

LIMFENI SISTEM





TIMUS- grudna žlezda

Morfofunkcionalne karakteristike:

- limfopoezna žlezda
- aktivna do polne zrelosti
- nema izvodnog kanala
- stvara i ubacuje u krvotok T – limfocite
- posle puberteta zamenjuje se vezivom
- značajna za limfopoezu i imunološki odgovor

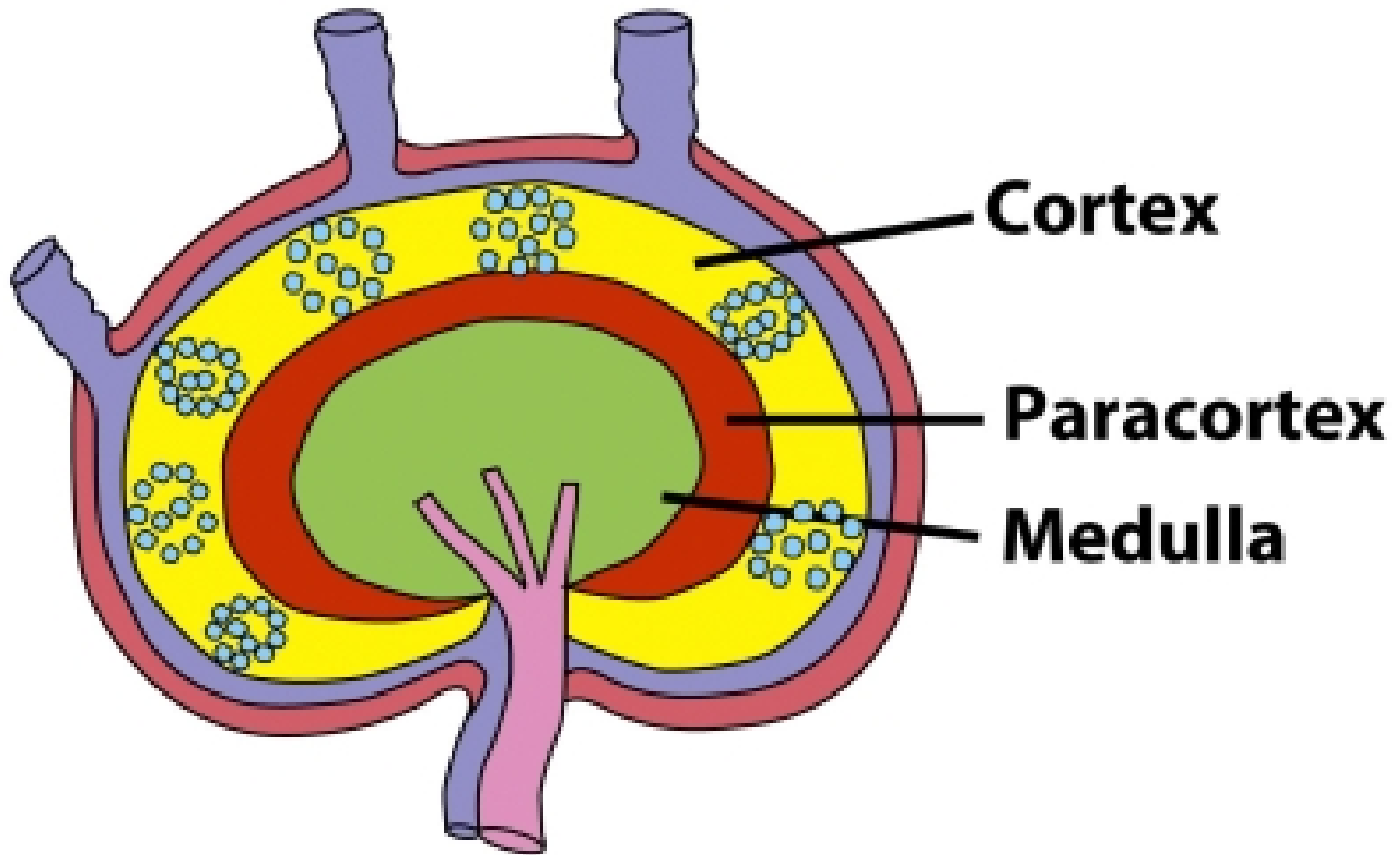
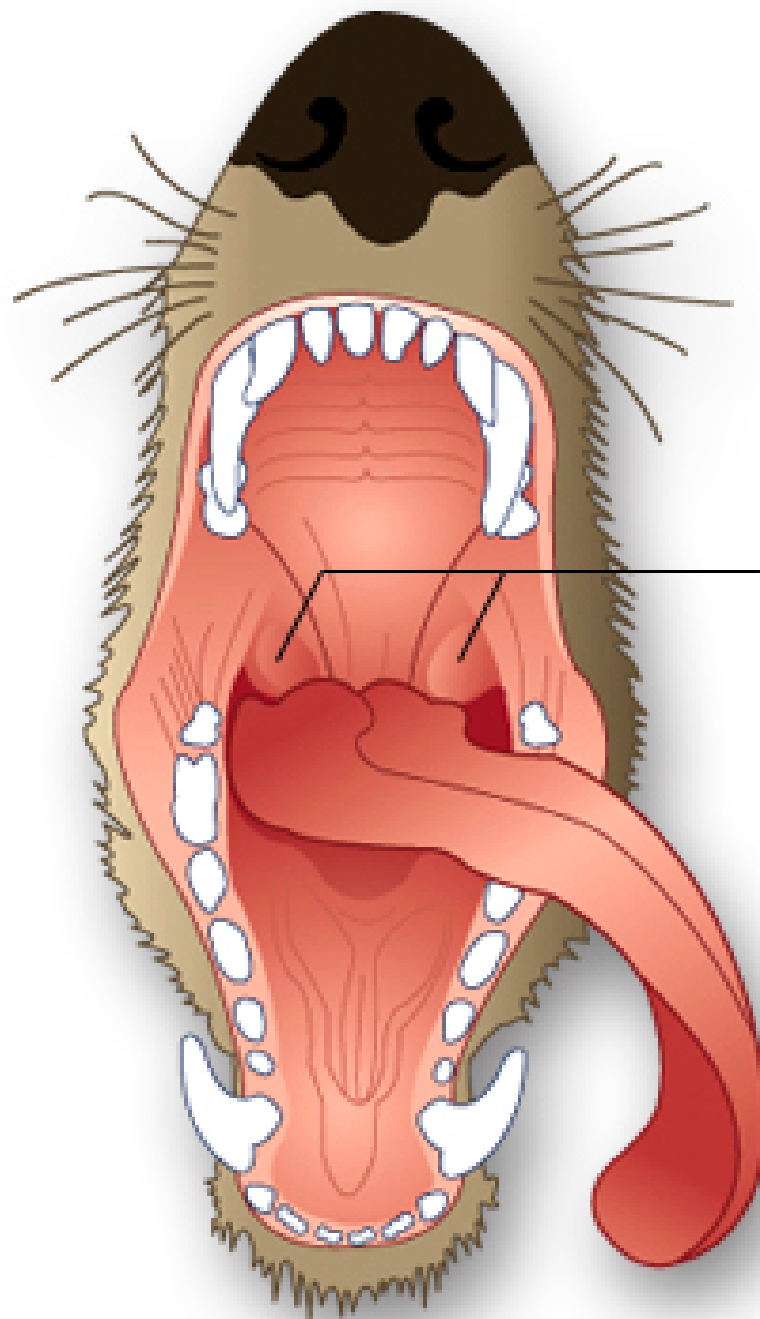


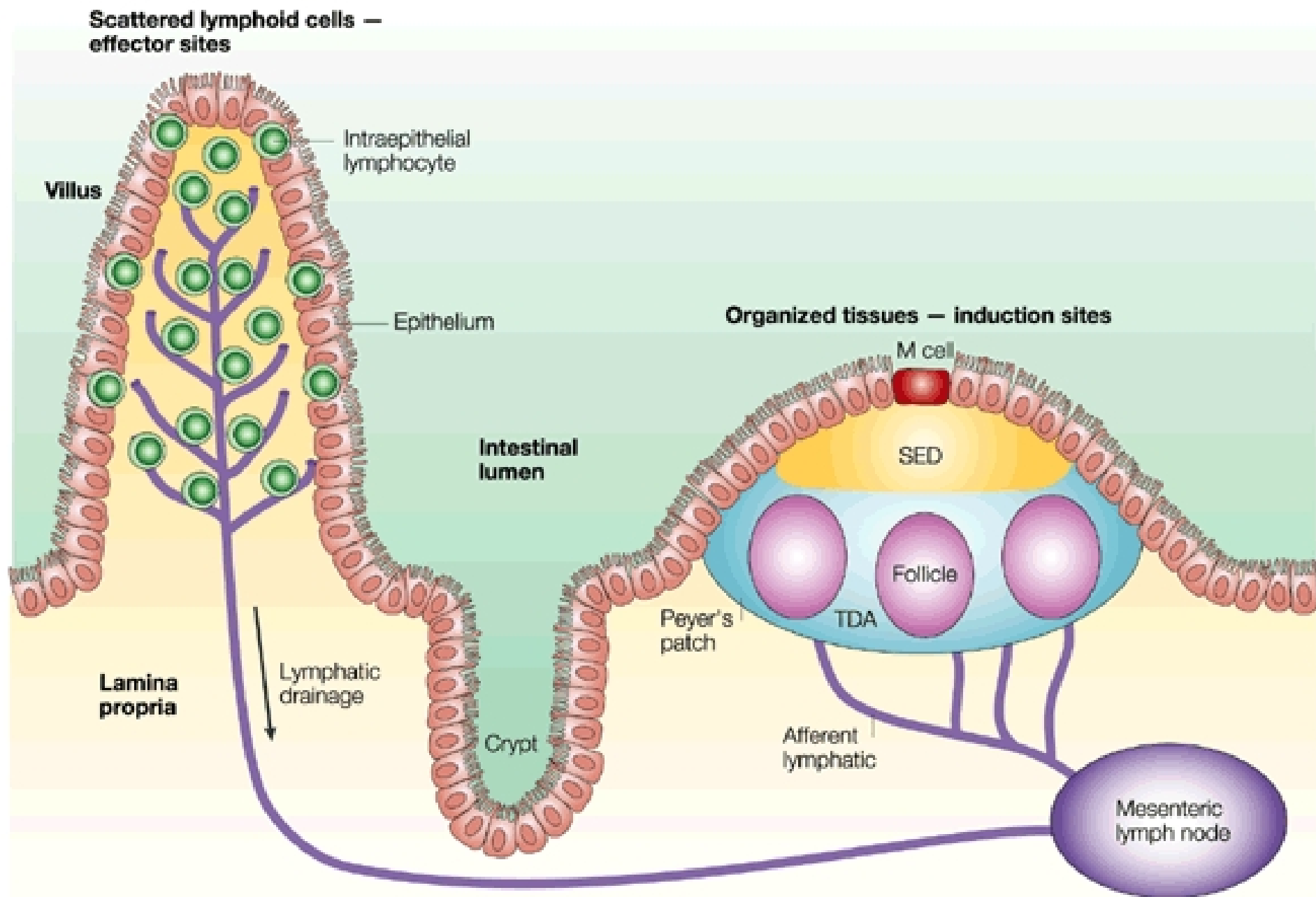
Figure 2-14a
Kuby IMMUNOLOGY, Sixth Edition
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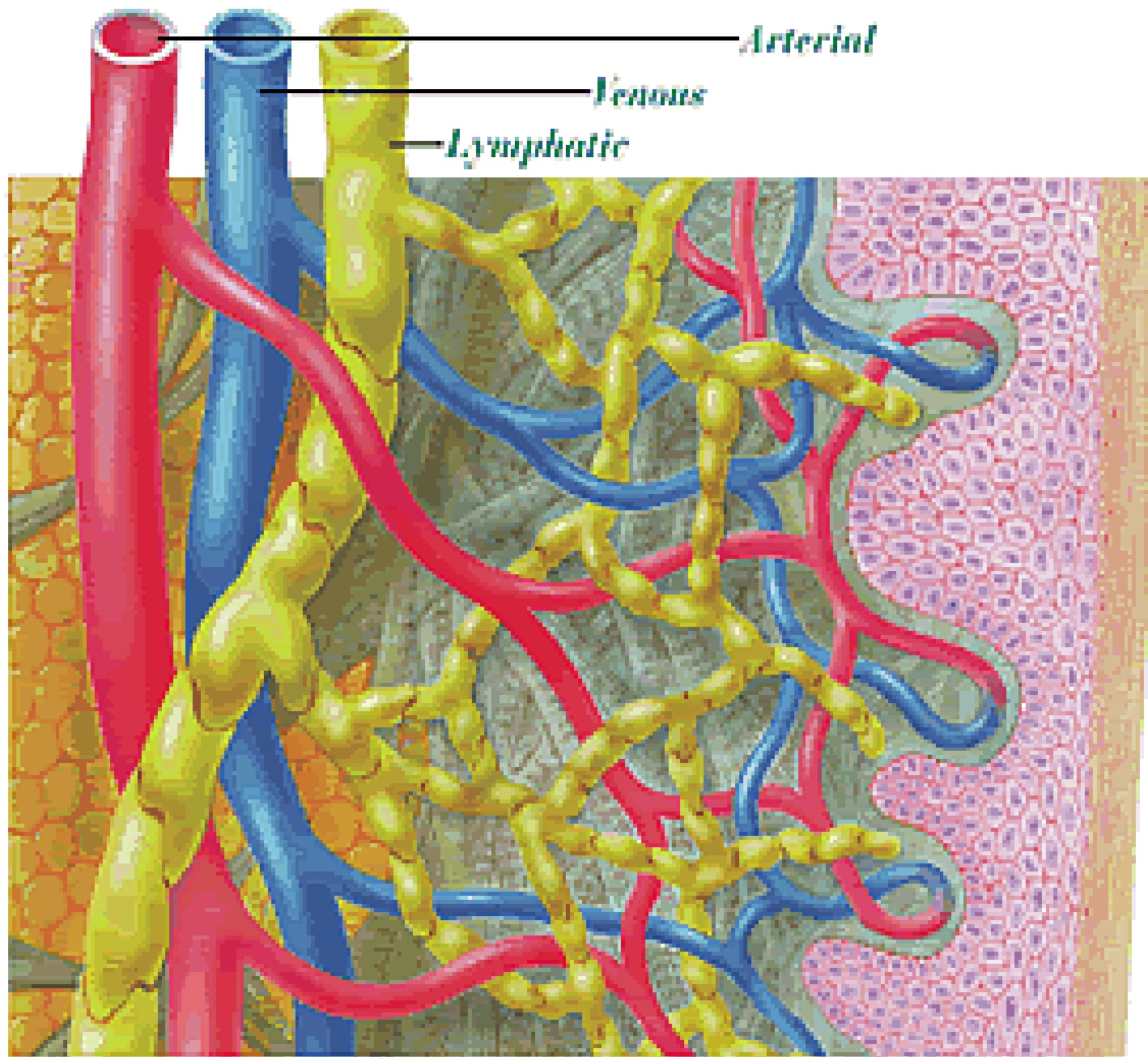
SLEZINA (LIEN)

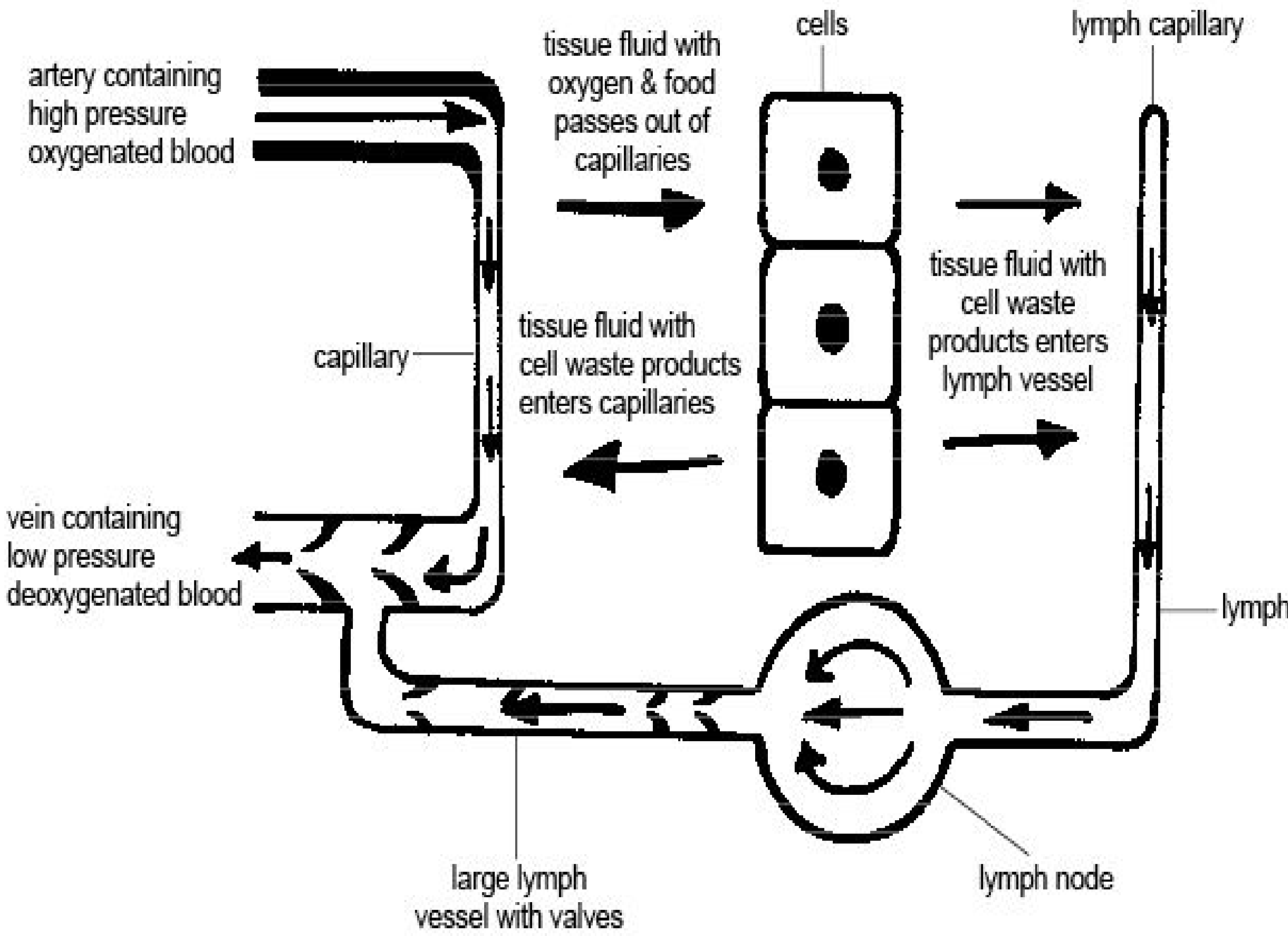
- Limfopoezni organ.
- Učestvuje u odbrani organizma.
- Razgrađuju se eritrociti.



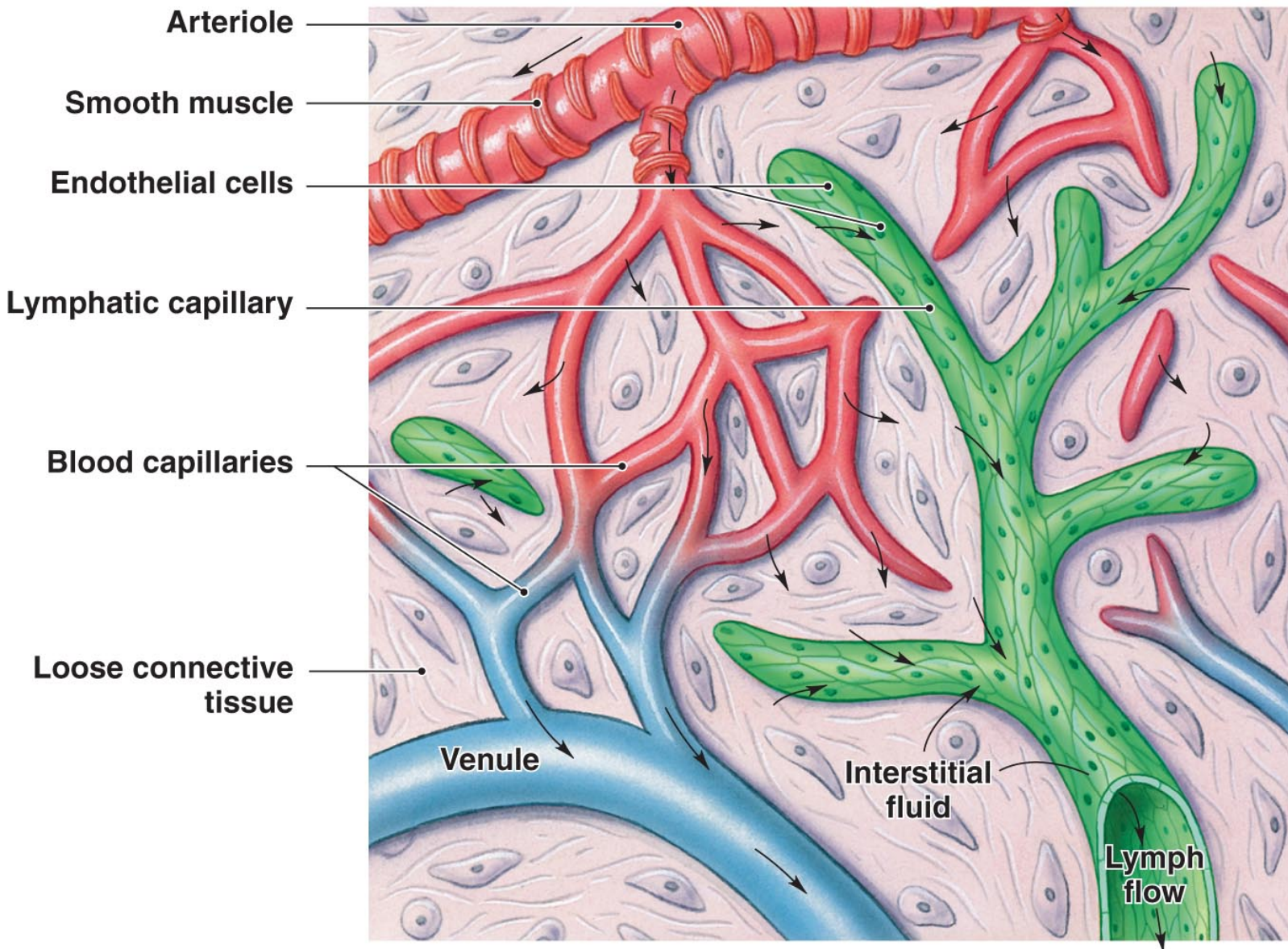
Tonsils



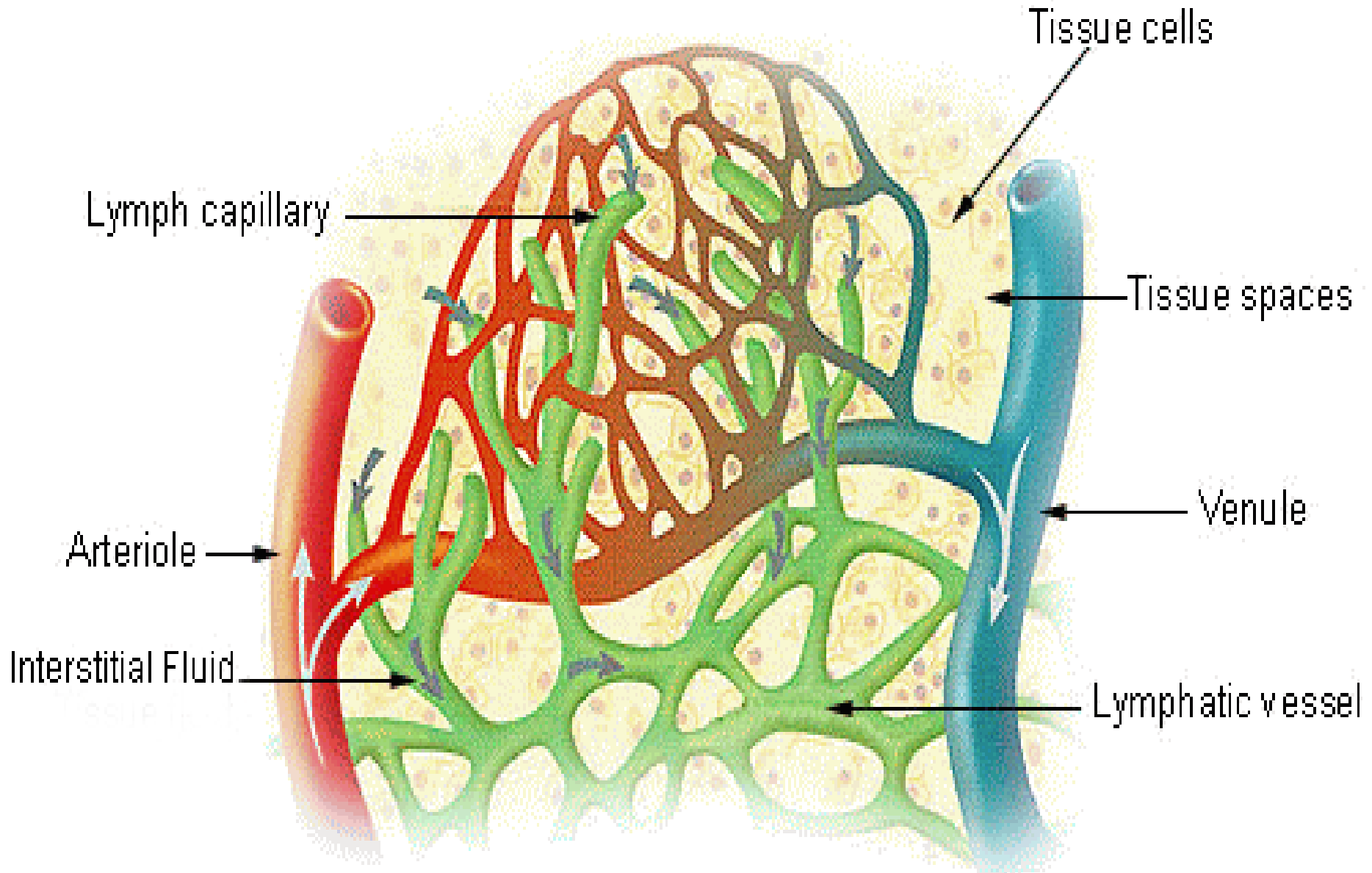


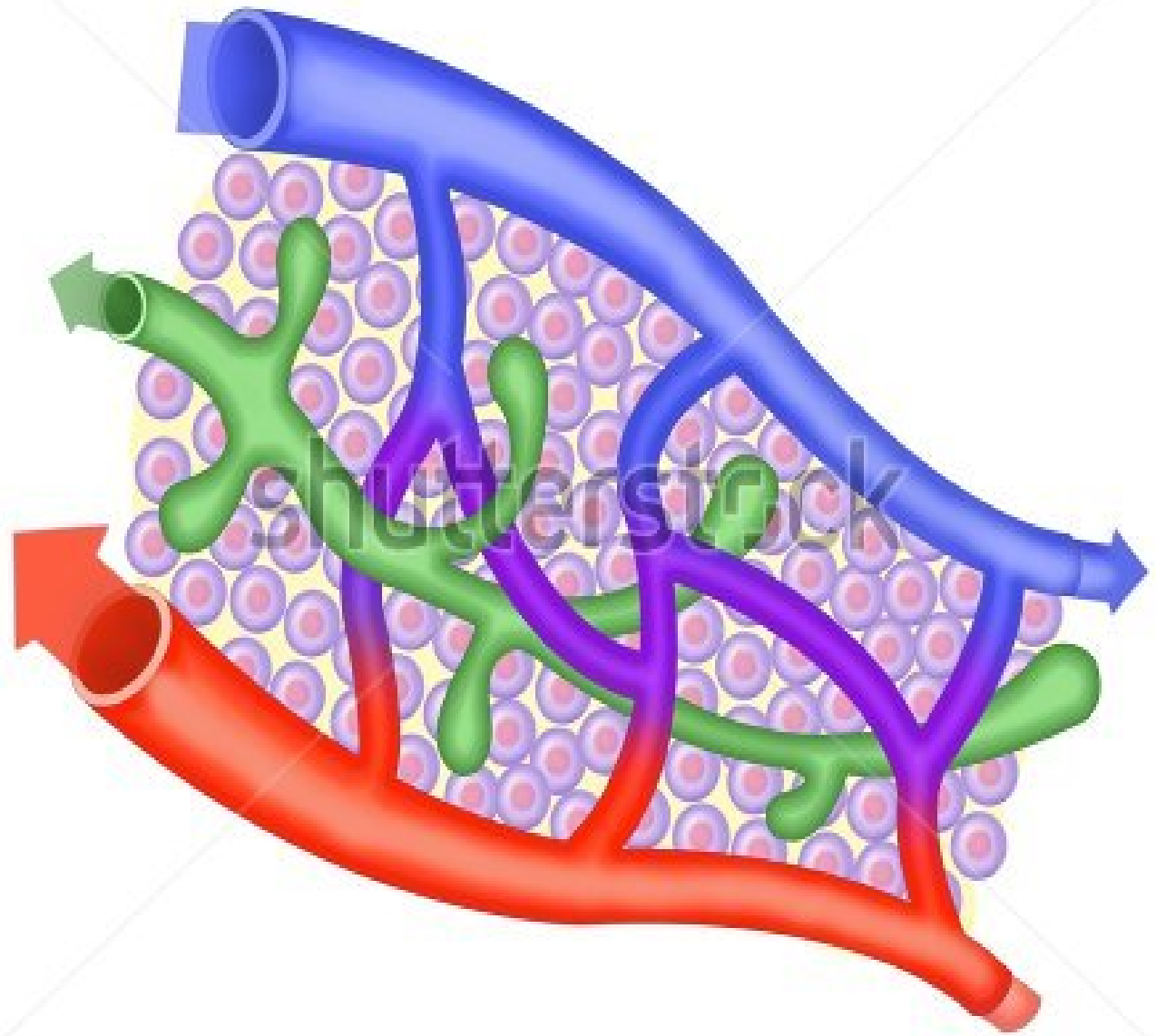


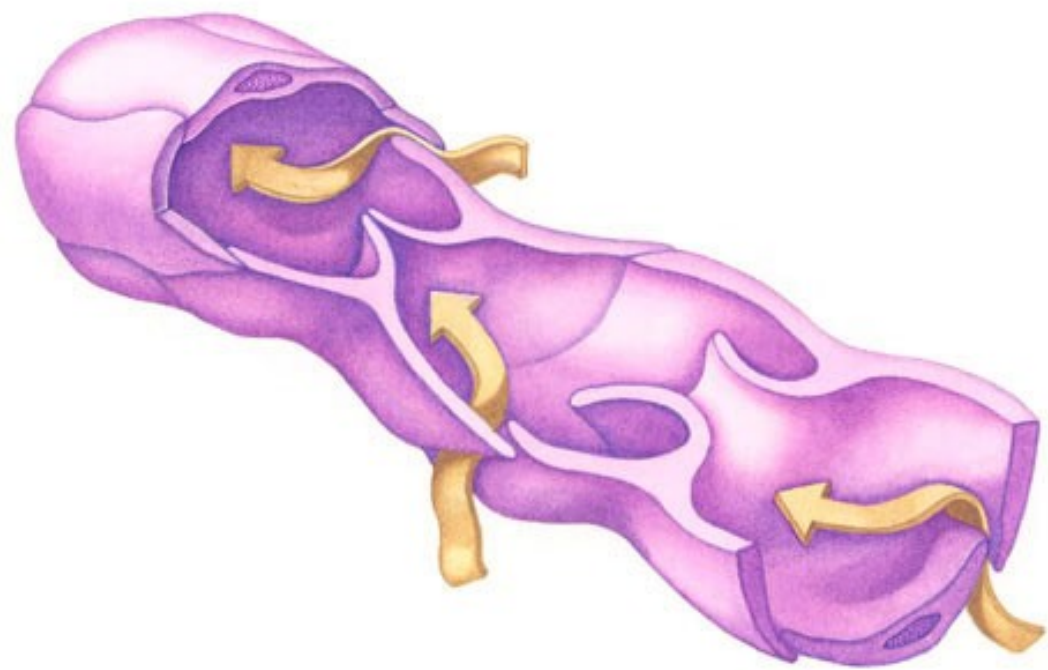
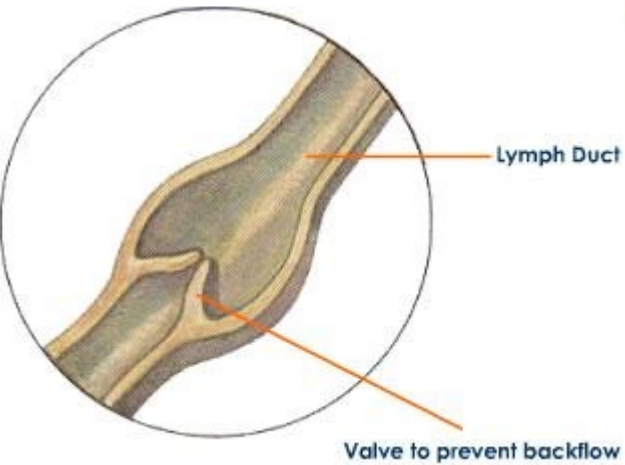
The flow of interstitial fluid into lymphatic capillaries, where it is called lymph

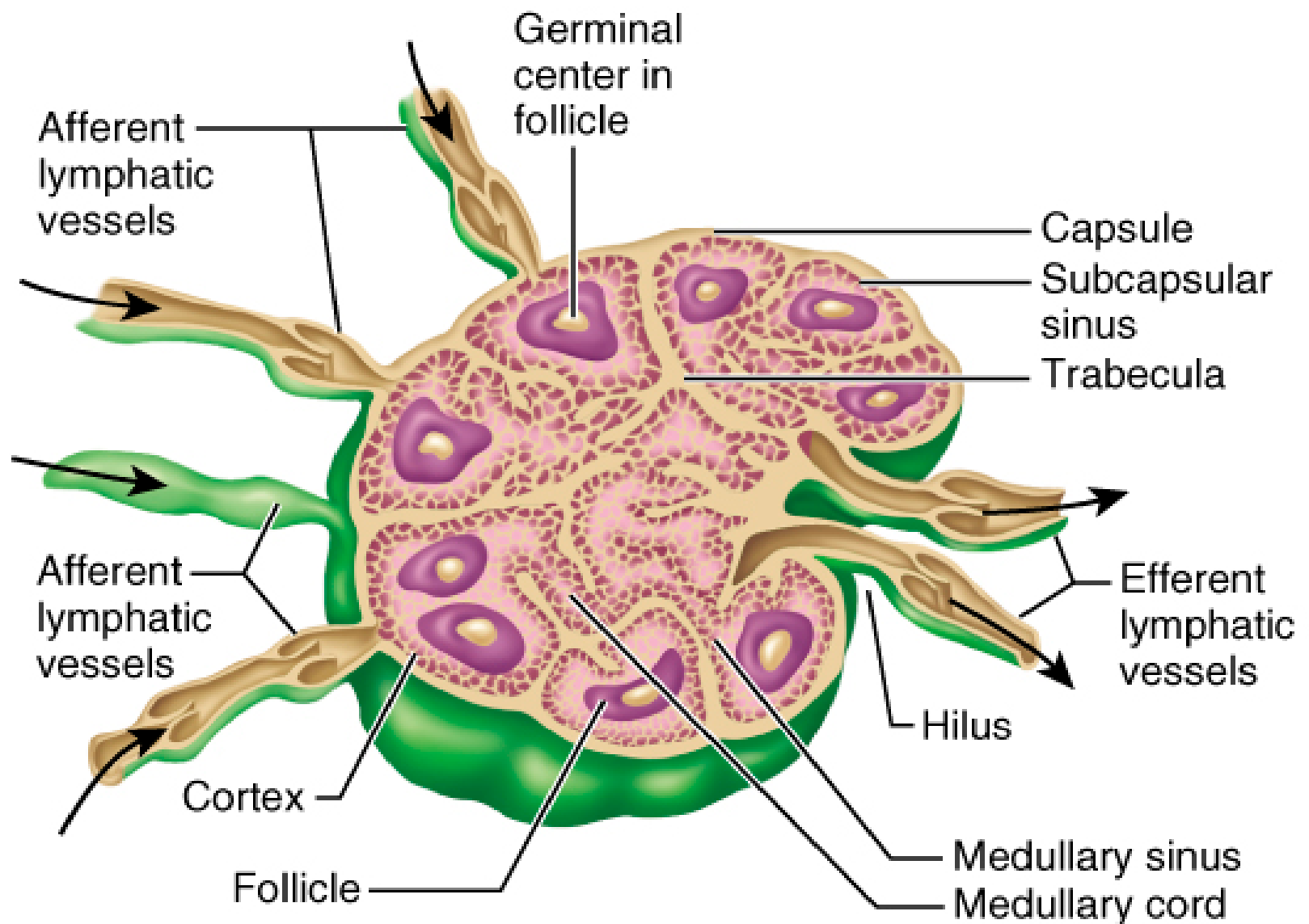


Lymph Capillaries in the Tissue Spaces



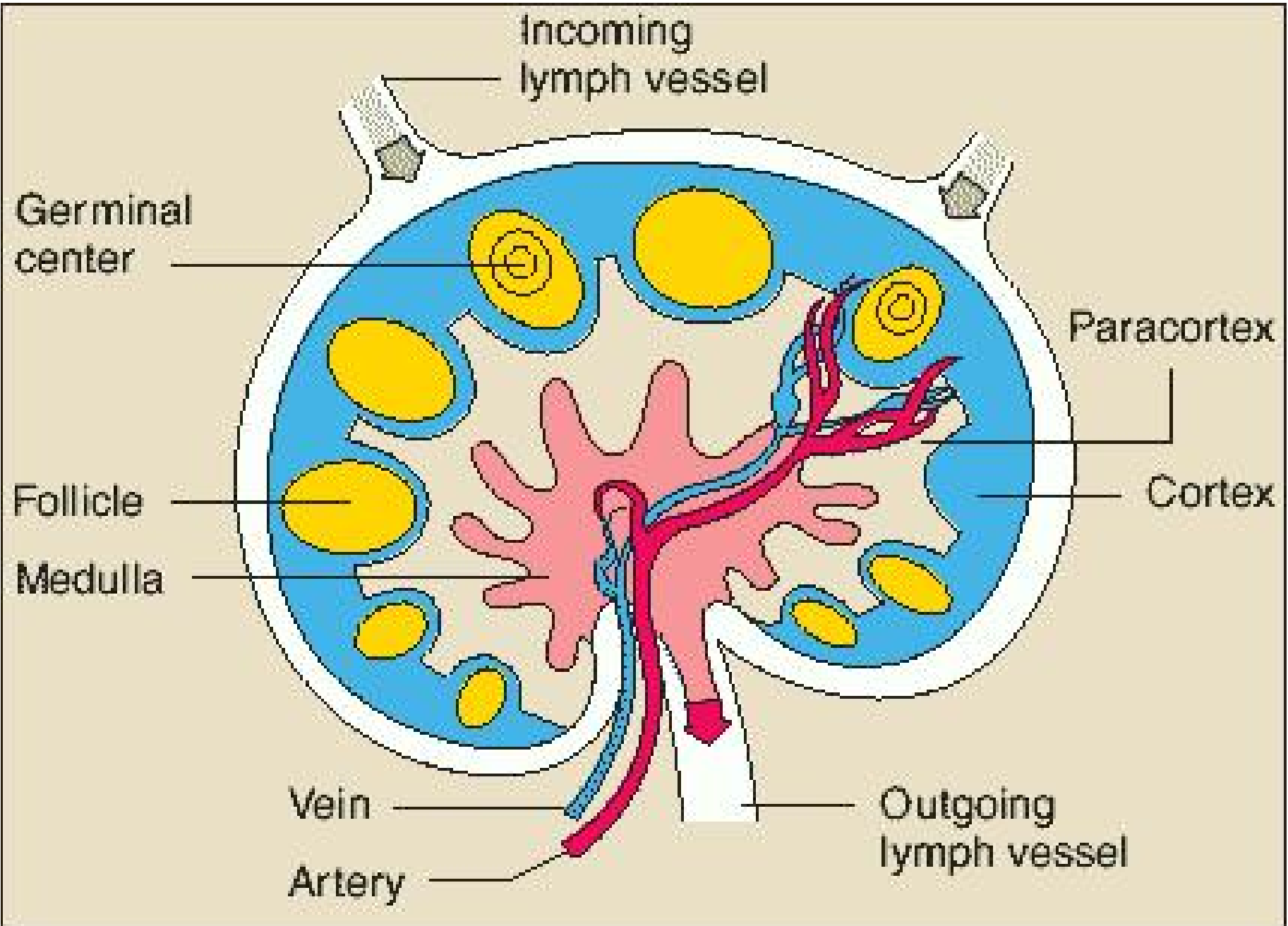






(a)

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lymph nodes of your canine

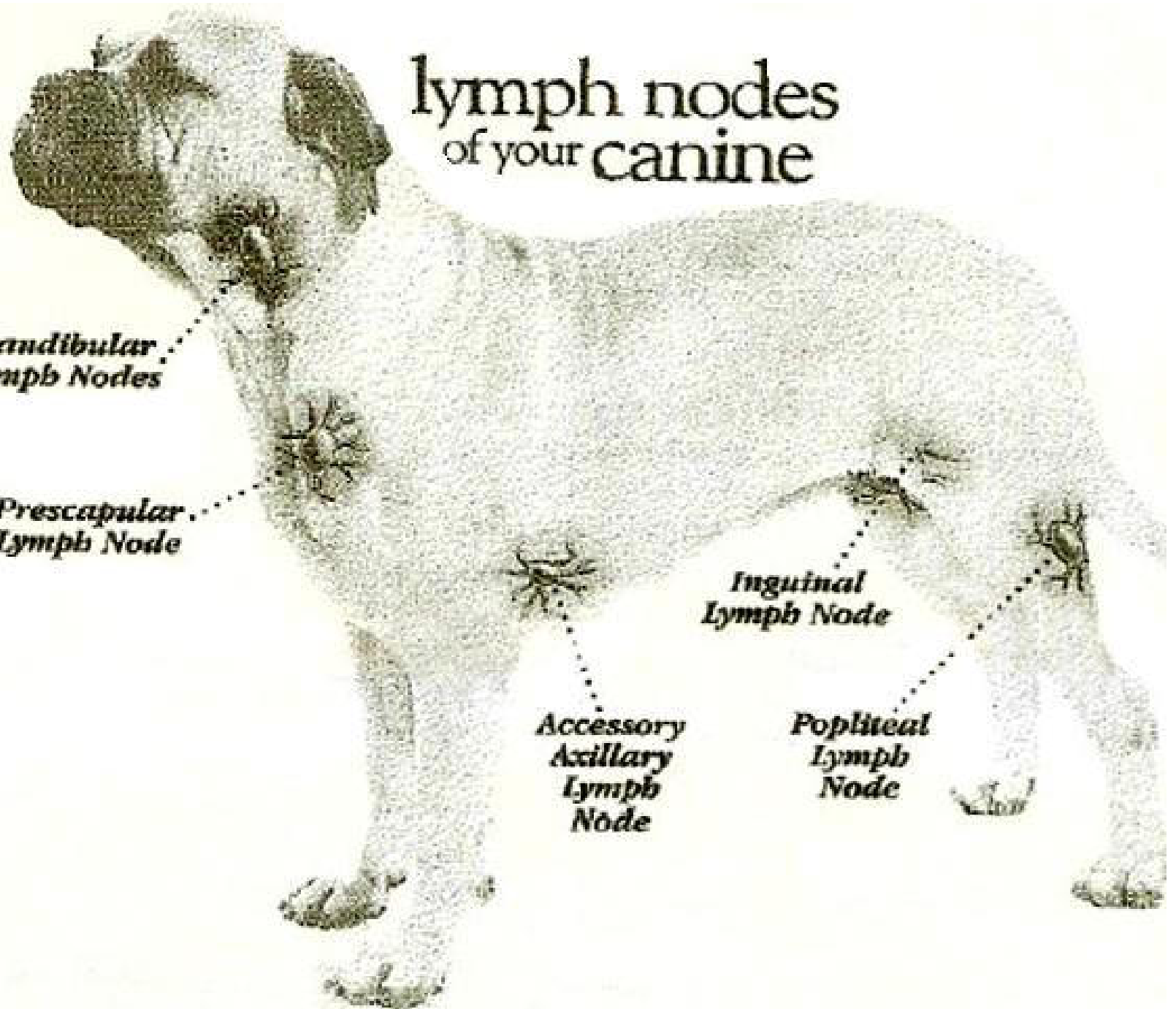
*Mandibular
Lymph Nodes*

*Prescapular
Lymph Node*

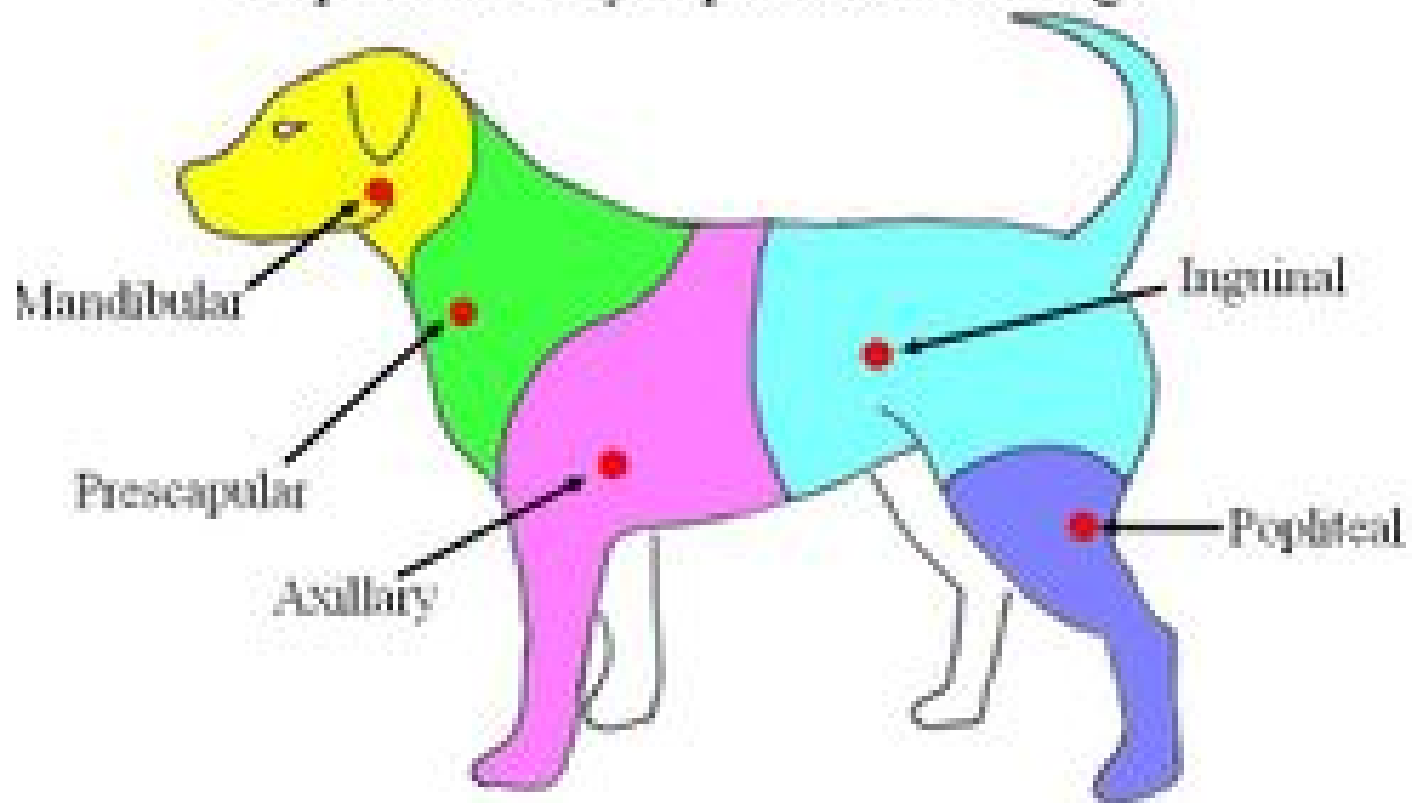
*Inguinal
Lymph Node*

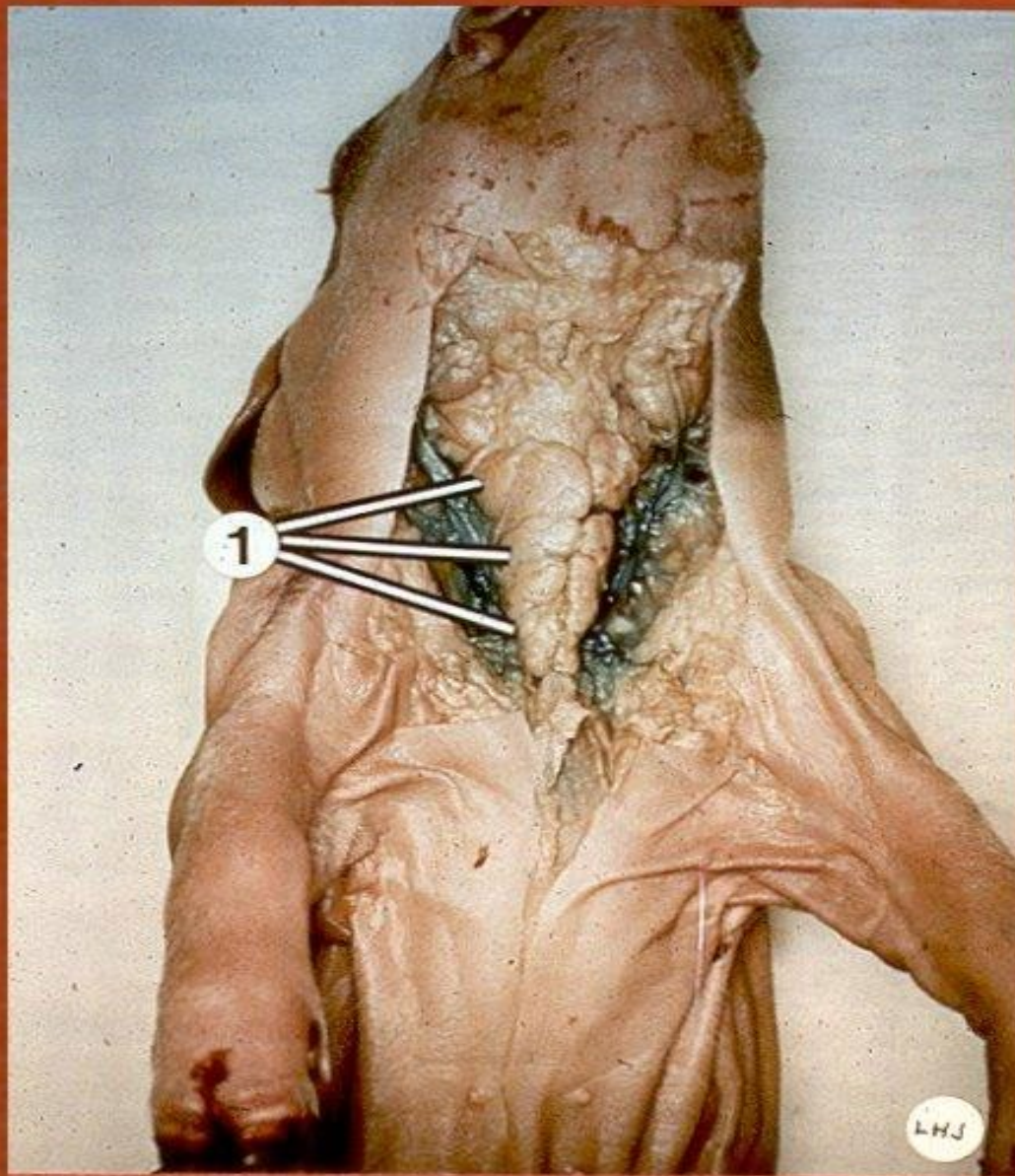
*Accessory
Axillary
Lymph
Node*

*Popliteal
Lymph
Node*



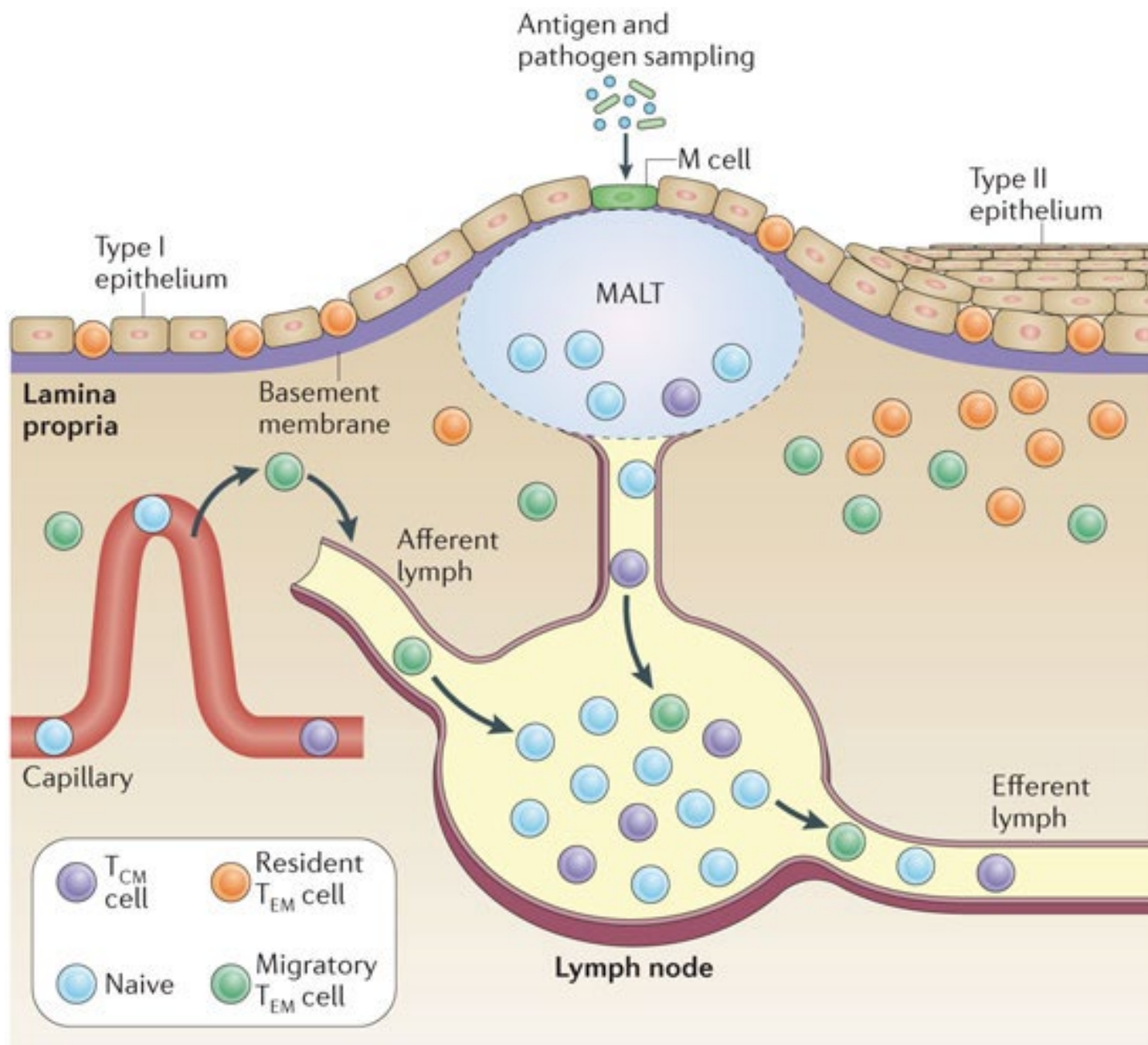
Superficial lymphatic drainage





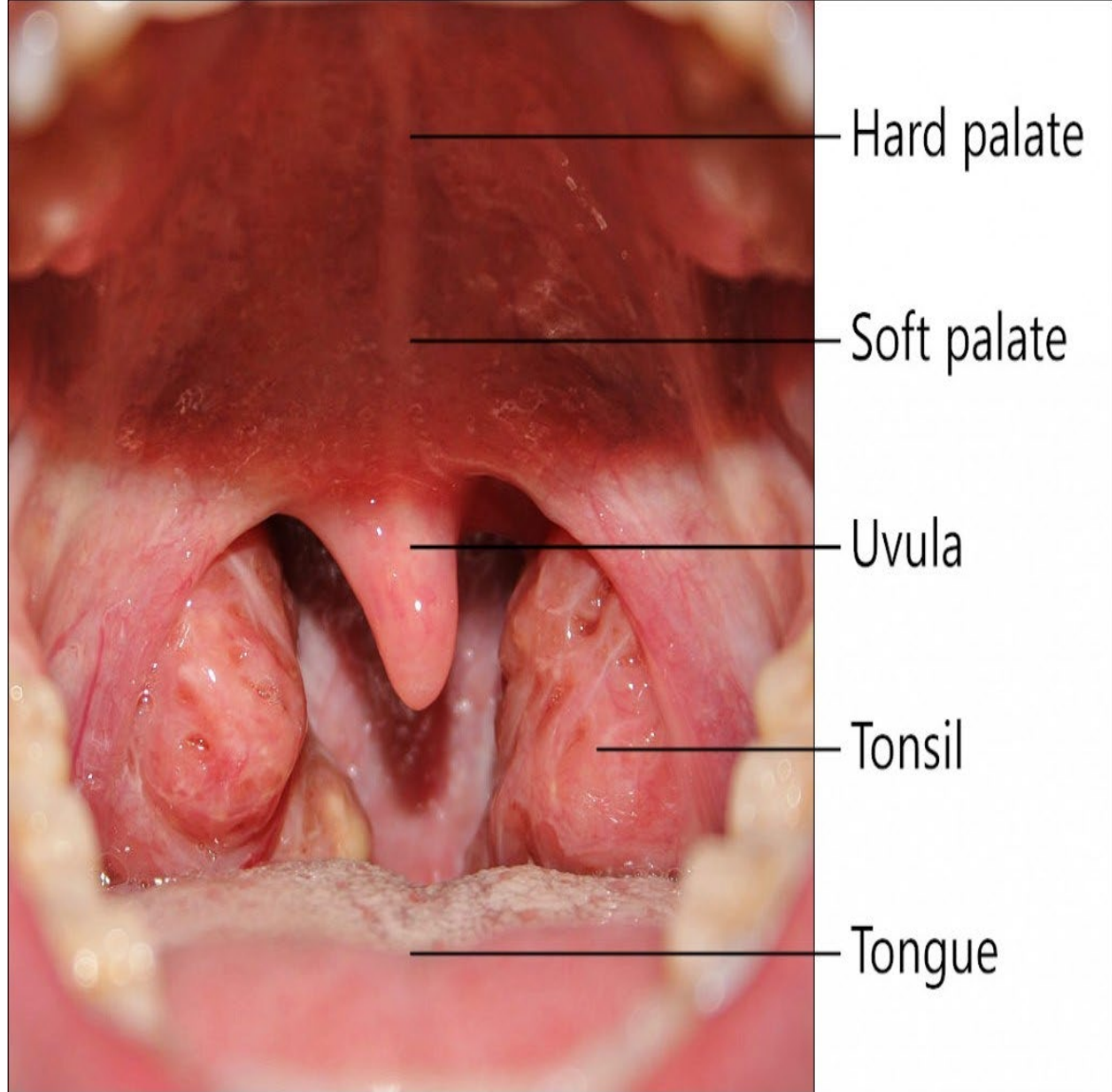
THE STERNOHYOID AND STERNOTHYROID MUSCLES HAVE BEEN REMOVED TO SHOW YOU THE EXTENT OF THE LOBES OF THE THYMUS GLAND.

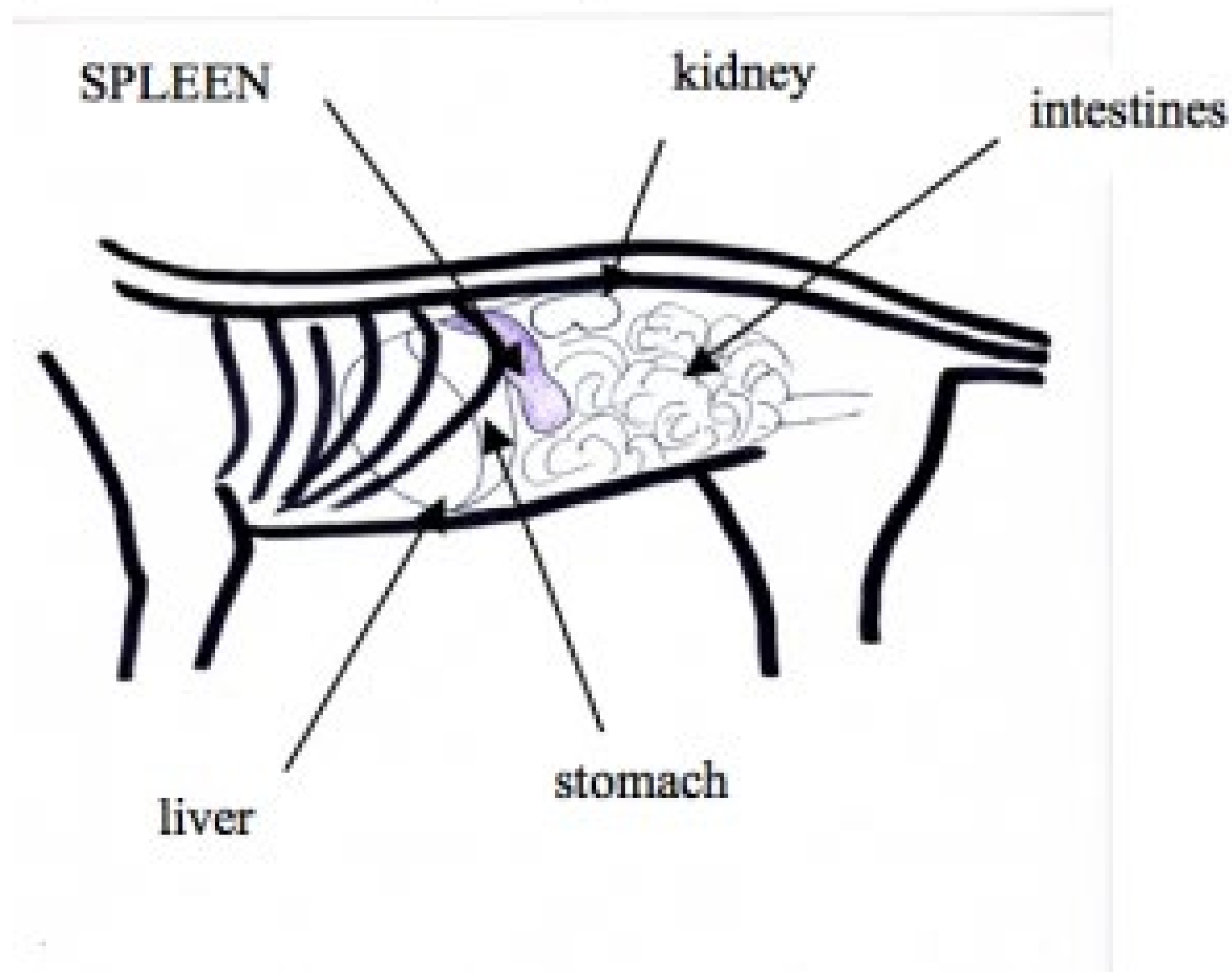
1. THYMUS GLAND





2 14:38



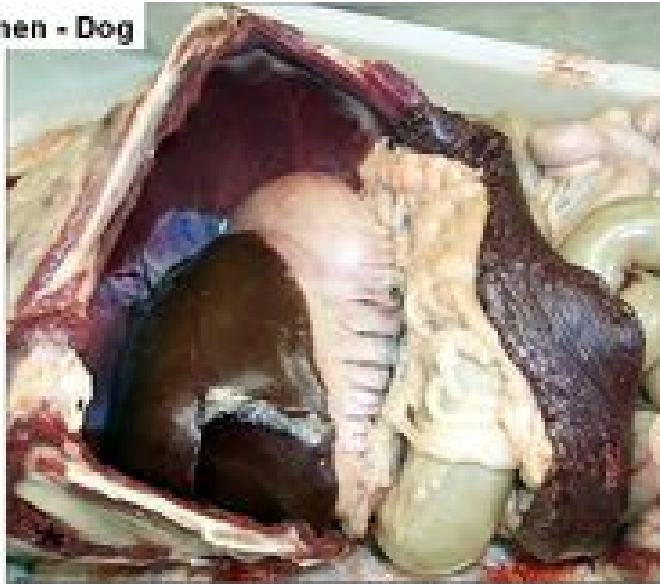




gty.im/
128582008

By
Laurie O'Keefe

Cranial Abdomen - Dog



Cadaver in right lateral decubitus. Abdominal wall has been incised. Liver capsule & diaphragm intact. Left ilio-caps is reflected laterally with forceps.

- Identify: Tenthredin & muscicola portions of diaphragm, left lateral & left medial lobes of liver, right medial lobe of liver, body & body of stomach, greater curvature of stomach & pyloric region, spleen.
- Also visible: Large intestine & pylorus



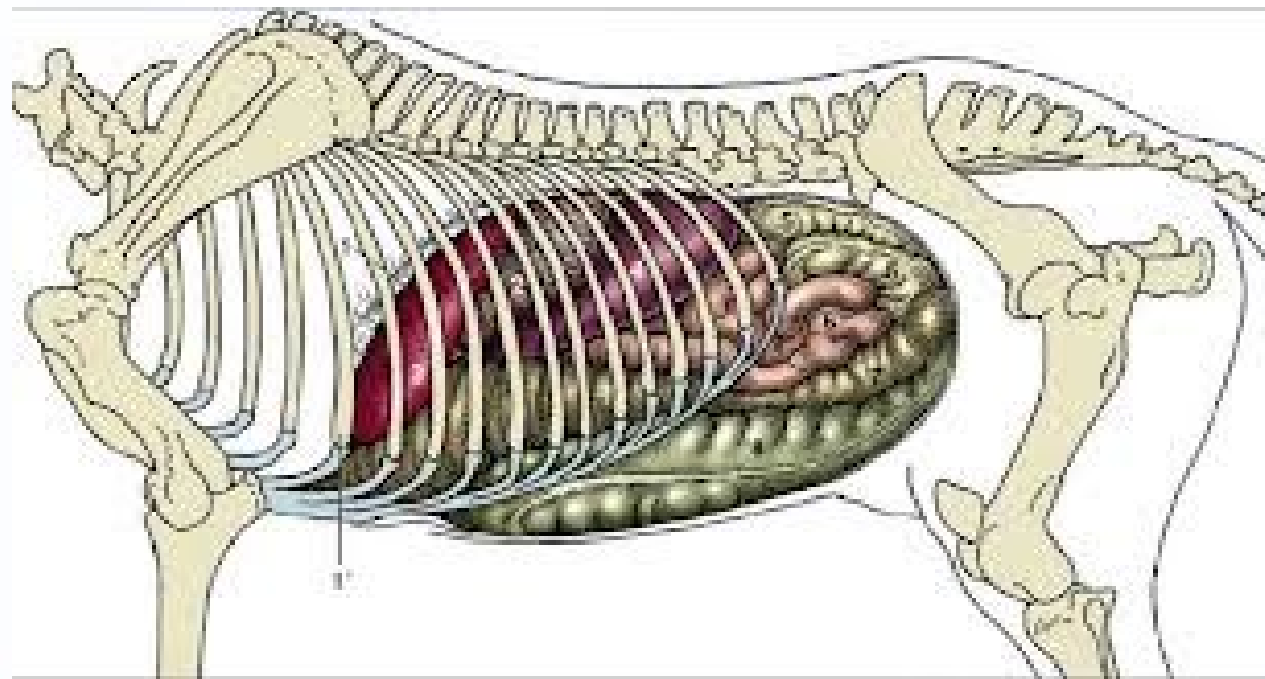
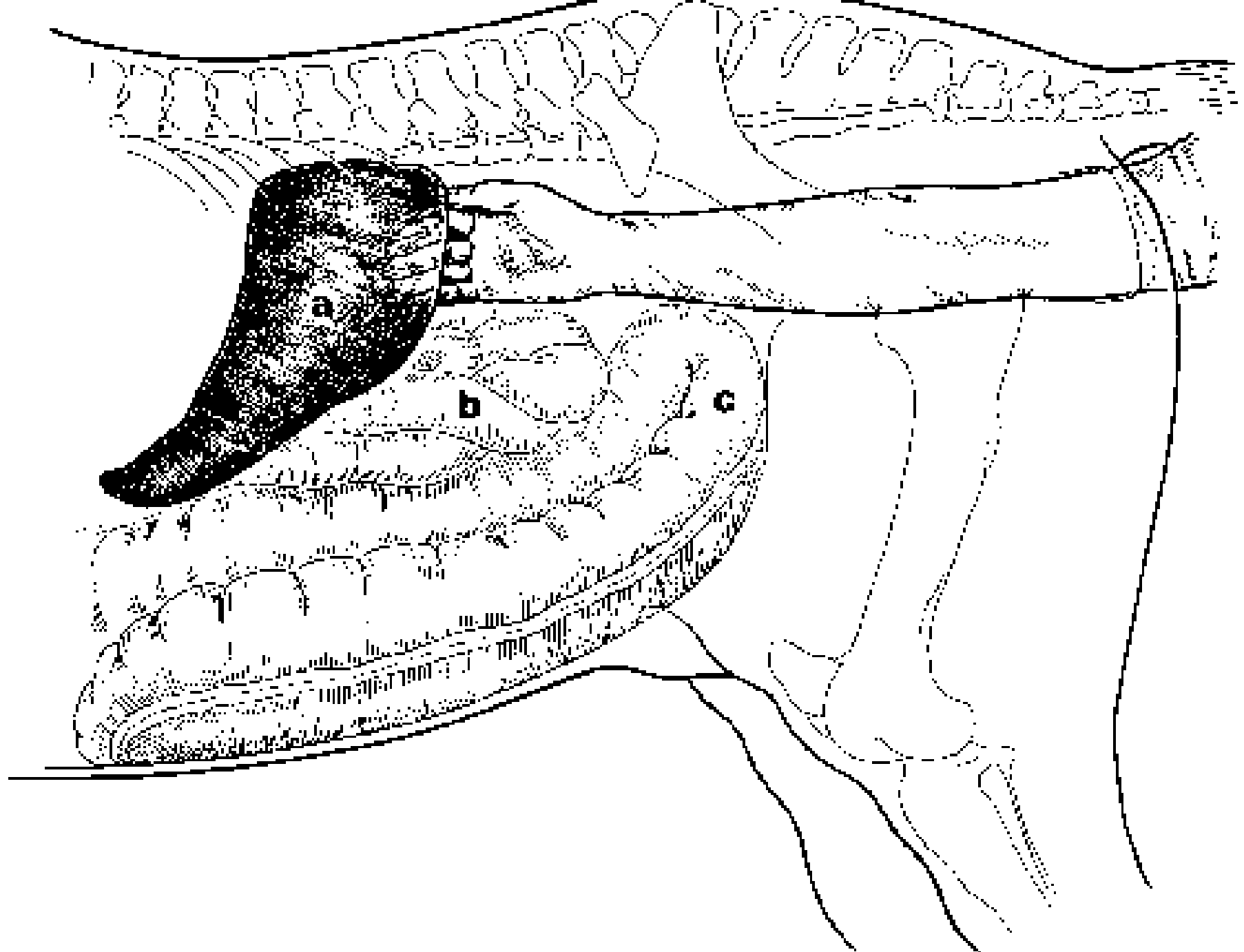
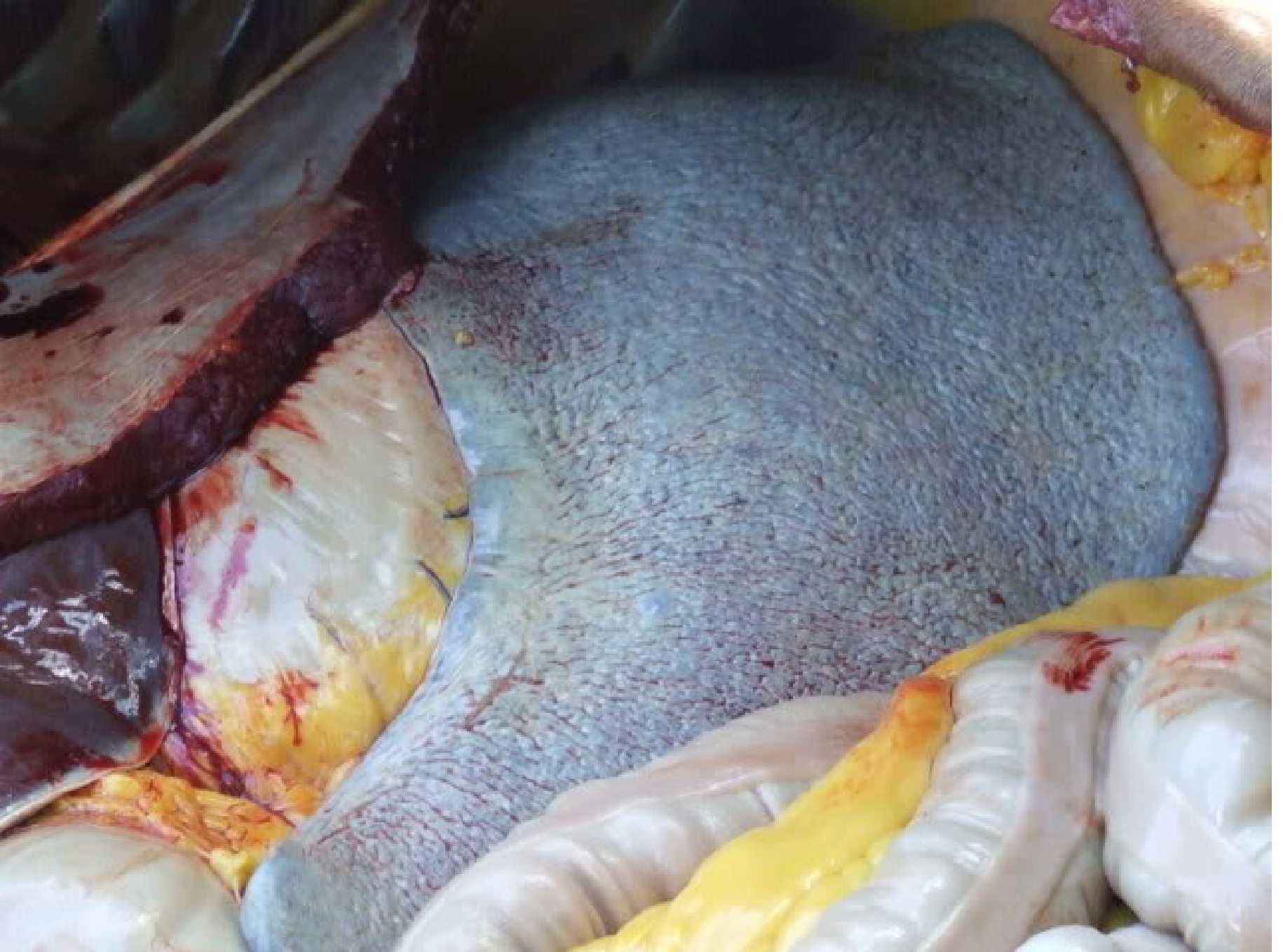


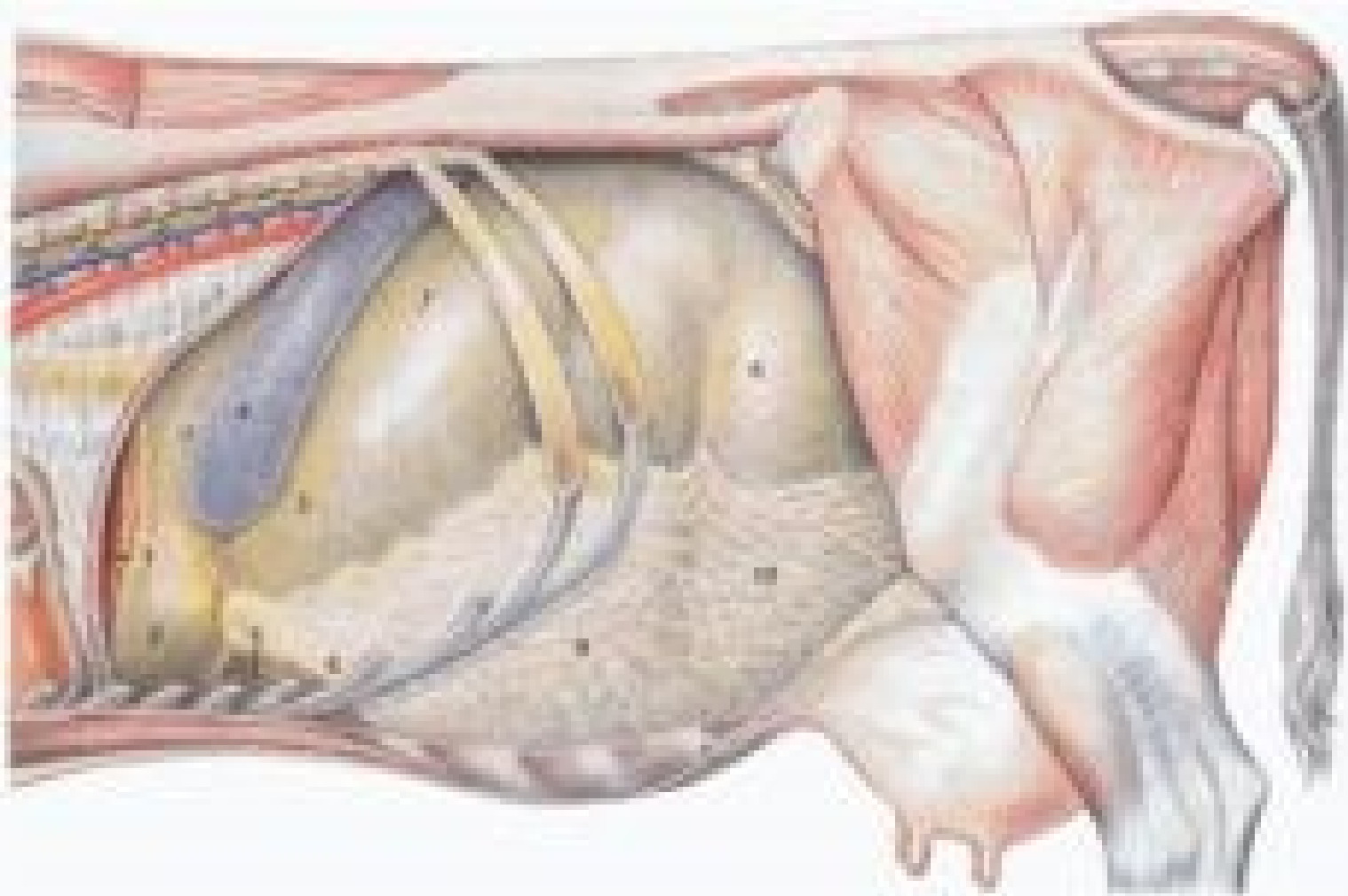
Figure 21-8 Visceral surface of the spleen. 1, Renal surface; 2, intestinal surface; 3, gastric surface; 4, greater omentum (gastrosplenic ligament); 5, splenic artery and vein; 6, retro-splenic ligament; 7, phrenicosplenic ligament.











LIMFNI SISTEM

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LIMFNI SISTEM

- Od limfopoeznih organa, limfnih sudova i limfnih čvorova.

LIMFNI ČVOROVİ (LYMPHONODI)

- Limforetikularno tkivo obavijeno vezivnotkivnom kapsulom, uklopljeno u sistem limfnih sudova - **limfni čvor.**

**Limfni čvorovi – omotač (Capsula),
kora (Cortex) i srž (Medulla).**

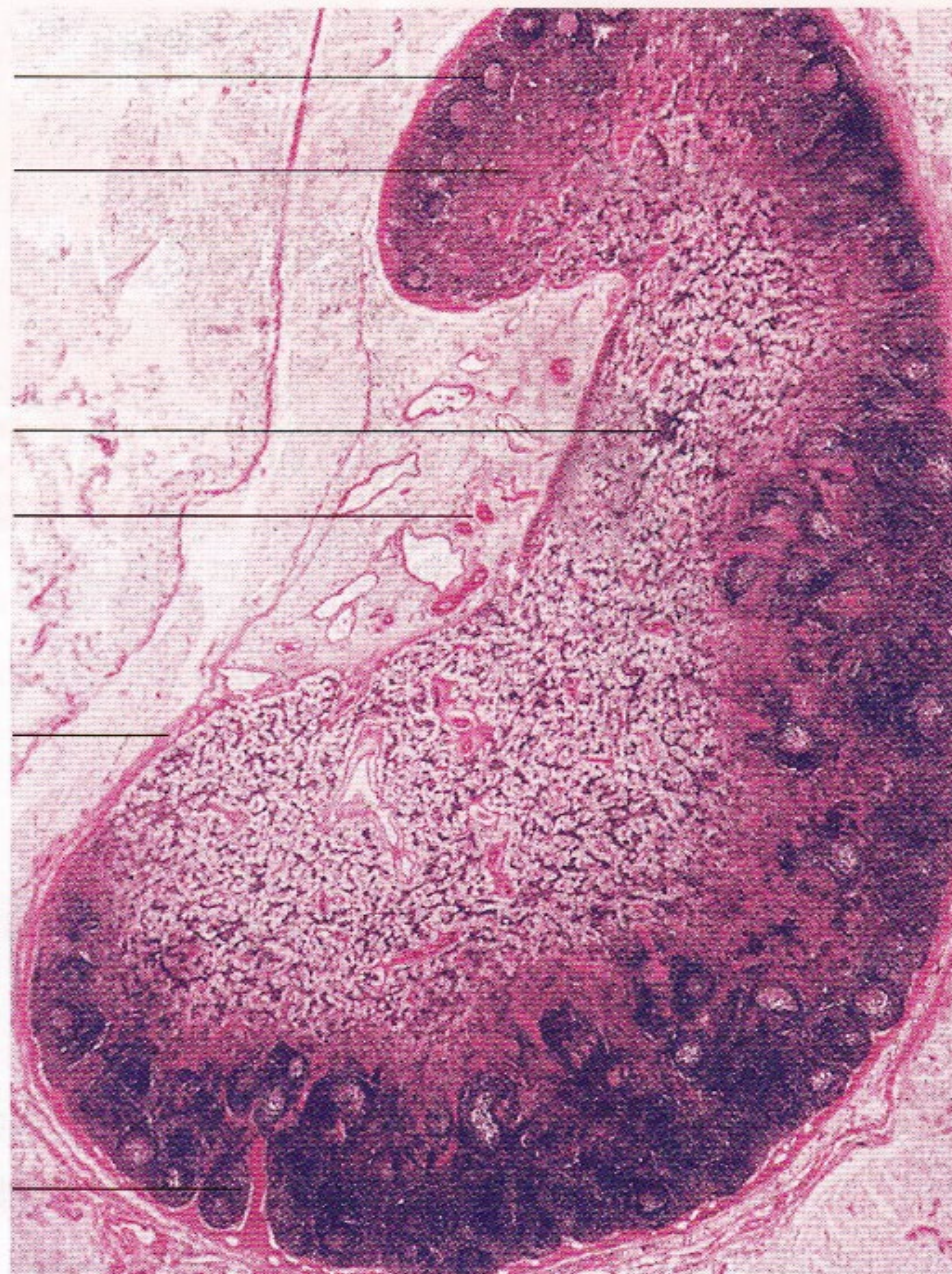
Periferni limfni
folikuli
Cortex

Medulla

Hilus

Capsula

Trabecula



Slika 13-2. Histološki presjek limfnog čvora ovce.

- Limfa dospeva u limfni čvor preko više limfnih sudova (**Vasa afferentia**). Ulivaju se u ivični sinus (**Sinus marginalis**).

- Napušta limfni čvor preko 1 ili 2 limfna suda (**Vasa efferentia**).

SLEZINA (LIEN)

- Limfopoezni organ.
- Učestvuje u odbrani organizma.
- Razgrađuju se eritrociti.

- Uloga rezervoara krvi, prilikom potrebe krv se predaje krvotoku.

- **Facies parietalis** (na dijafragmu) et **visceralis** (naležu trbušni organi, želudac, creva, bubreg).

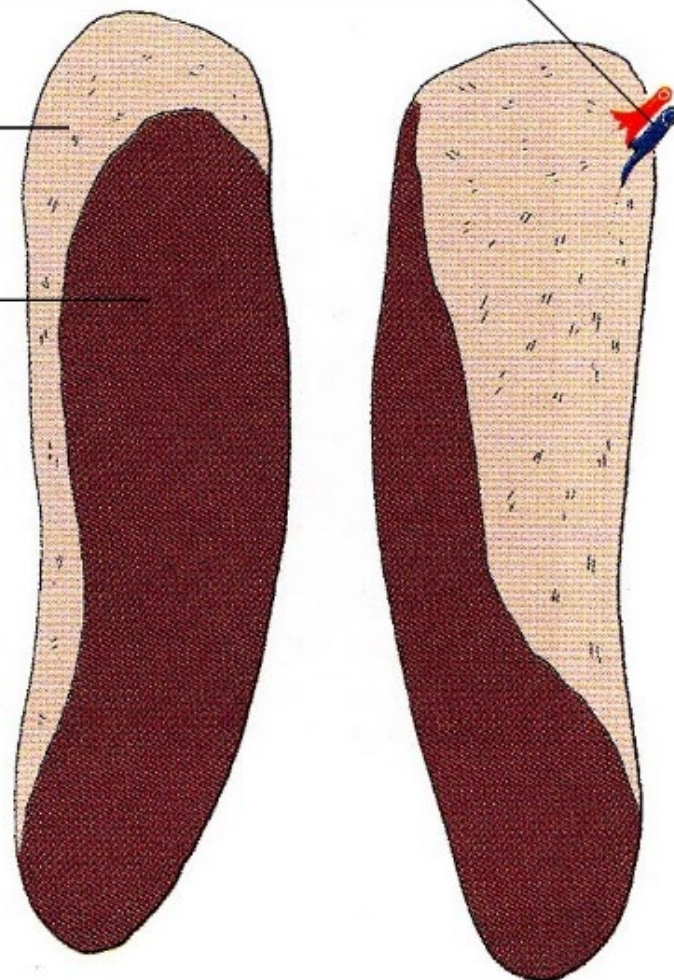
- **Margo cranialis et caudalis**
- **Extremitas dorsalis et ventralis**

- Na visc. str. - **Hilus lienis** : krvni sudovi (A. et V. lienalis), nervi (grane N. vagus et sympathicus), limfni čvorovi (Lnn. lienales).

Hilus lienis s a. i v. lienalis

Pričvrсно područje za burag

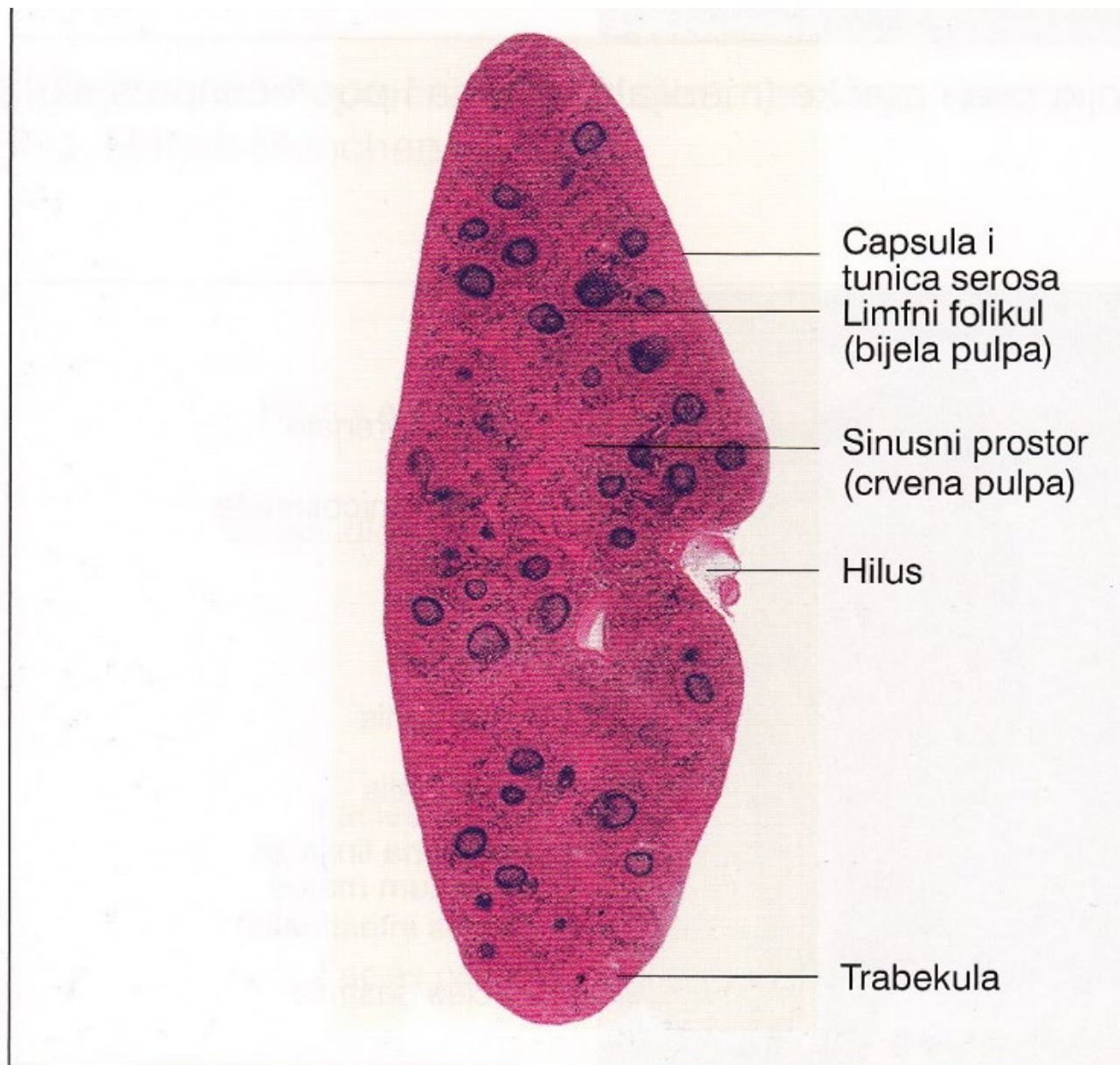
Slobodni dio prekriven
potrbušnicom



Govedo

- Spoljašnji omotač (**Capsula**), od omotača polaze pregrade - **Trabeculae lienis**.

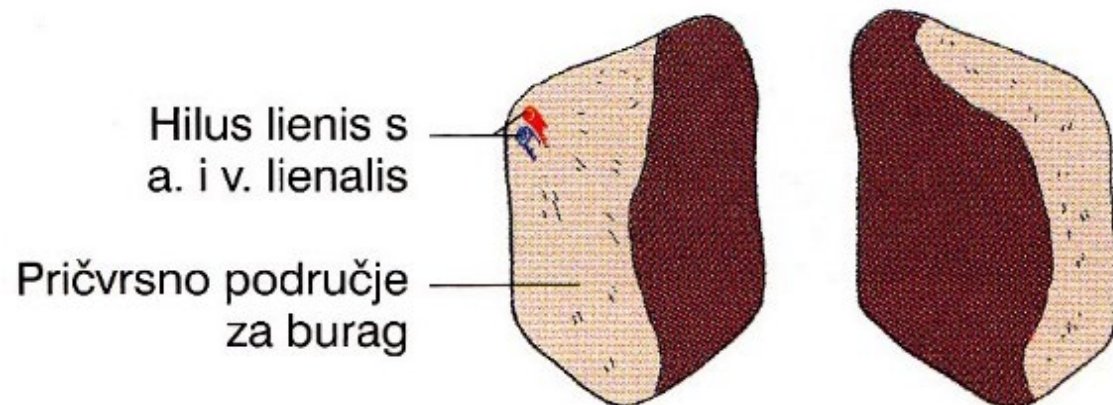
- Između **Pulpa lienis (rubra et alba)**, sadrži krvne sudove.



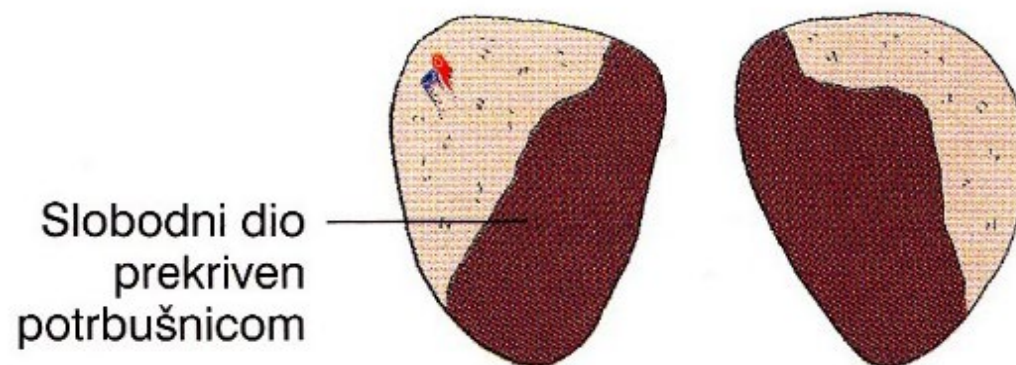
Slika 13-25. Histološki presjek kroz slezenu mačke, Liebich, 2004.

- **Slezina Ru** – uzdužno ovalna i pljosnata. Kratak Hilus. Sa buragovom vrećom preko Lig. gastrolienale, za dijafr. preko Lig. phrenicolienale.

- **Slezina Ov** – nepravilno trouglastog oblika, kratak Hilus.
- **Slezina koze** – trapezoidnog oblika.

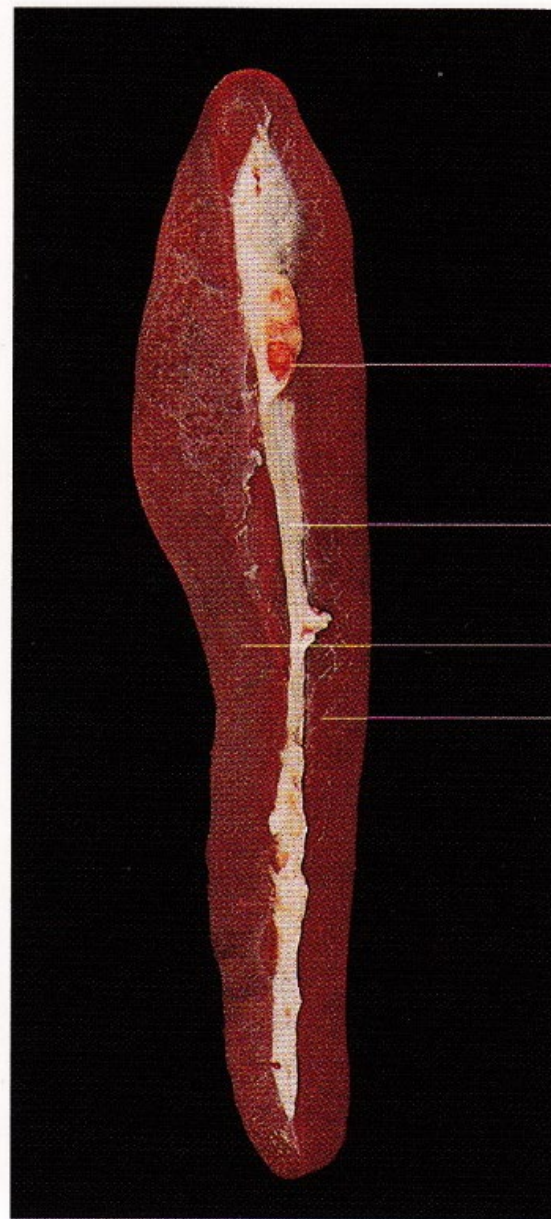


Koza



Ovca

- **Slezina su** – duga, jezičastog oblika, Hilus celom dužinom. Preko Lig. gastrolienale sa želucem.



A. i v. lienalis na hilusu

Hilus lienis s prihvatištem
omentuma majusa

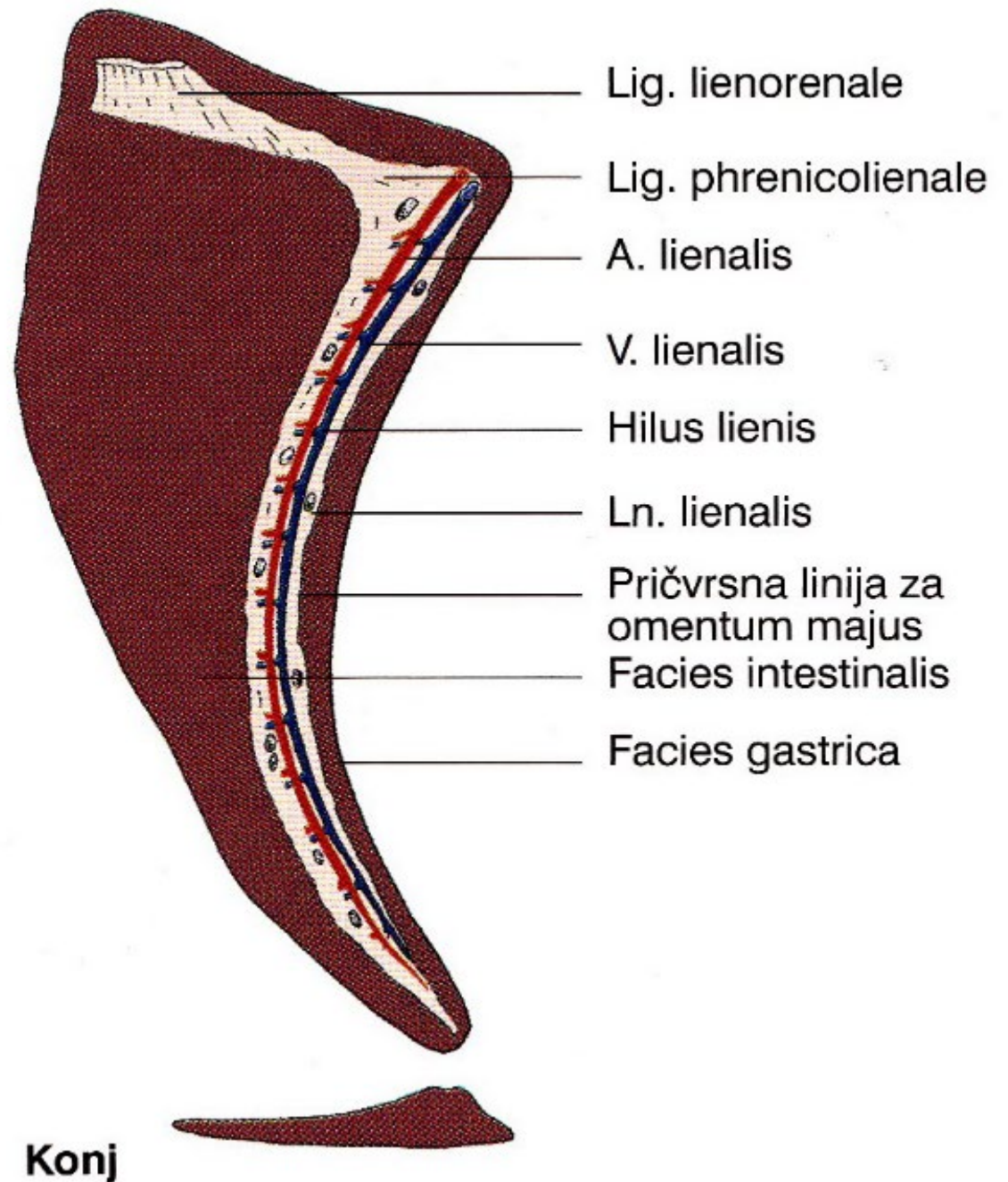
Facies intestinalis

Facies gastrica

Slika 13-19. Pogled na facies visceralis slezene svinje, snimio dr. J. Maierl, München.

- **Slezina eq** – pločasta u obliku srpa.
Hilus celom dužinom. Za želudac
preko Lig. gastrolienale.

- Za dijafragmu preko Lig. phrenicolienale, sa levim bubregom preko Lig. renolienale.



- **Slezina Car** – pločasta, jezičastog oblika, u sredini uža, ventr. kraj proširen. Hilus celom dužinom. Za želudac preko Lig. gastrolienale.



Pas



Mačka

Extremitas dorsalis

Hilus lienis

Pričvrсна linija za
omentum majus

Facies gastrica

Facies intestinalis

A. i v. lienalis

Extremitas ventralis

THYMUS

- Limfopoezni organ kod mladih.
- Uloga u izgradnji limfocita.
- Pars (lobus) cervicalis (**Ru, su**)
- Pars thoracalis (Spatium med. precordiale)

- Obavijen vezivnotkivnom kapsulom, polaze pregrade i dele žlezdu na lobuse i lobuluse.
- **Lobulus** – osnovna morf. i funkc. jedinica timusa (srž i kora).

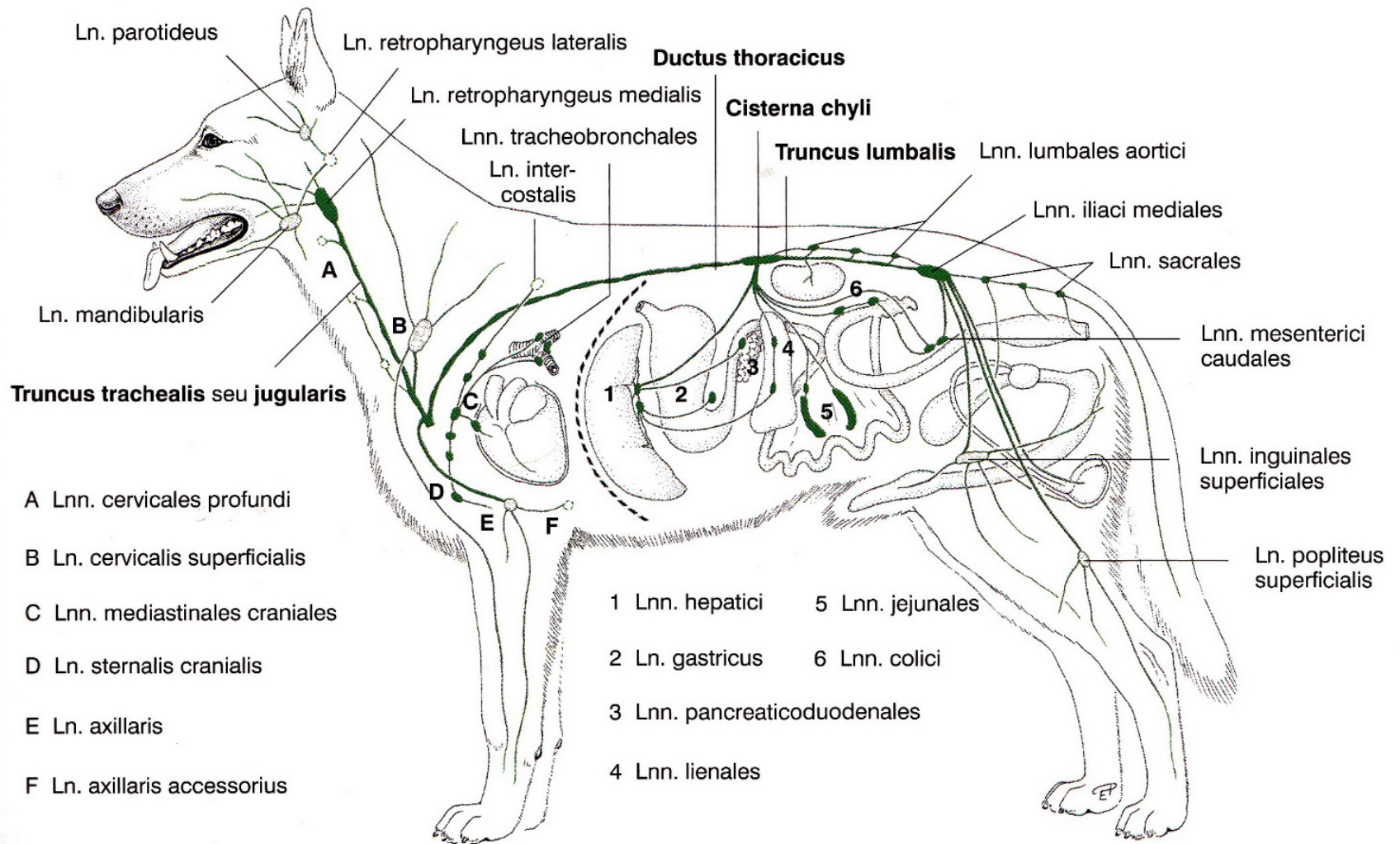
LIMFNI SUDOVI (VASA LYMPHATICA)

- **VELIKI LIMFNI SUDOVI :**
 - 1. Ductus thoracicus**
 - 2. Truncus lymphaticus dexter**

- **Ductus thoracicus** – počinje limfnim rezerv. (**Cisterna chyli**) u predelu 1. slab. p. Ulazi u grudnu d. kroz Hiatus aorticus, zatim u V. cava cranialis.

- Prima limfu iz zad. ekstr., karlične i trbušne d., leve polovine grudne d. i levog pred. ekstremiteta.

- Pre ušća u V. cava cranialis, uliva se veći limfni sud – **Truncus jugularis sinister**, sakupio limfu iz leve polovine glave i vrata.



- **Truncus lymphaticus dexter** – iz desne polovine glave i vrata, desnog pred. ekstremiteta i desne polovine grudne d.

LIMFNI SISTEM GLAVE

- **Limfni centar – Lymphocentrum (Lc.) - funkcionalno slične grupe. 3 limfna centra :**
 - 1. Lc. parotideum**
 - 2. Lc. mandibulare**
 - 3. Lc. retropharyngeum**

1. Lc. parotideum – Lnn. parotidei
ventralno od mandibularnog zgloba,
kod **ca** kaudalno.

**2. Lc. mandibulare – Lnn.
mandibulares - u Spatium
mandibulae.**

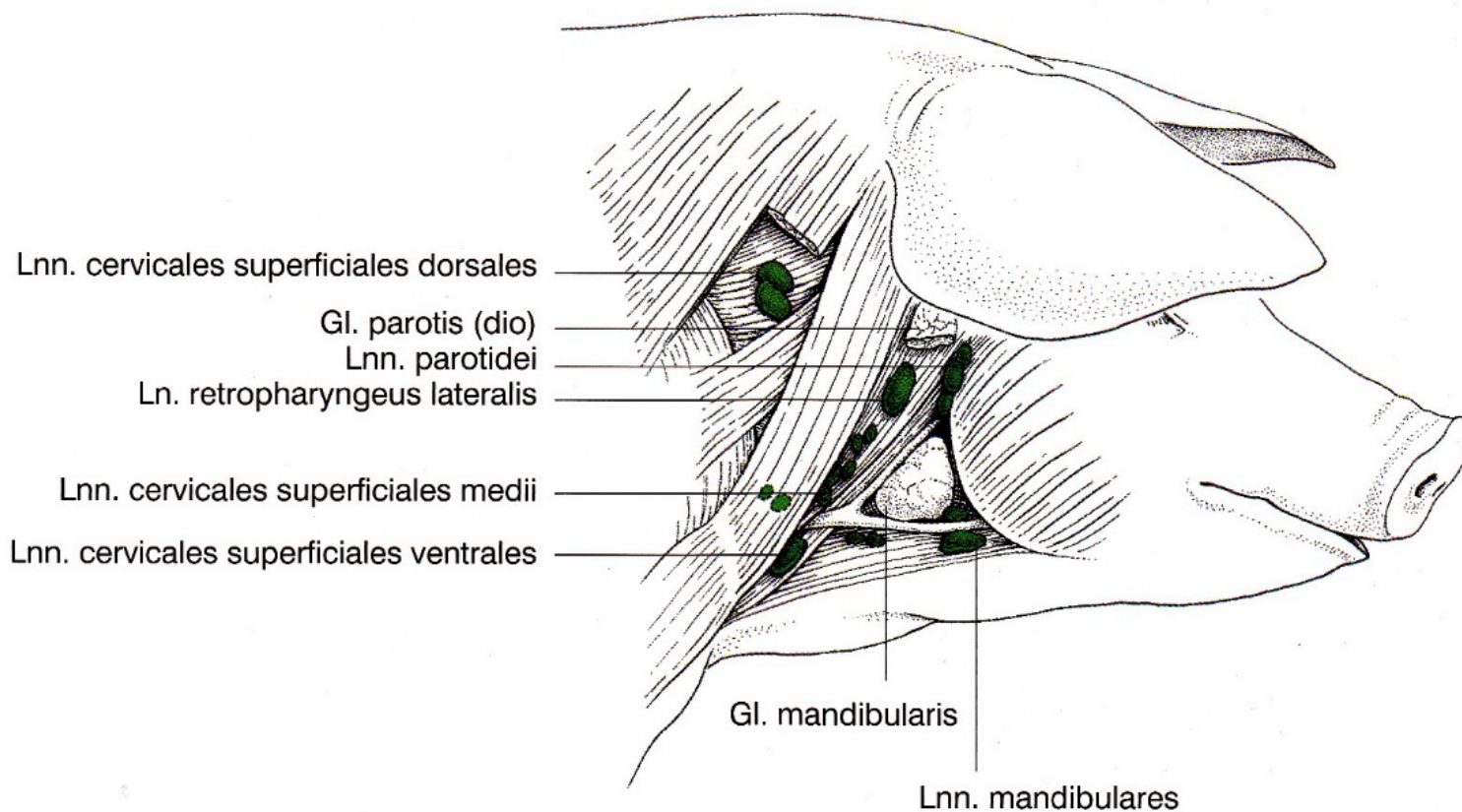


Lnn. mandibulares

**3. Lc. retropharyngeum : Lnn.
retropharyngei laterales (u blizini
krila atlasa) et mediales (Pharynx).**

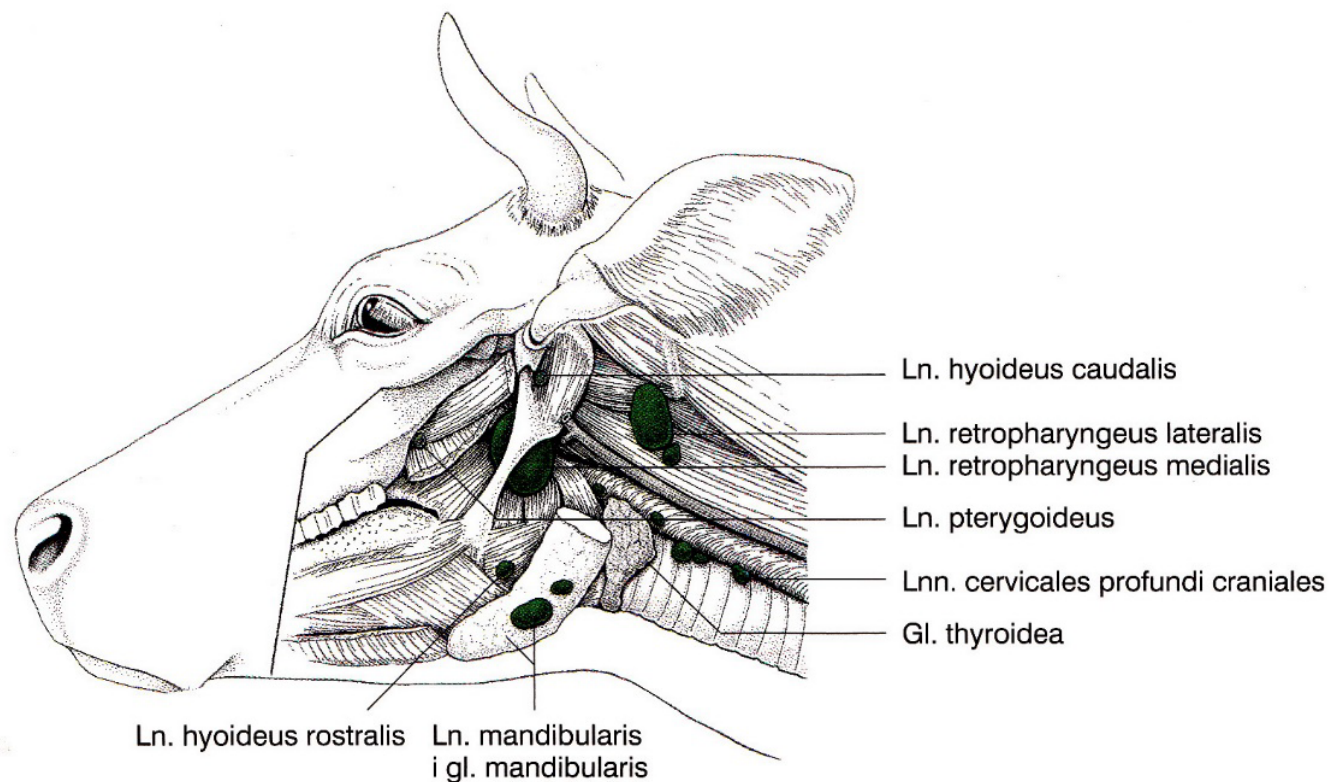
LIMFNI SISTEM VRATA

- 2 limfna centra :
 1. **Lc. cervicale superficiale – Lnn. cervicales superficiales.** Kod su dorsales, medii et ventrales, kod Ru accessorii.



Slika 13-8. Shematski prikaz limfnih čvorova glave i prednjeg dijela vrata svinje, Najbrt, 1982.

**2. Lc. cervicale profundum – Lnn.
cervicales profundi craniales, medii
et caudales.**



Slika 13-9. Shematski prikaz dubokih limfnih čvorova na glavi i na prednjem dijelu vrata goveda, Najbrt, 1982.

LIMFNI SISTEM PREDNJIH EKSTREMITETA

- **Lc. axillare obuhvata :**
 - 1. Lnn. axillares proprii** (nema su)
 - 2. Lnn. axillares primae costae** (nema eq i ca)
 - 3. Lnn. axillares accessorii** (nalaze se kod Car, ponekad kod Bo i Ov)

- 4. Lnn. cubitales (kod eq i Ov)**
- 5. Ln. infraspinatus (kod Bo)**

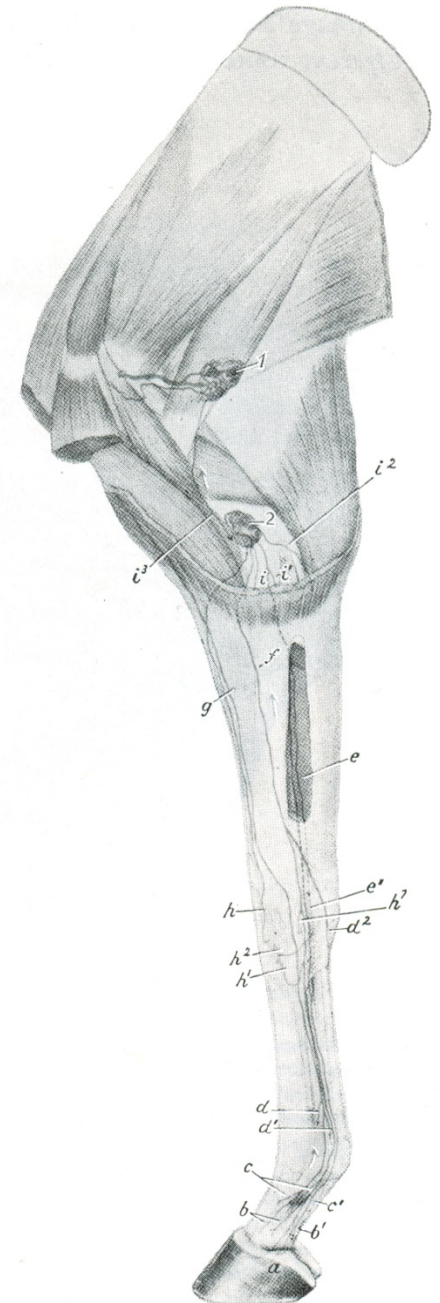


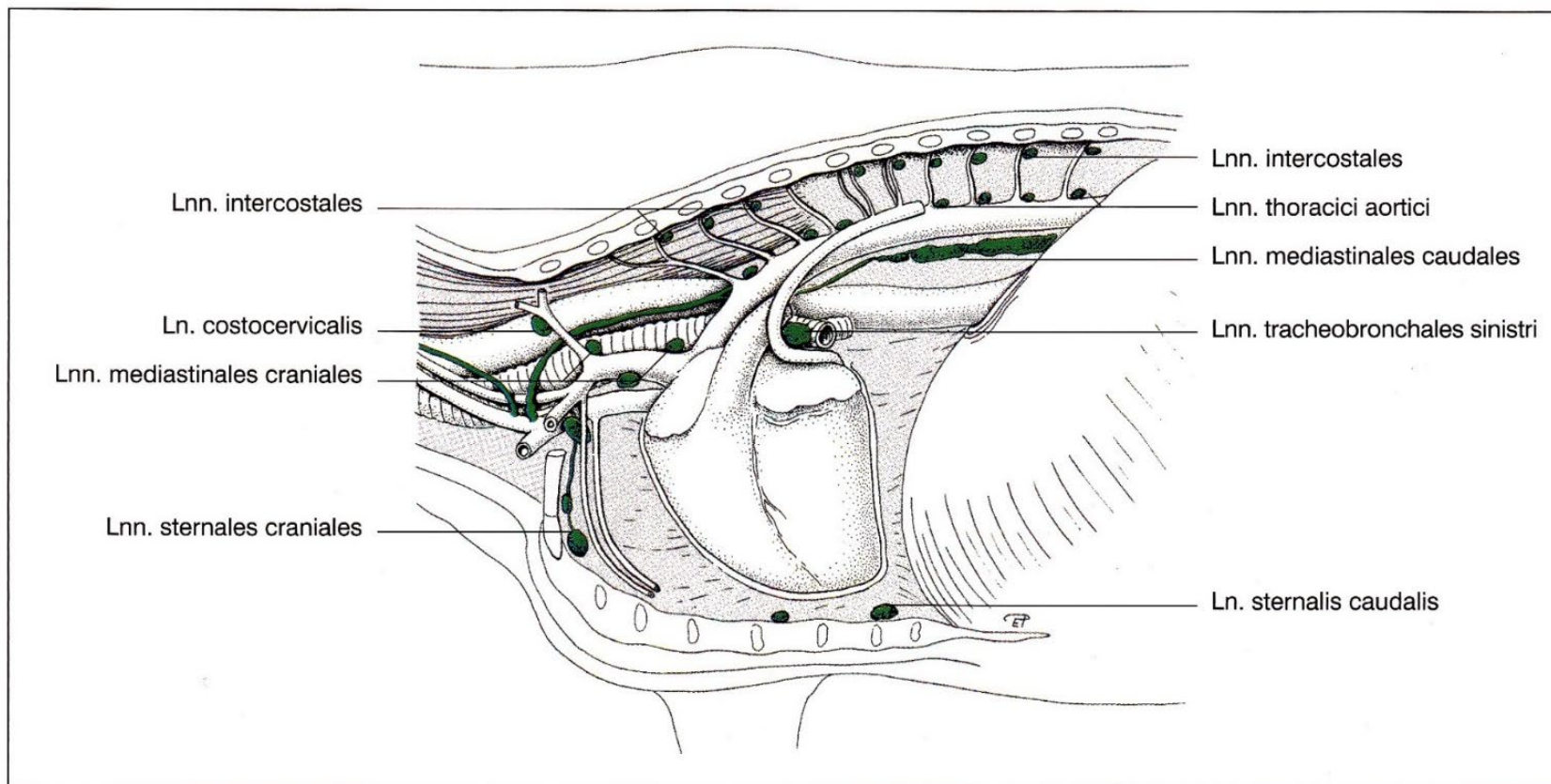
Fig. 324. Deep vessels and lymph nodes of the pectoral limb of the horse. Medial view.
(After Baum, 1928.)

1 nll. axillares proprii, 2 nll. cubitales

a lymph vessels of hoof and coffin joint, *b*, *b'* of pastern, *c*, *c'* of fetlock, *d*, *d'*, *d*² lymph vessels running from lateral to medial side, *e*, *e'* deep, *f*, *g* superficial vessels to cubital nodes, *b*, *b'*, *b*¹, *b*², lymph vessels of carpal joint, *i*, *i'*, *i*², *i*³ elbow joint

LIMFNI SISTEM ZIDA I ORGANA GRUDNE DUPLJE

- 4 limfna centra :
 1. **Lc. thoracicum dorsale :**
 - a) **Lnn. thoracici aortici**
 - b) **Lnn. intercostales**

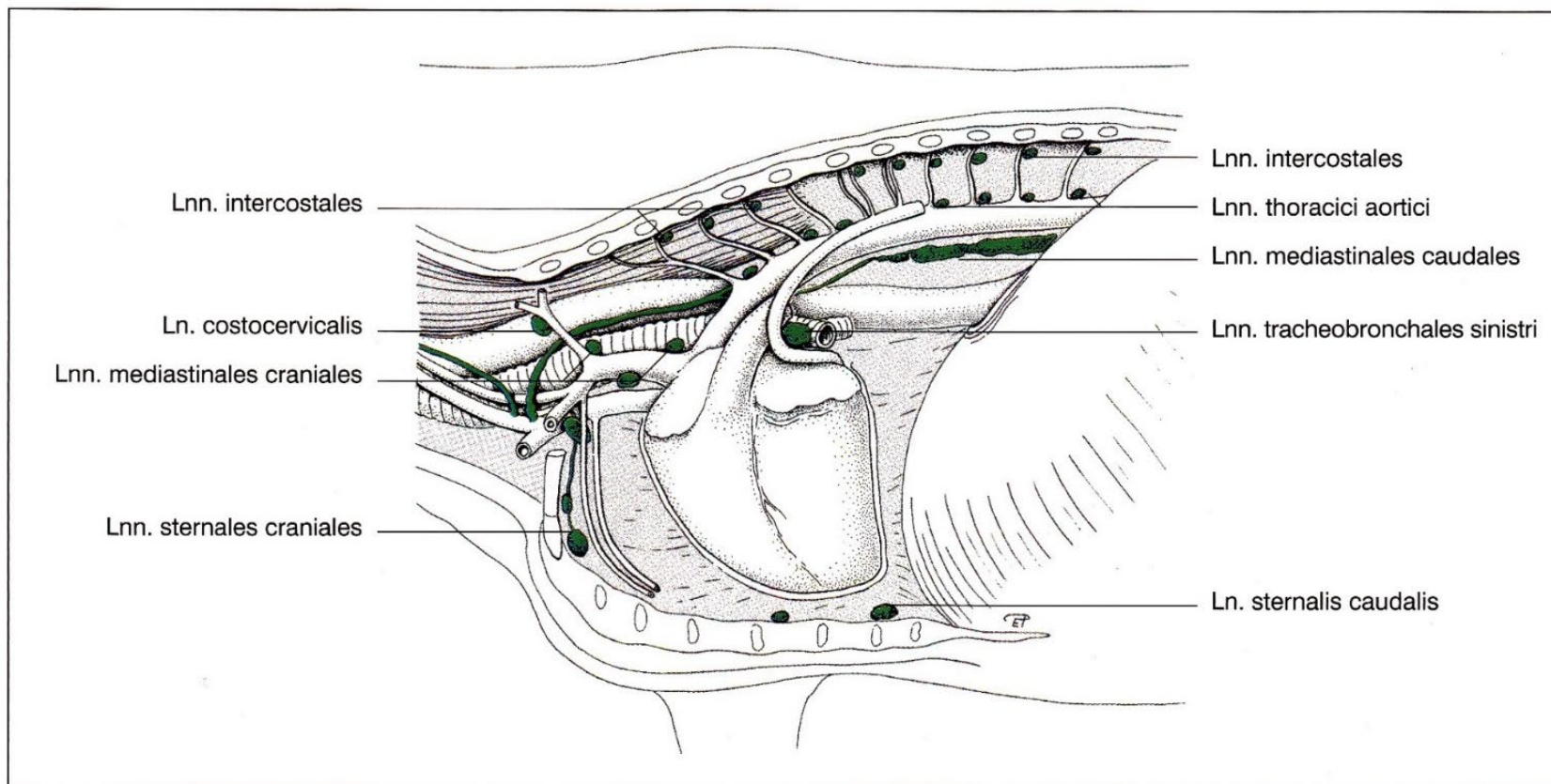


Slika 13-10. Shematski prikaz limfnih čvorova prsne šupljine goveda, Najbrt, 1982.

2. Lc. thoracicum ventrale :

a) Lnn. sternales craniales

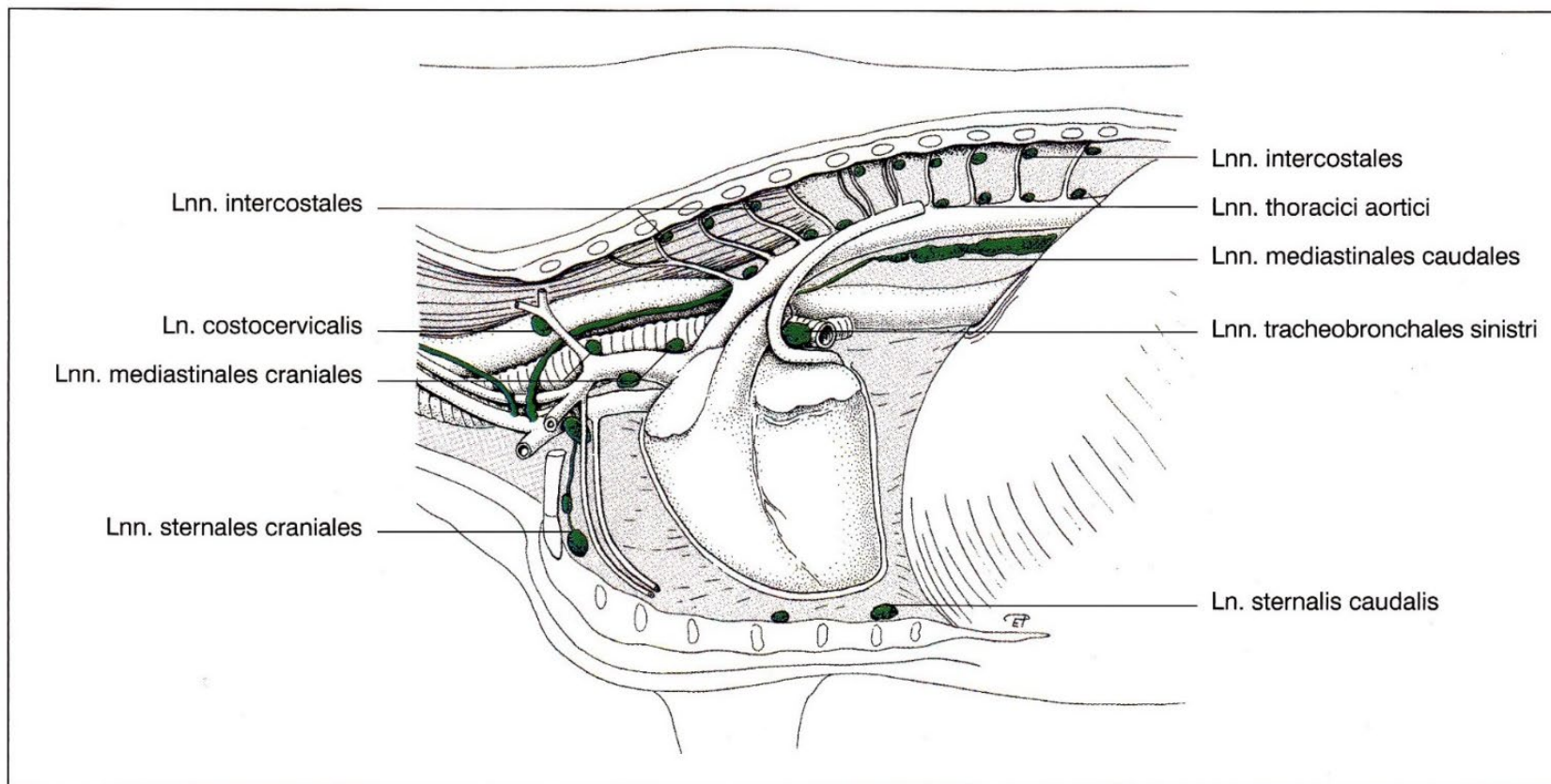
b) Lnn. sternales caudales



Slika 13-10. Shematski prikaz limfnih čvorova prsne šupljine goveda, Najbrt, 1982.

3. Lc. mediastinale :

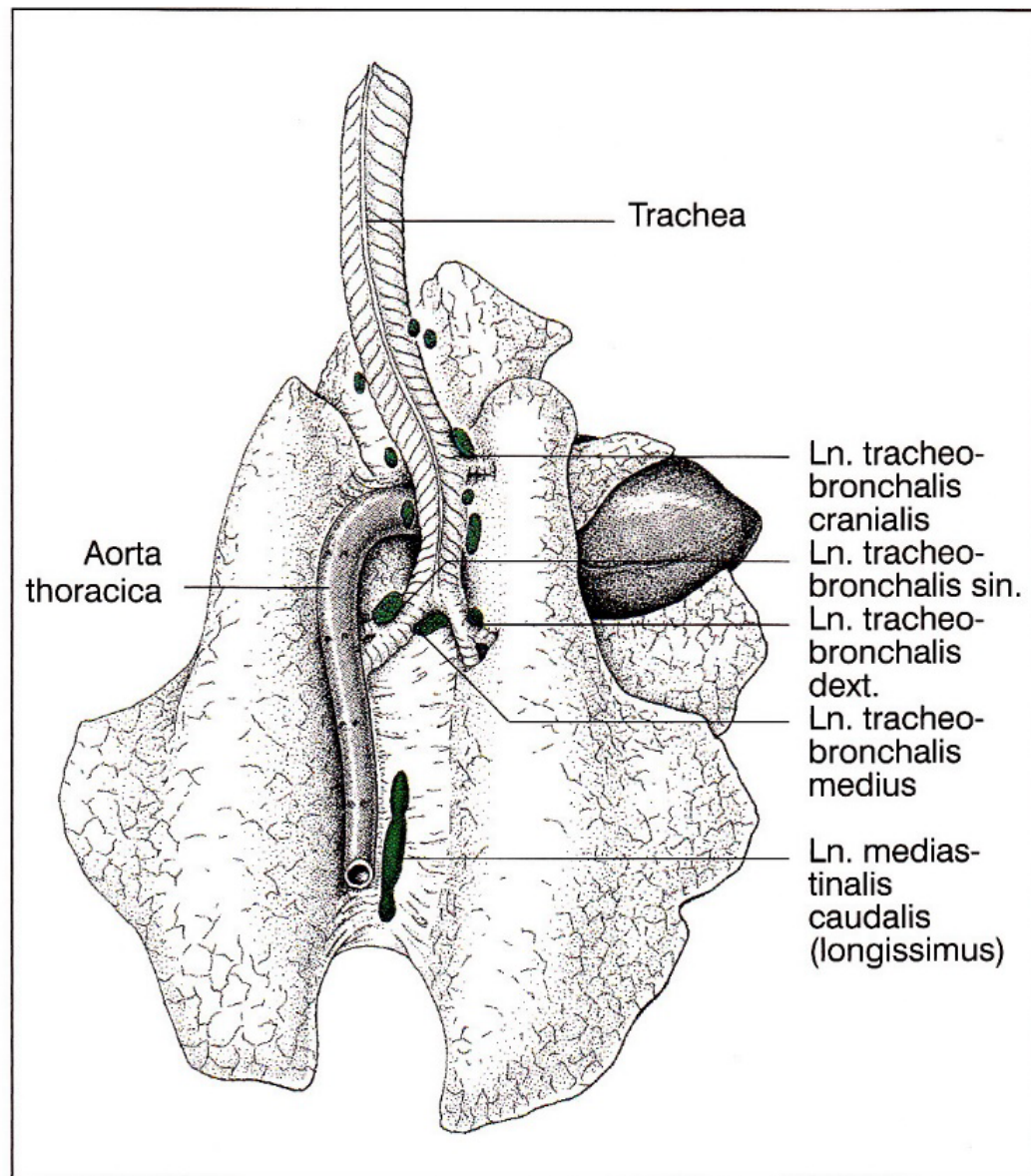
- a) Lnn. mediastinales craniales – Kod eq i
Ln. nuchalis.**
- b) Lnn. mediastinales medii – nema su i
Car**
- c) Lnn. mediastinales caudales - nema Car**



Slika 13-10. Shematski prikaz limfnih čvorova prsne šupljine goveda, Najbrt, 1982.

4. Lc. bronchale

- a) Lnn. bifurcationes (tracheobronchales)
dextri, sinistri et medii**
- b) Lnn. tracheobronchales craniales kod su
i Ru**
- c) Lnn. pulmonales**

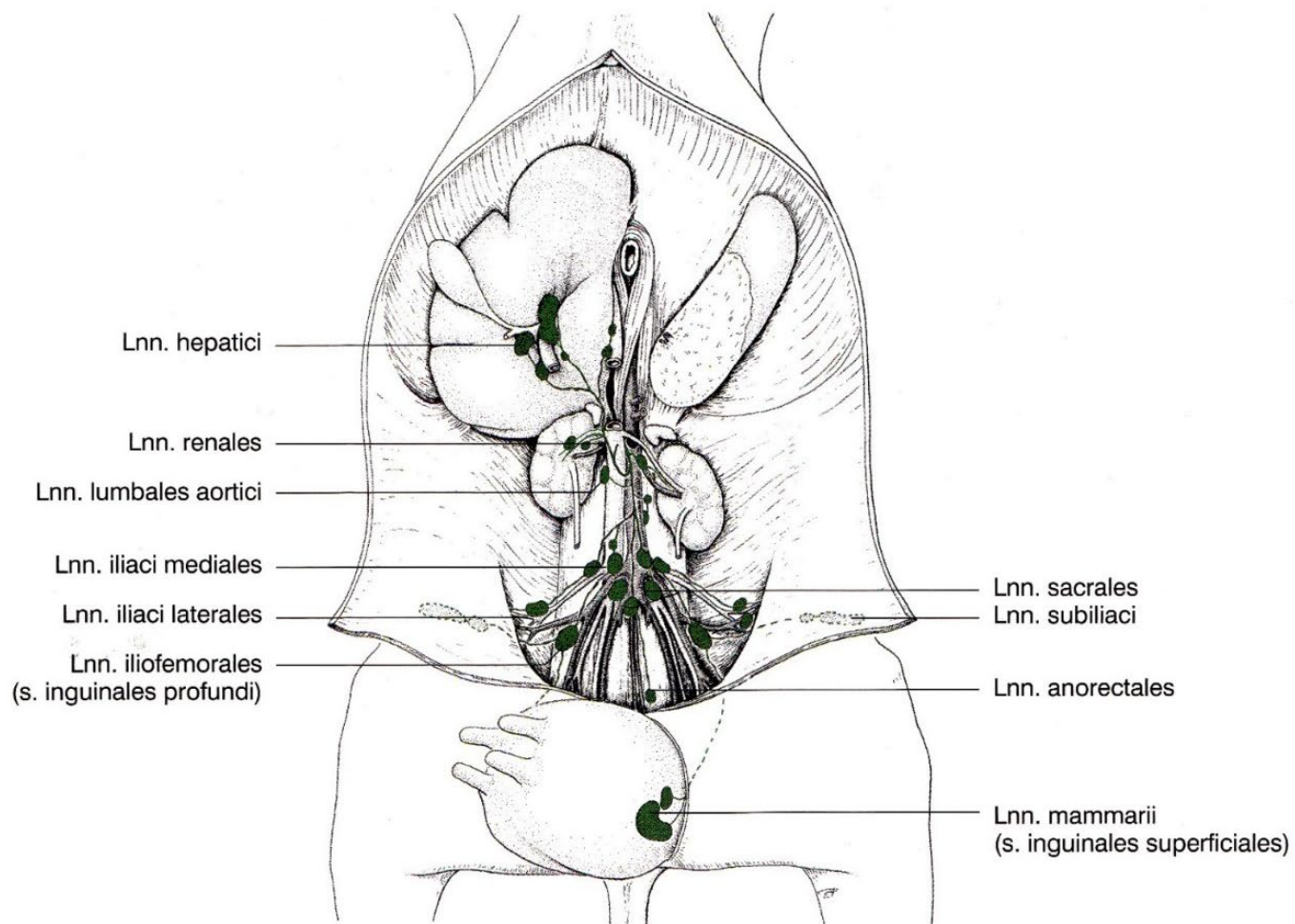


Slika 13-11. Shematski prikaz limfnih čvorova pluća u goveda (dorzalna strana), Najbrt, 1982.

LIMFNI SISTEM DORZALNOG TRBUŠNOG ZIDA I TRBUŠNIH ORGANA

- 4 limfna centra :

**1. Lc. lumbale – Lnn. lumbales aortici i
Lnn. renales. Kod Bo i Lnn. lumbales
proprii. Kod su i Ln.
phrenicoabdominalis**

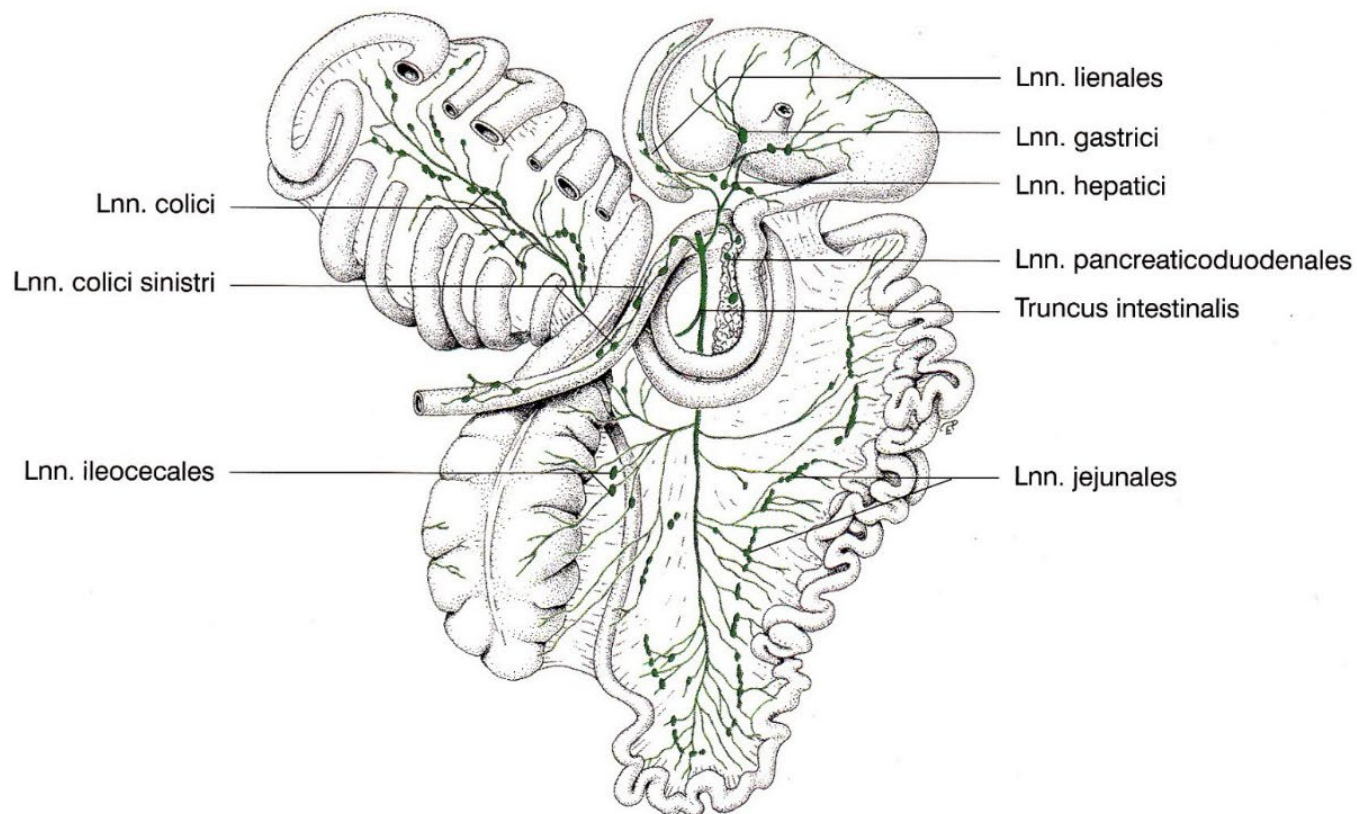


Slika 13-14. Limfni čvorovi i sabirne limfne žile trbušne i zdjelične šupljine goveda (djelomični pregled), Baum, 1912.

**2. Lc. celiacum – Lnn. celiaci et
mesenteriales kod Ru. Lnn. celiaci su
i eq. Lnn. lienales. Lnn. gastrici kod
su.**

- **Lnn. ruminales dextri, sin. et
craniales. Lnn. reticulares. Lnn.
omasiales. Lnn. rumino et
reticuloabomasiales.**

- **Lnn. abomasiales dorsales et ventrales. Lnn. hepatici. Lnn. pancreaticoduodenales. Lnn. omentales kod eq.**



Slika 13-13. Limfni čvorovi crijeva svinje s limfnim čvorovima želuca, slezene, jetre i gušterače i njihove sabirne žile, Najbrt, 1982.

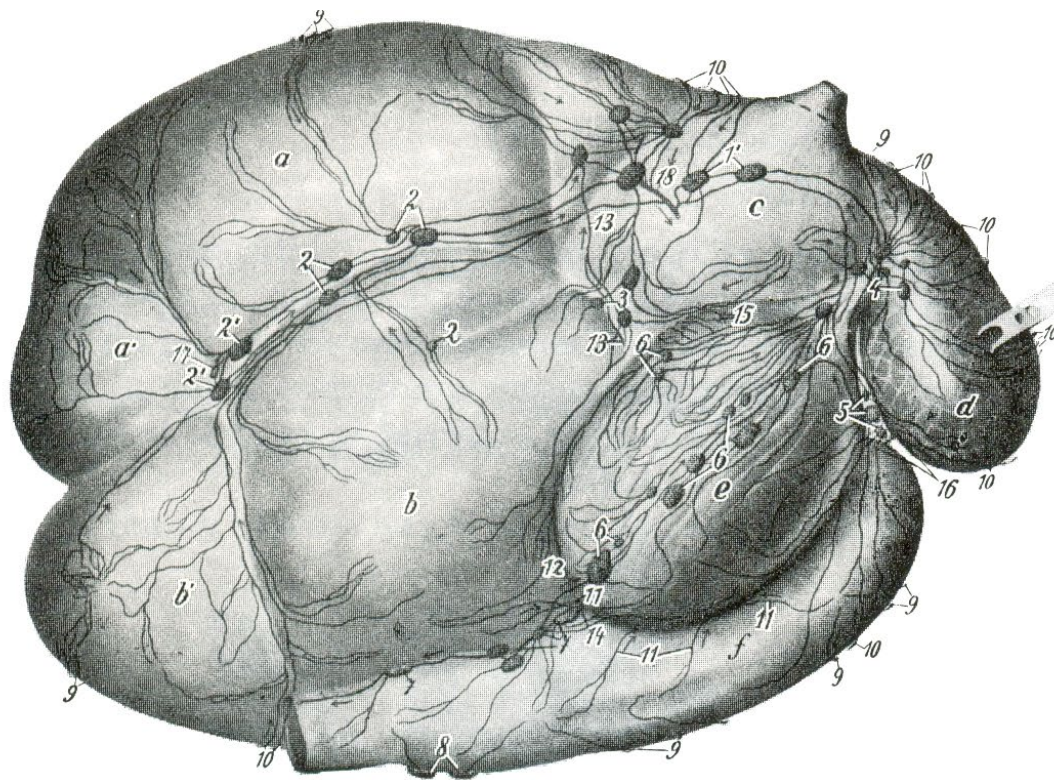


Fig. 302. Lymph vessels and lymph nodes on the right surface of the stomach of the ox.

(After Baum, 1912.)

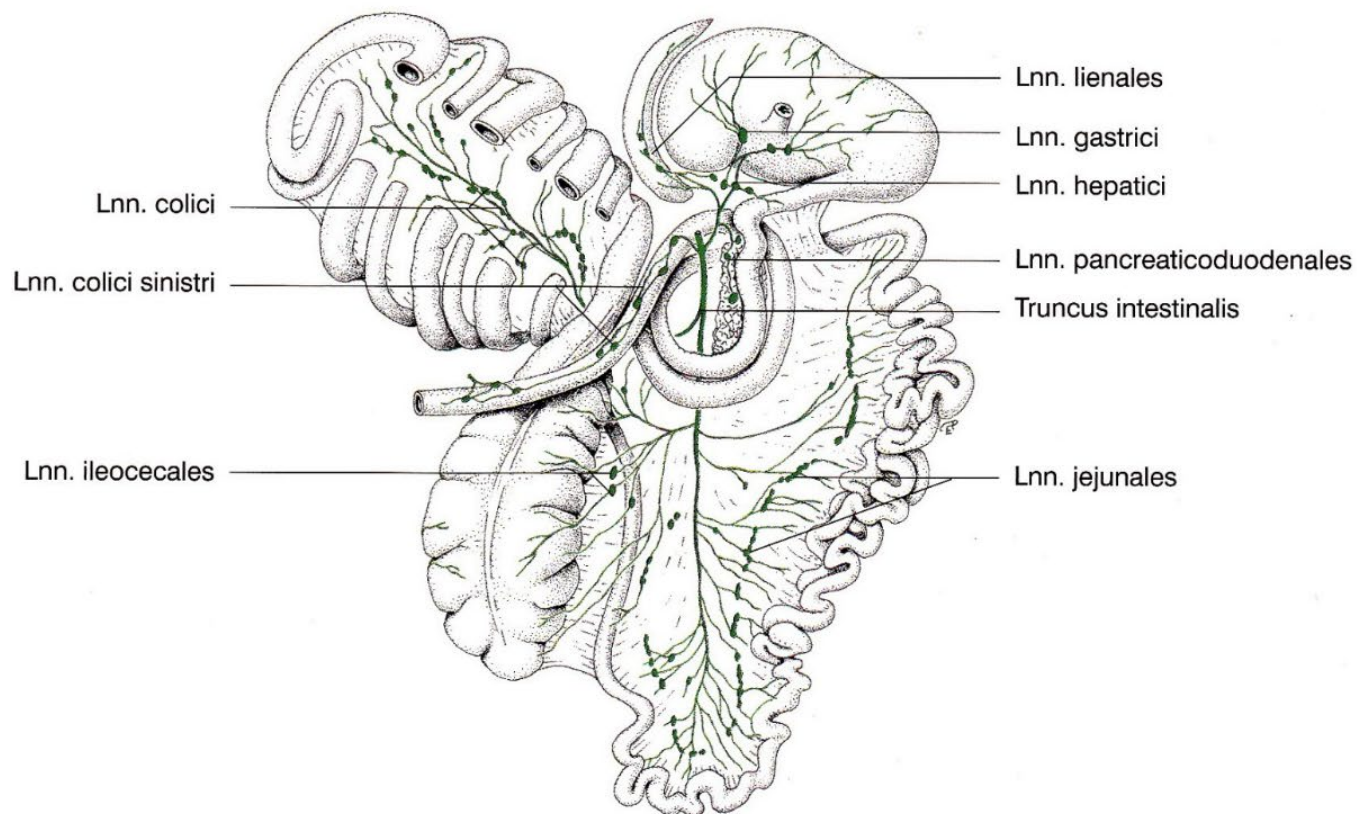
The vasa efferentia are drawn as thicker lines to distinguish them from the others

a dorsal sac of the rumen, *a'* caudodorsal blind sac, *b* ventral sac of the rumen, *b'* caudoventral blind sac, *c* atrium of the rumen, *d* reticulum, *e* omasum, *f* abomasum

1, 1' nll. lienales seu atriales, 2, 2' nll. ruminales dextri, 3 nll. ruminales craneales, 4 nll. reticulares, 5 nll. reticuloabomasiales, 6 nll. omasiales, 7 nll. abomasiales dorsales, 8 nll. abomasiales ventrales, 9, 9 lymph vessels curving from the right to the left side, 10, 10 lymph vessels curving from the left to the right side, 11, 11 lymph vessels going to the reticuloabomasal nodes, 12 lymph vessels going to the cranial ruminal nodes, 13 efferent vessels of the left ruminal nodes, 14 efferent vessels terminating in the ruminoabomasal nodes, 15 lymph vessels of the omasum going to the reticuloabomasal nodes, 16 efferent vessels of the ruminoabomasal nodes, 17 lymph vessels from the left side, 18 truncus gastricus.

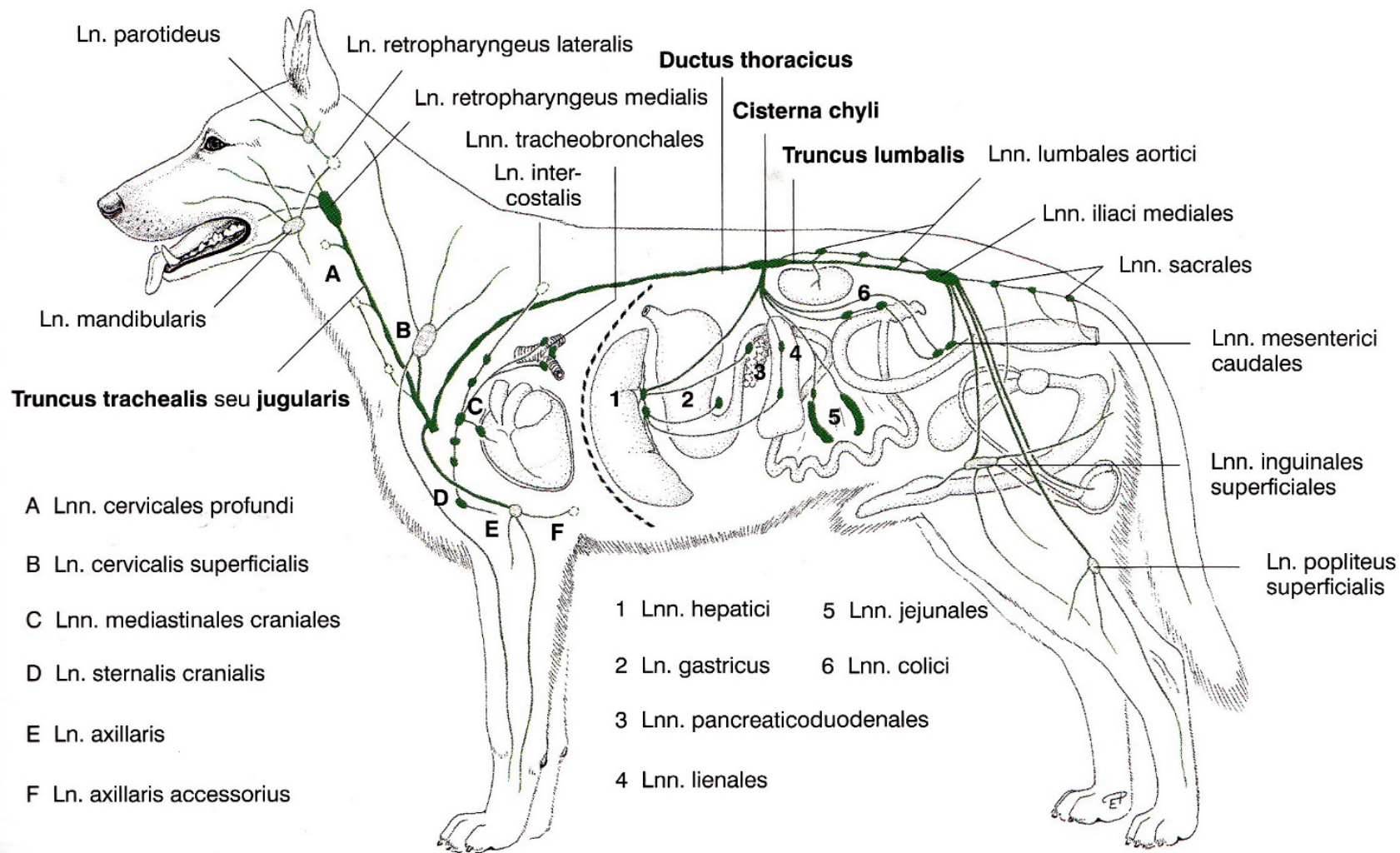
3. Lc. mesentericum craniale :

- a) Lnn. mesenterici craniales – nema Car**
- b) Lnn. jejunales**
- c) Lnn. ileocolici – kod su**
- d) Lnn. colici**
- e) Lnn. cecales – kod eq i Bo**



Slika 13-13. Limfni čvorovi crijeva svinje s limfnim čvorovima želuca, slezene, jetre i gušterače i njihove sabirne žile, Najbrt, 1982.

4. Lc. mesentericum caudale – Lnn. mesenterici caudales



LIMFNI SISTEM BOČNOG I VENTRALNOG TRBUŠNOG ZIDA, KARLICE I ZAD. EKSTR.

- 5 limfnih centara :

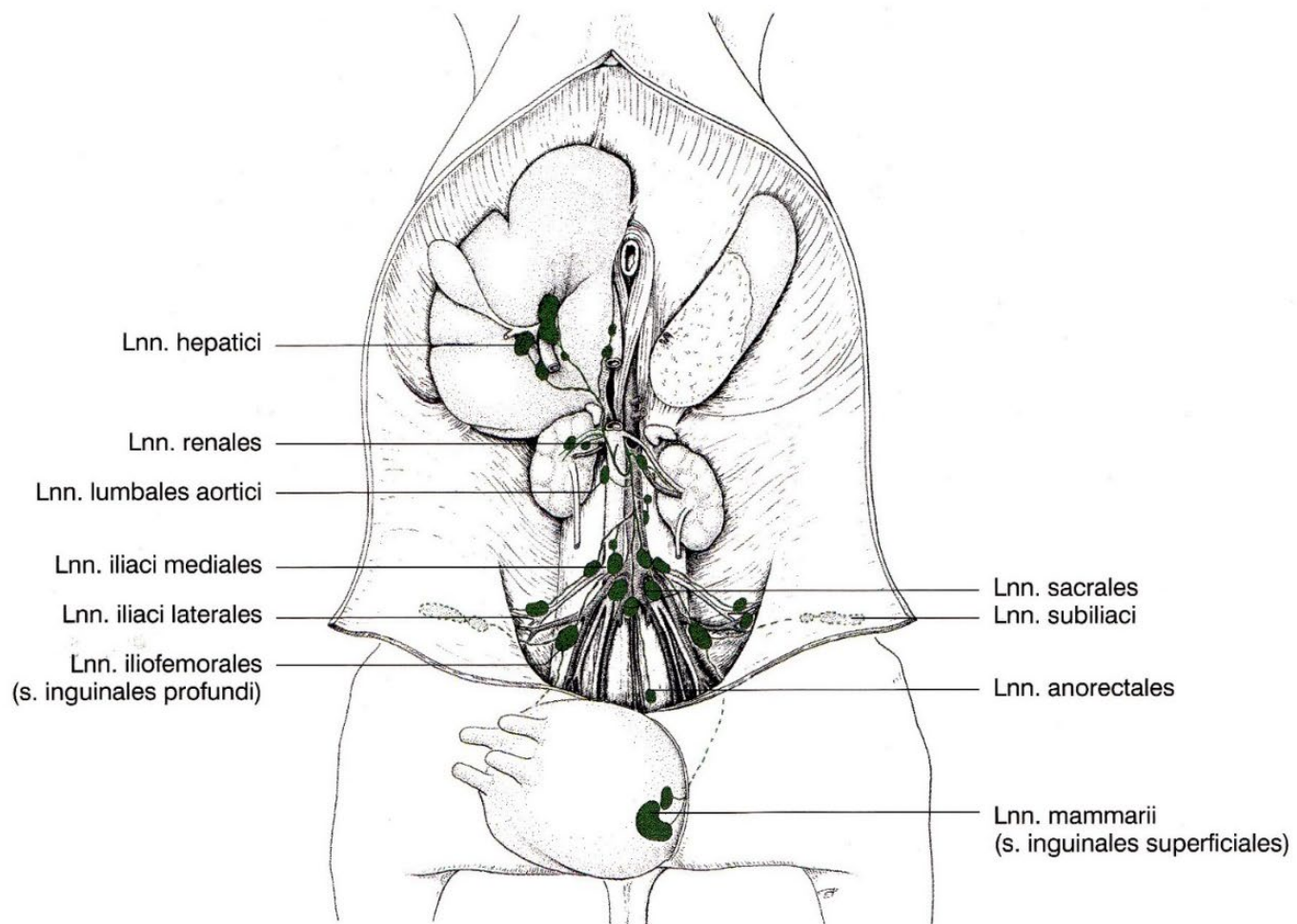
1. Lc. iliosacrale :

a) Lnn. iliaci mediales

b) Lnn. iliaci lat. - nema koza i Car

c) Lnn. sacrales

d) Lnn. anorectales

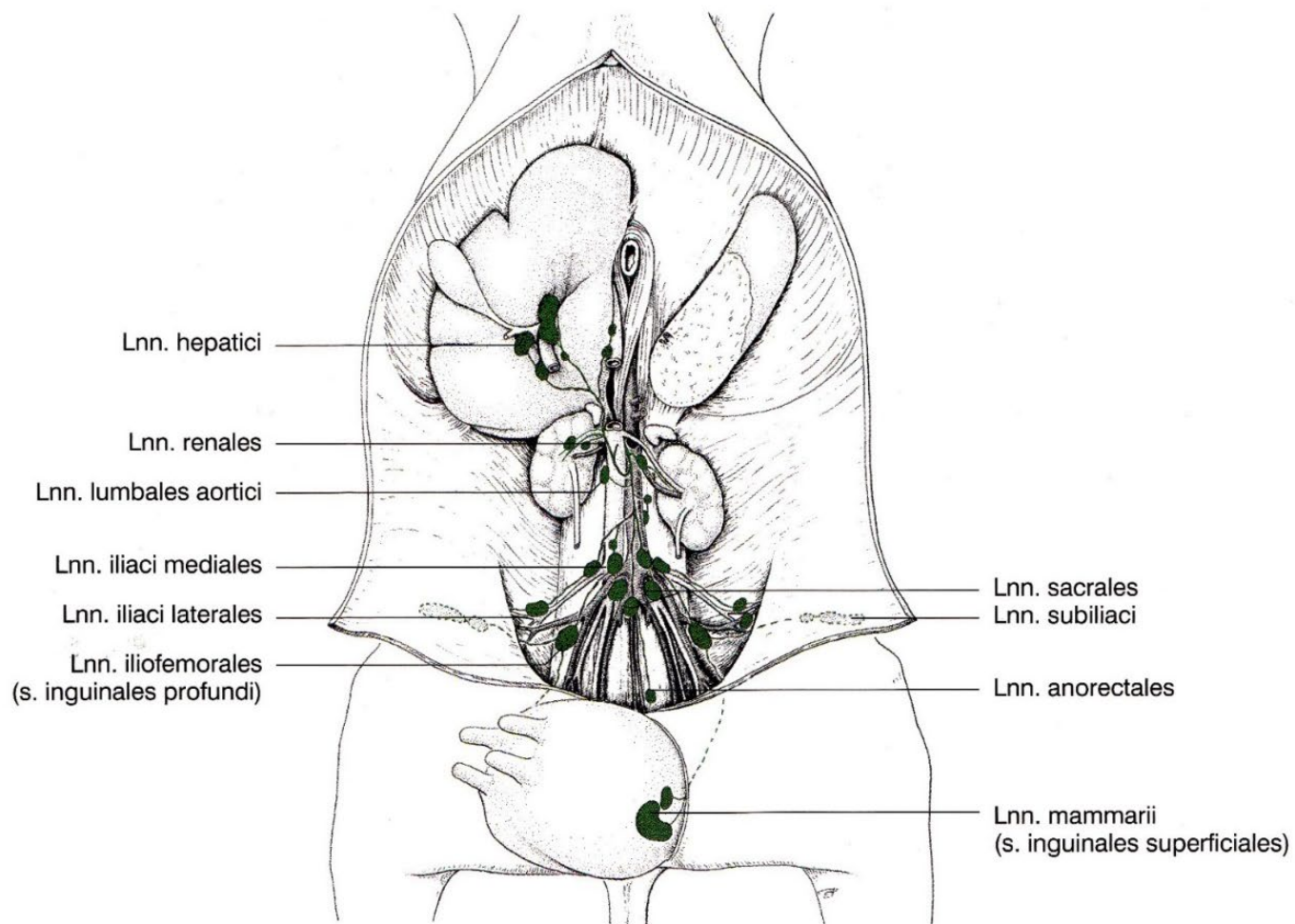


Slika 13-14. Limfni čvorovi i sabirne limfne žile trbušne i zdjelične šupljine goveda (djelomični pregled), Baum, 1912.

2. Lc. inguinale profundum :

a) Lnn. iliofemorales – kod Bo, su, Car

**b) Lnn. inguinales profundi - Ln. femoralis
kod Car.**

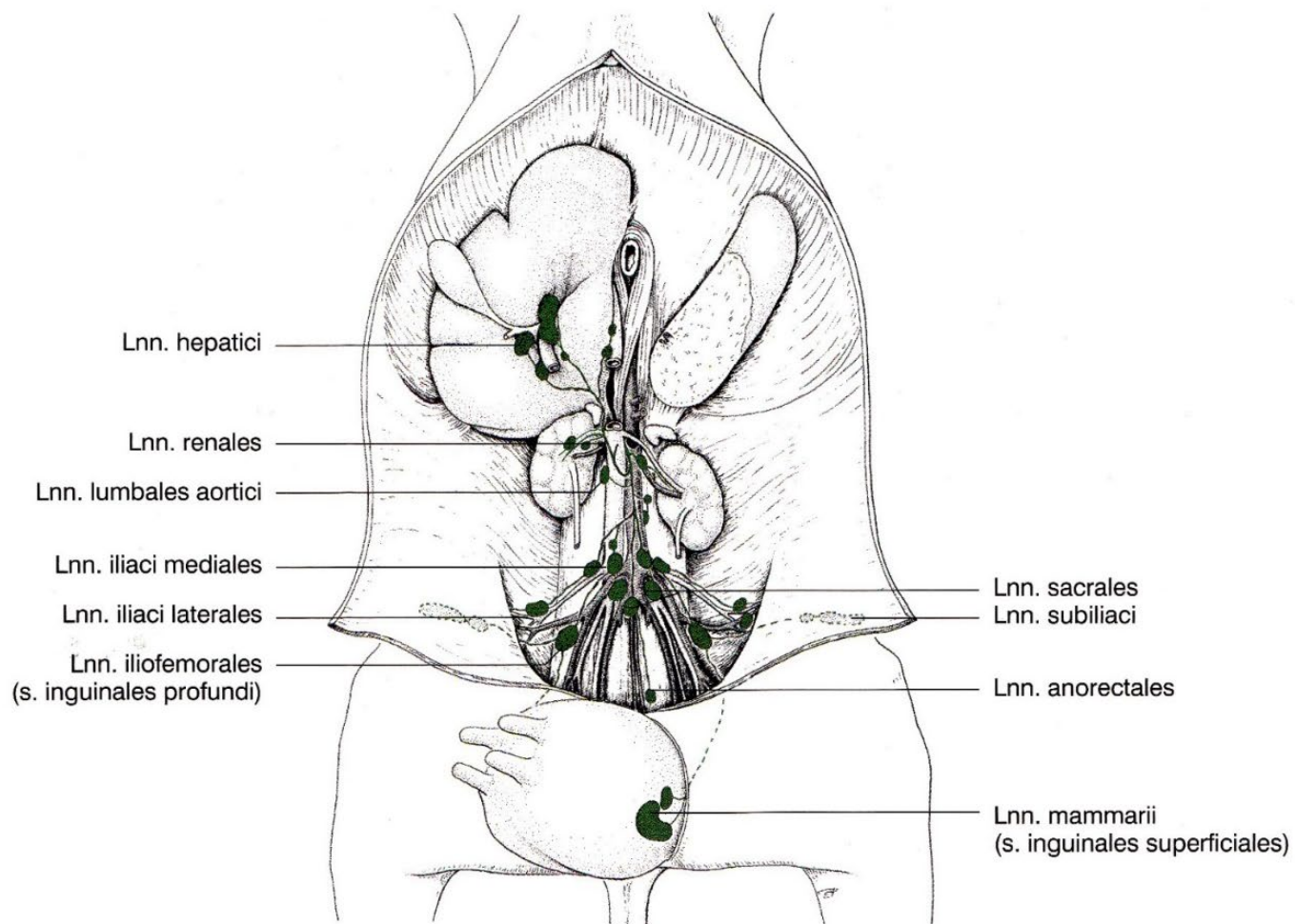


Slika 13-14. Limfni čvorovi i sabirne limfne žile trbušne i zdjelične šupljine goveda (djelomični pregled), Baum, 1912.

3. Lc. inguinale superficiale :

a) Lnn. inguinales superficiales

b) Lnn. subiliaci - nema Car



Slika 13-14. Limfni čvorovi i sabirne limfne žile trbušne i zdjelične šupljine goveda (djelomični pregled), Baum, 1912.

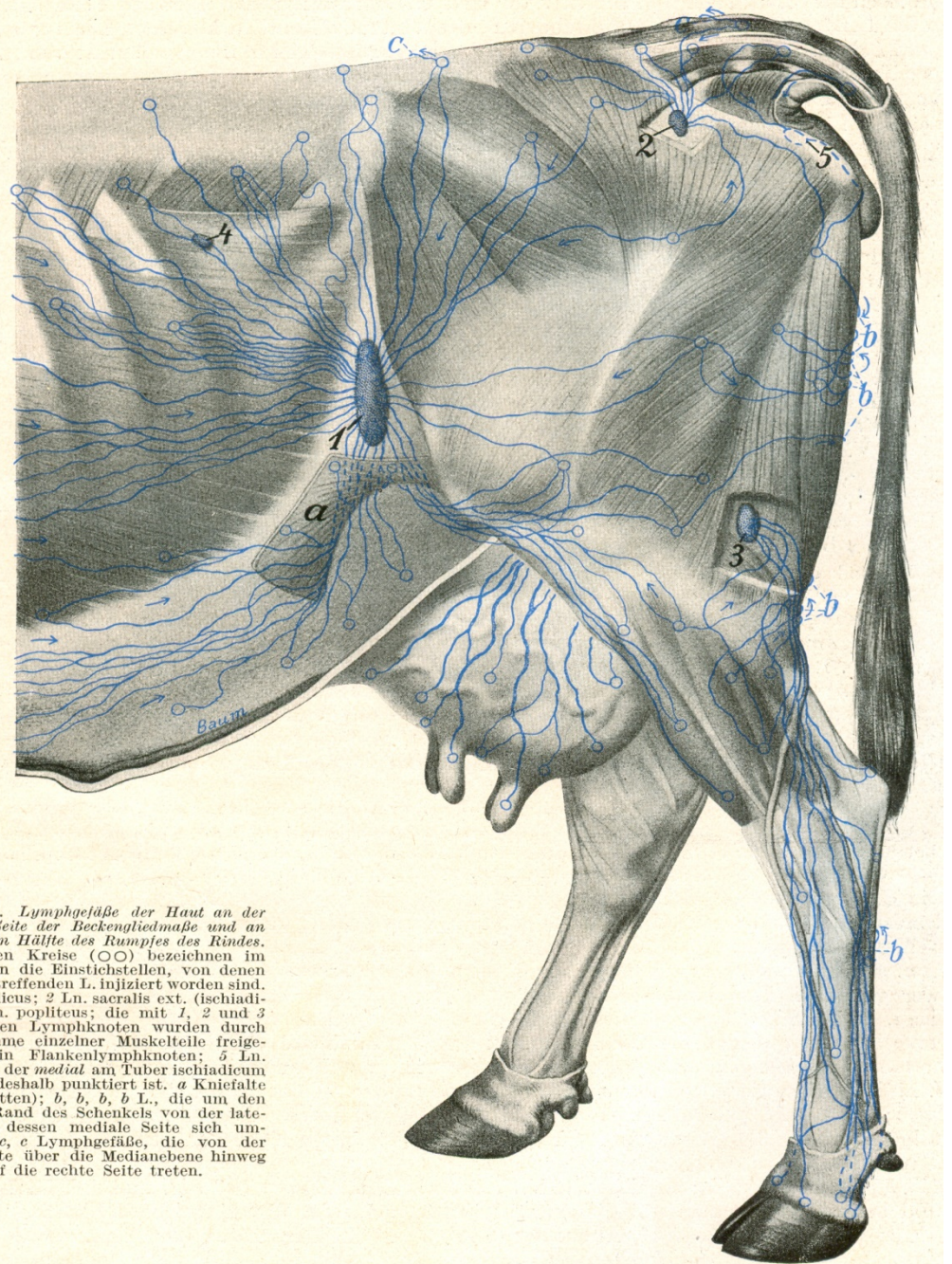


Abb. 1250. *Lymphgefäße der Haut an der lateralen Seite der Beckengliedmaße und an der hinteren Hälfte des Rumpfes des Rindes.* Die kleinen Kreise (○○) bezeichnen im allgemeinen die Einstichstellen, von denen aus die betreffenden L. injiziert worden sind. 1 Ln. subilicus; 2 Ln. sacralis ext. (ischiadicus); 3 Ln. popliteus; die mit 1, 2 und 3 bezeichneten Lymphknoten wurden durch Herausnahme einzelner Muskelteile freigelegt; 4 ein Flankenlymphknoten; 5 Ln. tuberosus, der medial am Tuber ischiadicum liegt und deshalb punktiert ist. a Kniefalte (abgeschnitten); b, b, b, b L., die um den hinteren Rand des Schenkels von der lateralen auf dessen mediale Seite sich umschlagen; c, c Lymphgefäße, die von der linken Seite über die Medianebene hinweg auf die rechte Seite treten.

4. Lc. ischiadicum :

a) Ln. gluteus – kod su i Bo

b) Lnn. ischiadici

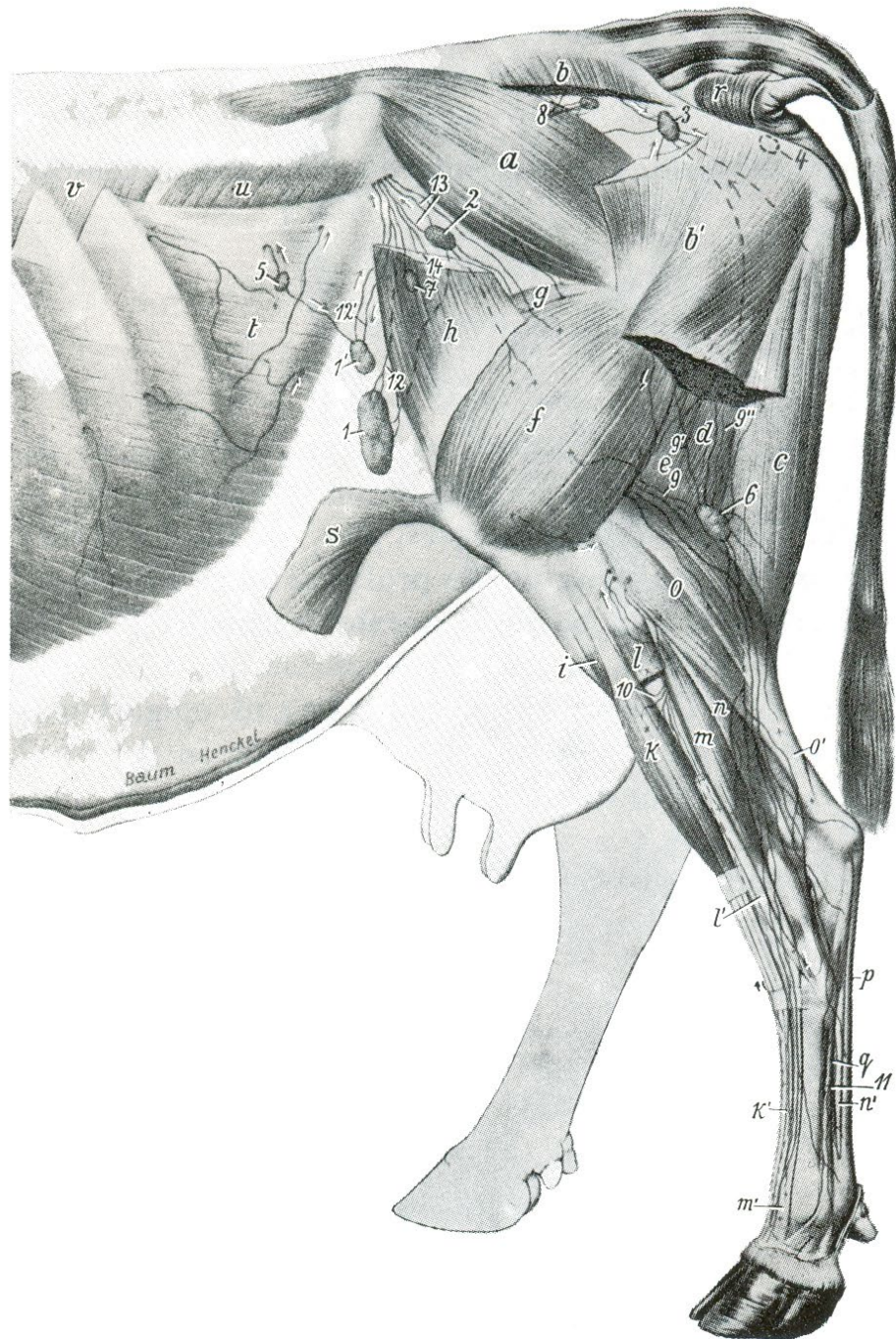


Fig. 259. Lcc. inguinale superficiale, ischiadicum and popliteum of the ox.

(After Baum, 1912.)

Part of the superficial muscle has been removed

The small crosses (+ + +) indicate the approximate position where the corresponding lymph vessels were injected

1, 1' nll. subliaci, 2 nl. coxalis, 3 nl. ischiadicus, 4 nl. tuberalis, 5 nl. fossae paralumbalis, 6 nl. popliteus profundus, 7 nl. coxalis accessorius, 8 nl. gluteus, 9, 9', 9'' vasa efferentia of the lc. popliteum, 10 lymph vessels from the m. tibialis cranialis, 11 lymph vessel coming through from the medial side, 12, 12' vasa efferentia of the nll. subliaci, 13 vasa efferentia of the nl. coxalis, 14 lymph vessels of the m. tensor fasciae latae

a m. gluteus medius, b, b' m. gluteobiceps, large parts of which have been excised, c m. semitendinosus, d m. semimembranosus, e m. adductor, f m. vastus lateralis, g m. rectus femoris, h m. tensor fasciae latae, the proximal part of which has been removed, i m. tibialis cranialis, k m. peroneus tertius and m. extensor digitorum communis, l m. peroneus longus, a large part of which has been excised, l' its tendon, m m. extensor digitorum lateralis, m' its tendon, n m. flexor digitorum profundus, n' its tendon, o m. gastrocnemius, caput laterale, o' Achilles tendon, p superficial flexor tendon, q m. interosseus medius, r m. coccygeus, s terminal part of the m. cutaneus trunci, t m. obliquus externus abdominis, u m. obliquus internus abdominis, v m. serratus dorsalis caudalis

5. Lc. popliteum :

- a) Lnn. poplitei superficiales – kod Car**
- b) Lnn. poplitei profundi - kod eq, Ru, retko su, nema Car.**

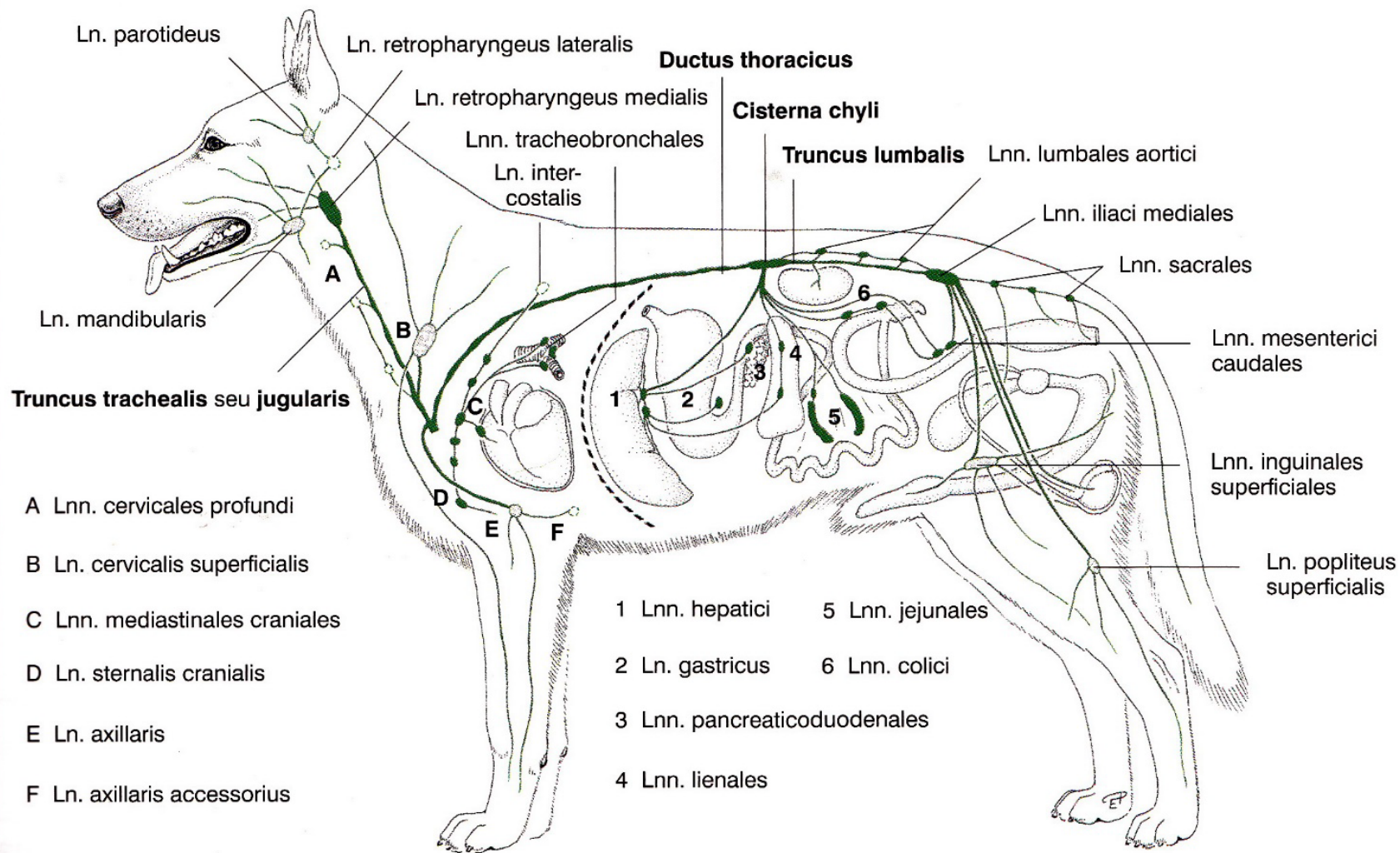


Fig. 335. Deep lymph nodes and lymph vessels of the pelvic limb of the horse. Medial view.

(After Baum, 1928.)

a nll. poplitei profundi, *b* nll. inguinales profundi, *c* nll. iliaci mediales, *d* nll. sacrales, *e* nl. obturatorius, *f* nll. iliaci laterales

1, 1' lymph vessels of the hoof and coffin joint, *2, 2'* of the pastern joint, *3, 3', 3''* of the fetlock joint; *4, 4', 4''* lymph vessels which pass from the lateral to the medial side, *6* lymph vessels lying in the neighbourhood of the saphenous vein, *7* lymph vessel running in company of the caudal tibial vein; *8* lymph vessel which terminates in the popliteal nodes, *9, 9¹, 9², 9³, 9⁴, 9⁵* lymph vessels of the tarsal joint, *10, 10¹, 10²* of the knee joint; *11* lymph vessels entering the femoral canal from the lateral side

