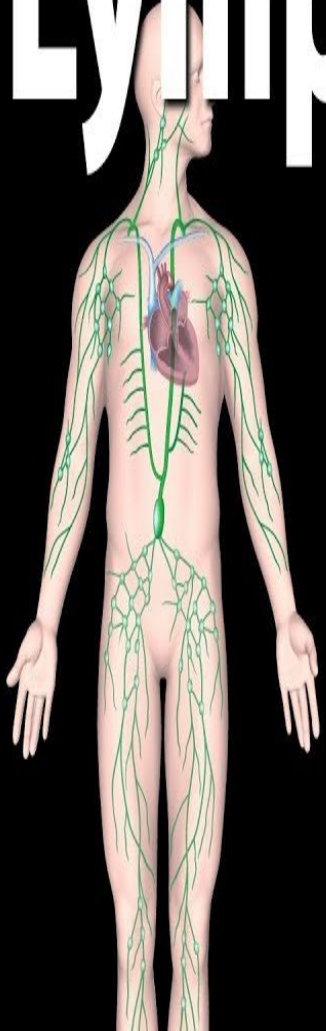


Lymphatic System

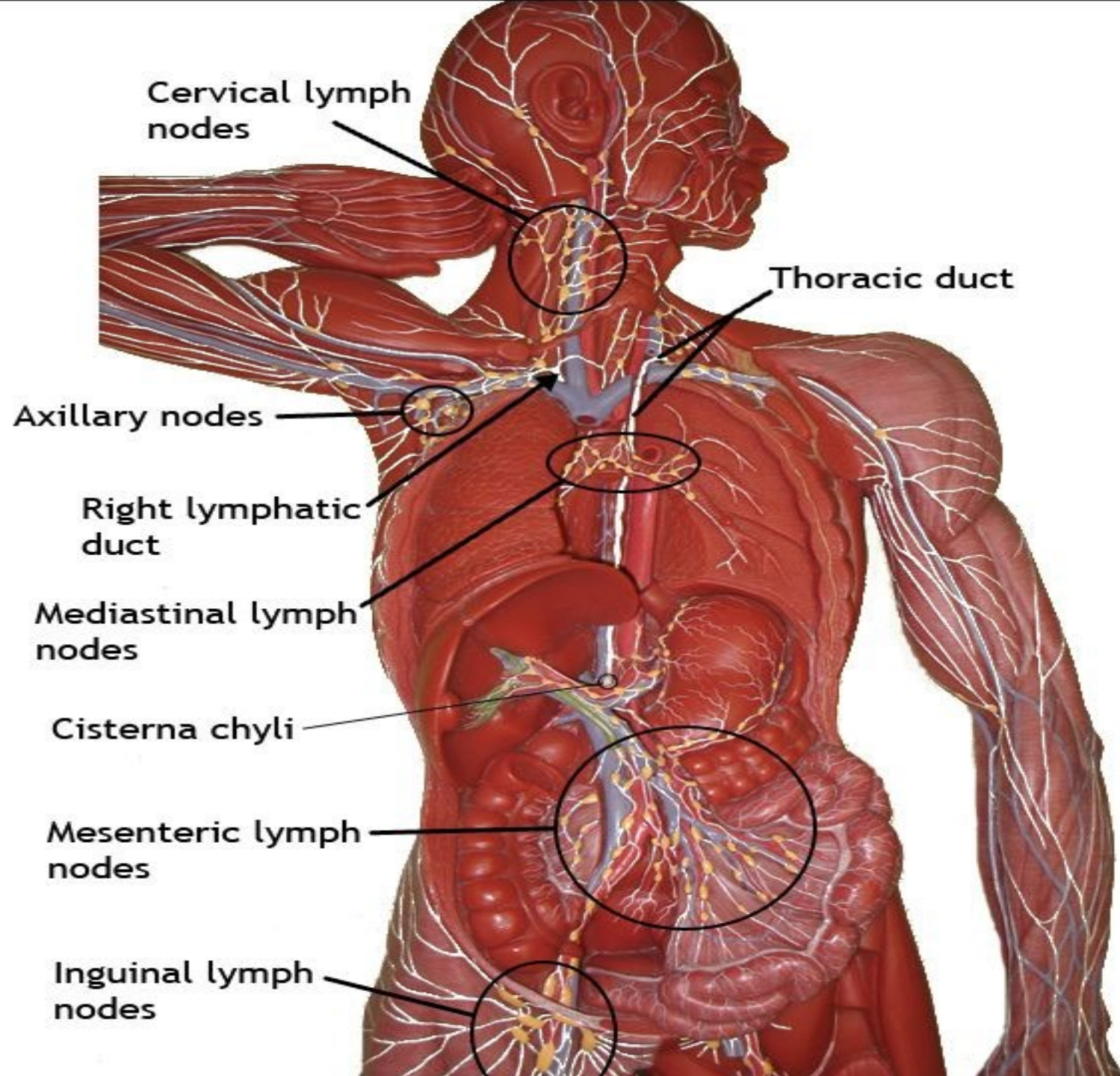
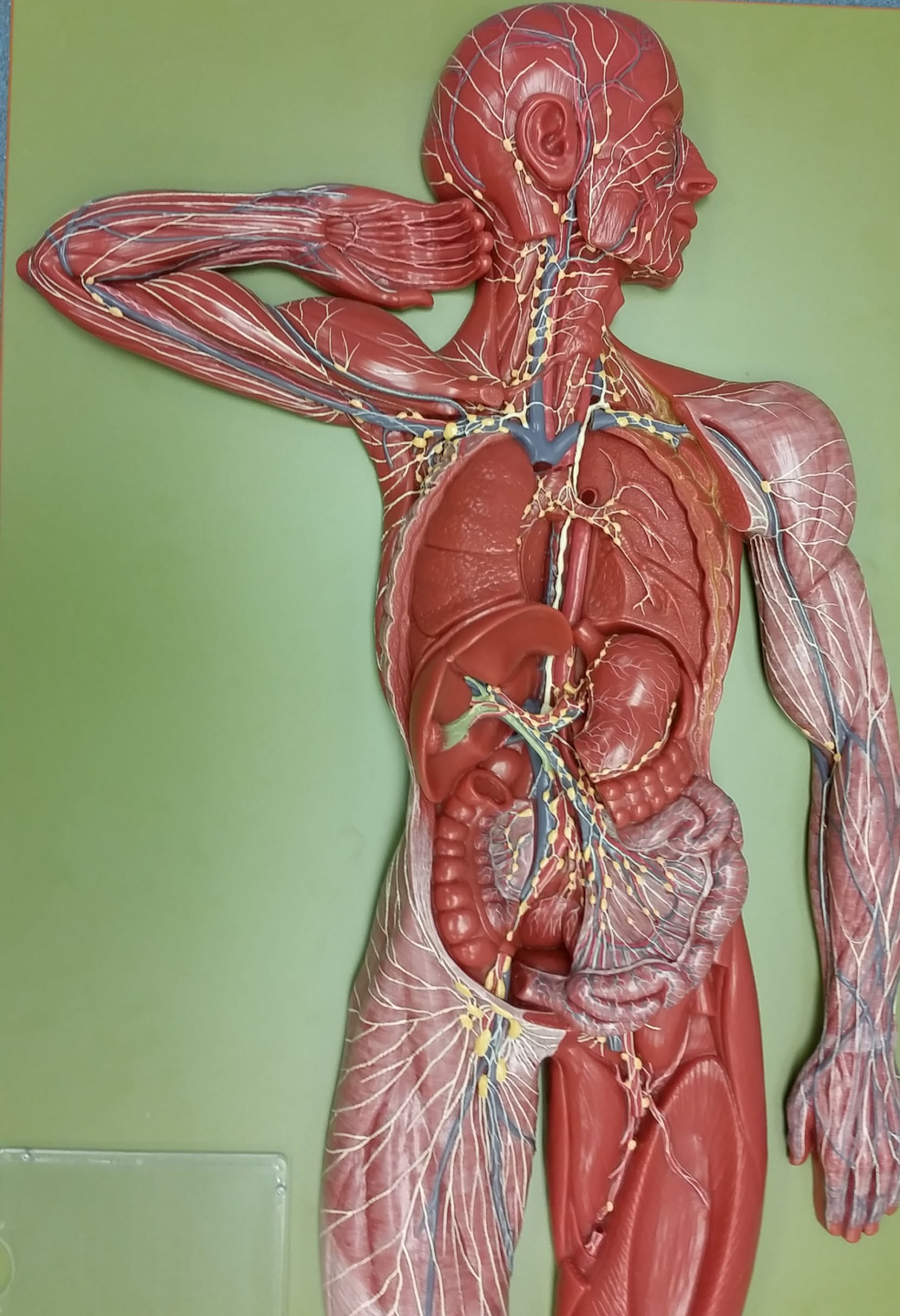


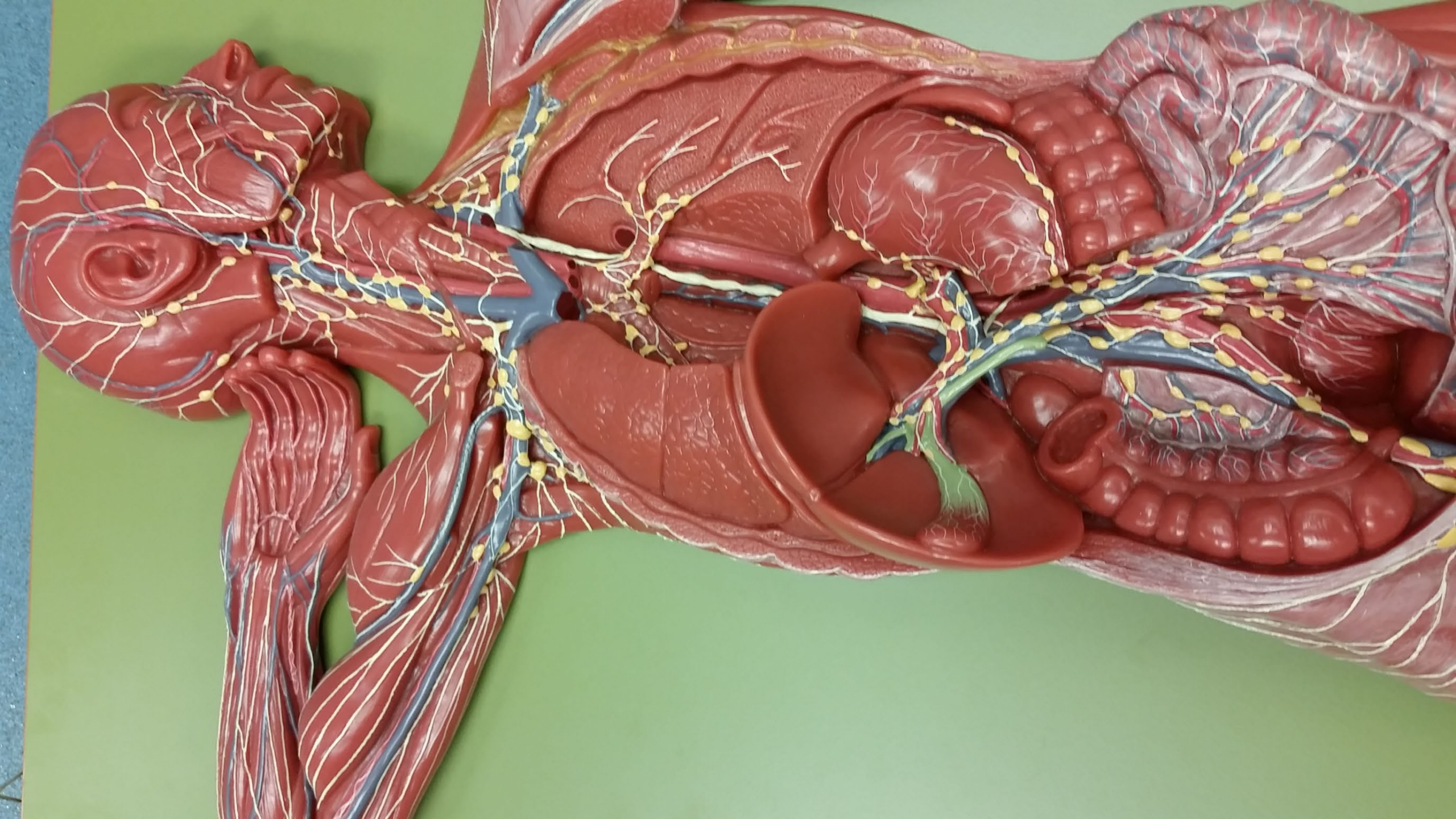
Lymphoid tissue

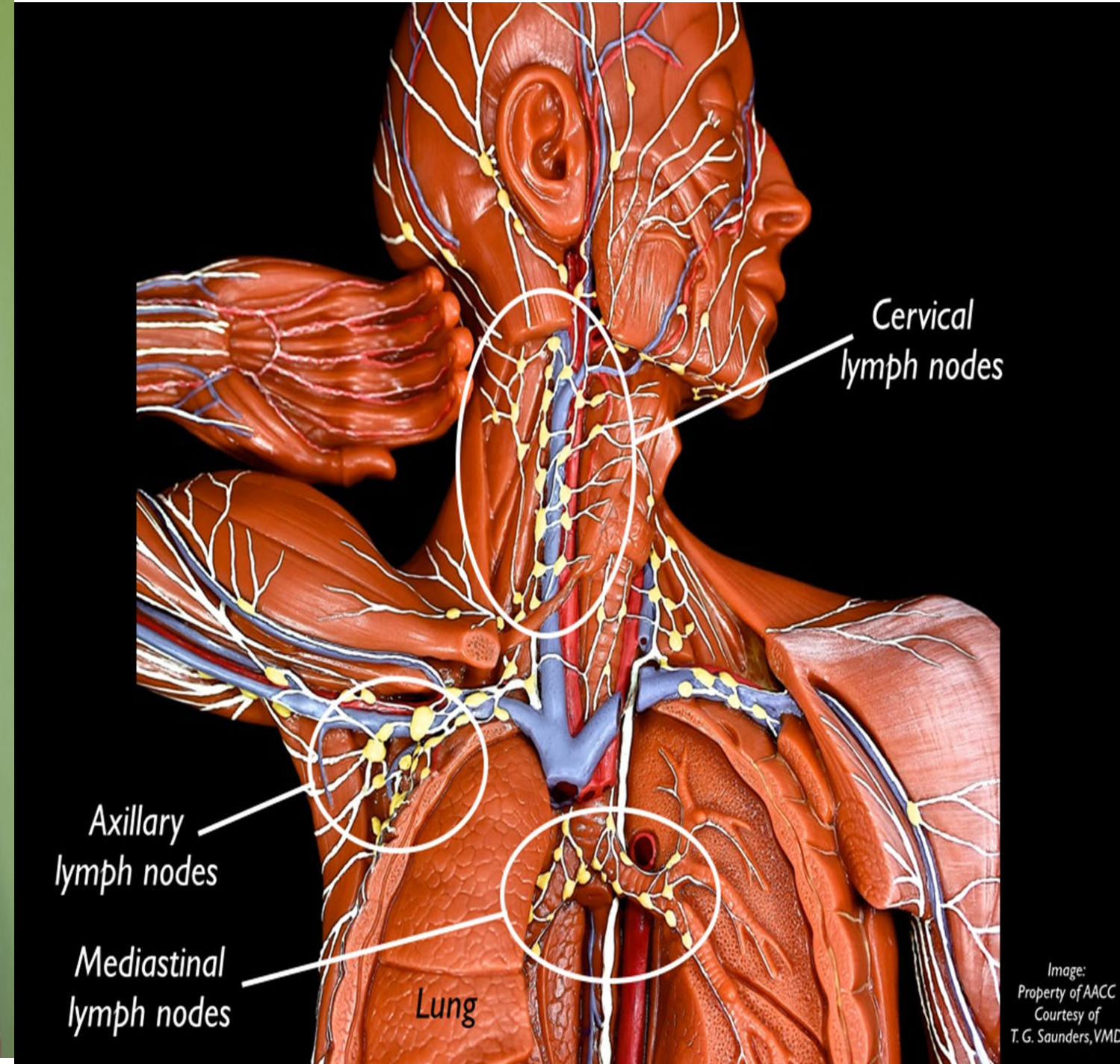
D.Hammoudi, MD

Function of the Lymphoid System

- The main purpose of the lymphoid system is to detect and inactivate foreign substances, such as:
 - Invading microorganisms
 - Cells of transplanted organs
 - Foreign materials (like pollen)
 - Cancer cells
- Lymph also brings nutrients from blood vessels to cells and picks up waste products.







Mediastinal Nodes

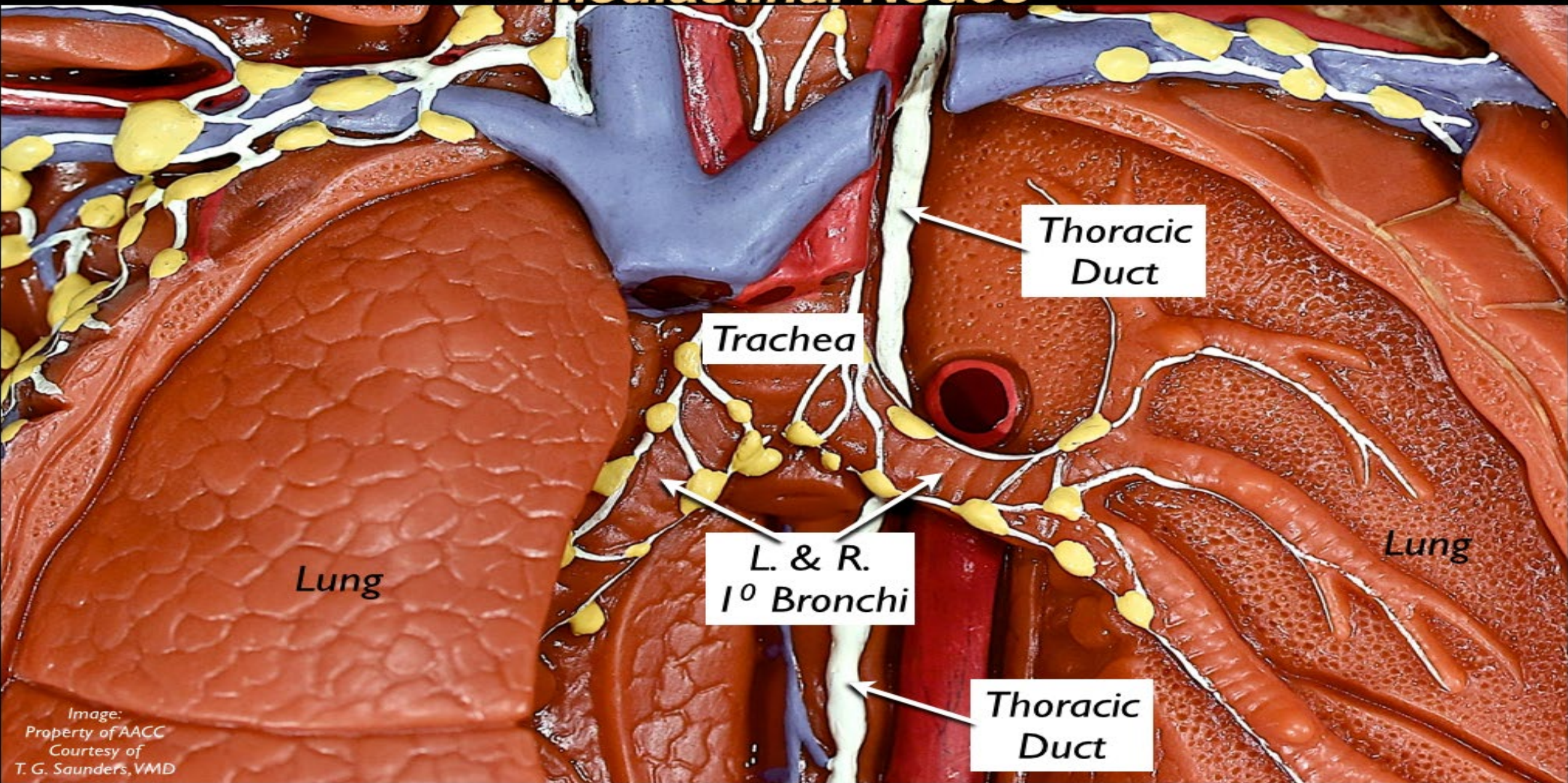
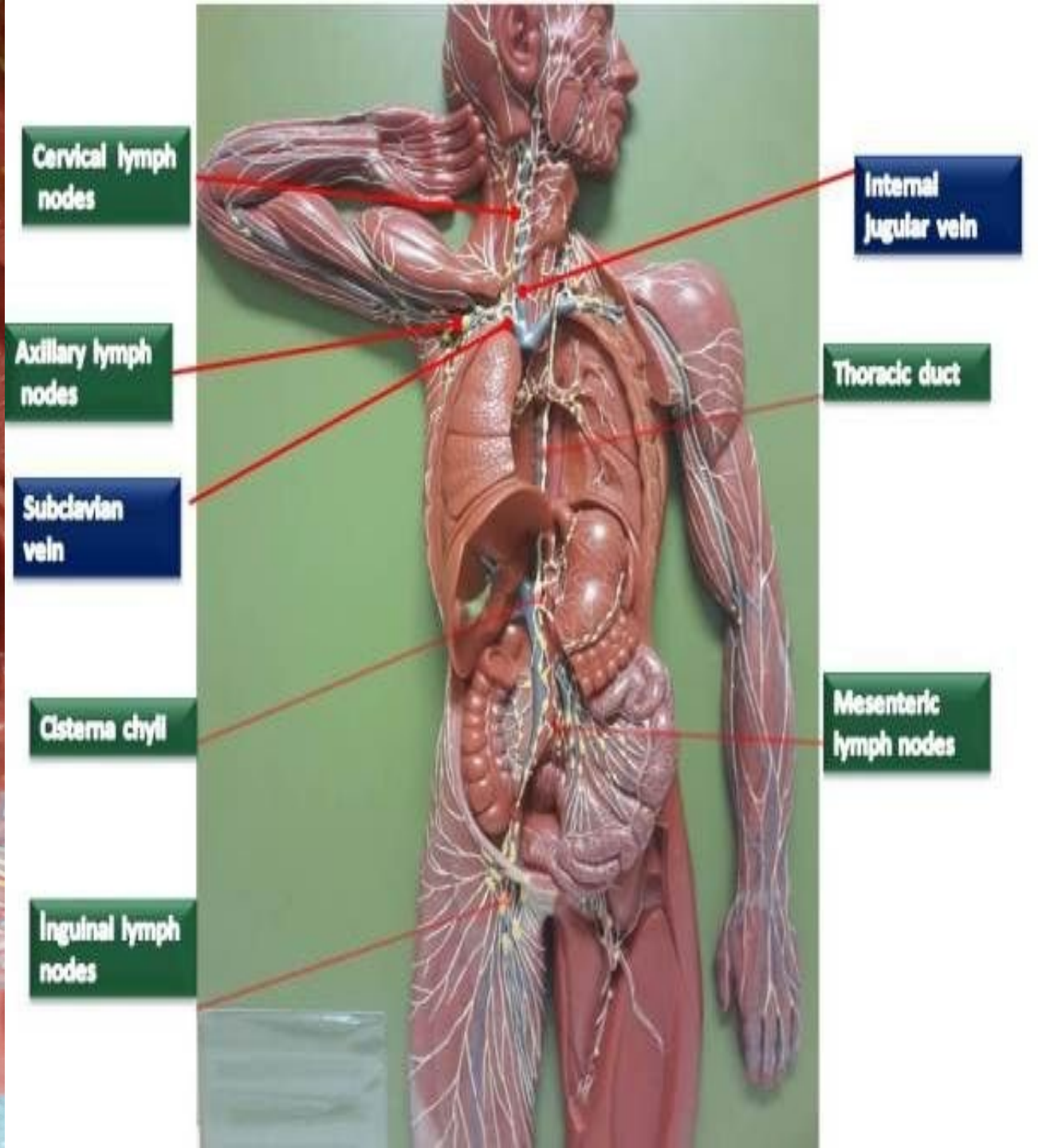
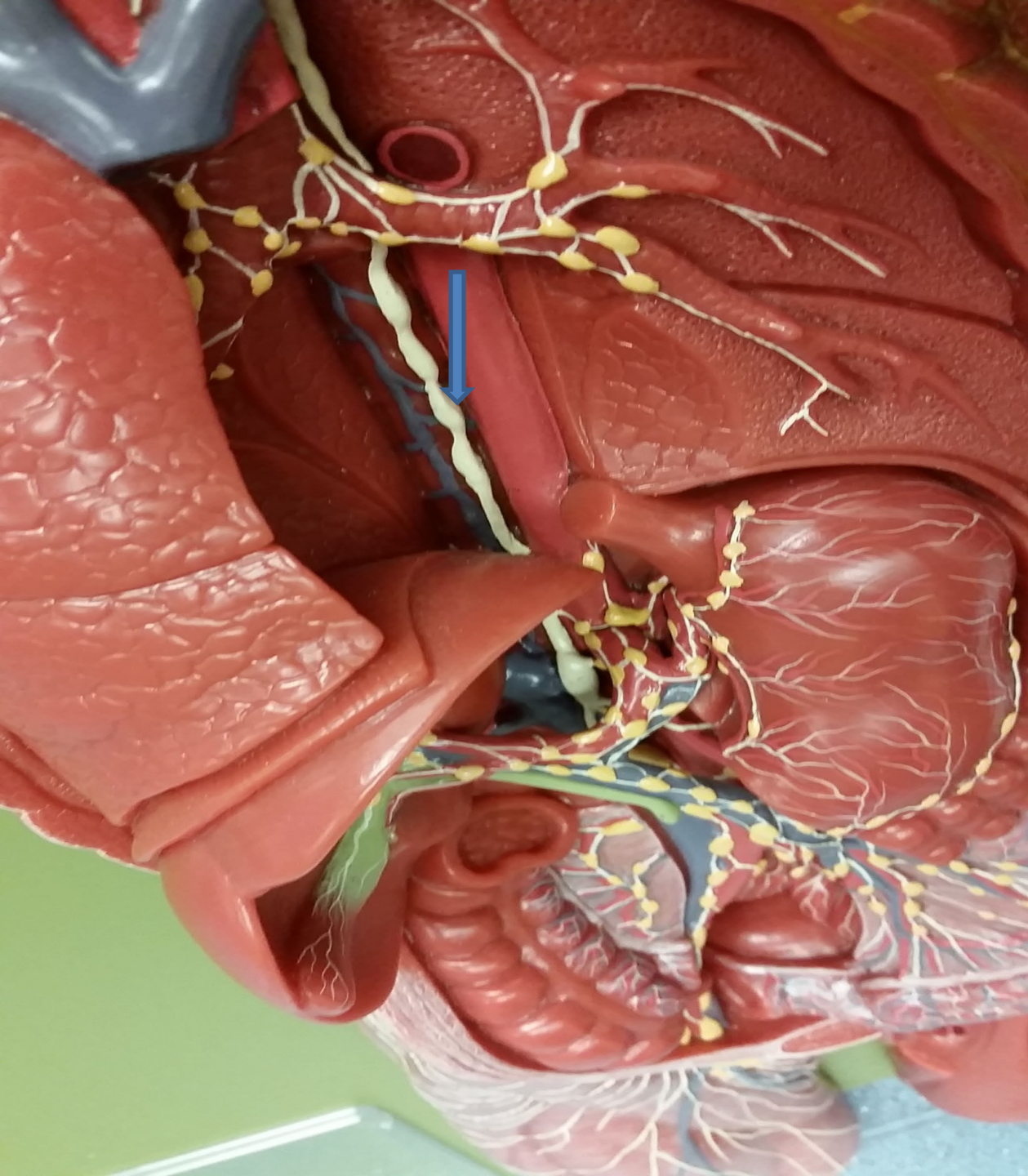
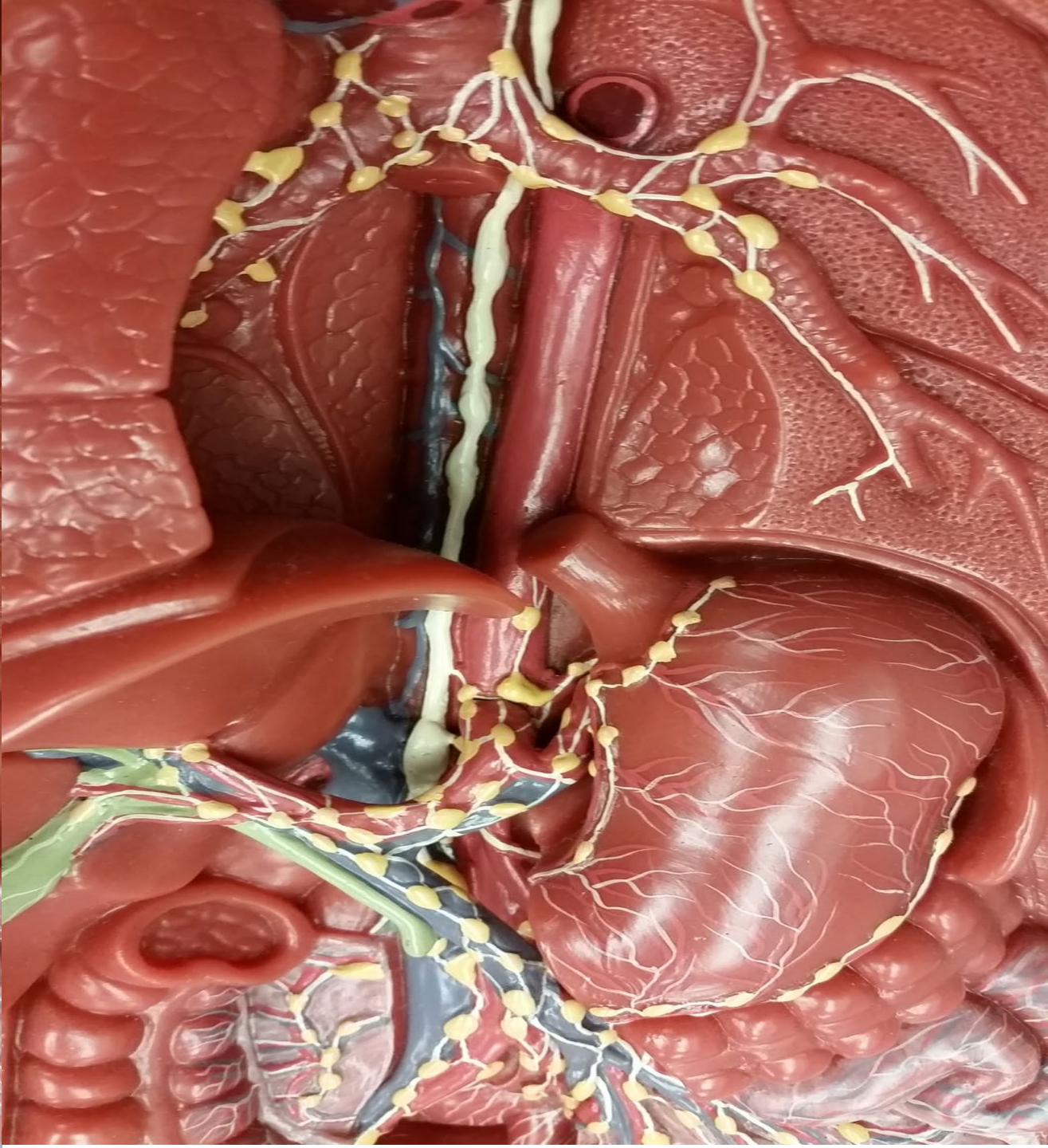
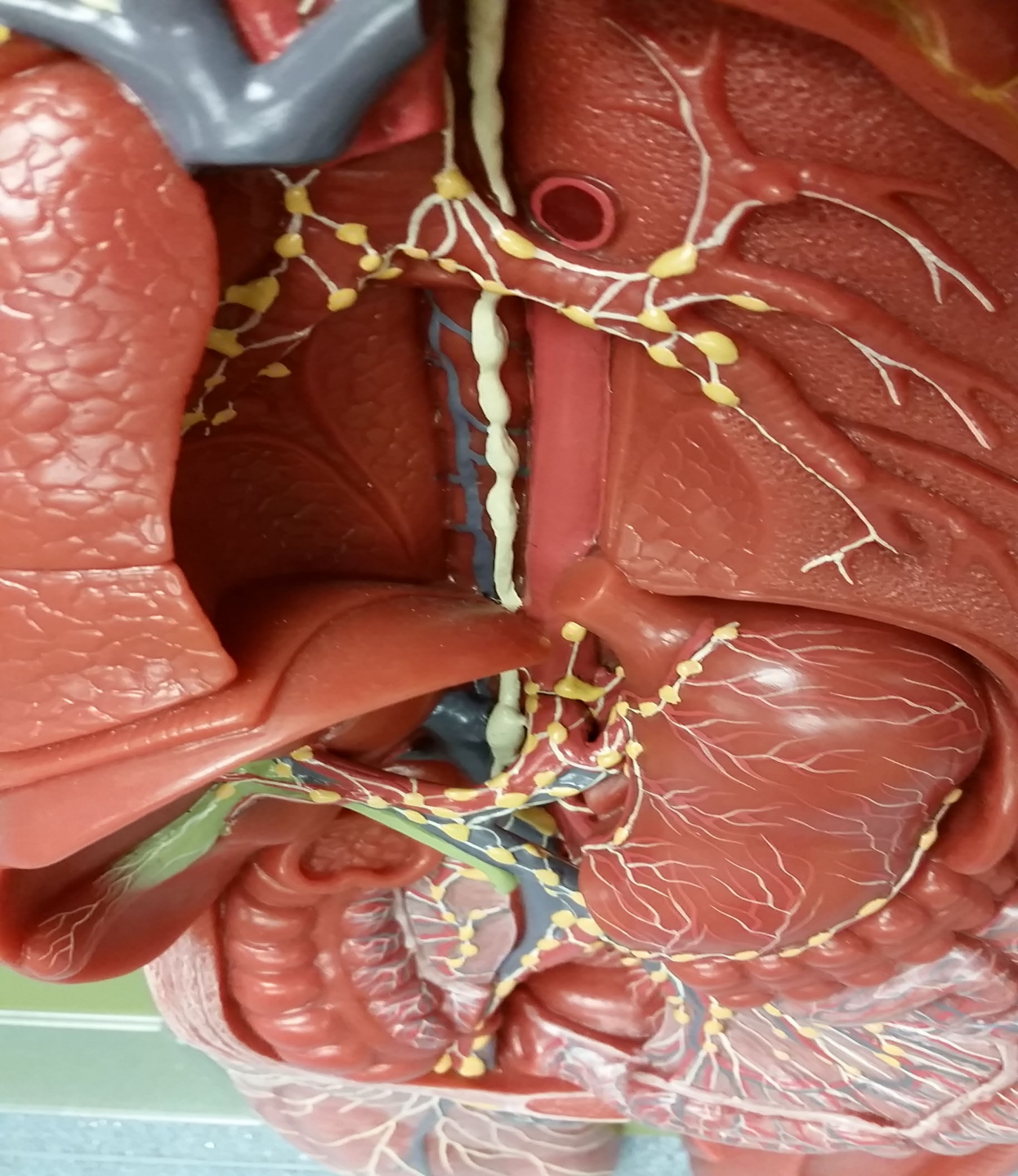
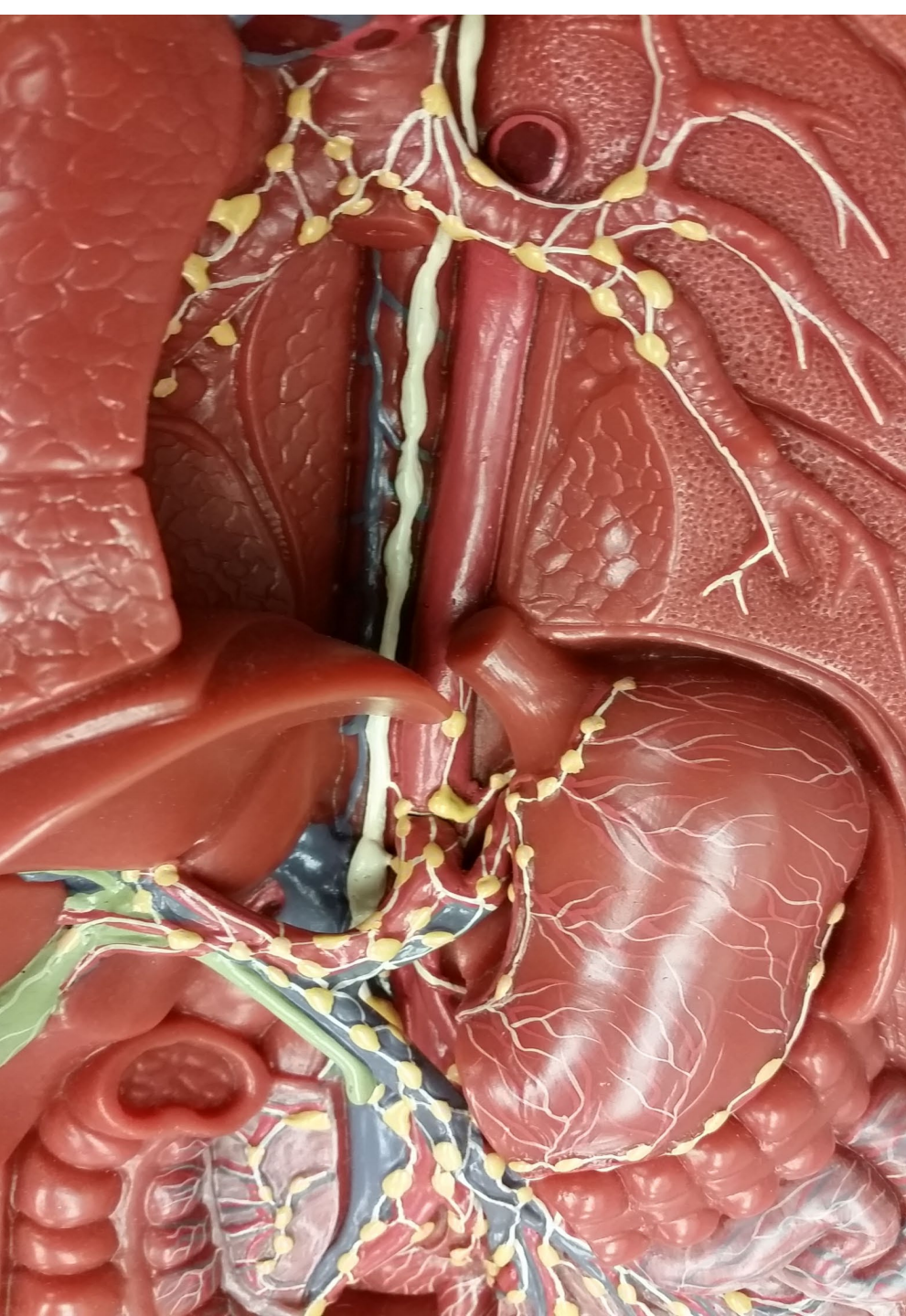


Image:
Property of AACC
Courtesy of
T. G. Saunders, VMD

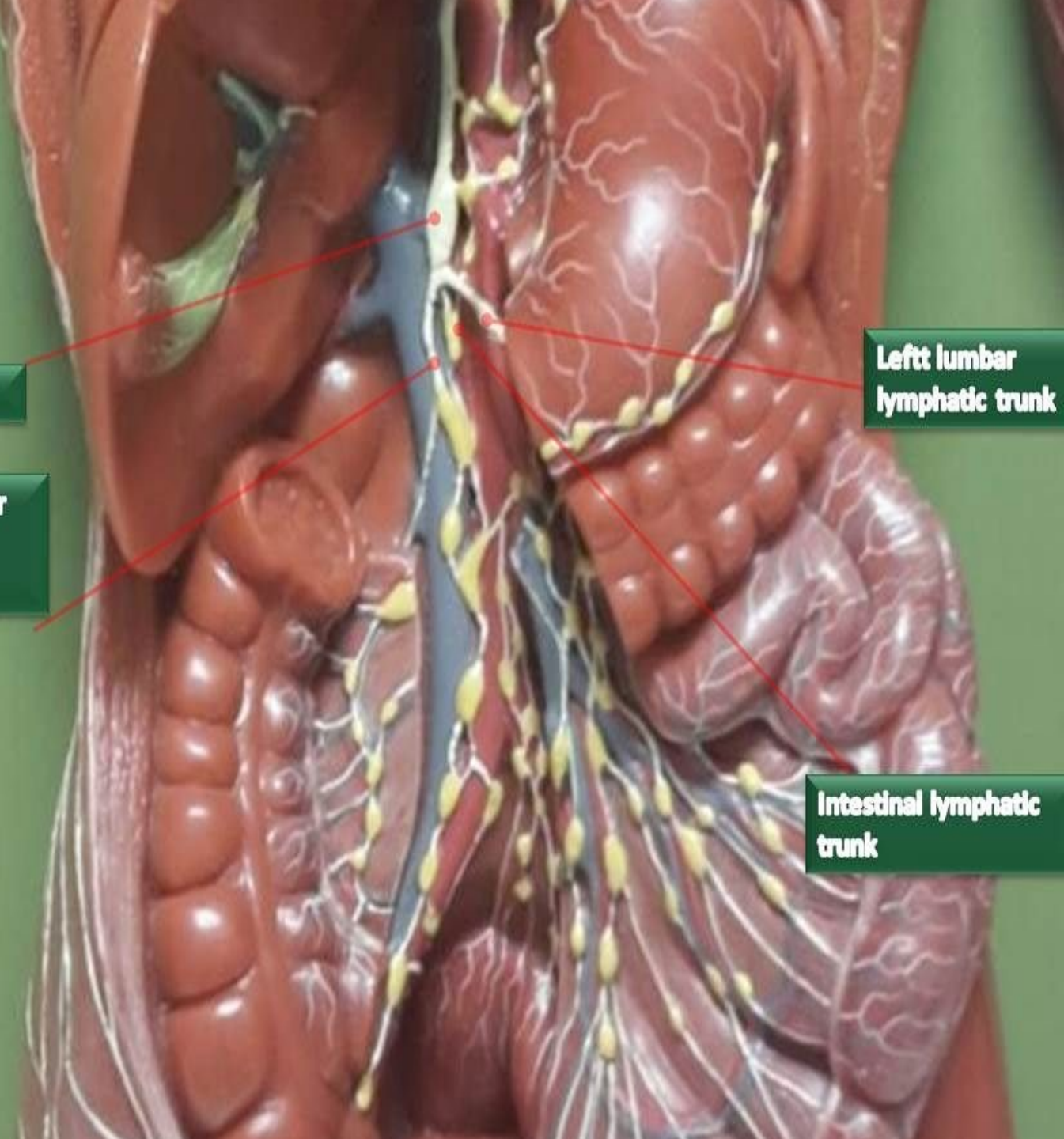






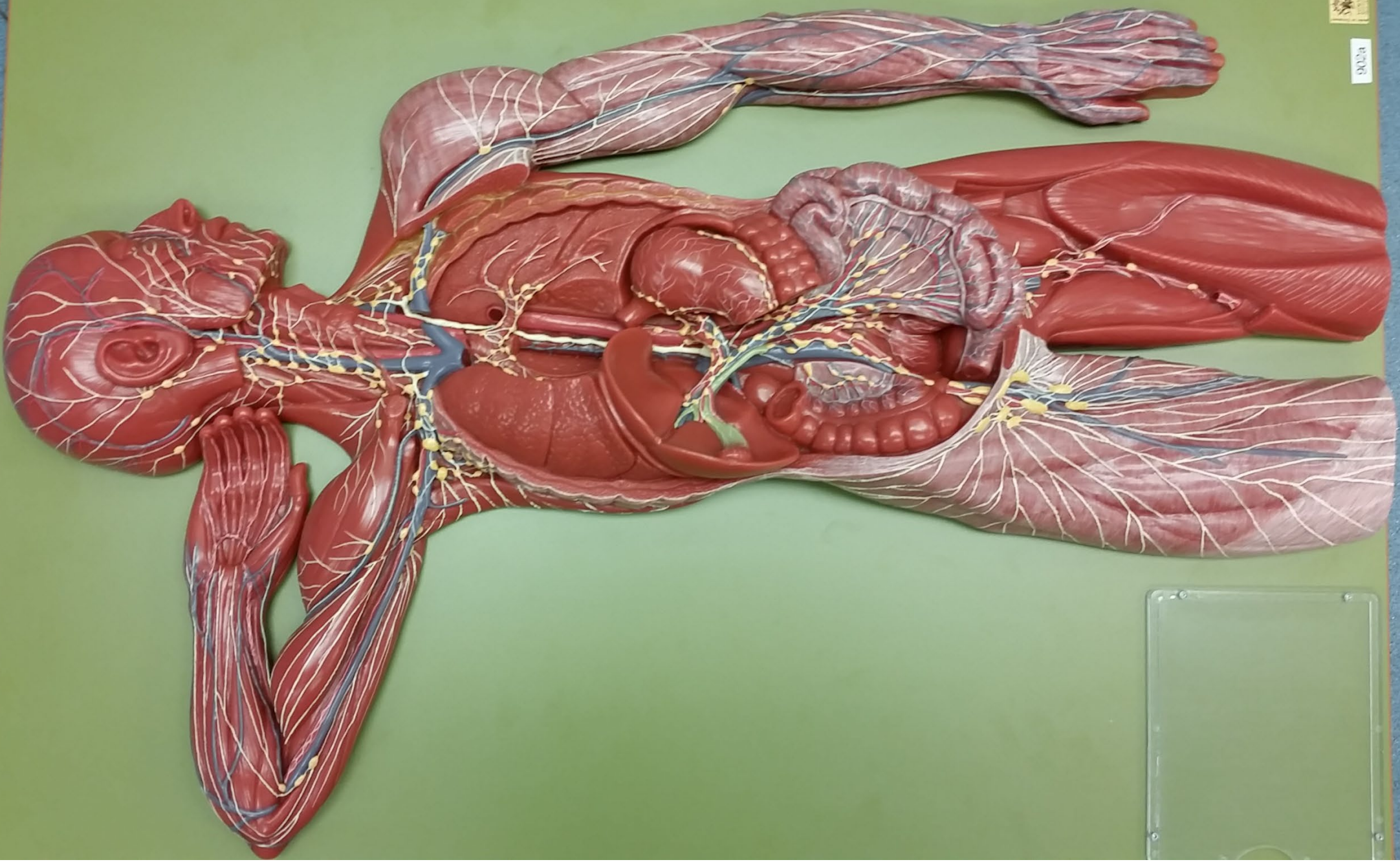
Cisterna chyli

Right lumbar lymphatic trunk



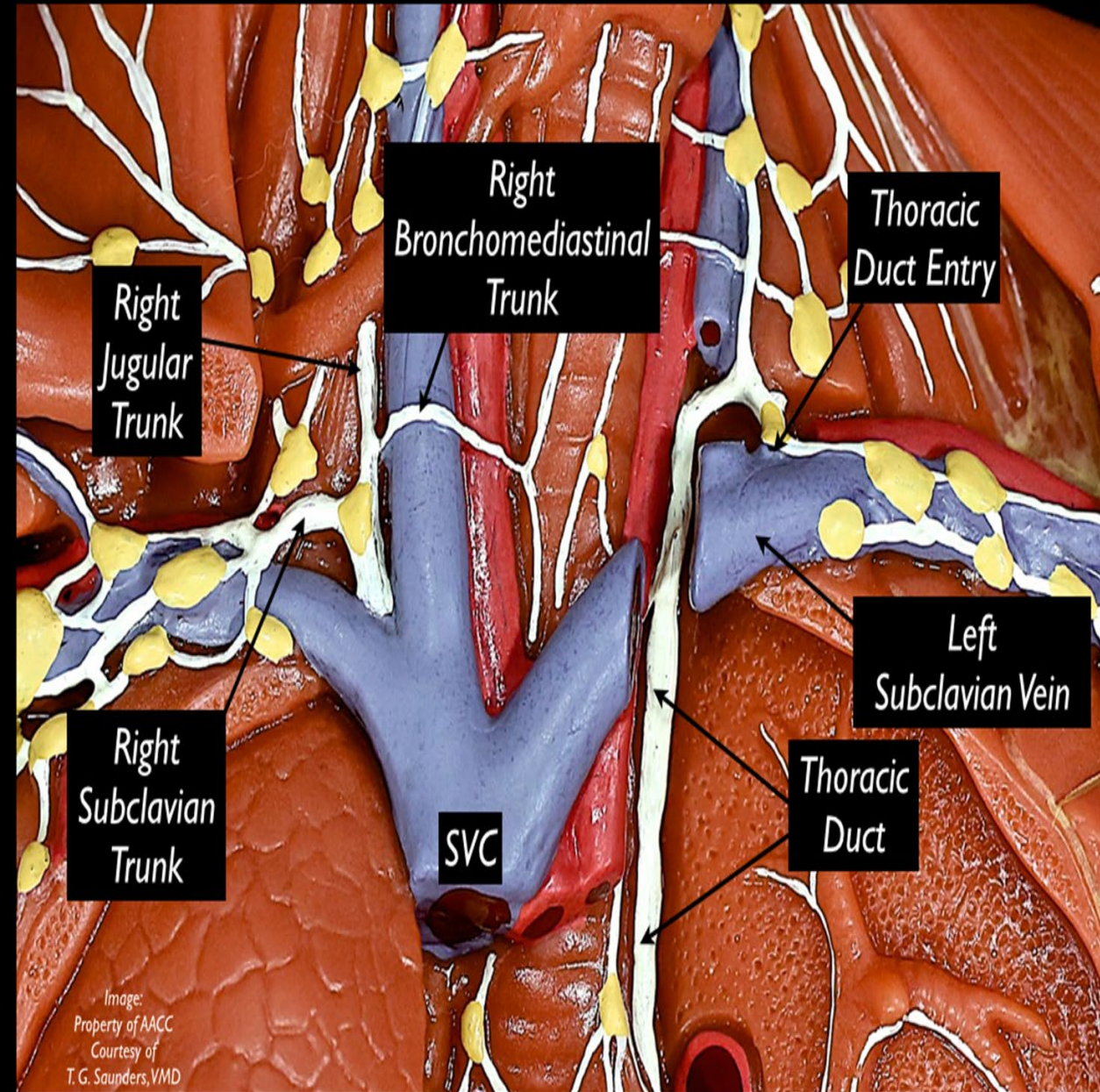
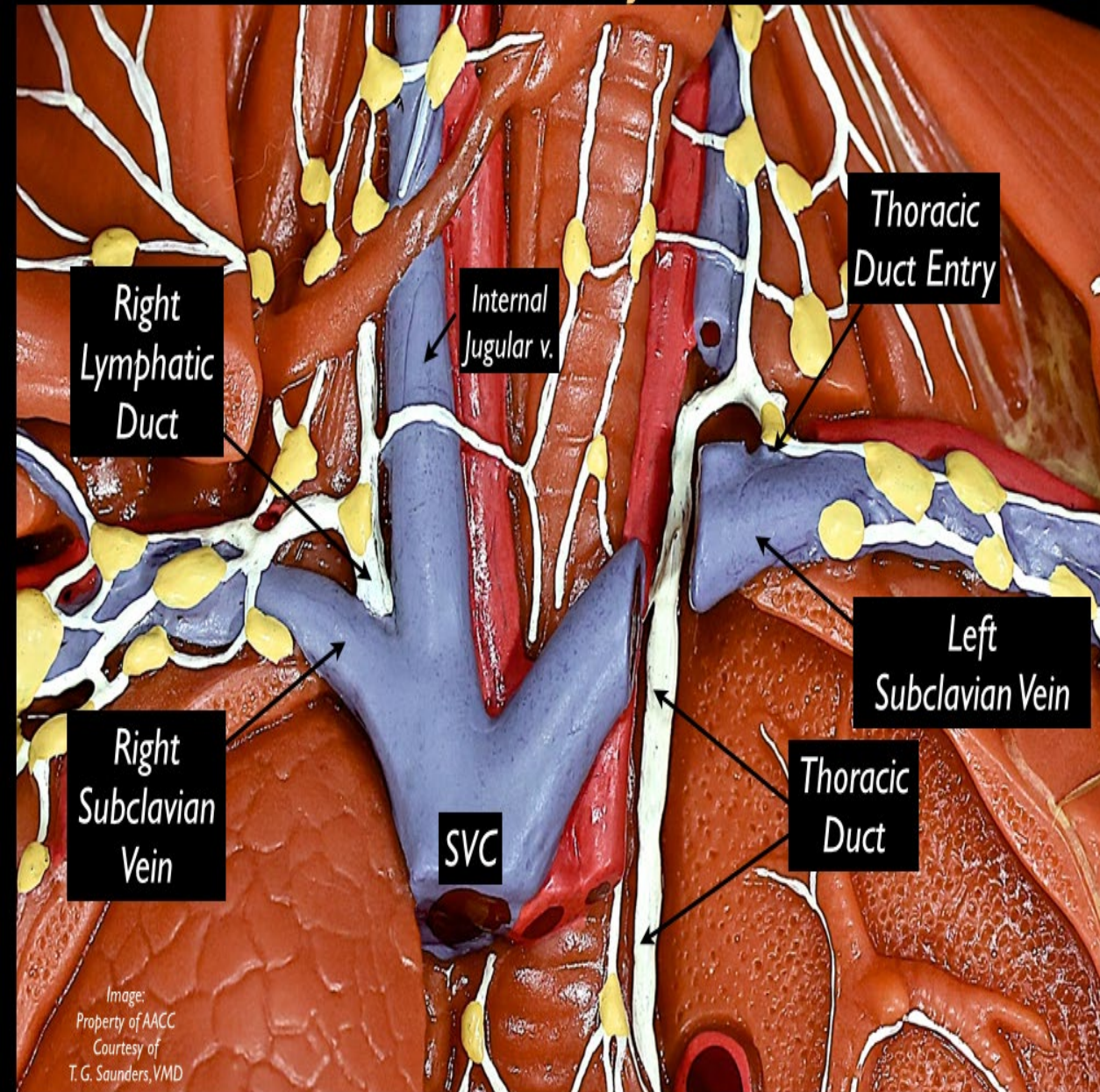
Left lumbar lymphatic trunk

Intestinal lymphatic trunk



922a

Main Duct Entry Points

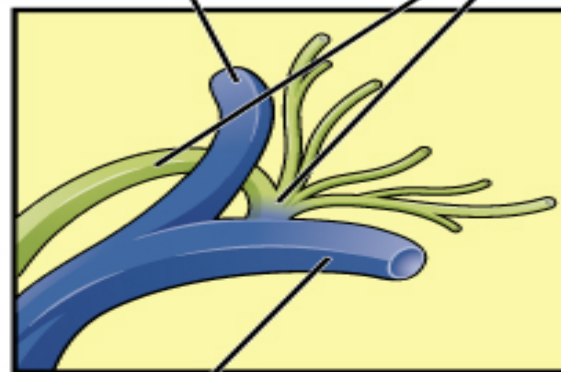
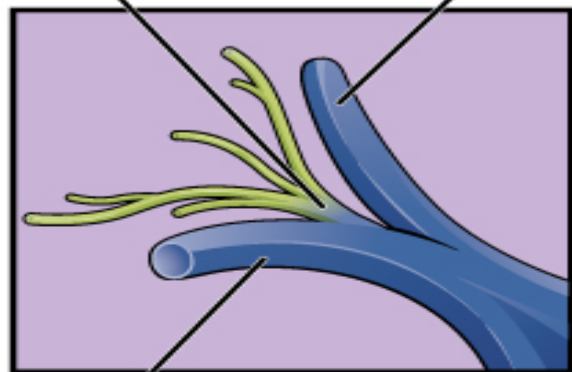


Right lymphatic duct

Right internal jugular vein

Left internal jugular vein

Thoracic duct drains into subclavian vein



Right subclavian vein

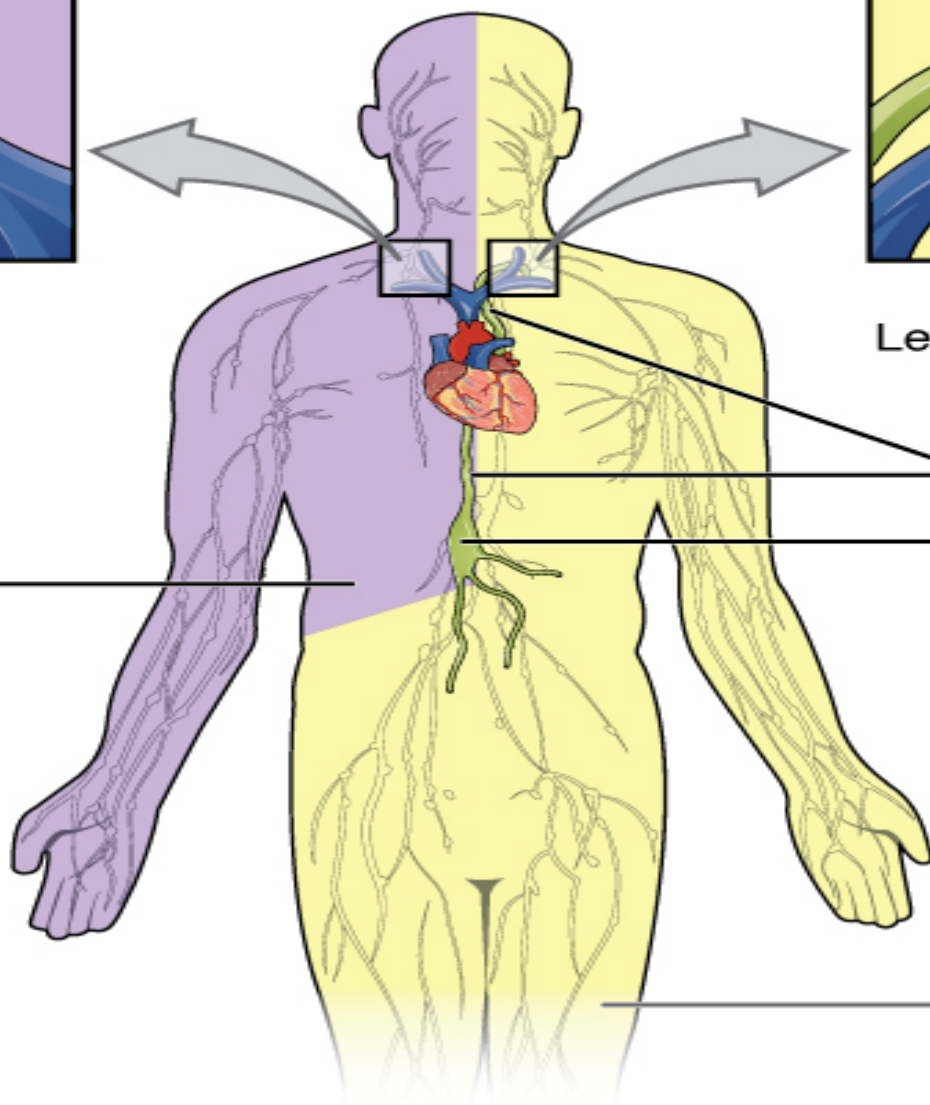
Left subclavian vein

Drained by right lymphatic duct

Thoracic duct

Cisterna chyli of thoracic duct

Drained by thoracic duct



Distal Thoracic Duct

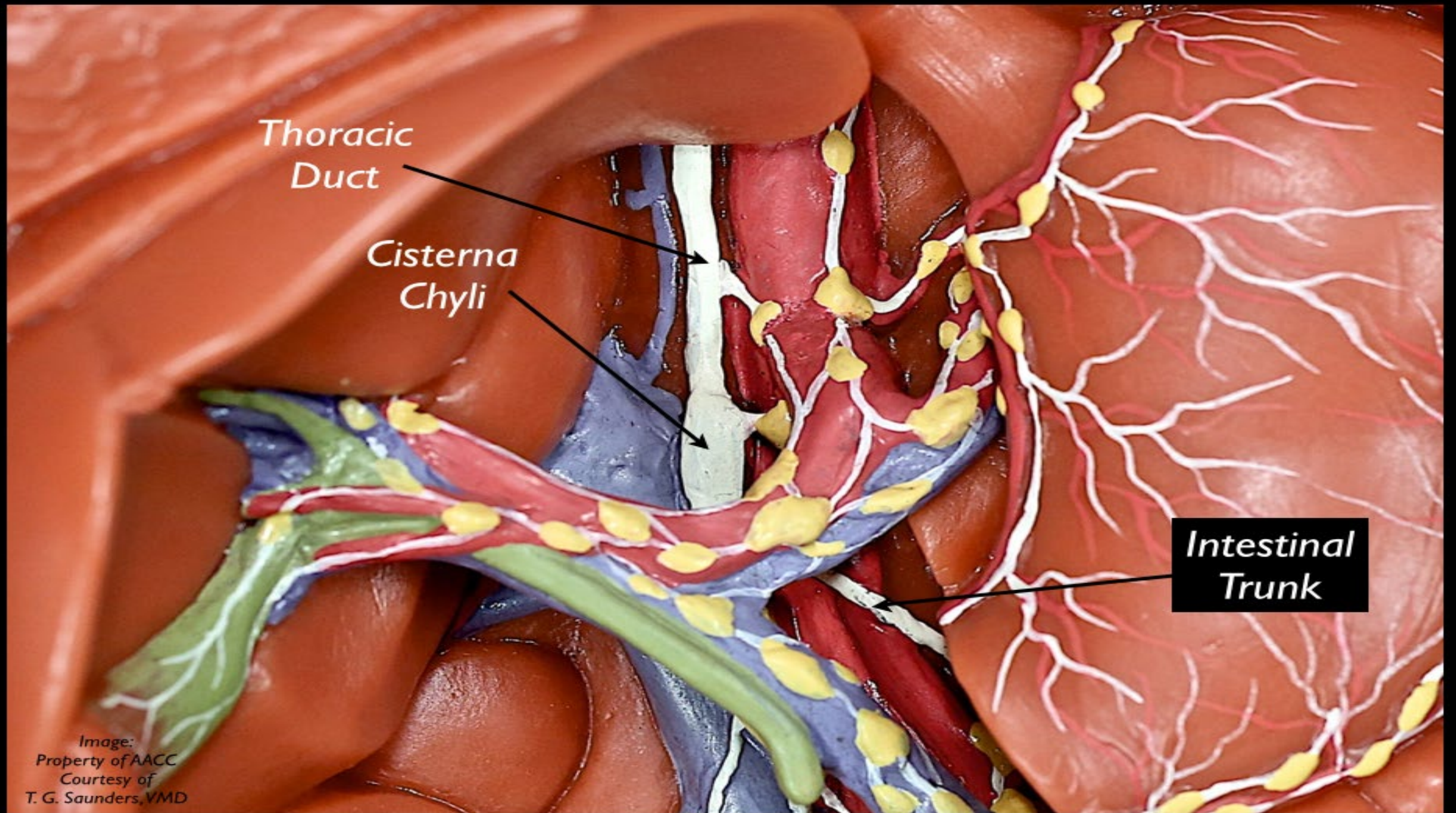
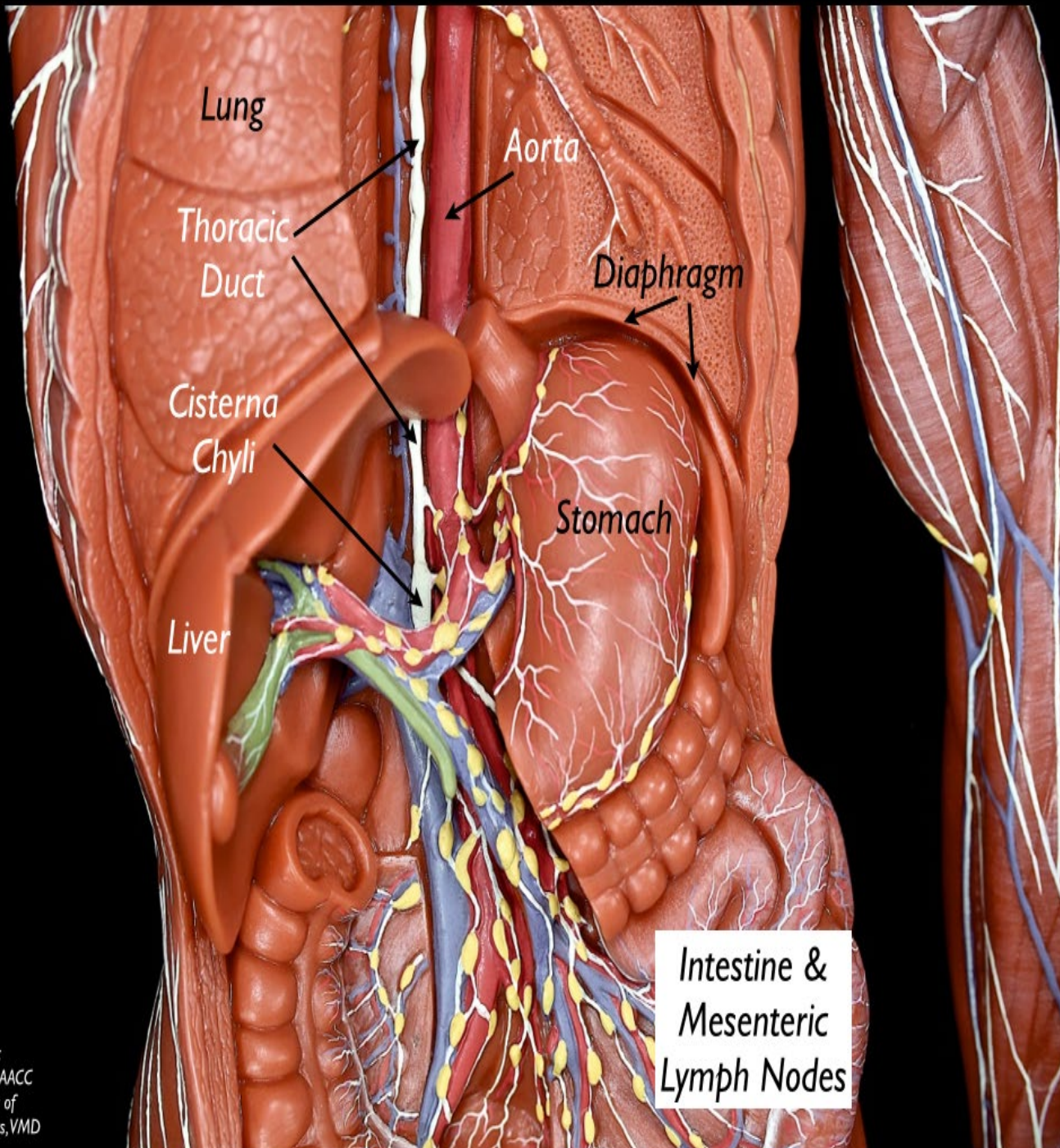


Image:
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Courtesy of
T. G. Saunders, VMD



View from right side; low

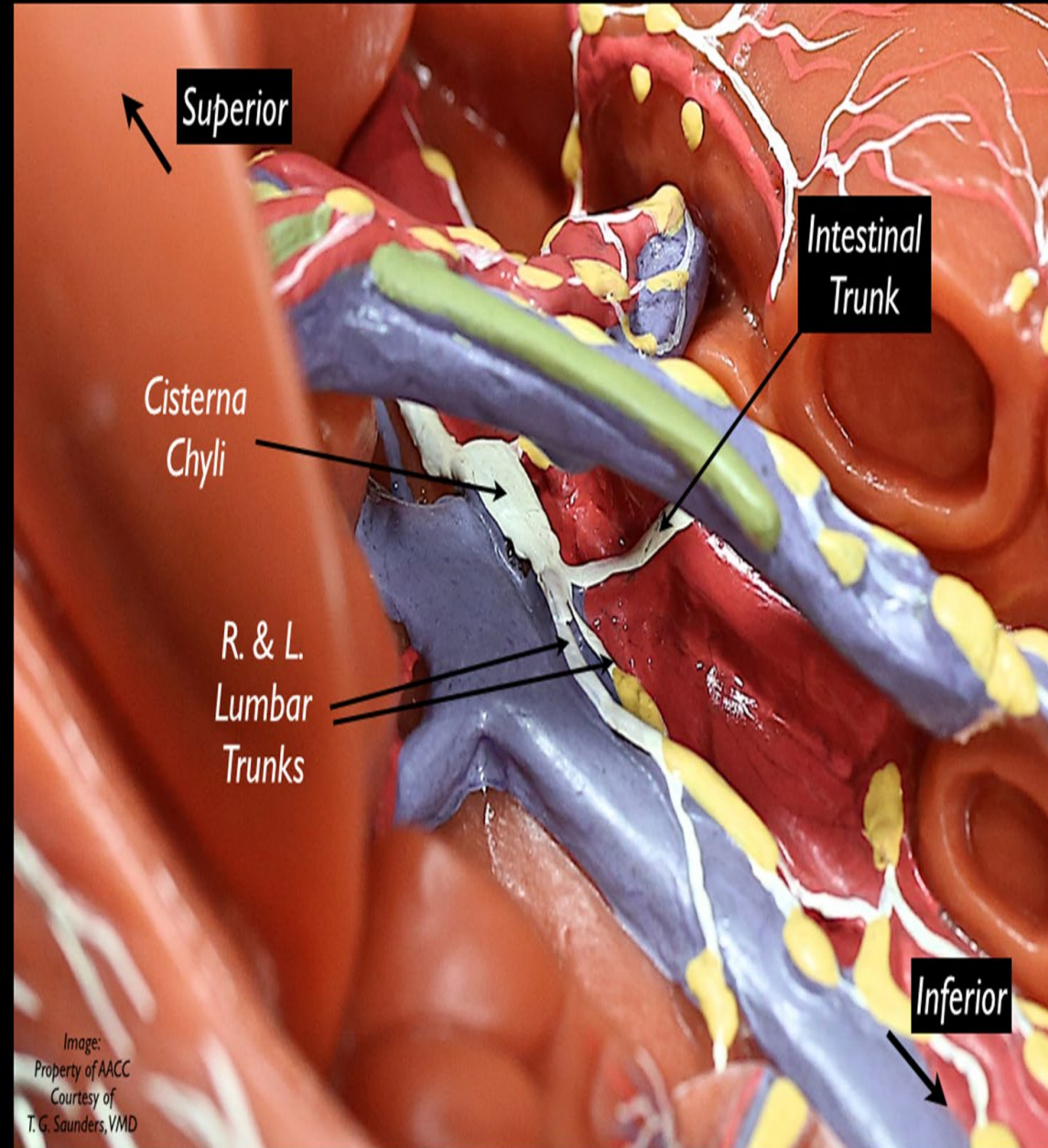
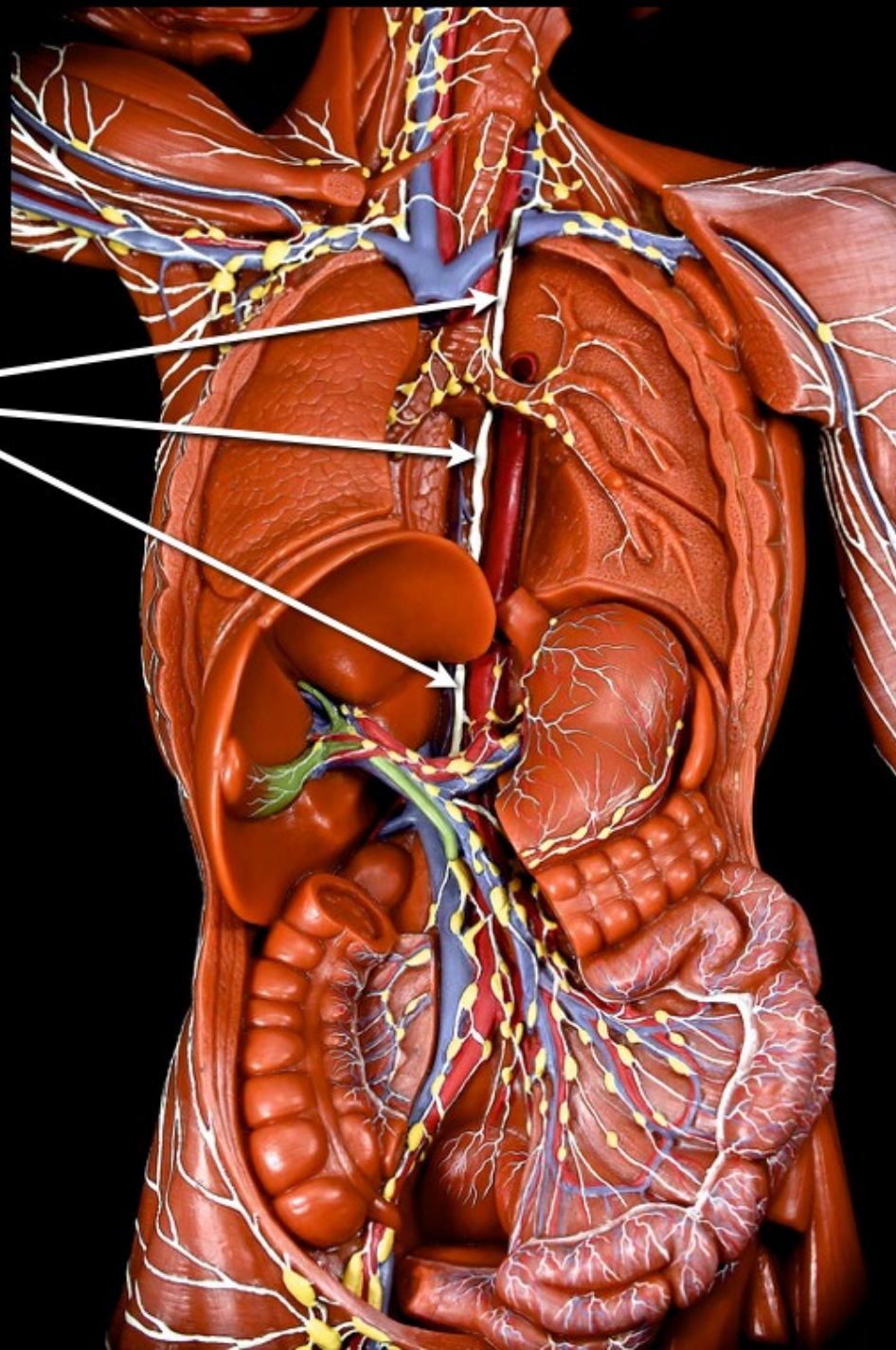


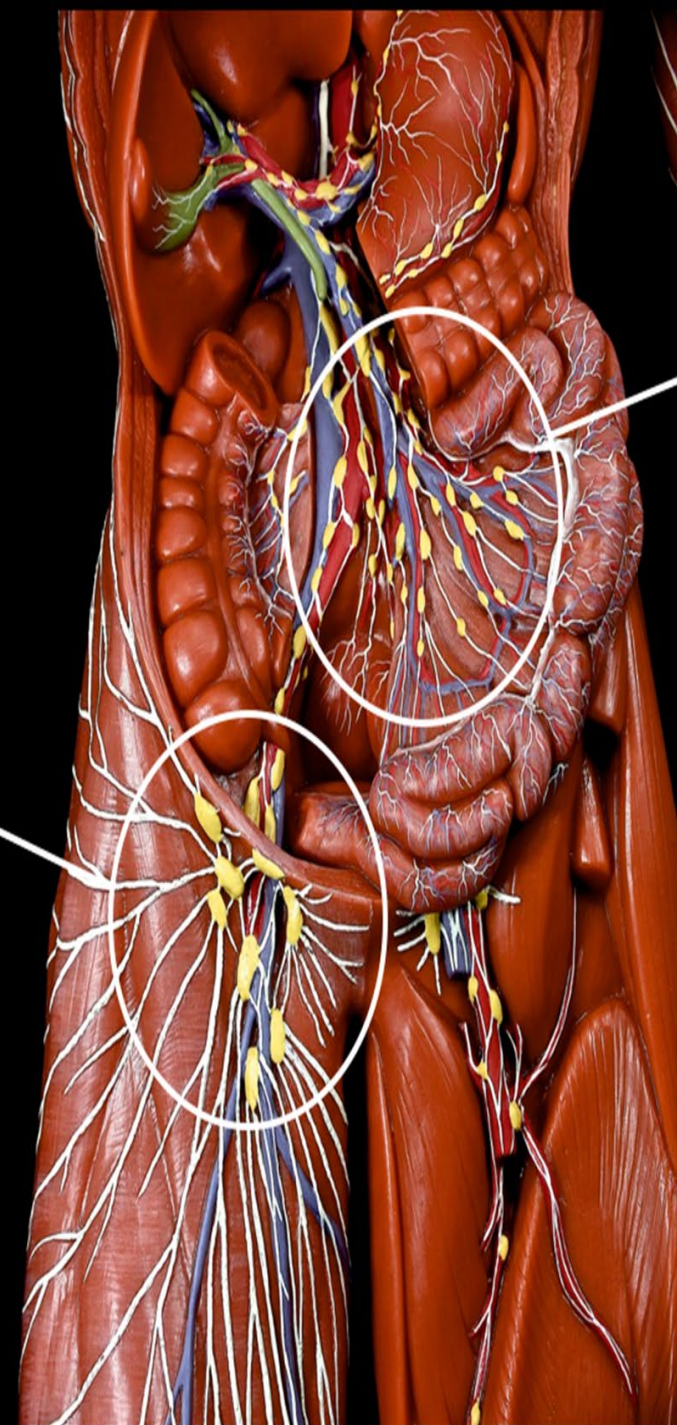
Image:
Property of AACC
Courtesy of
T. G. Saunders, VMD

Image:
Property of AACC
Courtesy of
T. G. Saunders, VMD

Thoracic
Duct



Inguinal
lymph nodes



Mesenteric
lymph nodes

Secondary (Peripheral) Lymphoid Organs

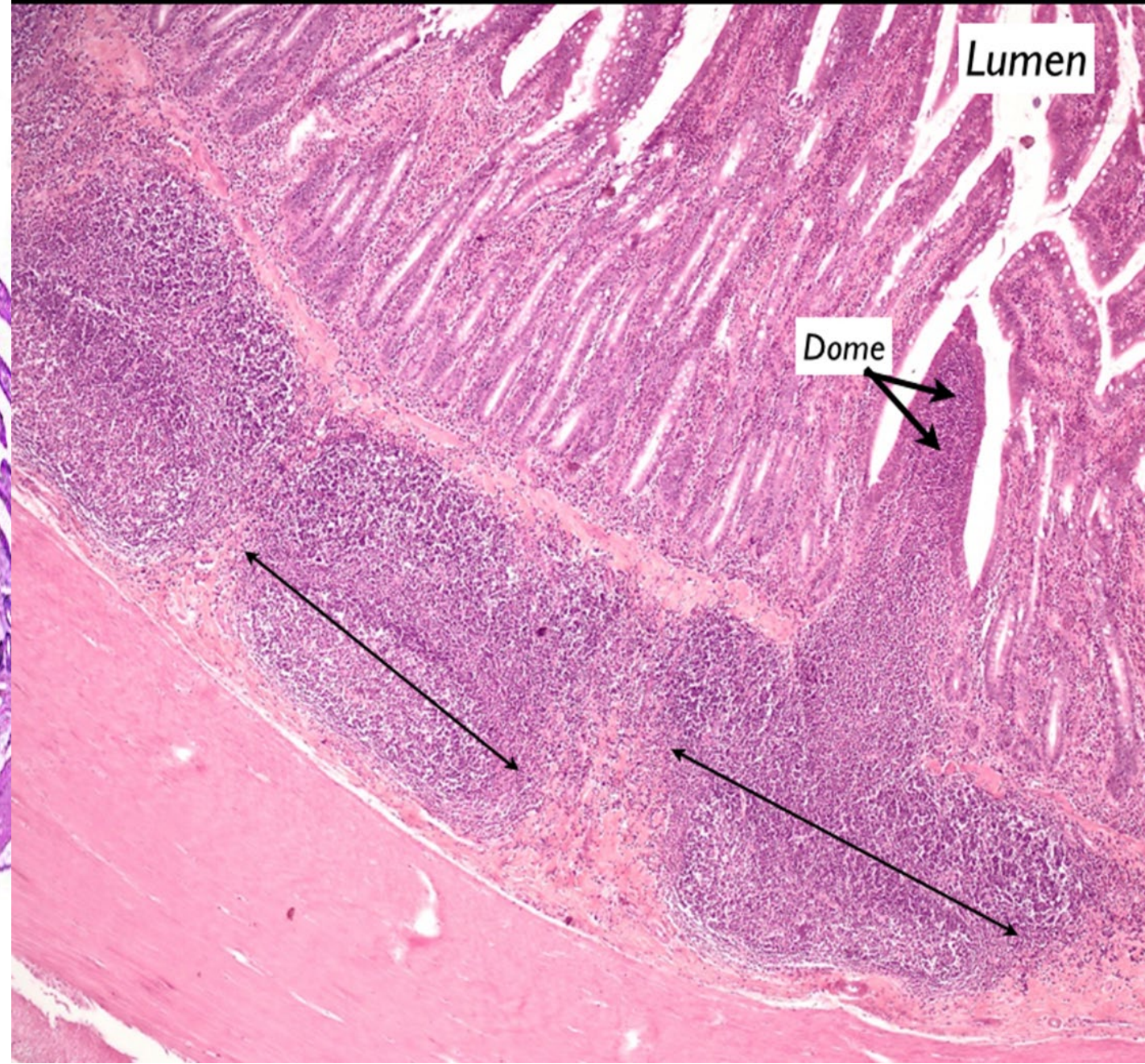
Secondary lymphoid organs trap antigens and initiate immune responses. Lymphoid cells can undergo further maturation here too. There are three secondary lymphoid organs:

- Lymph nodes
- Spleen
- Mucosa-associated lymphoid tissue (MALT)

Secondary (Peripheral) Lymphoid Organs

- Secondary lymphoid organs consist of lymphoid follicles and diffuse lymphoid tissue in different architectural arrangements.
- Main function: trap antigens and present them to circulating lymphocytes.
- Specific functions:
 - Lymph nodes: filter lymph
 - Spleen: filters blood
 - MALT: filters antigens that attempt to cross mucosal surfaces

Ileum: Peyer's Patches



Ileum with Peyer's Patches

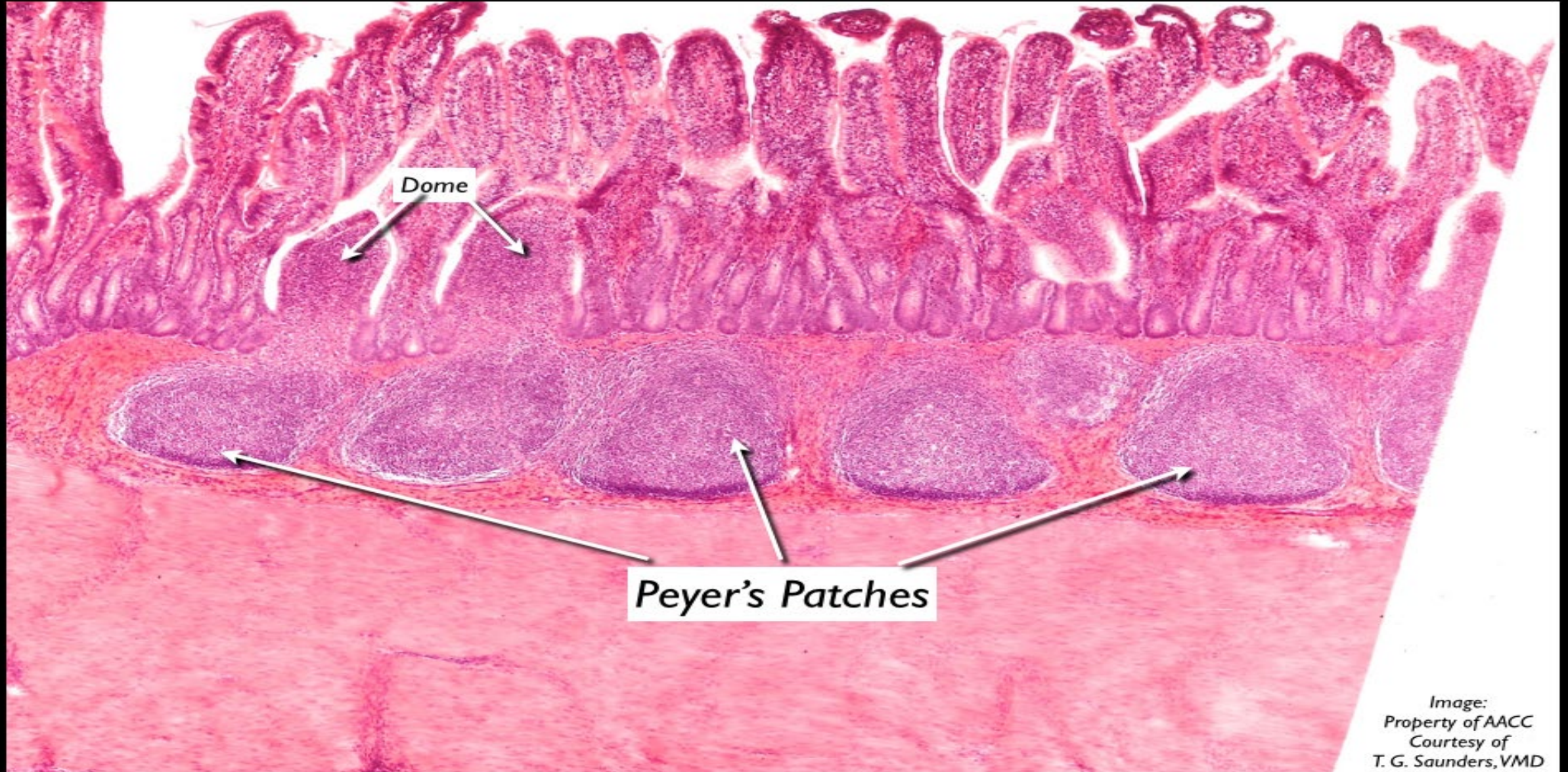
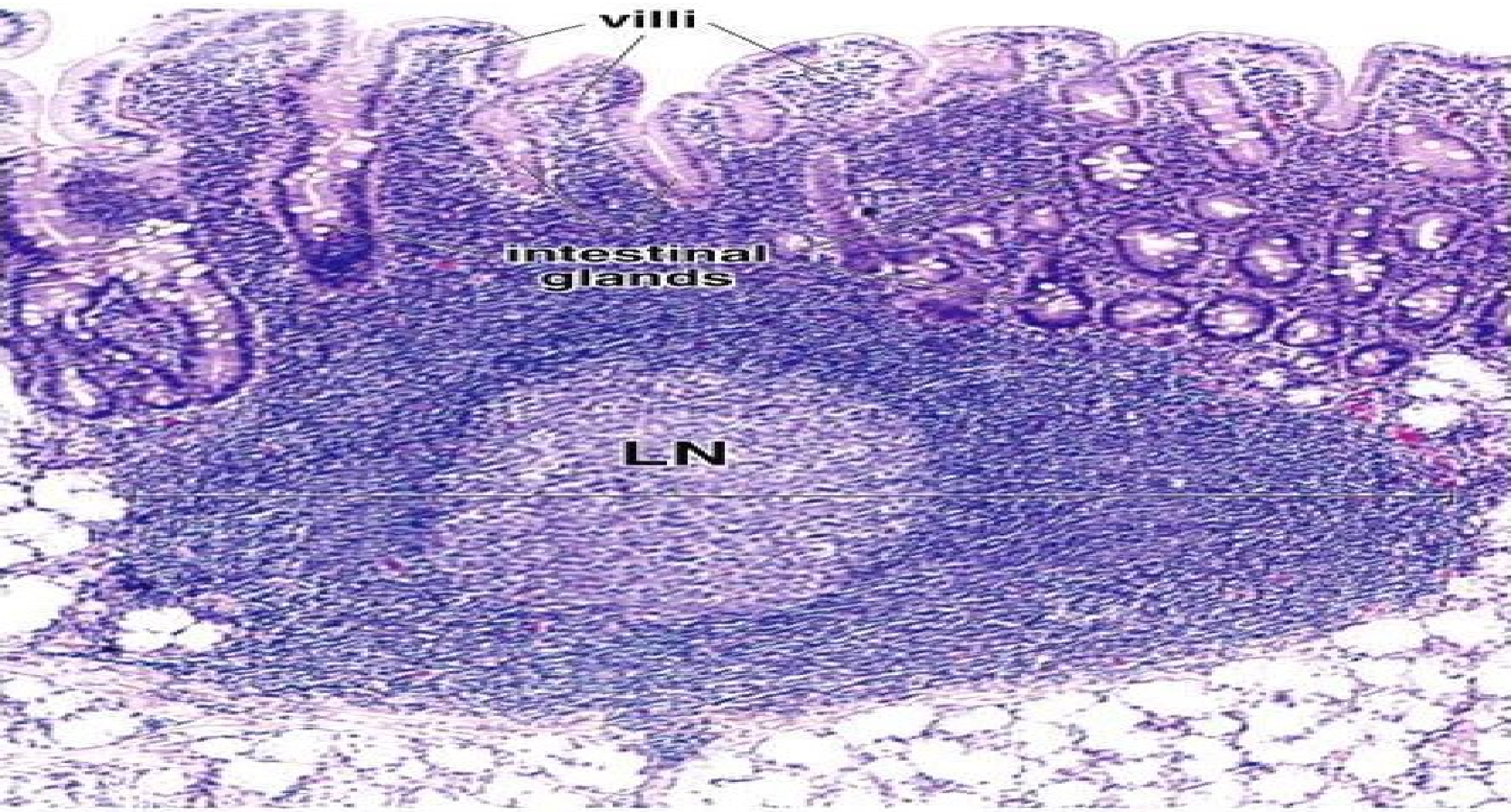


Image:
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Courtesy of
T. G. Saunders, VMD



villi

**intestinal
glands**

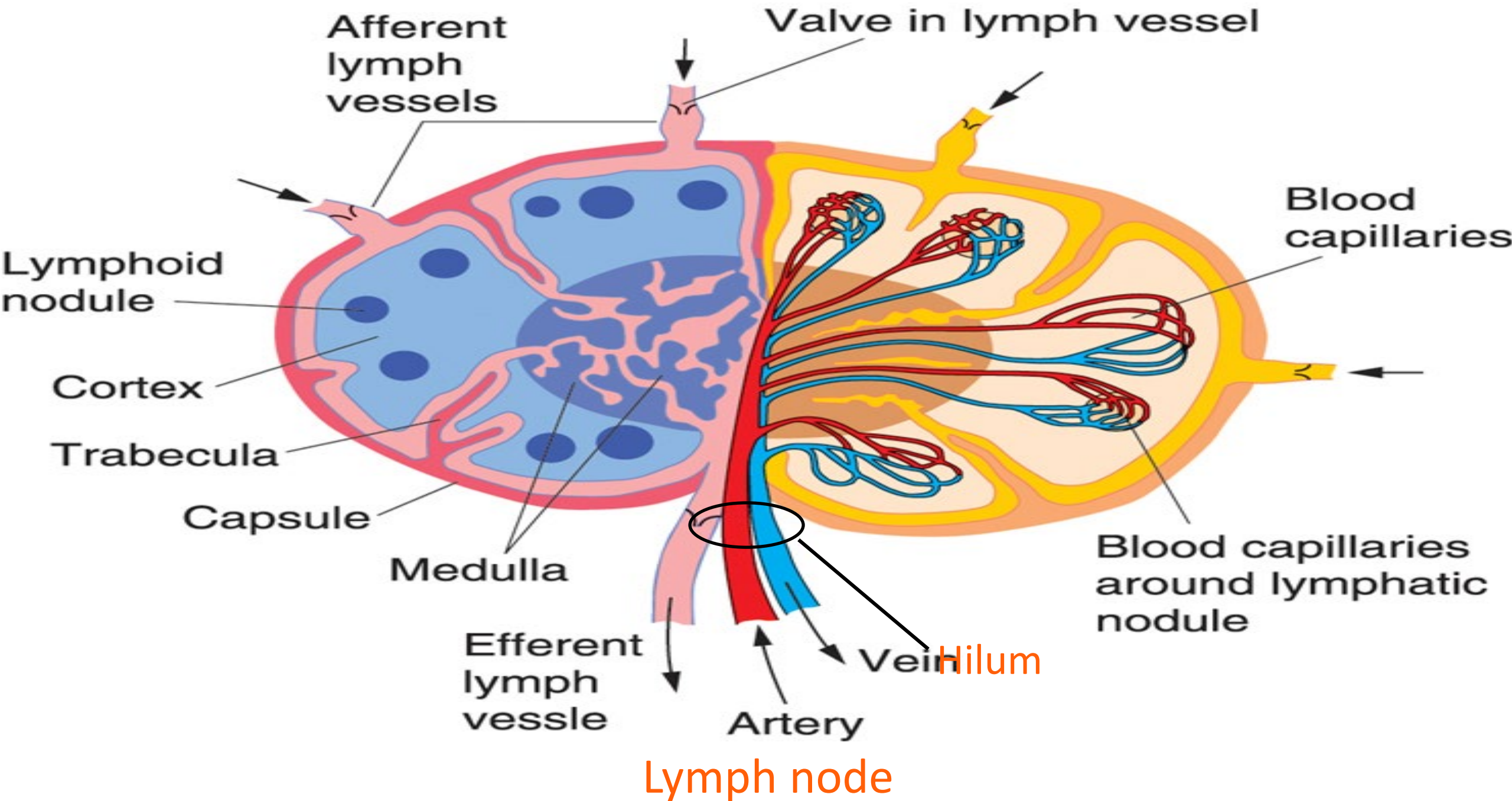
LN

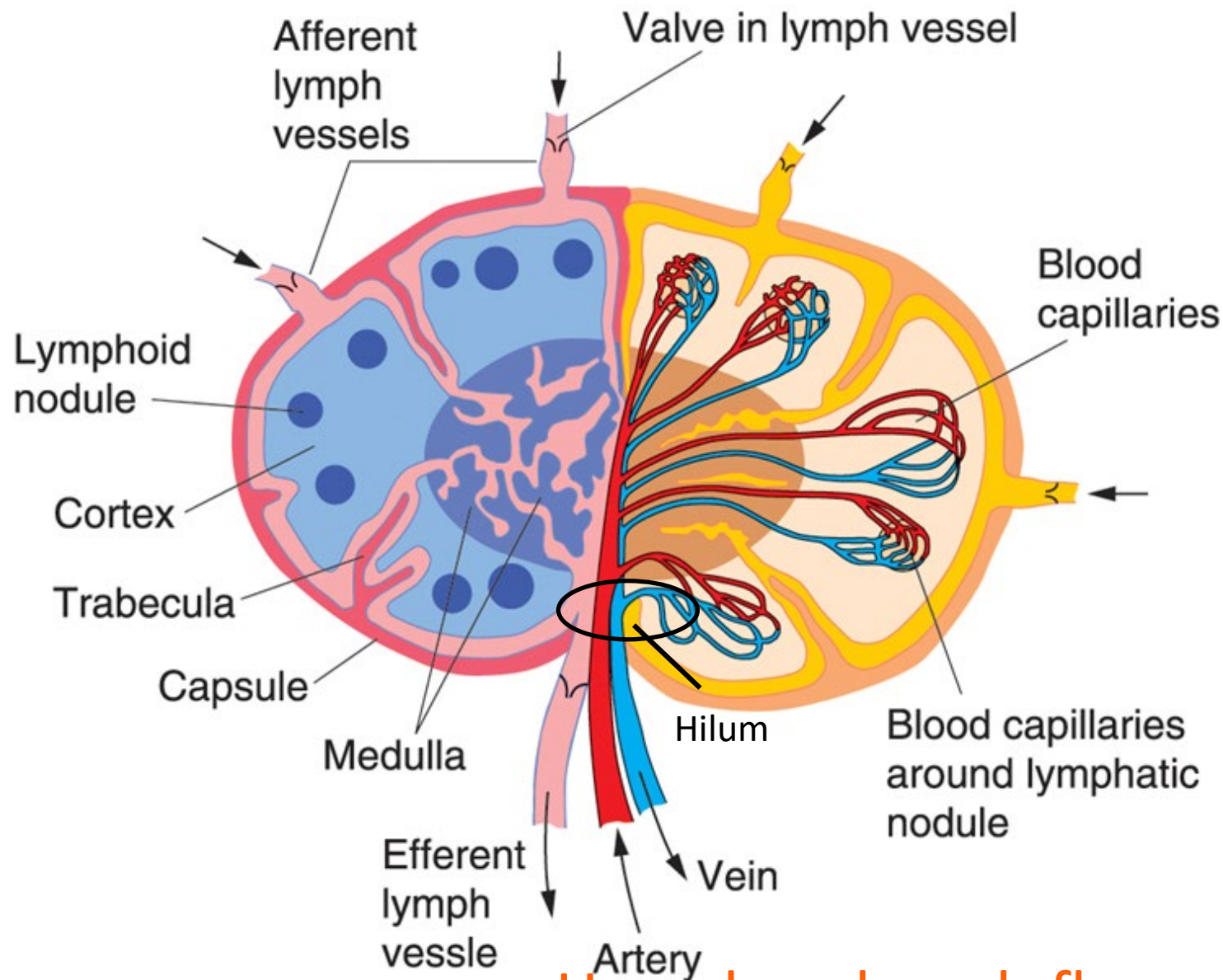
Oesophagus H&E



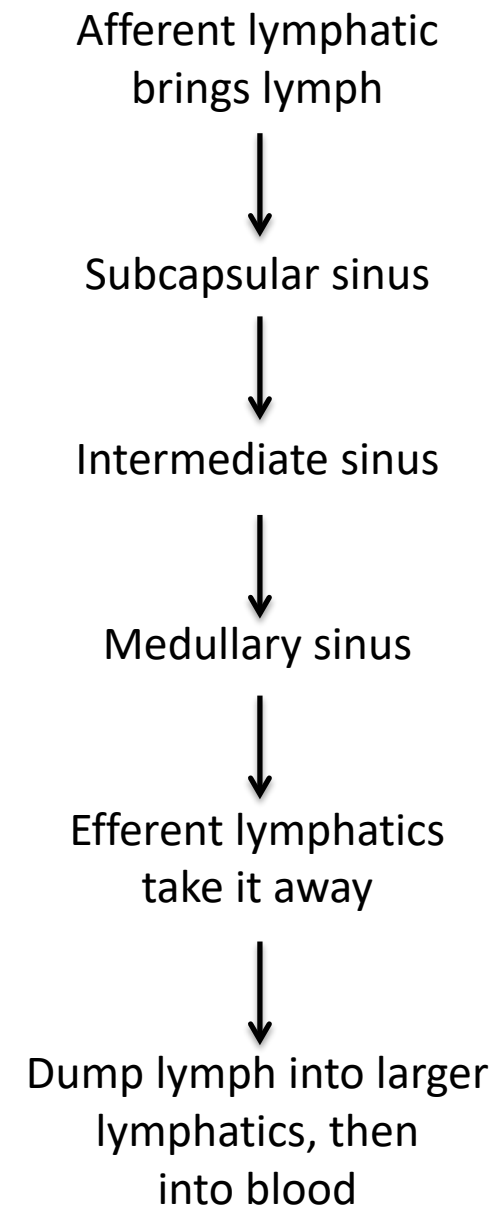
MALT

MALT - Mucosa Associated Lymphoid Tissue

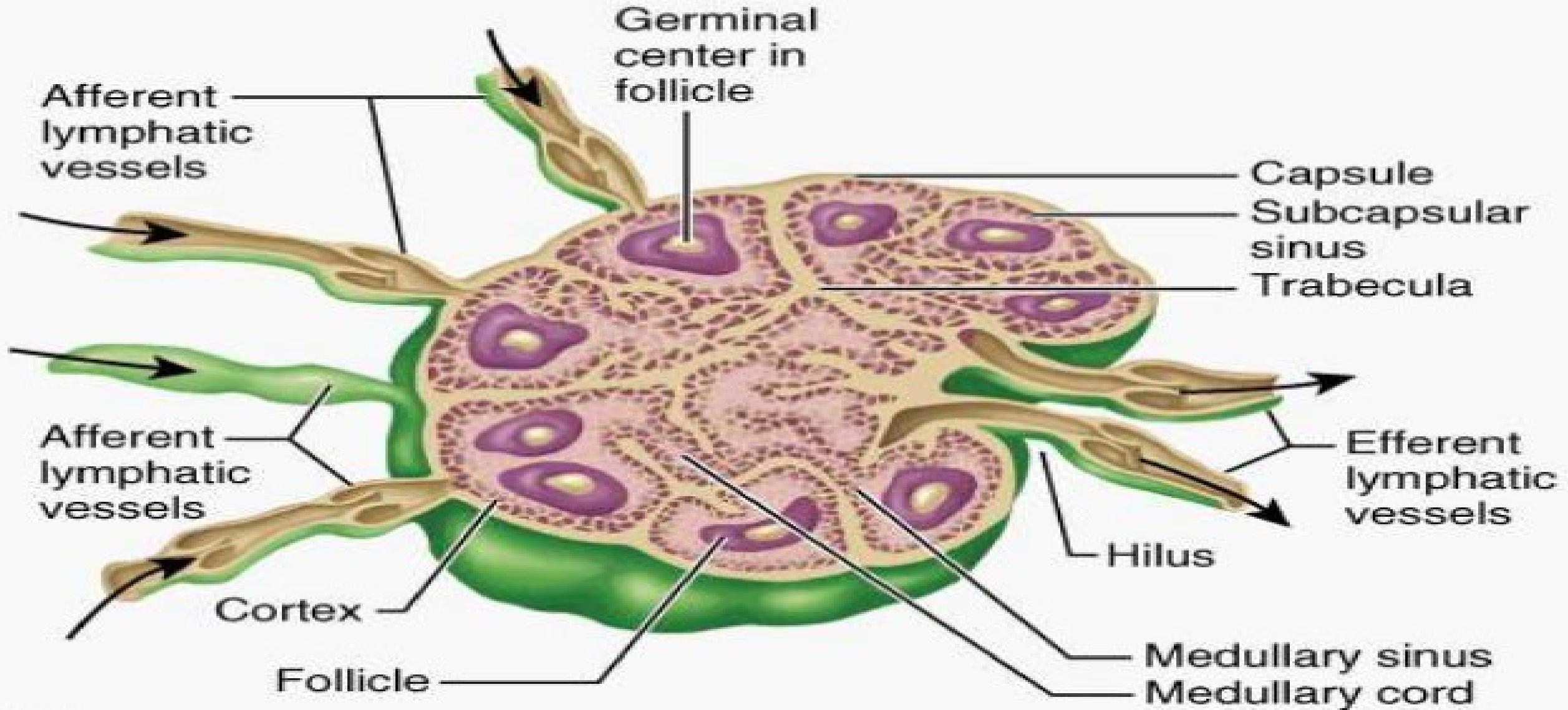




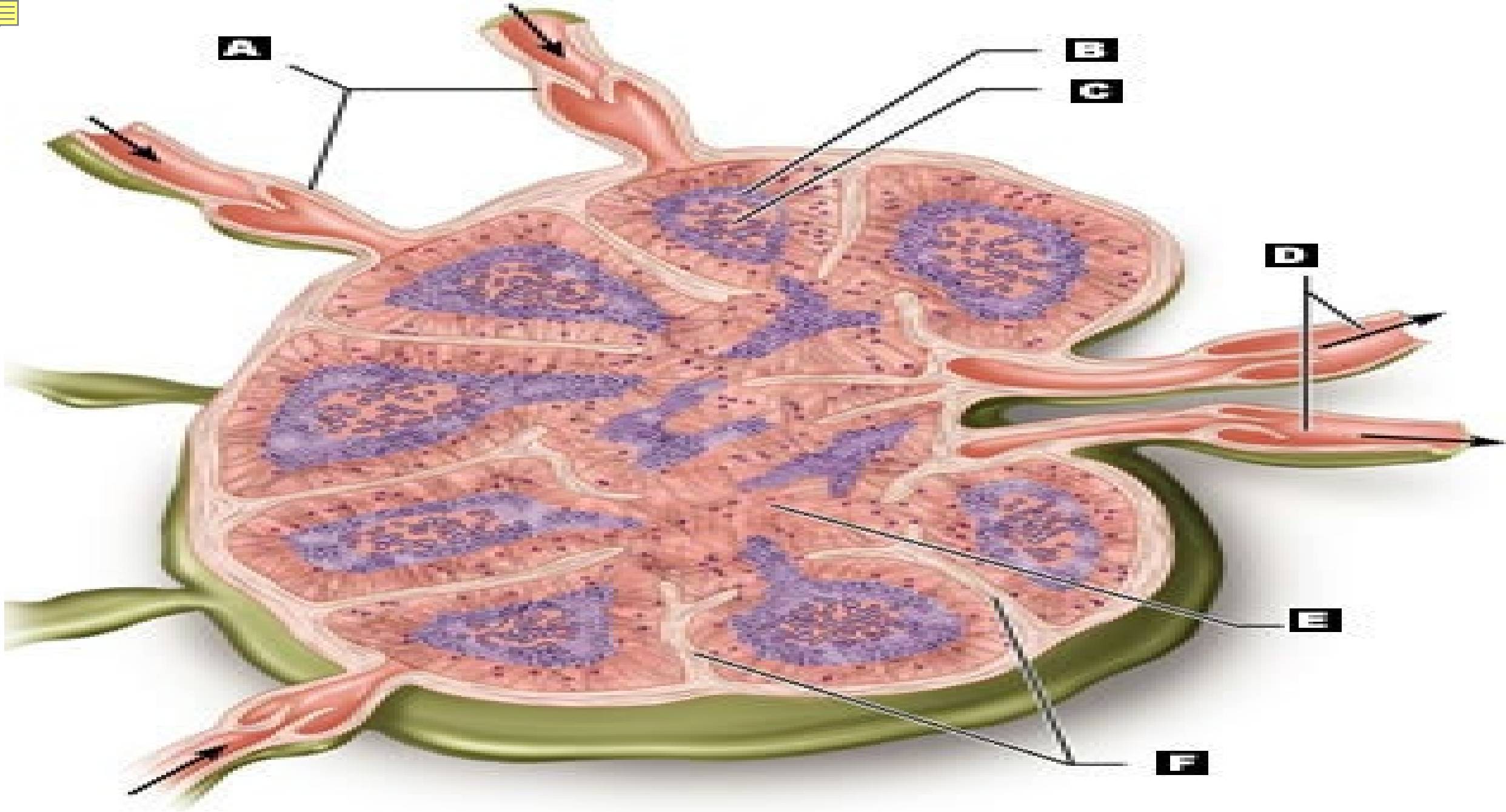
How does lymph flow through the node?

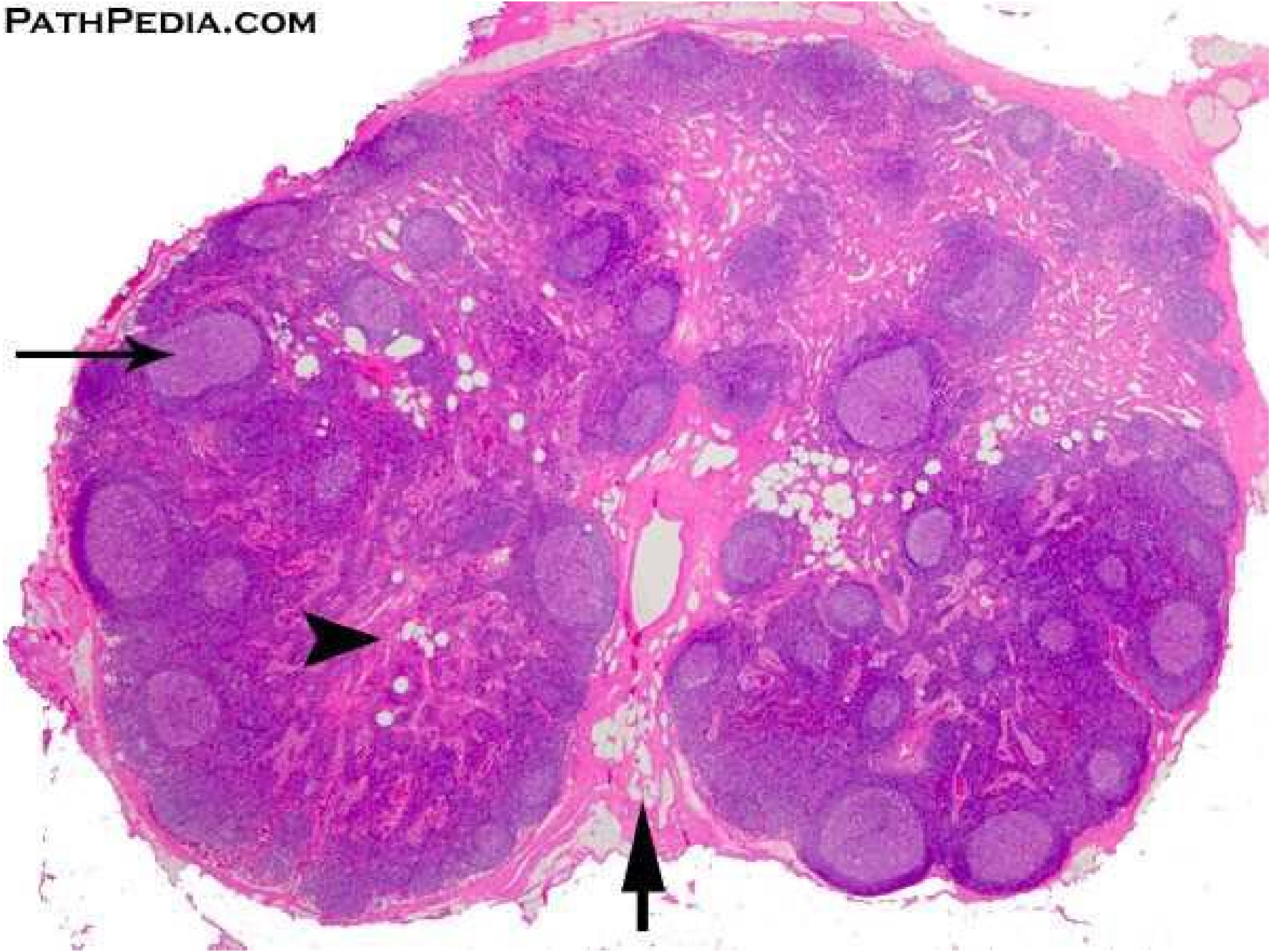


Structure of lymph node



(a)





Lymph Node

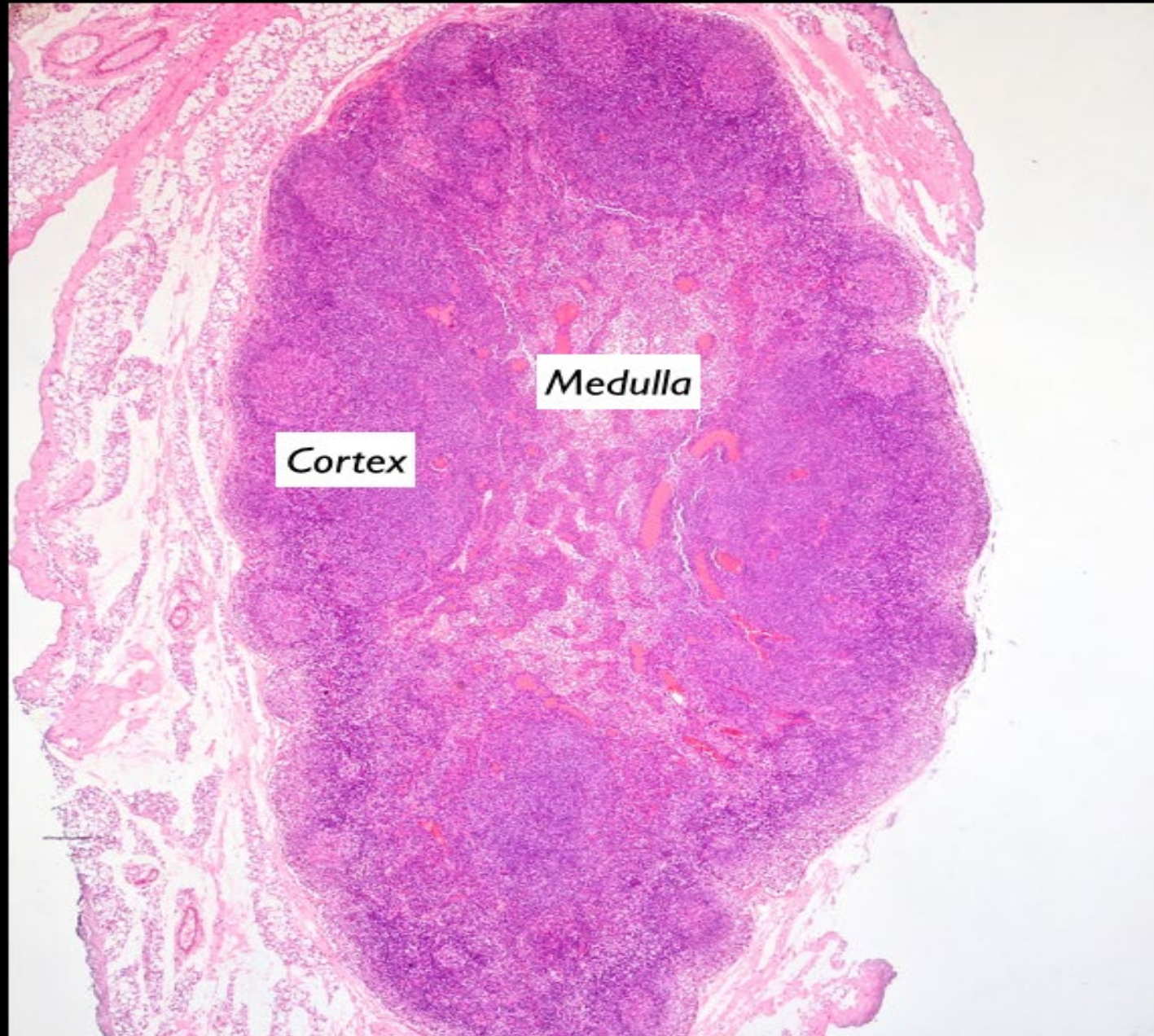
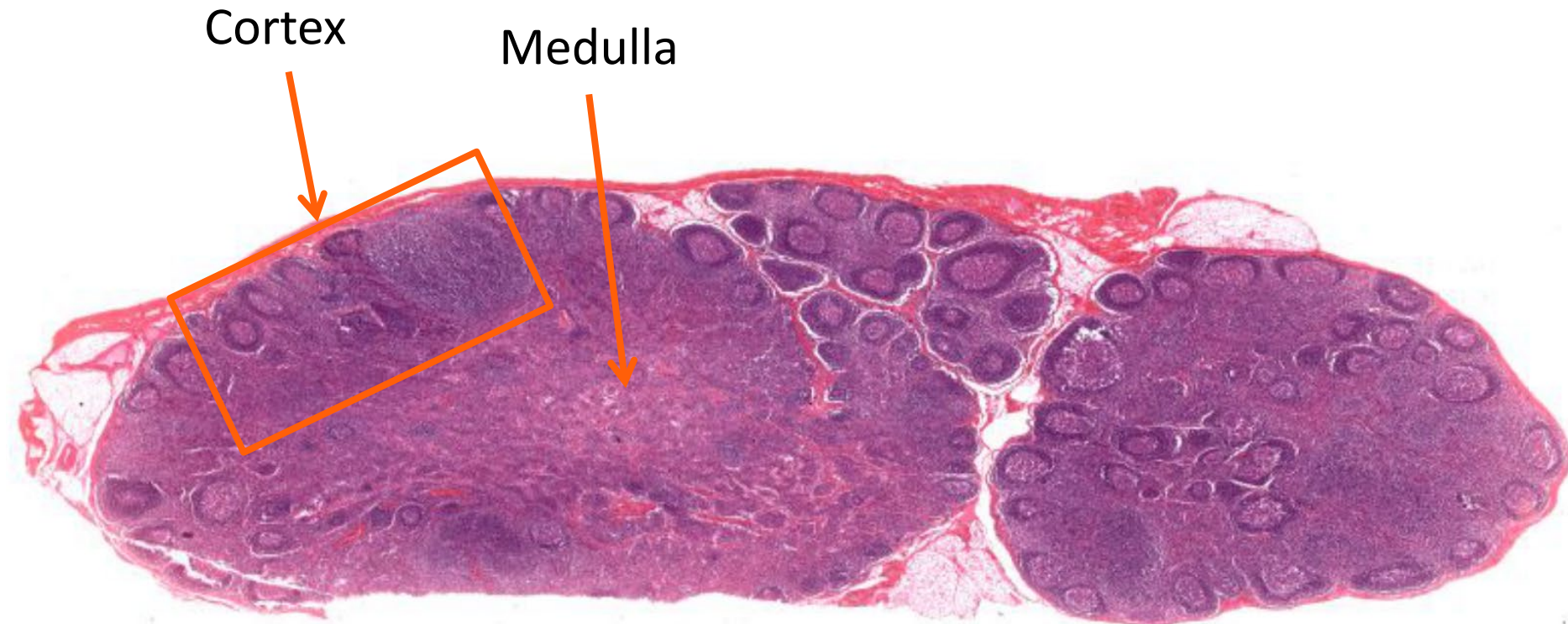
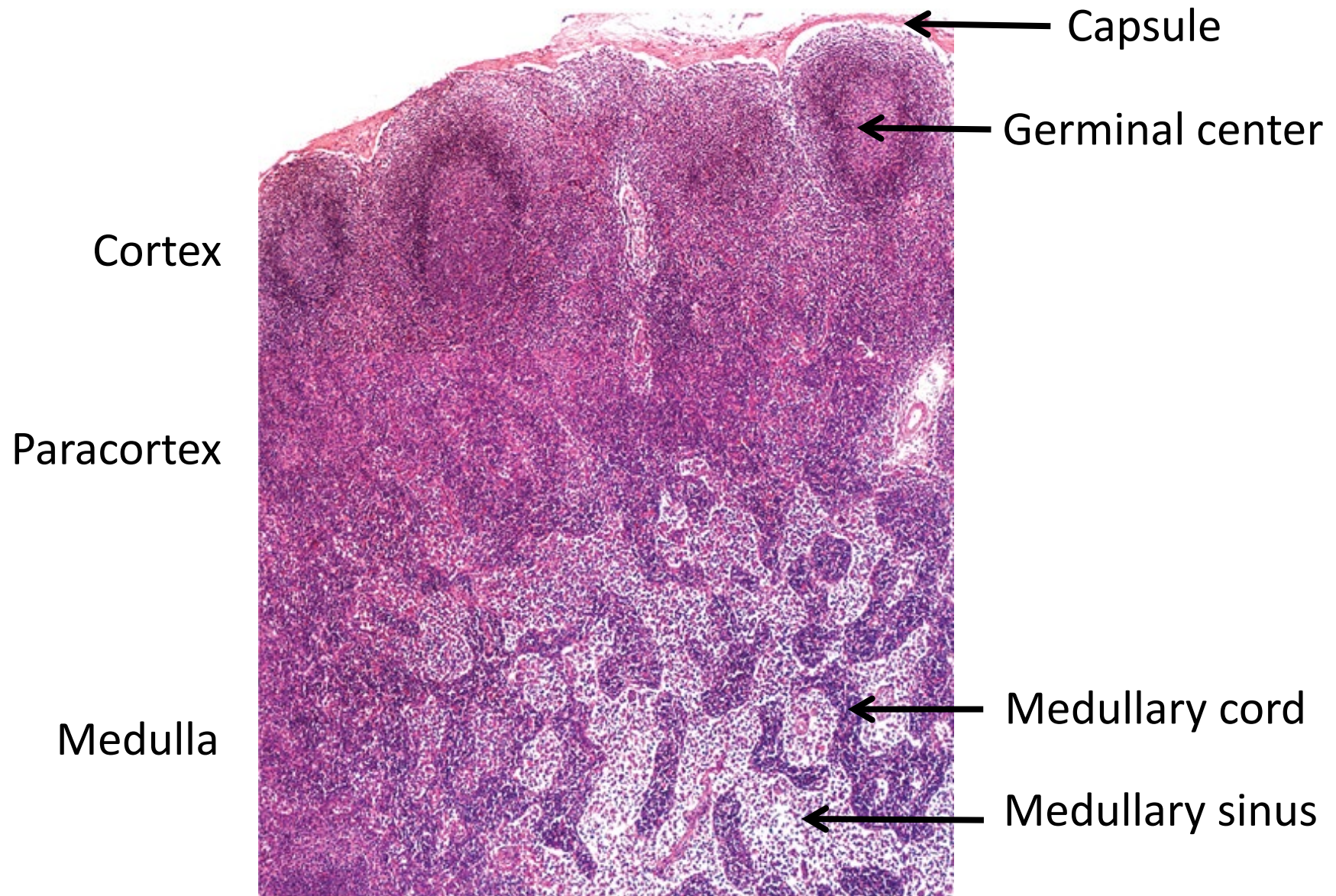


Image:
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Courtesy of
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Lymph node: low power



Lymph node

Lymph Node

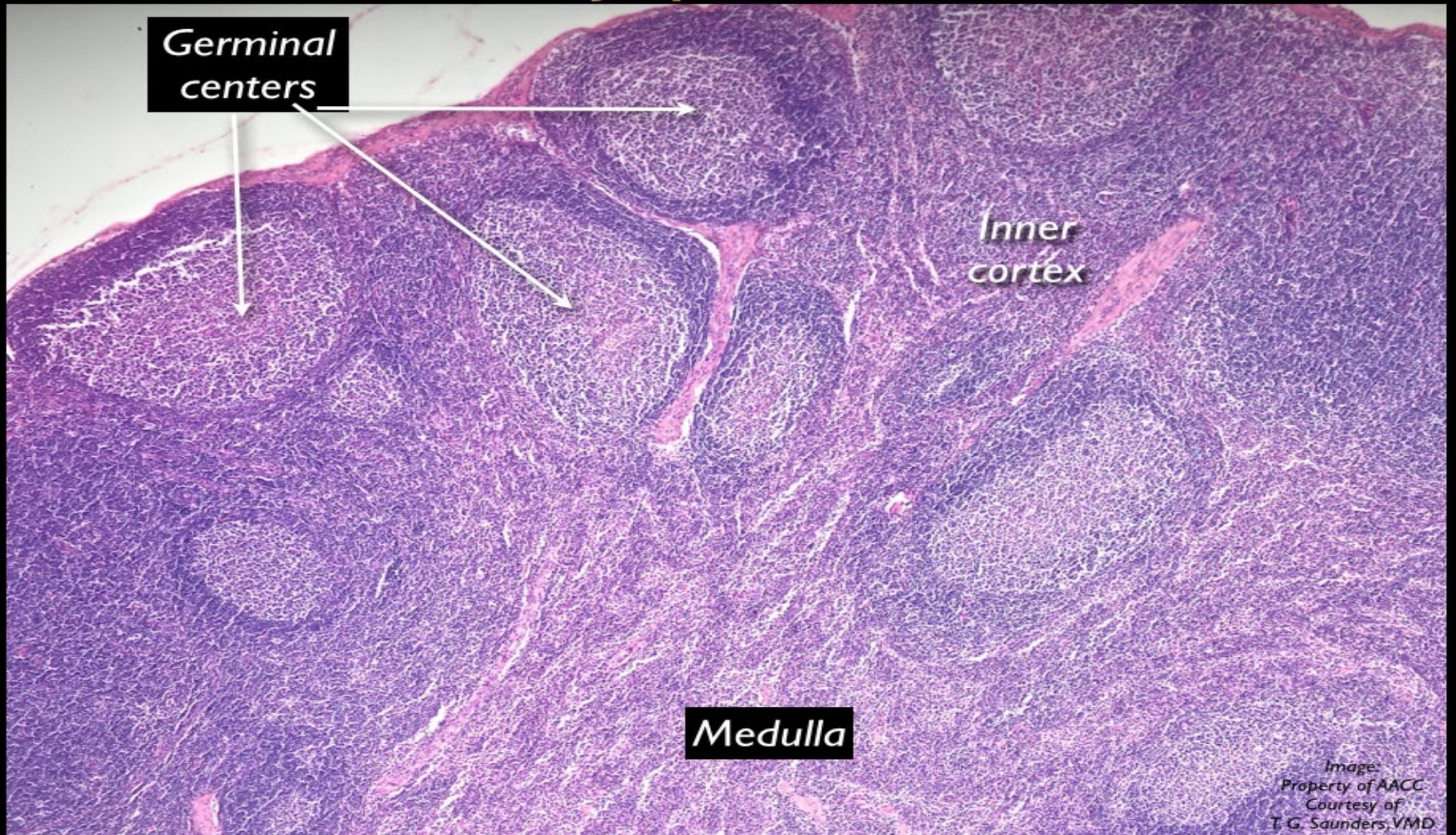
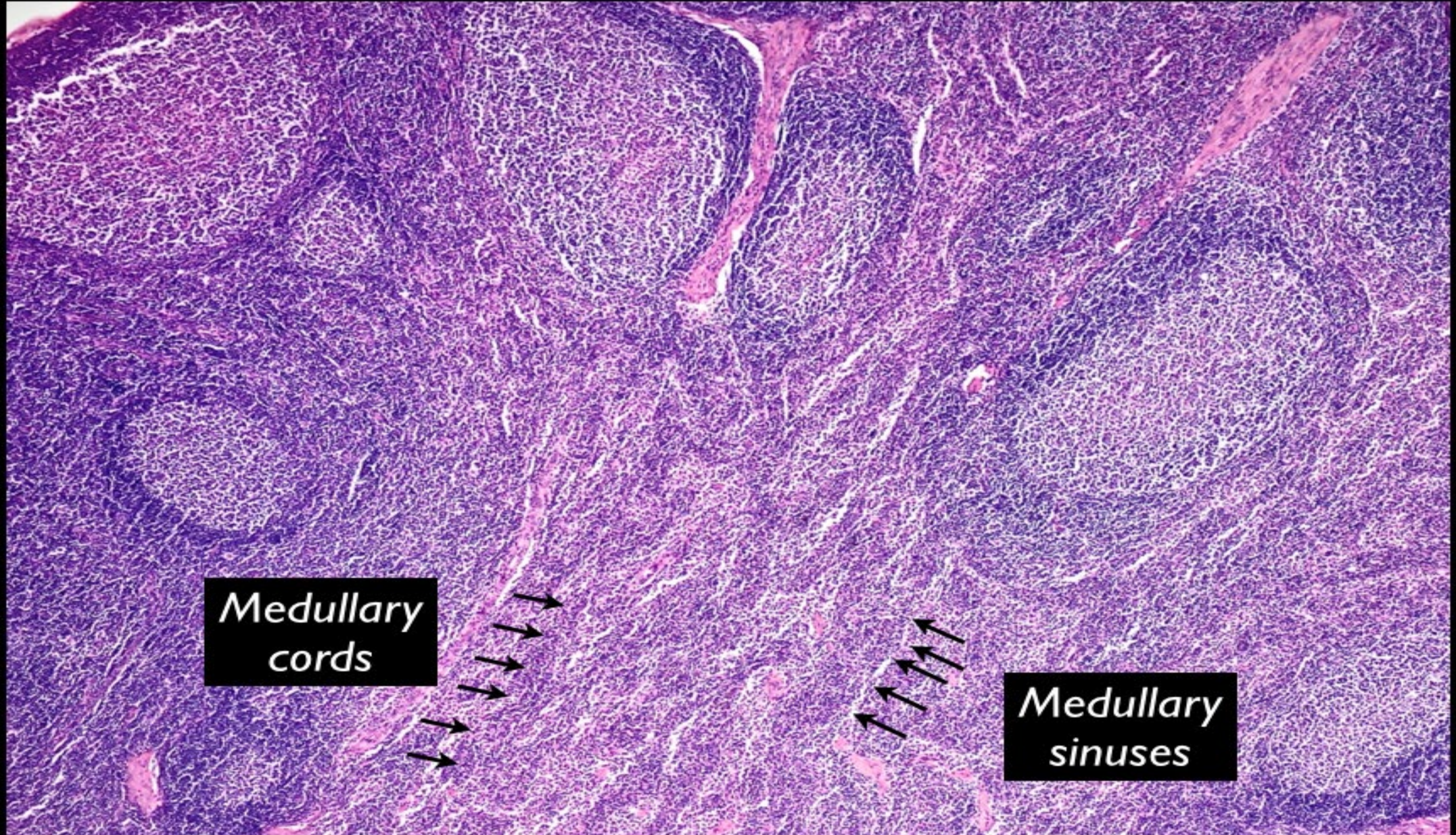


Image:
Property of AACC
Courtesy of
T.G. Saunders, VMD

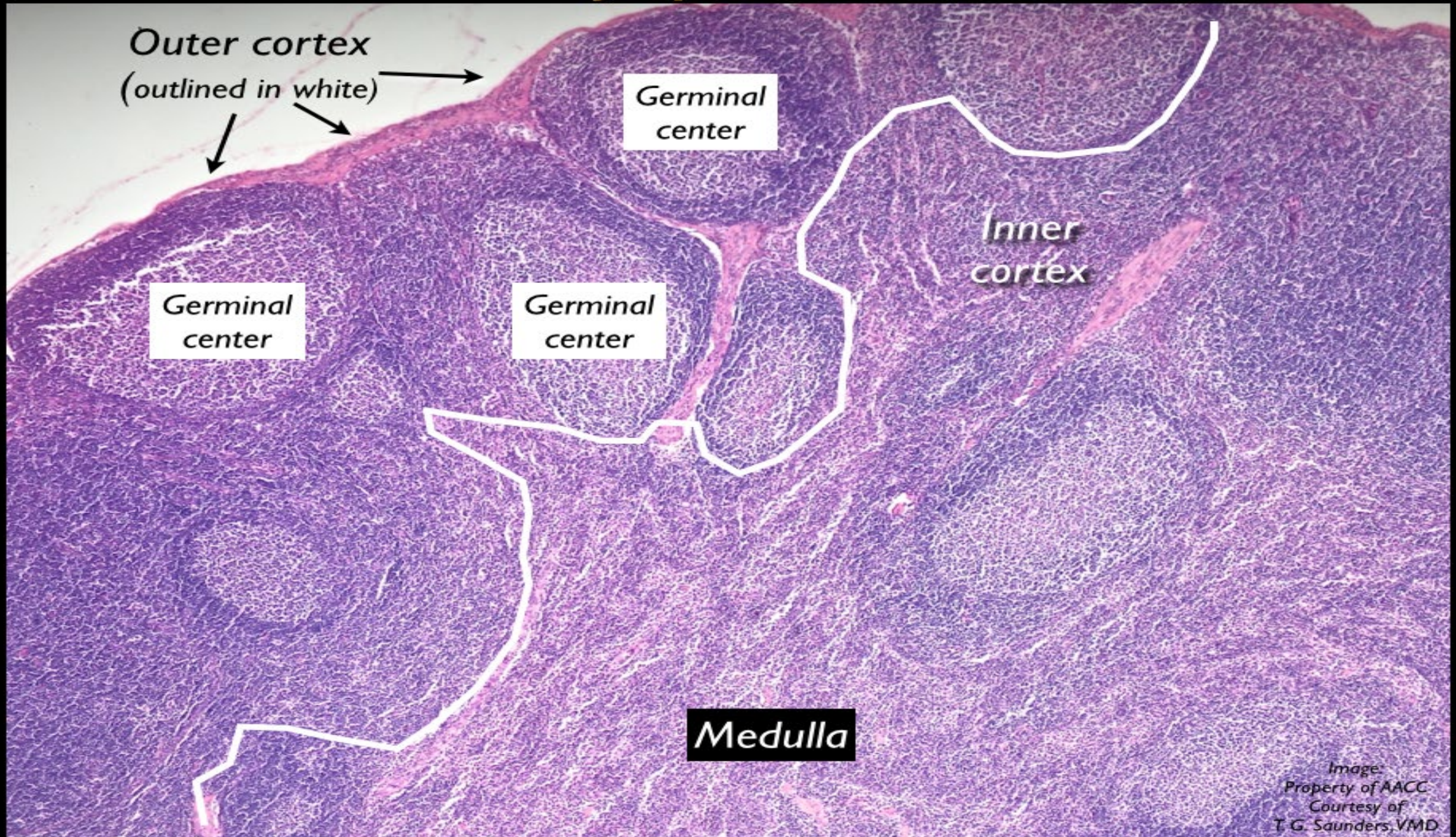
Lymph Node



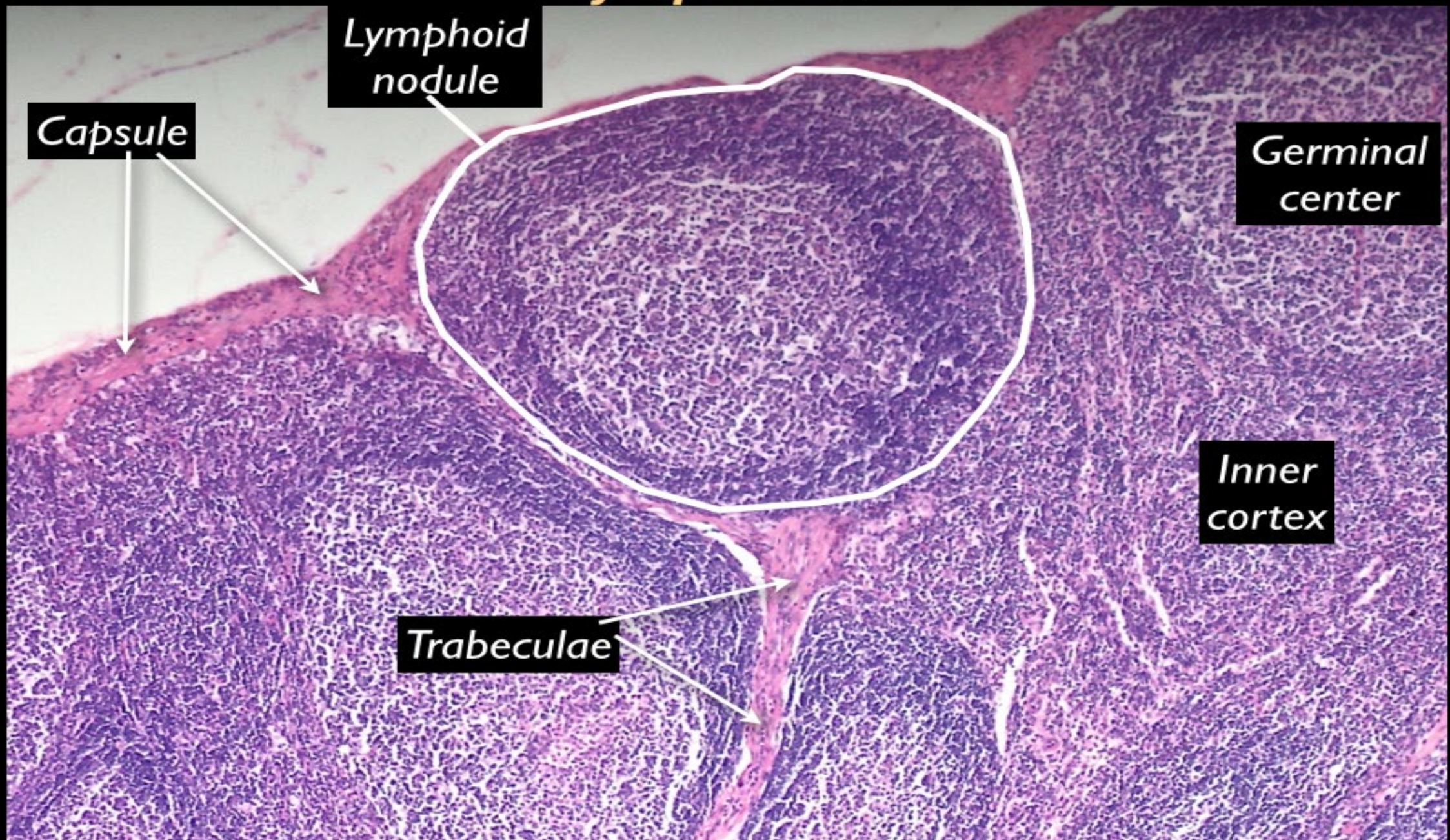
Medullary
cords

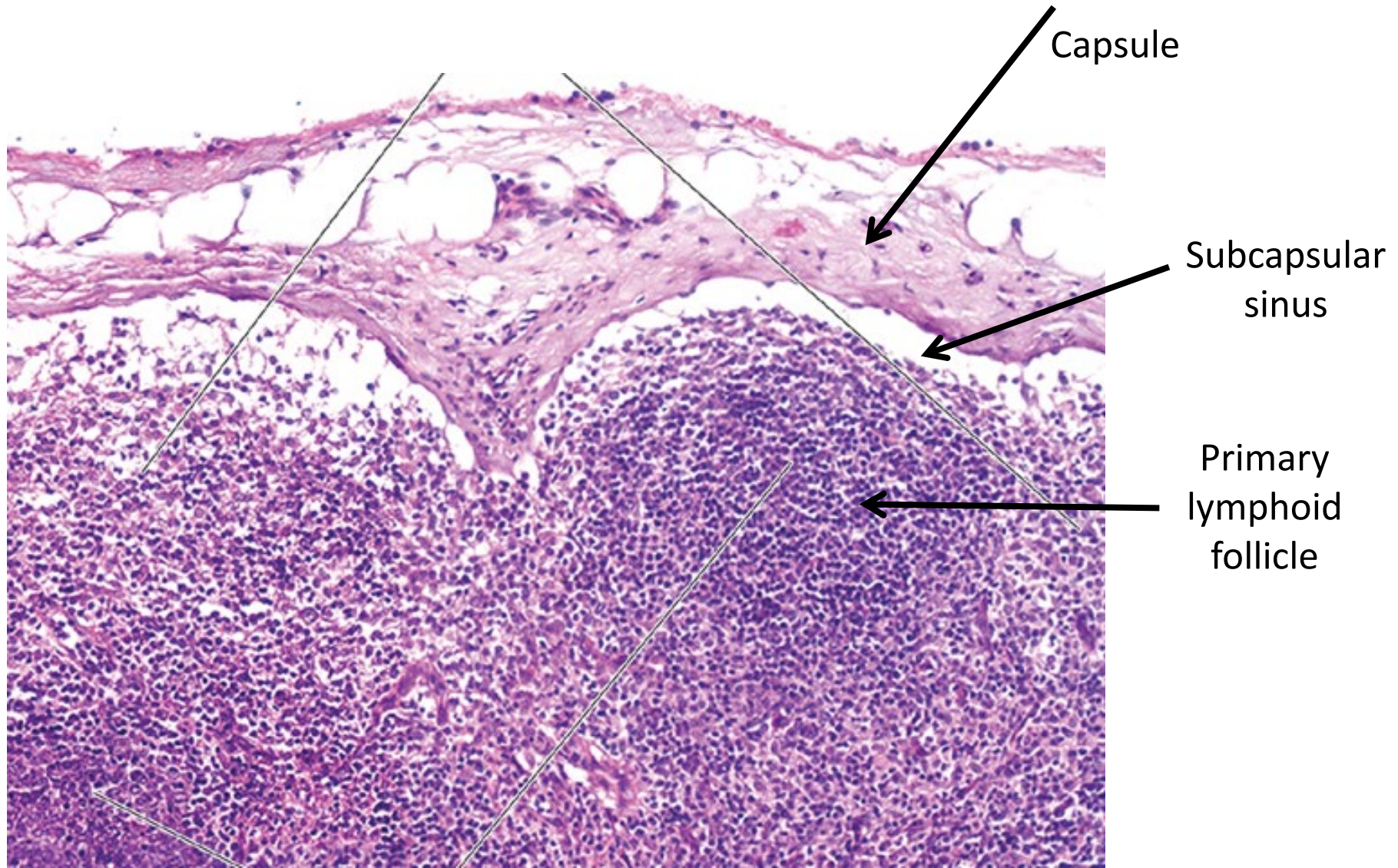
Medullary
sinuses

Lymph Node

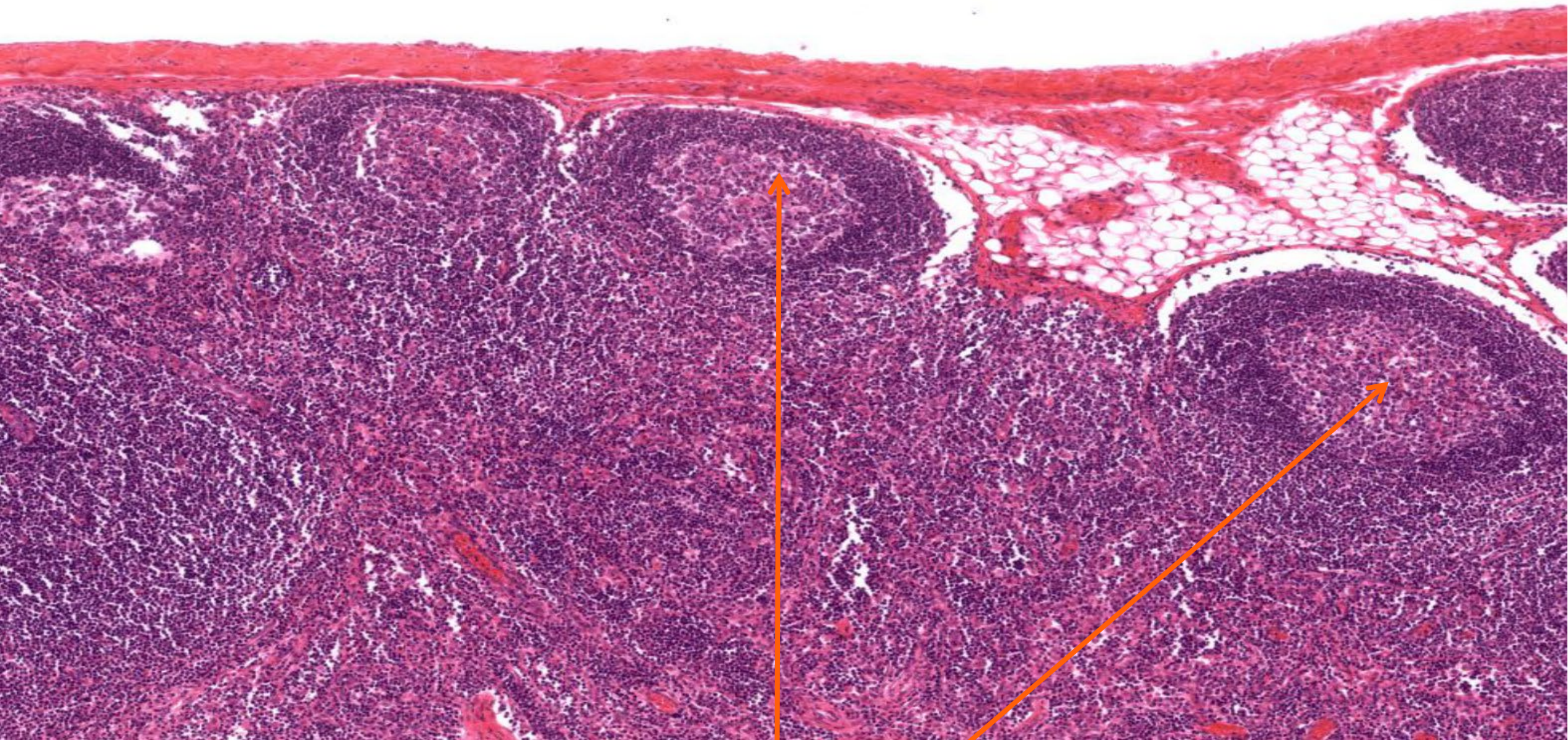


Lymph Node

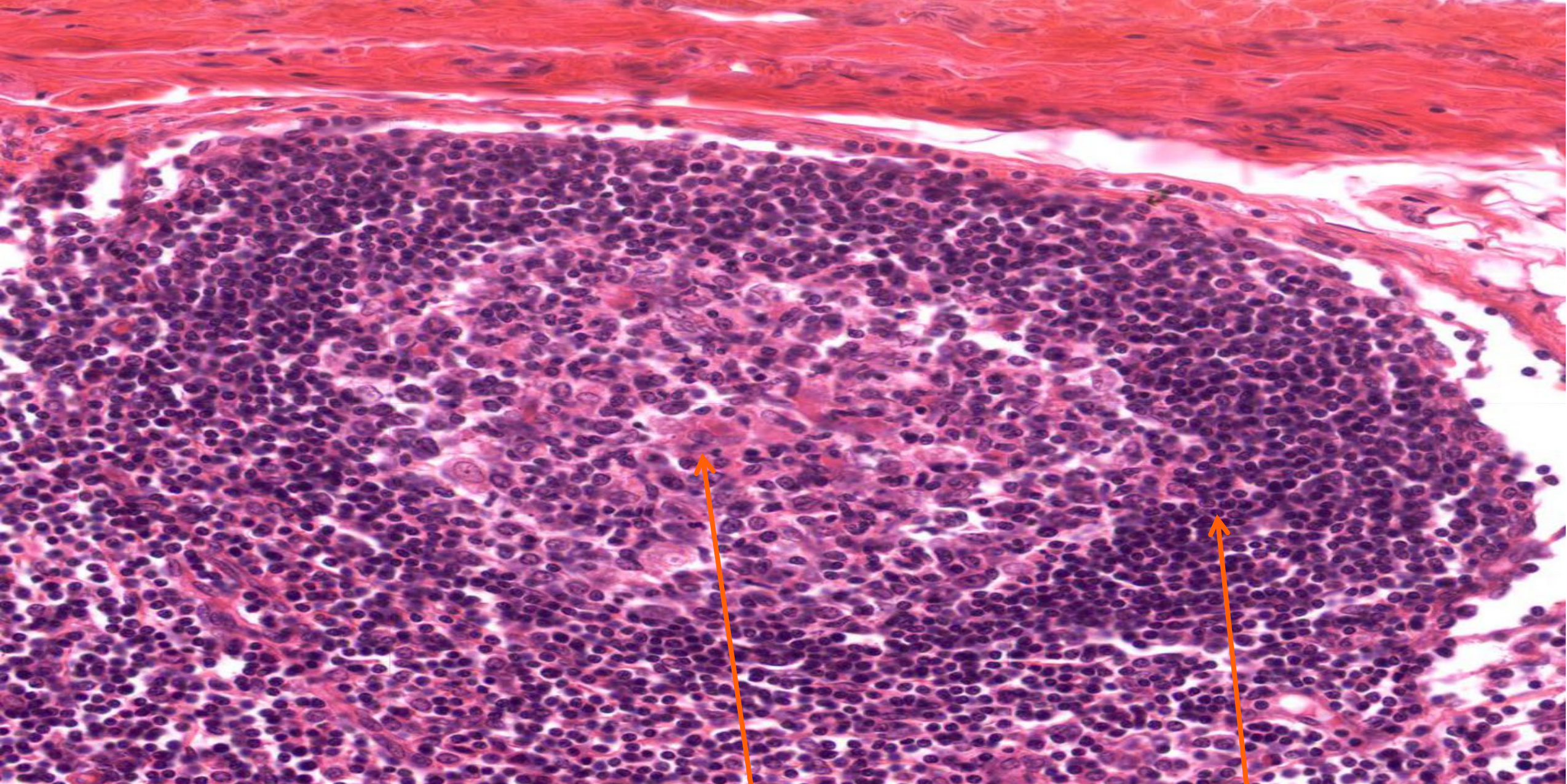




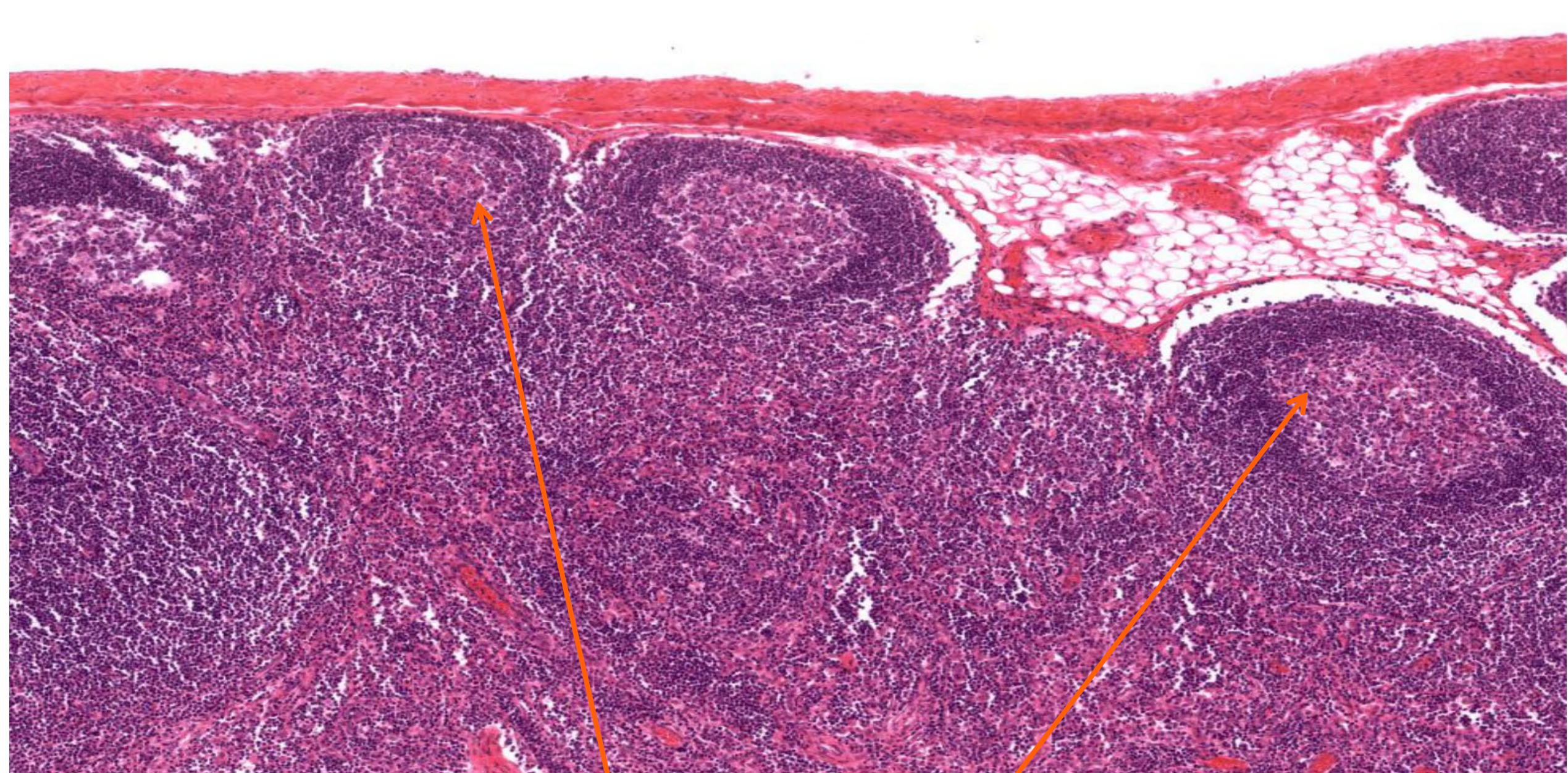
Lymph node: primary follicles



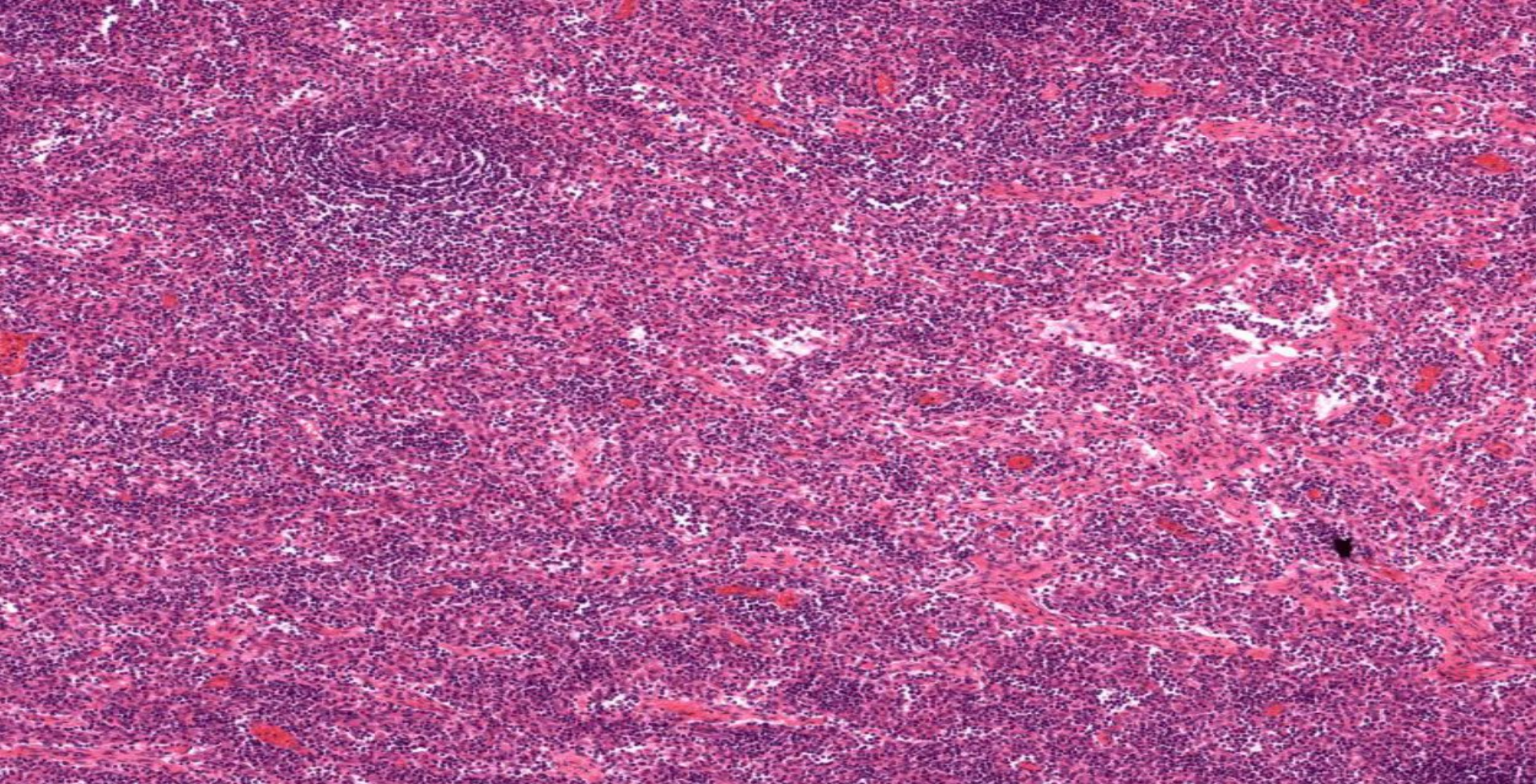
Lymph node: secondary follicles



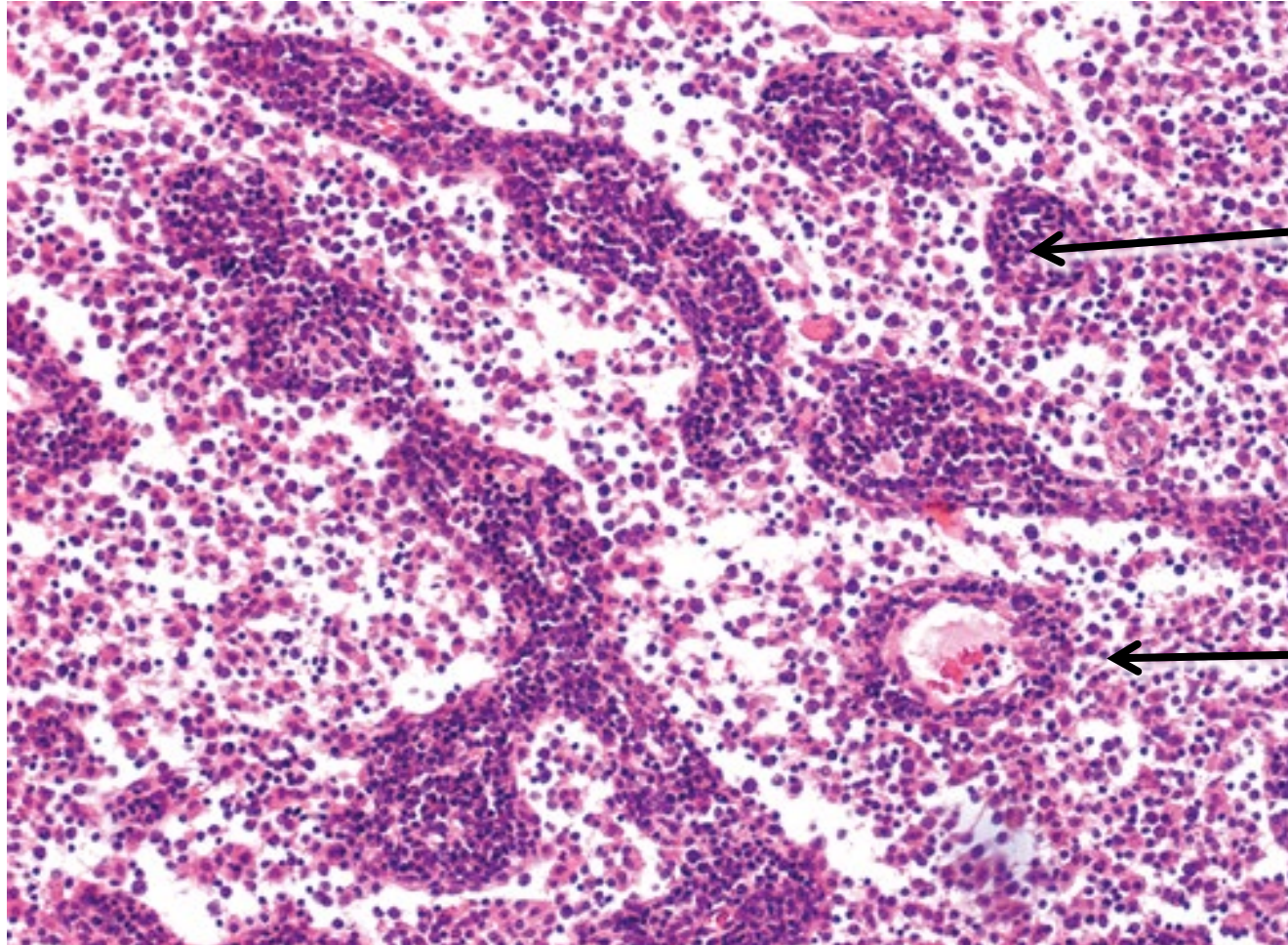
Secondary follicle with germinal center and mantle zone



B cells are in follicles; T cells are in interfollicular areas



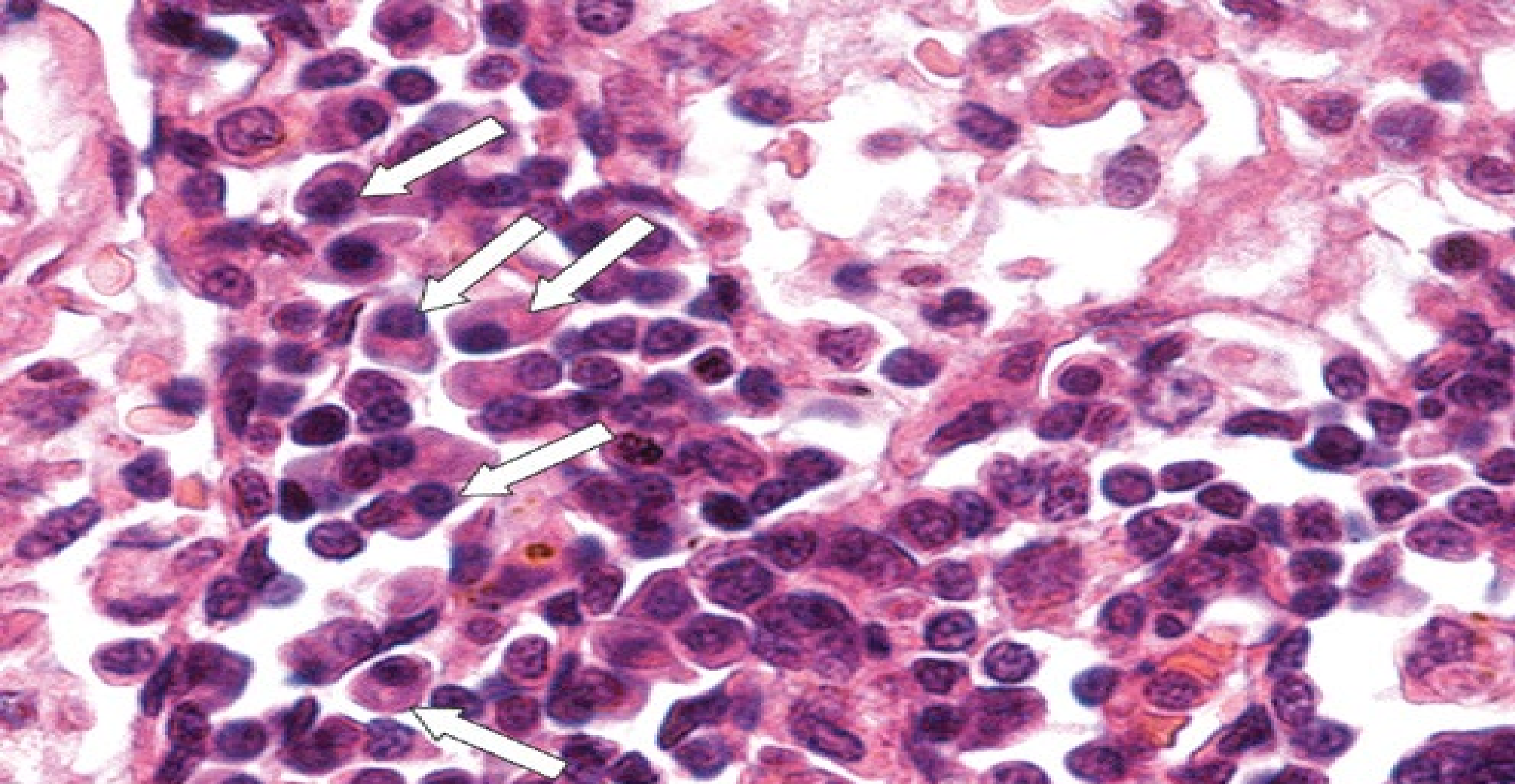
Lymph node: medulla



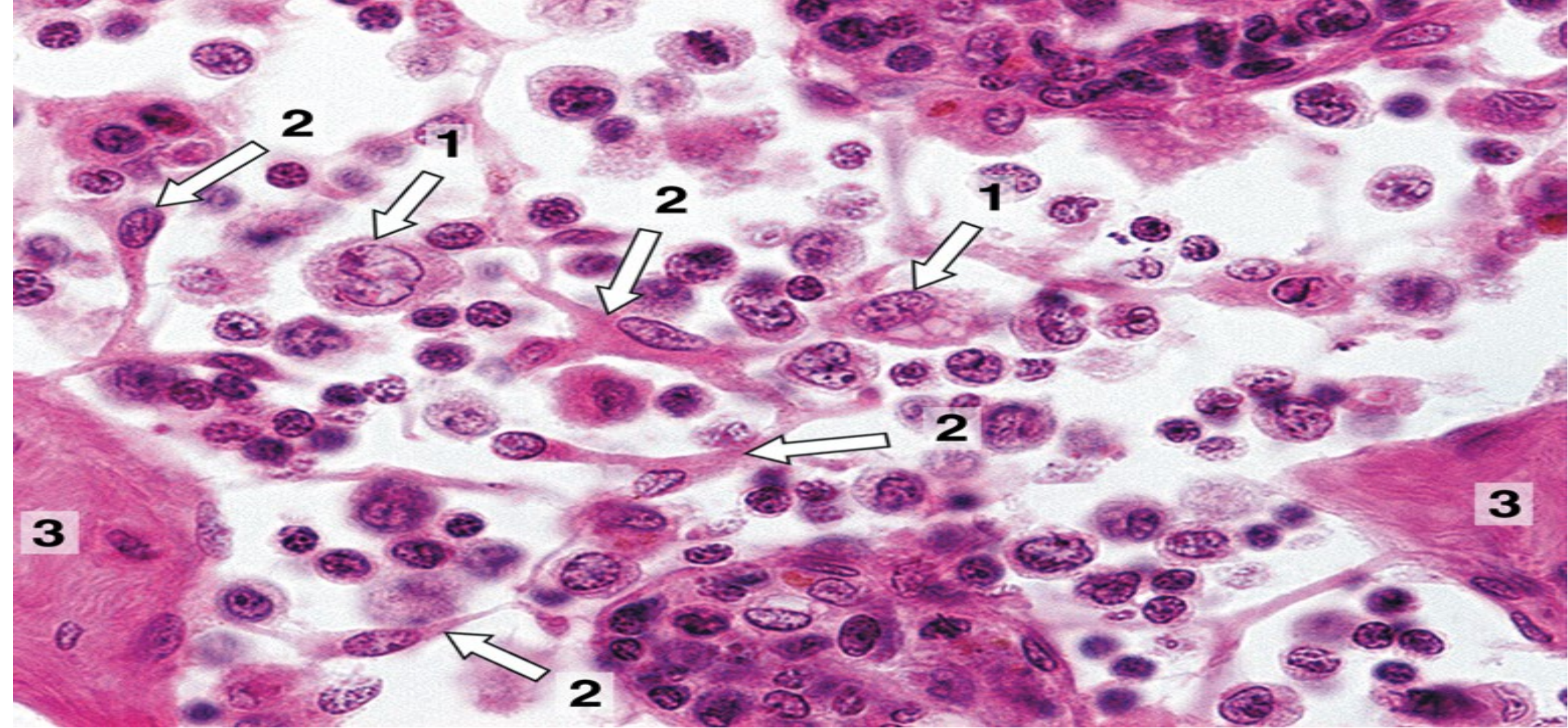
Medullary
cords contain B
cells, plasma
cells and
macrophages

Medullary
sinuses contain
reticular fibers,
lymph,
circulating cells
and antigens

Lymph node: medulla



Medullary cord with tons of plasma cells (arrows)

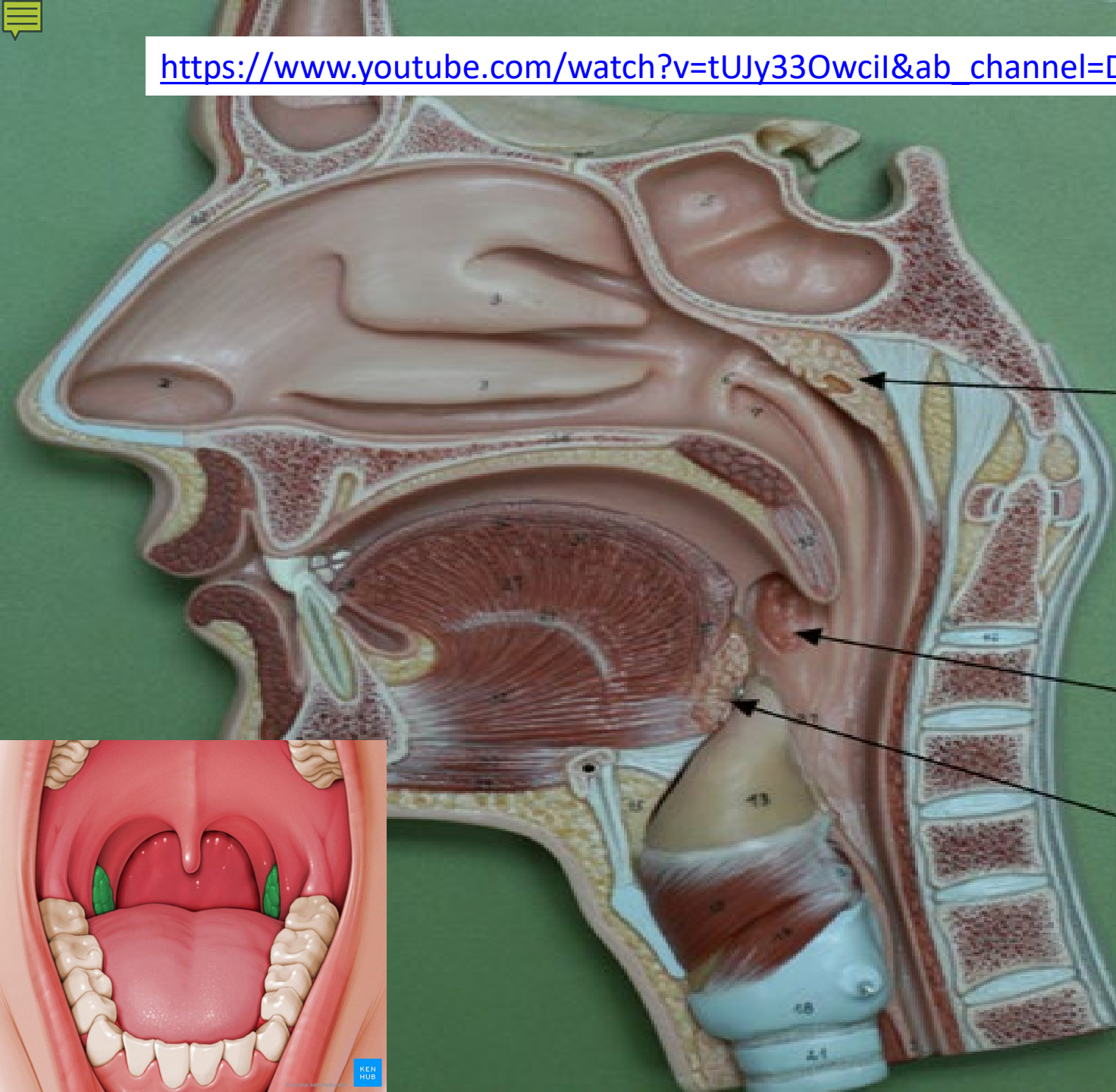


Medullary sinus with macrophages (1),
reticular cells (2) and trabeculae (3)

FIGURE 1

https://www.youtube.com/watch?v=tUJy33Owcil&ab_channel=Dr.E

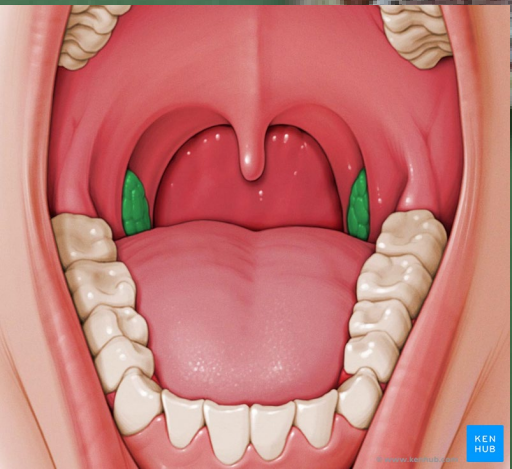
A model of the head with a section through the midline showing:

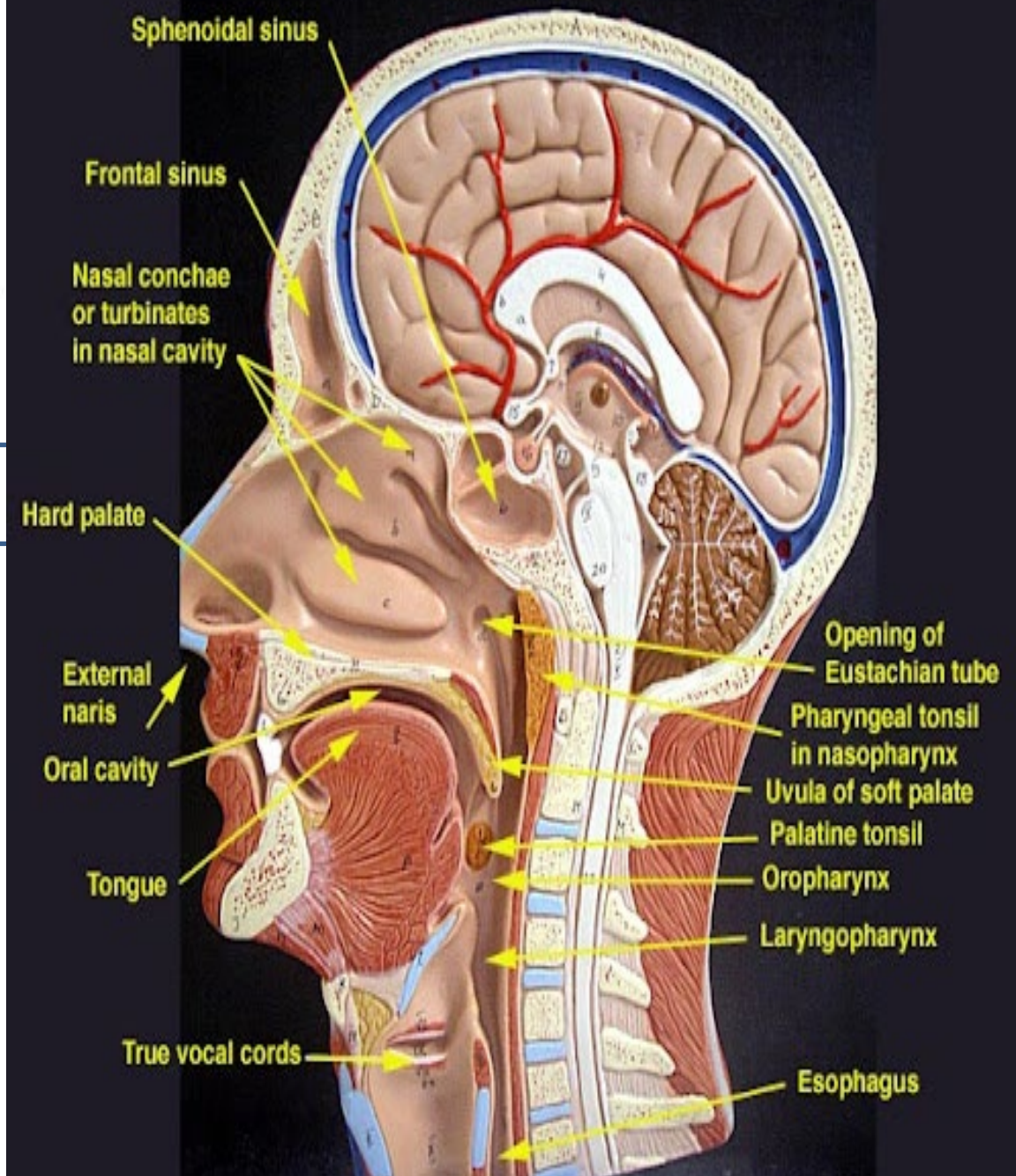
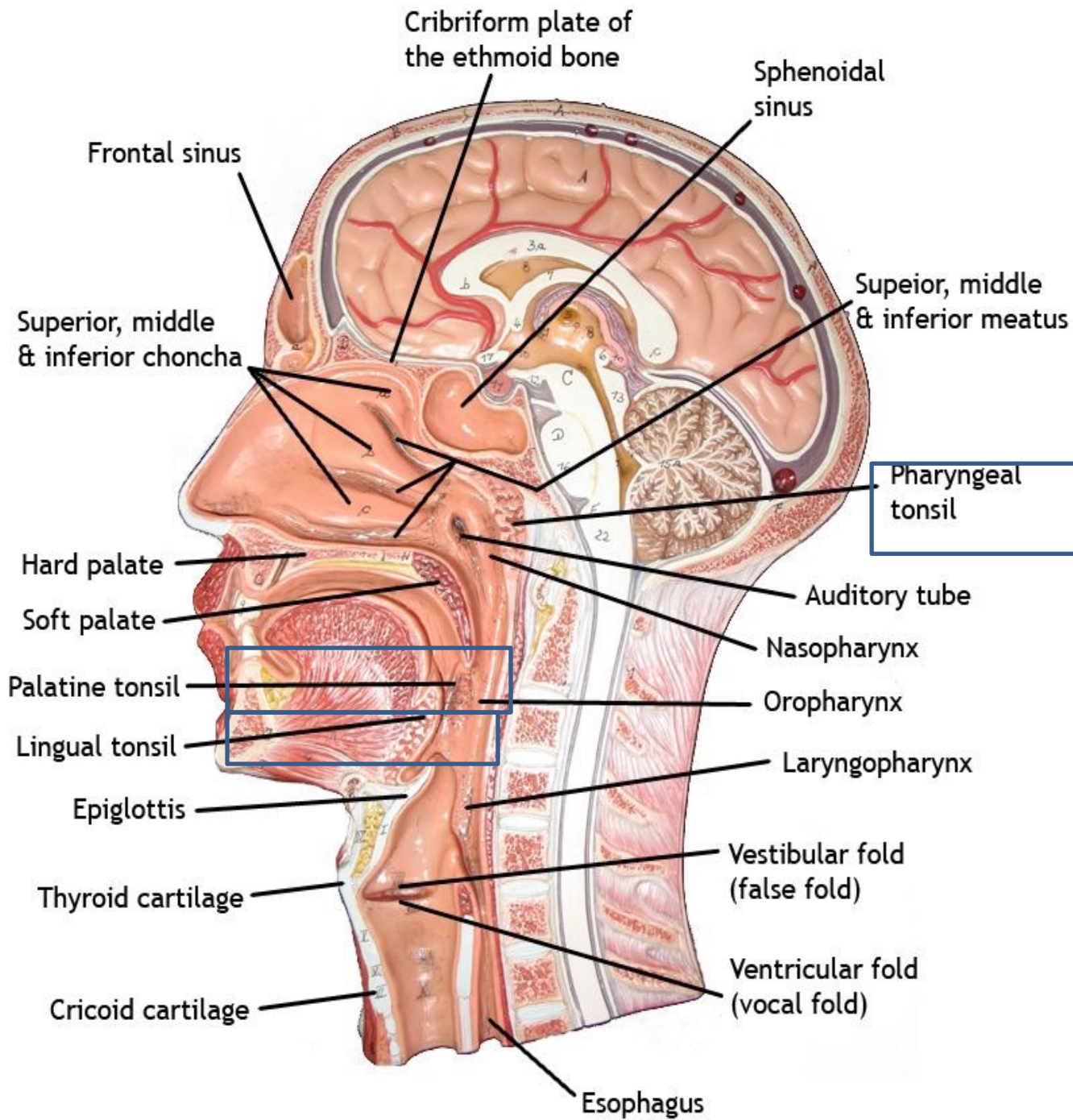


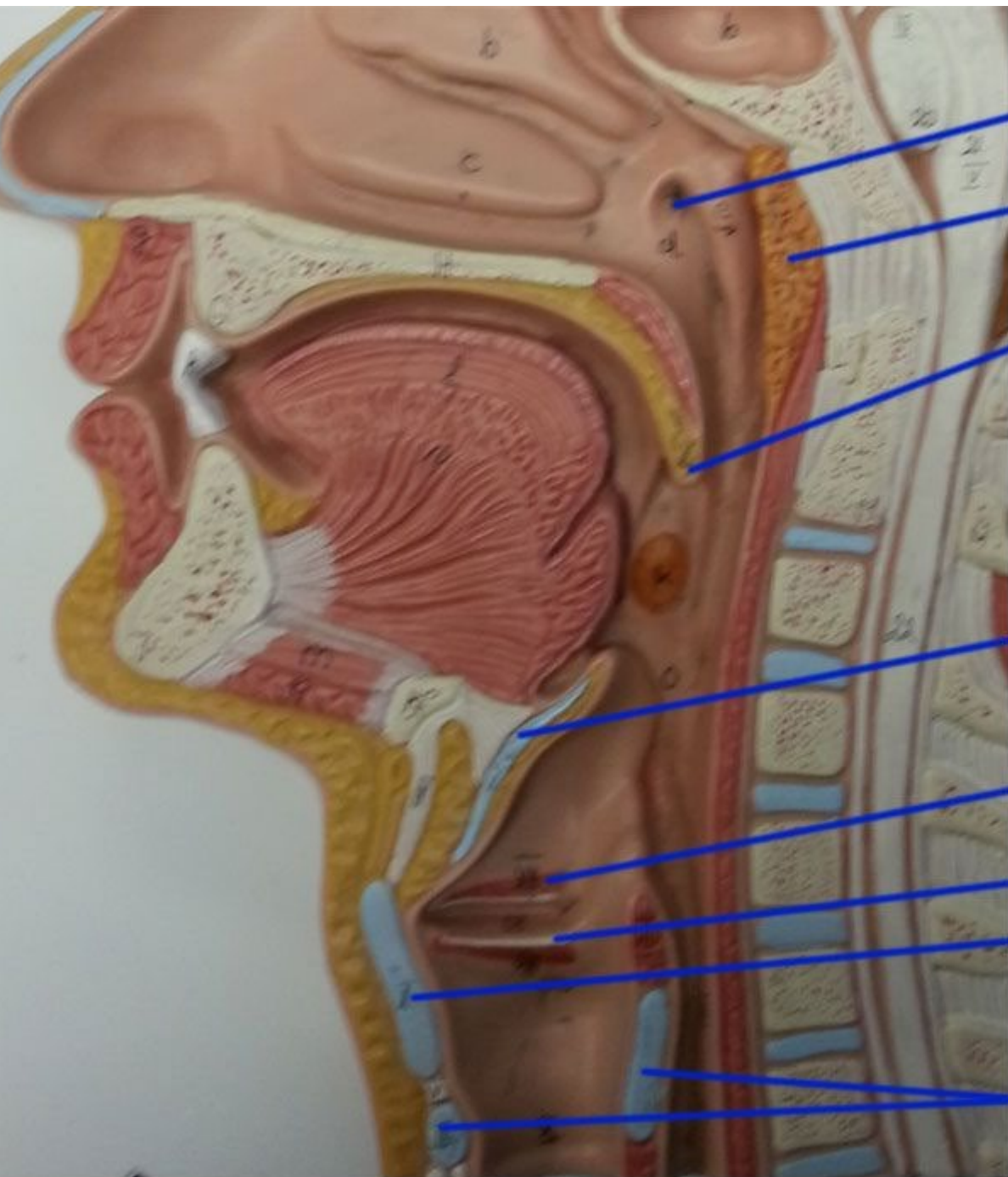
Adenoid
(Pharyngeal Tonsil)

Tonsil
(Palatine Tonsils)

Lingual Tonsils







Opening of
pharyngotympanic
tube

Pharyngeal tonsil

Palatine tonsil
(actually behind
this structure)

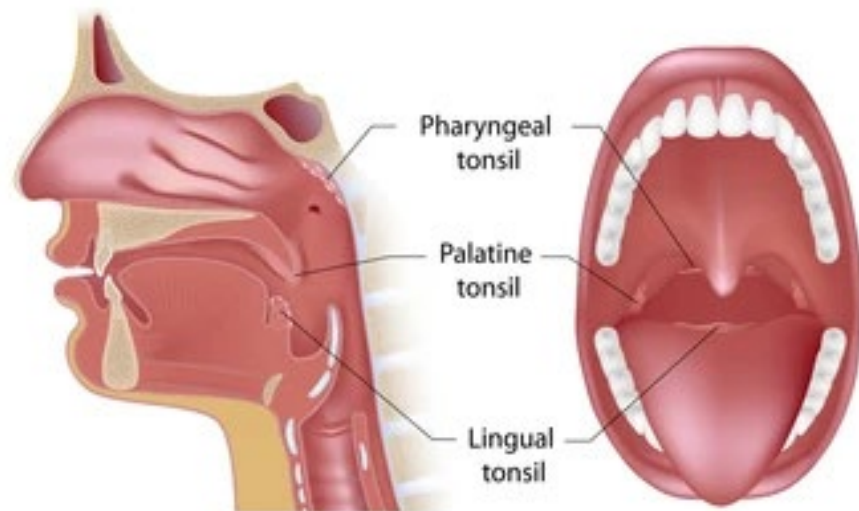
Epiglottis

Vestibular fold

Vocal fold

Thyroid cartilage

Cricoid cartilage



Pharyngeal
tonsil

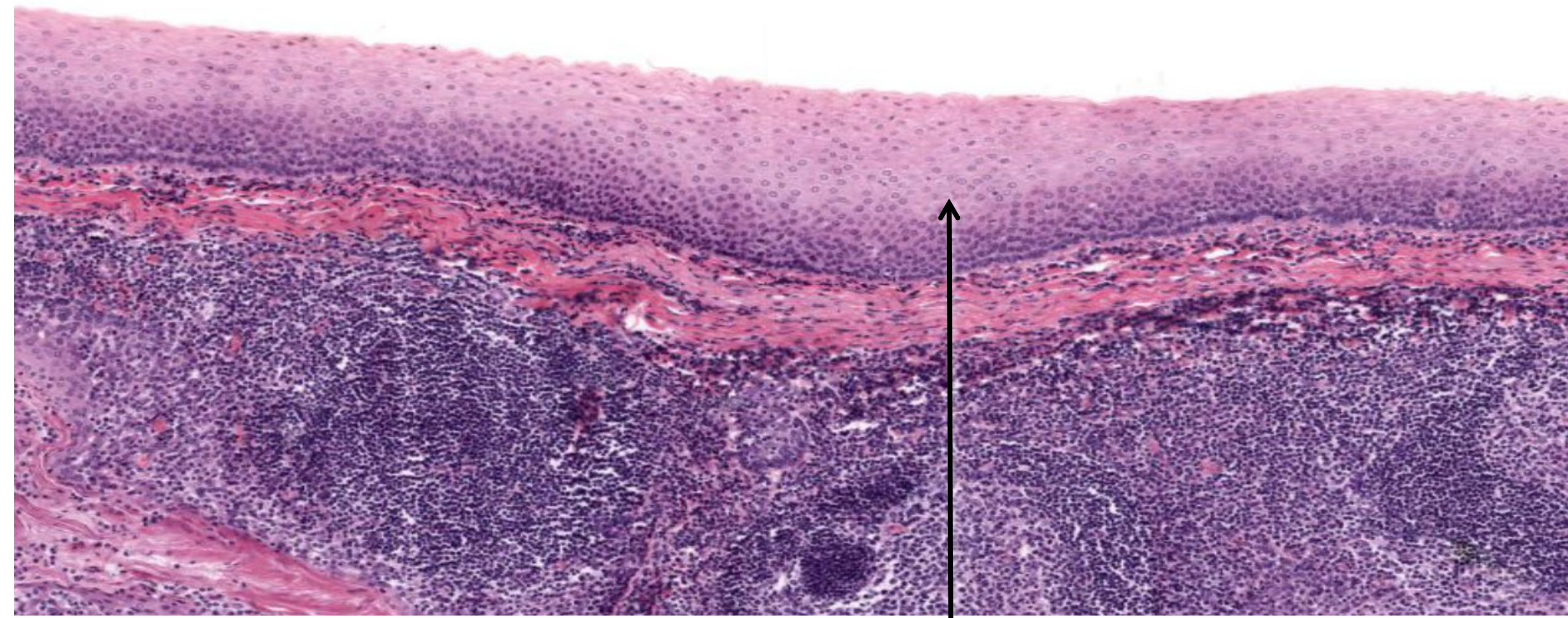
Palatine
tonsil

Lingual
tonsil

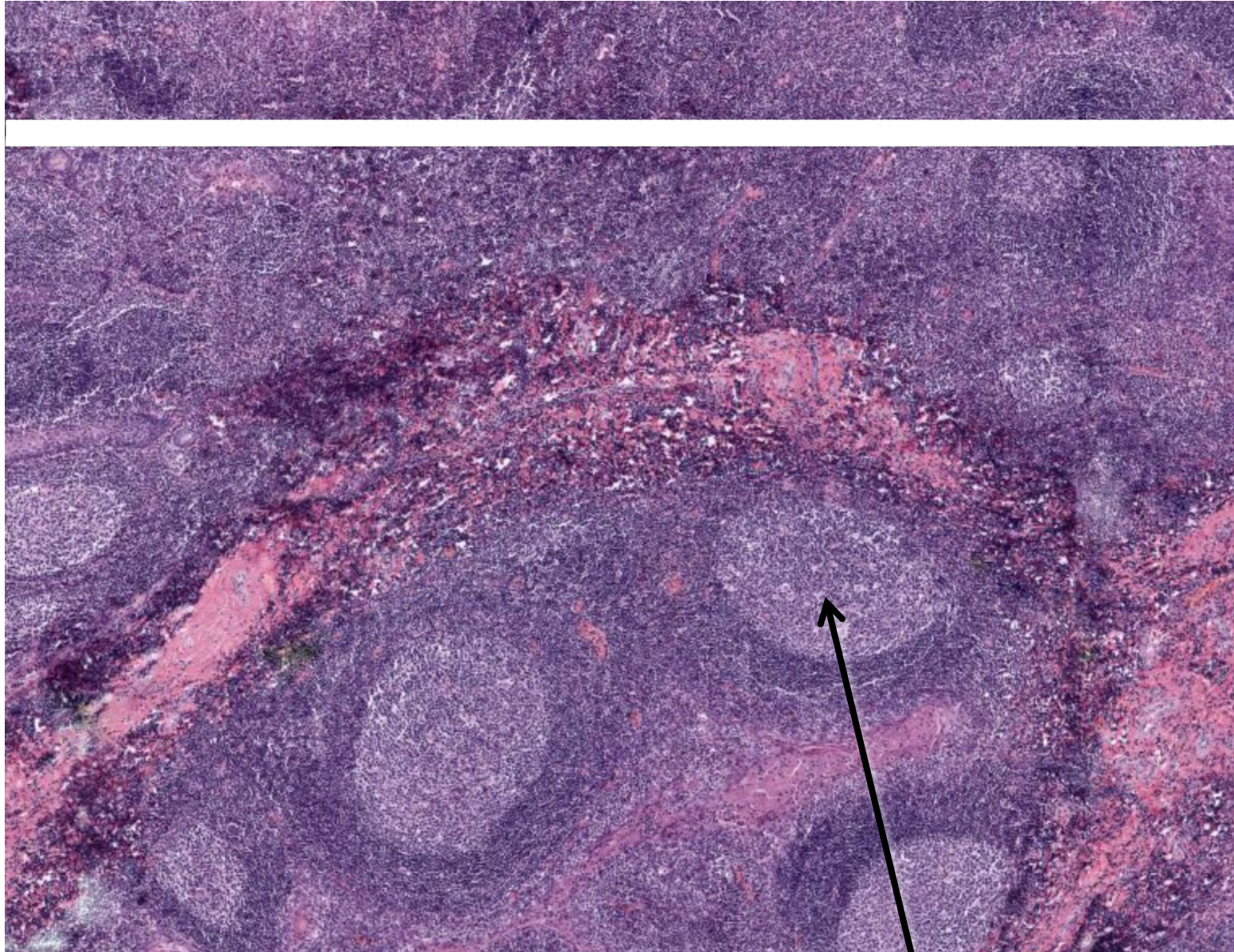
shutterstock.com · 120863452



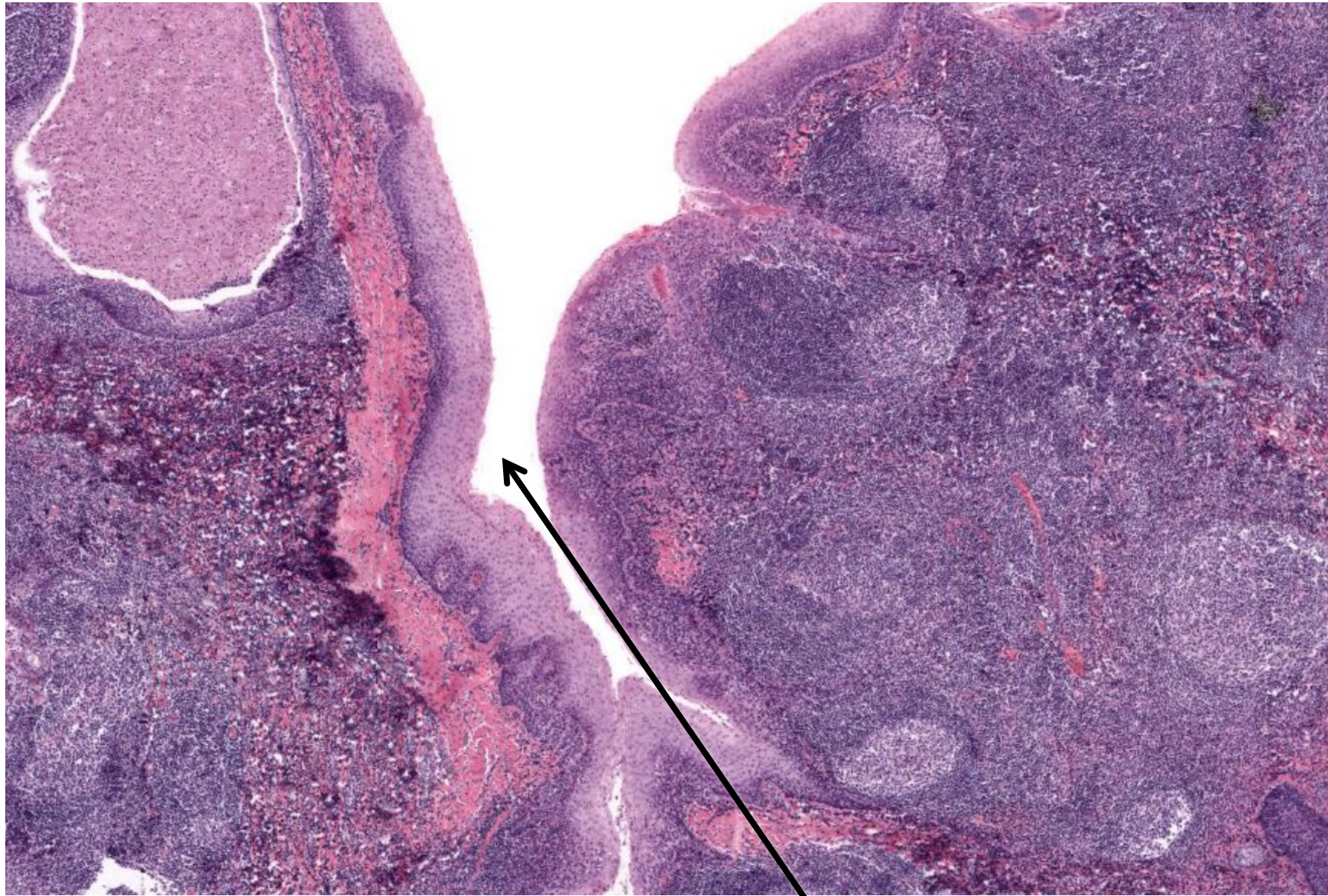
Palatine tonsil: super low power view



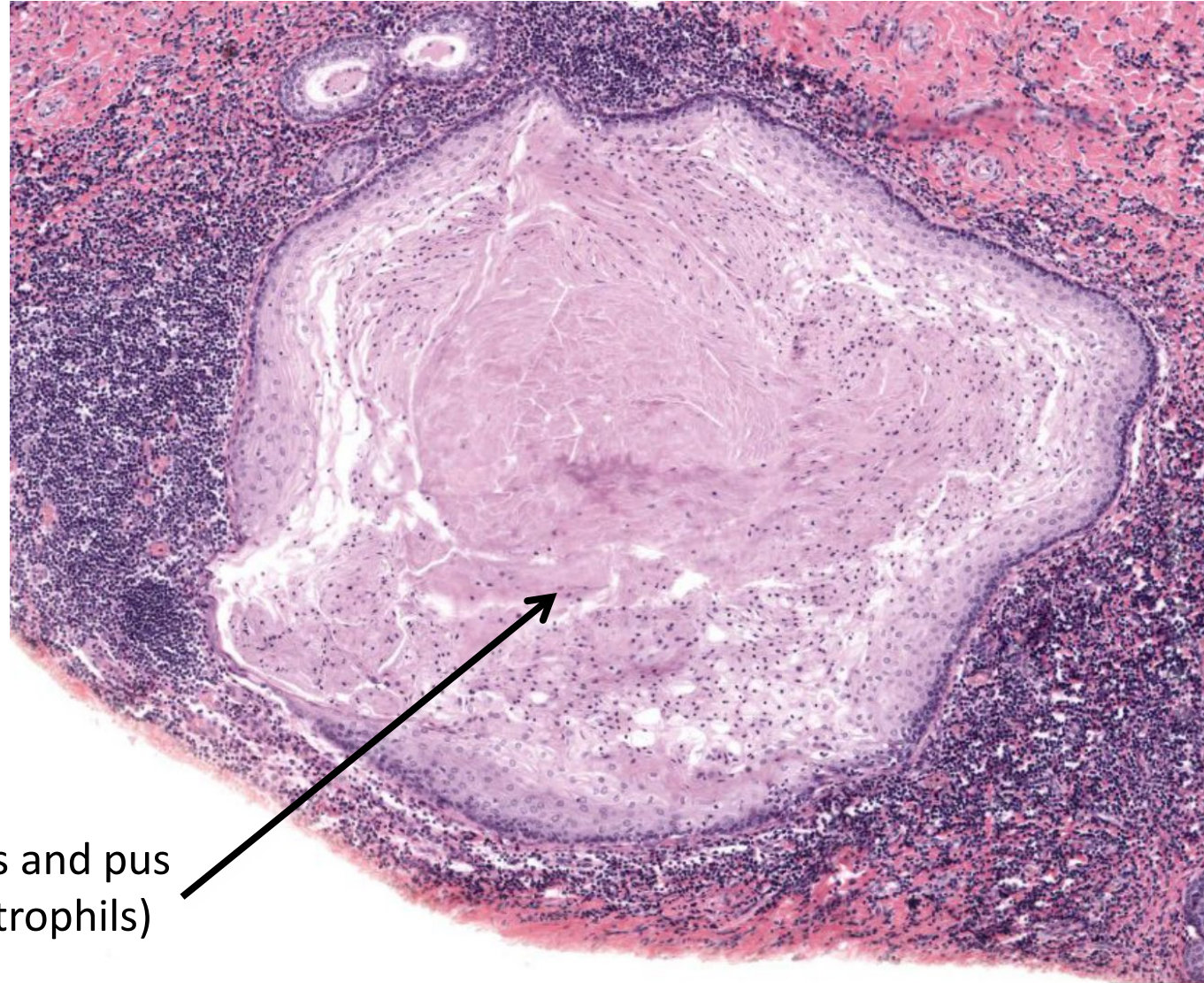
Palatine tonsil: stratified squamous epithelium



Palatine tonsil: lymphoid follicles

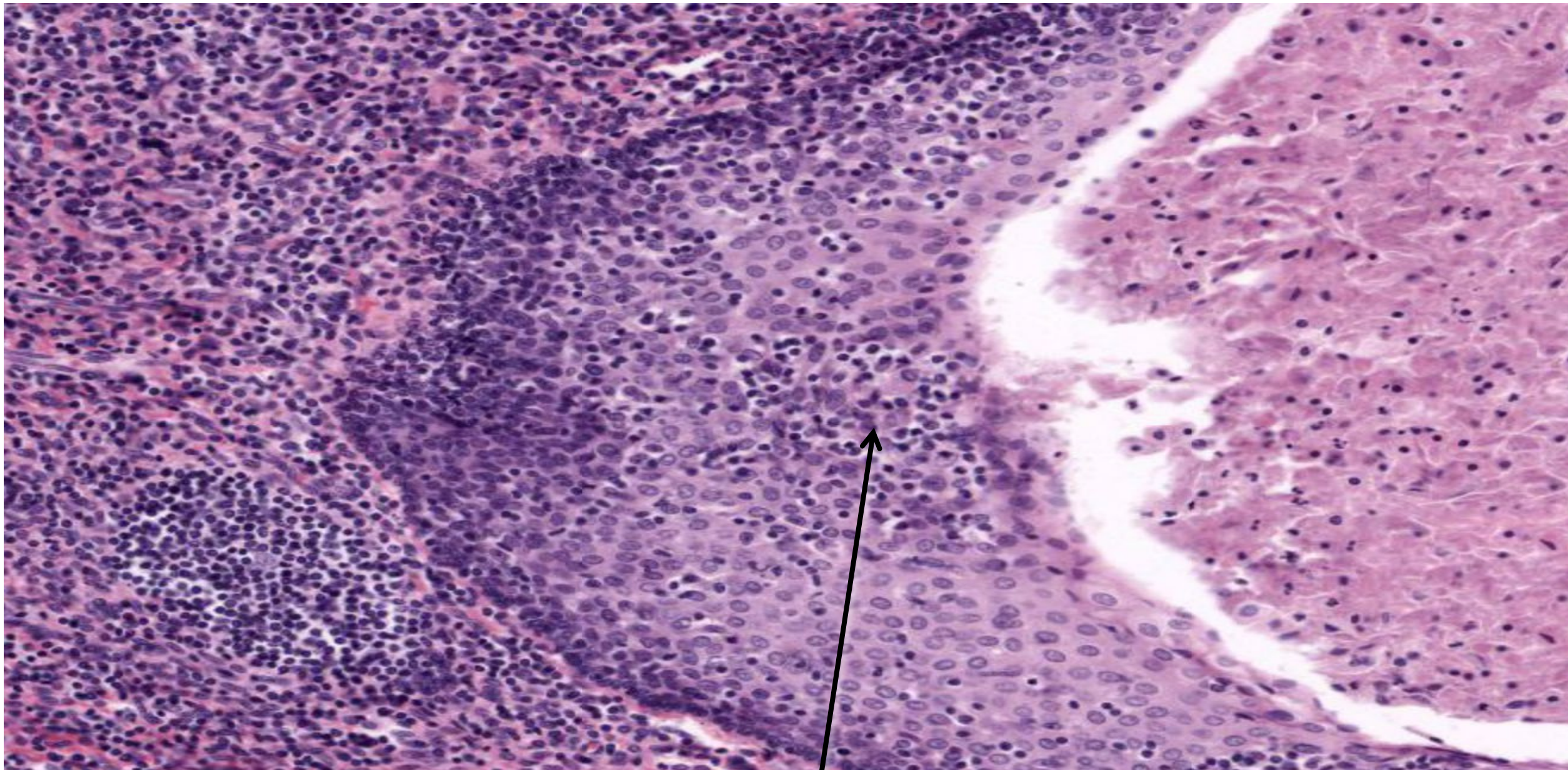


Palatine tonsil: crypt



Debris and pus
(neutrophils)

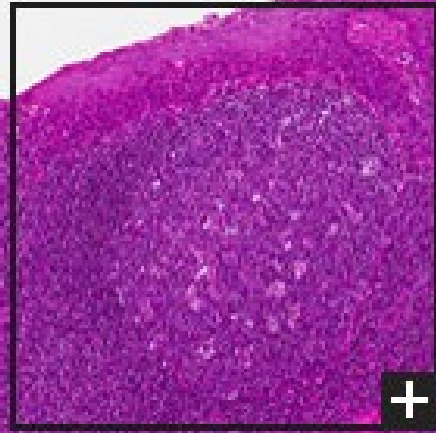
Palatine tonsil: sequestered crypt



Palatine tonsil: lymphocytes traversing epithelium



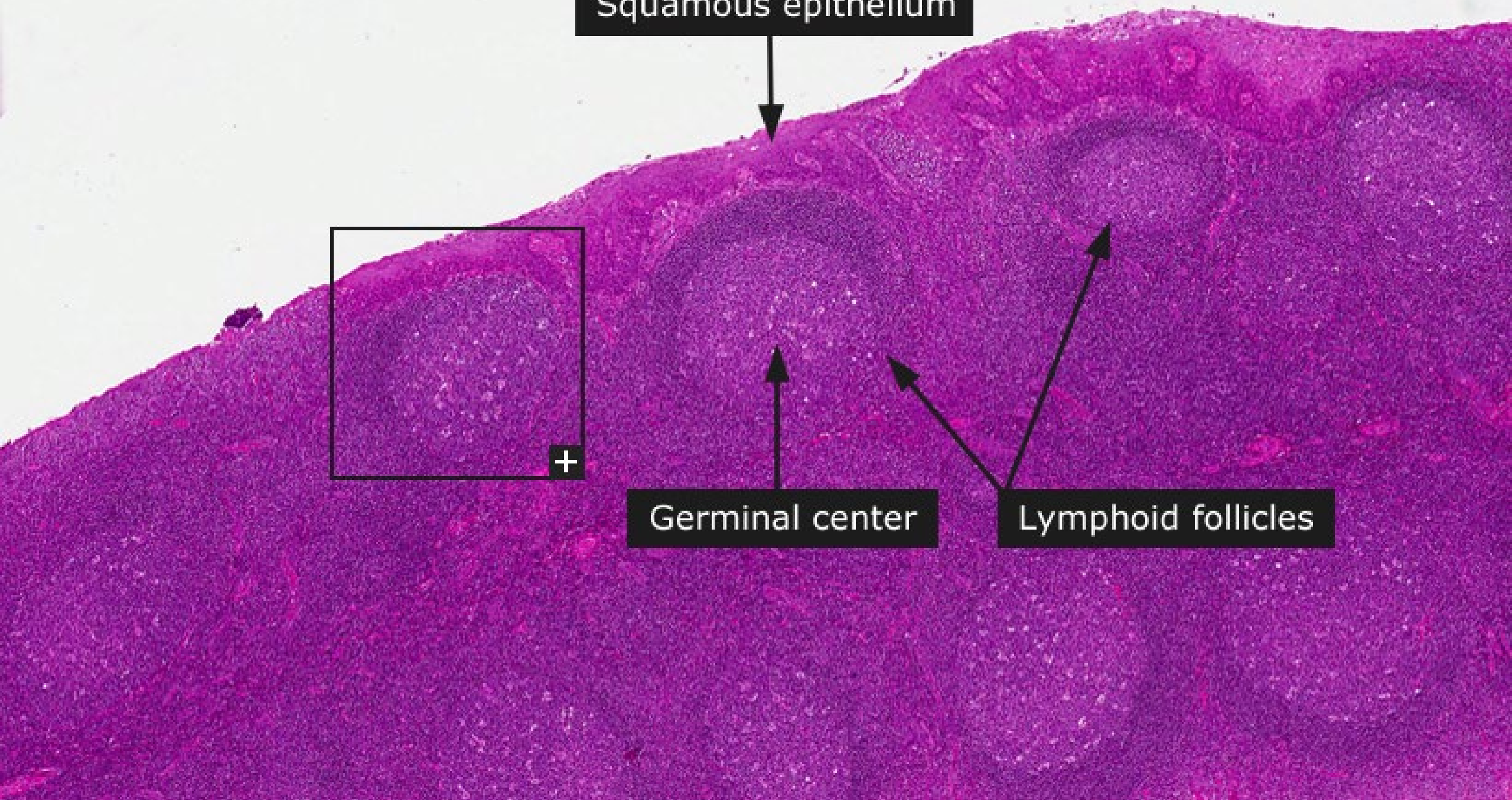
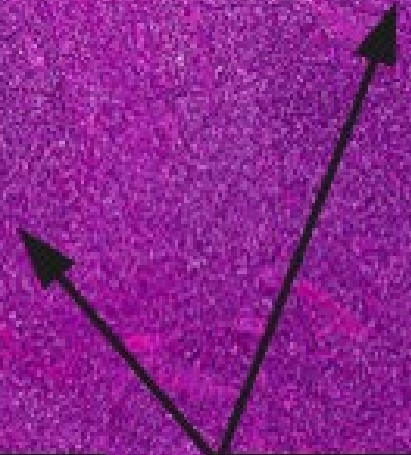
Squamous epithelium



Germinal center

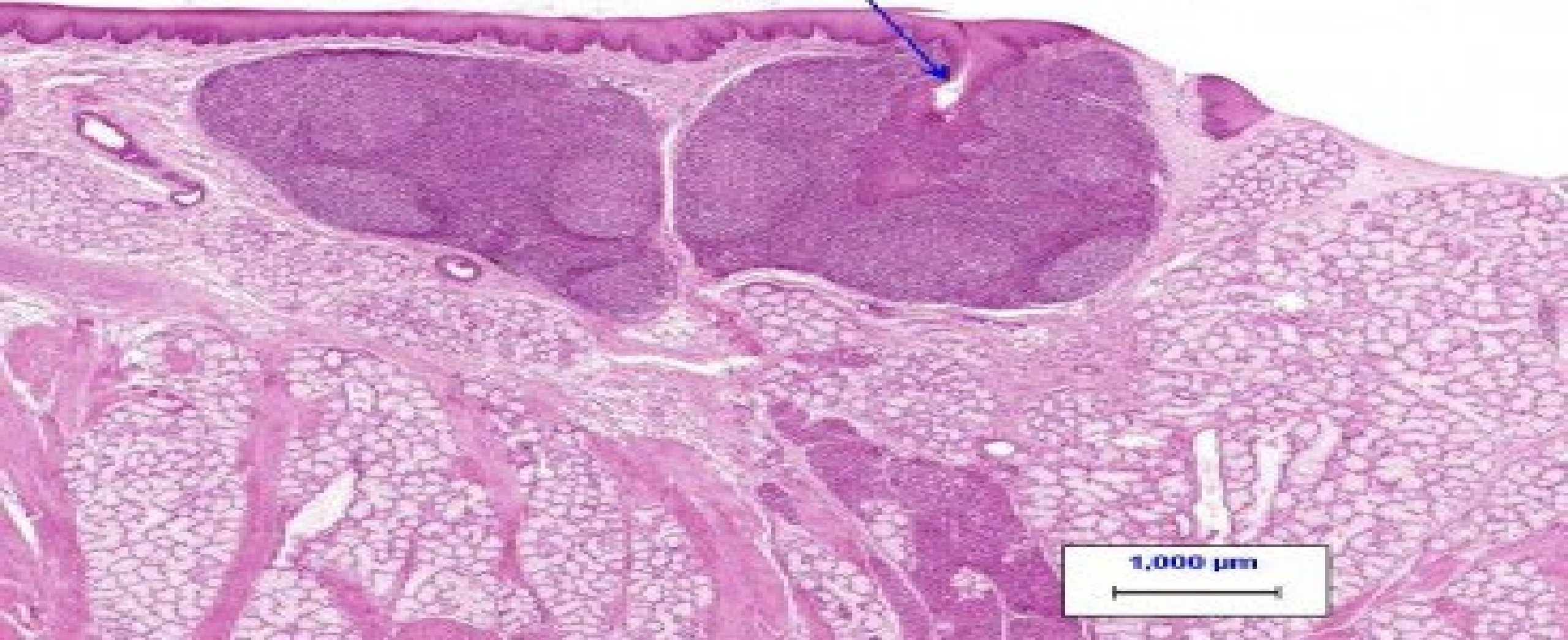


Lymphoid follicles

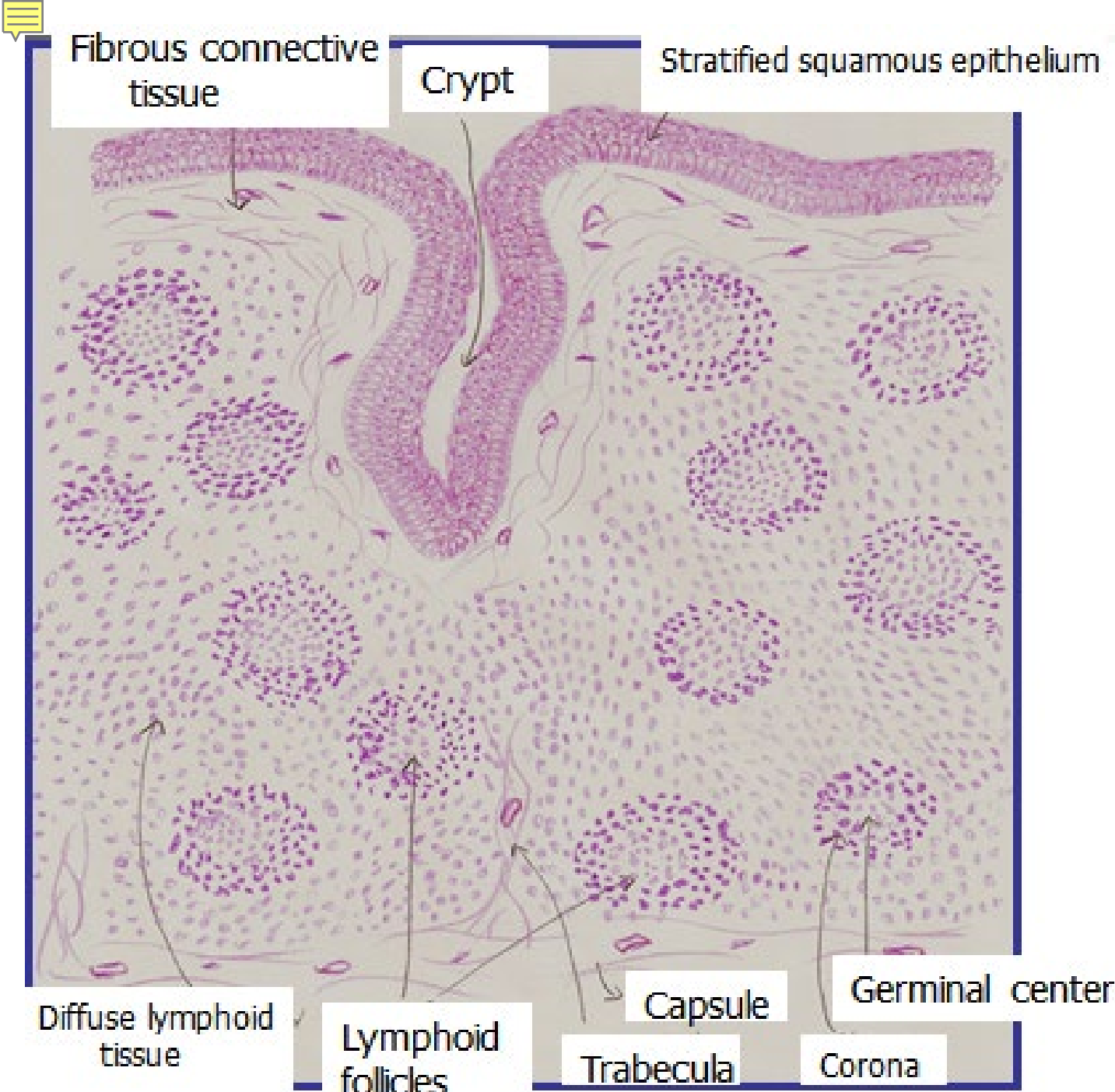


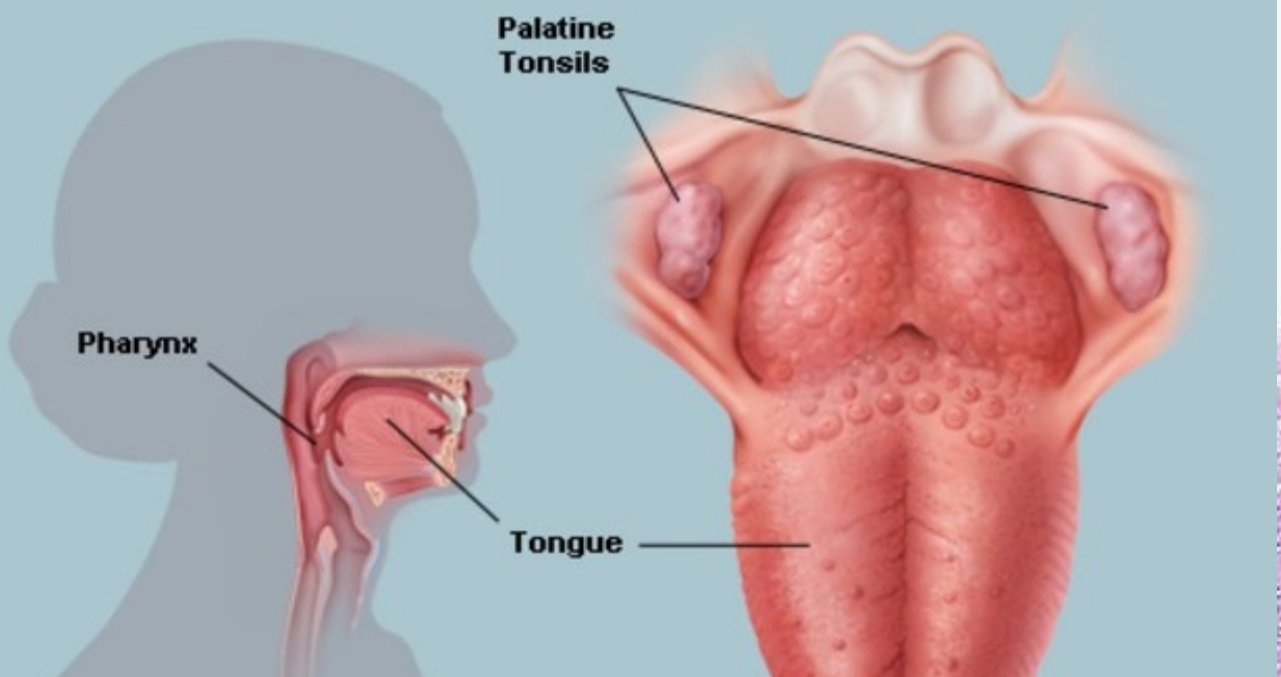


Crypt of tonsil

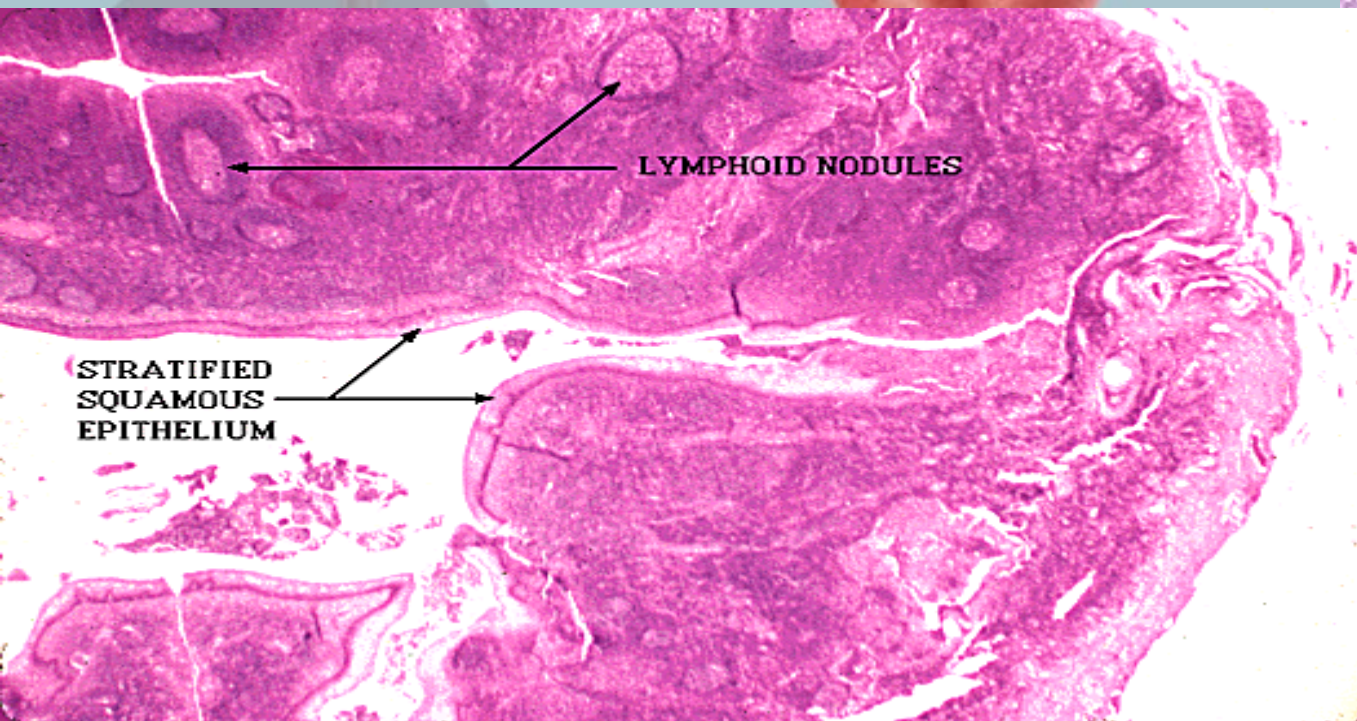
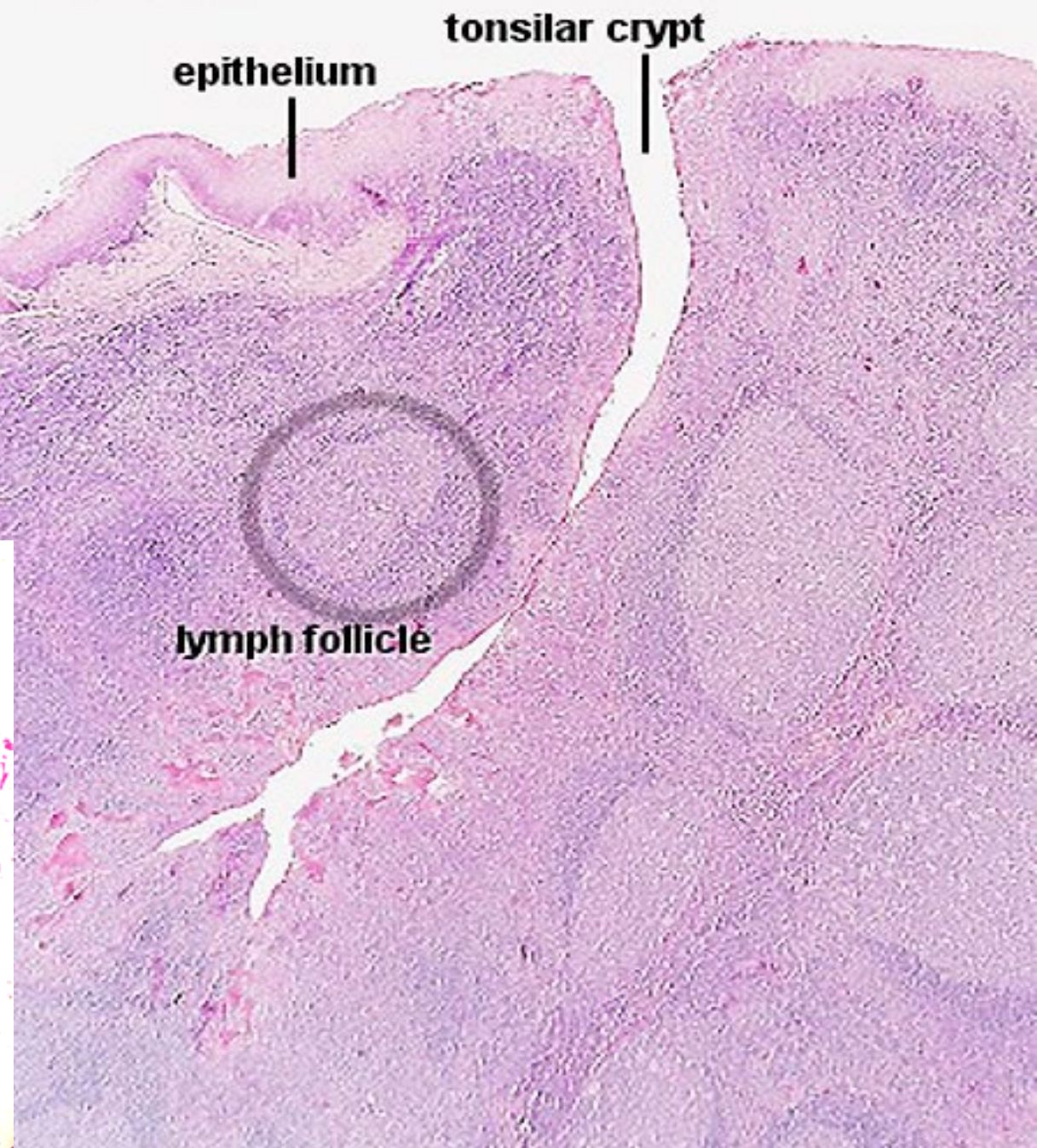


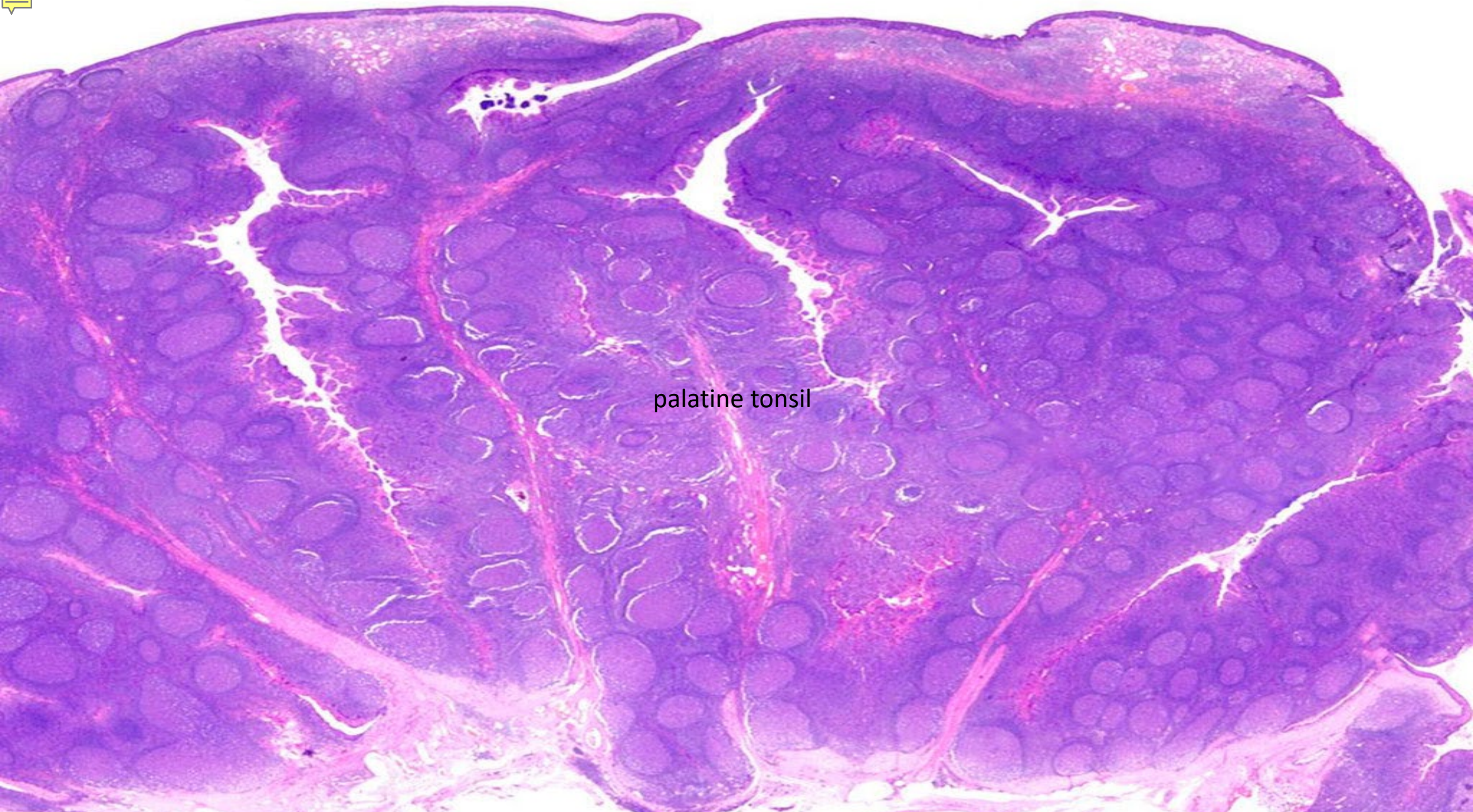
1,000 μ m





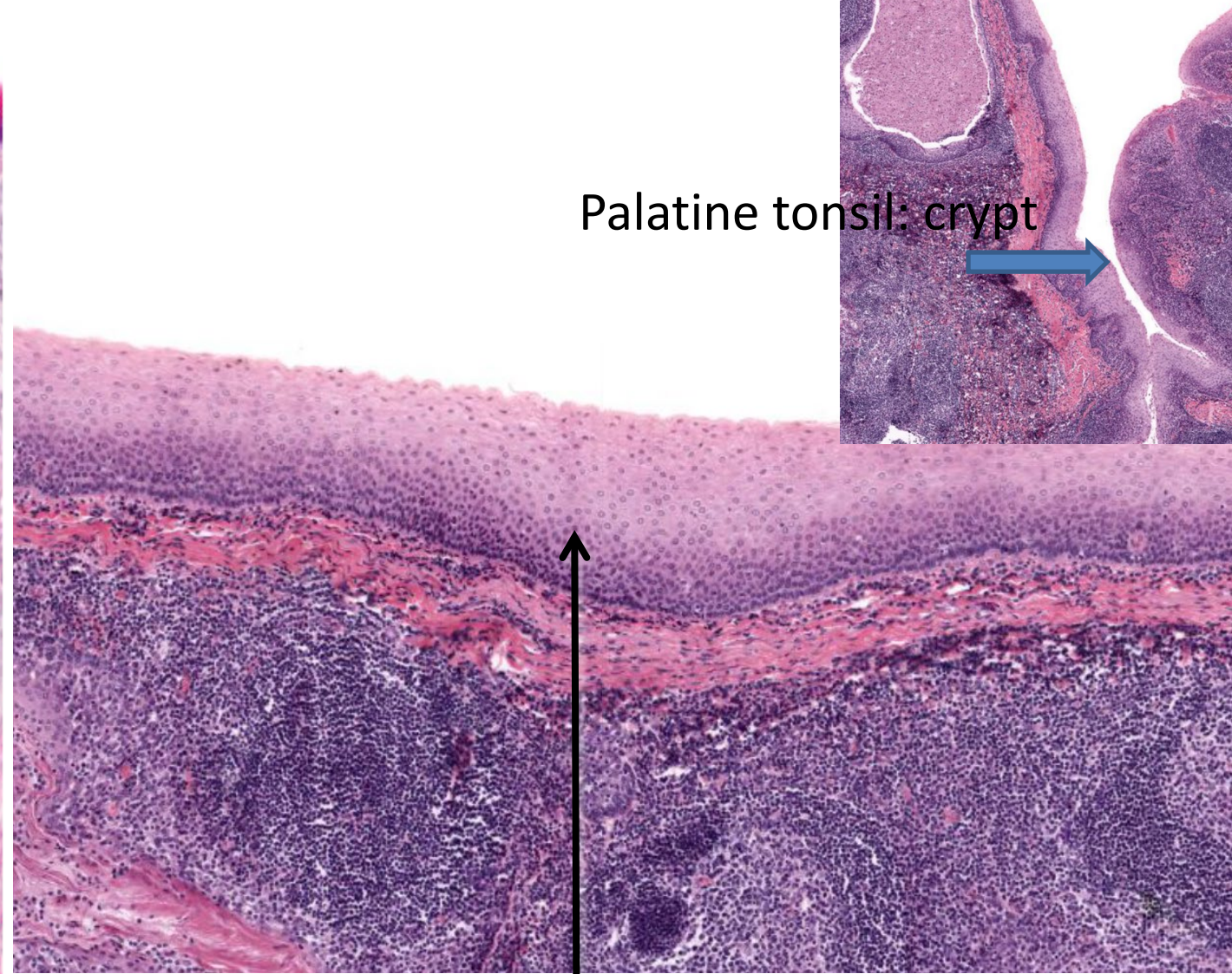
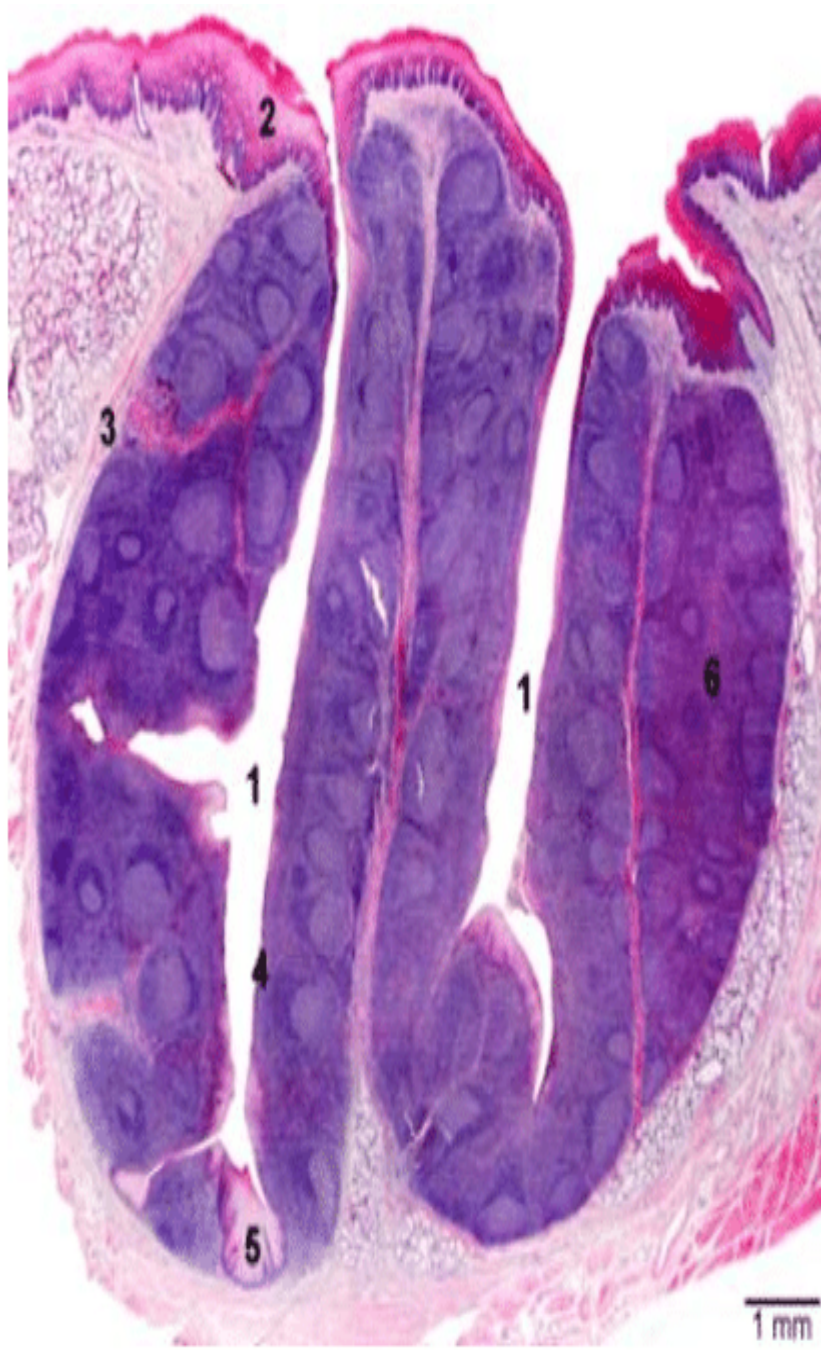
Tonsil H&E





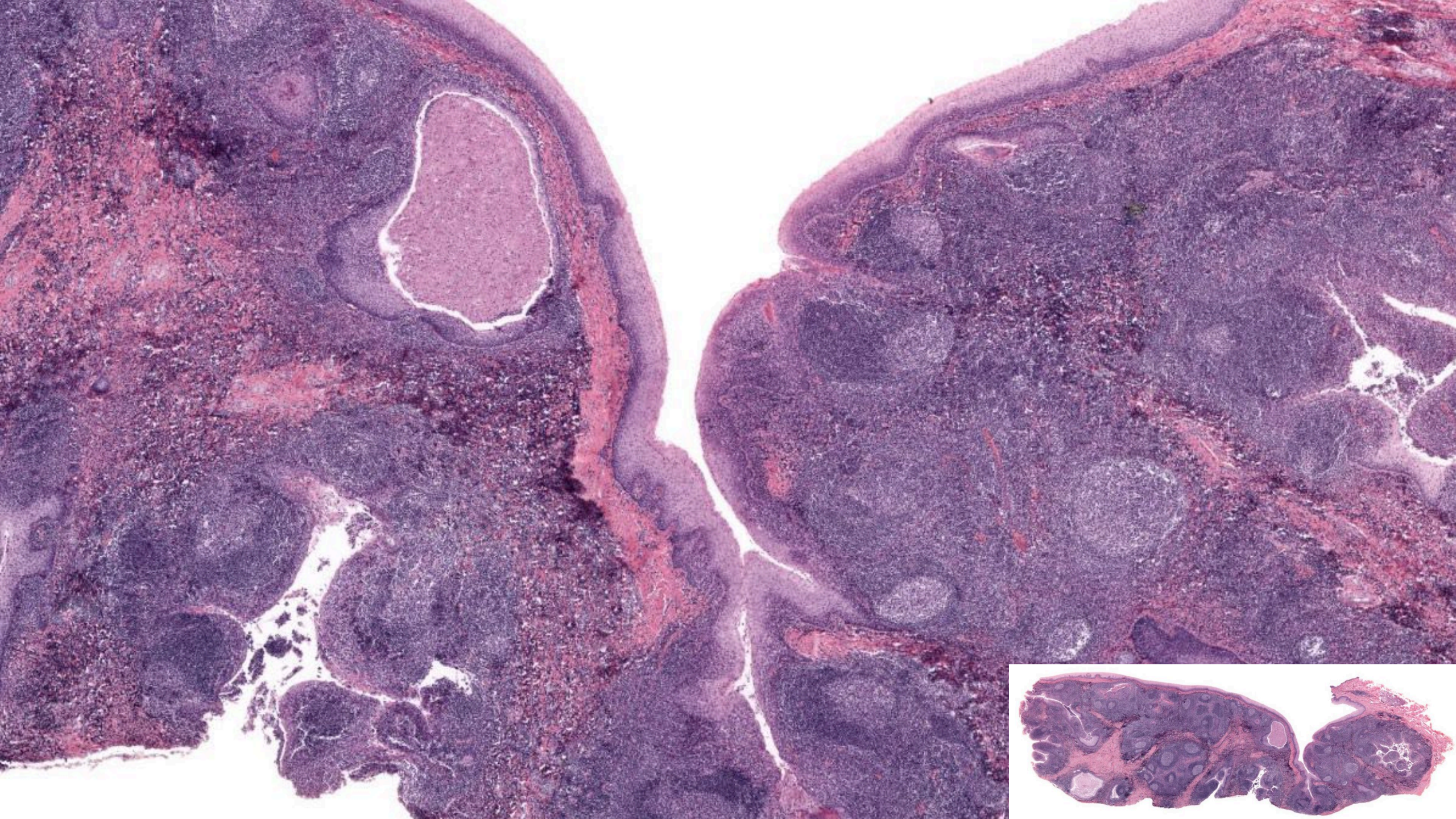
palatine tonsil



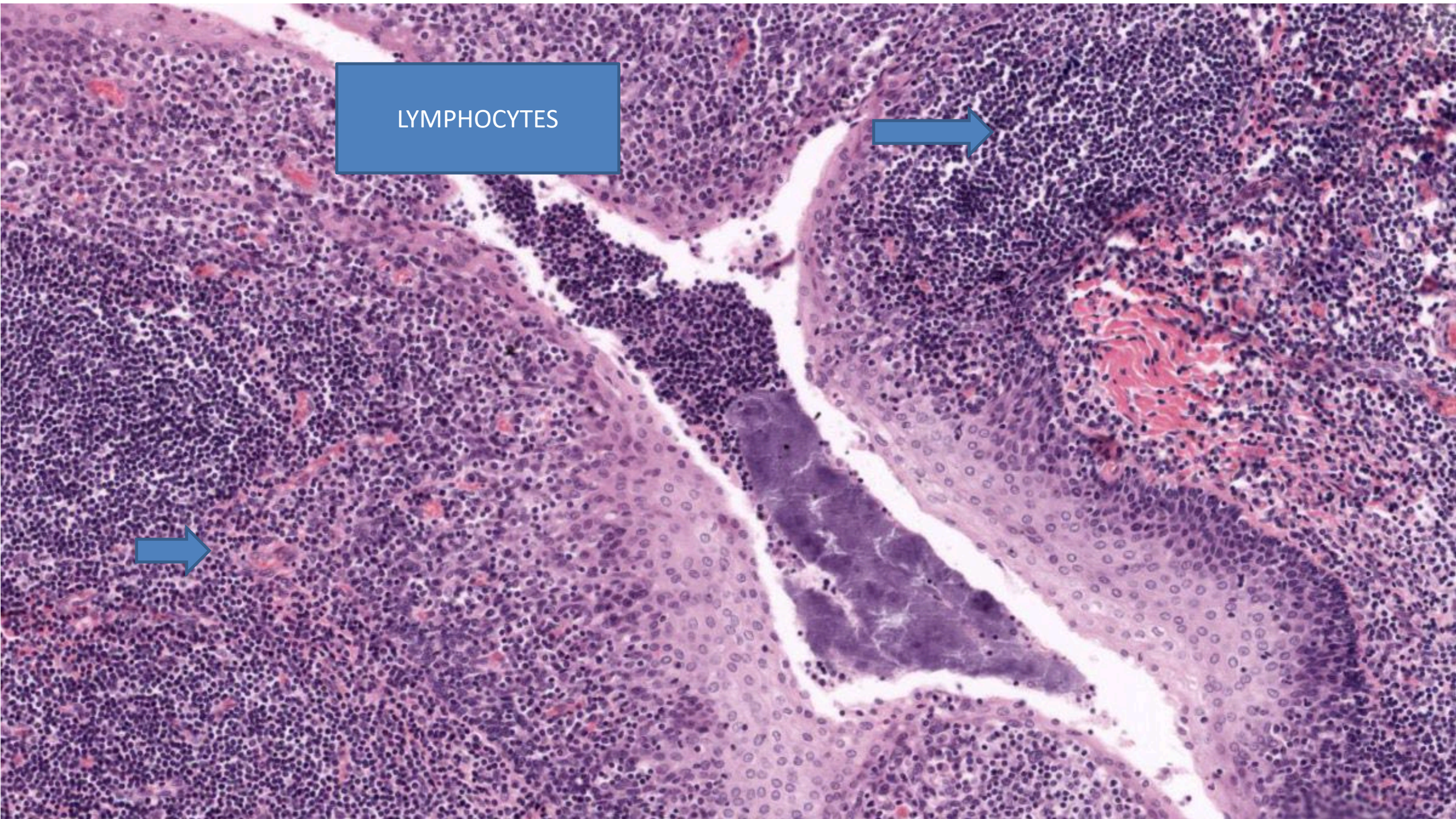
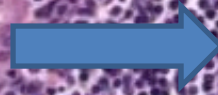
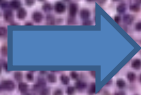


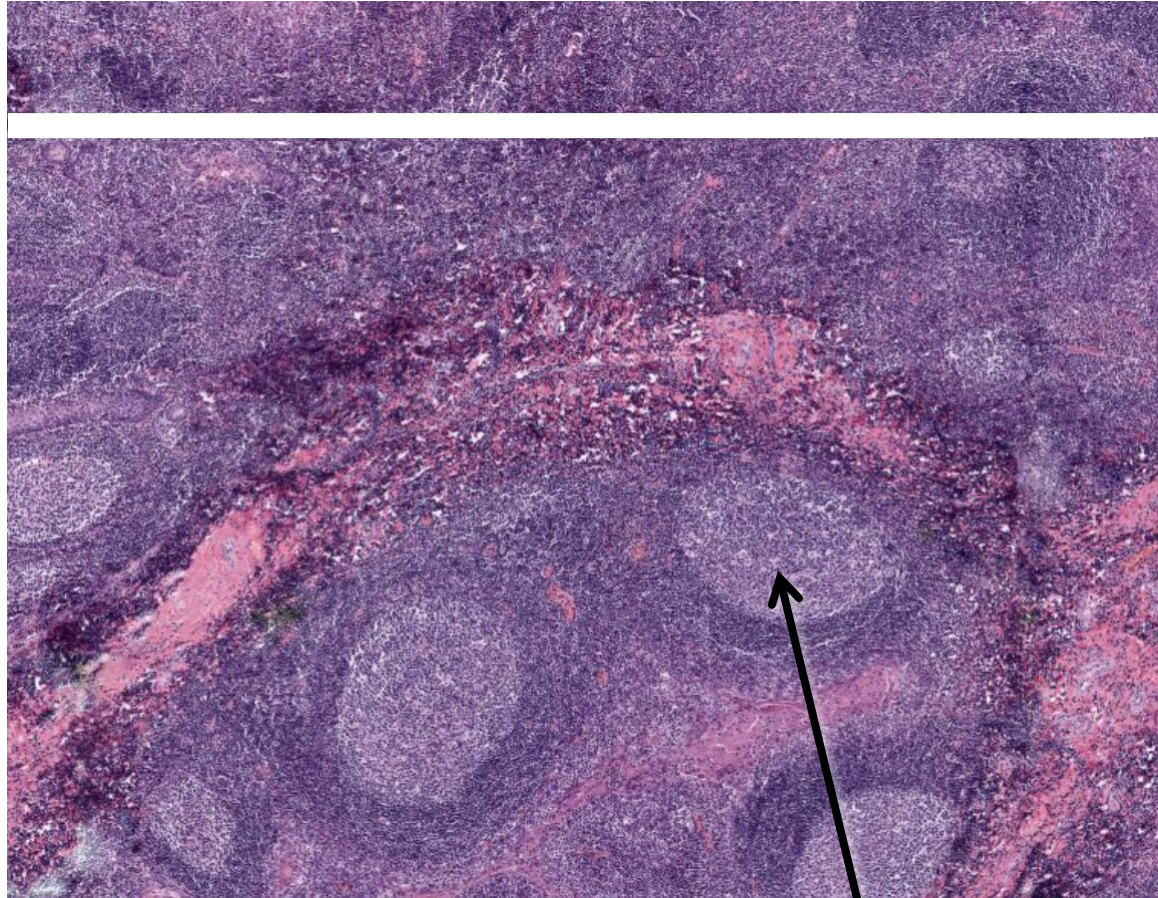
Palatine tonsil: crypt

Palatine tonsil: stratified squamous epithelium

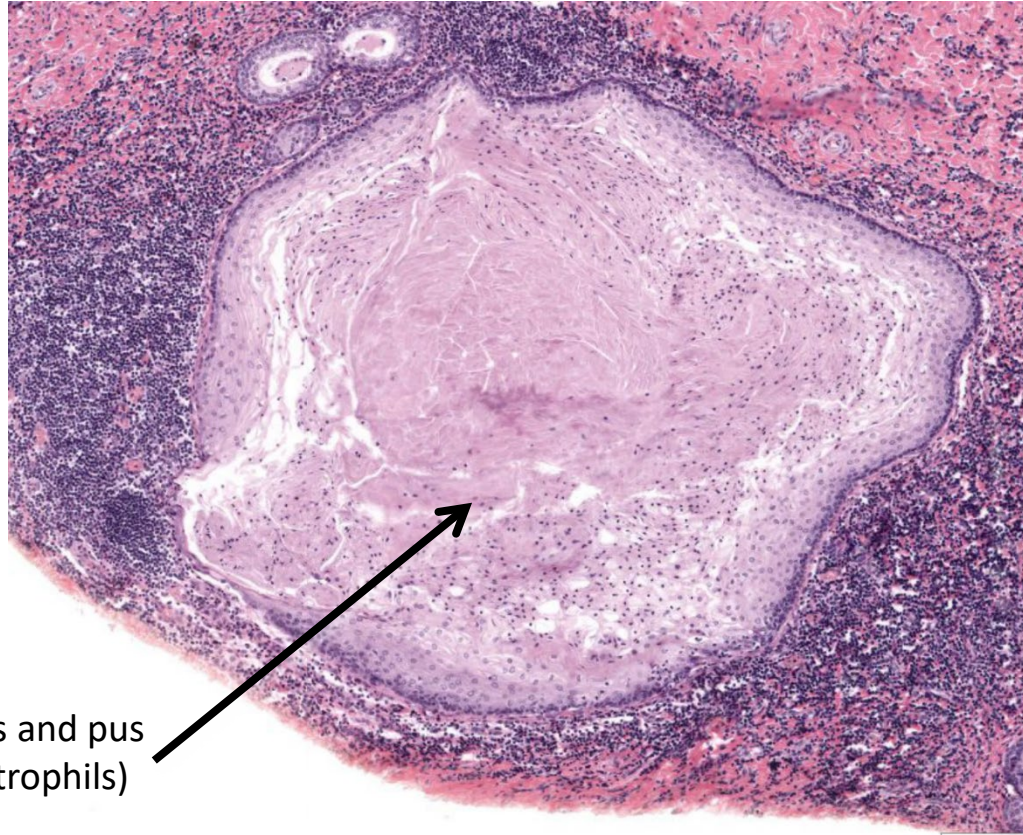


LYMPHOCYTES





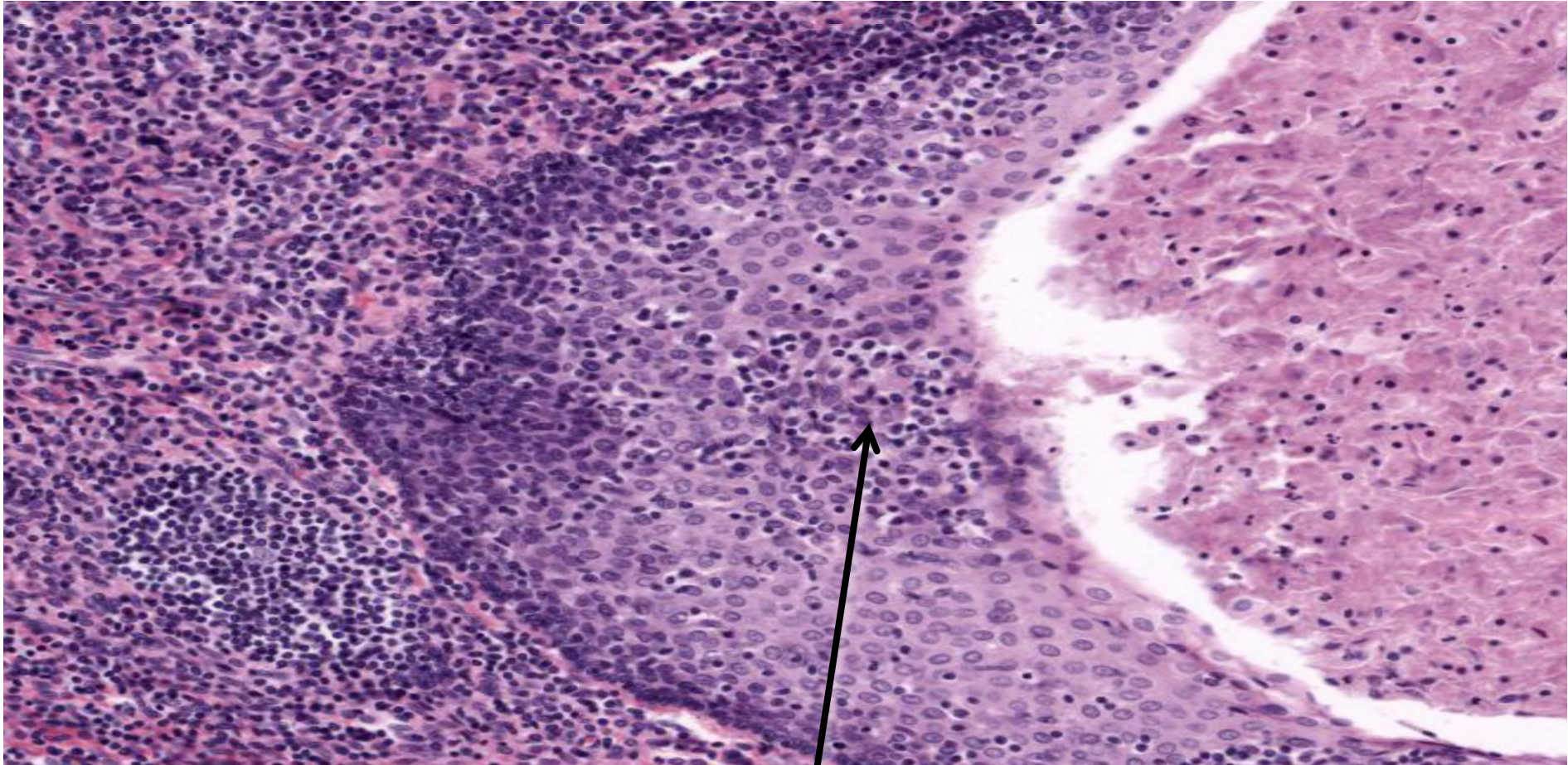
Palatine tonsil: lymphoid follicles



Debris and pus
(neutrophils)

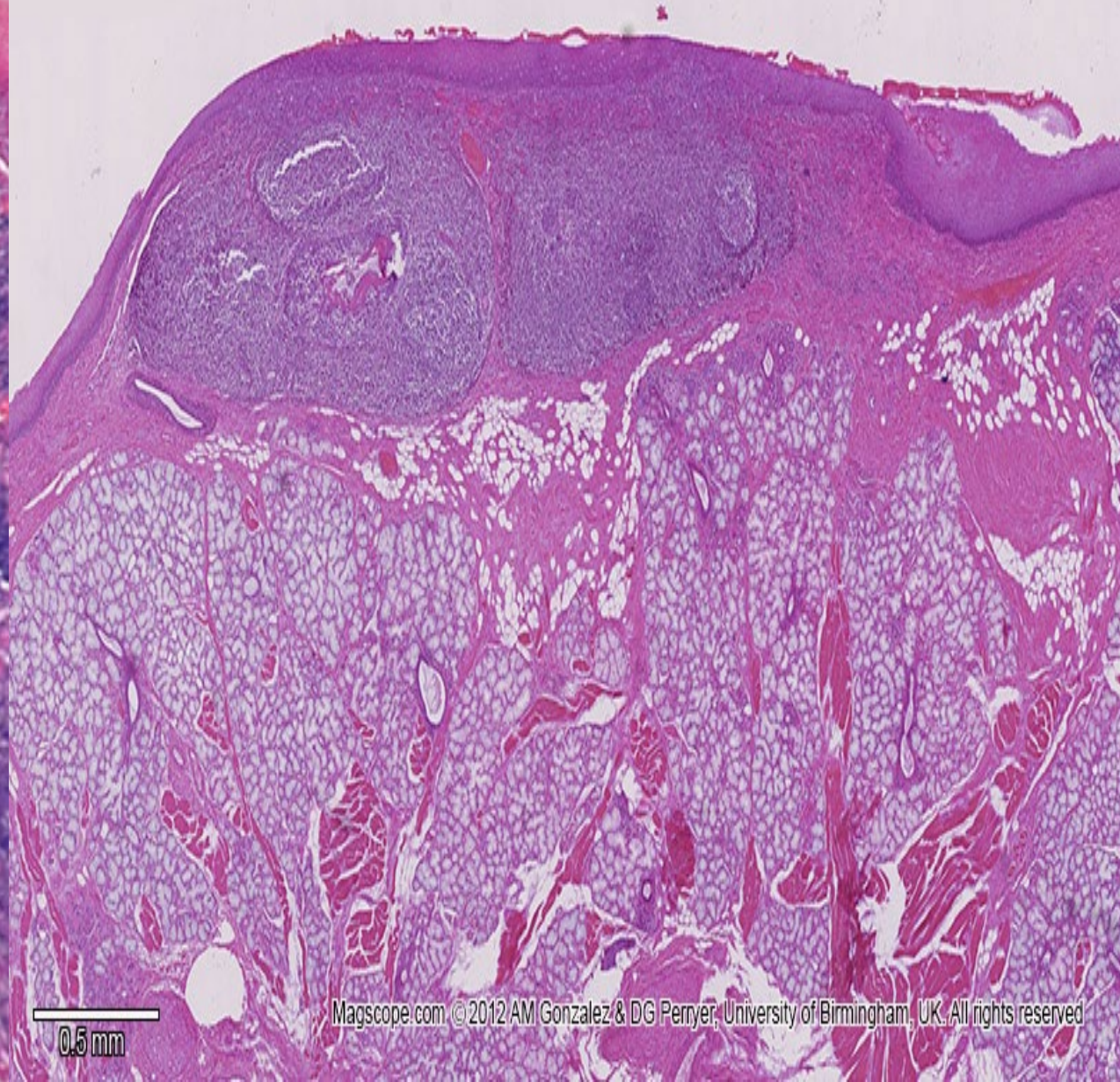
Palatine tonsil: sequestered crypt

Endothelial cells



Palatine tonsil: lymphocytes traversing epithelium

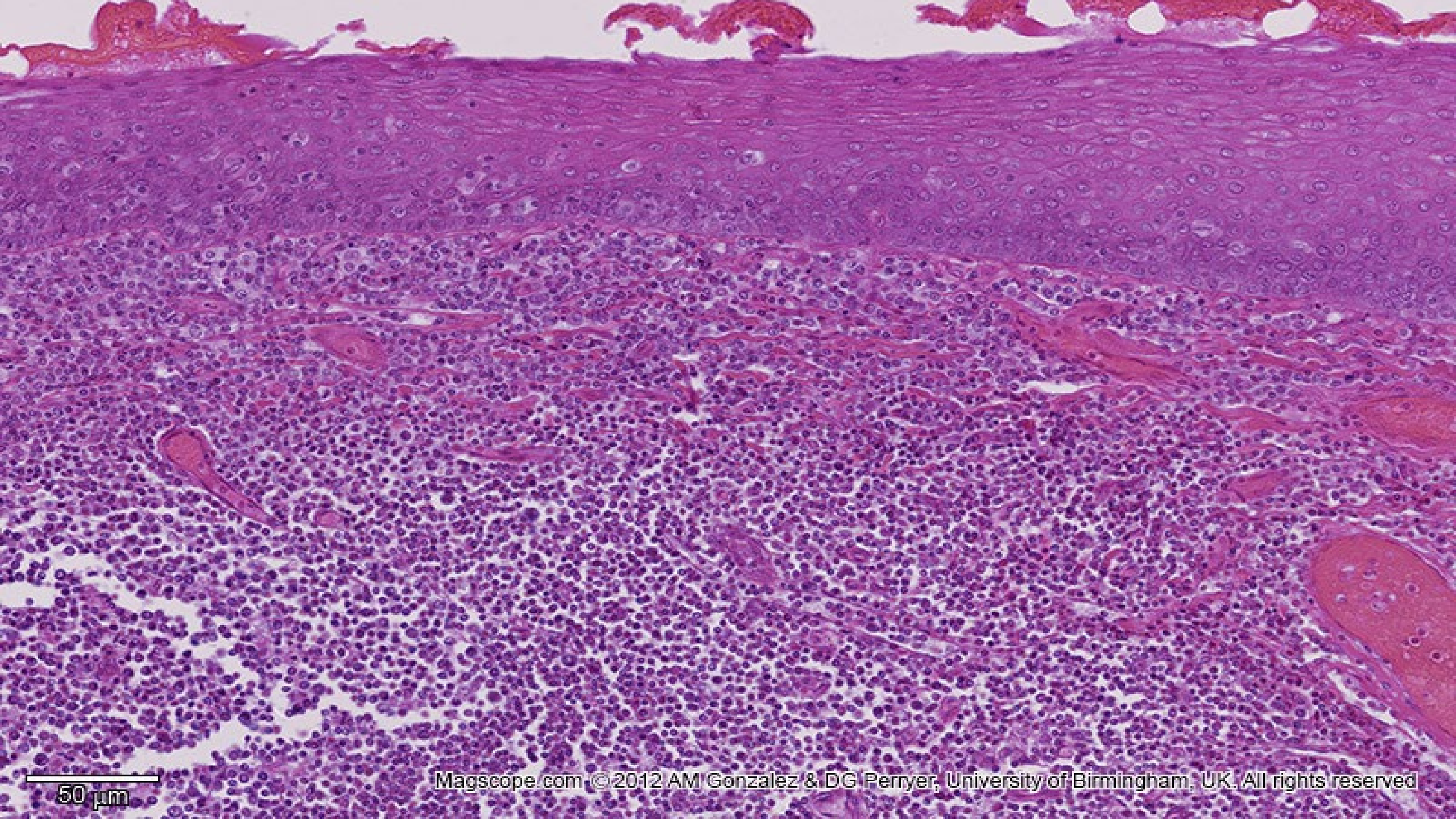
Lingual tonsils



0.5 mm

lingual tonsils located on the dorsal part of the tongue covered by stratified squamous epithelium





50 μ m

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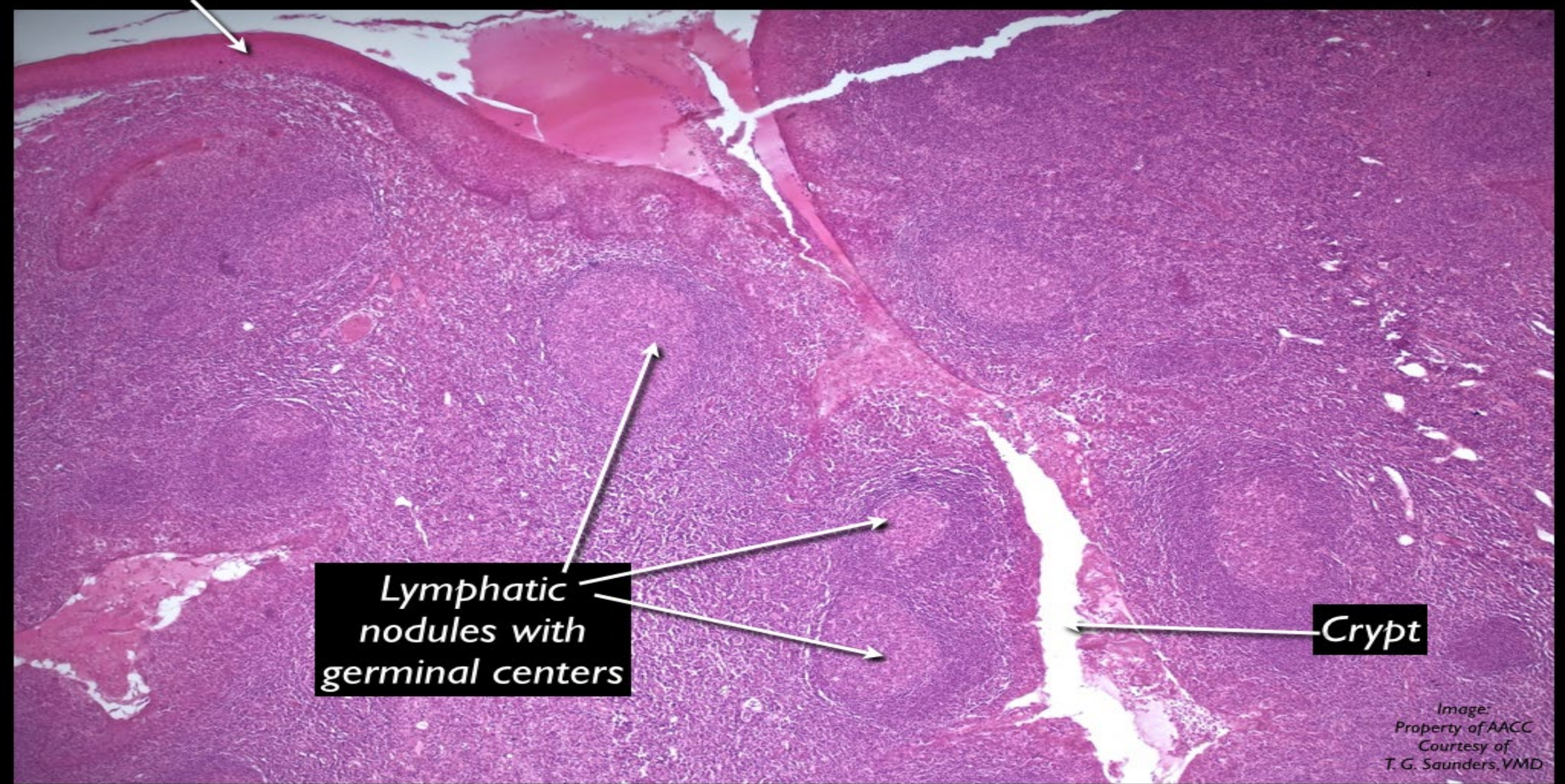
Epithelium

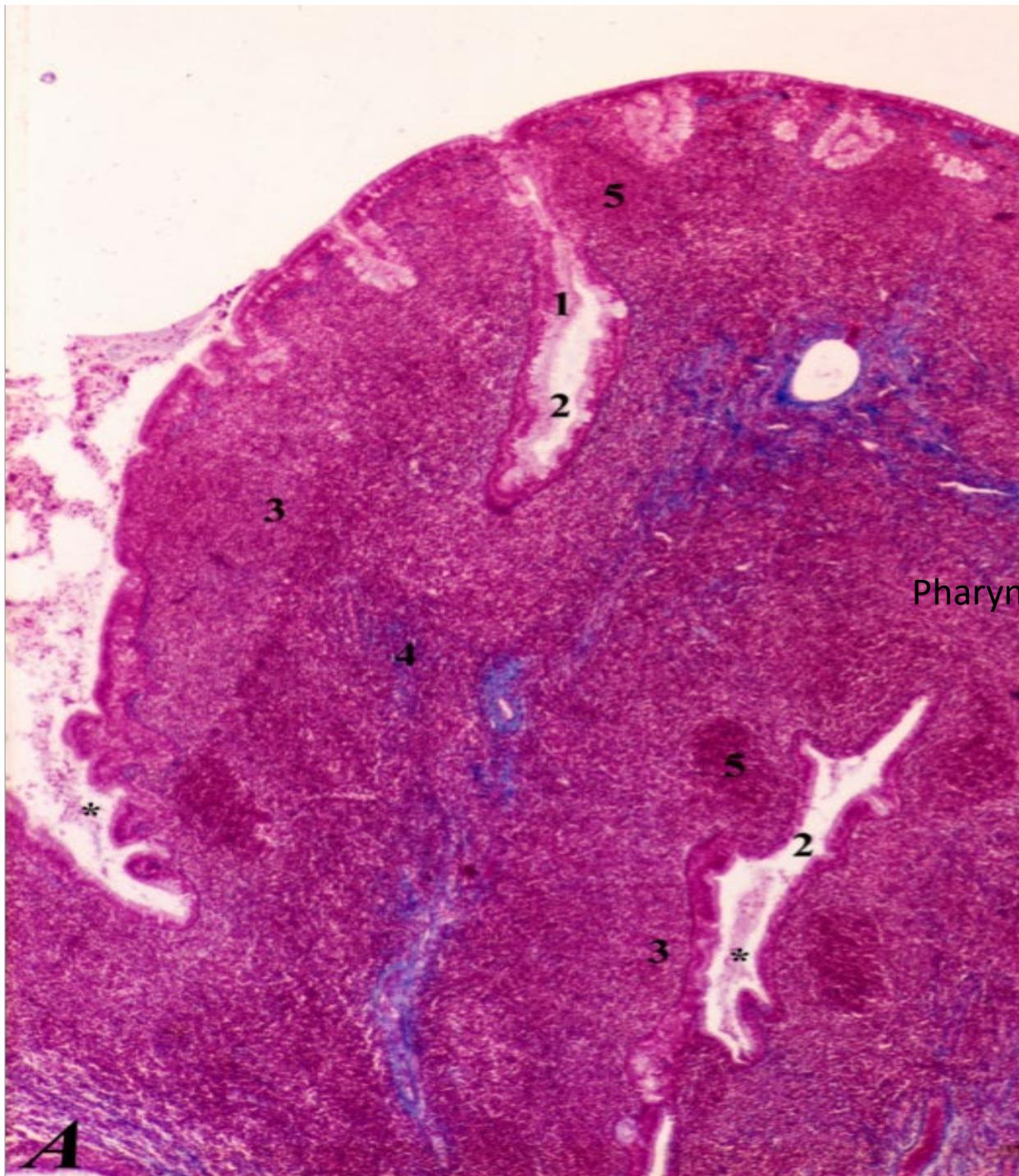
Tonsil

Lymphatic
nodules with
germinal centers

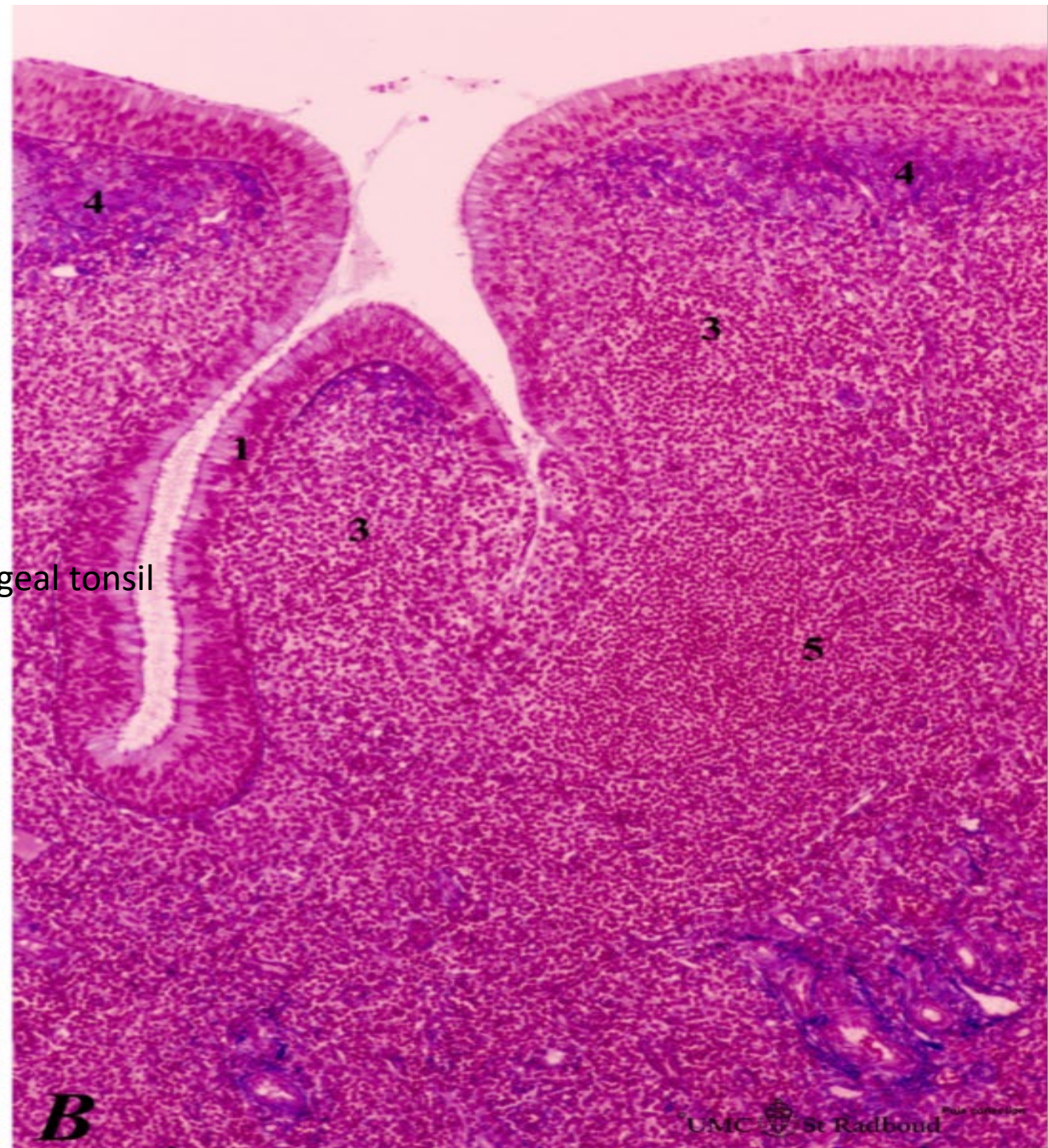
Crypt

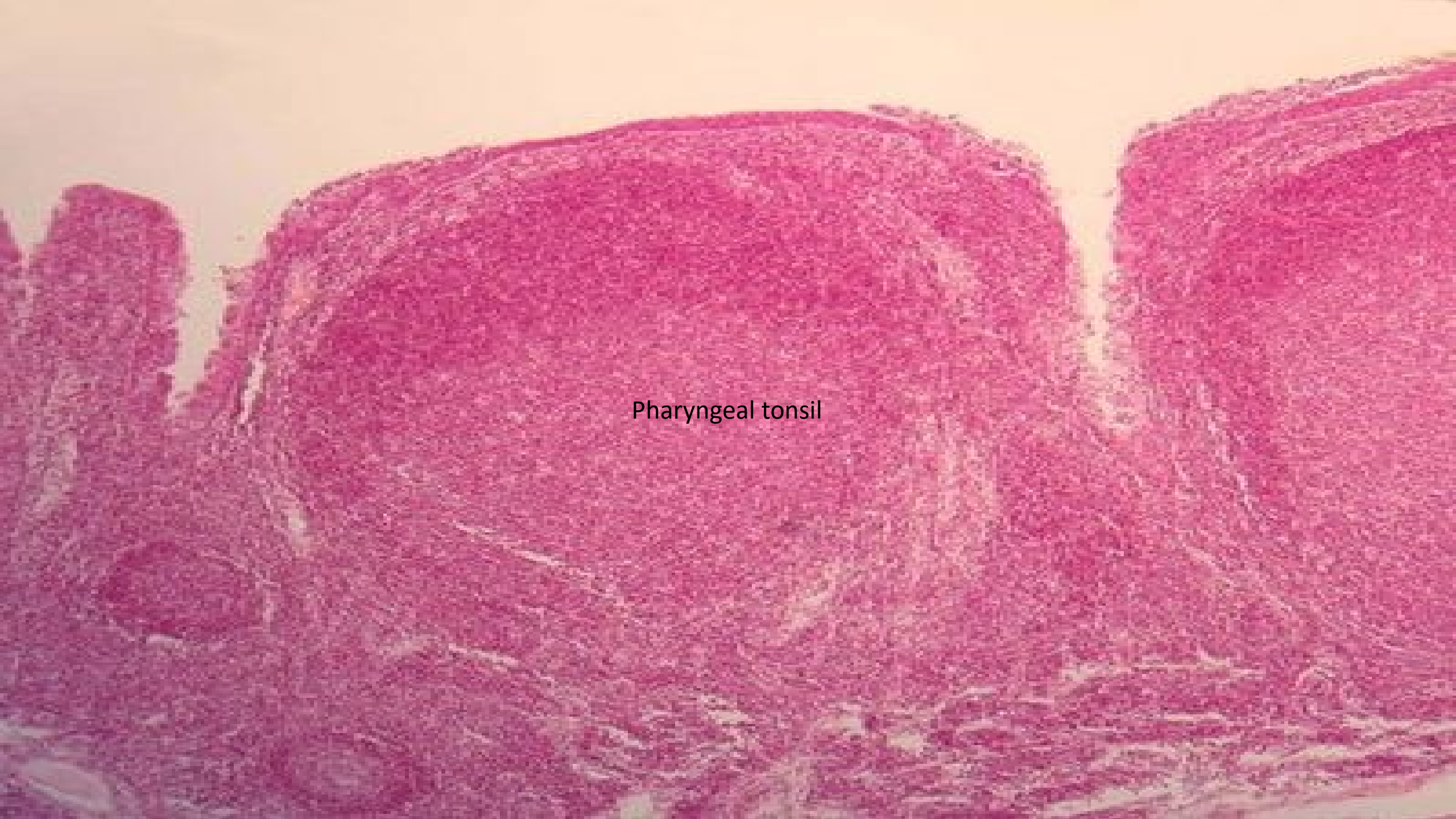
Image:
Property of AACC
Courtesy of
T.G. Saunders, VMD



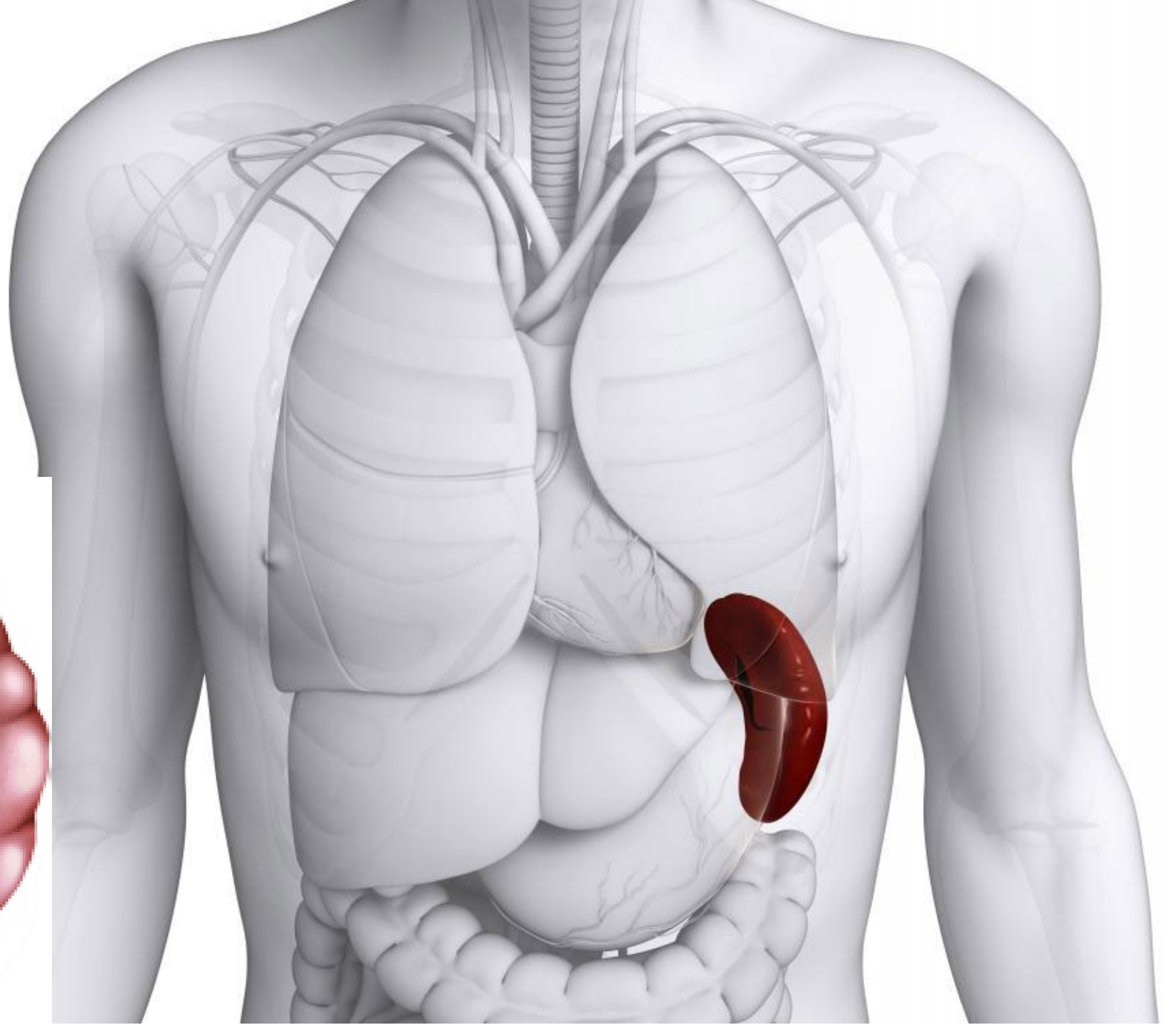
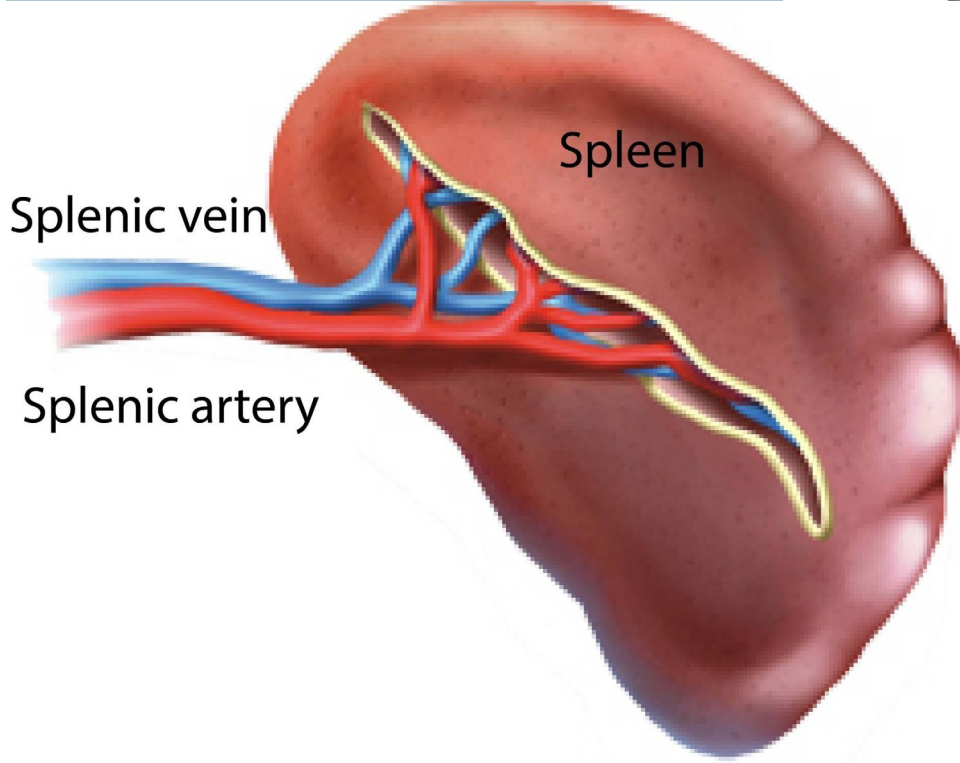
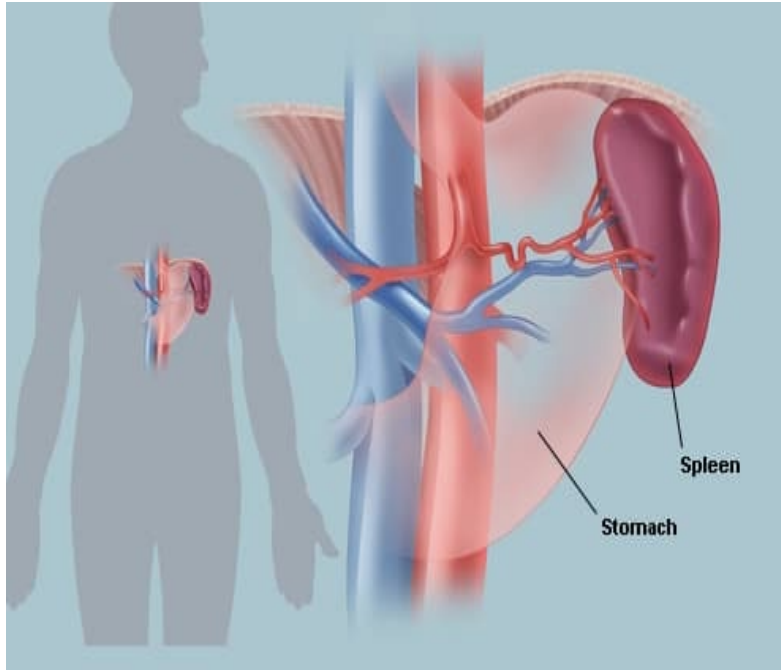


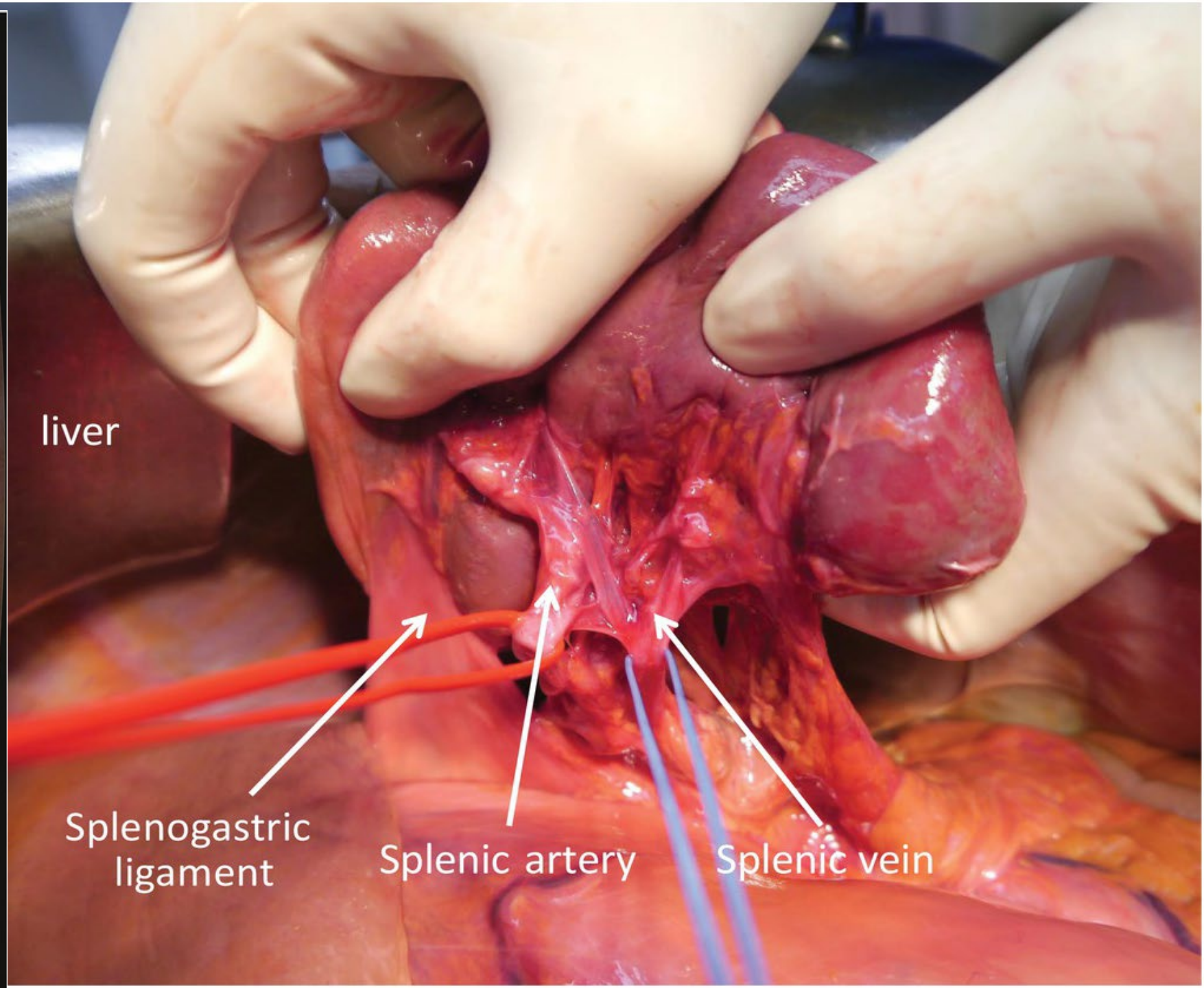
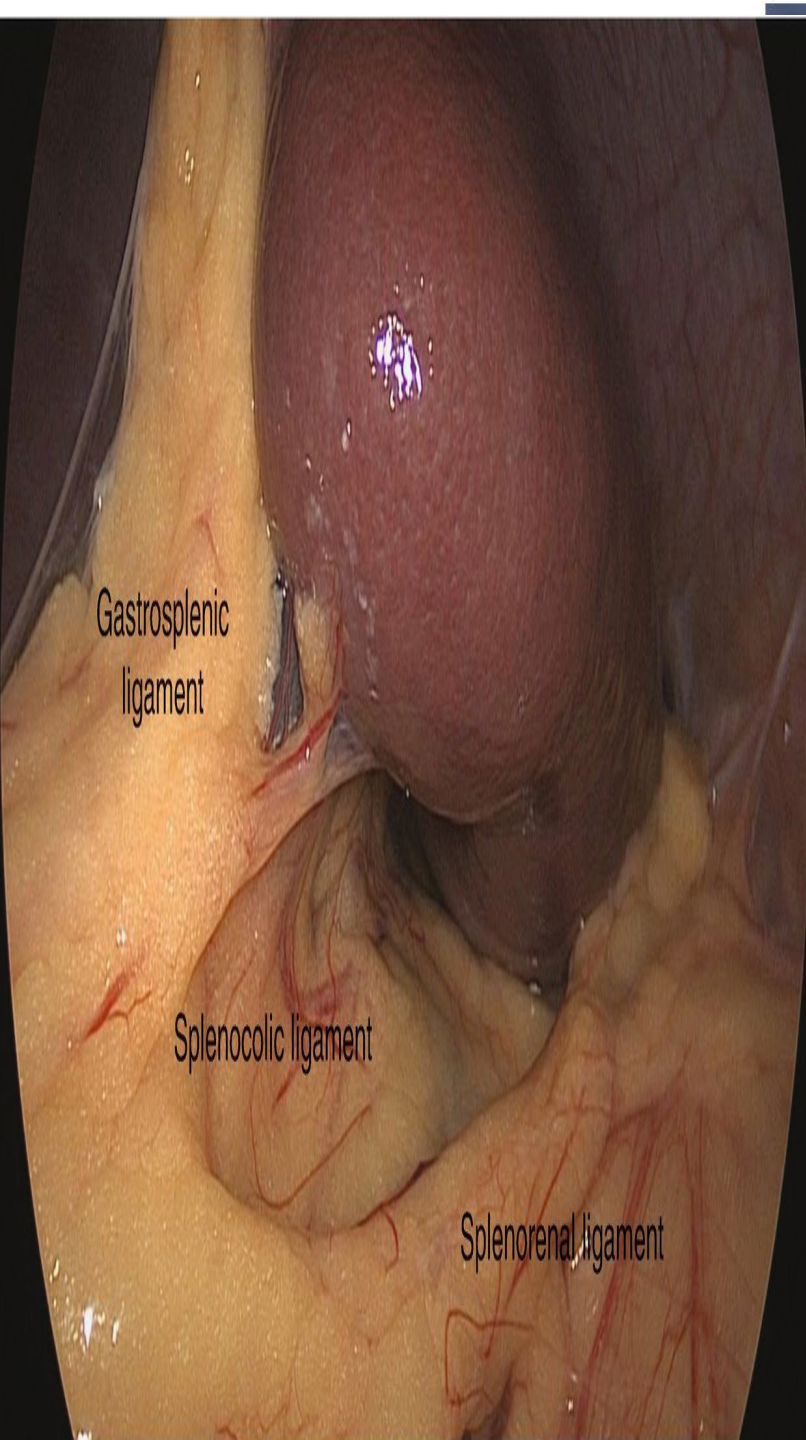
Pharyngeal tonsil



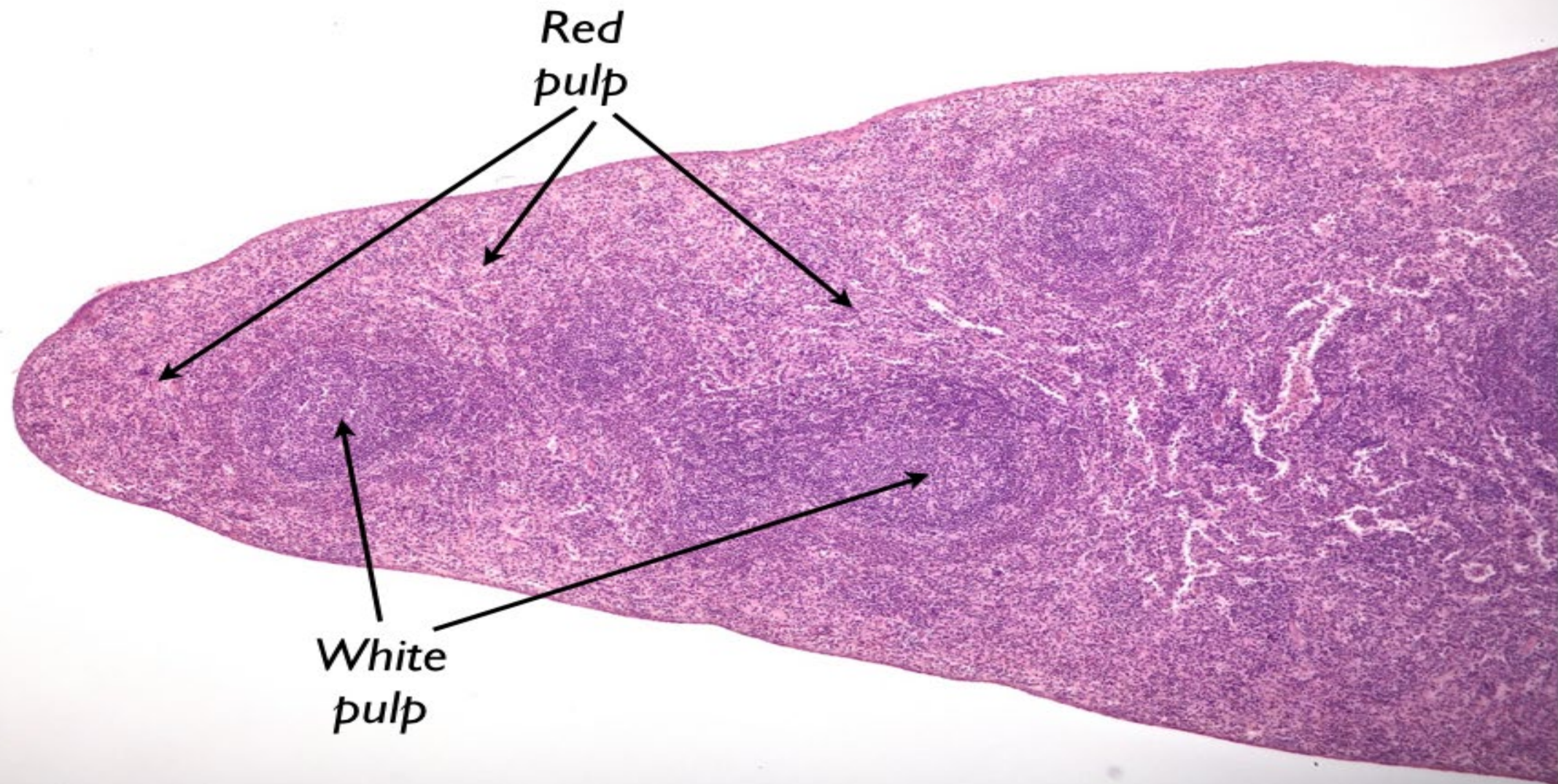


Pharyngeal tonsil





Spleen



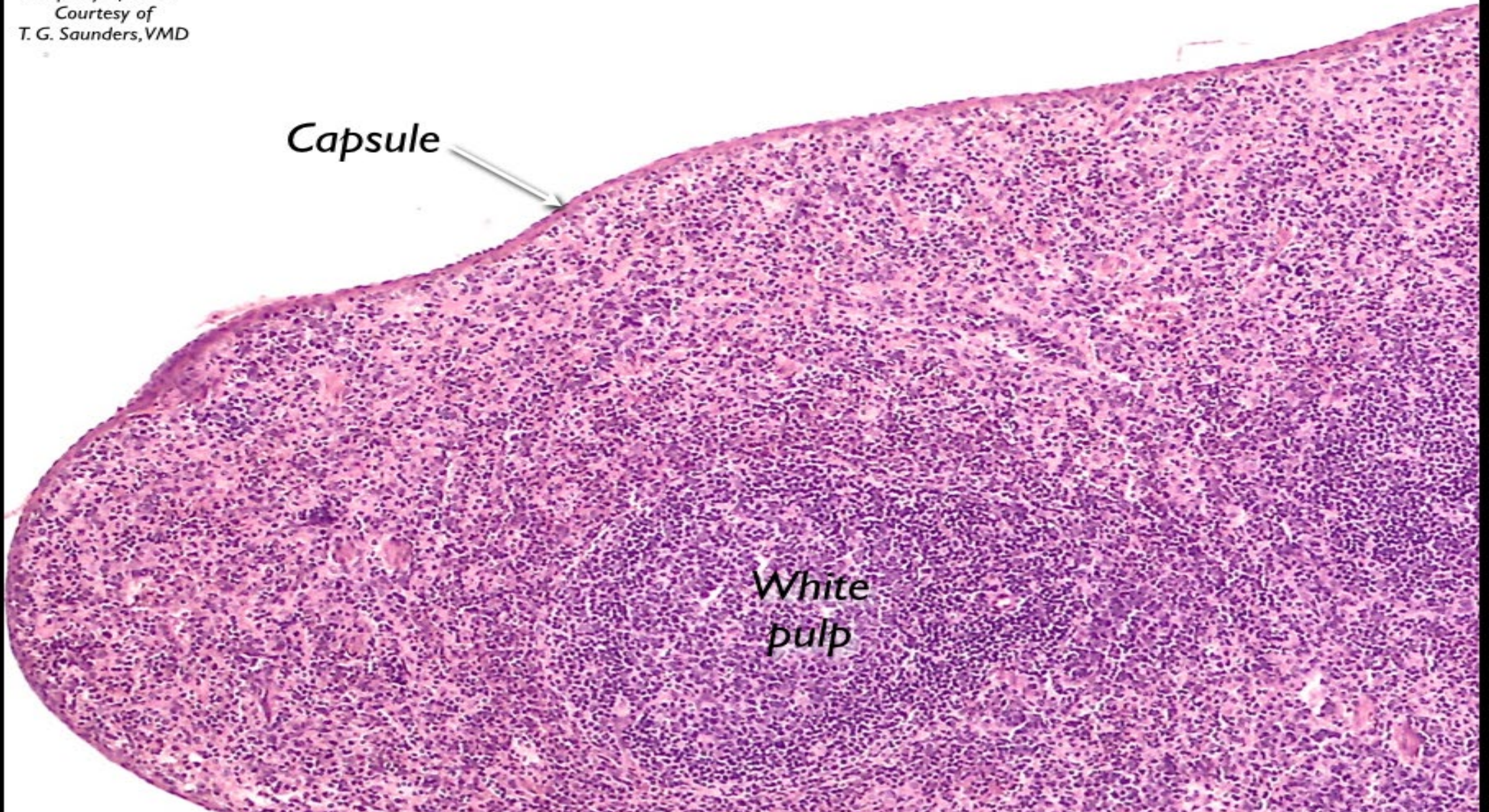
Spleen

Image:
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Courtesy of
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Capsule



White
pulp



Spleen

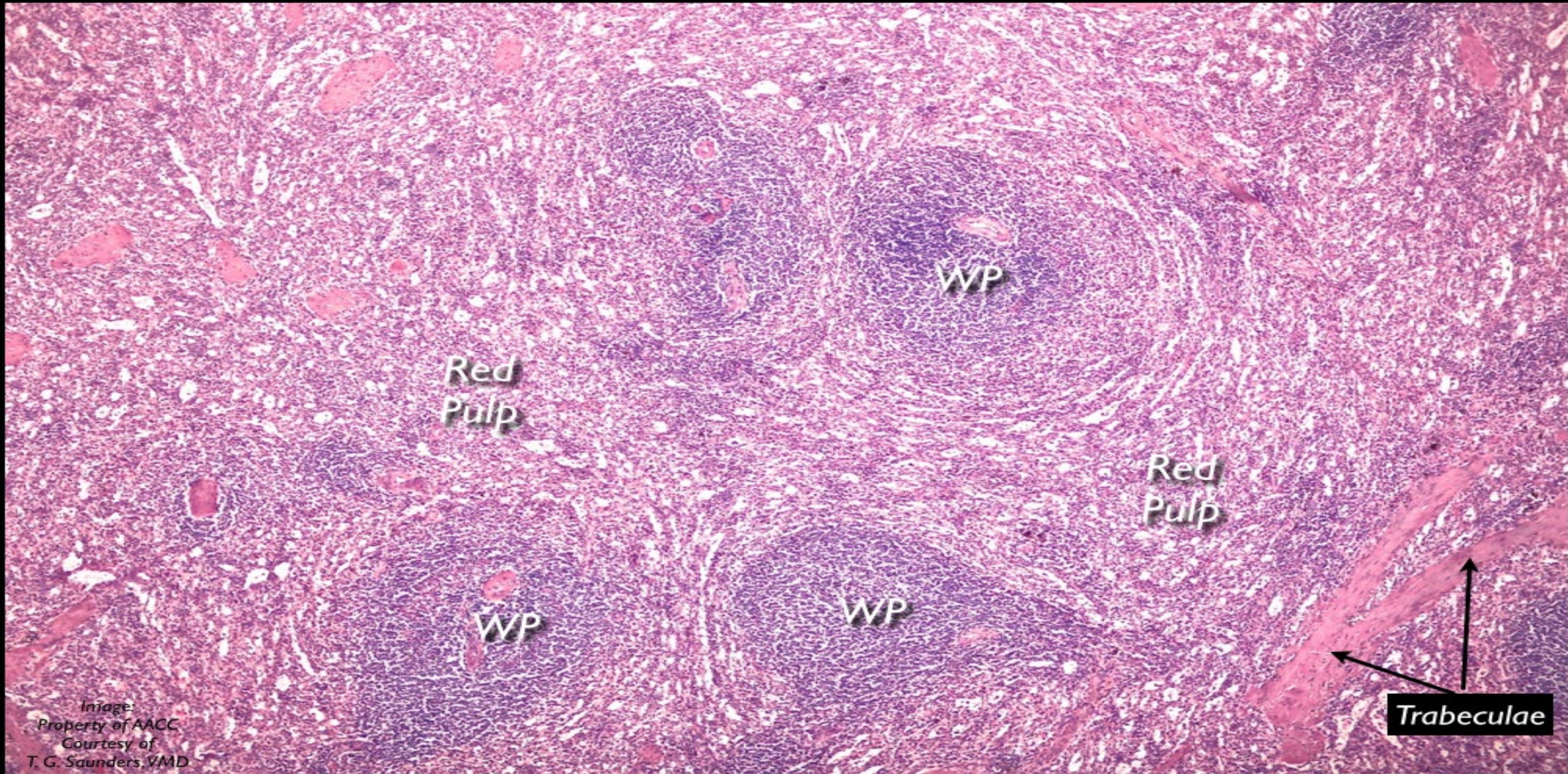
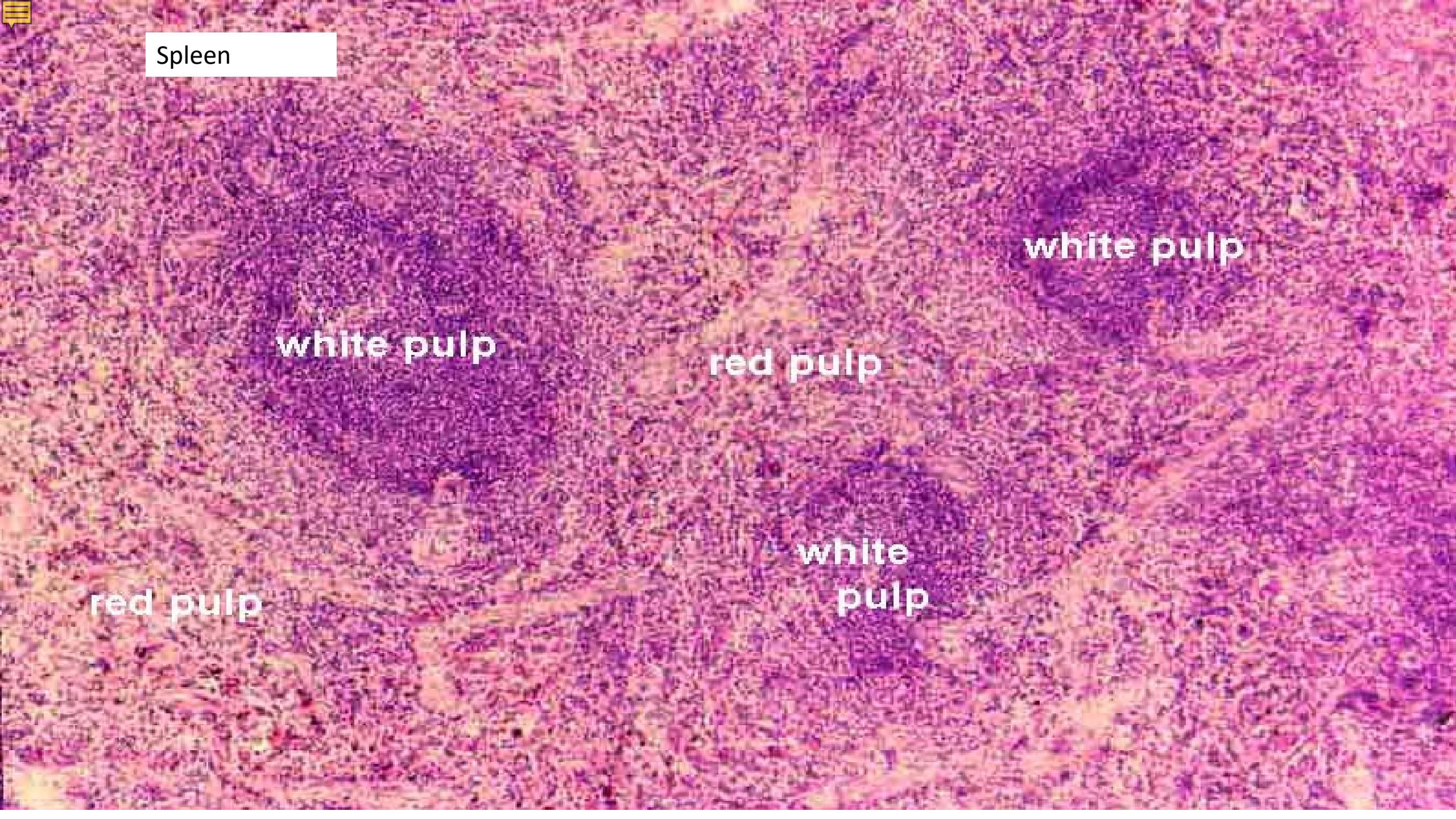


Image:
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Courtesy of
T. G. Saunders, VMD



Spleen



white pulp

white pulp

red pulp

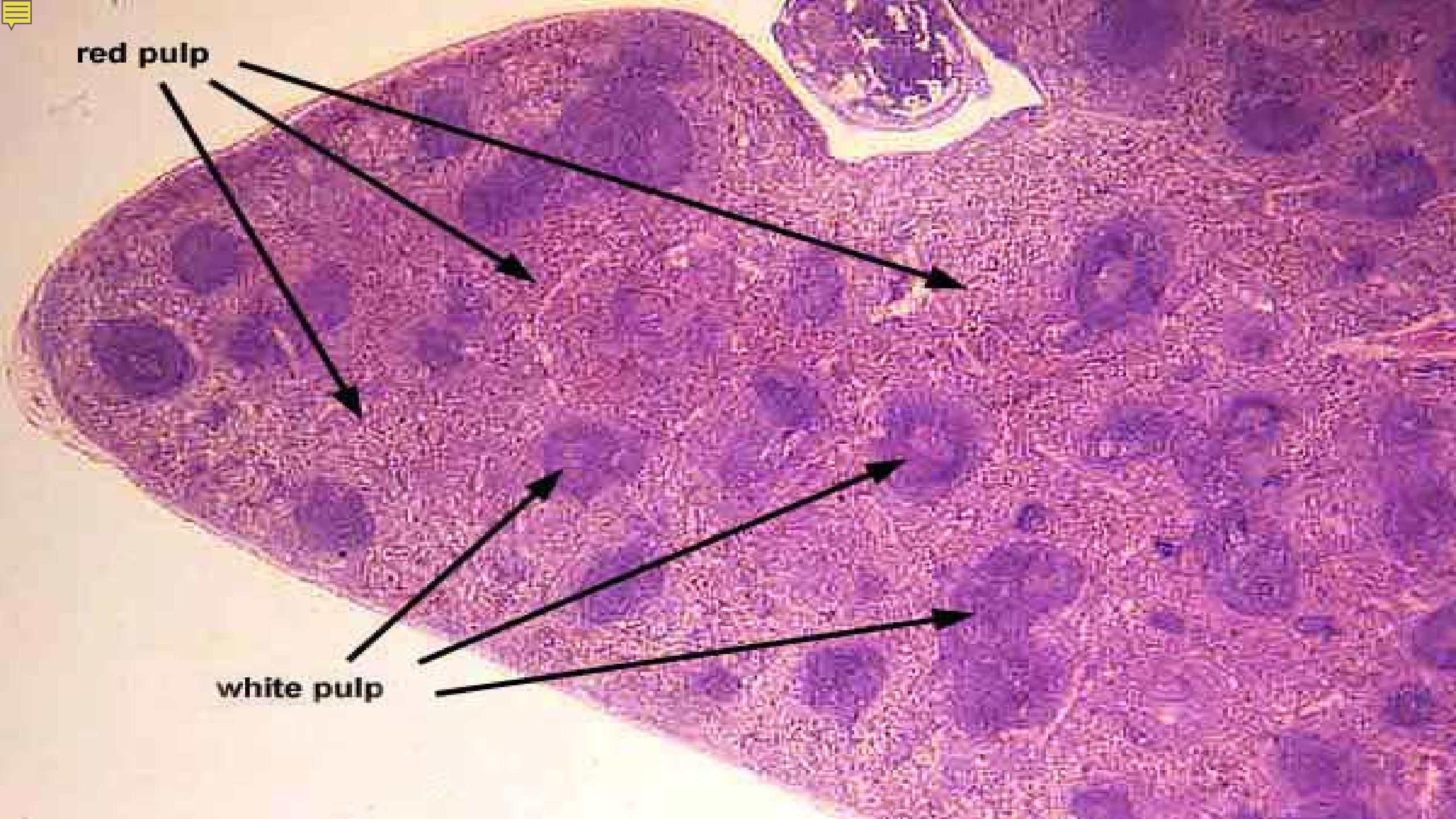
white
pulp

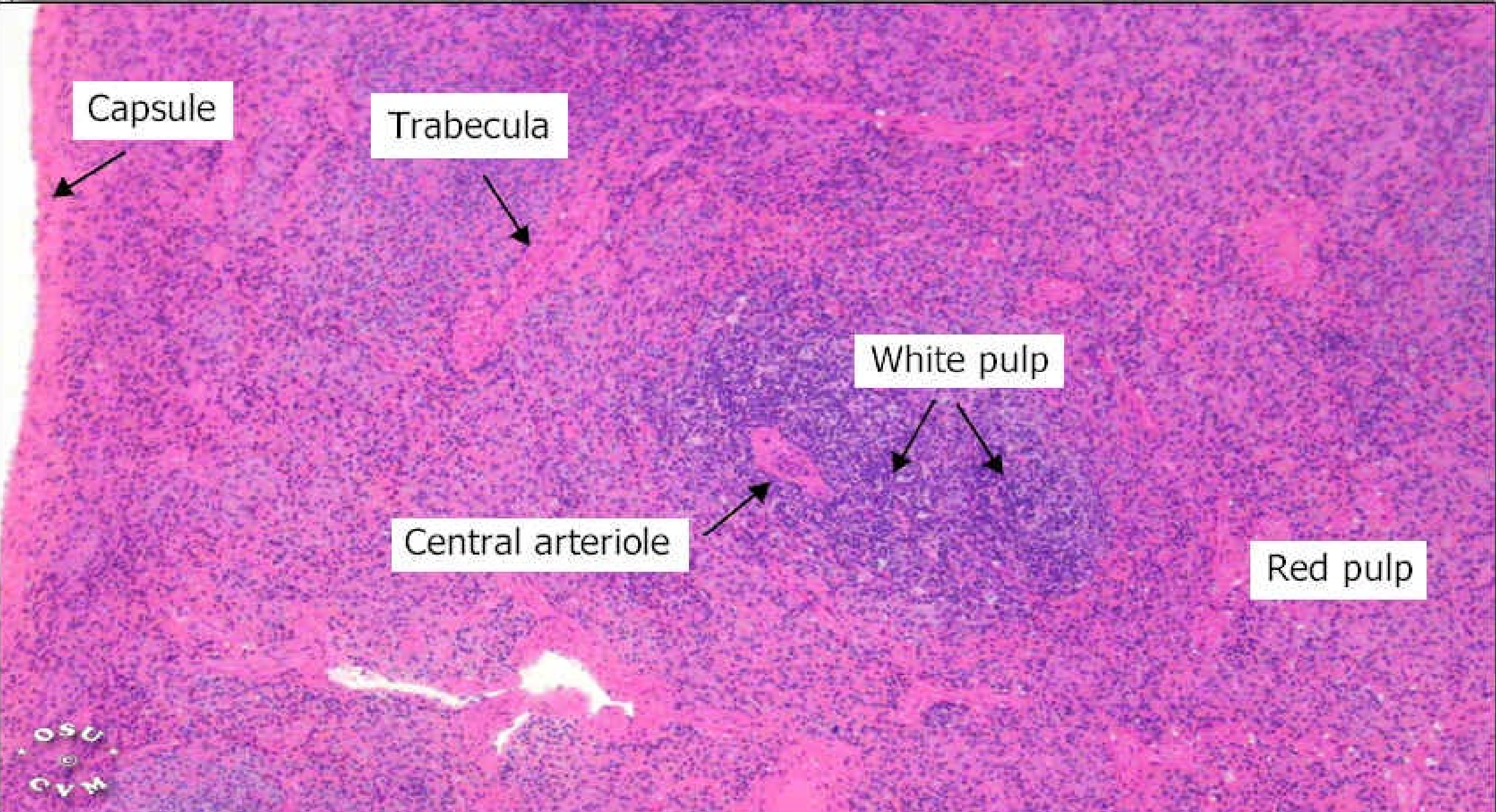
red pulp



red pulp

white pulp





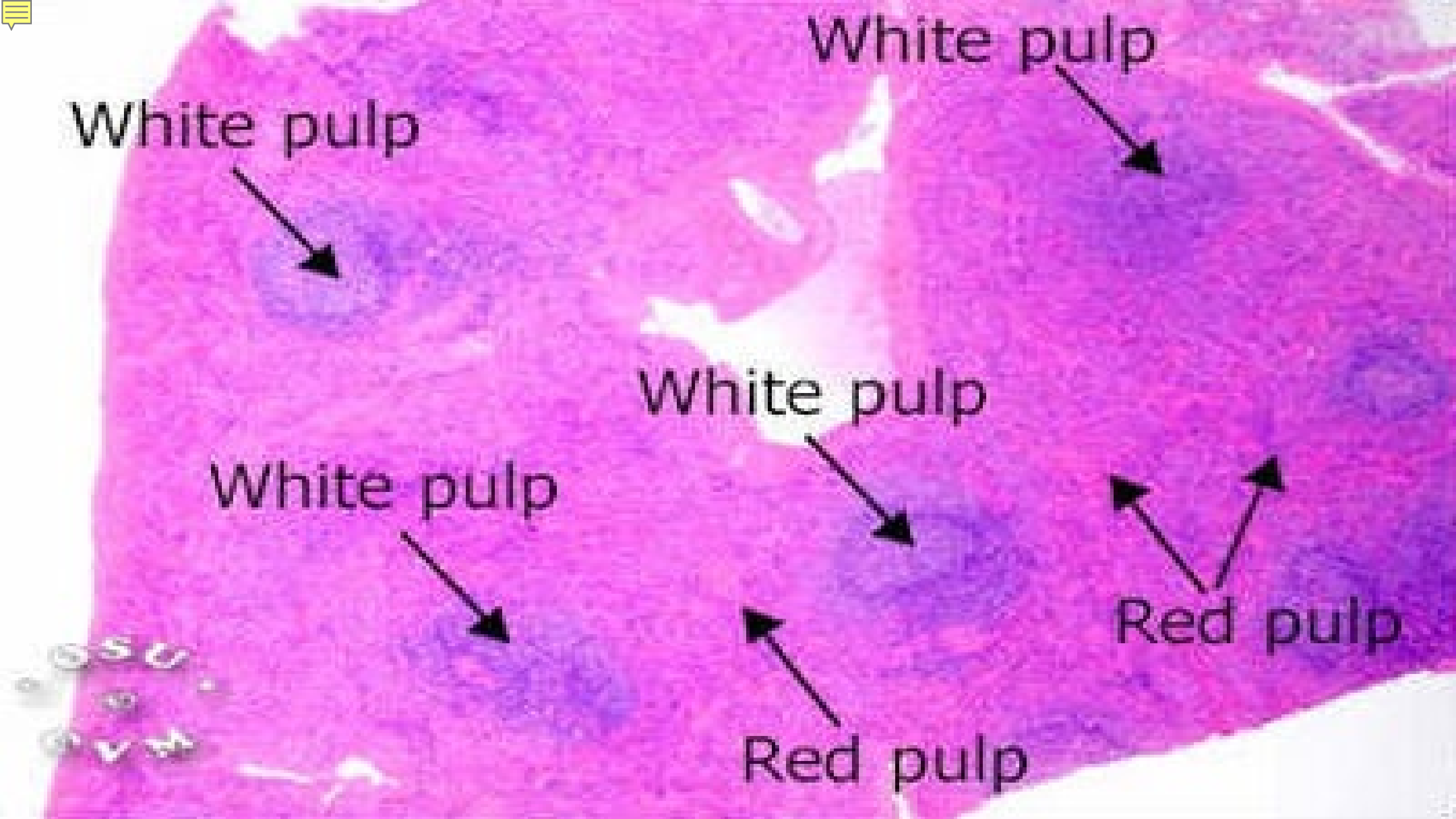
Capsule

Trabecula

White pulp

Central arteriole

Red pulp



White pulp

White pulp

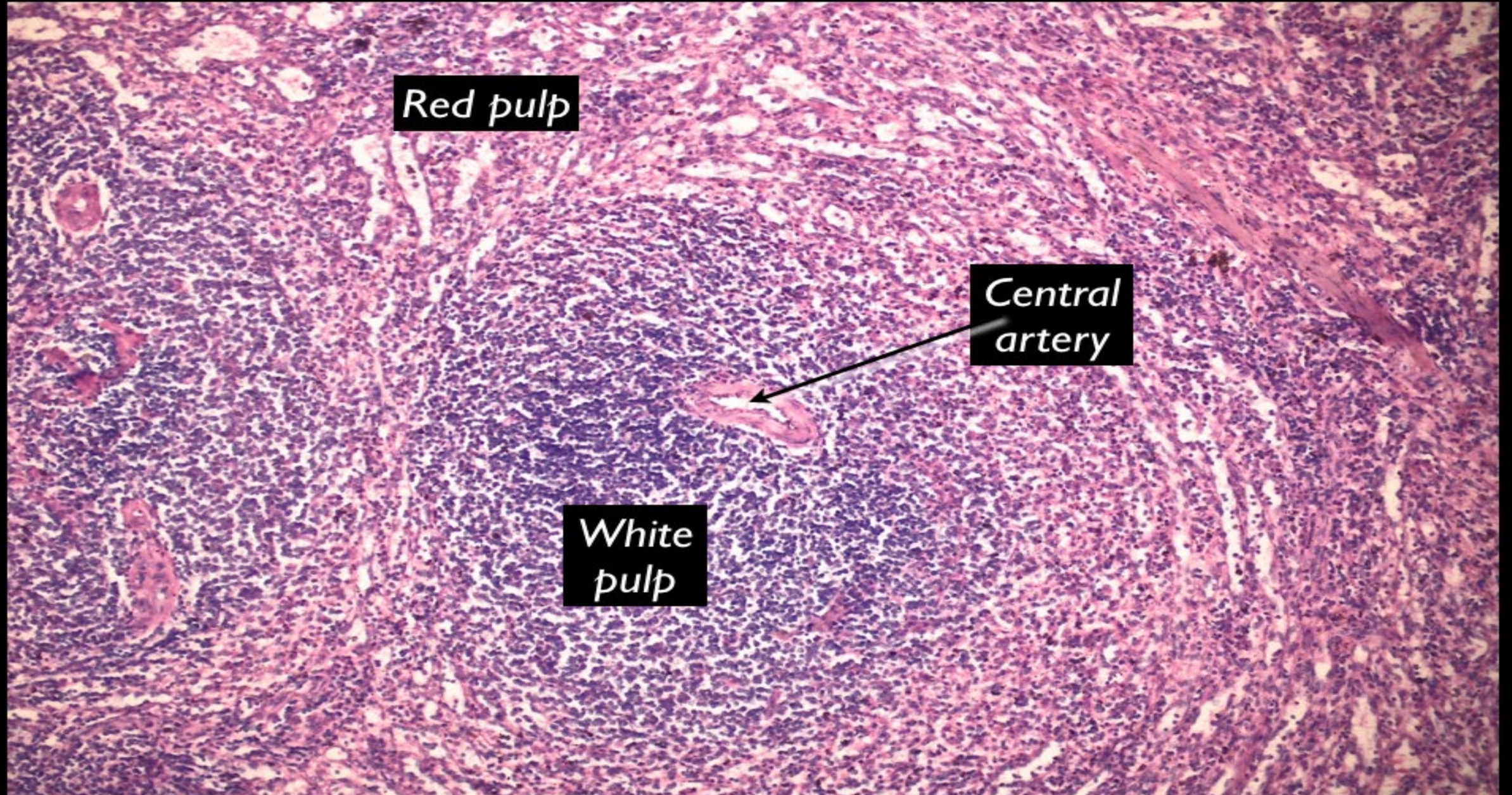
White pulp

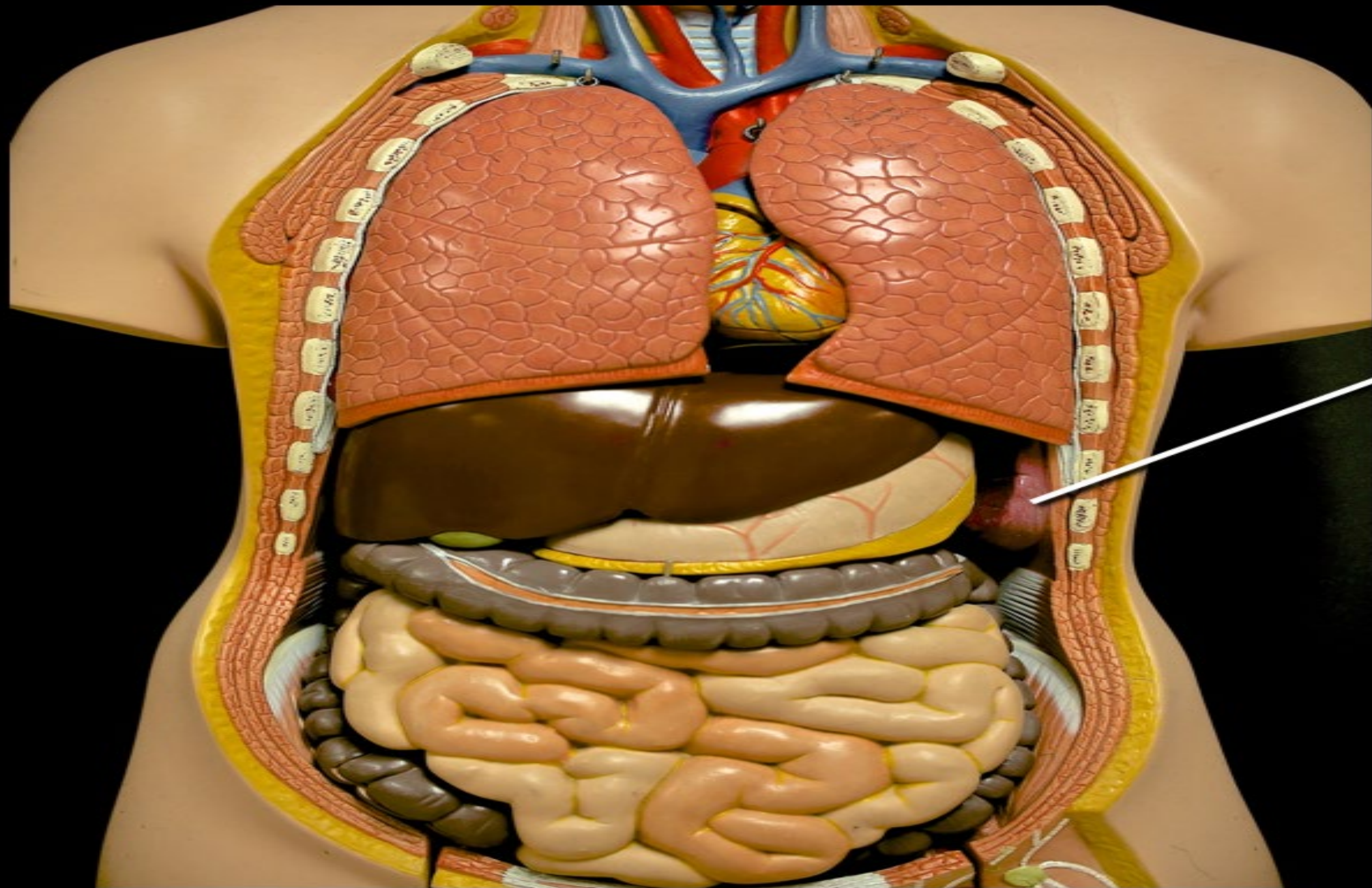
White pulp

Red pulp

Red pulp

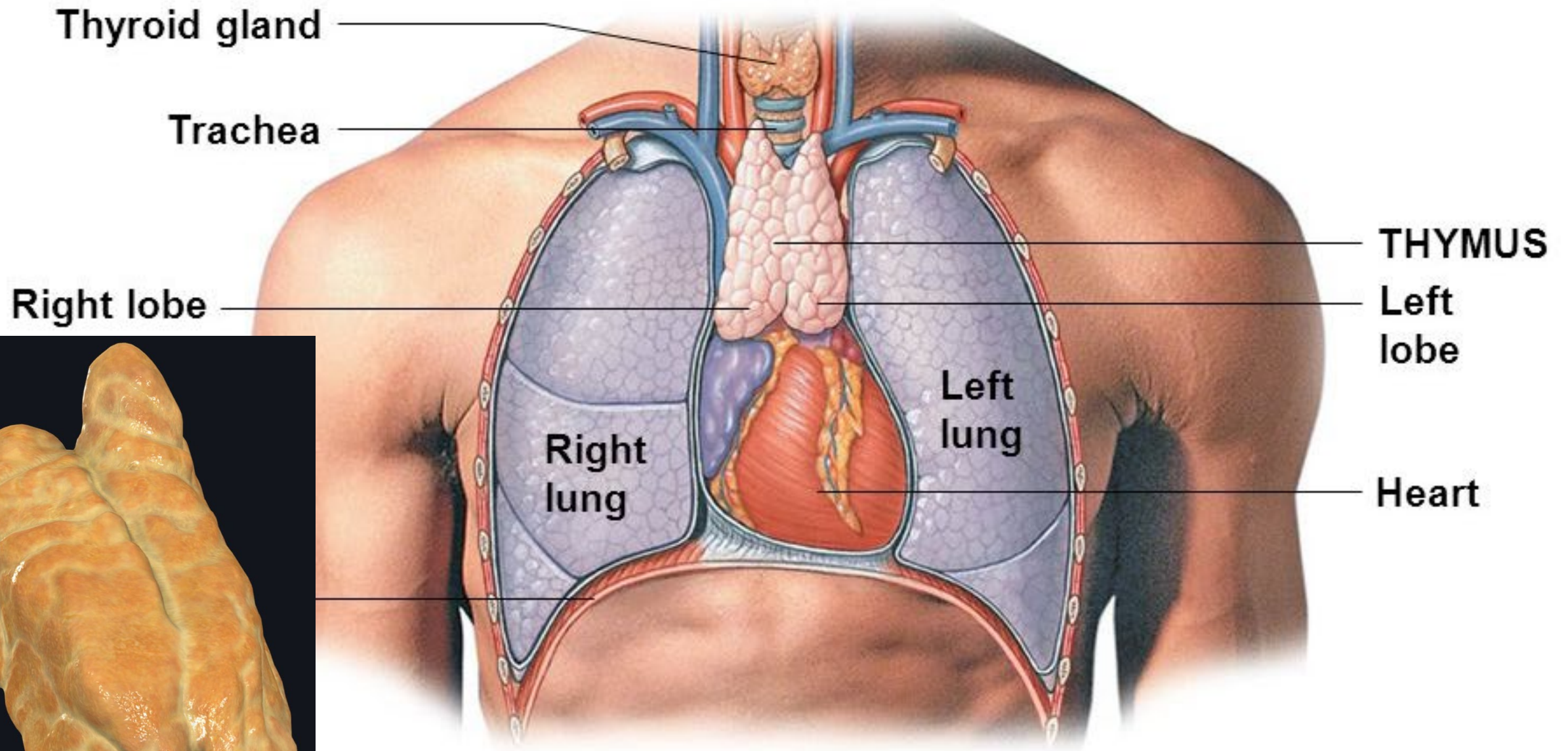
Spleen



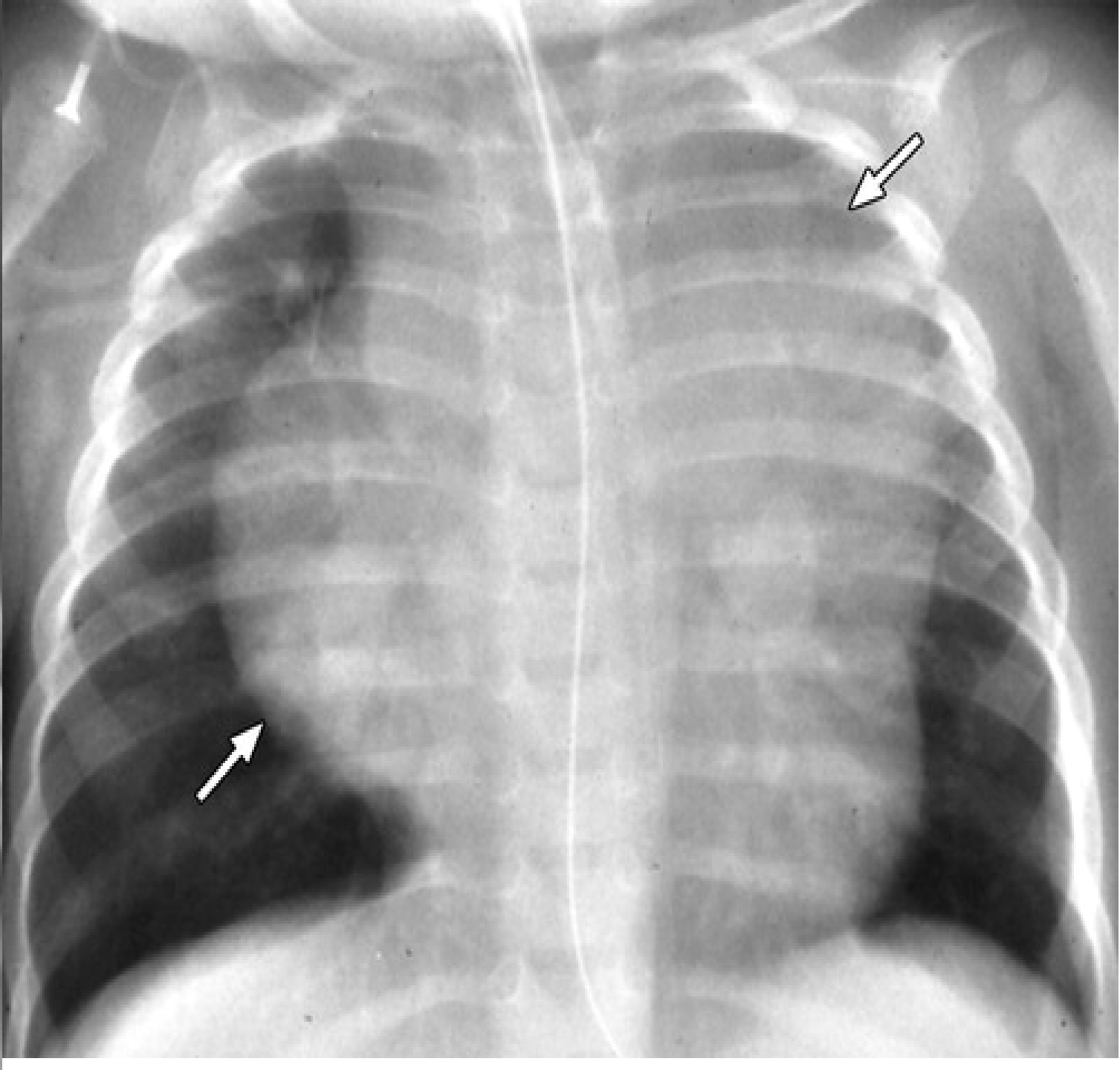
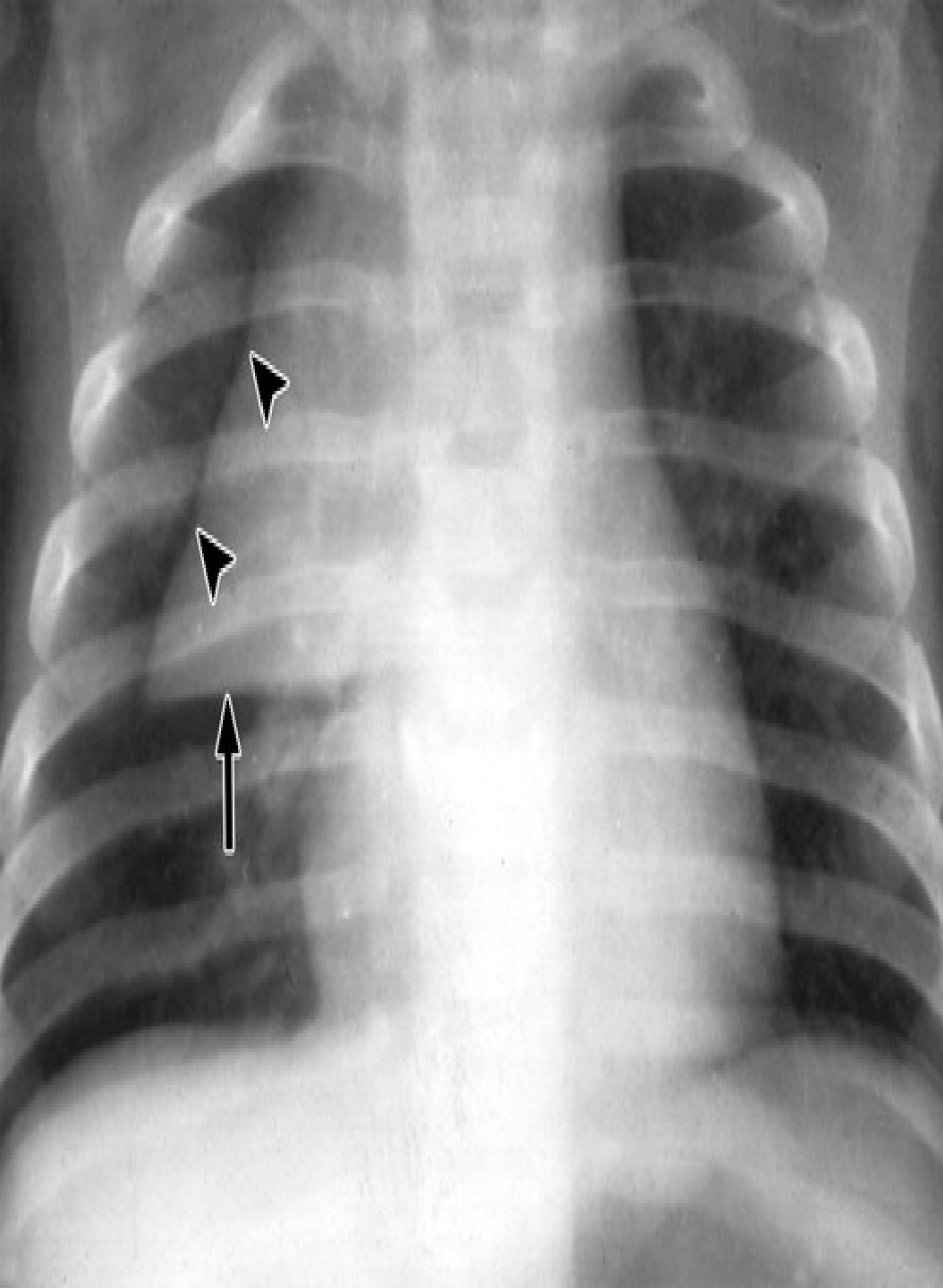


Spleen

Image
Property of
Courte
T. G. Saund



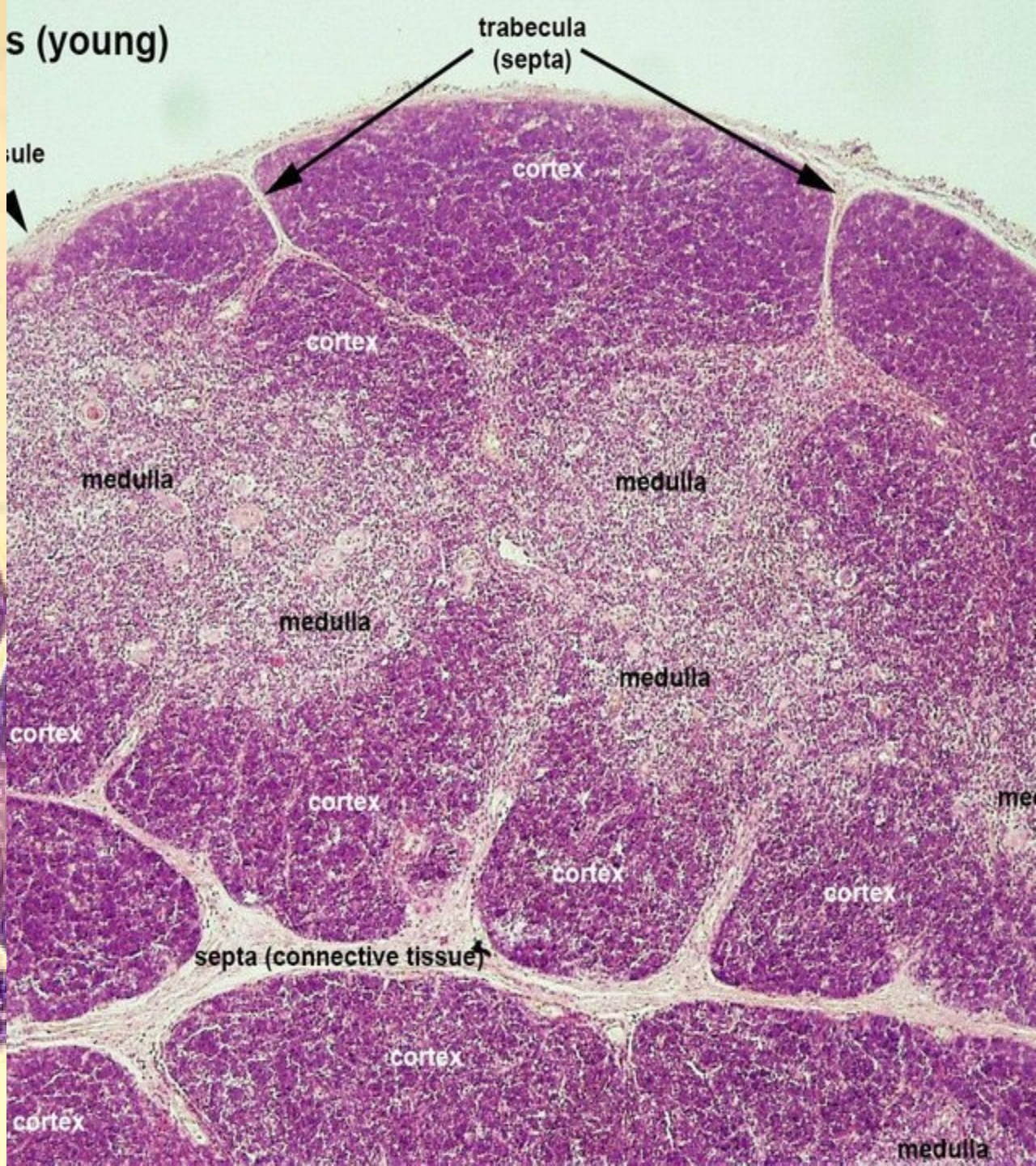
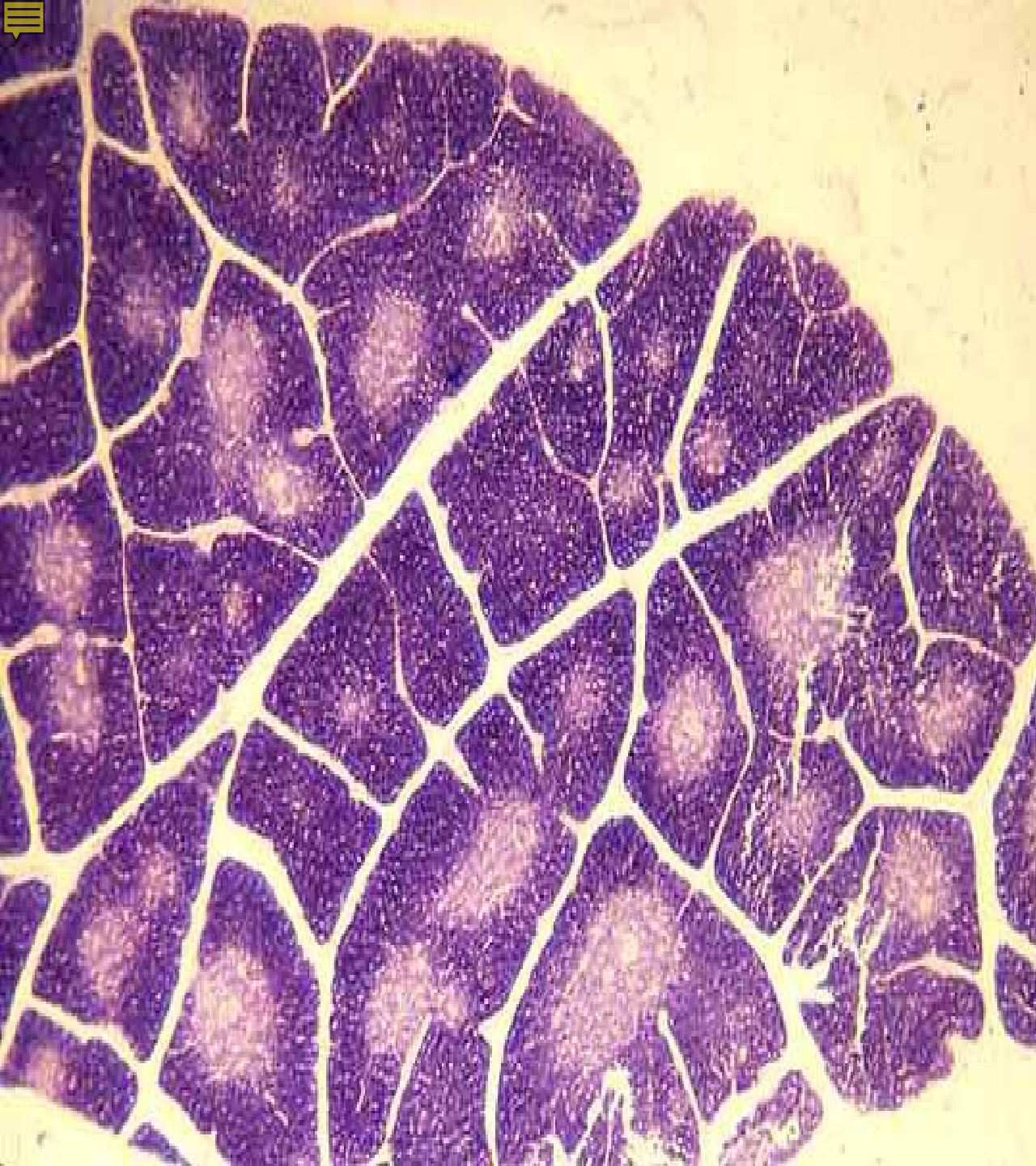
The location of the thymus on gross dissection; note the relationship to other organs in the chest.



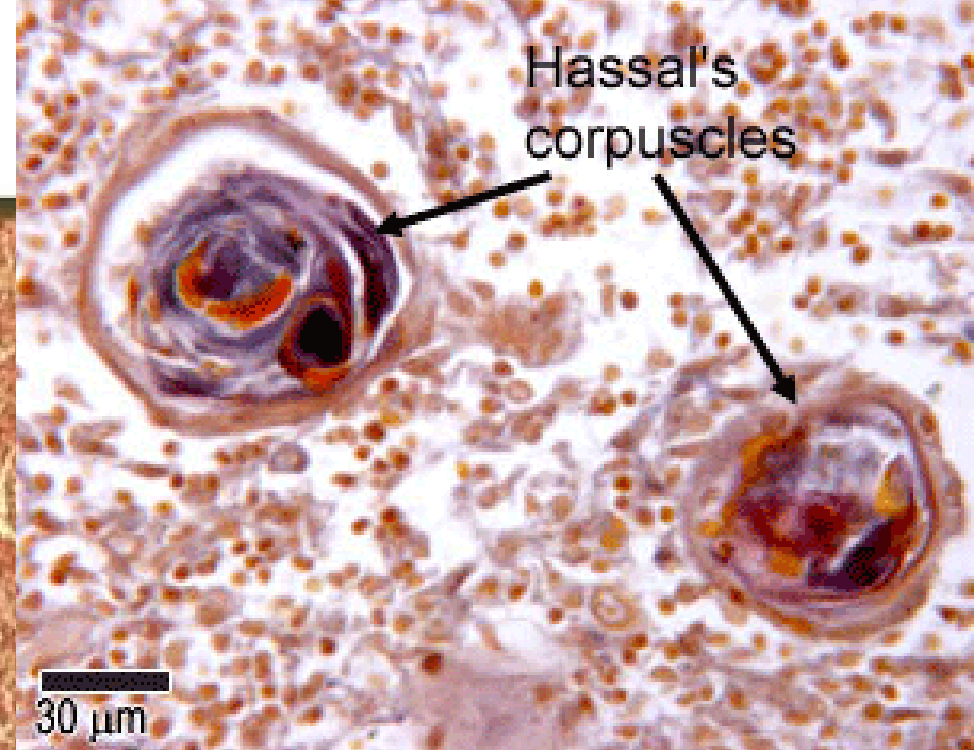
Thymus



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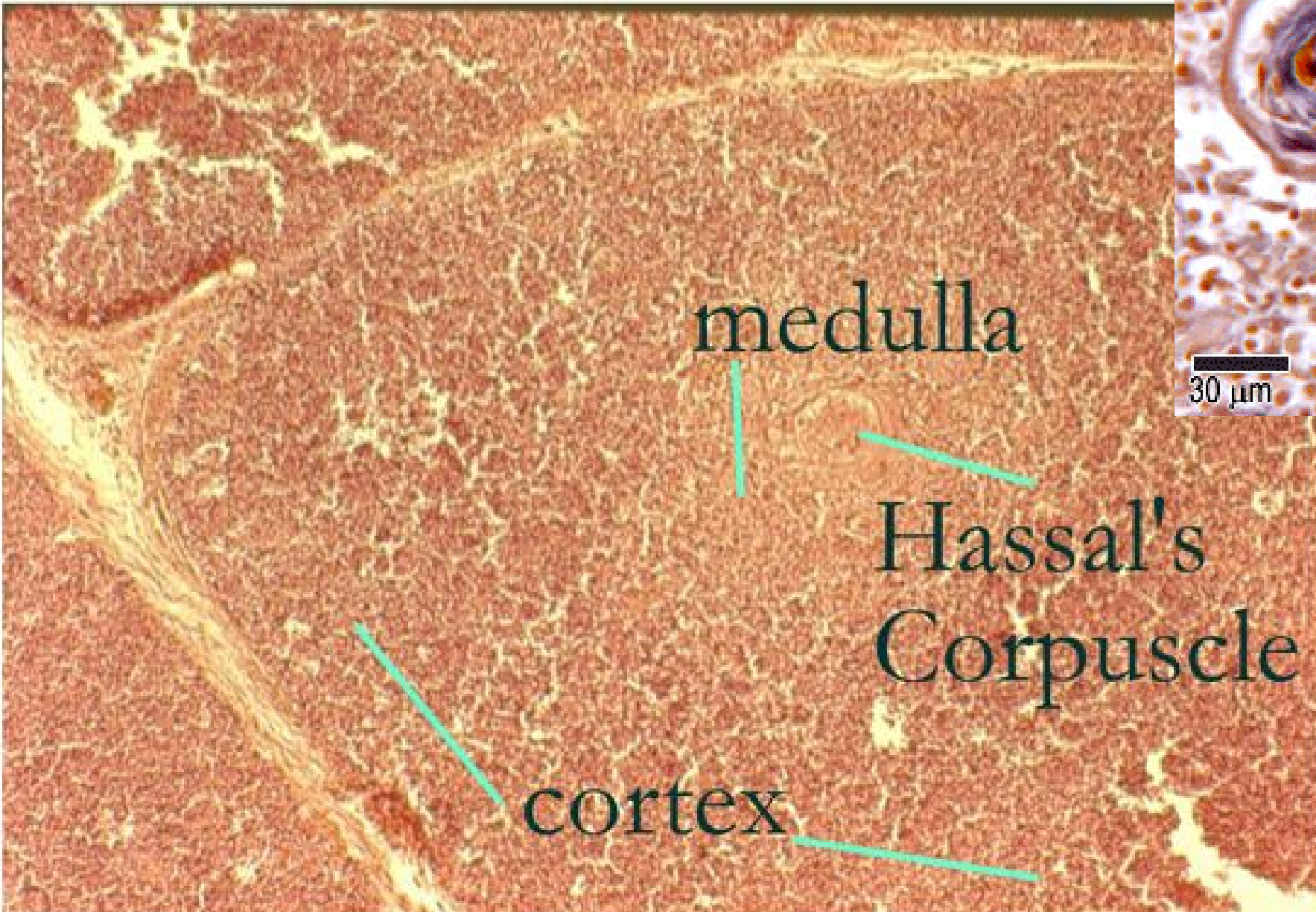
Thymus



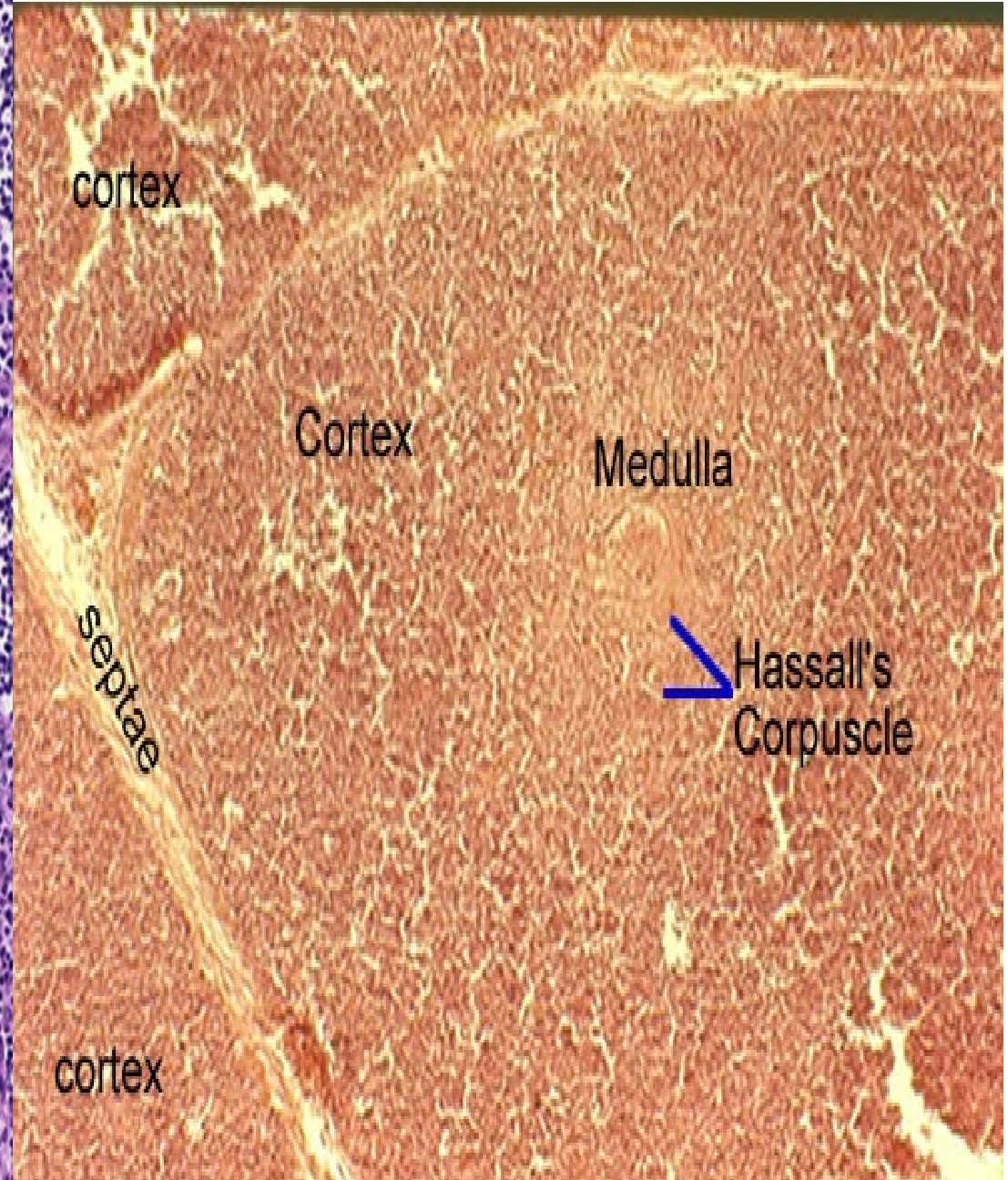
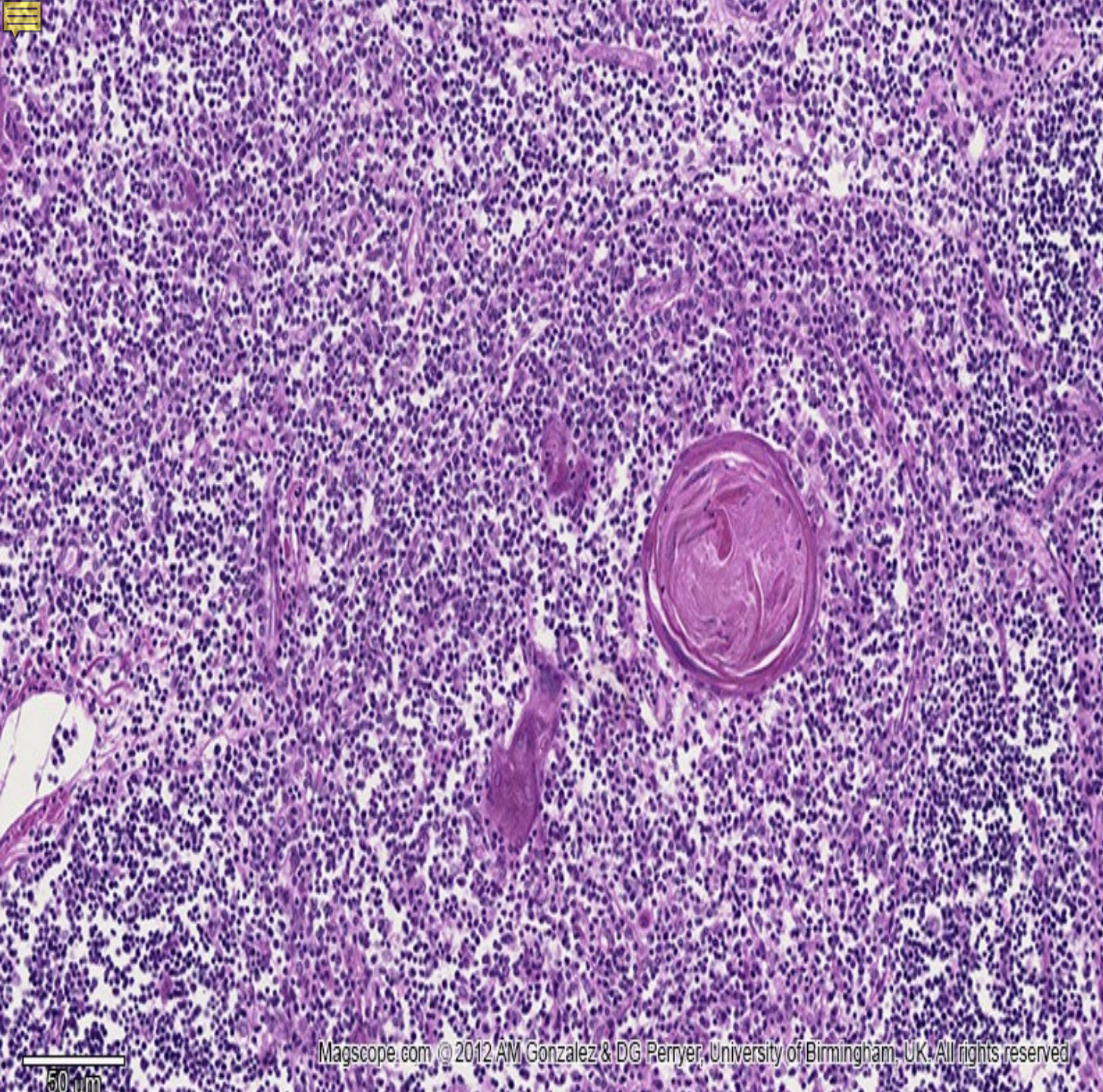
medulla

Hassal's
Corpuscle

cortex



Thymus



50 μm

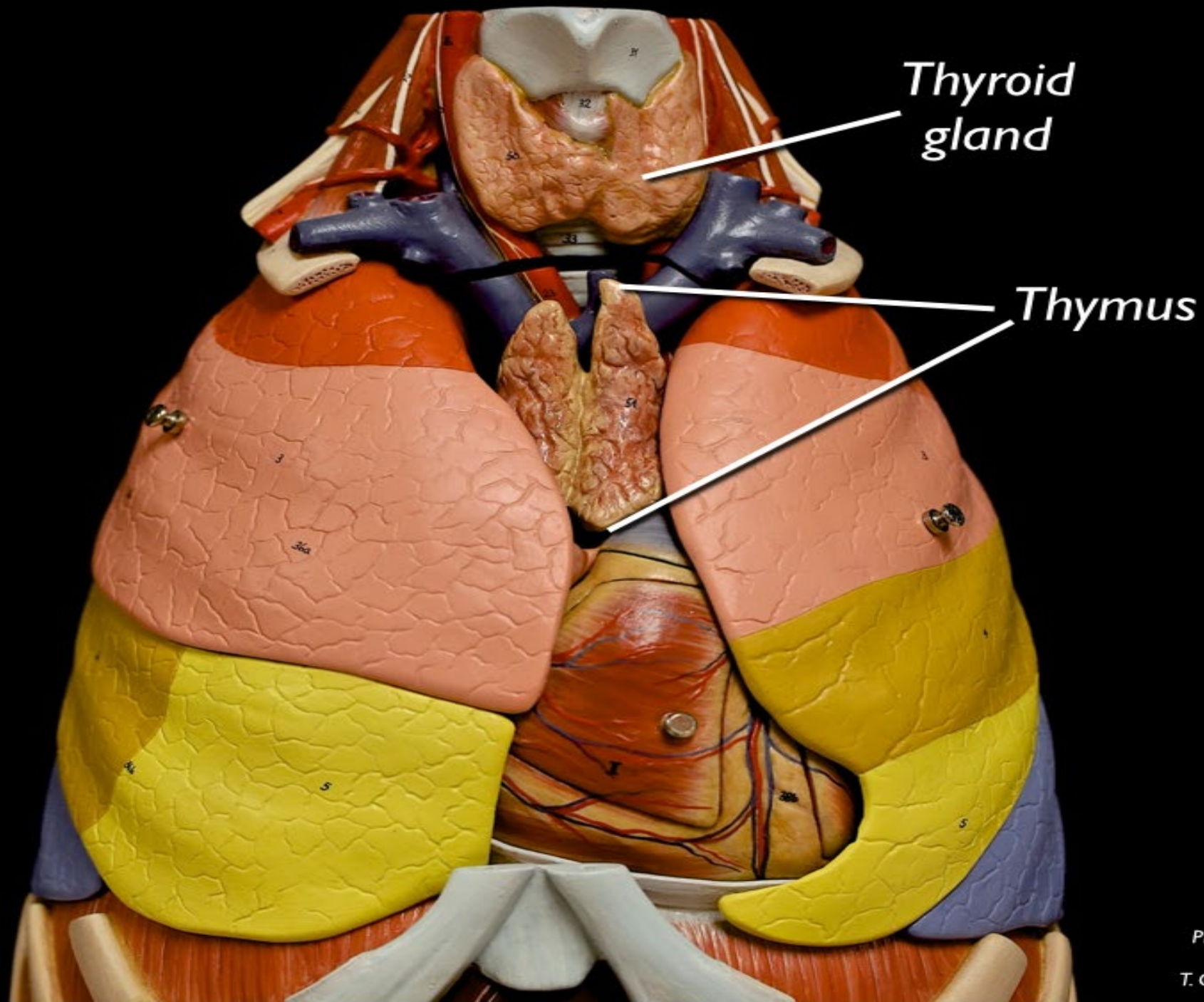


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