usually small | | |
| 6 | lymphonodi sternales craniales | | |

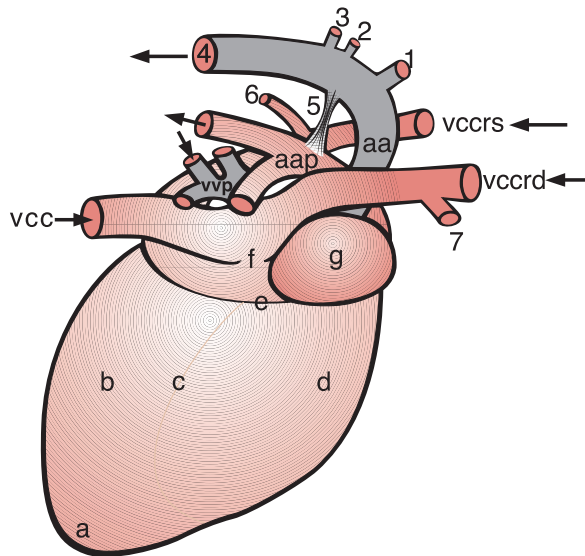
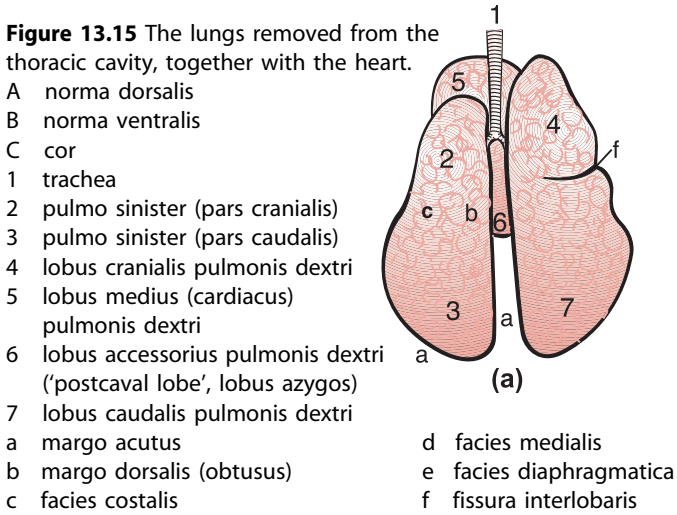


Figure 13.16 The heart, from the right side (cor, adspetus dexter).

- a apex cordis
aa arcus aortae
aap arteriae pulmonales
b ventriculus sinister
c sulcus interventricularis subsinuosus
d ventriculus dexter
e sulcus coronarius
f sinus venarum cavarum et atrium dextrum
g auricula dextra
- vcc vena cava caudalis
vccrd vena cava cranialis dextra
vccrs vena cava cranialis sinistra
vvp venae pulmonales
- 1 truncus brachiocephalicus
2 arteria carotis communis sinistra
3 arteria subclavia sinistra
4 aorta thoracica
5 ligamentum arteriosum (Botalli)
6 vena azygos sinistra
7 vena subclavia dextra

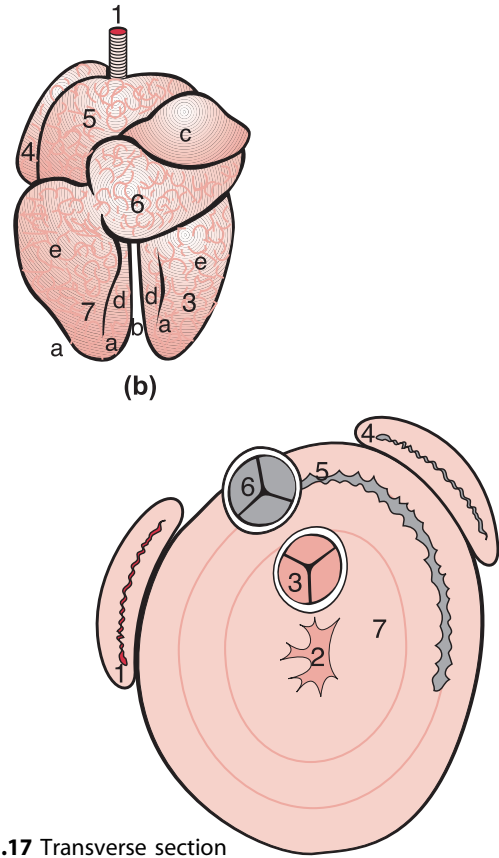


Figure 13.17 Transverse section through the heart at the level of exits of large vessels.

1 cavum auriculae sinistrae
2 cavum ventriculi sinistri
3 ostium et valva aortae
4 cavum auriculae dextrae
5 cavum ventriculi dextri
6 ostium et valva trunci pulmonalis
7 septum interventriculare

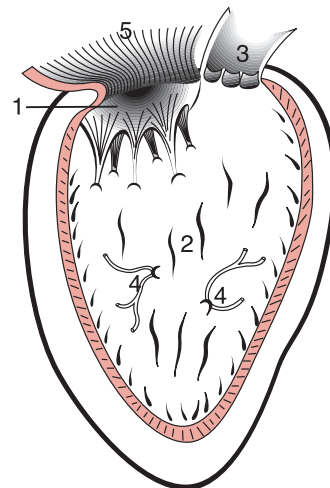
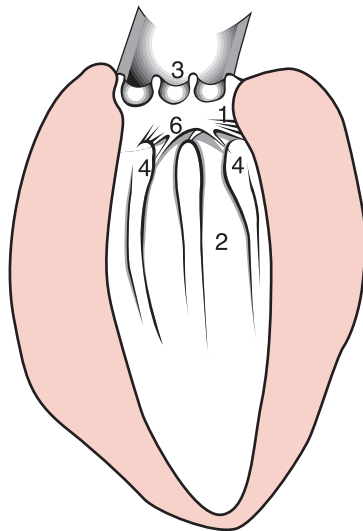
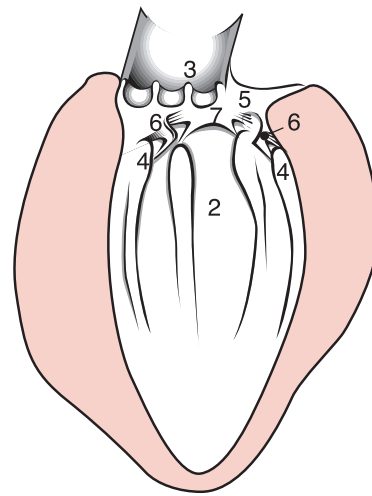


Figure 13.18 The heart, right ventricle opened (cor, ventriculus dexter apertus).

1 valva atrioventricularis dextra (tricuspidalis), ostium atrioventriculare dextrum shimmering through
2 septum interventriculare
3 ostium et valva trunci pulmonalis
4 trabeculae septomarginales
5 outer wall of the right ventricle, detached and deflected



(a)



(b)

Figure 13.19a,b The heart, left ventricle cut open (cor, ventriculus sinister resectus).

- 1 valva atrioventricularis sinistra (bicuspidalis)
- 2 septum interventriculare
- 3 ostium et valva aortae
- 4 musculi papillares
- 5 ostium atrioventriculare sinistrum
- 6 cuspis parietalis
- 7 cuspis septalis

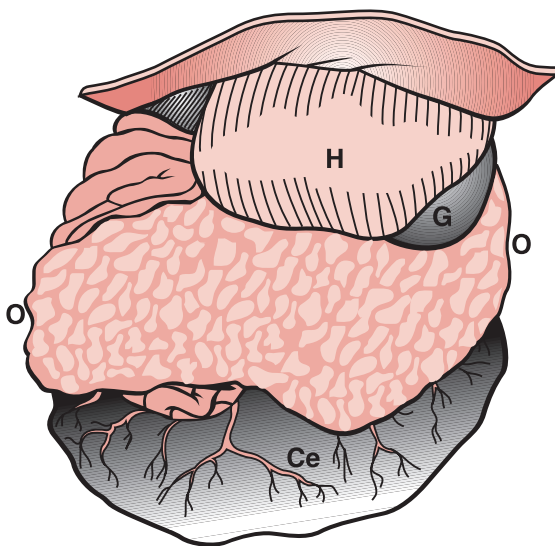


Figure 13.20 Ventral view of the abdominal cavity, superficial layer. Organs and tissues seen after opening the abdominal cavity.
 Ce intestinum cecum
 G gaster (ventriculus, stomach)
 H hepar (liver)
 O saccus omenti majoris (in well-nourished individuals exhibiting prominent adipose tissue located along the lymphatic vessels)

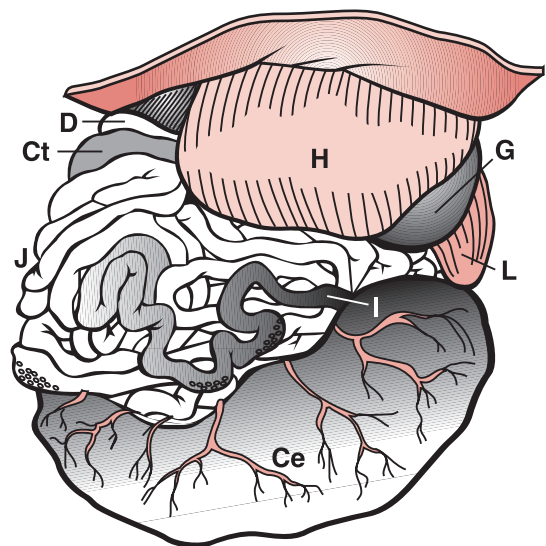


Figure 13.21 Ventral view of the abdominal cavity after removal of the omentum.
 Ce cecum
 Ct colon transversum
 D duodenum
 G gaster
 H hepar
 I ileum
 J jejunum
 L lien

Figure 13.22a,b Ventral view of the abdominal cavity (XY), cecum in right (a) or central (b) position. In some instances the cecum can even be located on the left side. (See also Colour Plate 5.)

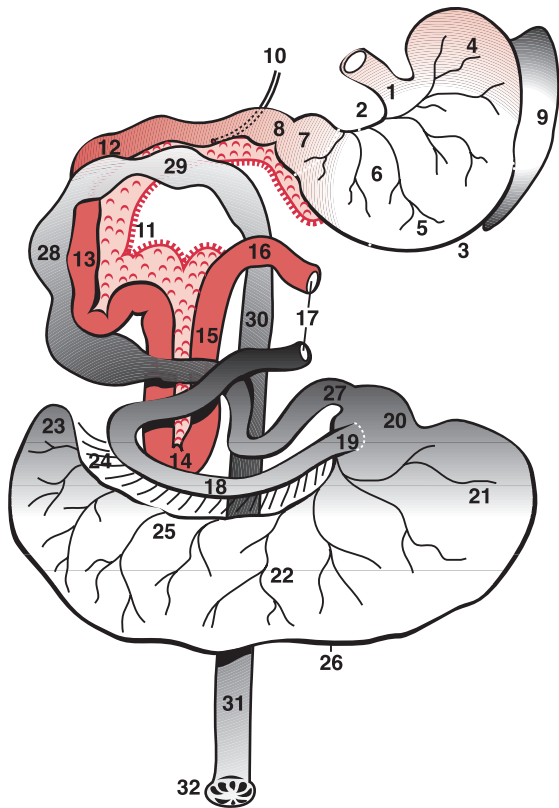
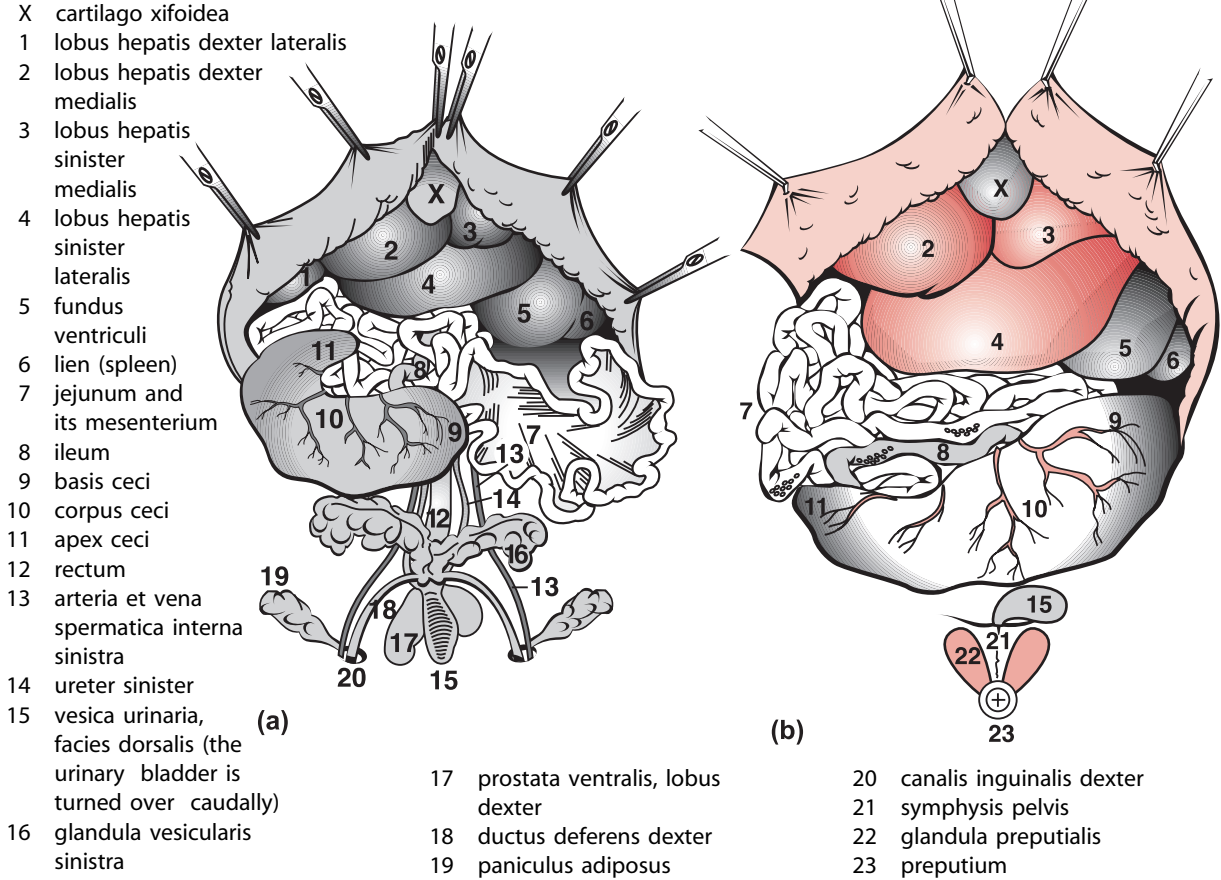


Figure 13.23 Ventral view of the gastrointestinal tract after removal of the jejunum.

- 1 esophagus et ostium cardiacum
 2 curvatura ventriculi minor
 3 curvatura ventriculi major
 4 saccus cecus
 5 fundus ventriculi
 6 corpus ventriculi
 7 pars pylorica ventriculi
 8 ostium pyloricum
 9 lien (spleen)
 10 ductus hepatoentericus (choledochus)
 11 pancreas
 12 flexura duodeni cranialis
 13 pars descendens (duodeni)
 14 flexura duodeni caudalis
 15 pars ascendens (duodeni)
 16 flexura duodenojejunalis
 17 jejunum
 18 ileum
 19 ostium ileocecale
 20 excavatio ceci
 21 basis ceci
 22 corpus ceci
 23 apex ceci
 24 ligamentum ileocecale
 25 curvatura ceci minor
 26 curvatura ceci major
 27 ostium cecocolicum
 28 colon ascendens (with fluid contents)
 29 colon transversum (with solid contents)
 30 colon descendens
 31 rectum
 32 anus

Figure 13.24 The stomach opened at the large curvature to show its mucous membranes.

- 1 ostium cardiacum
- 2 pars cardiaca – saccus cecus (tela mucosa aglandularis)
the cutaneous mucosa is white-reddish, arranged in narrow circular folds which can stretch when the stomach is filled
- 3 margo plicatus
- 4,5,6 telae mucosae glandulares
- 4 pars fundica fusca (brown-red)
- 5 pars fundica pallida (pale-brown)
- 4,5 the mucosa forms irregular, rounded reserve folds
- 6 pars pylorica
- 7 torus pyloricus
- 8 duodenum

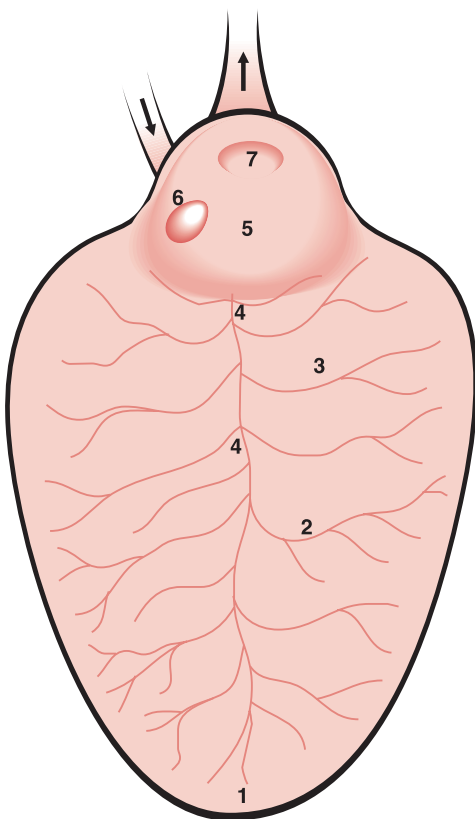
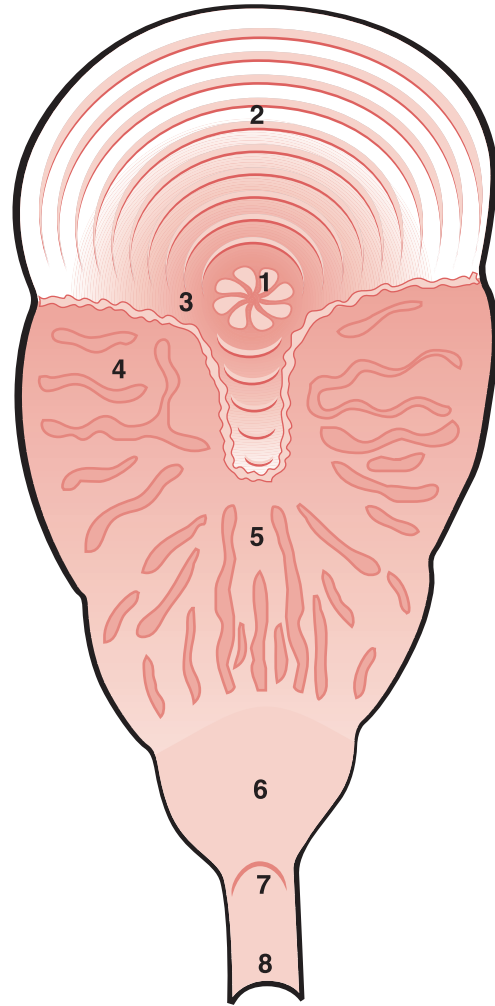
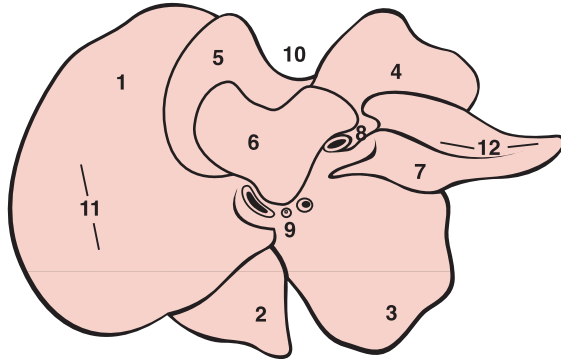


Figure 13.25 The cecum opened at the large curvature to show the mucous membrane.

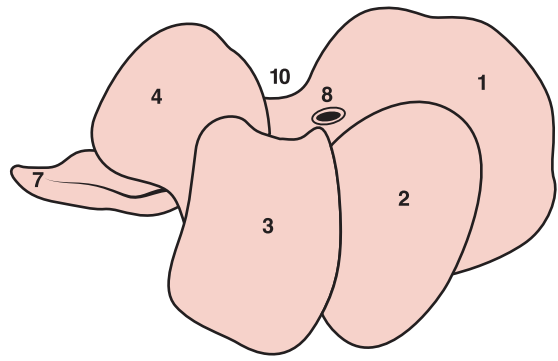
- 1 apex ceci
- 2 corpus ceci
- 3 basis ceci
- 4 blood vessels, seen underneath the mucosa,
arrive from the small curvature
- 5 excavatio ceci
- 6 ostium ileocecale
- 7 ostium cecocolicum

Figures 13.26–13.29 The liver. (a) Facies visceralis; (b) facies diaphragmatica. The rat does not possess a gall bladder so that the liver is connected to the duodenum by ductus choledochus (enterohepaticus). This series of figures demonstrates the great individual variation of hepatic lobulation in rats. Lobus quadratus is not described in rats.

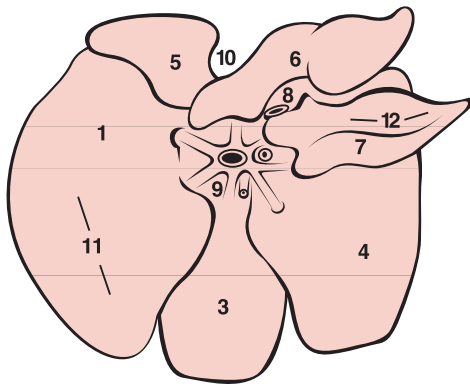
- | | |
|---|--|
| 1 lobus lateralis sinister | 8 vena cava caudalis grows into the liver collecting venae hepaticae |
| 2 lobus medialis sinister | 9 at the porta hepatis, arteria hepatica and vena portae enter, and ductus hepatoentericus (hepaticus communis, choledochus) exits the liver |
| 3 lobus medialis dexter | 10 margo dorsalis with sulcus esophagicus (impressio esophagica) |
| 4 lobus lateralis dexter | 11 on the facies visceralis lobi lateralis sinistri there is impressio gastrica |
| 5 processus papillaris pars preventricularis (lobus caudatus) | 12 on the processus caudatus there is impressio renalis |
| 6 processus papillaris pars retroventricularis (lobus caudatus) | |
| 7 processus caudatus (lobus caudatus) | |



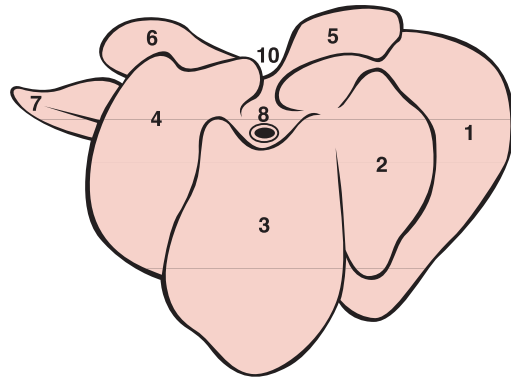
26 (a)



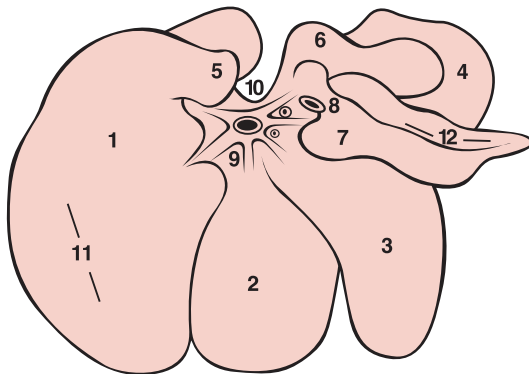
26 (b)



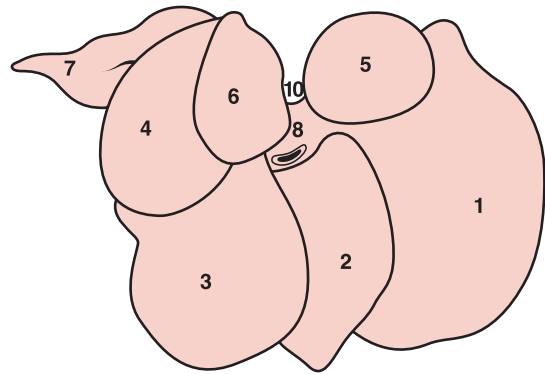
27 (a)



27 (b)

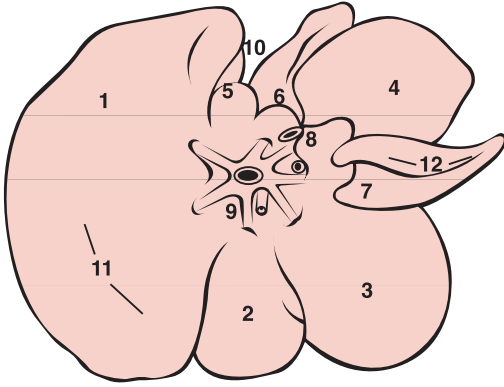


28 (a)

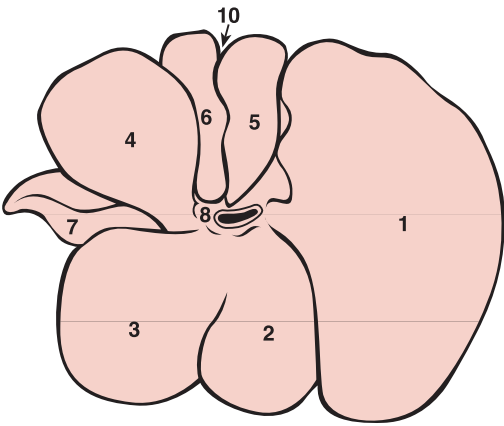


28 (b)

Figures 13.26–29 (continued)



29 (a)



29 (b)

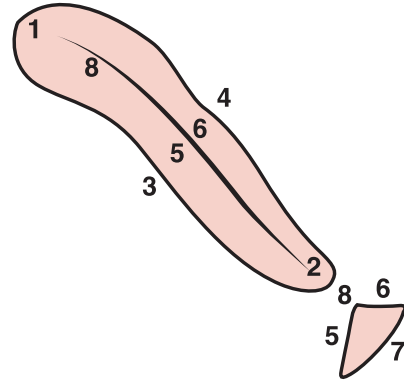


Figure 13.30 The spleen (lien) – visceral surface and transverse section (facies visceralis et sectio transversa lienis).

- 1 extremitas dorsalis
- 2 extremitas ventralis
- 3 margo cranialis
- 4 margo caudalis
- 5 facies gastrica
- 6 facies intestinalis
- 7 facies parietalis (diaphragmatica)
- 8 hilus lienis

Figure 13.31 Ventral view of the male urogenital tract.

- 1 testis dexter in scroti
- 2 ductus deferens dexter
- 3 glandula ductus deferentis
- 4 vesica urinaria is turned over, so that the facies dorsalis is displayed
- 5 prostata ventralis
- 6 prostata dorsolateralis
- 7 glandula vesicularis
- 8 glandula coagulationis
- 9 musculus urethralis
- 10 glandula bulbourethralis
- 11 musculus bulbocavernosus
- 12 corpus penis
- 13 glans penis
- 14 preputium
- 15 glandula preputialis
- 16 rectum
- 17 ren dexter et ureter dexter
- 18 glandula suprarenalis dextra

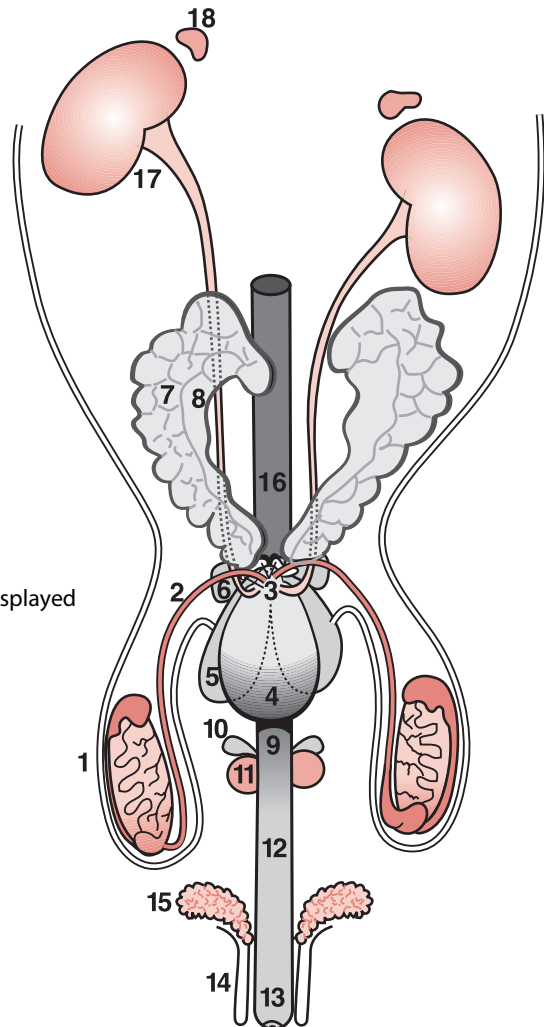
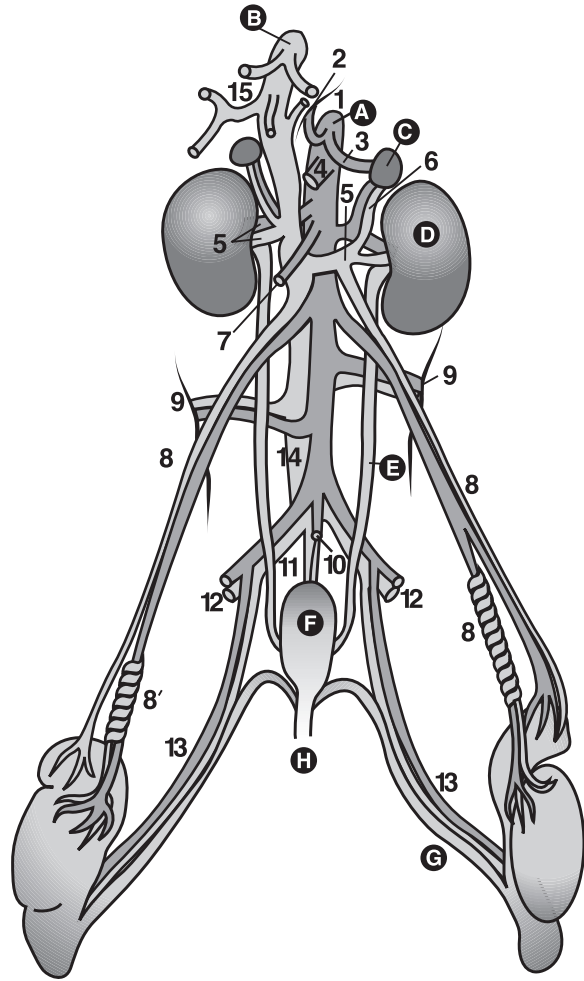


Plate 13.32 Ventral view of the main blood vessels of the abdominal and pelvic cavity (XY). (See also Colour Plate 6.)

- 1 aorta abdominalis
 - 2 arteriae phrenicae caudales (inferiores)
 - 3 arteria suprarenalis cranialis (superior)
 - 4 arteria celiaca
 - 5 arteria et vena renalis
 - 6 arteria et vena suprarenalis caudalis (inferior)
 - 7 arteria mesenterica cranialis (superior)
 - 8 arteria et vena testicularis have rami epididymales et ramus testicularis where the vein forms around the artery plexus pampiniformis (8')
 - 9 arteria et vena iliolumbalis
 - 10 arteria mesenterica caudalis
 - 11 arteria et vena iliaca communis
 - 12 arteria et vena iliaca interna
 - 13 arteria et vena ductus deferentis
 - 14 vena cava caudalis
 - 15 venae hepaticae
- A hiatus aorticus
 B foramen venae cavae caudalis
 C glandula suprarenalis (adrenalis) sinistra
 D ren sinister
 E ureter sinister
 F vesica urinaria
 G ductus deferens sinister
 H urethra

**Figure 13.33** Location of the male genital organs viewed from the left.

- 1 testis dexter in scroti
- 2 ductus deferens dexter
- 3 glandula ductus deferentis
- 4 vesica urinaria
- 5 prostata ventralis
- 6 prostata dorsolateralis
- 7 glandula vesicularis
- 8 glandula coagulationis
- 9 musculus urethralis
- 10 glandula bulbourethralis
- 11 musculus bulbocavernosus
- 12 corpus penis
- 13 glans penis
- 14 preputium
- 15 glandula preputialis
- 16 rectum
- S1 os sacrum

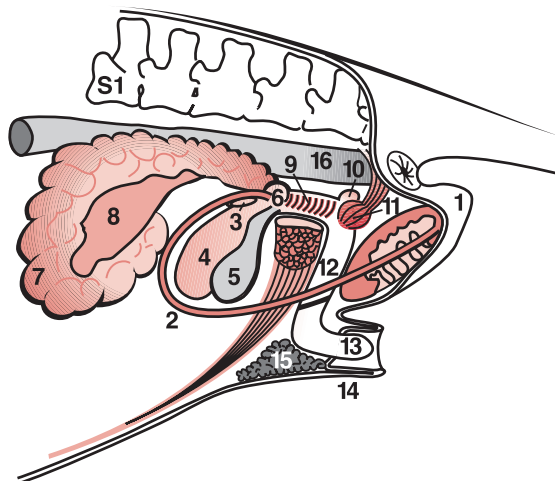


Figure 13.34 Testis in scrotum, dorsal view (testis in scroti, aspectus dorsalis).

- 1 testis dexter
- 2 caput epididymidis
- 3 corpus epididymidis
- 4 cauda epididymidis removed from the scrotum to demonstrate its relatively large size, obviously related to high fertility of rodents
- 5 ductus deferens dexter
- 6 funiculus spermaticus, arteria, vena et nervus spermaticus internus, et musculus cremaster internus
- 7 paniculus adiposus which maintains the widths of canalis inguinalis (8) and enables easy translocation of the testicle between the abdominal cavity and scrotum
- 8 canalis inguinalis
- 9 ligamentum testis proprium
- 10 mesorchium
- 11 septum scroti

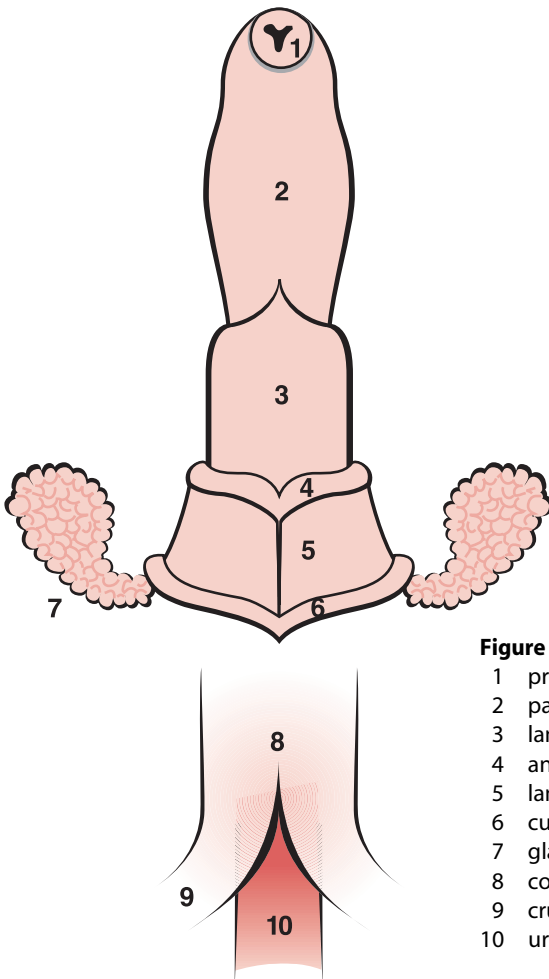
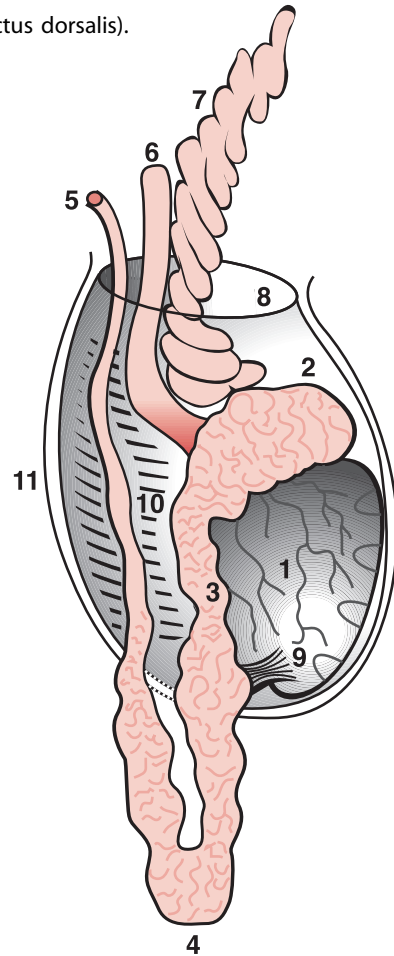


Figure 13.35 Glans nudus penis et crura penis ischiadica.

- 1 processus urethrae et orificium urethrae externum
- 2 pars libera penis
- 3 lamina interna preputii
- 4 anulus preputialis
- 5 lamina externa preputii
- 6 cutis resecta
- 7 glandulae preputiales
- 8 corpus penis
- 9 crura penis attached to arcus ischiadicus (radix penis)
- 10 urethra entering the penis from the pelvic cavity

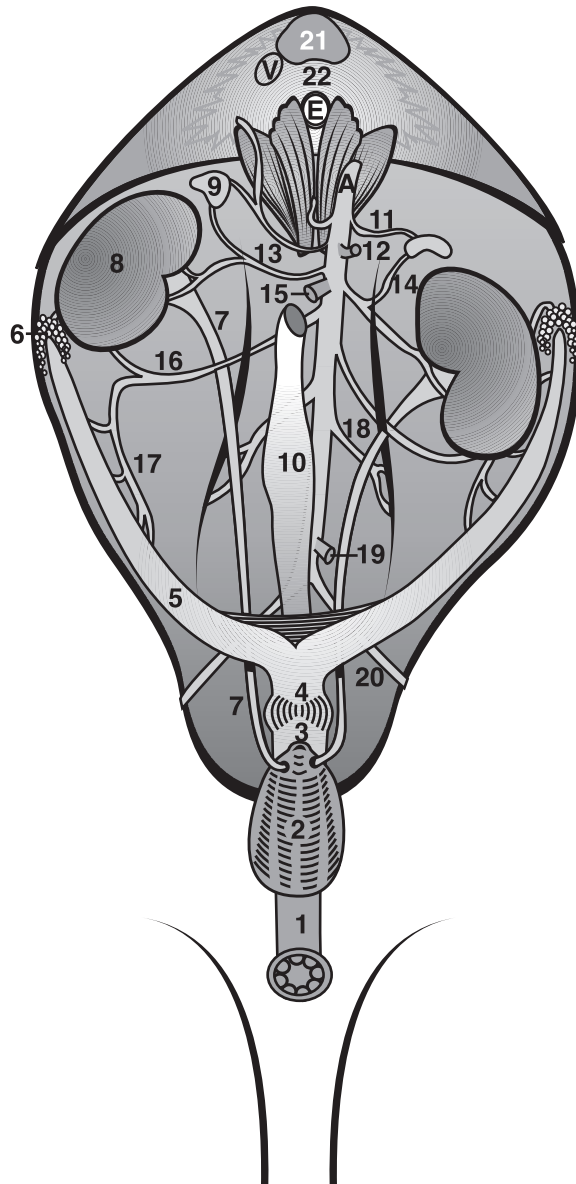
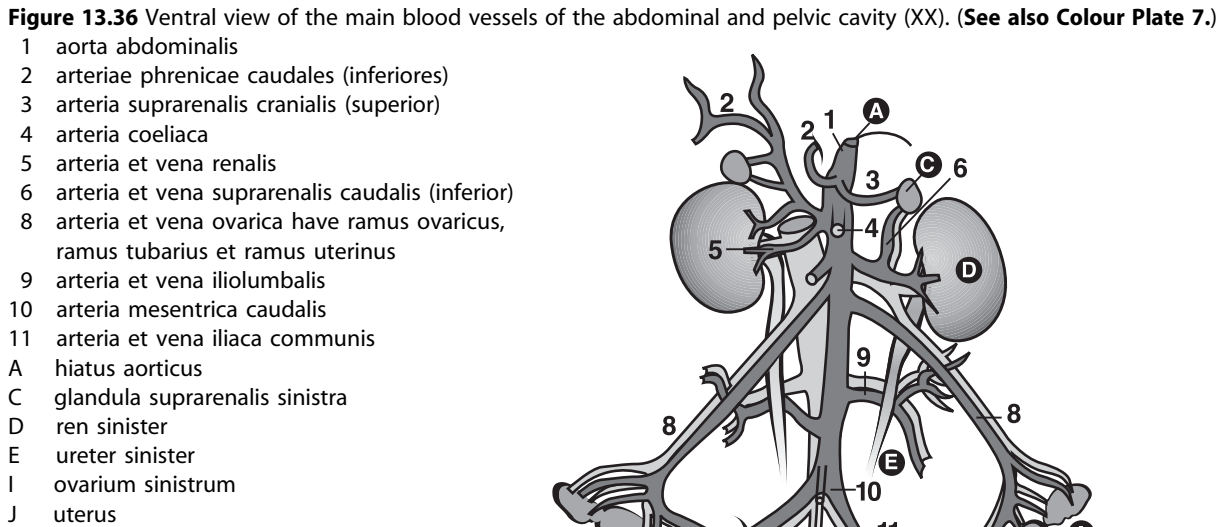


Figure 13.37 Ventral view of the abdominal cavity of a nonpregnant female. The gastrointestinal tract is removed and the veins are not depicted. (See also Colour Plate 8.)

- 1 rectum et anus
- 2 vesica urinaria, facies dorsalis – turned over, so that it covers introitus vaginae et clitoris
- 3 vagina
- 4 cervix uteri
- 5 uterus dexter
- 6 ovarium dextrum
- 7 ureter dexter
- 8 ren dexter
- 9 glandula suprarenalis (adrenalis) dextra
- 10 colon descendens
- 11 arteria suprarenalis cranialis sinistra
- 12 arteria coeliaca
- 13 arteria renalis dextra
- 14 arteria suprarenalis caudalis sinistra
- 15 arteria mesenterica caudalis
- 16 arteria ovarica dextra
- 17 ramus uterinus dexter
- 18 arteria circumflexa ilium profunda
- 19 arteria mesenterica caudalis
- 20 arteria iliaca communis sinistra
- 21 cartilago xiphoidea
- 22 diaphragma
- A aorta abdominalis
- E hiatus esophagicus
- V foramen venae cavae caudalis

Figure 13.38 Vagina simplex, dorsal median section, dorsal view (vagina simplex, sectio mediana dorsalis, adaspectus dorsalis).

- 1 introitus vaginae
- 2 corpus vaginae
- 3 portio vaginalis cervicis
- 4 canales cervicis uterorum et portio prevaginalis cervicis
- 5 uterus duplex
- S uterus sinister
- D uterus dexter

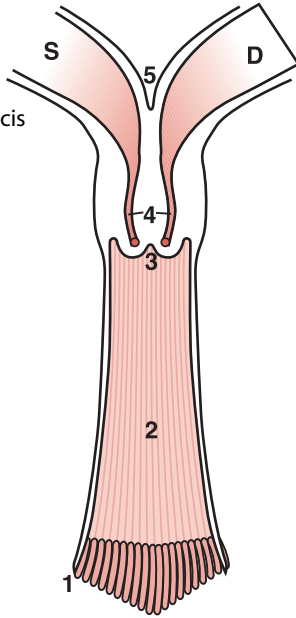


Figure 13.39 Position of the pregnant uterus, day 11 of pregnancy, view from the left.

- L6 vertebra lumbalis VI
- S os sacrum
- 1 anus
- 2 introitus vaginae
- 3 clitoris et ostium urethrae externum
- 4 glandulae clitoridis
- 5 symphysis pelvis et m. gracilis
- 6 rectum
- 7 vagina
- 8 cervix uteri
- 9 uterus sinister with embryos
- 10 ren sinister et ovarium cum oviducti
- 11 ureter sinister
- 12 vesica urinaria
- 13 urethra feminina et musculus urethralis

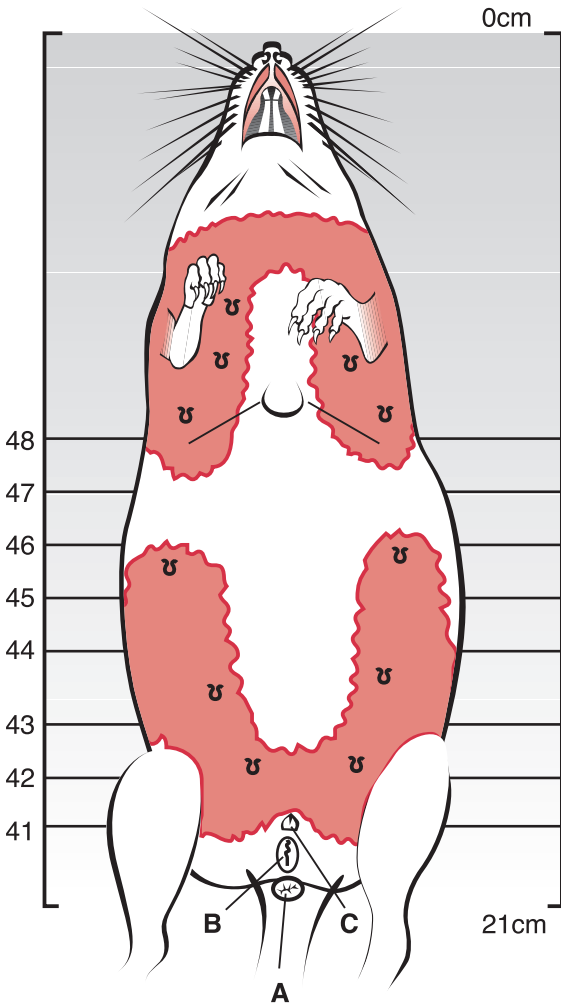
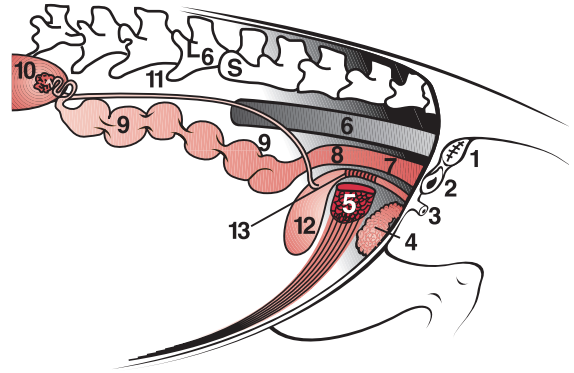


Figure 13.40 Shape of the abdomen of pregnant female, day 19 of pregnancy, ventral view with indication of the extent of the mammary gland. At this stage, the abdomen is the most voluminous part of the body. The abdominal cavity is mostly filled by the pregnant uterus, whereas the other organs, such as the intestines, stomach, spleen and liver are squeezed into the diaphragm. The gastrointestinal tract has little content. The body length of the animal used for this preparation is indicated, (0/21cm) as are the section levels of the following Figures 13.41–13.48 (41–48). These transverse sections are presented as caudal views.

- A anus
- B pudendum femininum
- C clitoris et ostium urethrae externum

Figure 13.41 Transverse section at the level of the first caudal vertebrae (scale = 1 cm).

- A rectum
- B vagina
- C urethra
- D fascia et tela pelvis
- 1 muscles of the tail
- 2 musculus biceps femoris
- 3,4 musculi semitendinosus et semimembranosus
- 5 caudal muscles of the leg (extensors of the tarsus and flexors of the toes)
- 6 dorsal muscles of the leg (extensors of the toes and flexors of the tarsus)
- 7 muscle of the clitoris
- 8 ossa cruris (tibia and fibula grown together)

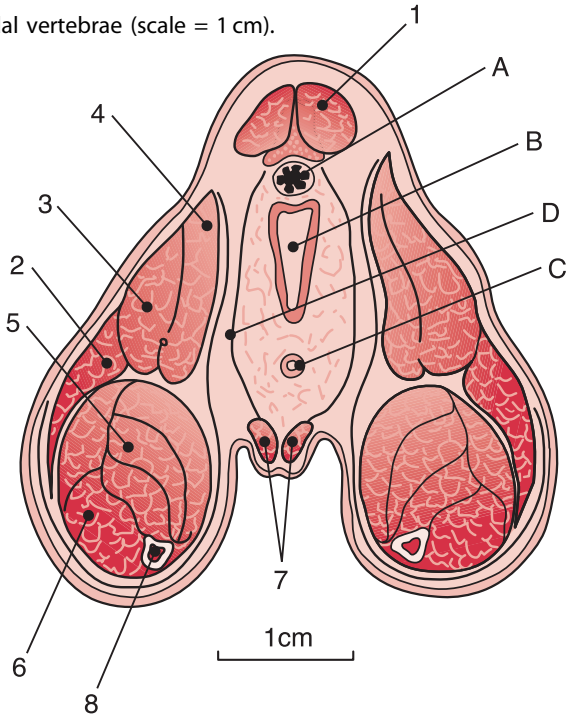


Figure 13.42 Transverse section at the level of the pelvis caudally to the acetabulum (scale = 1 cm).

- A rectum
- B cranial end of the vagina with opening of the left and right uterus (portio vaginalis cervicis – ostia uteri sinistri et dextri externa)
- C urethra
- D os sacrum
- E os ischii
- F symphysis pelvis
- G ossa cruris
- H_I uterus sinister (fetus I)
- J paniculi adiposi
- K mamma
- 1 dorsal, lateral and ventral muscles of the tail
- 2 musculus biceps femoris
- 3,4 musculi semitendinosus et semimembranosus
- 5 caudal muscles of the leg
- 6 dorsal muscles of the leg
- 7 abdominal wall
- 8 musculus gracilis
- 9 musculi obturatorii
- 10 musculus adductor

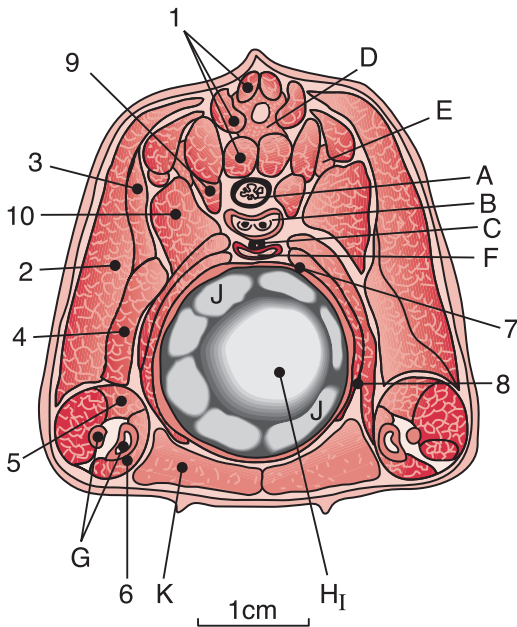


Figure 13.43 Transverse section at the level of acetabulum (scale = 1 cm).

- A colon descendens
- B articulatio coxae
- C femur (epiphysis distalis)
- D os sacrum
- H_I uterus sinister (fetus I)
- H_{II} uterus sinister (fetus II)
- J paniculi adiposi
- K mamma
- L_I uterus dexter (fetus I)
- 1 dorsal, lateral and ventral muscles of the tail
- 2 abdominal wall
- 3 musculus quadriceps femoris

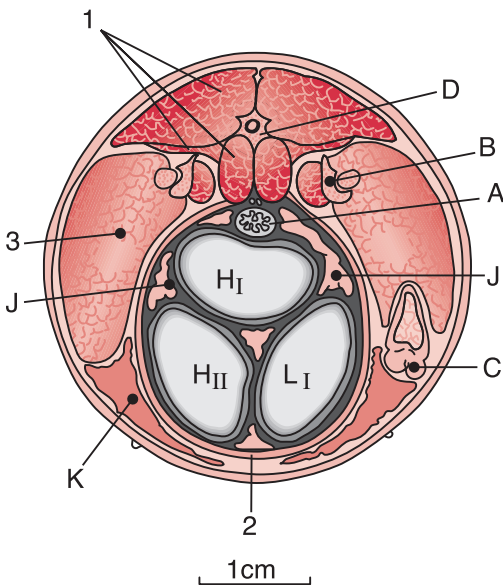


Figure 13.44 Transverse section 6 cm cranial to anus (scale = 1 cm).

- | | |
|--|--------------------------------------|
| A colon descendens, above it are aorta abdominalis et vena cava caudalis | H uterus sinister (fetus I, II, III) |
| B vertebra lumbalis surrounded by the long muscles of the vertebral column | J paniculi adiposi |
| D abdominal wall | K mamma |
| | L uterus dexter (fetus I) |
| | M placenta discoidea (disciformis) |
| | S intestinum |

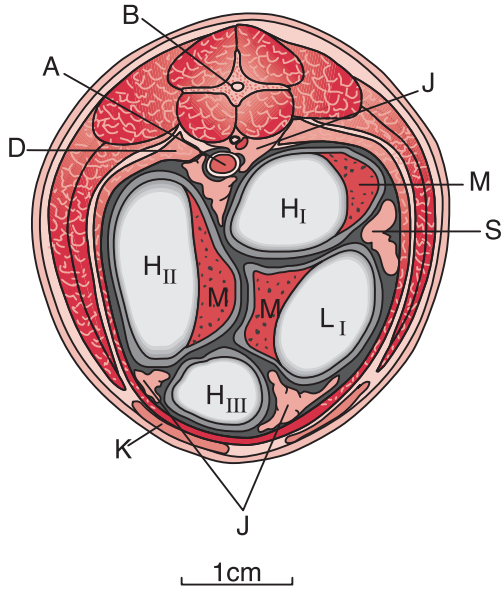


Figure 13.45 Transverse section 7.5 cm cranial to anus (scale = 1 cm).

- | | |
|--|---------------------------------------|
| A colon descendens et flexura coli, above it are aorta abdominalis et vena cava caudalis | J paniculi adiposi |
| B vertebra lumbalis | K mamma |
| D abdominal wall | L uterus dexter (fetus II, IV, V, VI) |
| H uterus sinister (fetus III, IV, V) | M placenta discoidea |
| | S intestinum tenue |

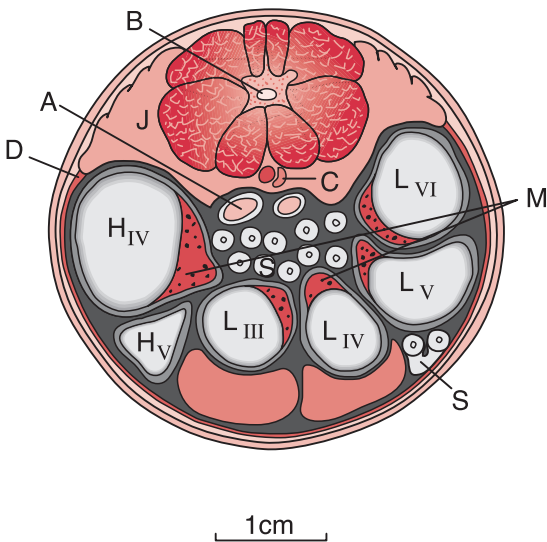
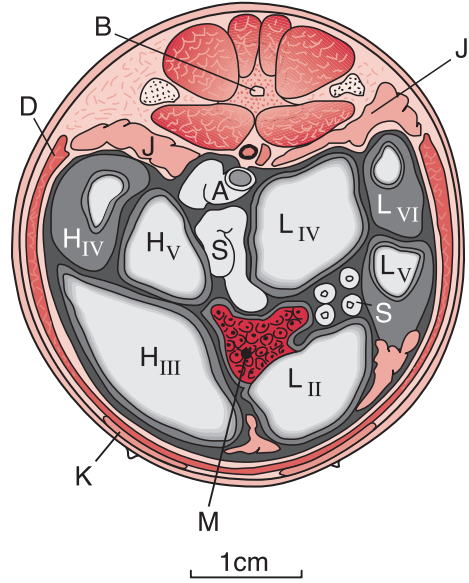


Figure 13.46 Transverse section 9 cm cranial to anus (scale = 1 cm).

- | | |
|--|--|
| A colon transversum | H uterus sinister (fetus IV, V) |
| B vertebra lumbalis surrounded by the long muscles of the vertebral column | J paniculi adiposi |
| C aorta descendens et vena cava caudalis | L uterus dexter (fetus III, IV, V, VI) |
| D abdominal wall | M placenta discoidea |
| | S intestinum tenue |

Figure 13.47 Transverse section 10 cm cranial to anus, at the level of the left kidney (scale = 1 cm).

- | | |
|--|---------------------------------|
| A aorta descendens (abdominalis) et vena cava caudalis | D abdominal wall |
| B vertebra lumbalis surrounded by the long muscles of the vertebral column | H uterus sinister (fetus V) |
| C ren sinister | J paniculi adiposi |
| | L uterus dexter (fetus V et VI) |
| | M placenta discoidea |
| | S intestinum tenue |

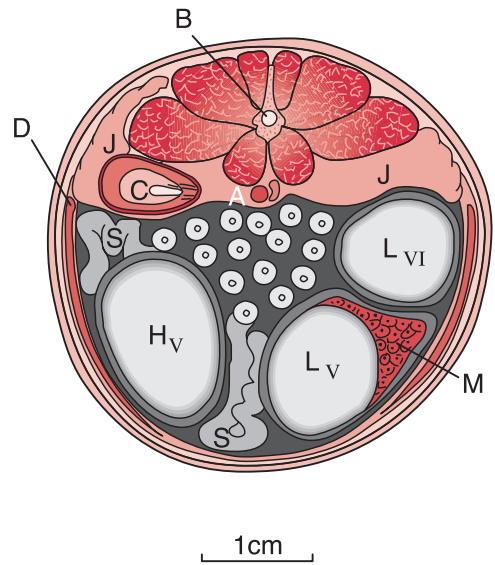


Figure 13.48 Transverse section 11.3 cm cranial to anus, at the level of the right kidney (scale = 1 cm).

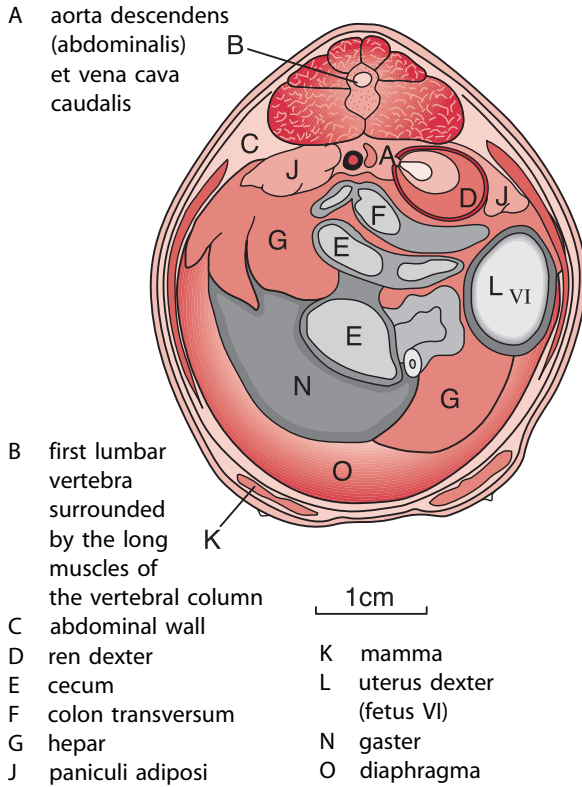
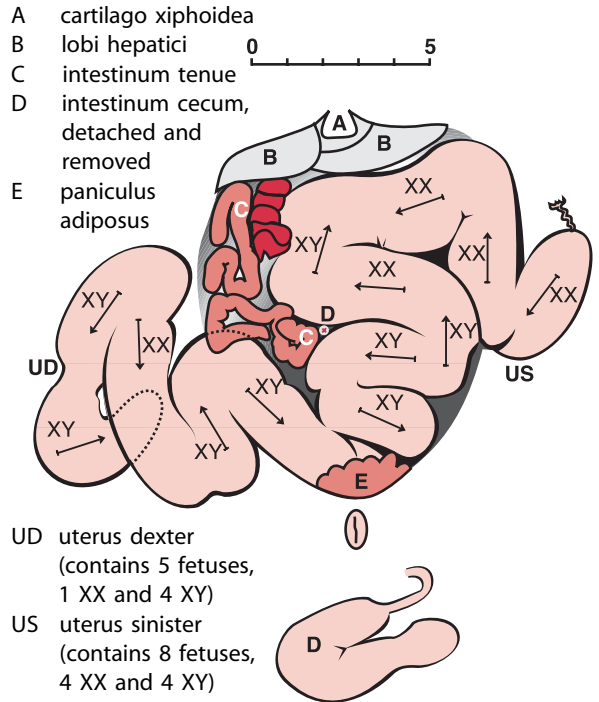


Figure 13.49 Uterus, day 20 of pregnancy, ventral view after opening the abdomen in the midline (scale = 5 cm).



The arrows are directed towards the head of each fetus; the heads are mostly, but not always directed to the vagina.

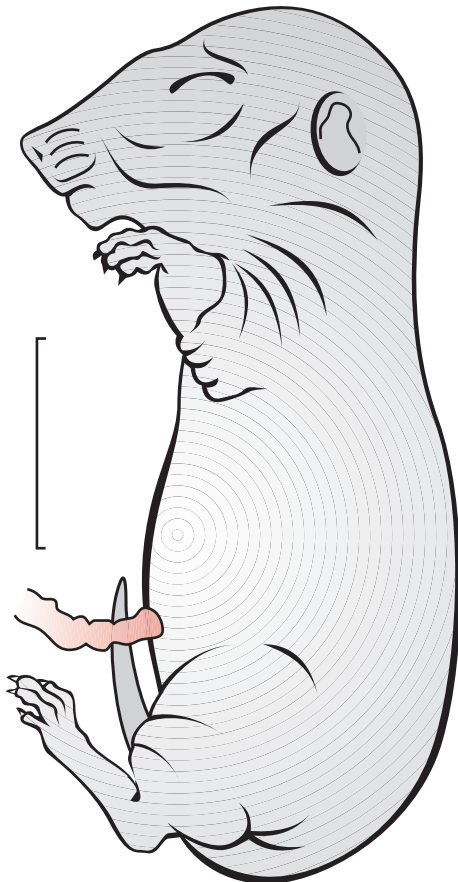


Figure 13.50 Lateral view of a fetus (scale = 1 cm). The eyelids are closed, the ears not fully developed, the nostrils almost imperceptible and the mouth appears to be closed. The skin is hairless, only on the muzzle are shadows of future sinus hairs.

Figure 13.51 Diagram of the pregnant uterus in transverse section.

- 1 uterine wall
- 2 fetus
- 3 umbilical cord
- 4 amnion
- 5 amniotic fluid
- 6 placenta discoidea

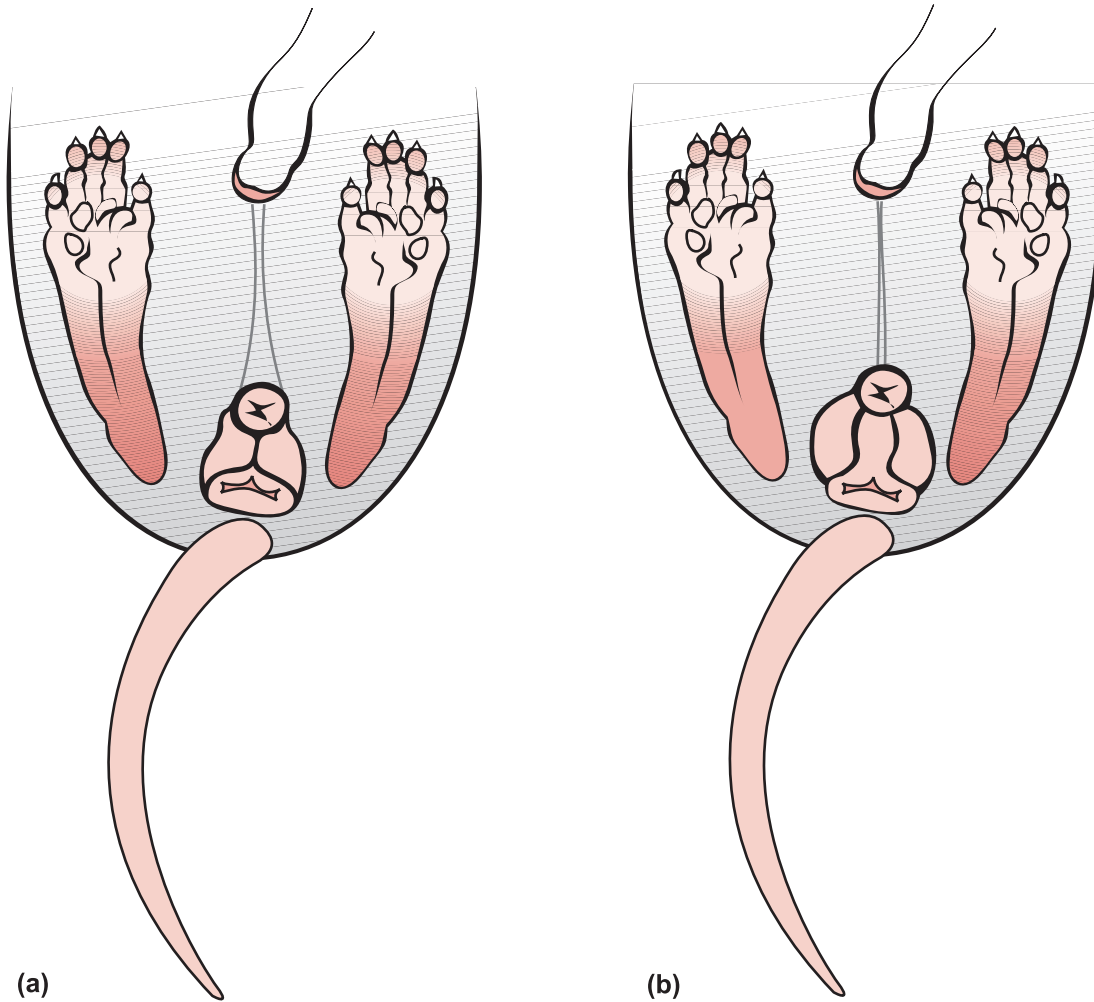
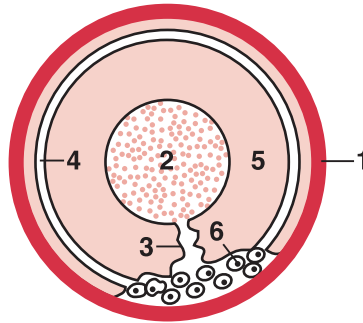


Figure 13.52a,b Sexual differentiation. In males (a) the distance between the anus and preputium is shorter (about 2 mm) than in females (b) (about 3 mm). Moreover, in females the labia and the introitus vaginae are indicated.