Your brain.

Where knowledge go to be lonely.

Respiratory System

Retrieval Practise

Because it is what works to make it like cinnamon

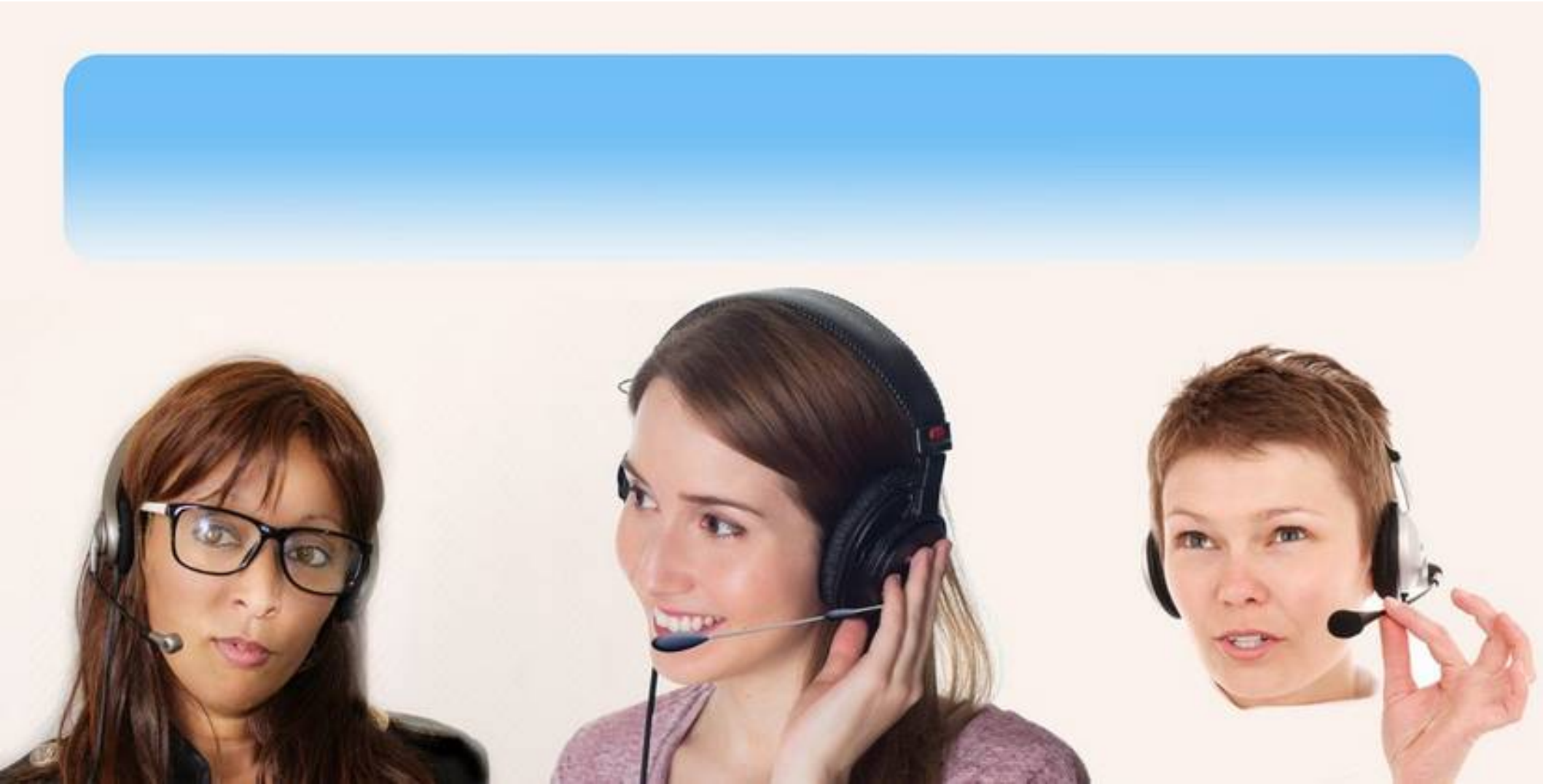

RULES


Ink!!!

?? Questions

Best Effort!

No Consultation



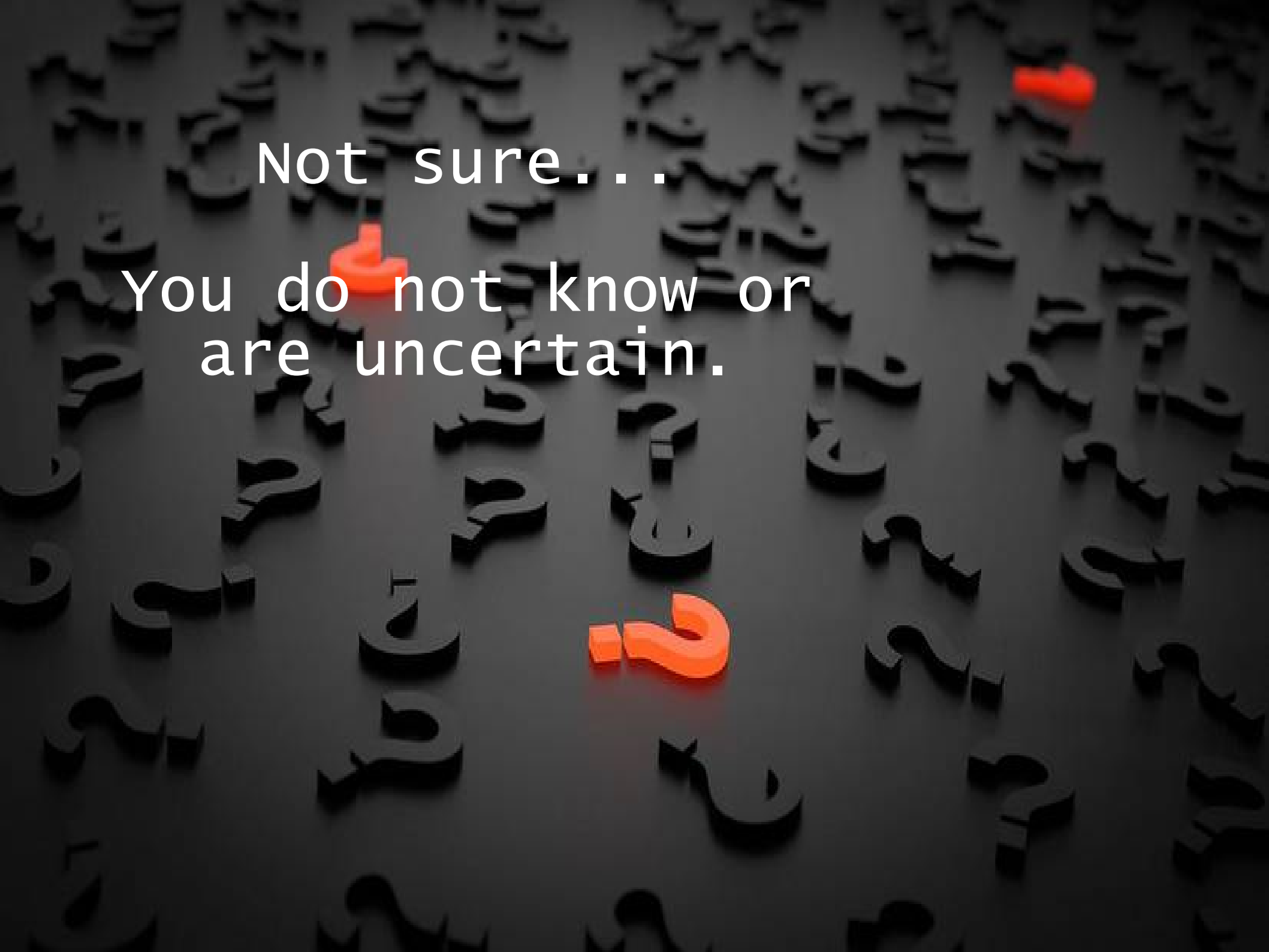

Google
https://www.google.com
Search
Images
Maps
Play
YouTube
News
Gmail
Drive
Calendar
More
Google
Google Search
I'm Feeling Lucky

Score each answer

Nailed it

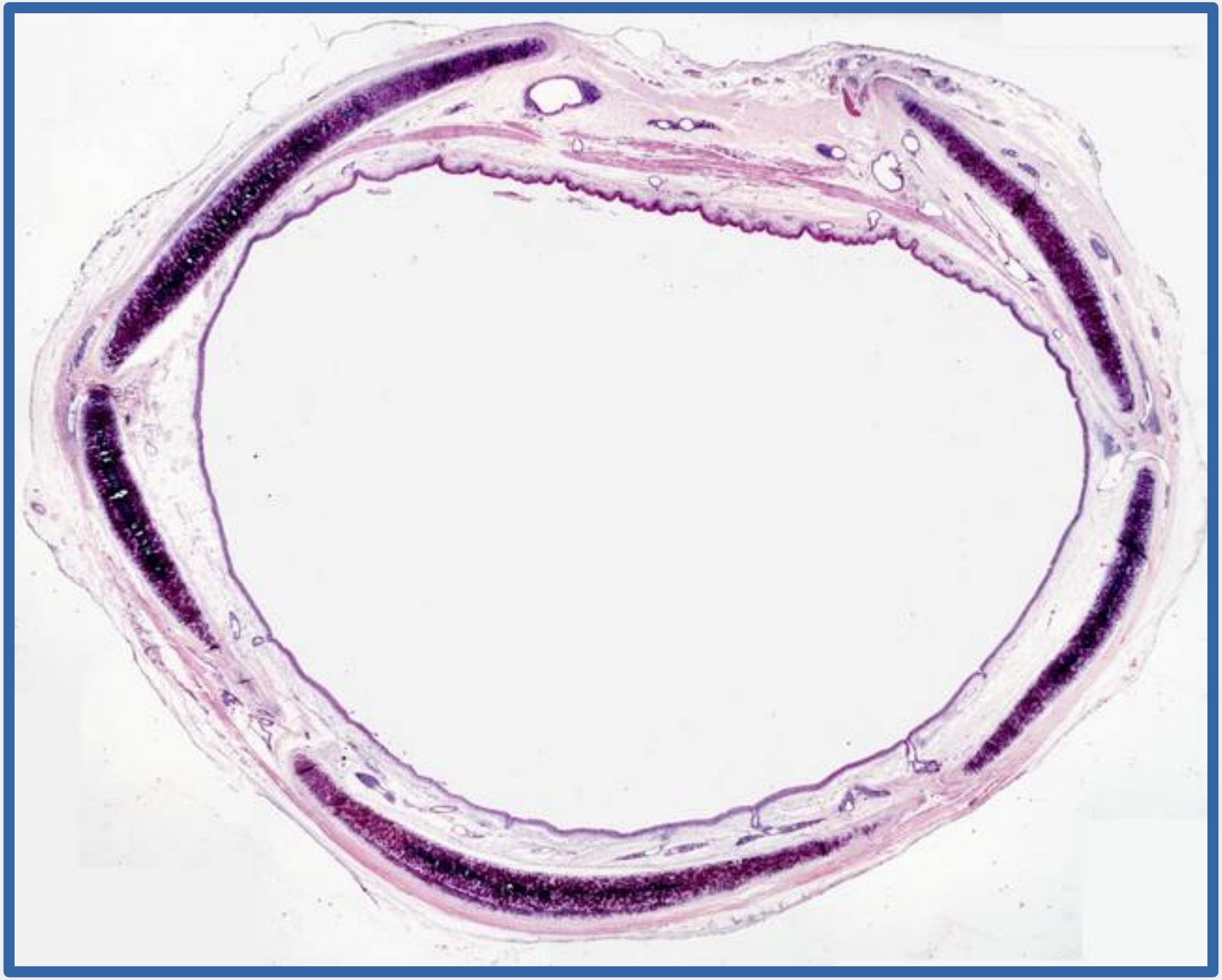
Not sure


Nailed it!
You are confident about your answer.


Not sure...
You do not know or are uncertain.

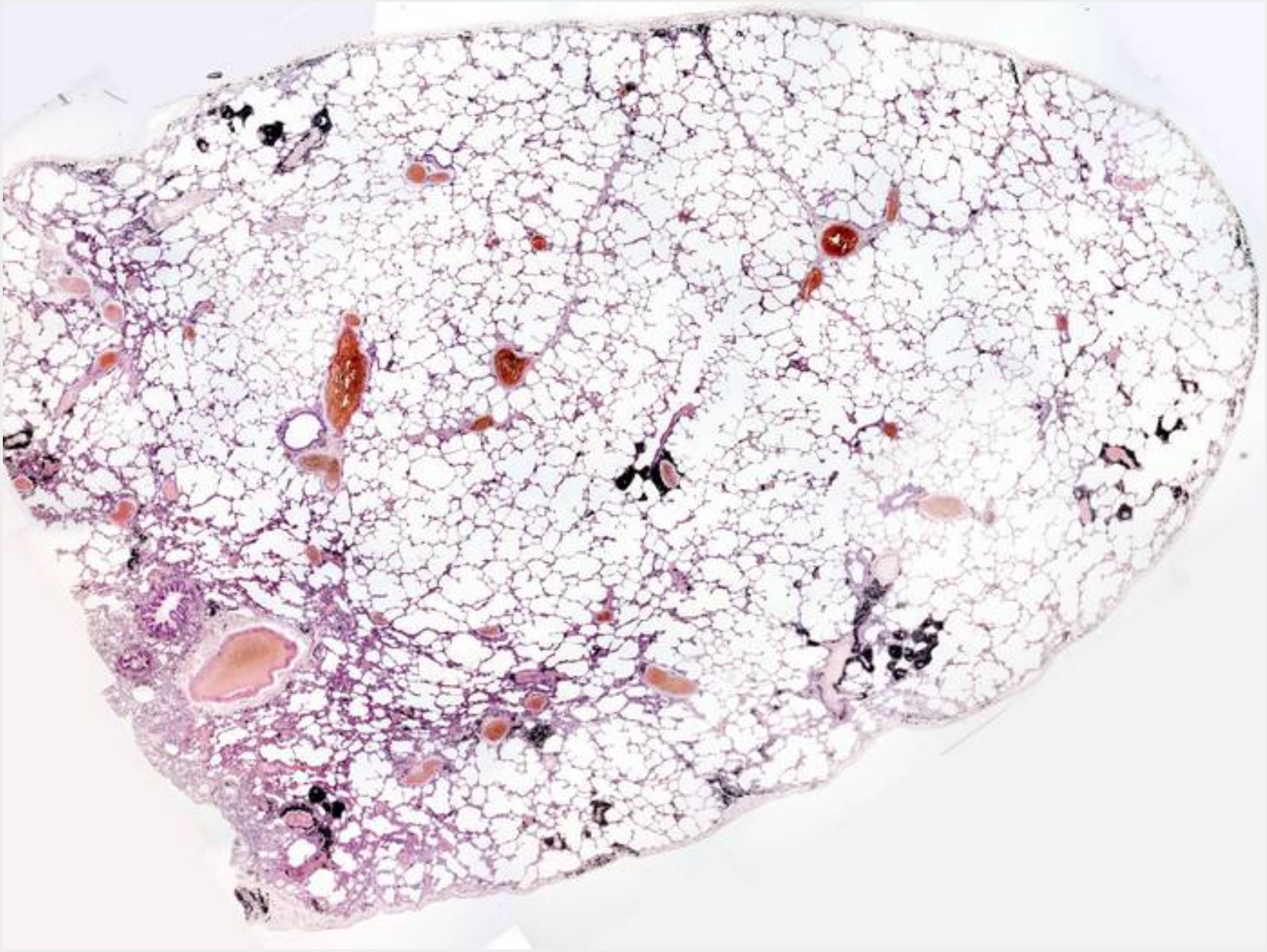
Ready?

Q01a: Identify the organ/structure

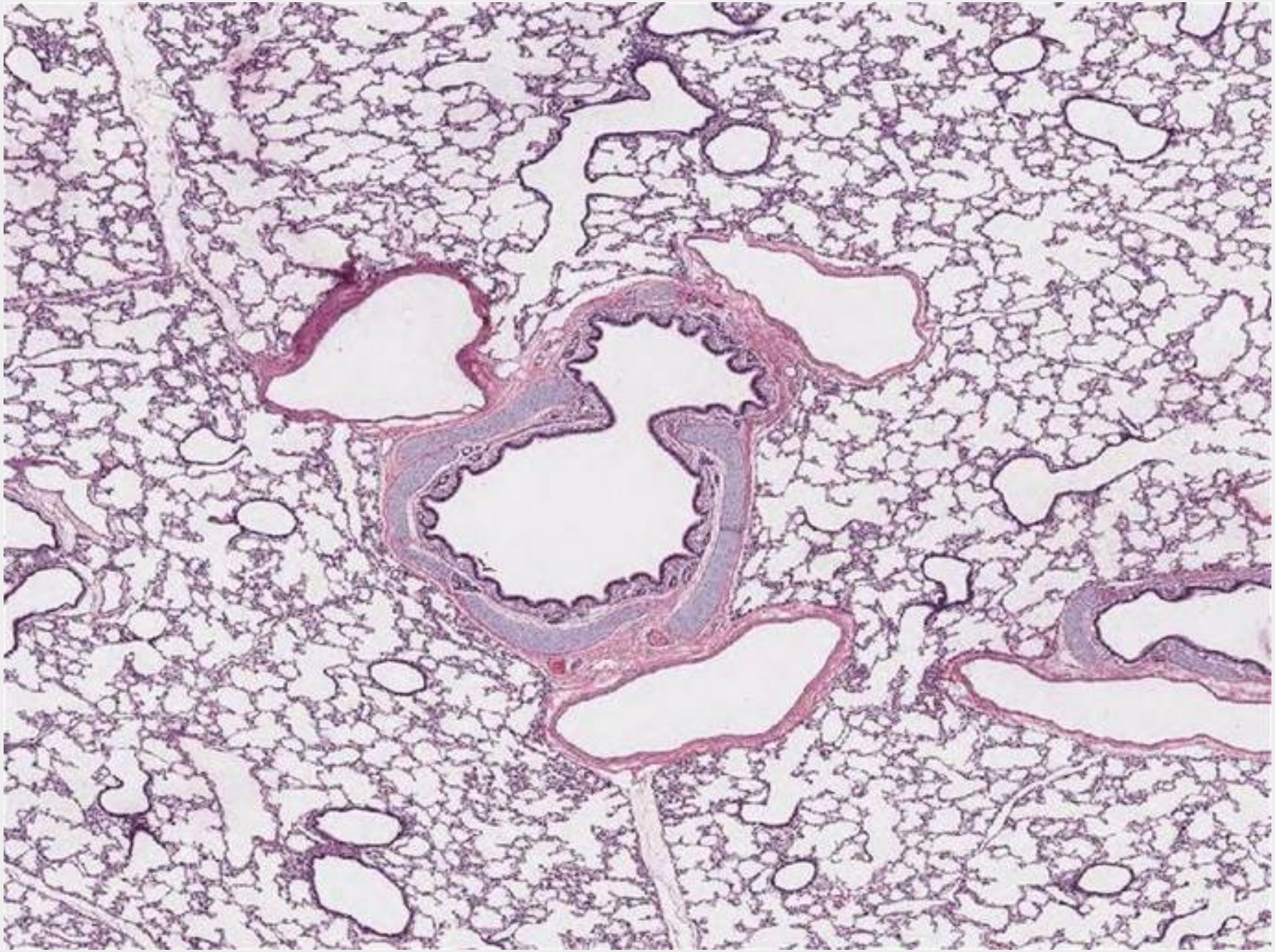


Q01b: Identify 3 main structures.

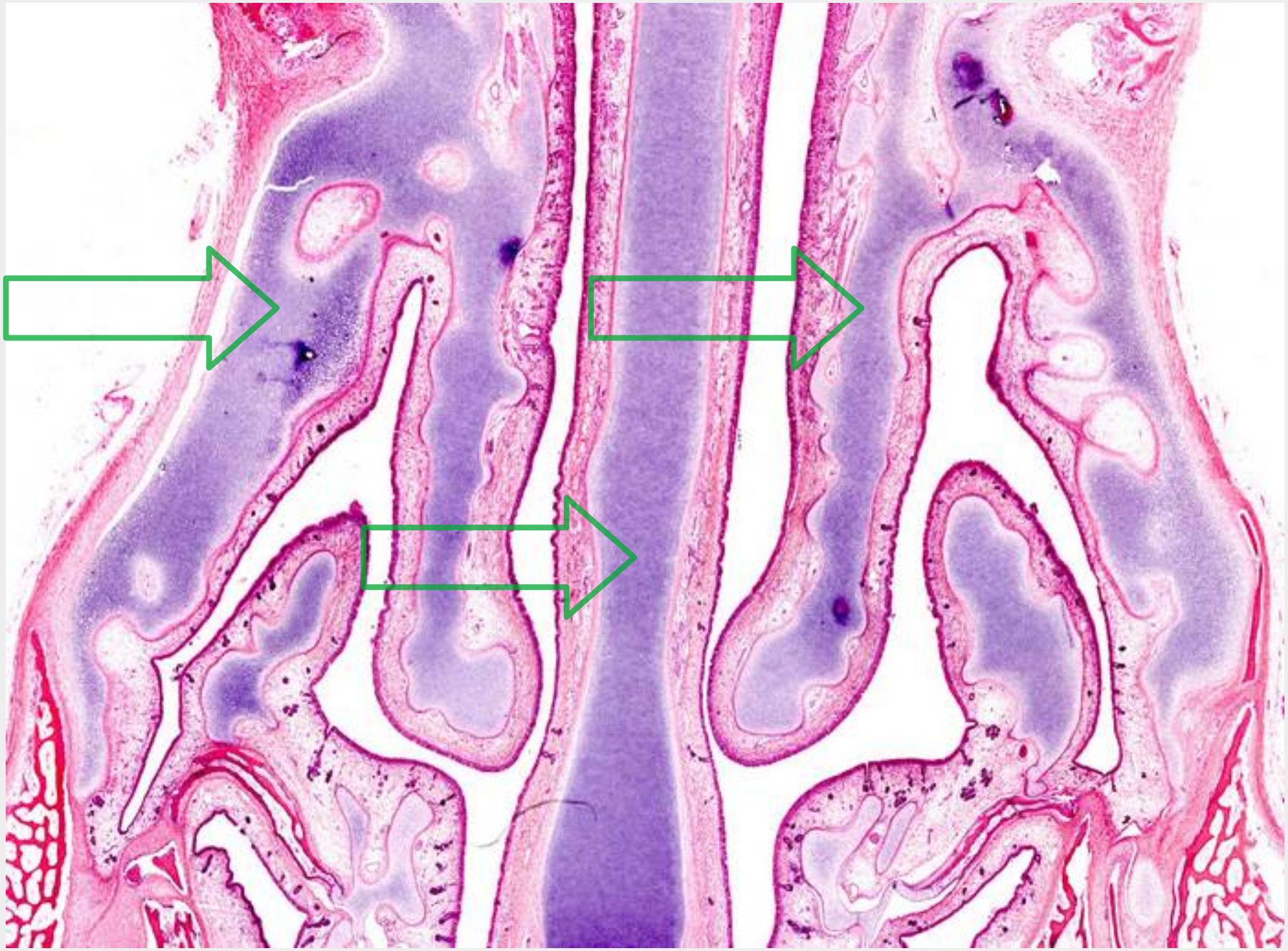
Q02a: Identify the organ/structure



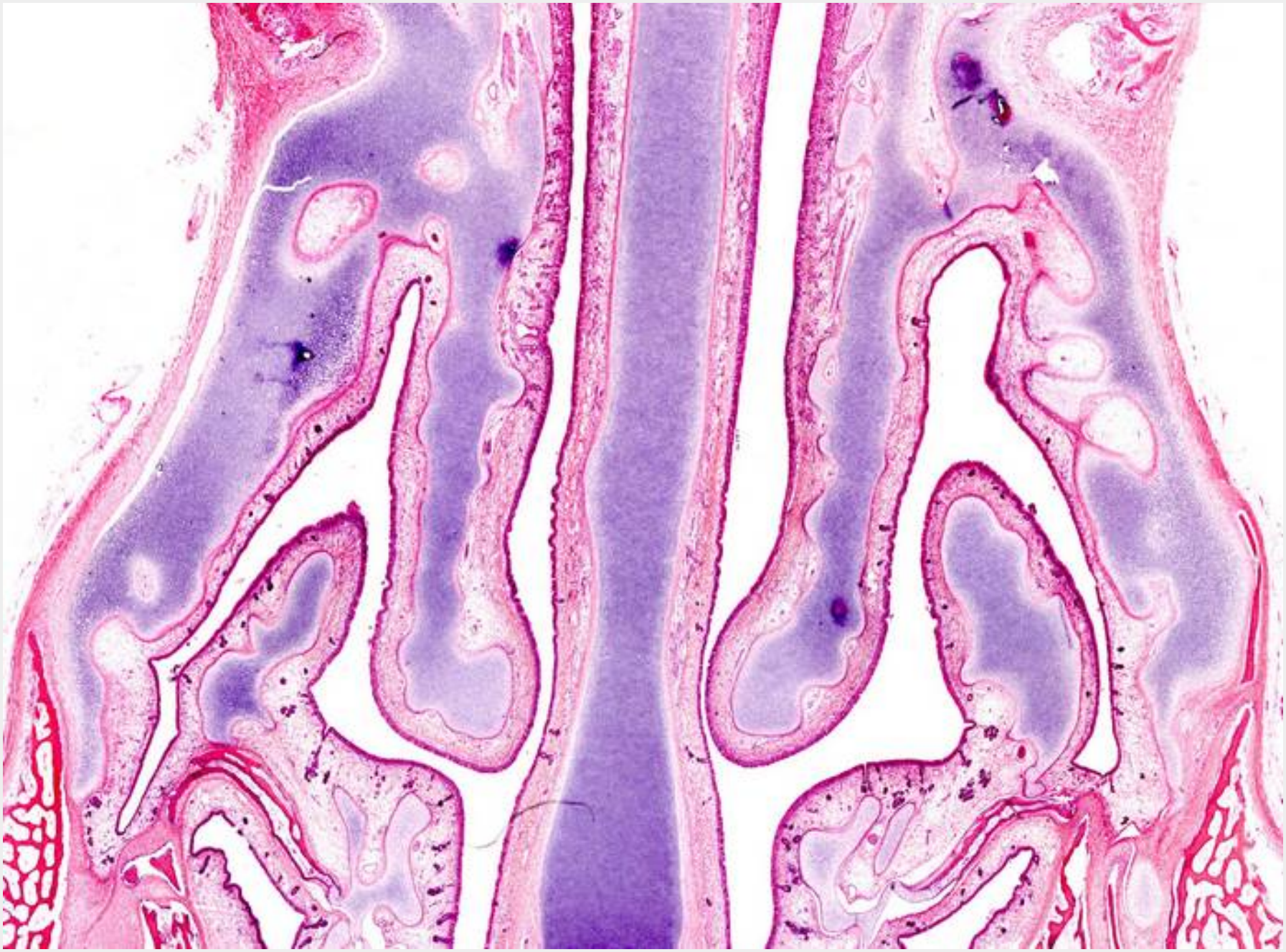
Q02b: Identify the organ.



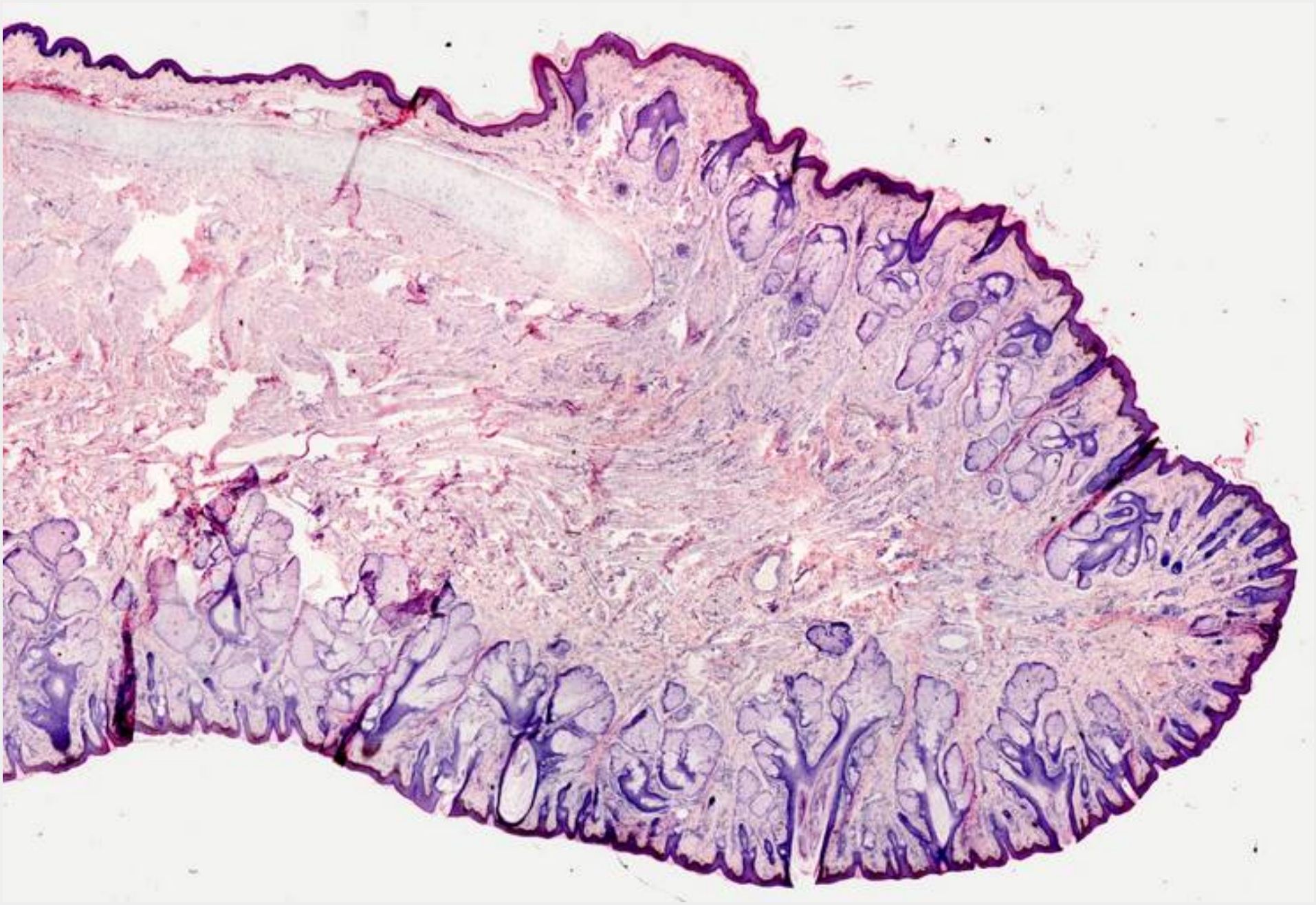
Q03a: Identify the cartilage found in this structure.



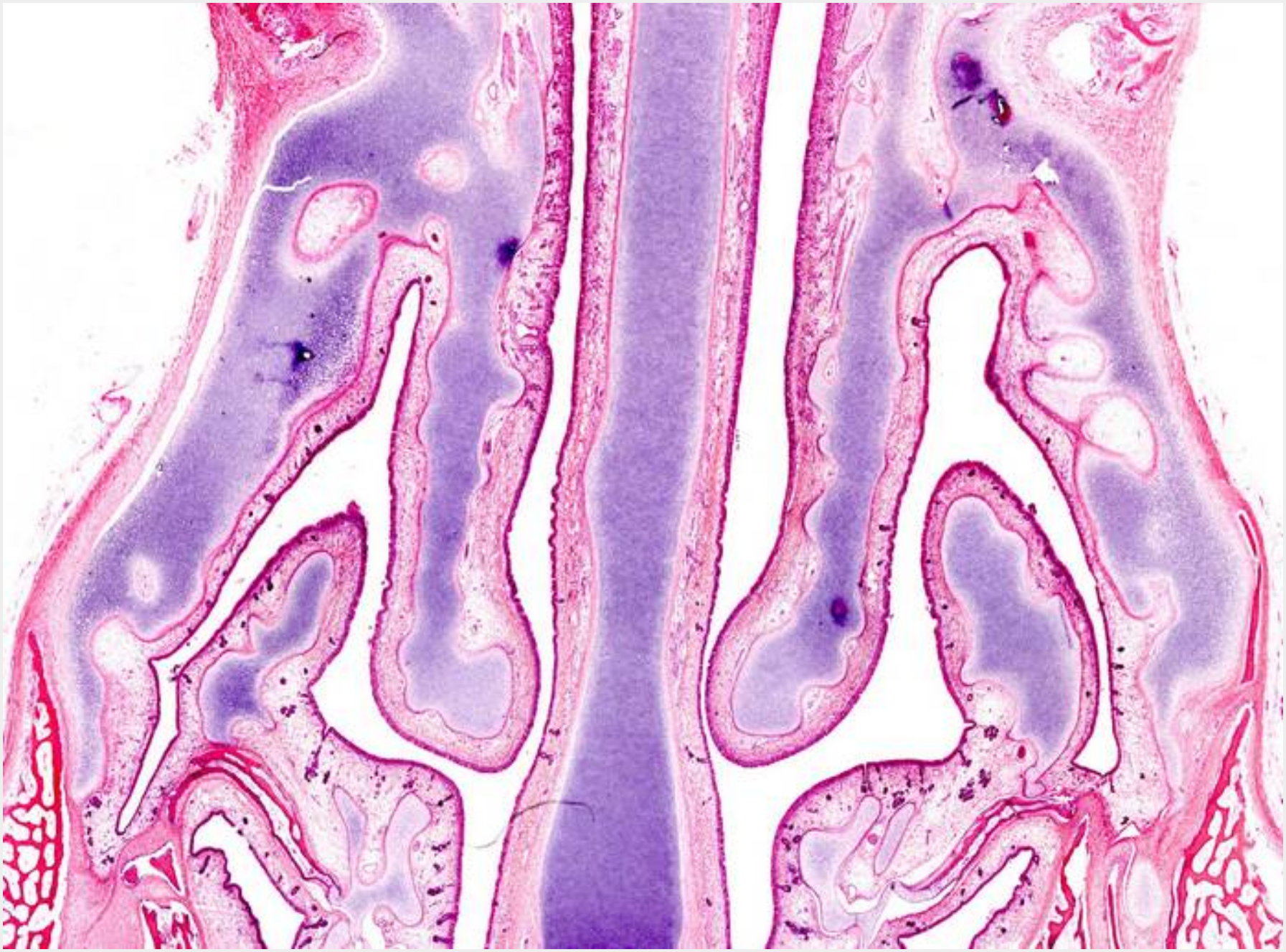
Q03b: Name the 3 types of cartilage.



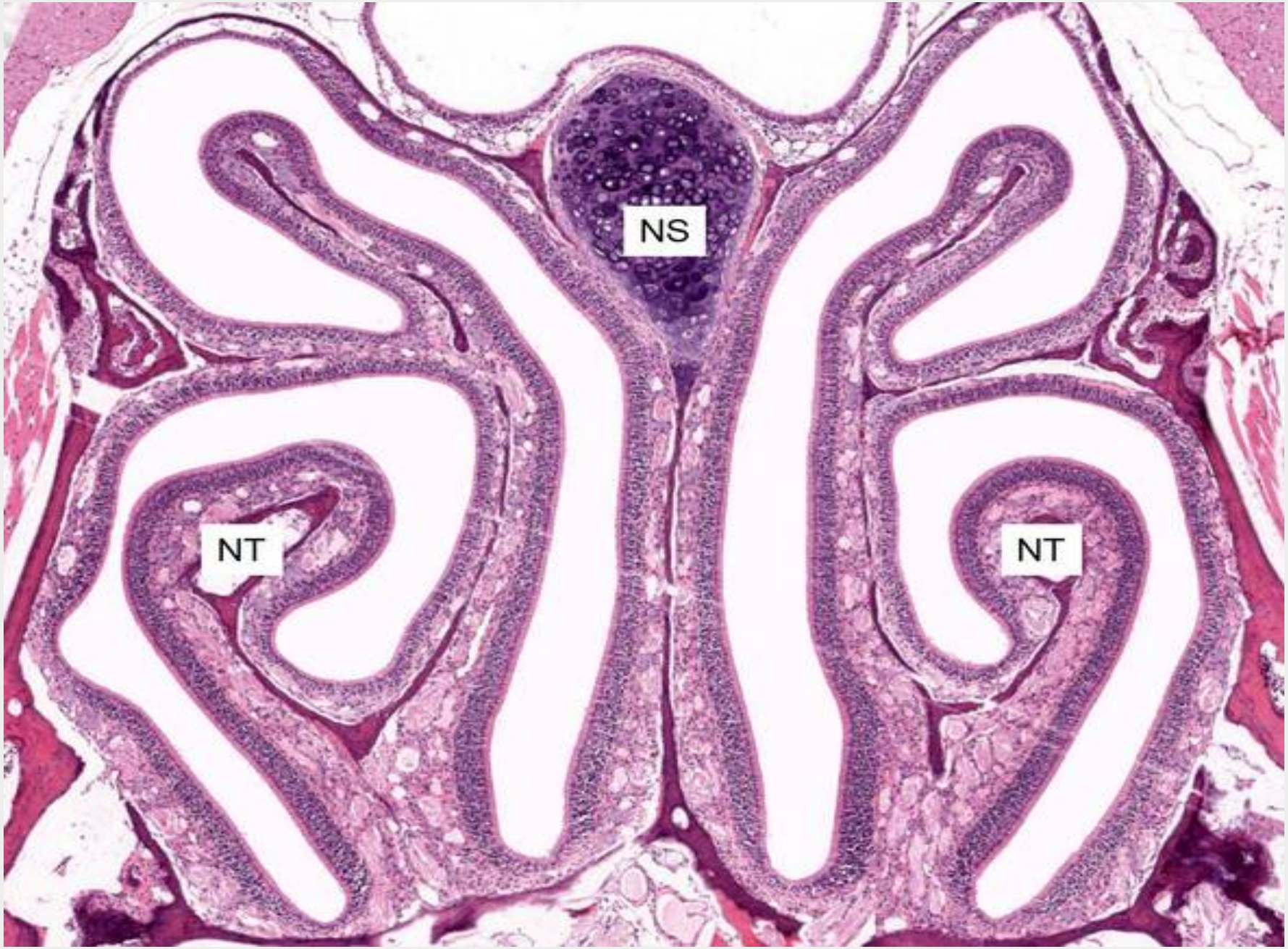
Q04a: Identify the organ/structure



Q05a: Identify the organ/structure



Q05b: Identify the structure.



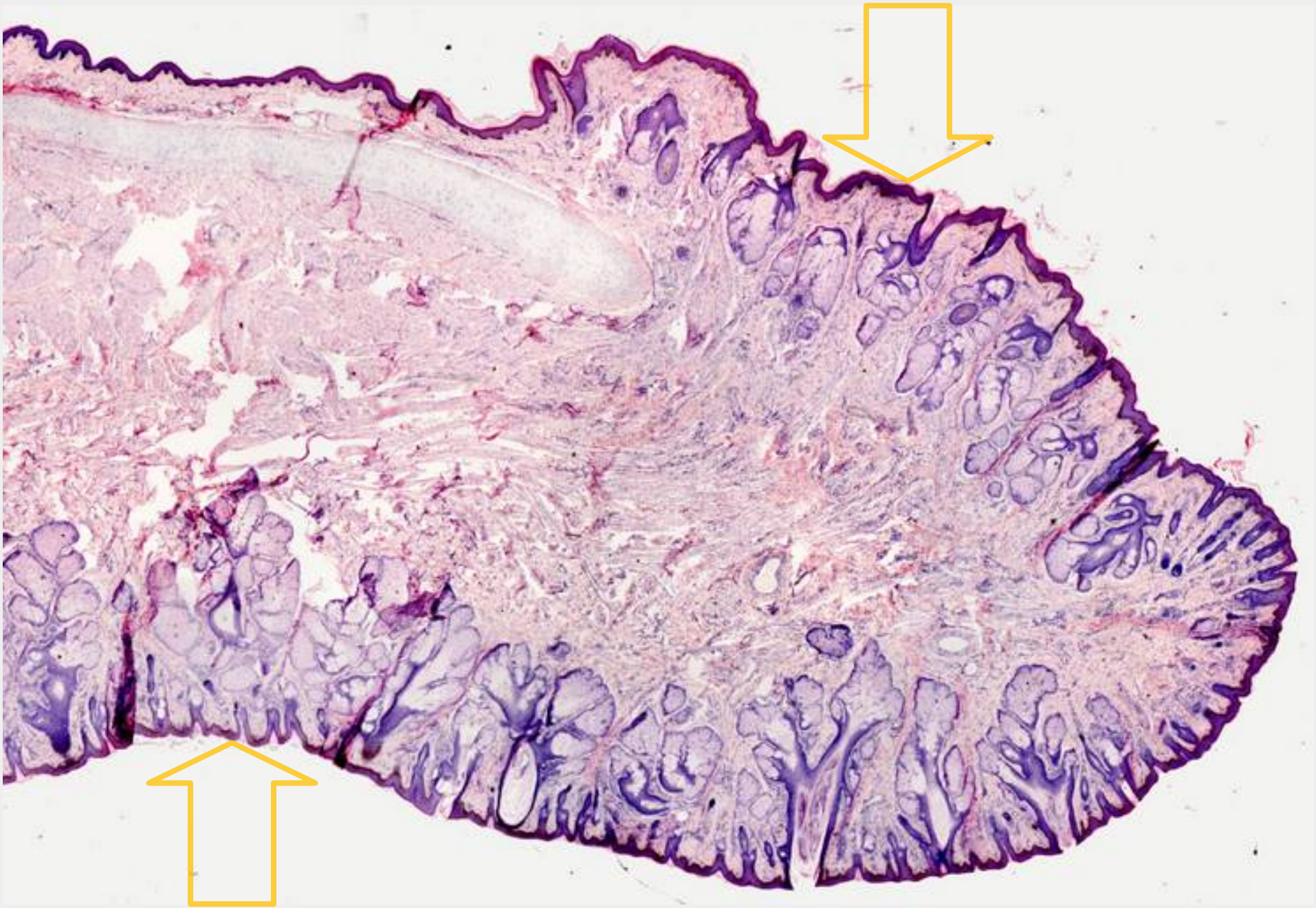
Q06a: What is the difference between the inside and outside epithelium of this structure?

Q06b: Name the two epithelia of the epiglottis.

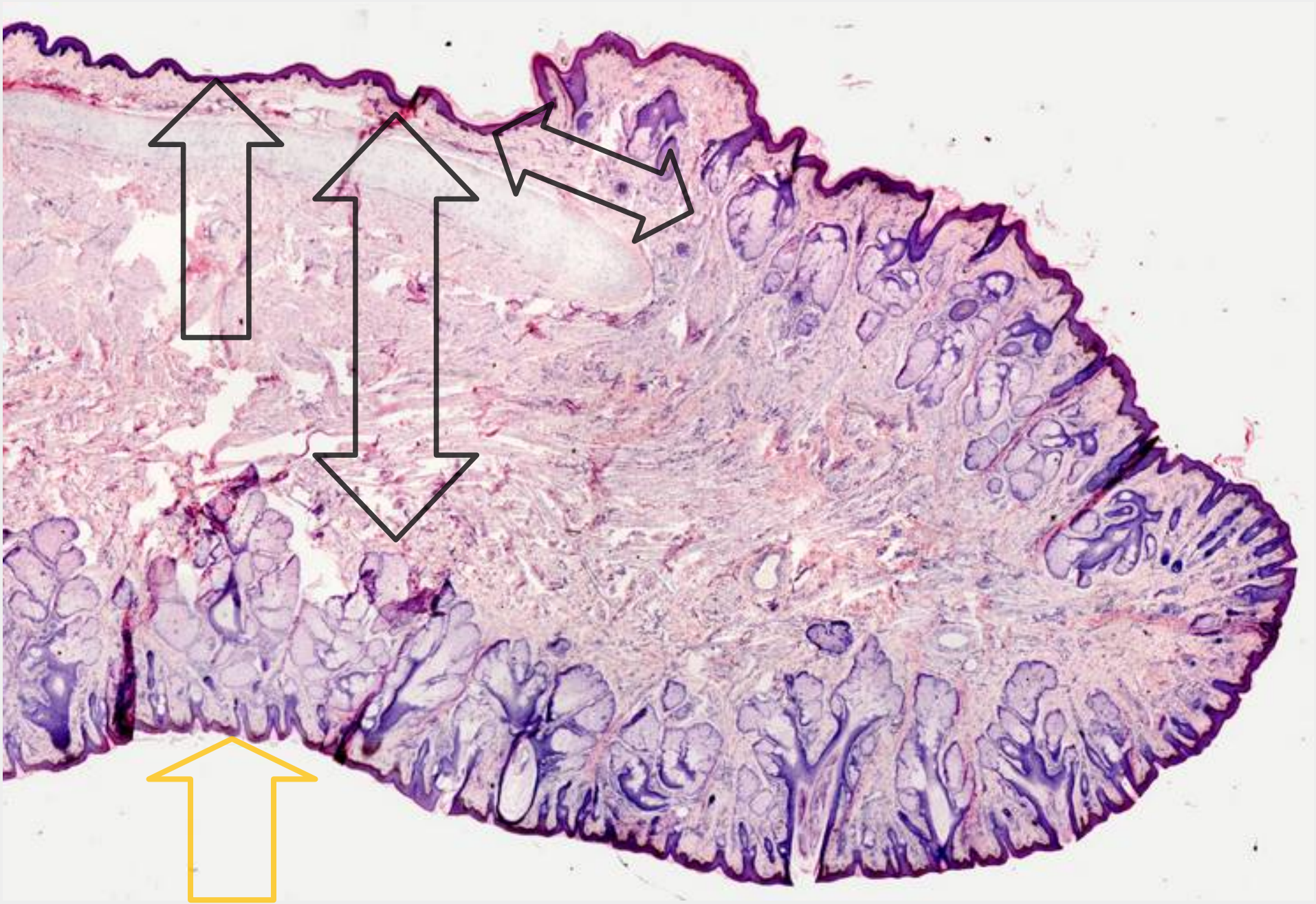
Q07a: What structures keeps the trachea open?

Q07b: Identify the cartilage found in this structure.

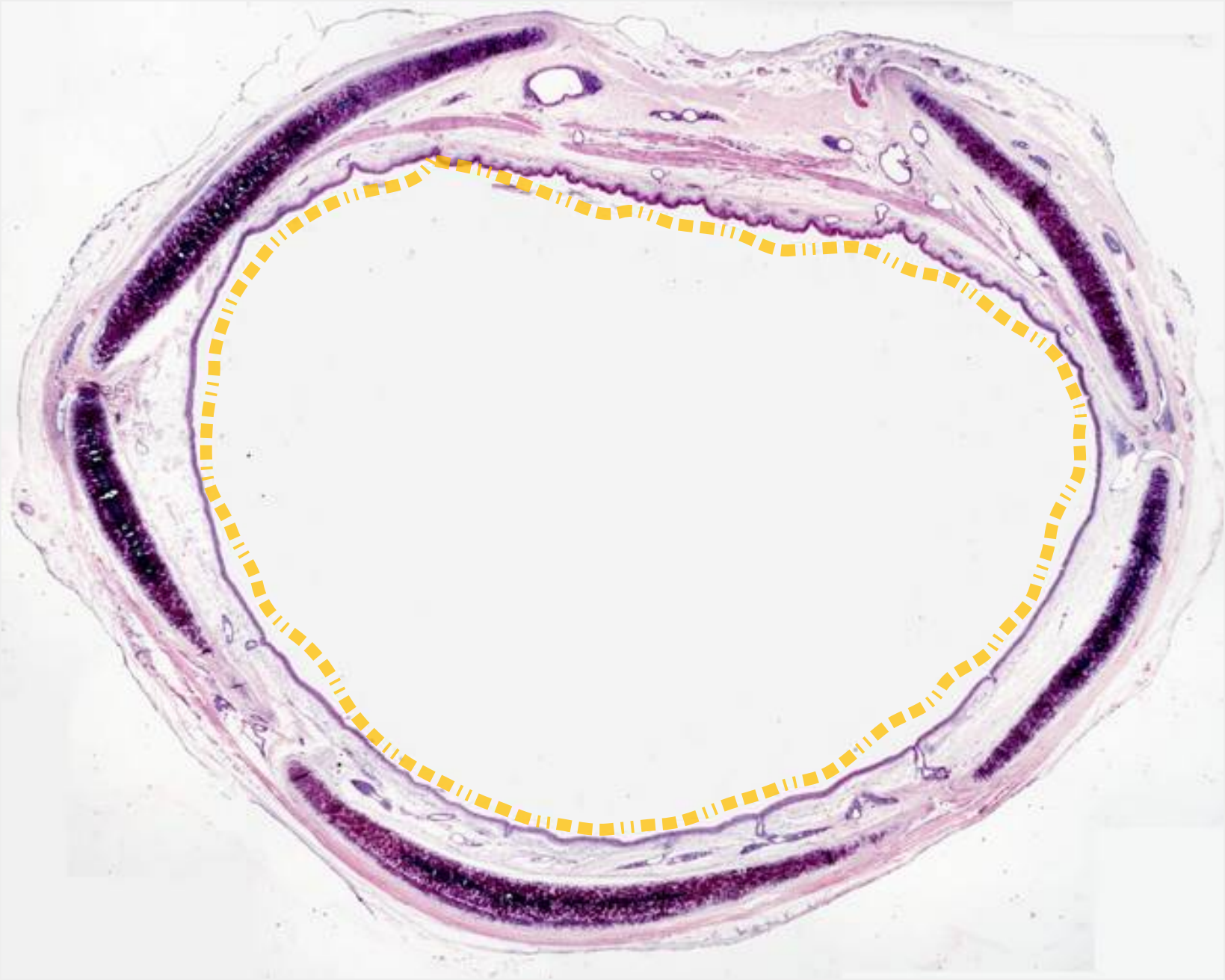
Q08a: What is the difference between the inside and outside epithelium of this structure?



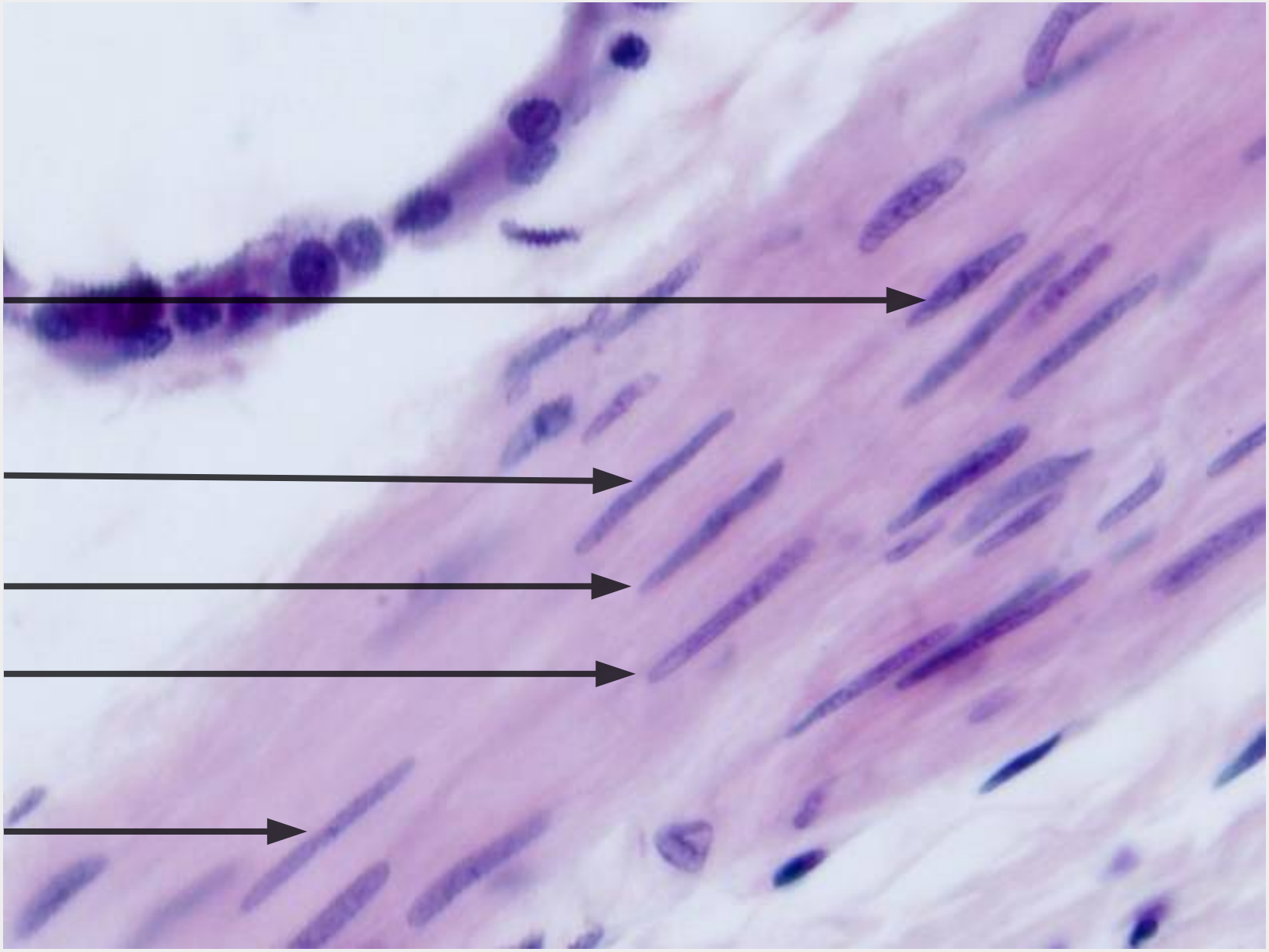
Q08b: List 3 transitions from outside to inside in the nostril.



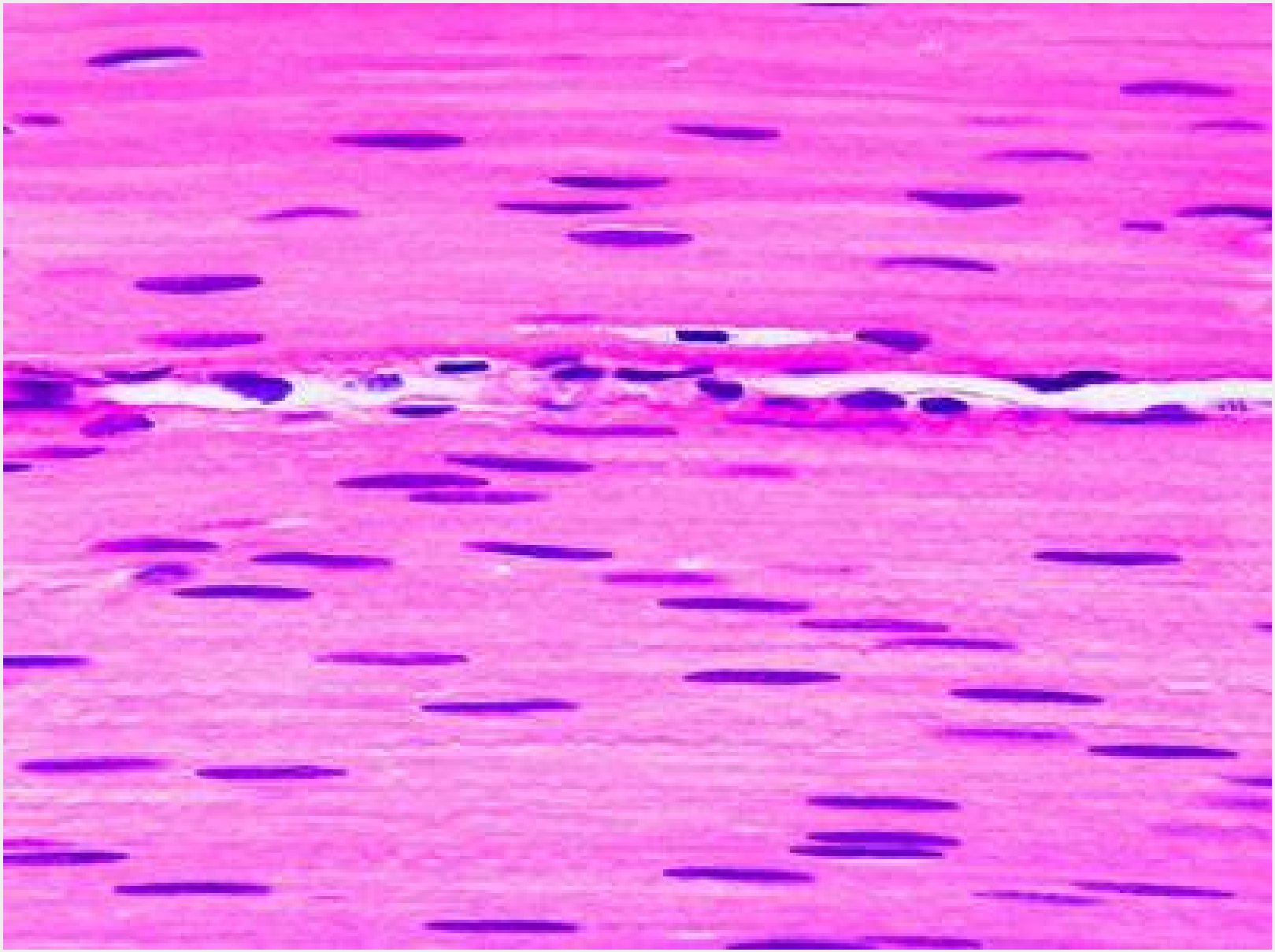
Q09a: List the 4 cells found in the epithelium lining this structure.



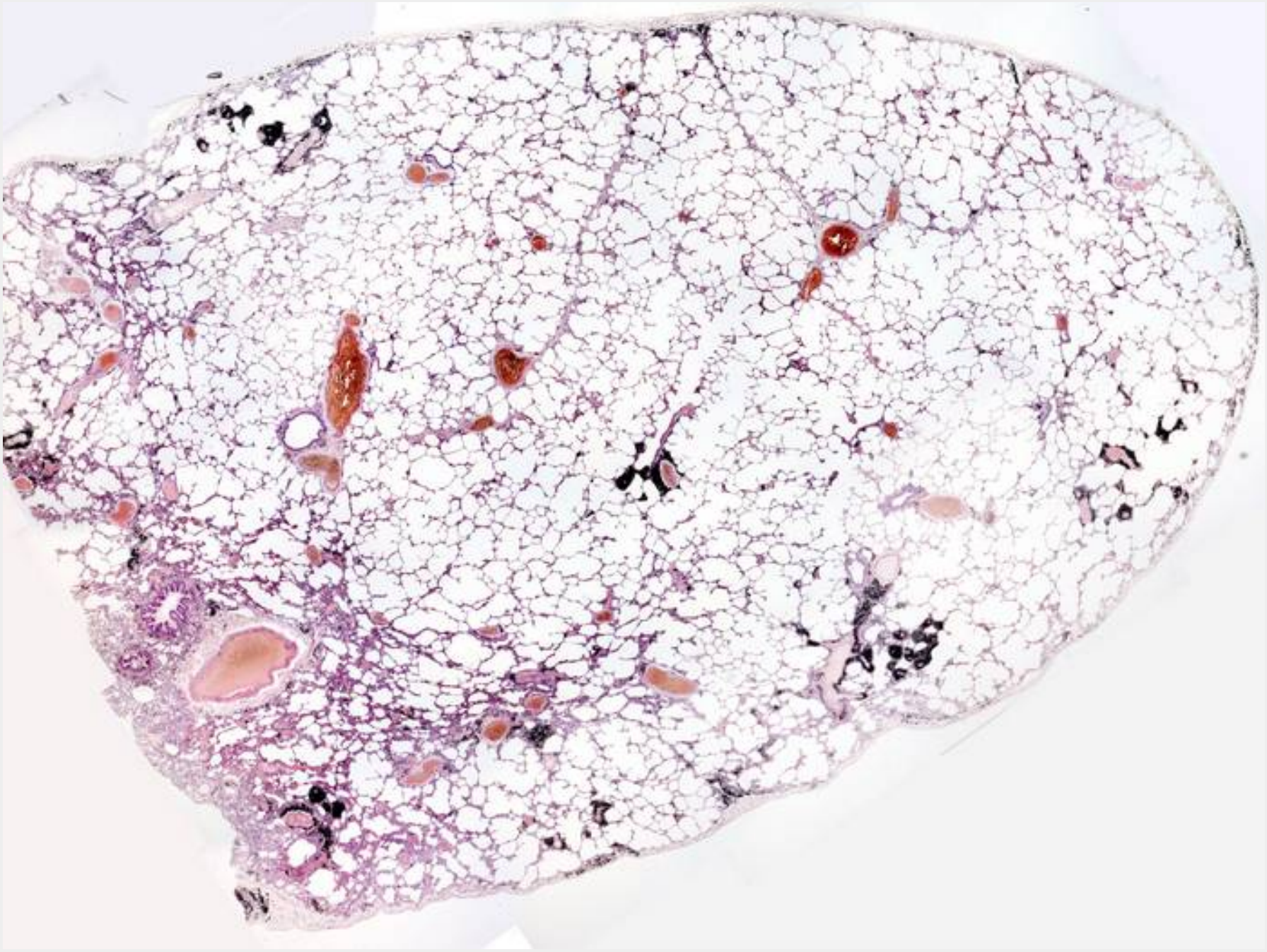
Q10a: Identify the contractile cells:



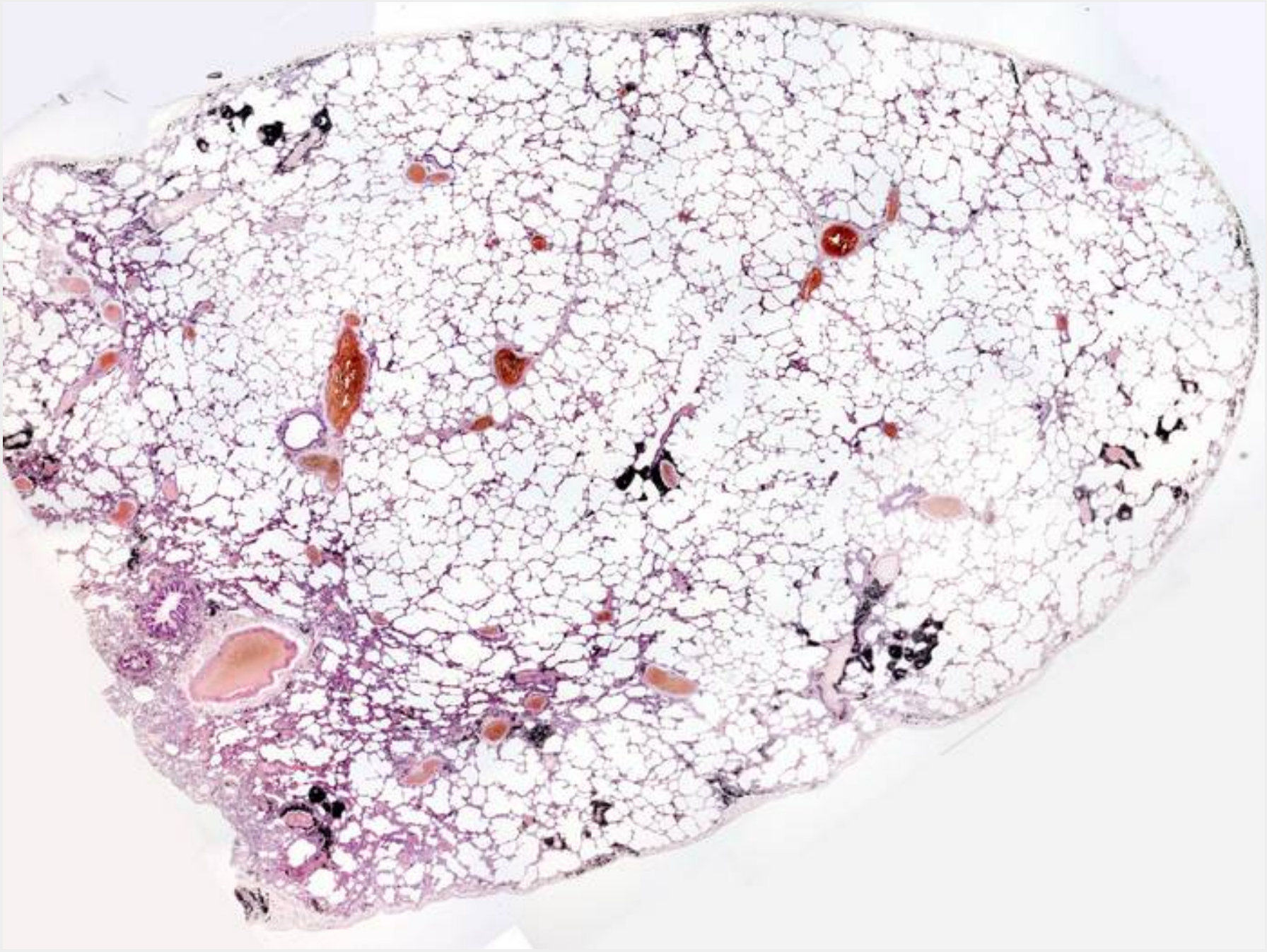
Q10b: What is typical of smooth muscle fibers?



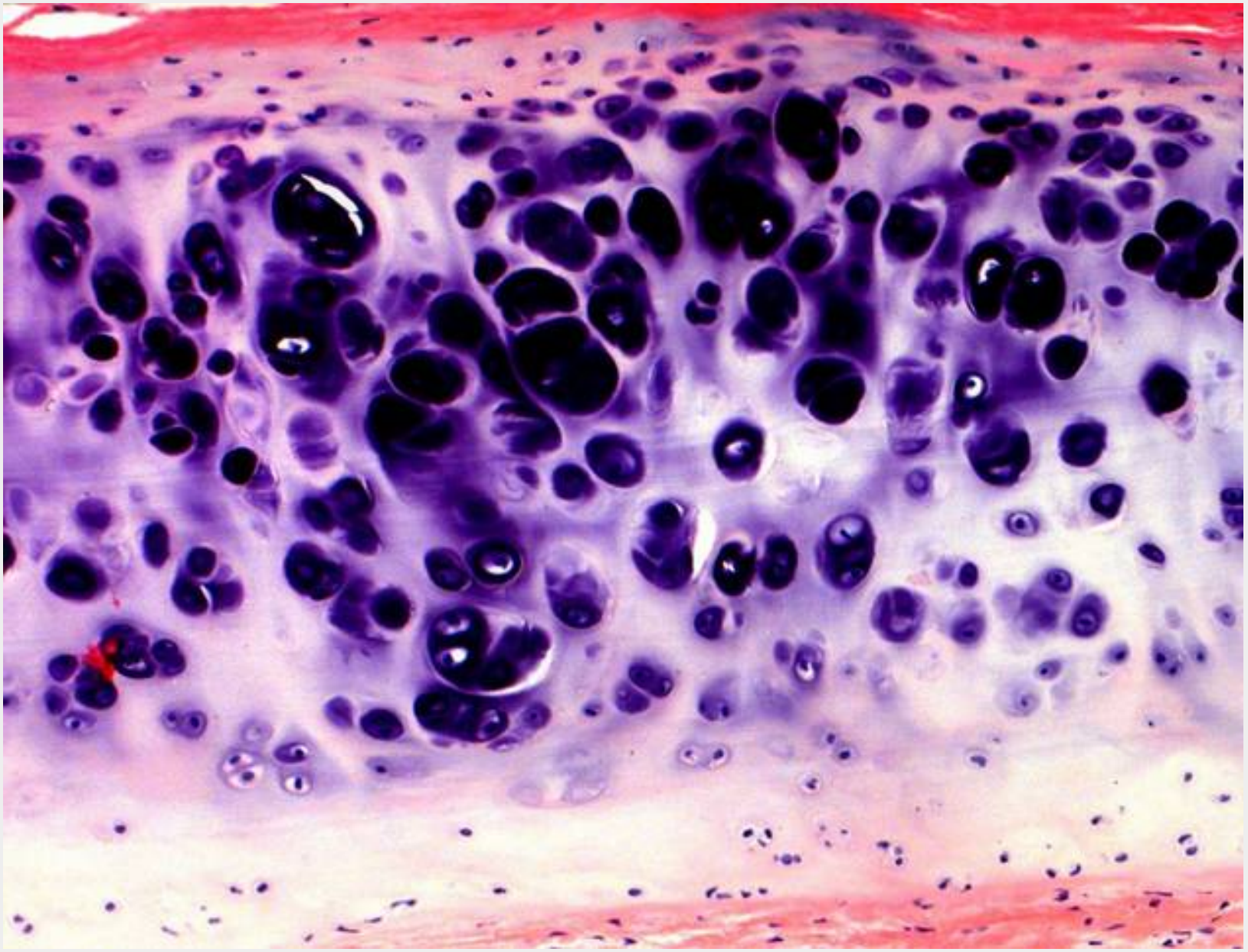
Q11a: Give a classification of blood vessel epithelium.



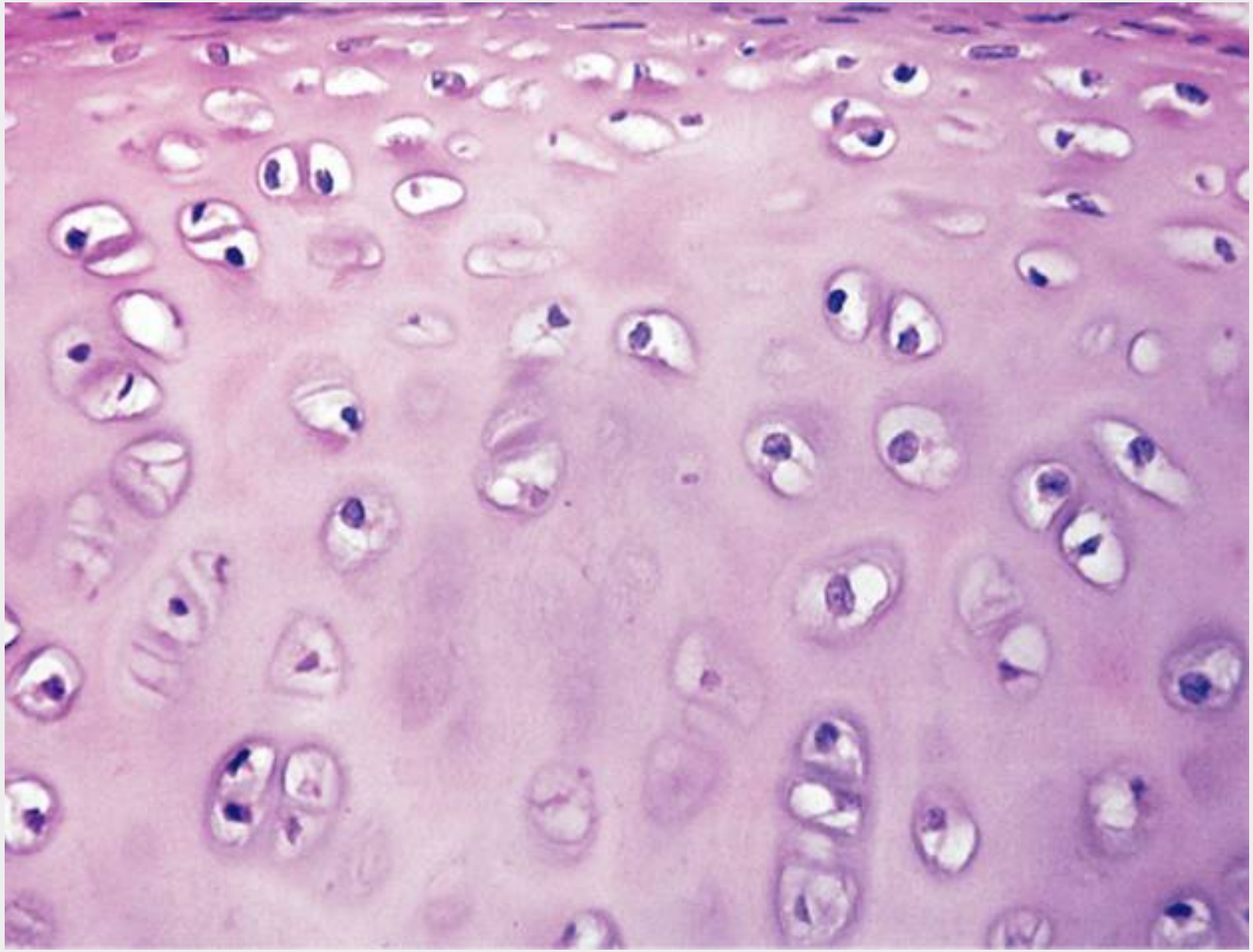
Q11b: Identify the dominant epithelium found in this organ.



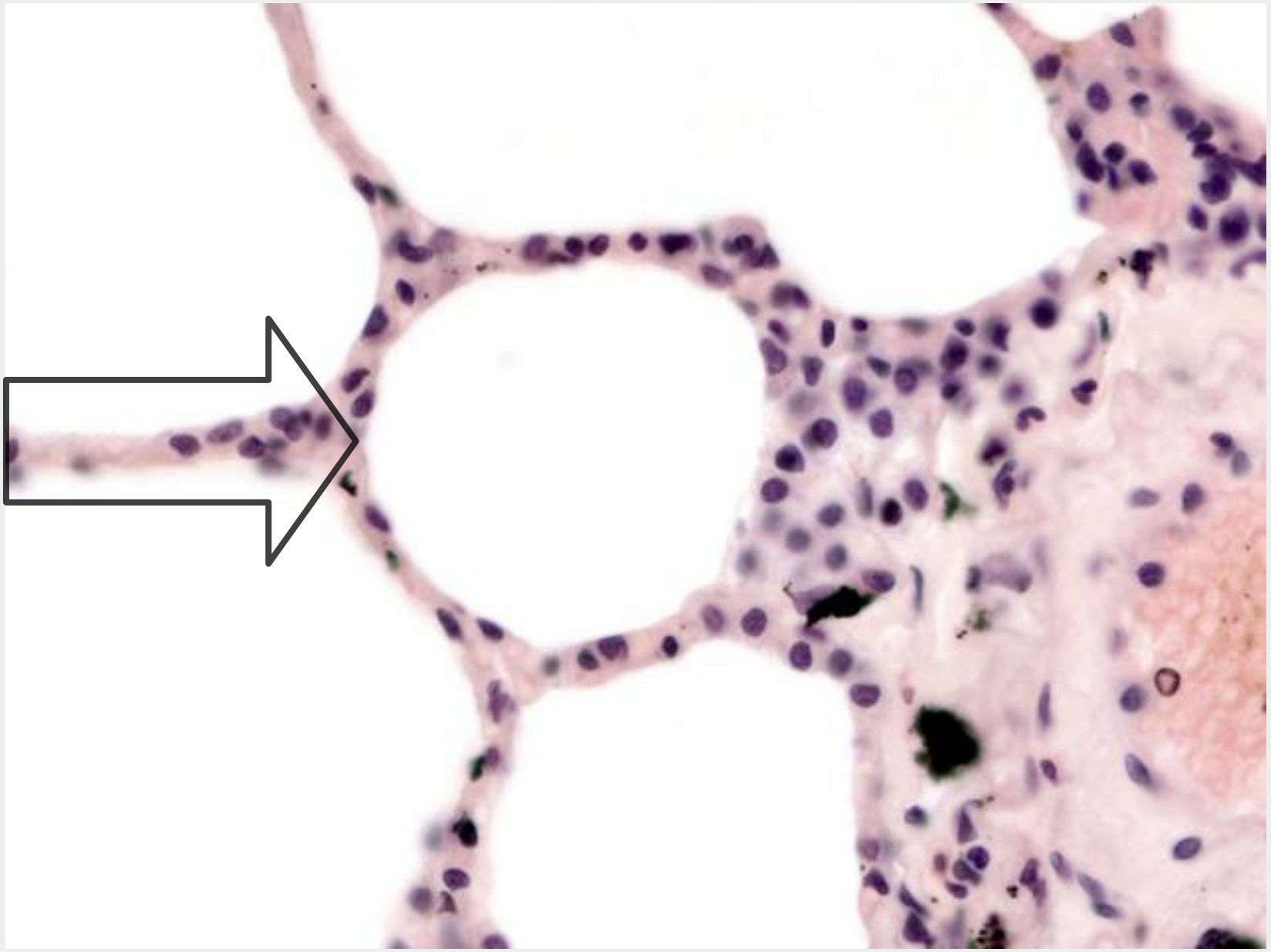
Q12a: Identify the tissue.



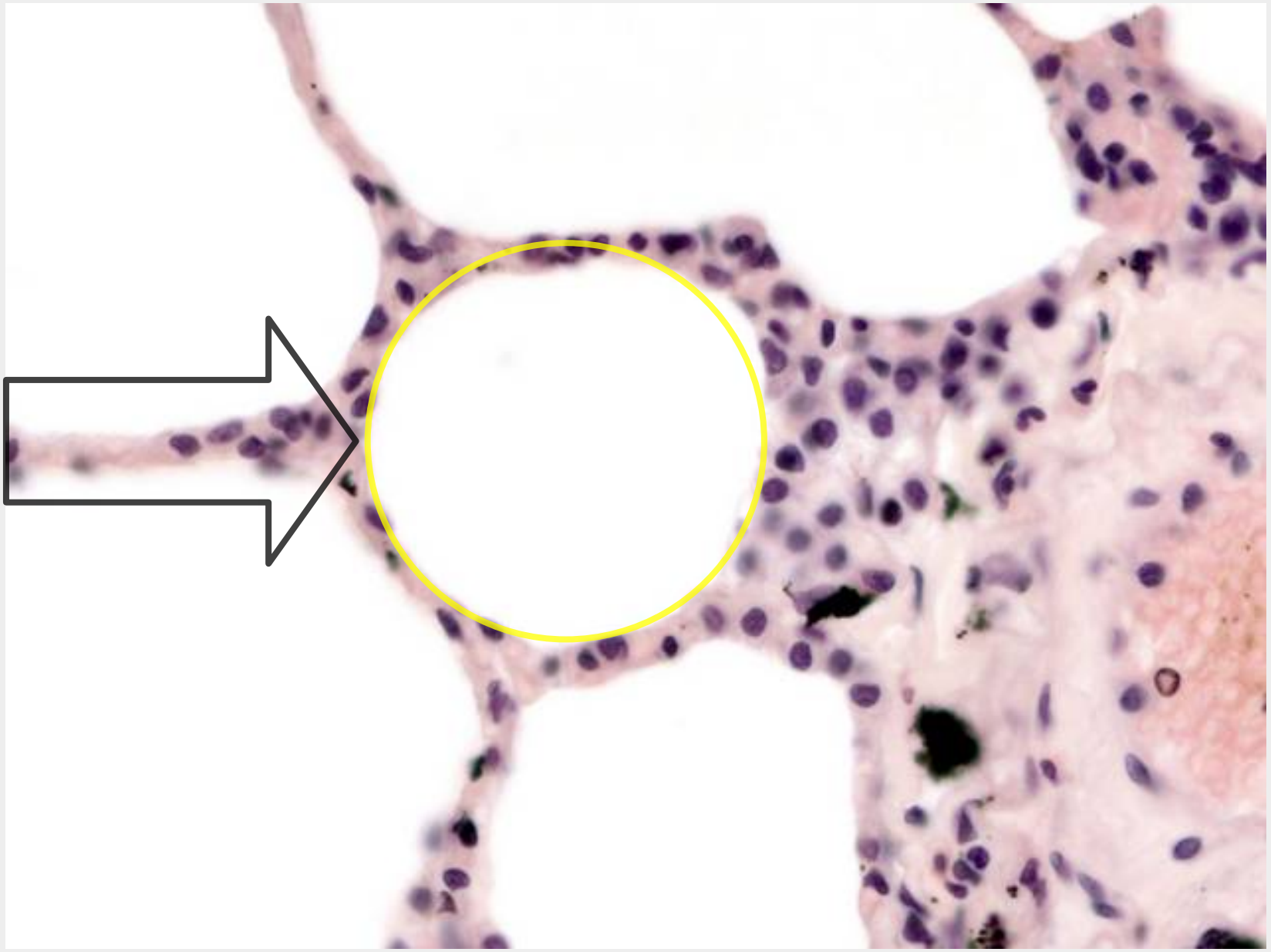
Q12b: Identify the tissue.



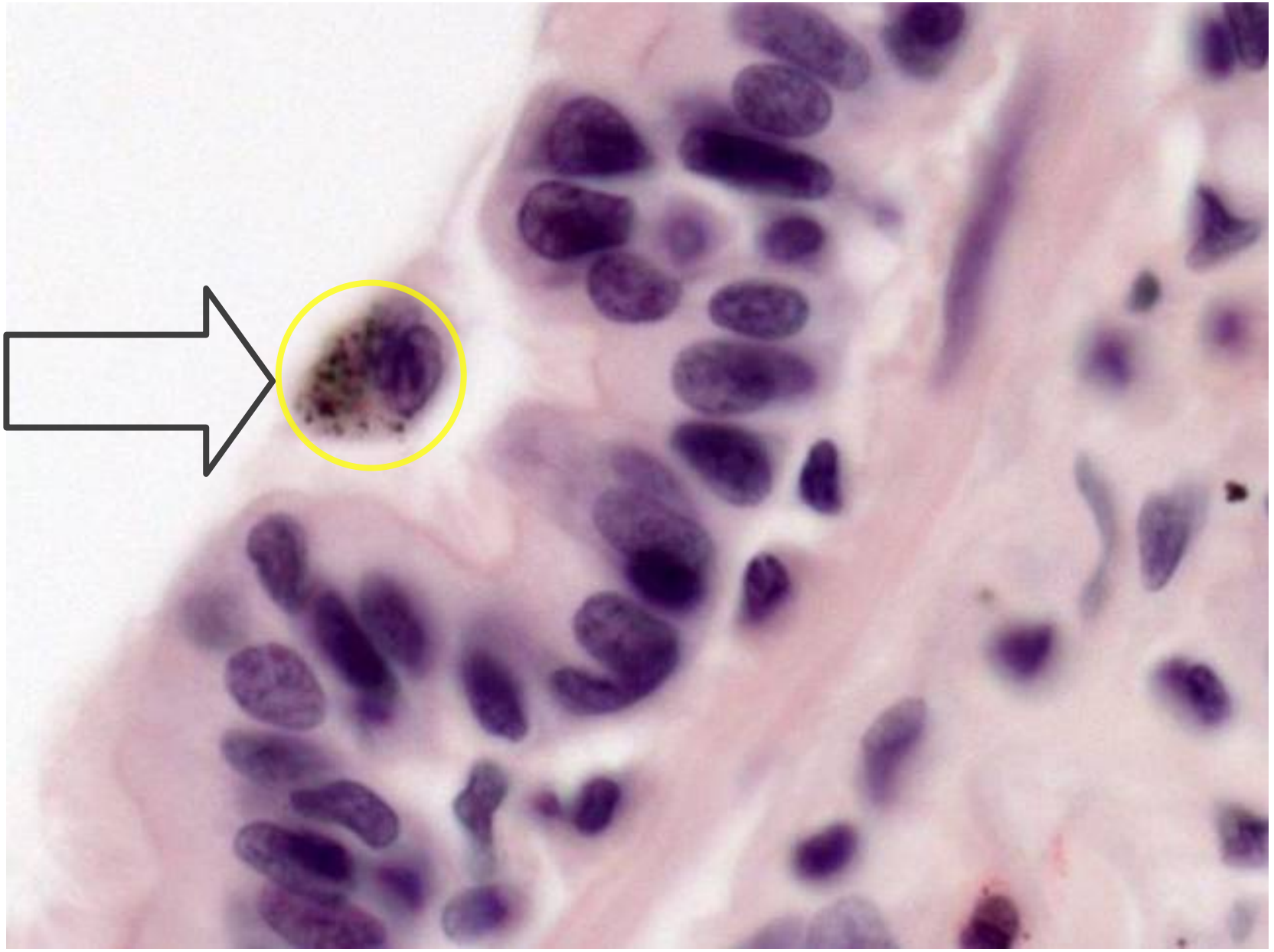
Q13a: In what structure does gas exchange take place?



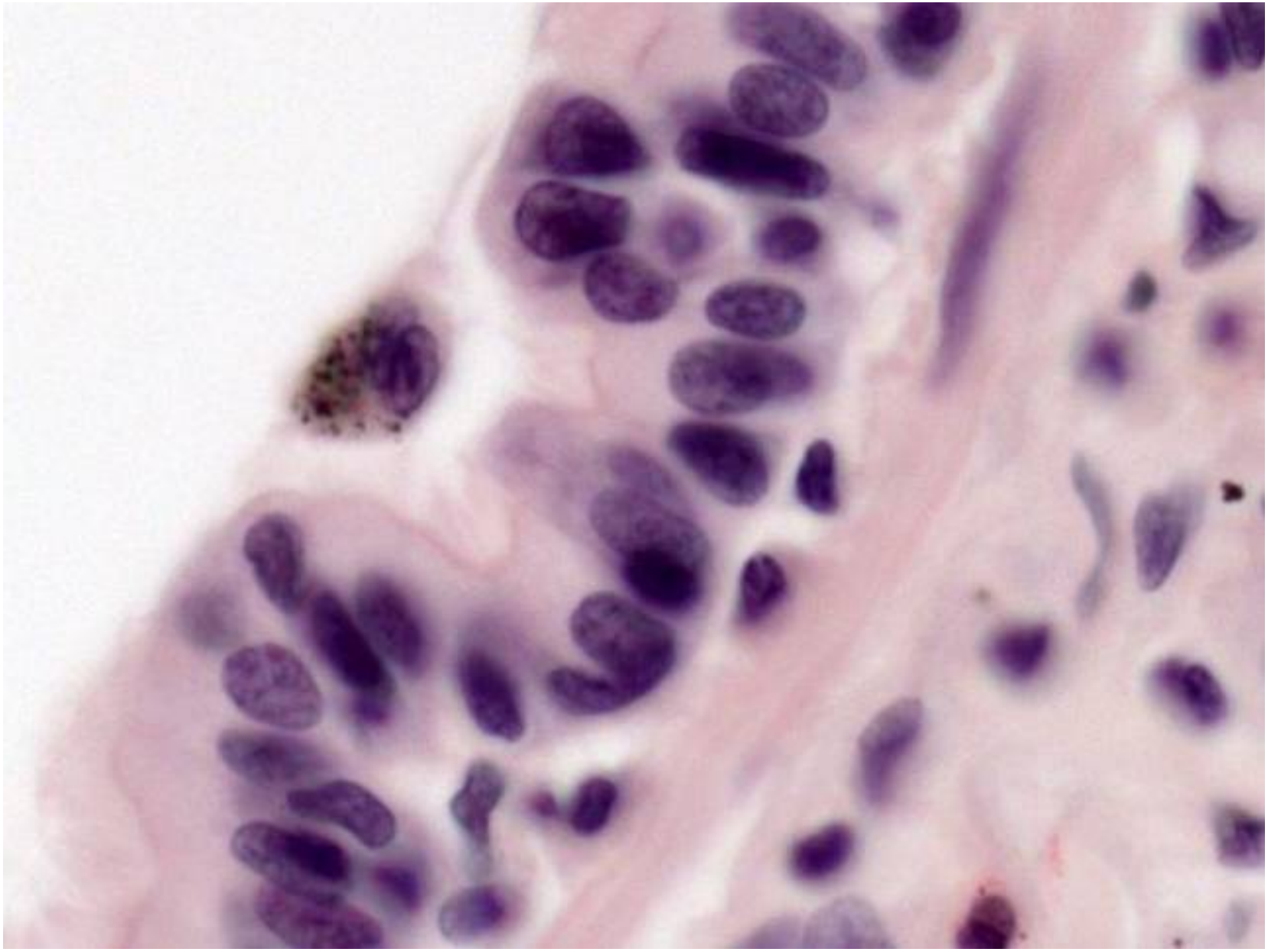
Q13b: Identify the indicated structure:



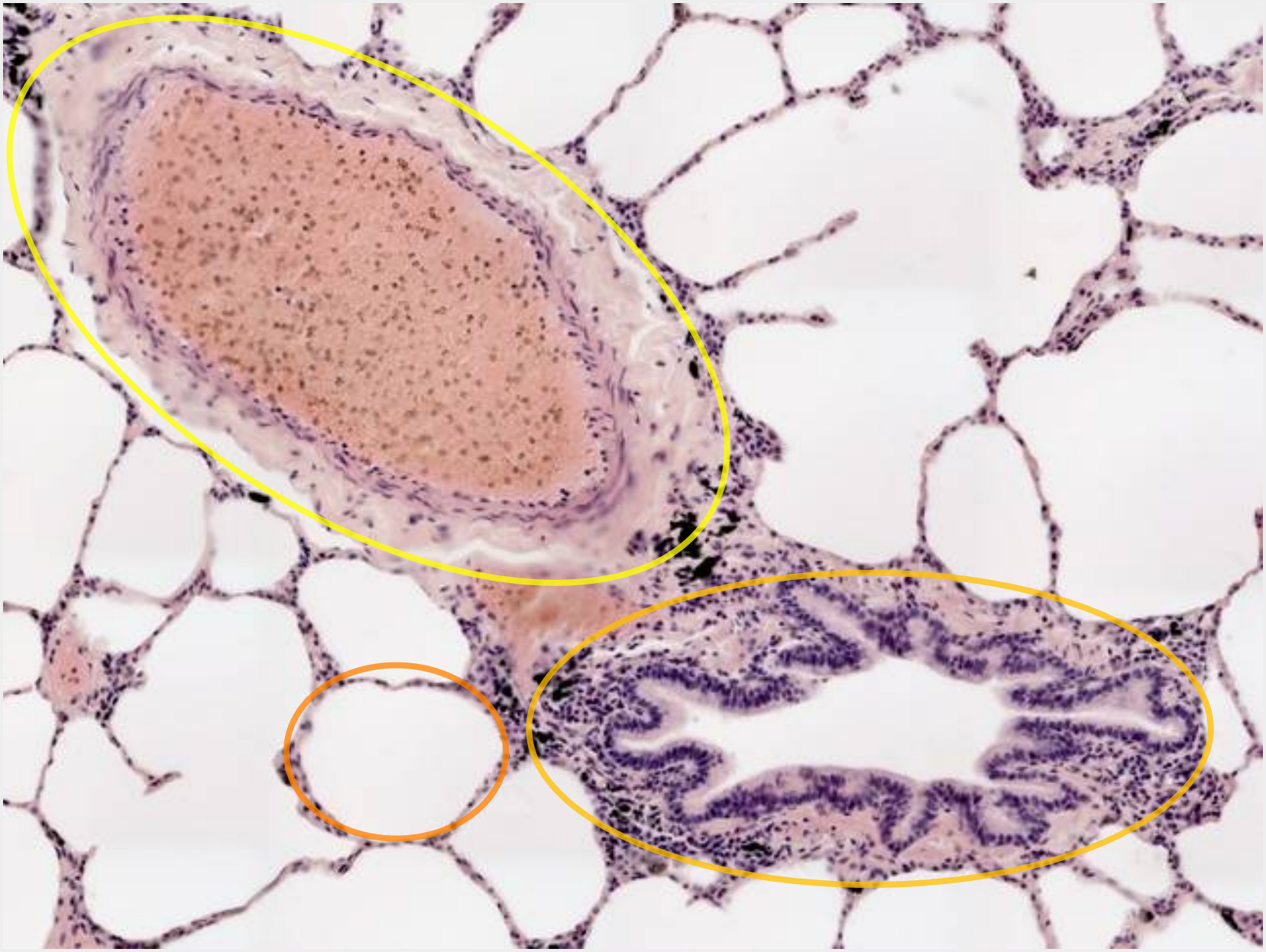
Q14a: Identify the indicated cell:



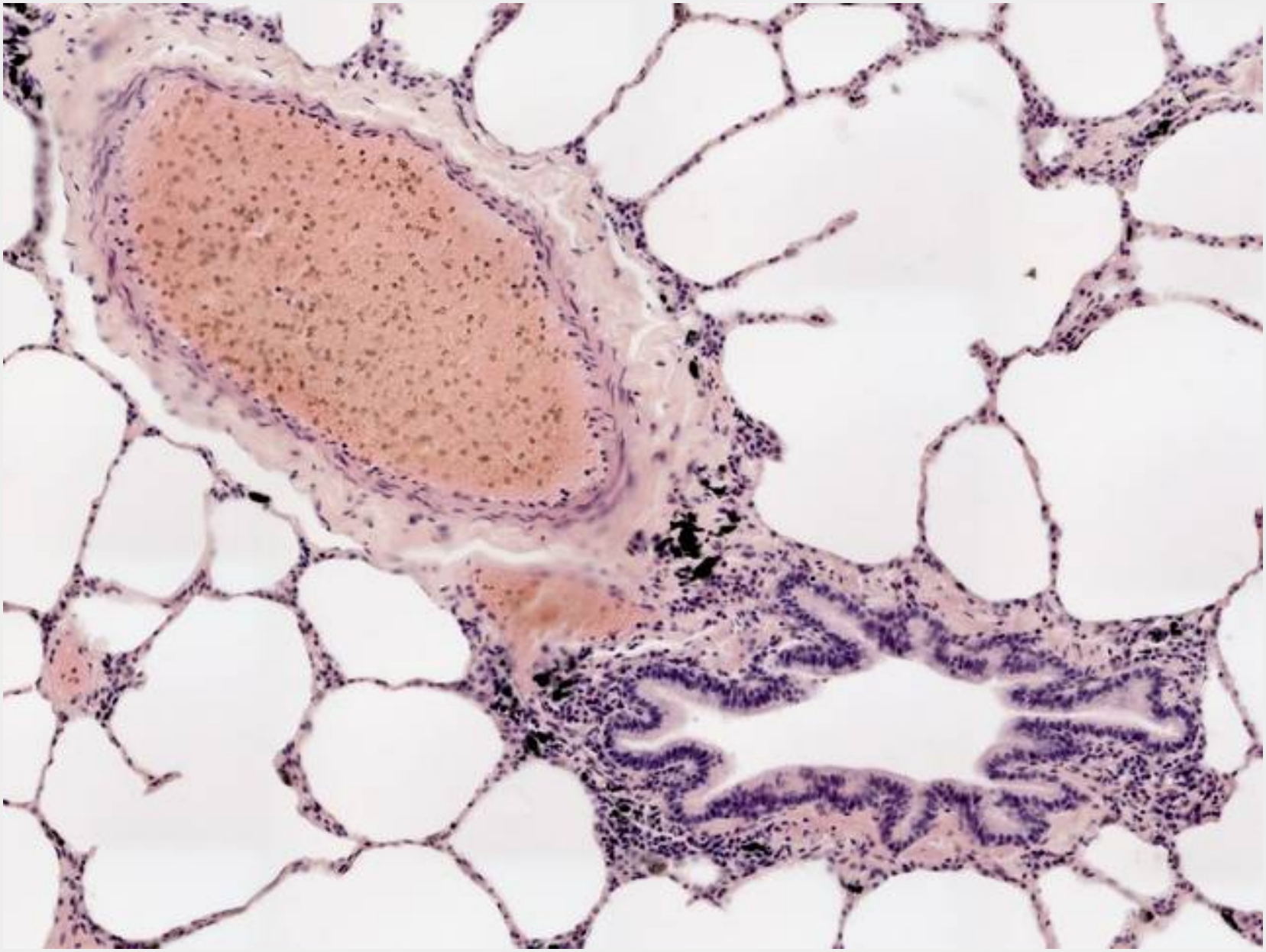
Q14b: Name the immune cell found in the airways.



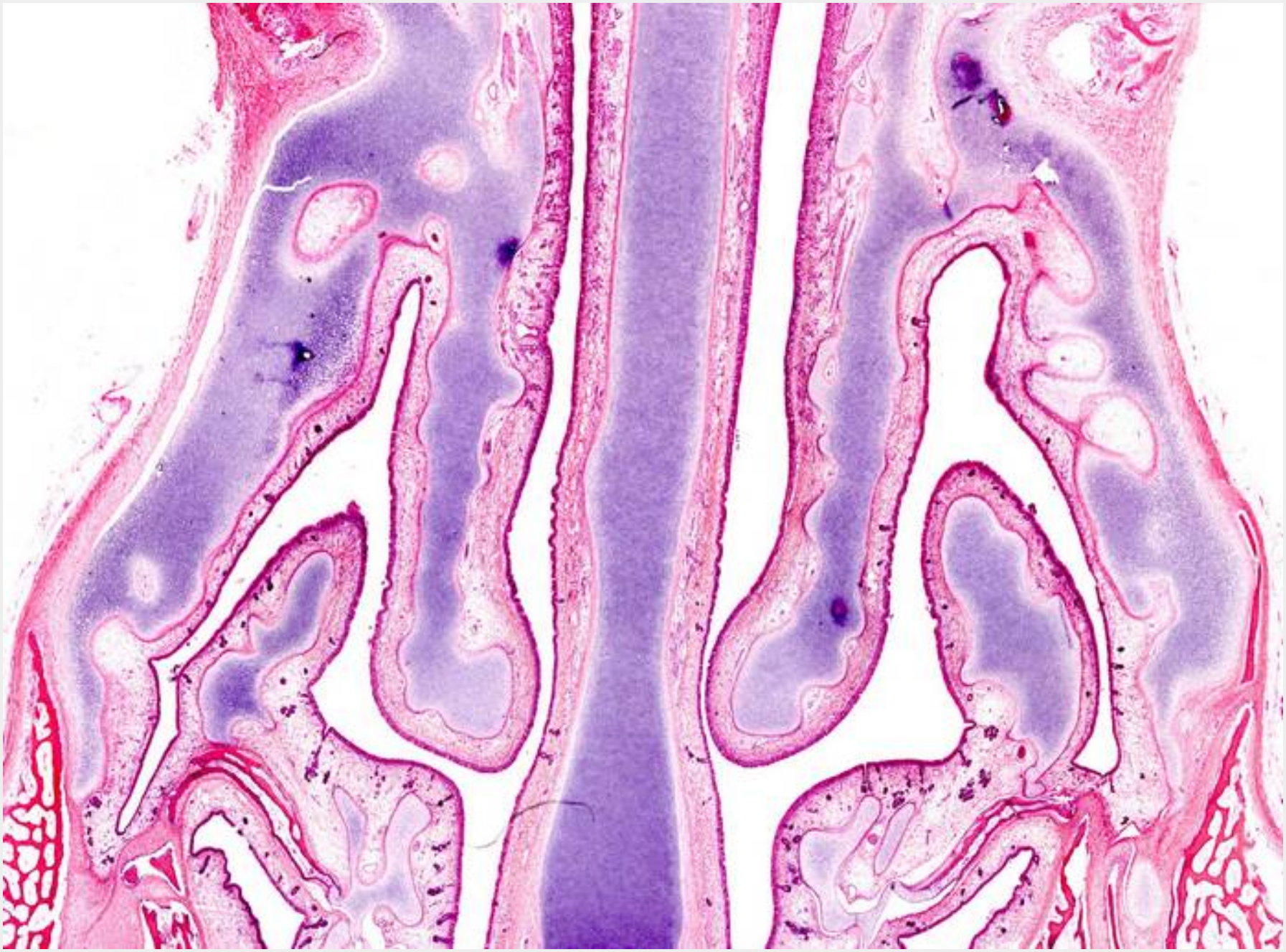
Q15a: Identify the 3 structures on the slide:



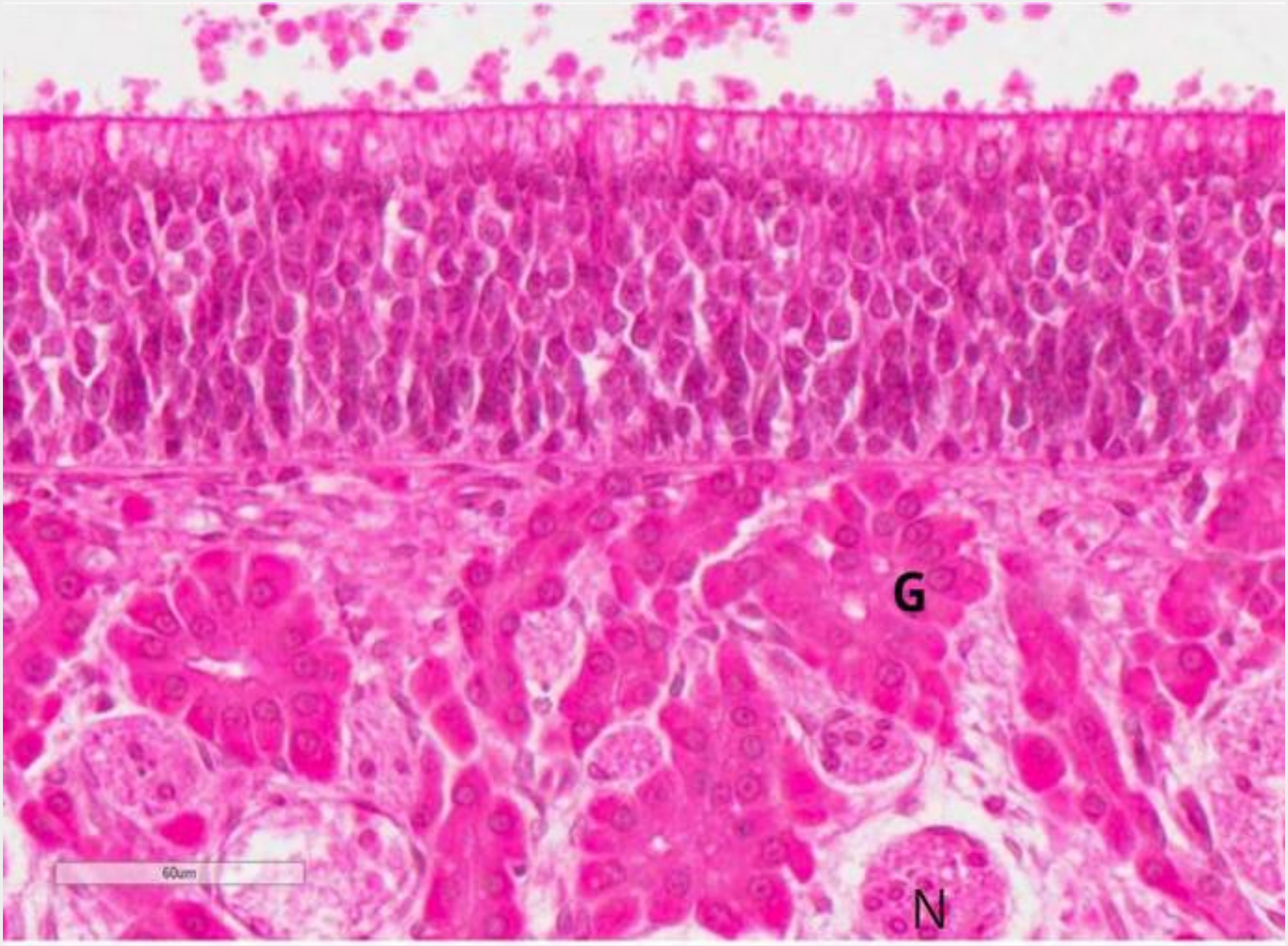
Q15b: Name 4 major structures found in the lung.



Q16a: Identify the epithelium lining this structure.

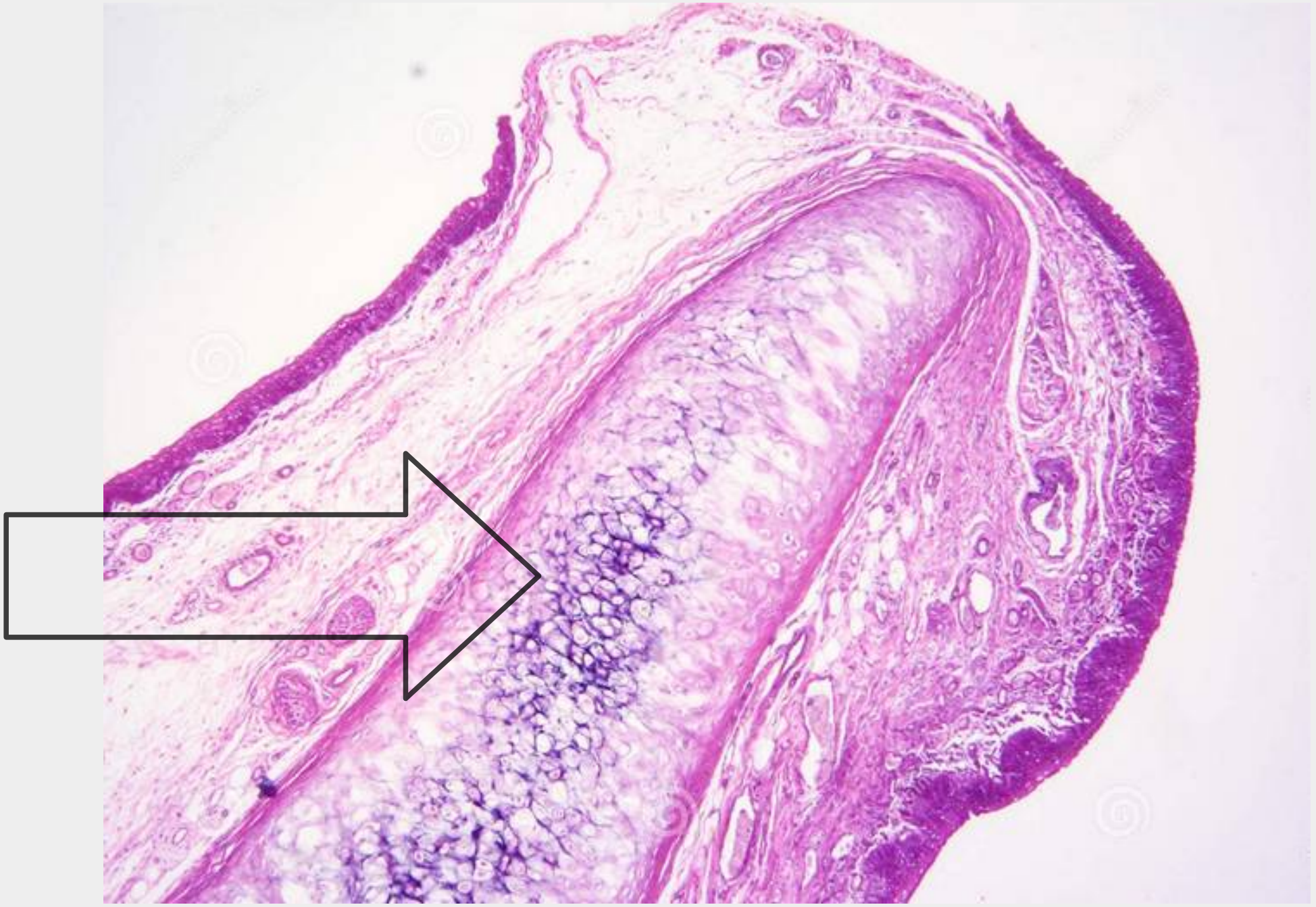


Q16b: Identify the epithelium.

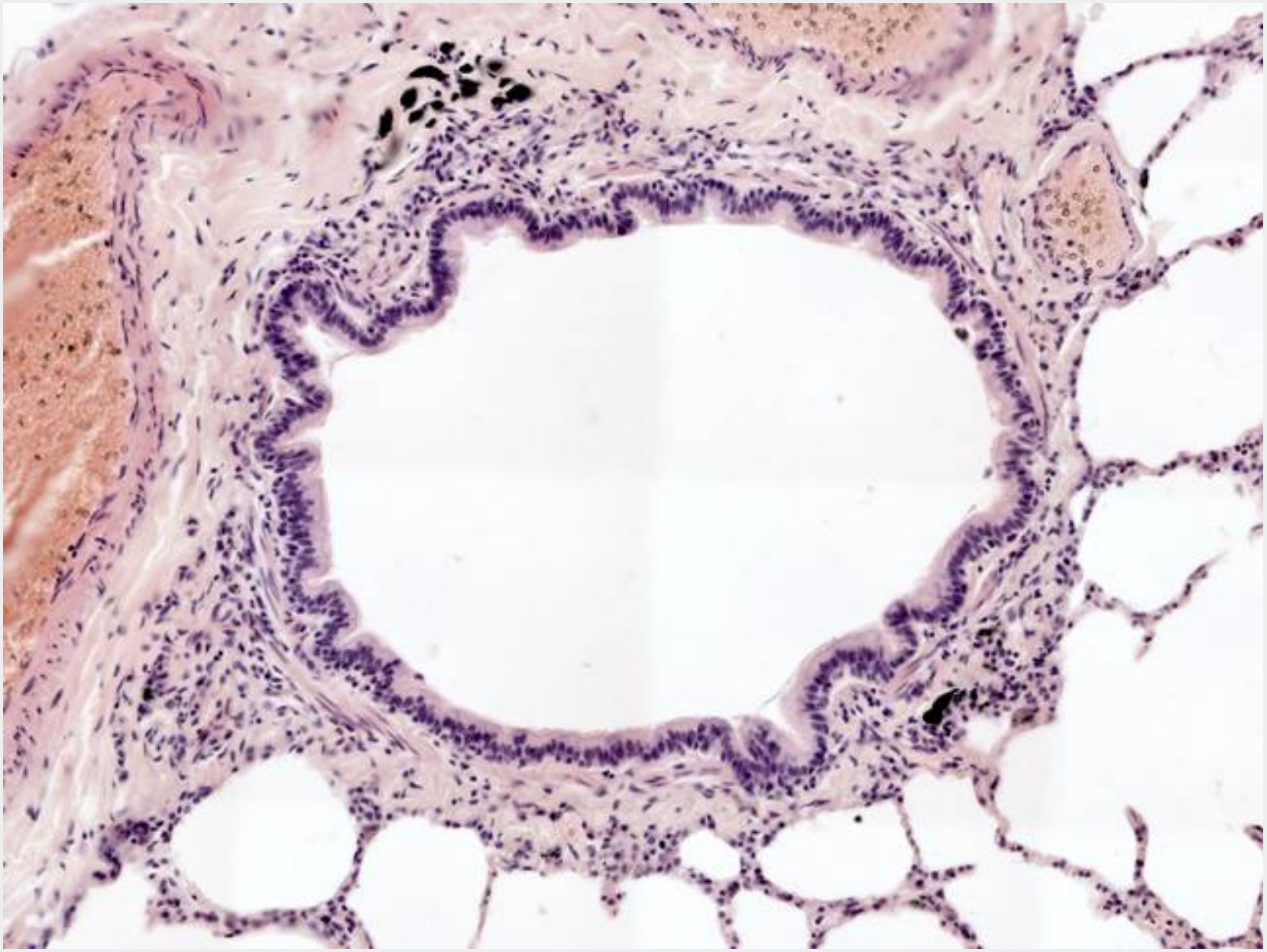


Q17a: Identify the organ/structure

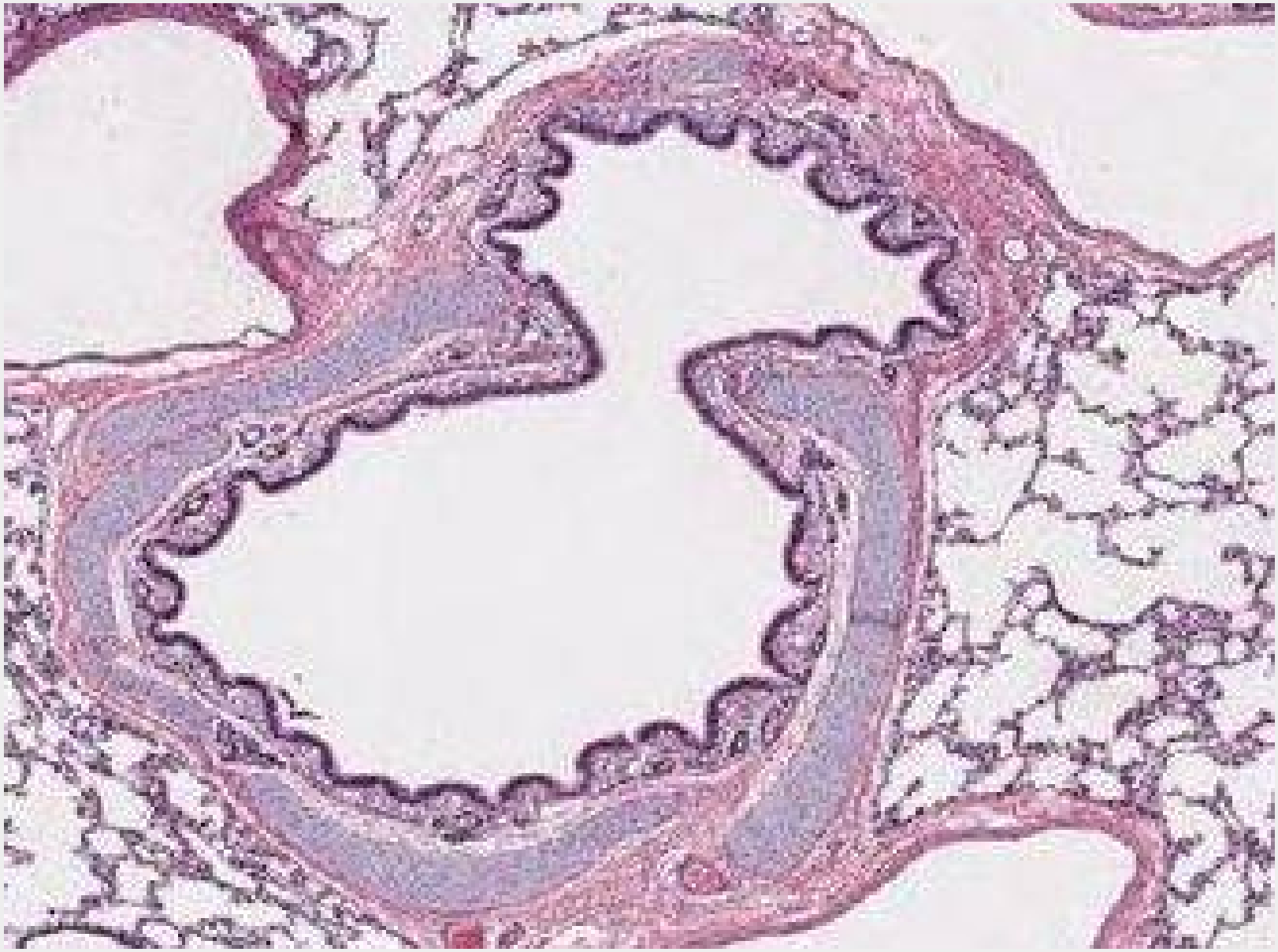
Q17b: Identify the structure.



Q18a: Identify the structure



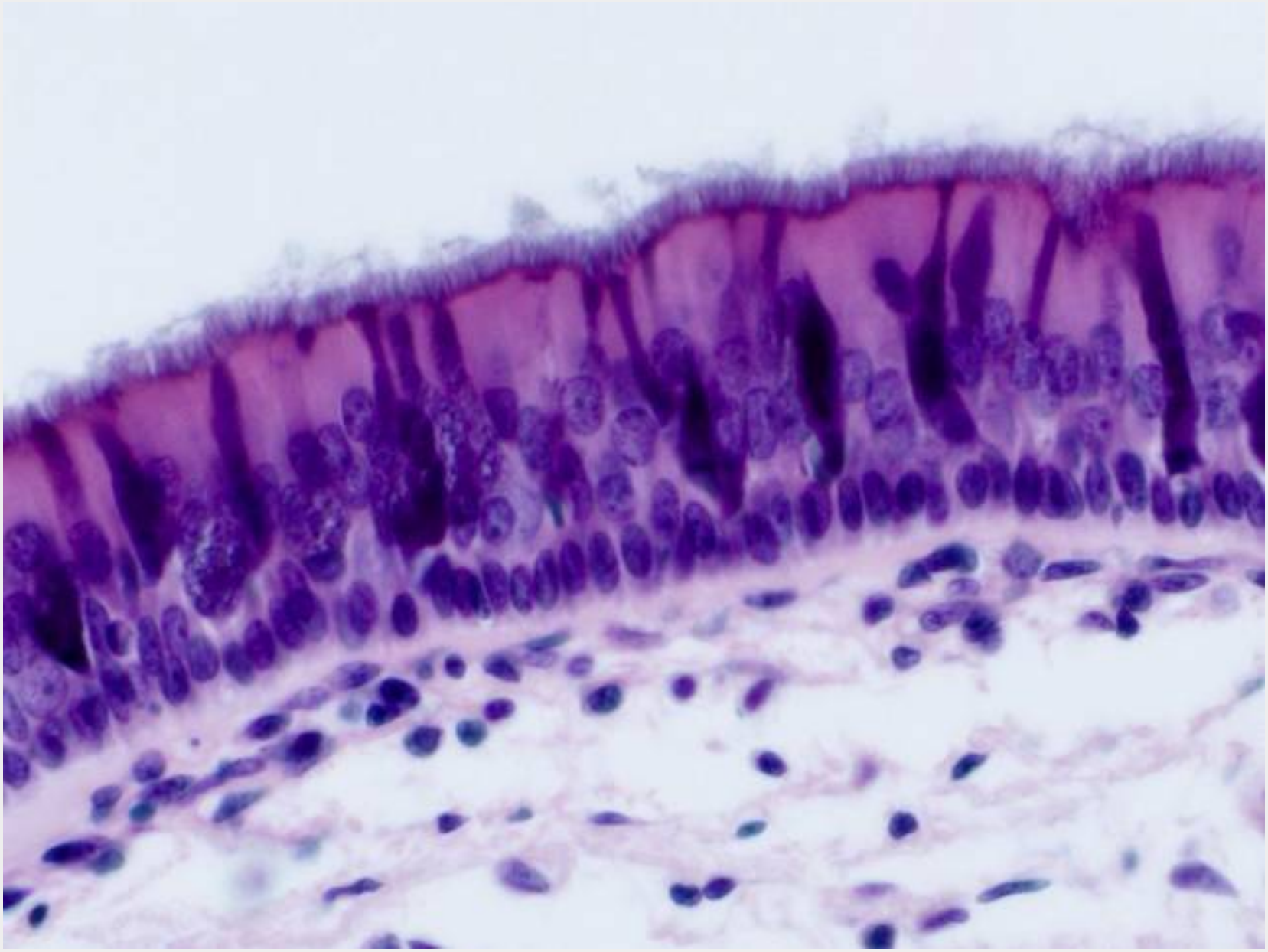
Q18b: Identify the structure



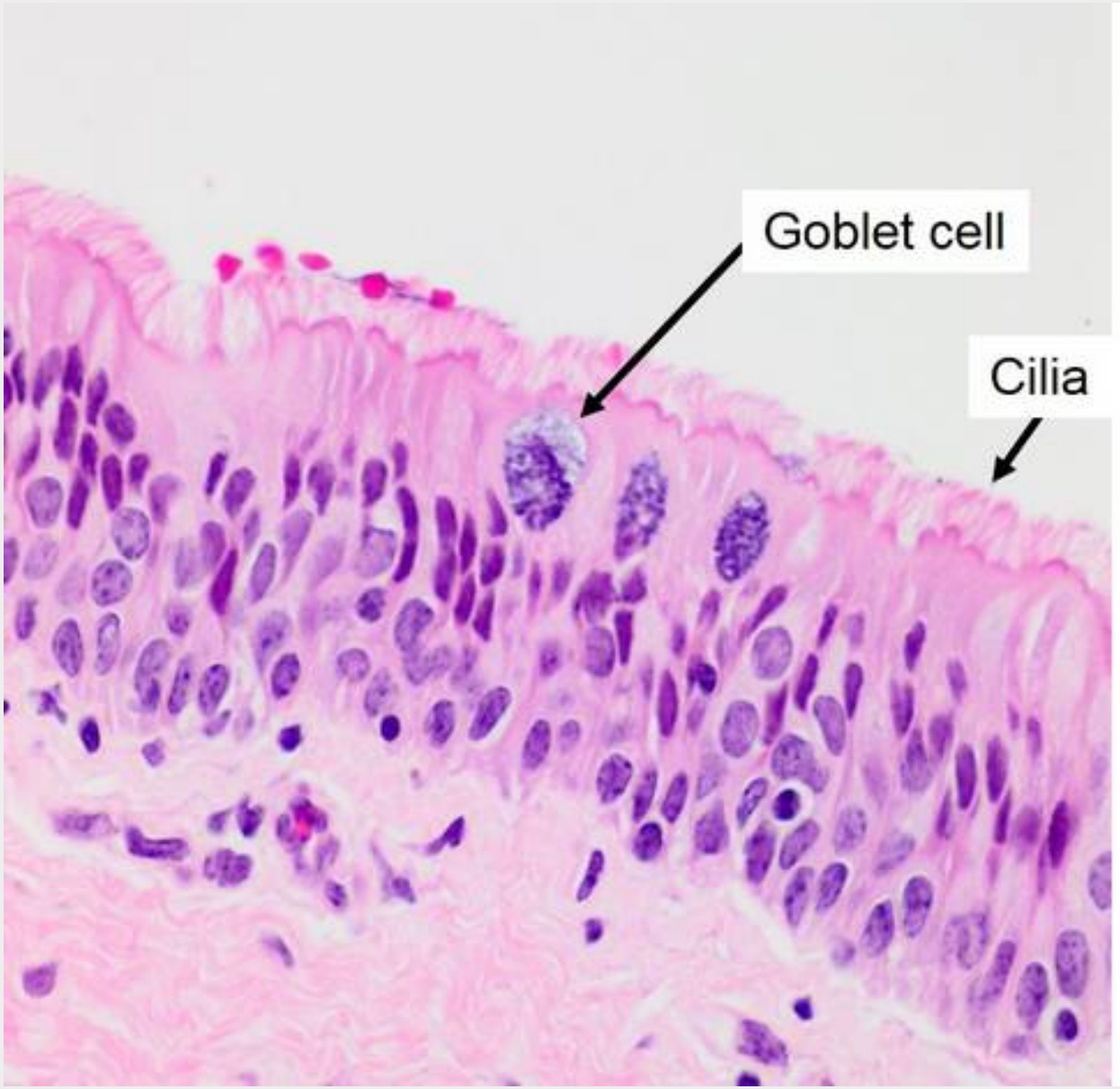
Q19a: Identify the structure.

Q19b: Identify the indicated structure.

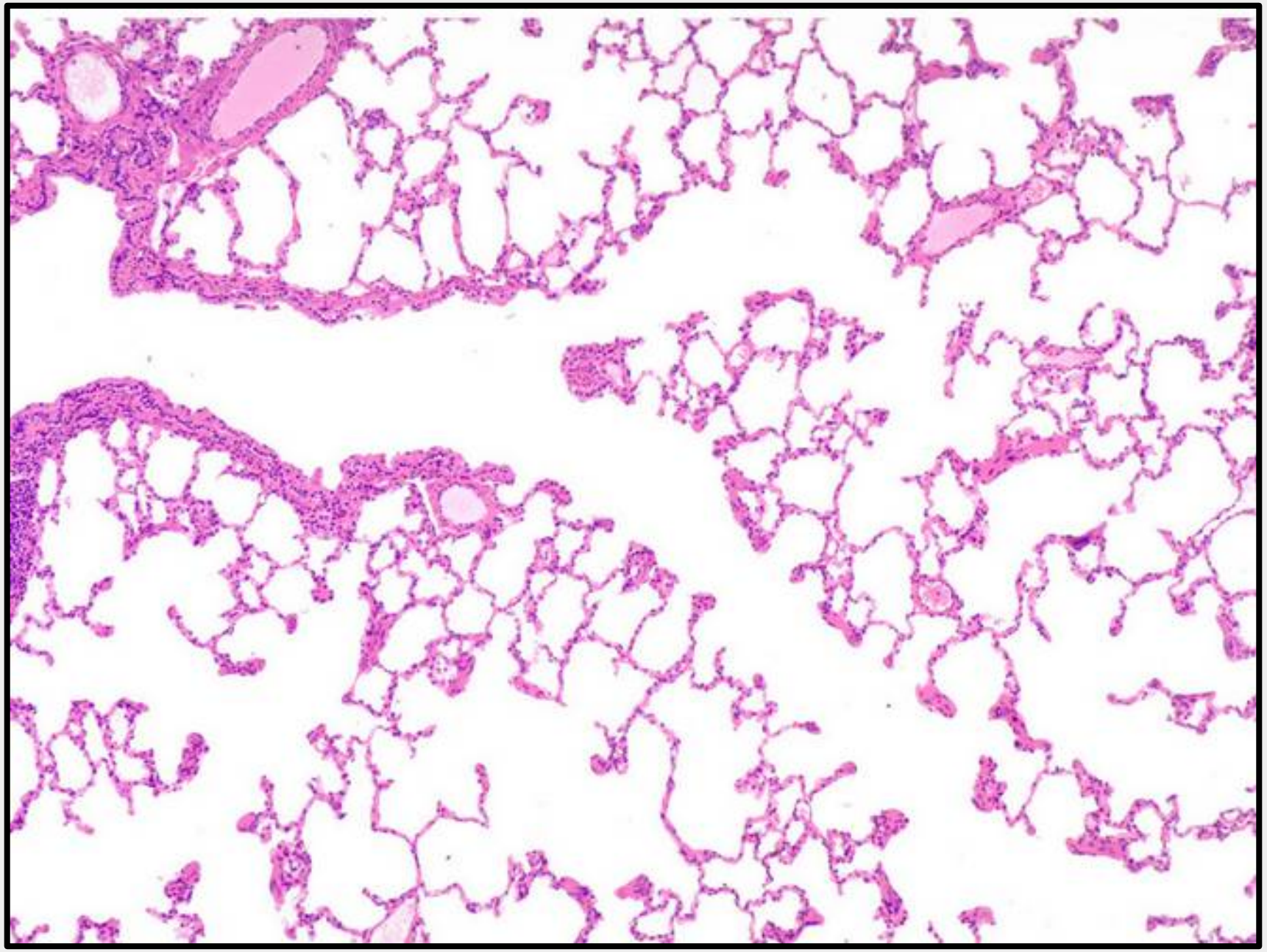
Q20a: Identify the epithelium:



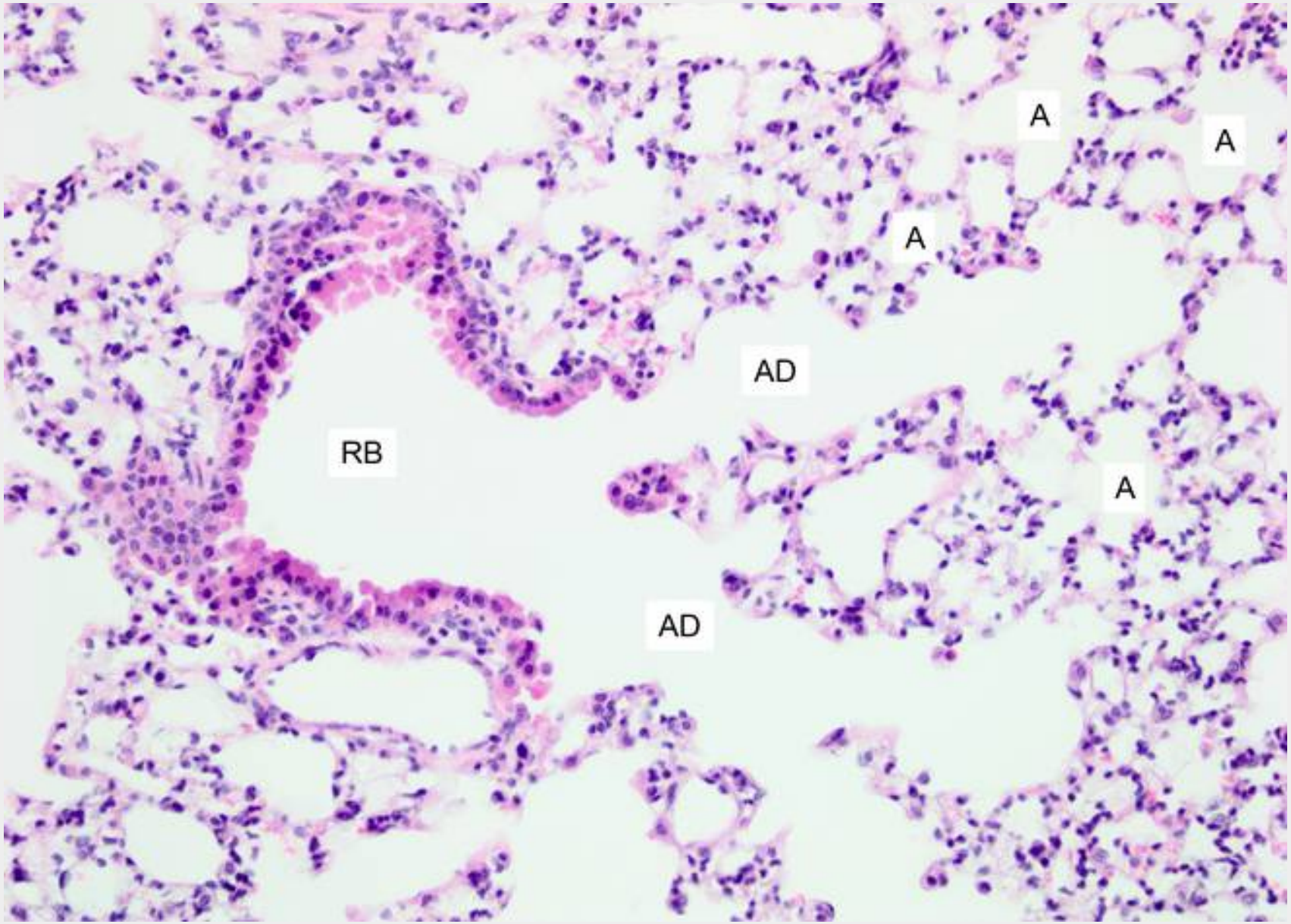
Q20b: Identify the epithelium:



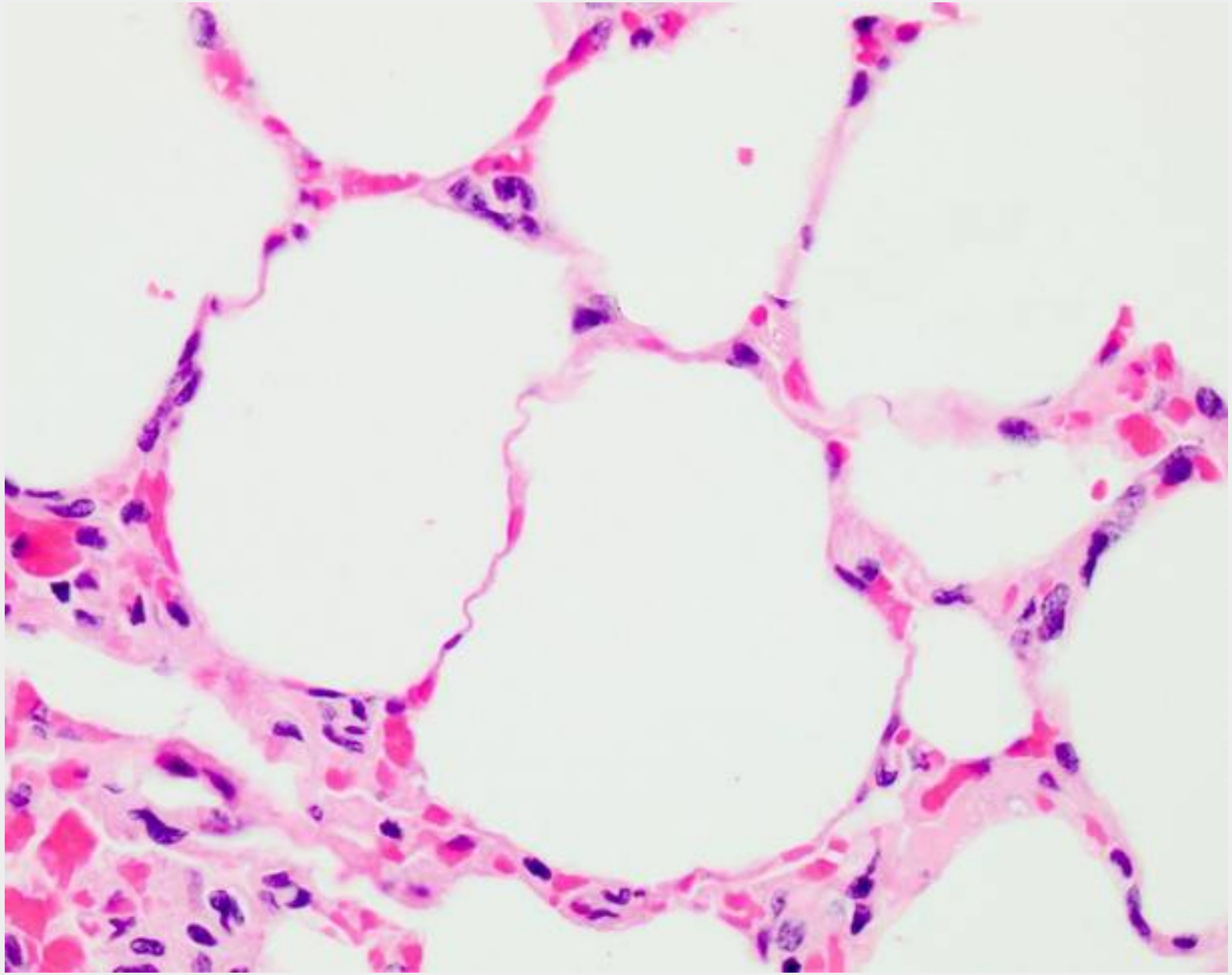
Q21a: What functional structure is found in this area?



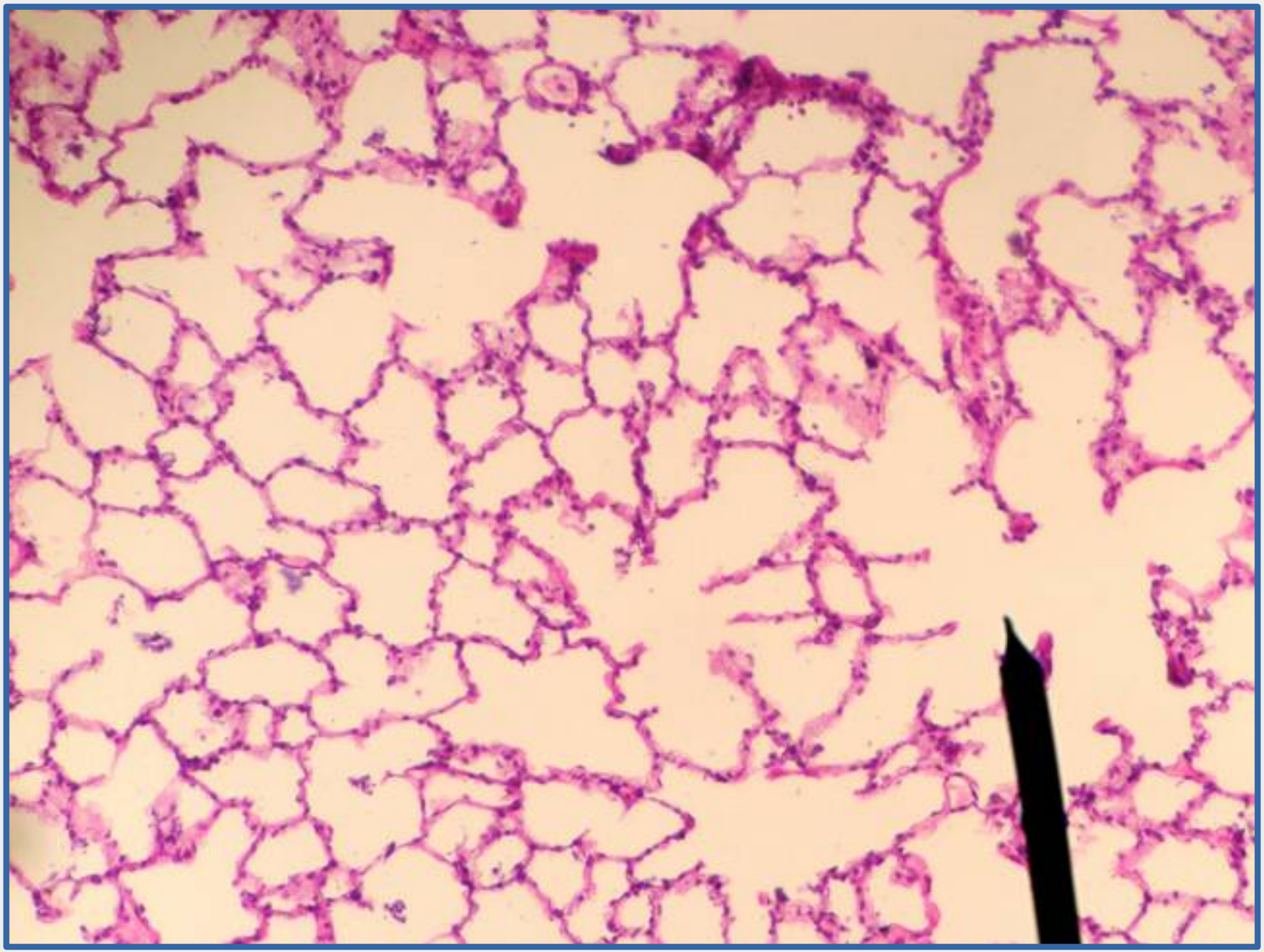
Q21b: What functional structures are found in this area?



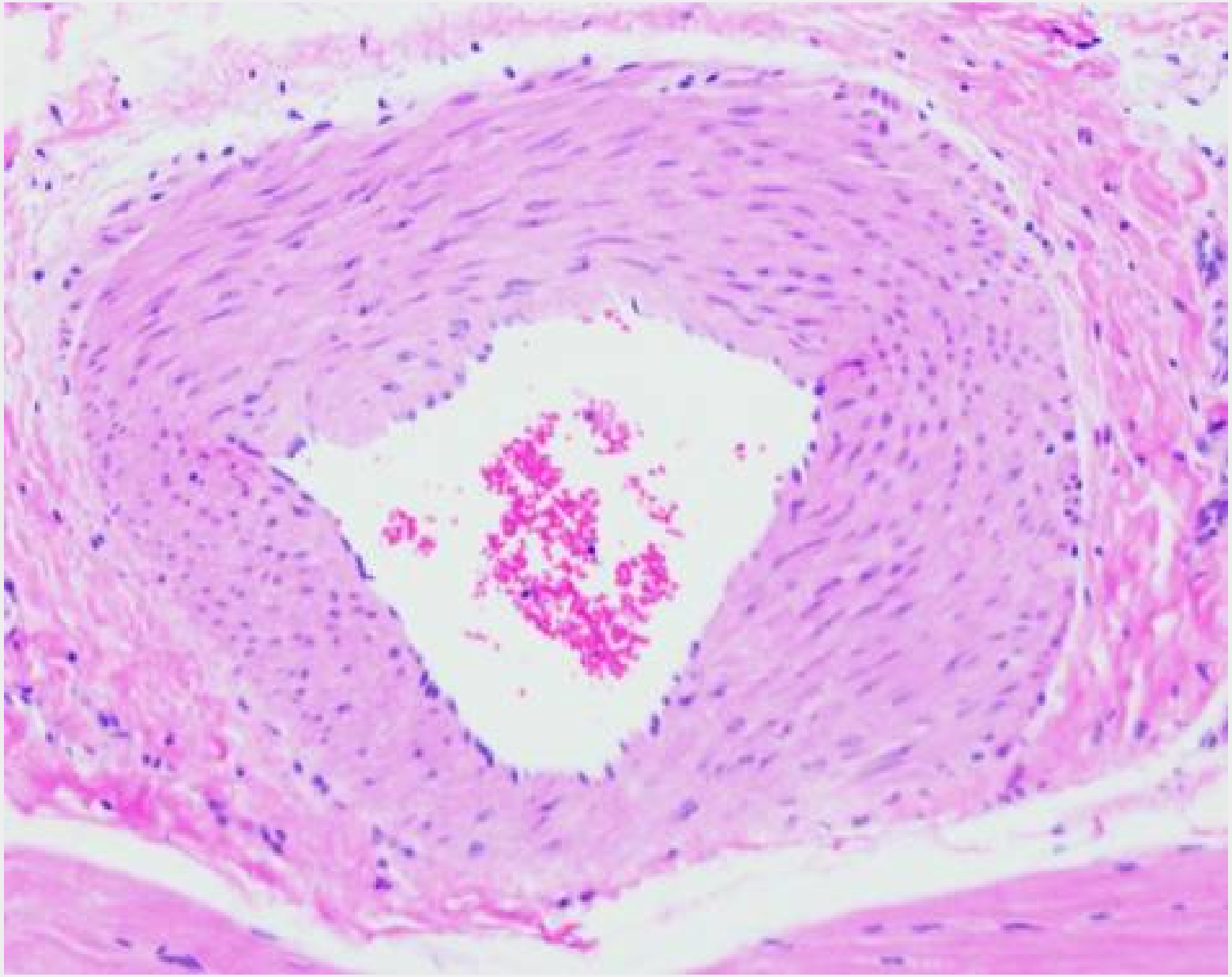
Q22a: Name the organ where this structure is found.



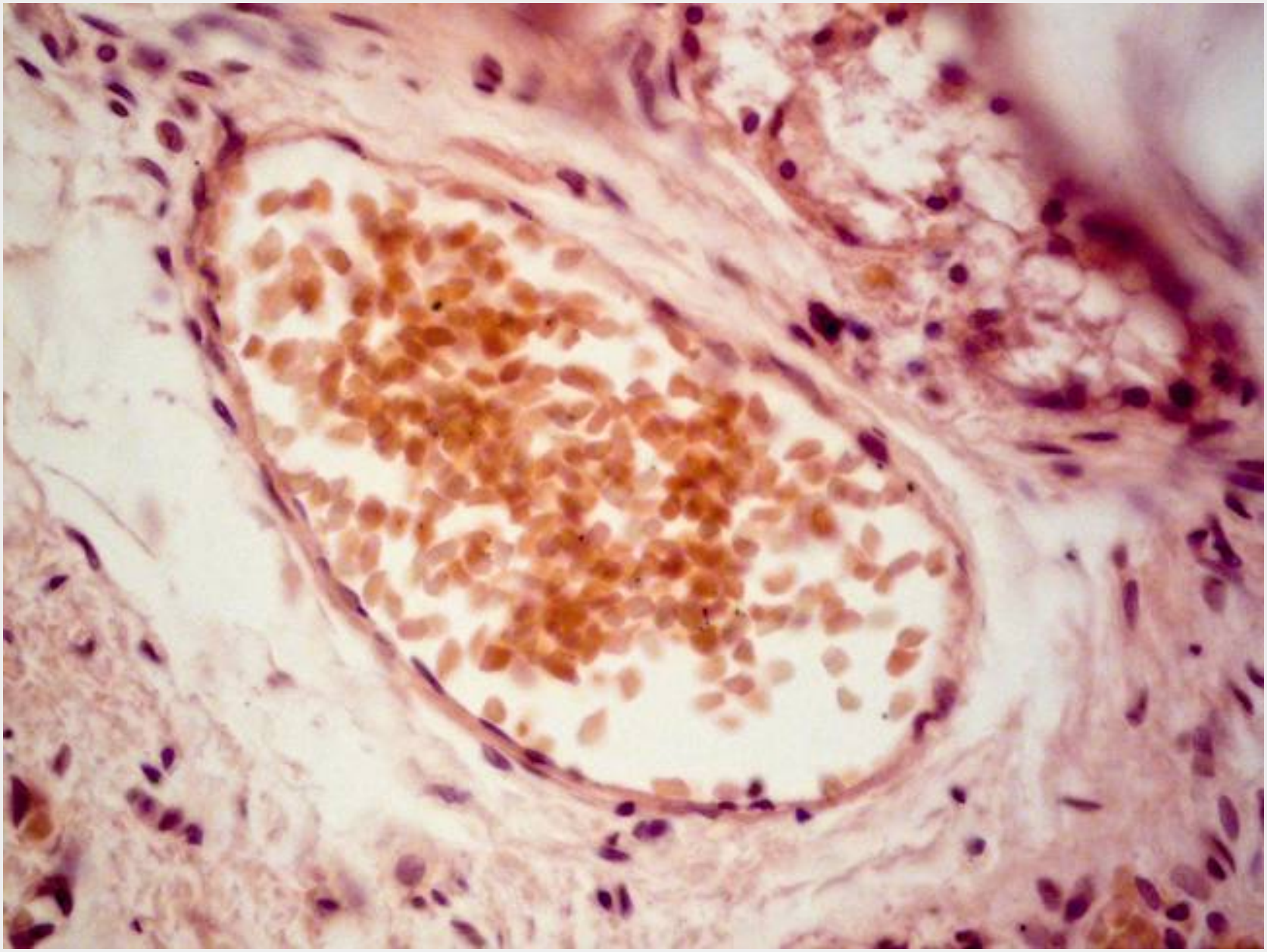
Q22b: Identify the organ.



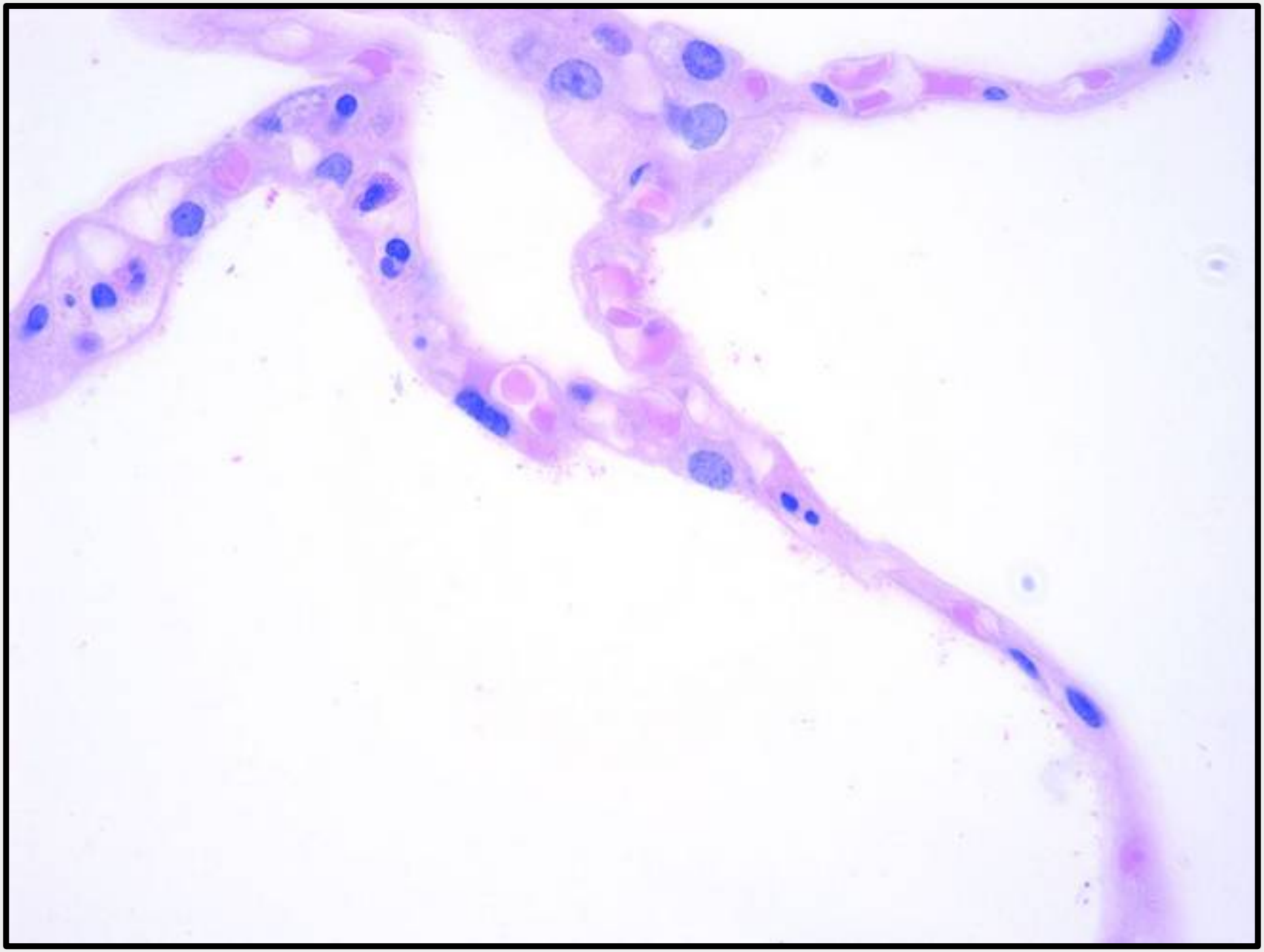
Q23a: Identify the structure:



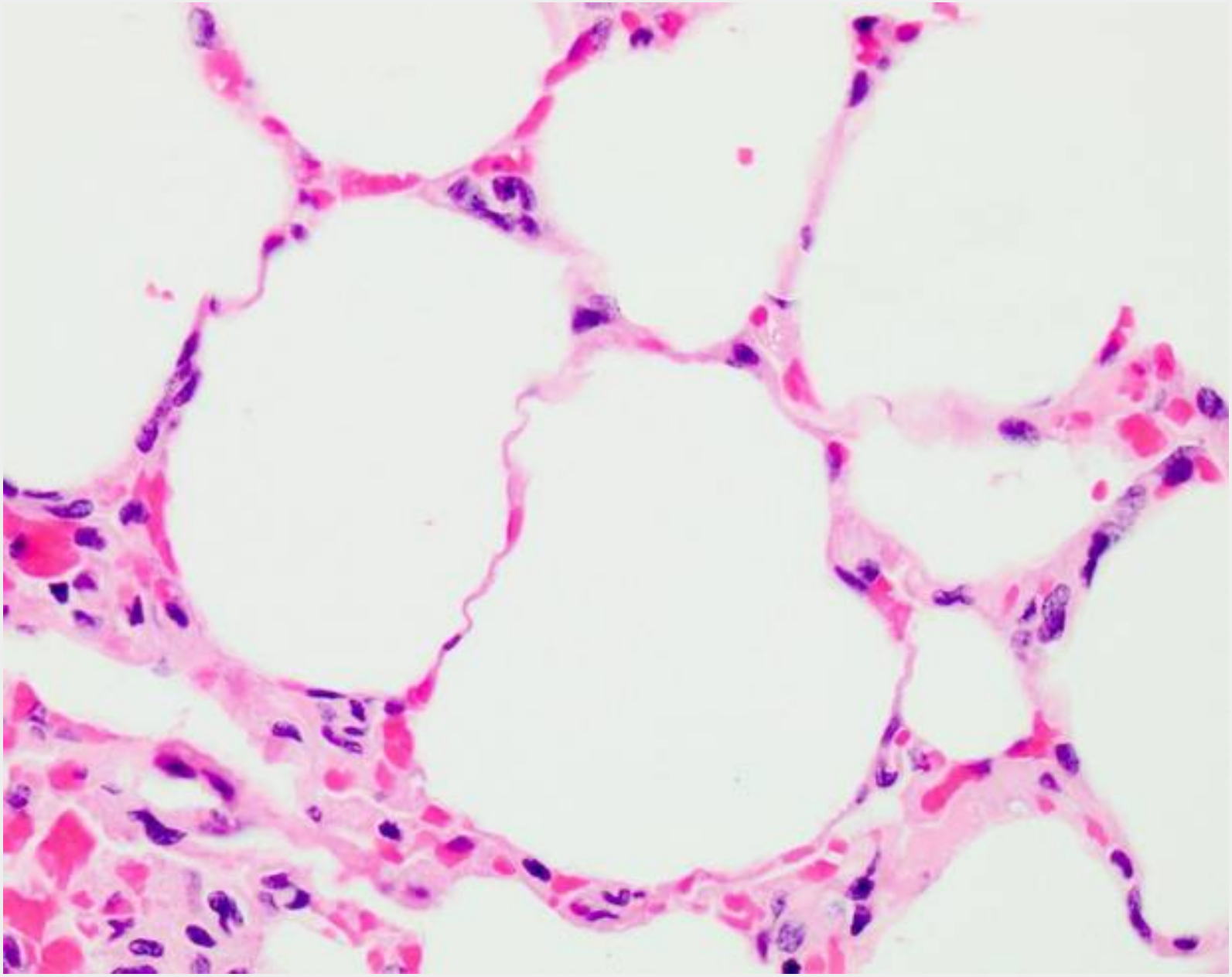
Q23b: Identify the structure:



Q24a: Identify the functional structure.

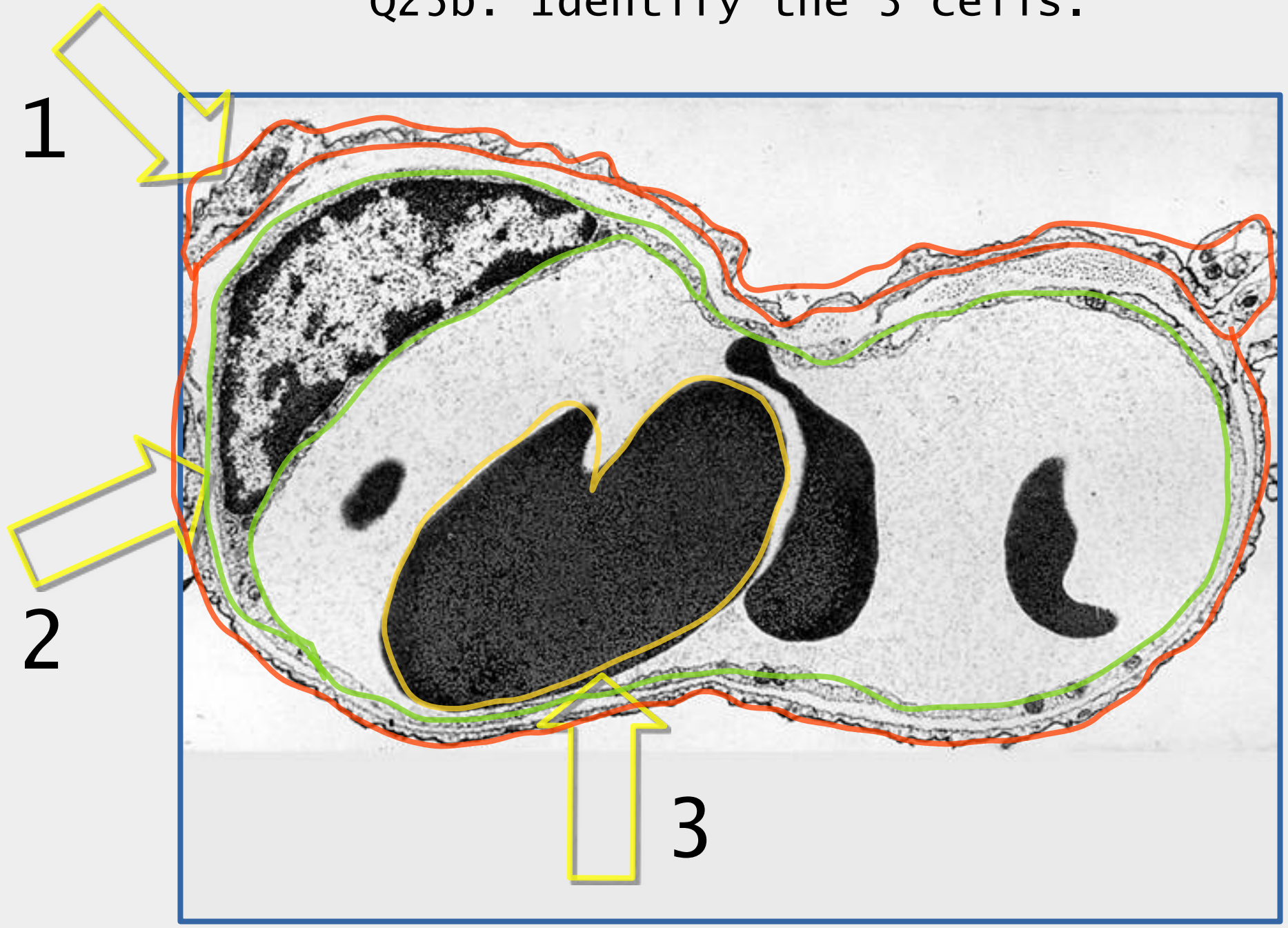


Q24b: What process takes place in this structure.

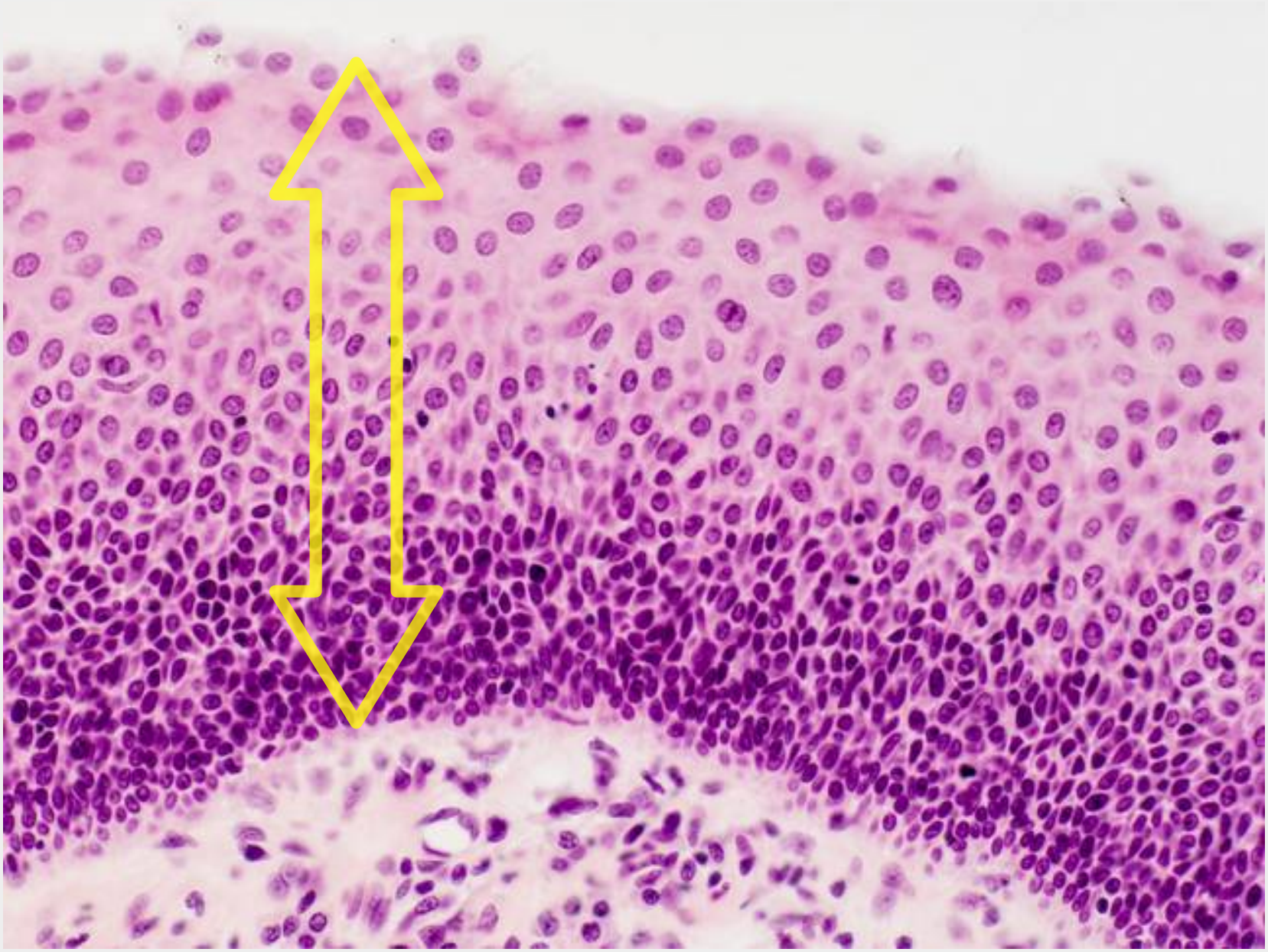


Q25a: Name the 3 components of the blood-air barrier.

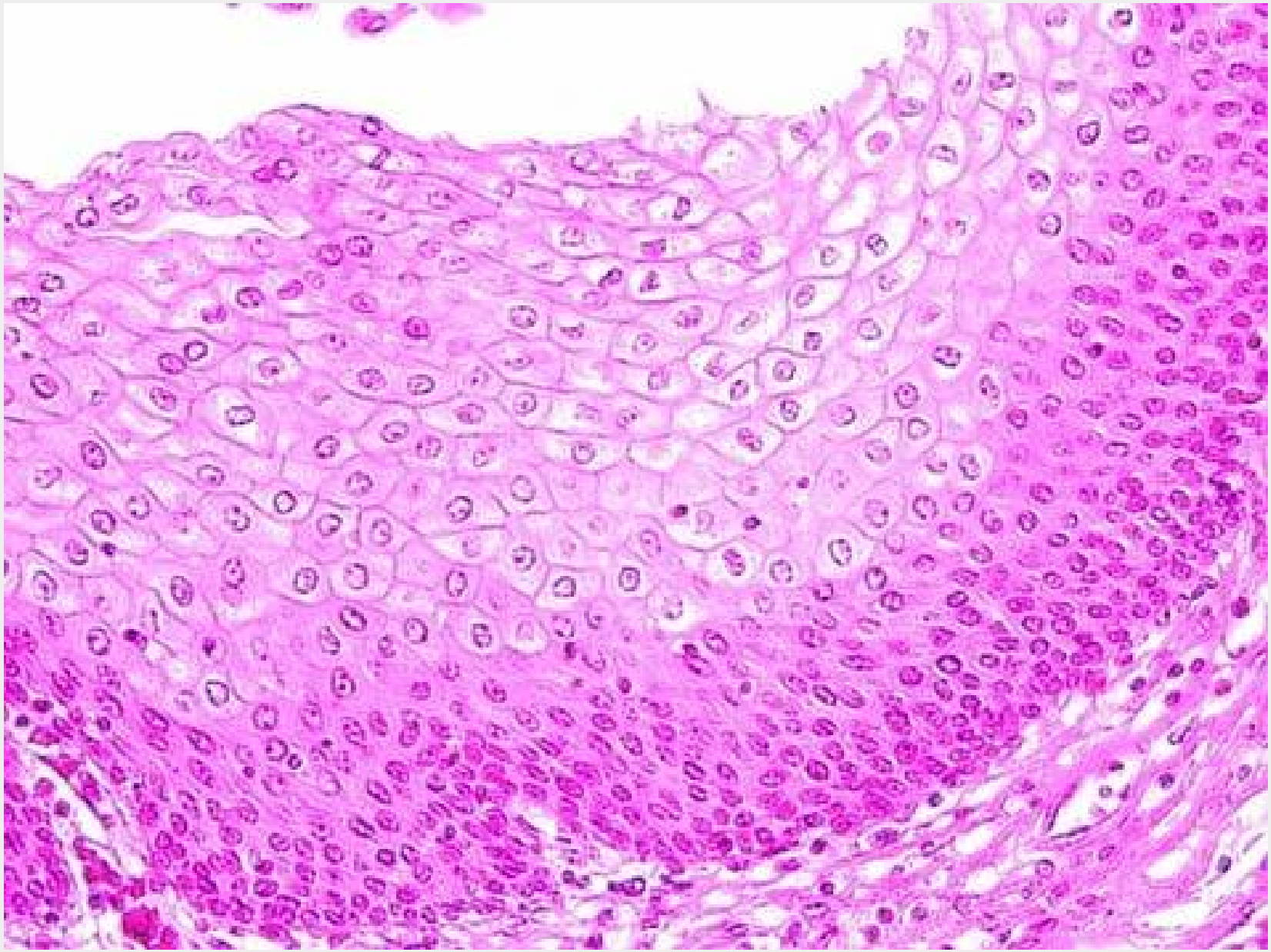
Q25b: Identify the 3 cells.



Q26a: Identify the epithelium:

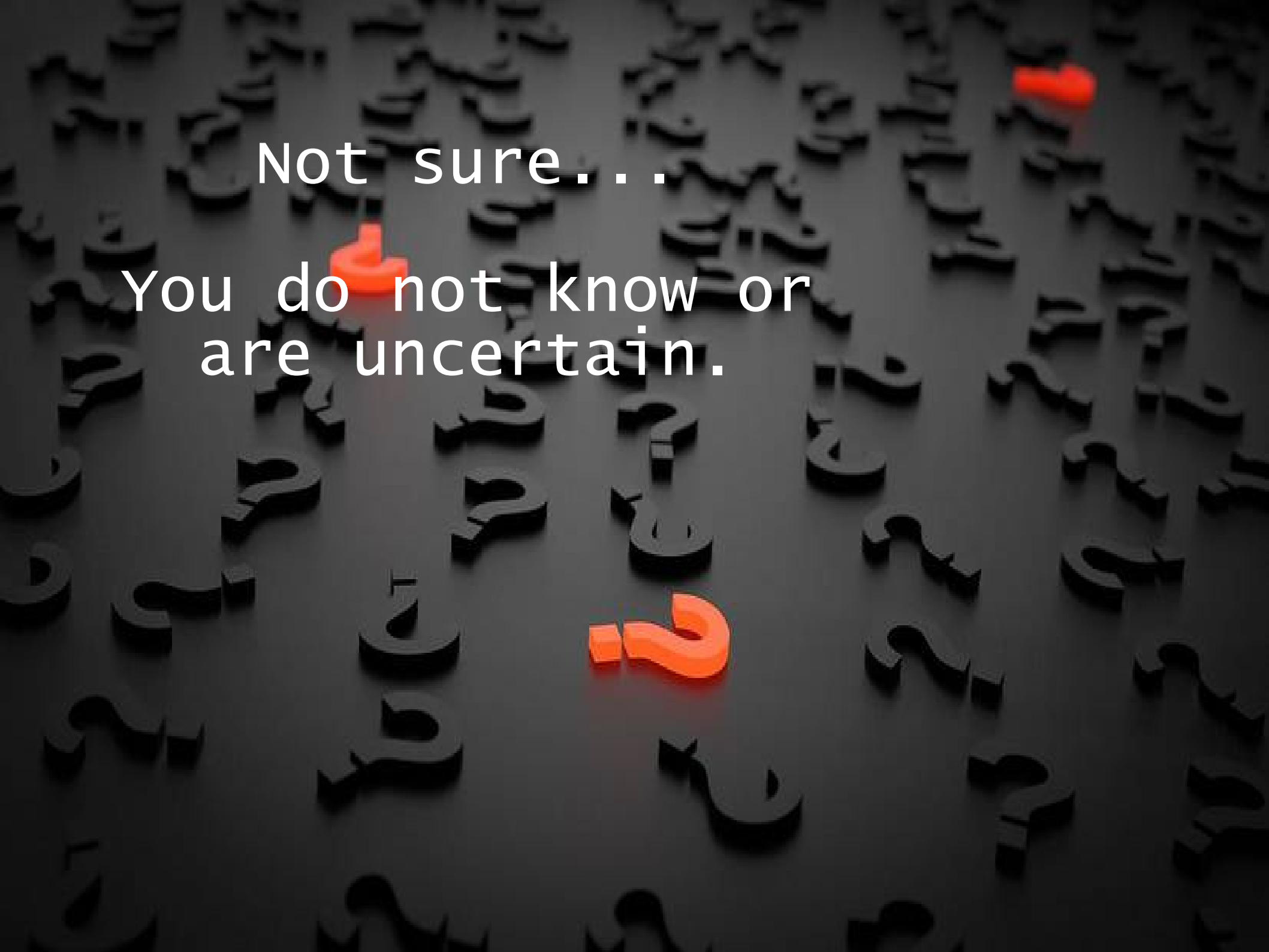


Q26b: Identify the epithelium:



Assess yourself


Nailed it!
You are confident about your answer.


Not sure...
You do not know or are uncertain.

Community of Truth

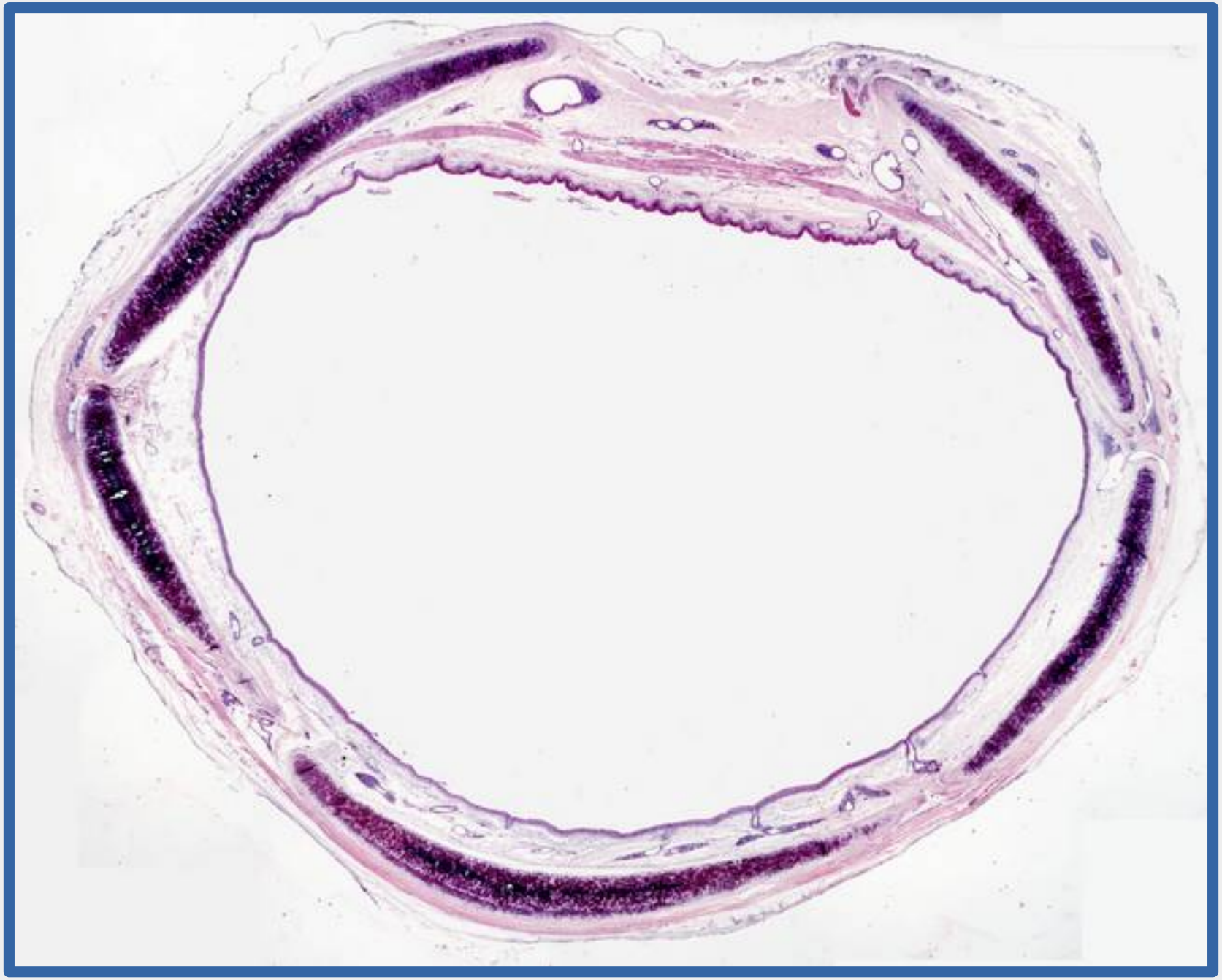
What is my answer?

What is the correct answer?

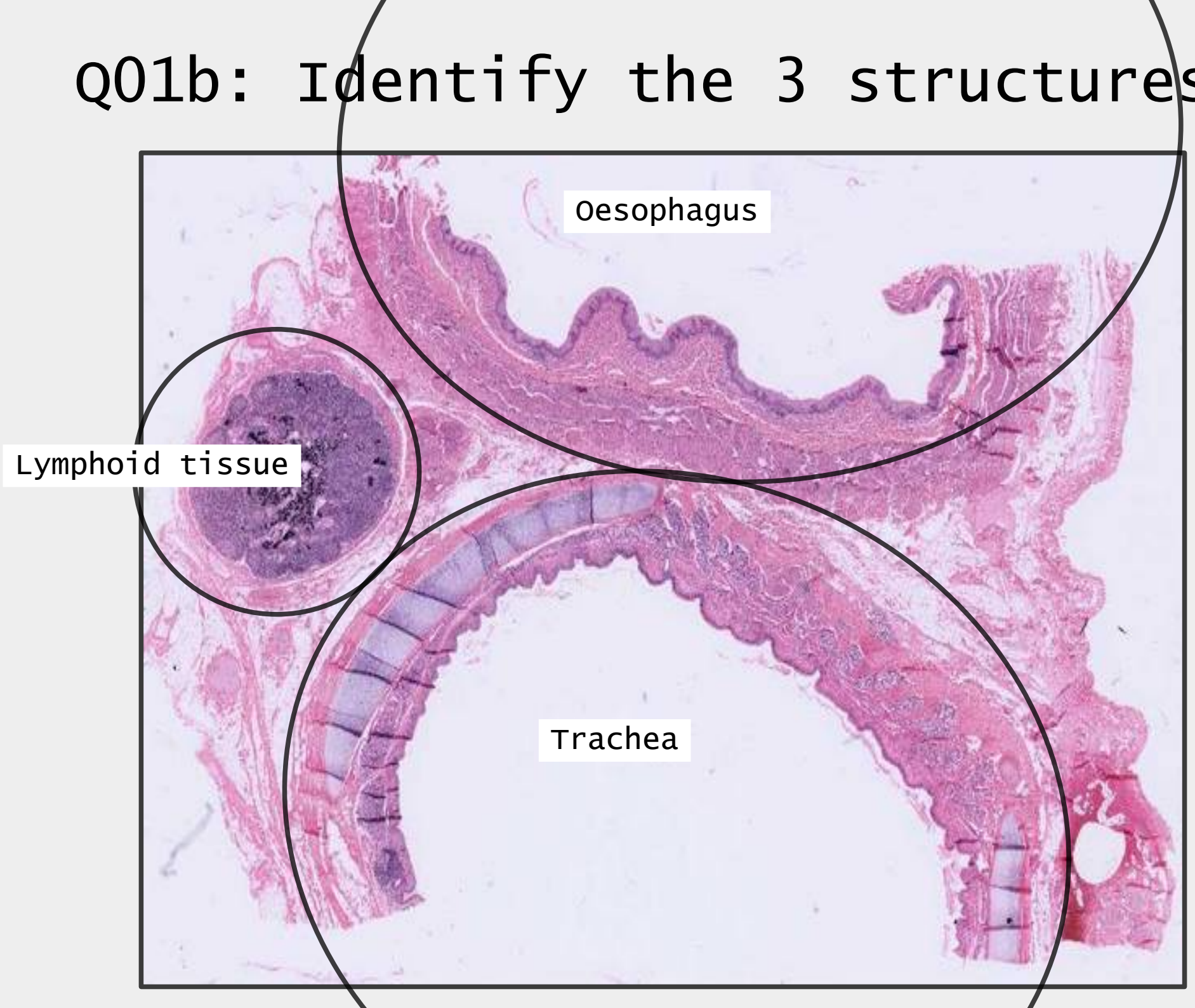
I am am wrong, what was my error?

THUS: Find the truth

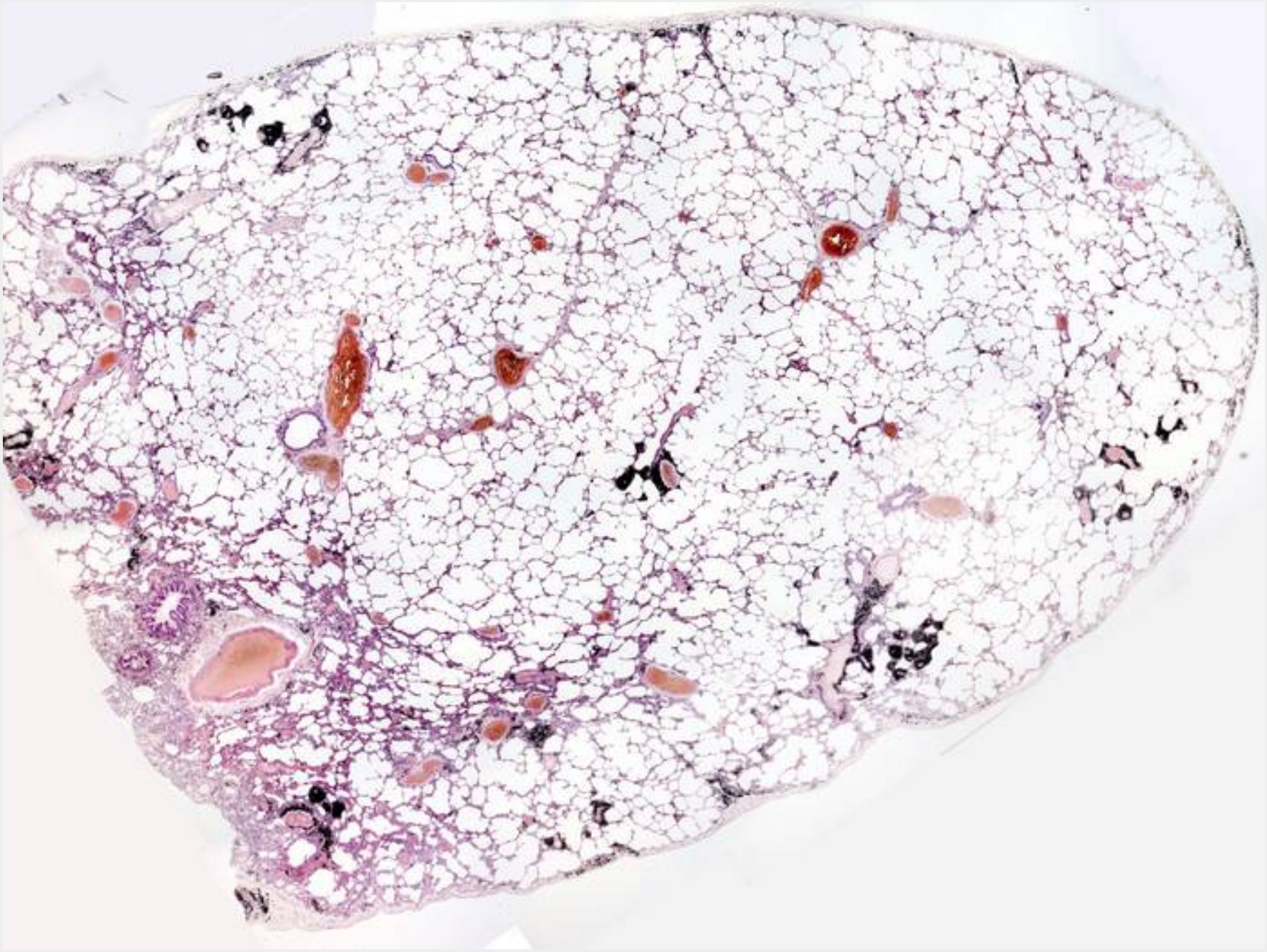
Q01a: Trachea



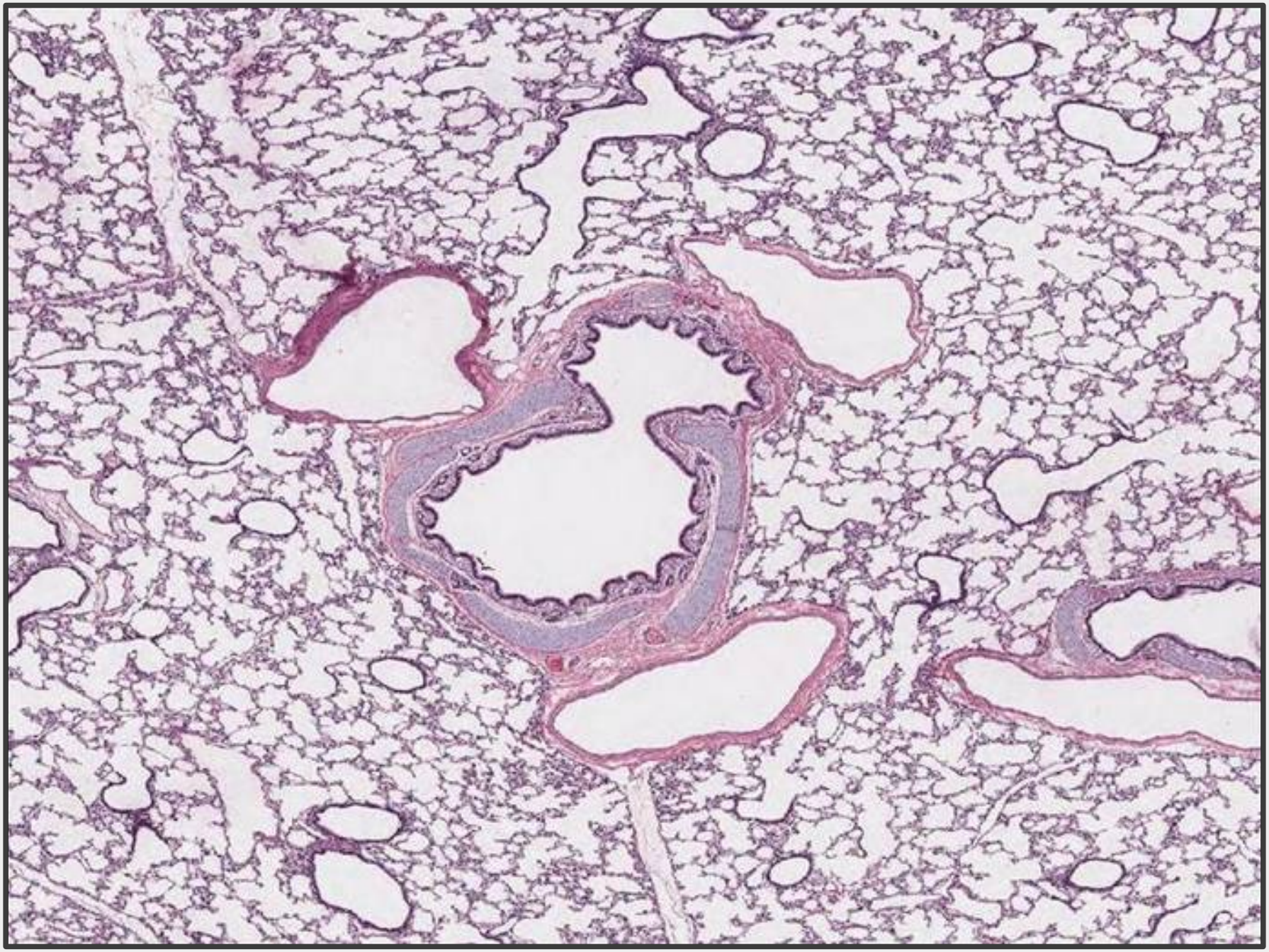
Q01b: Identify the 3 structures.



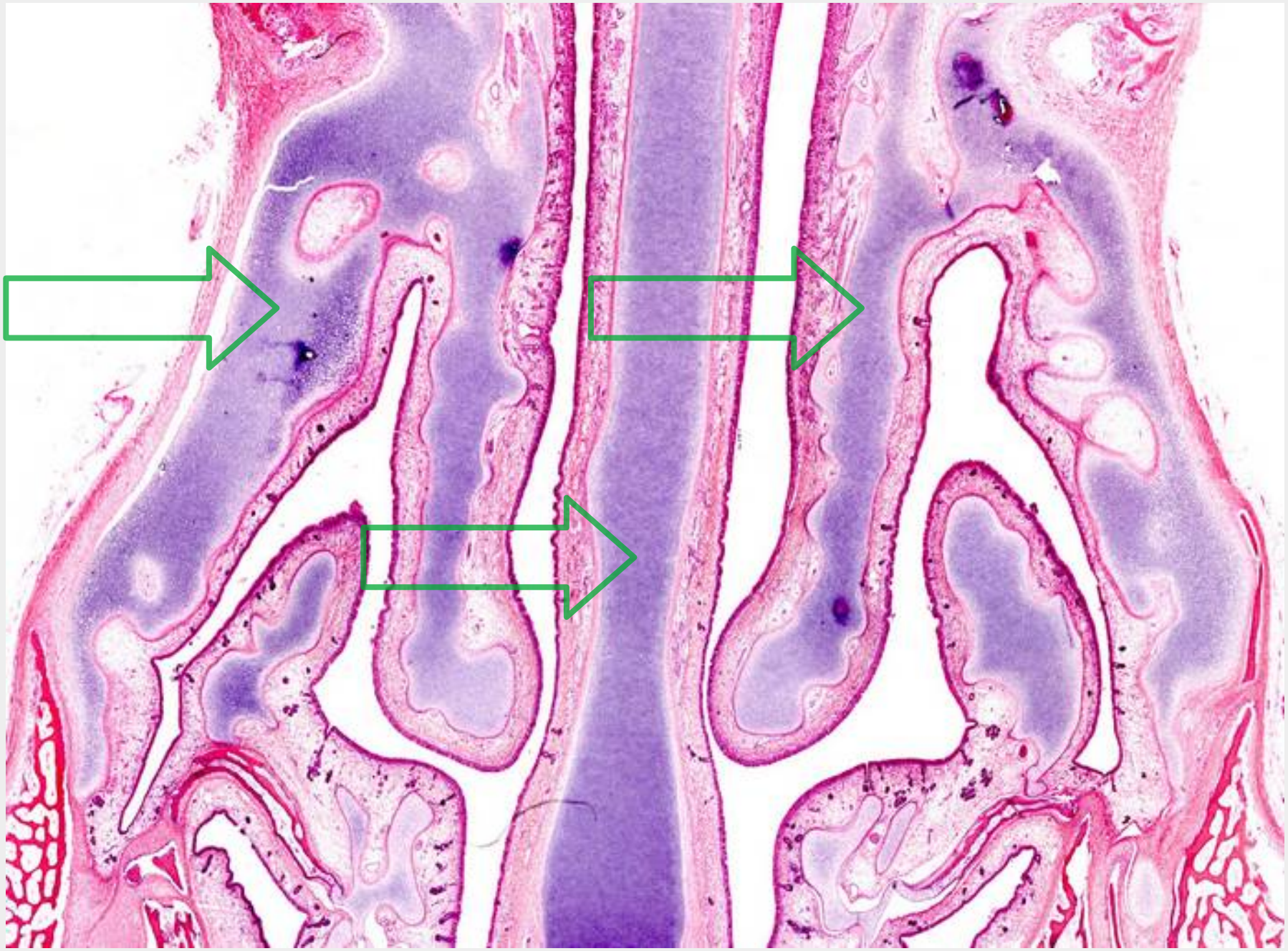
Q02a: Lung



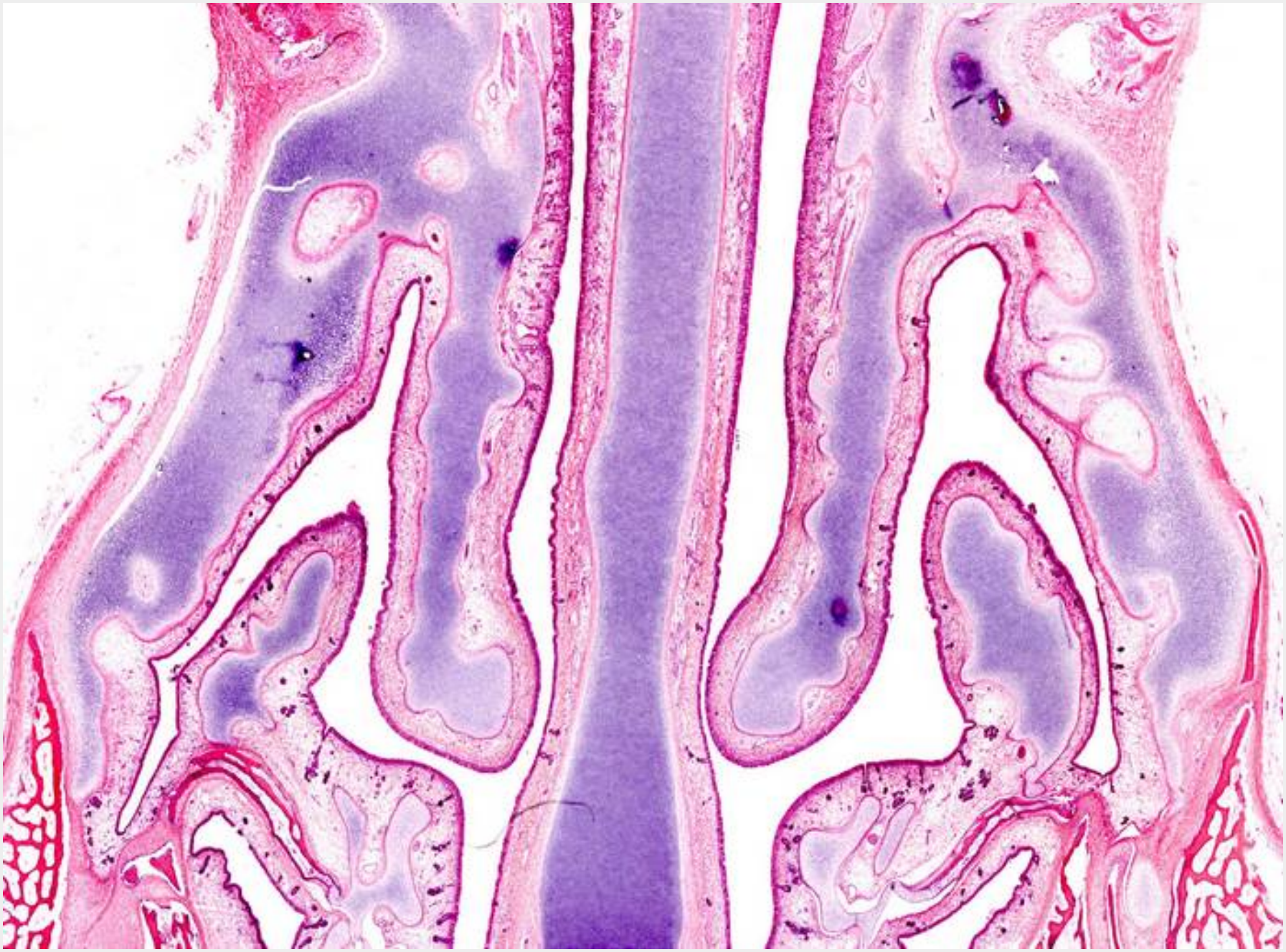
Q02b: Lung.



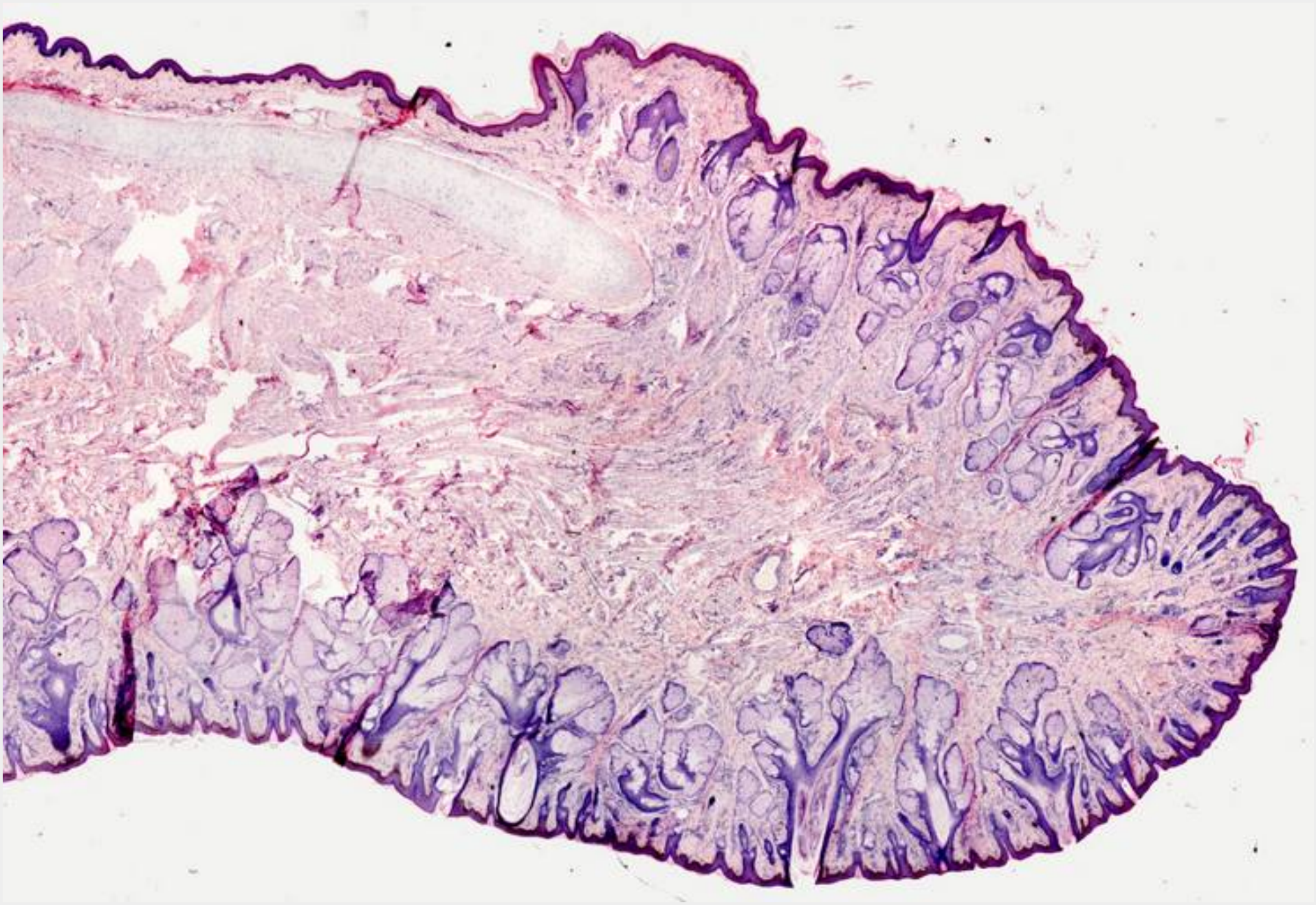
Q03a: Hyaline cartilage



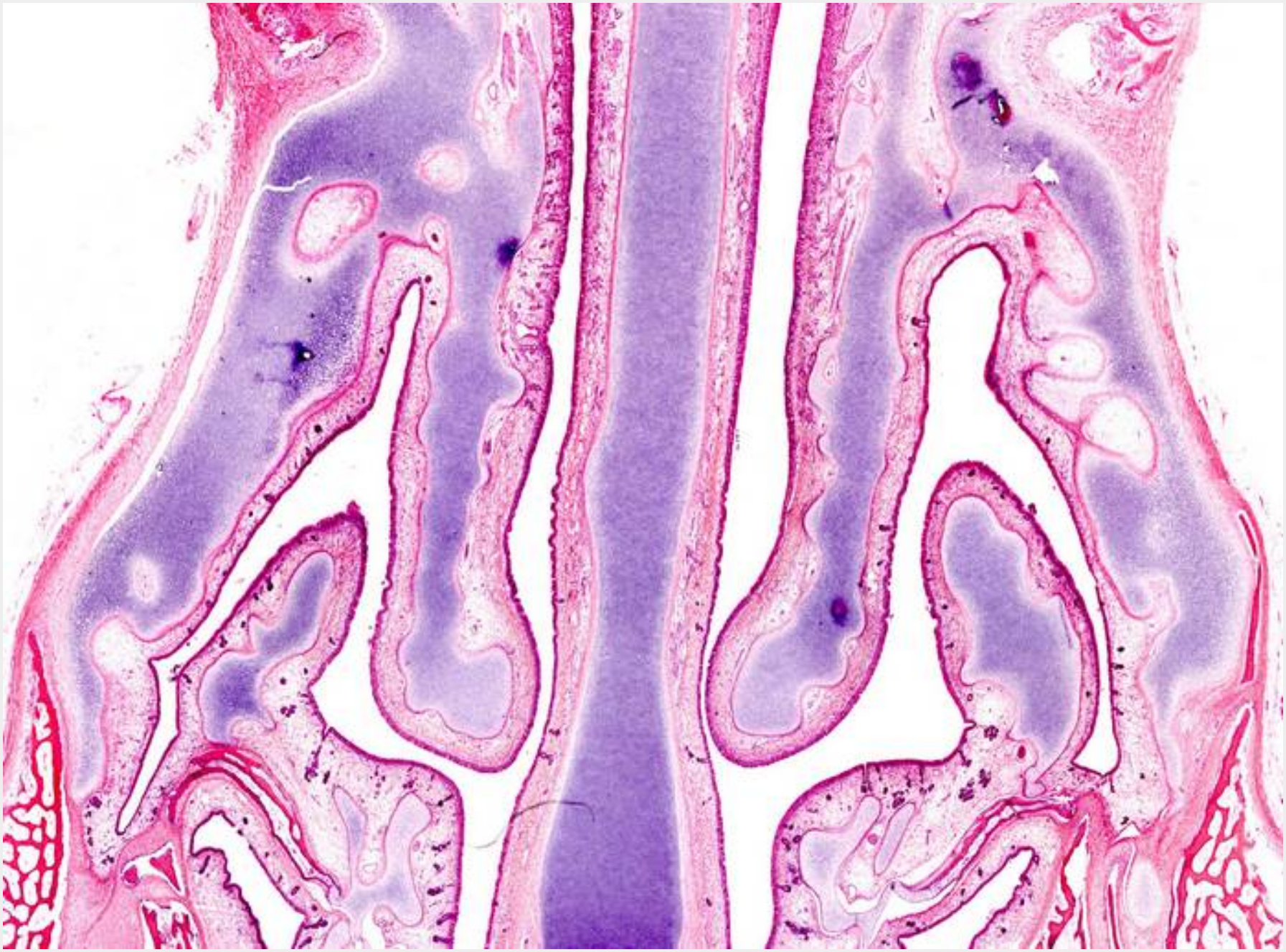
Q03b: Hyaline, Elastic, Fibrous



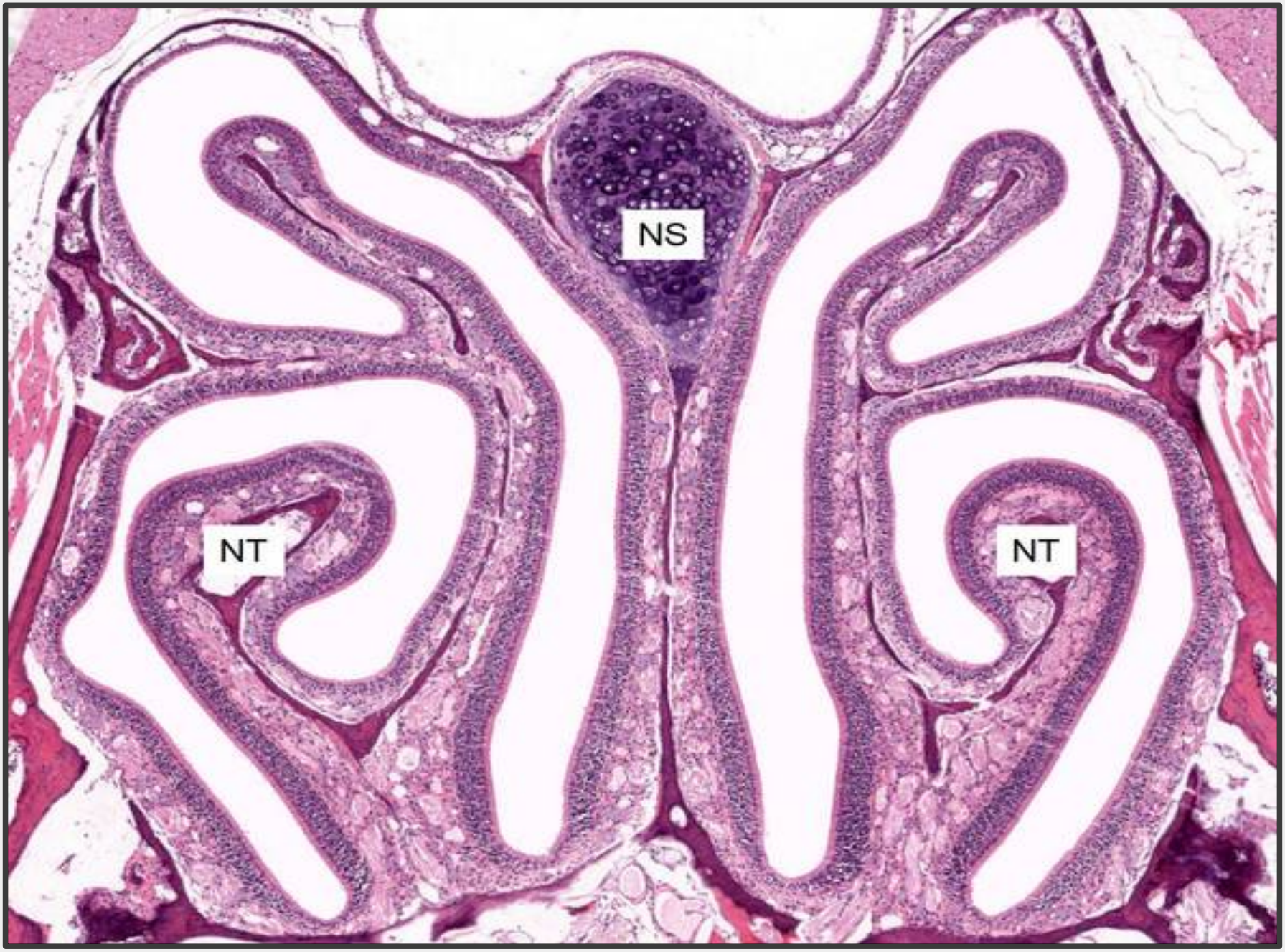
Q04: Nostril



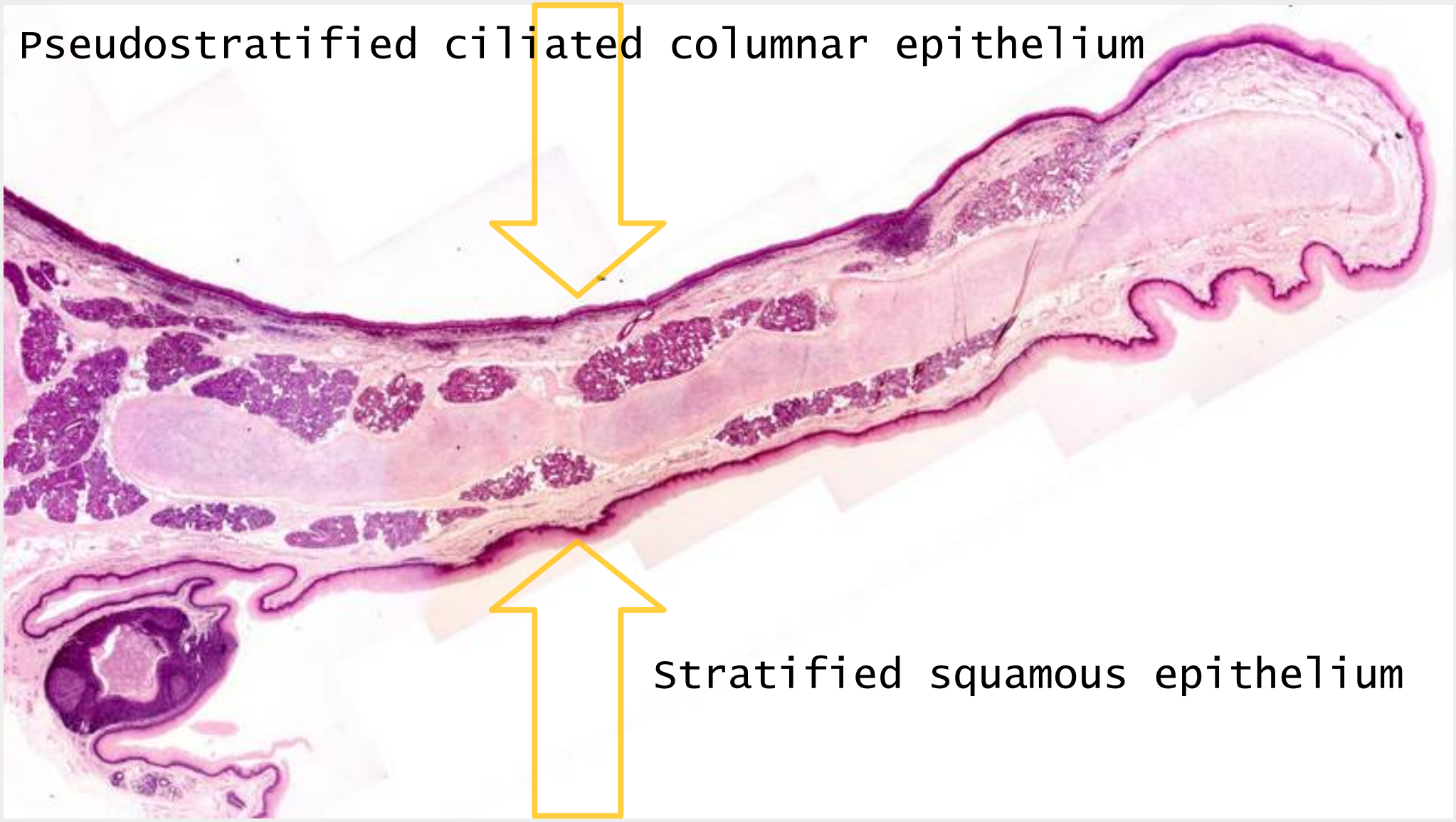
Q05a: Vestibulum nose – olfactory epithelium



Q05b: Vestibulum nose – olfactory epithelium

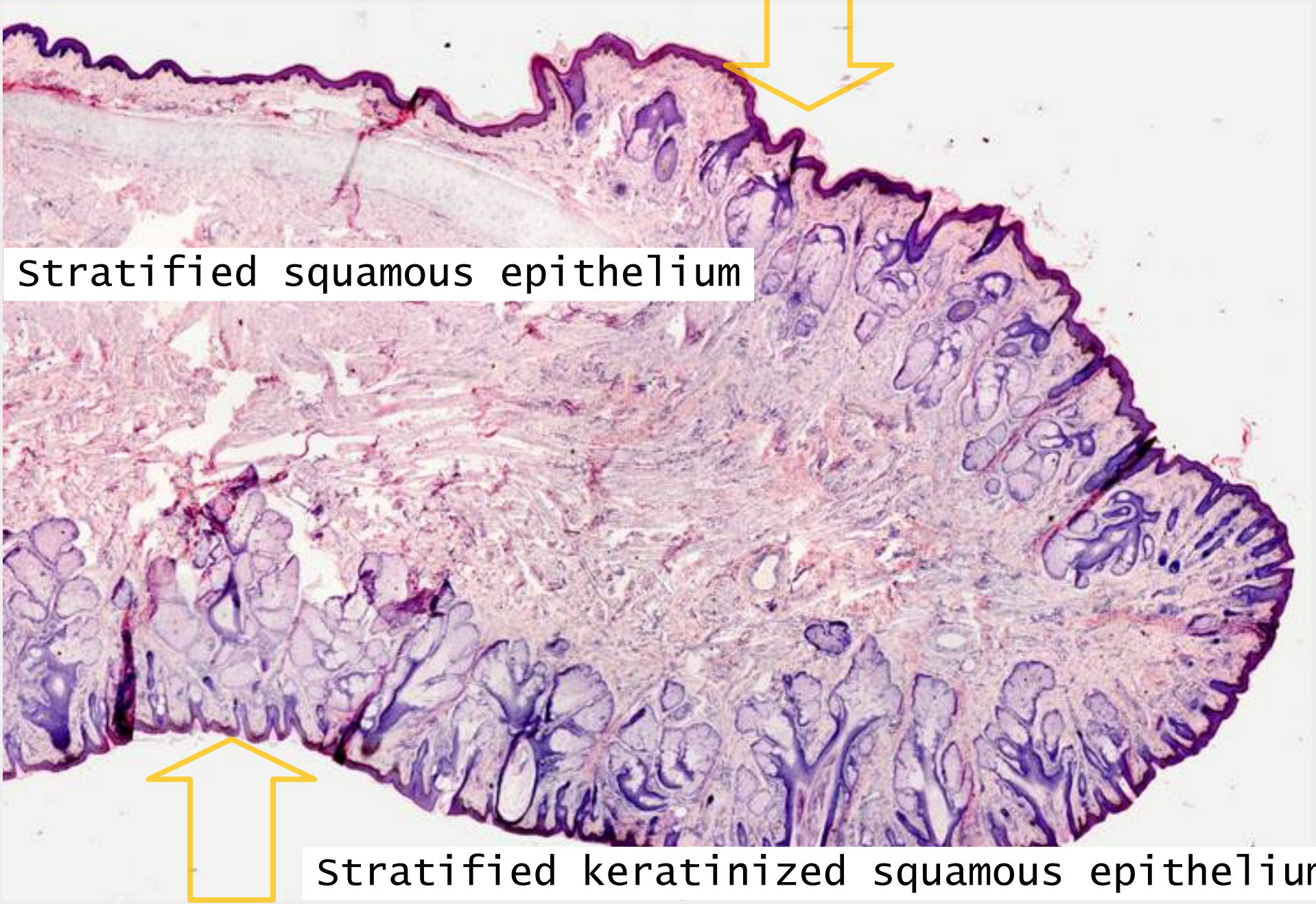


Q06a+b: Epiglottis

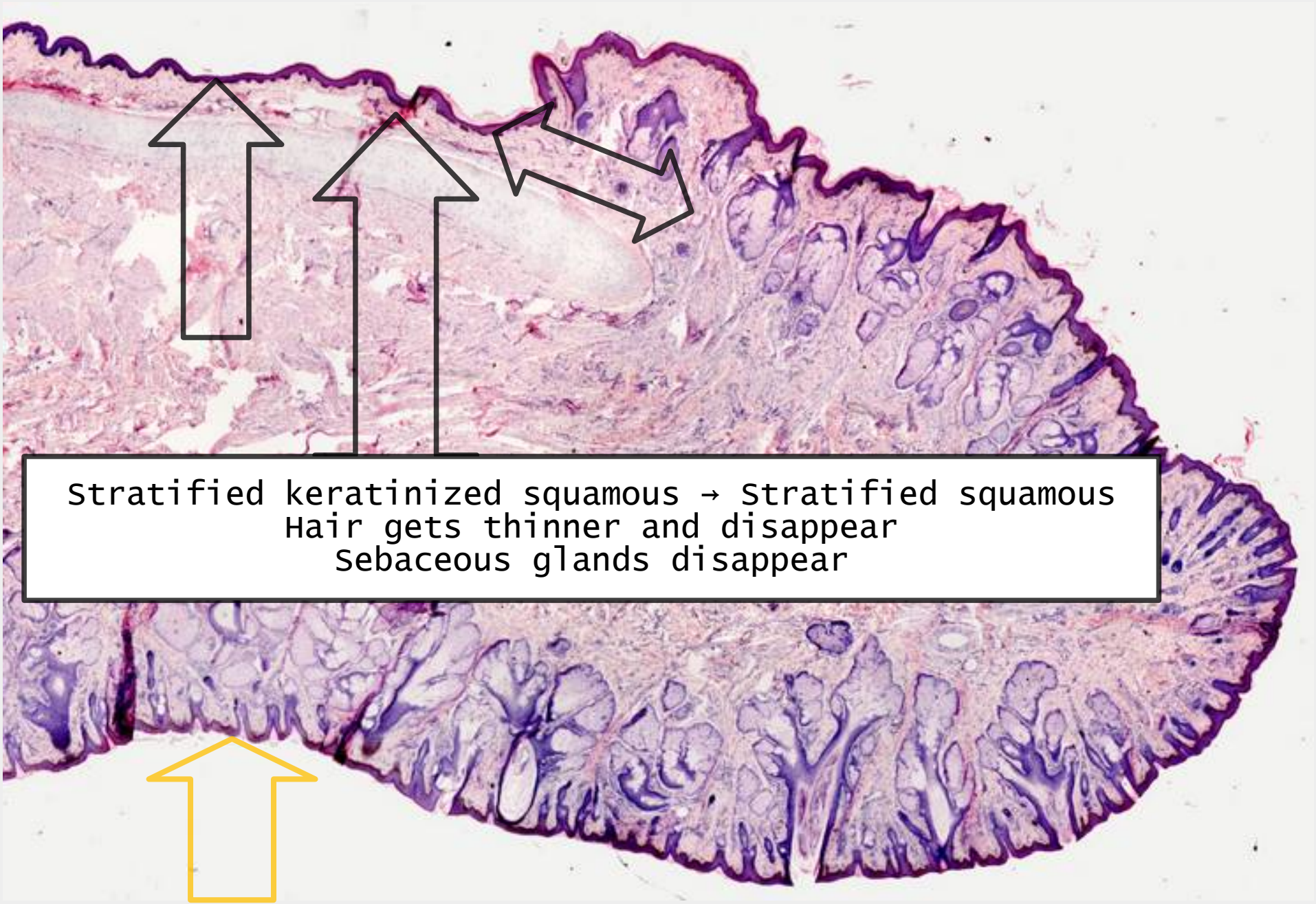


Q07a+b: Trachea – hyaline cartilage

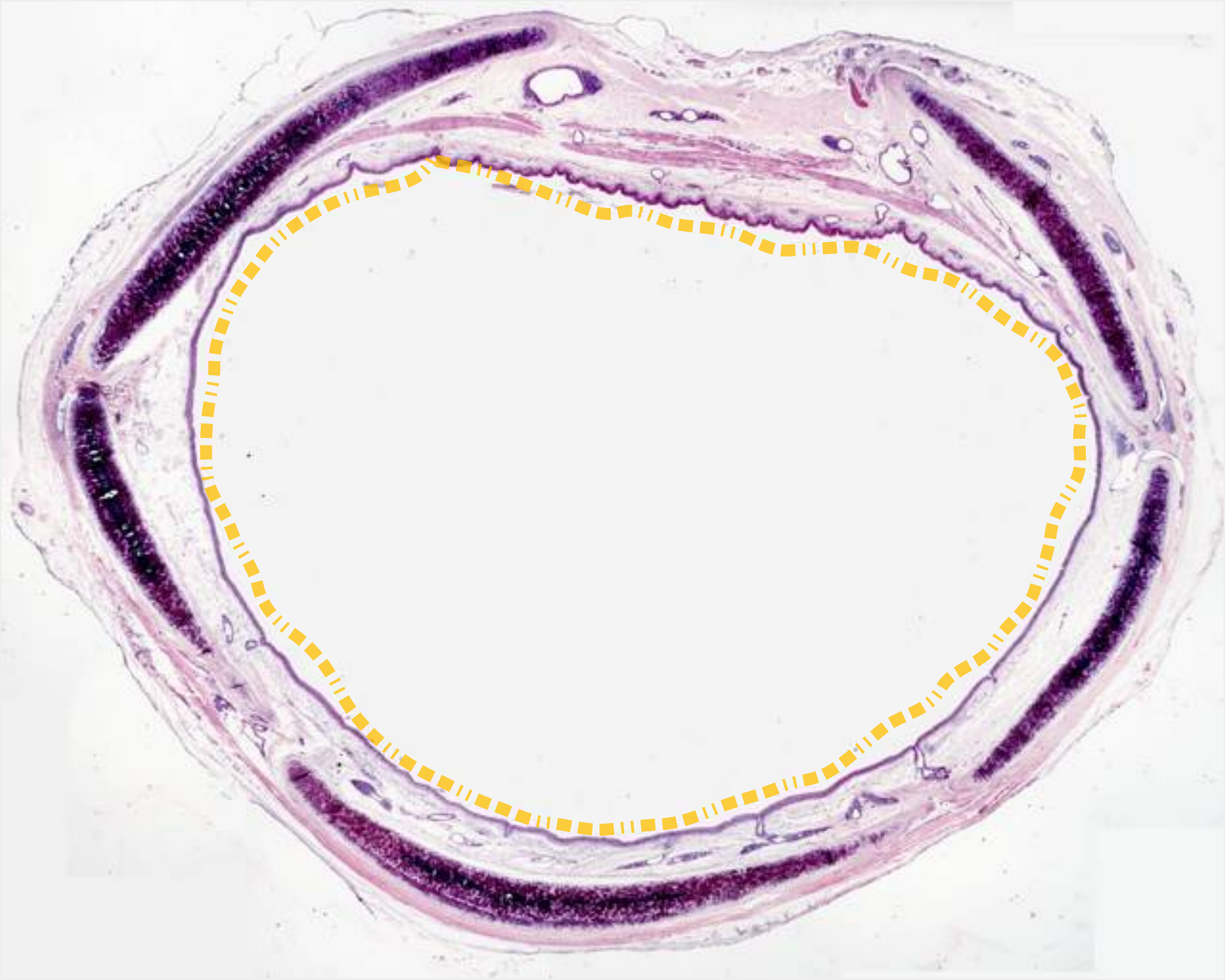
Q08a: Nostril



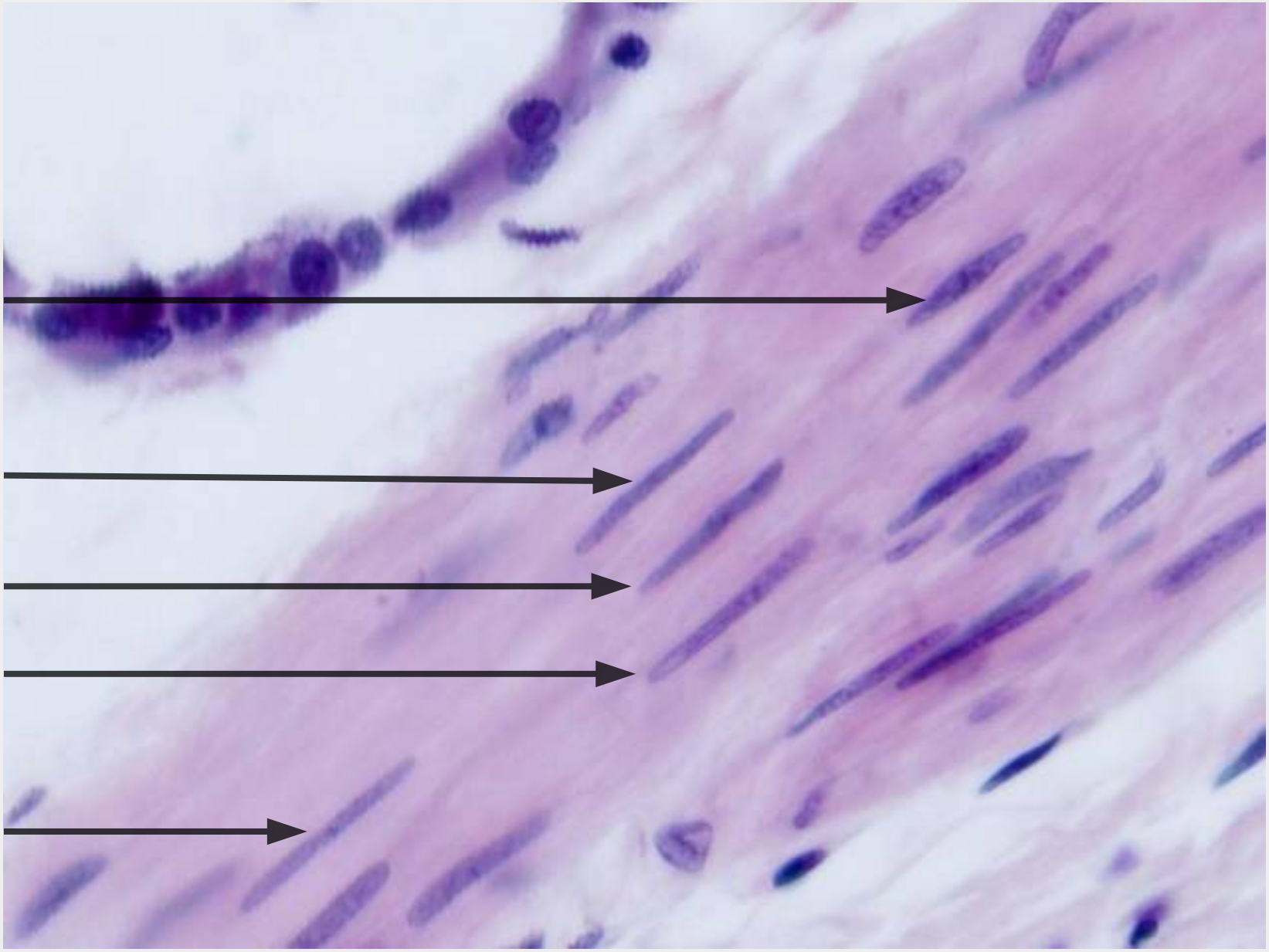
Q08a+b: List 3 transitions from outside to inside in the nostril.



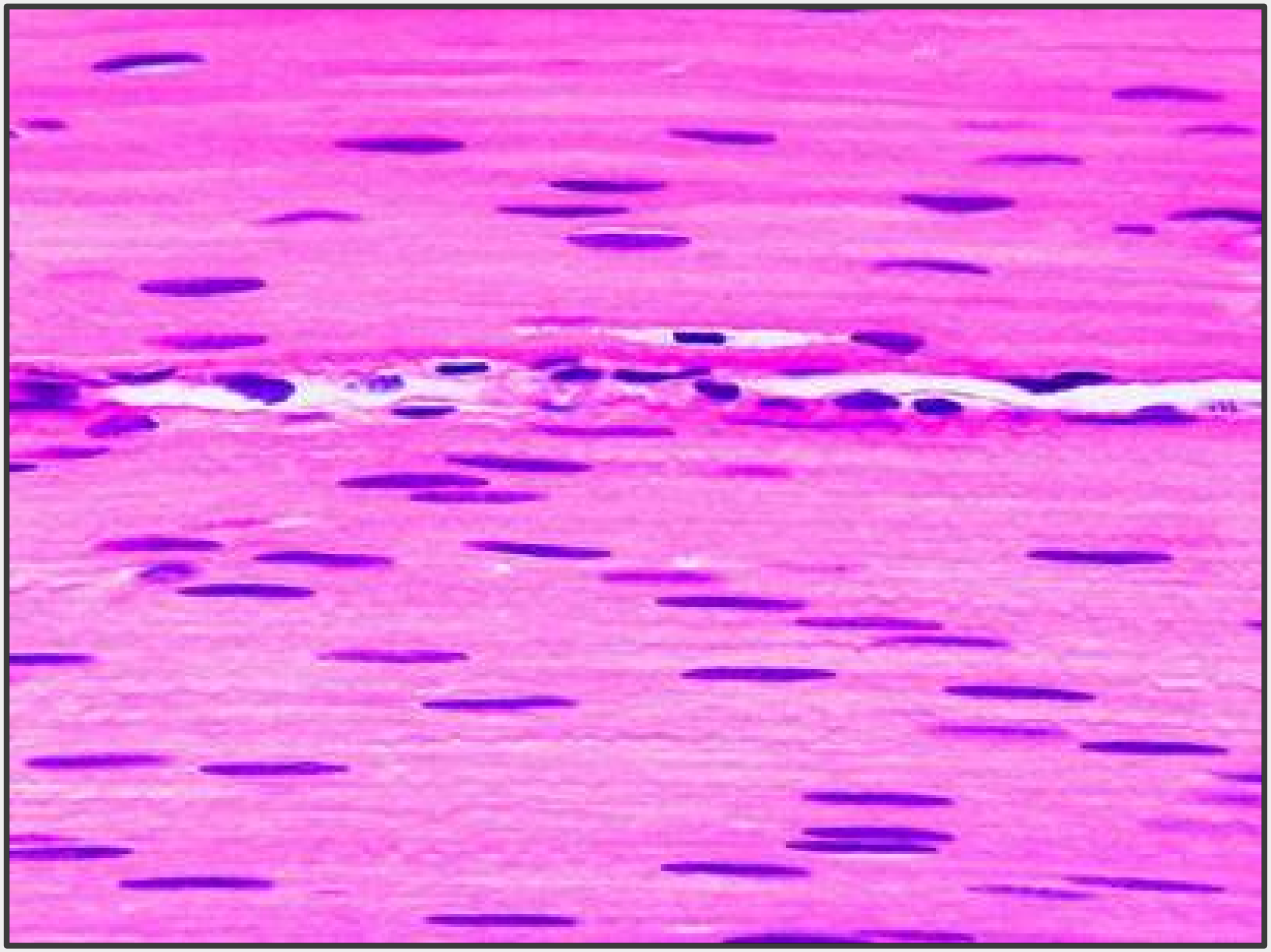
Q09: 4 cells - basal cells, goblet cells, ciliated and non-ciliated columnar cells



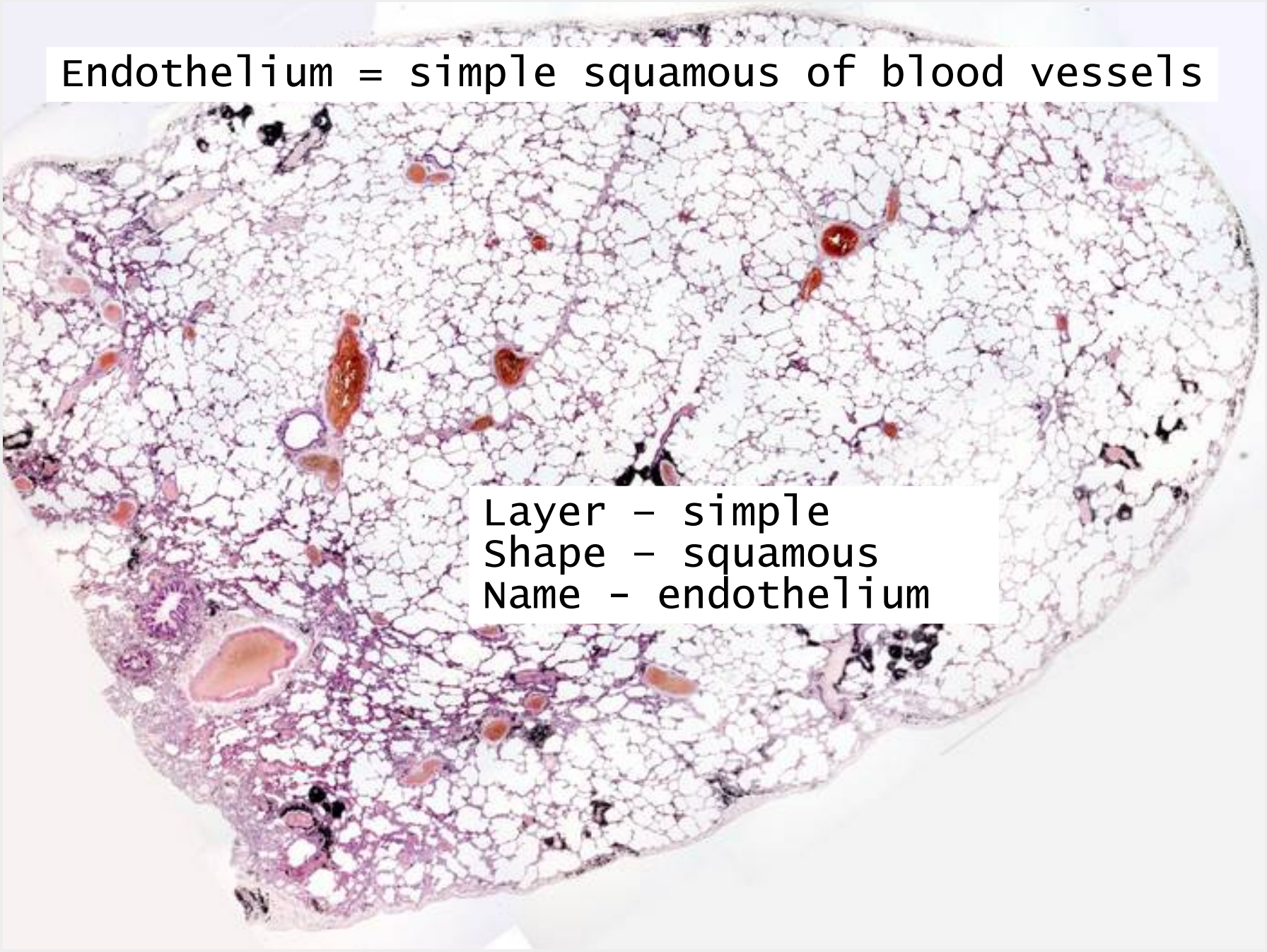
Q10a: Smooth muscle



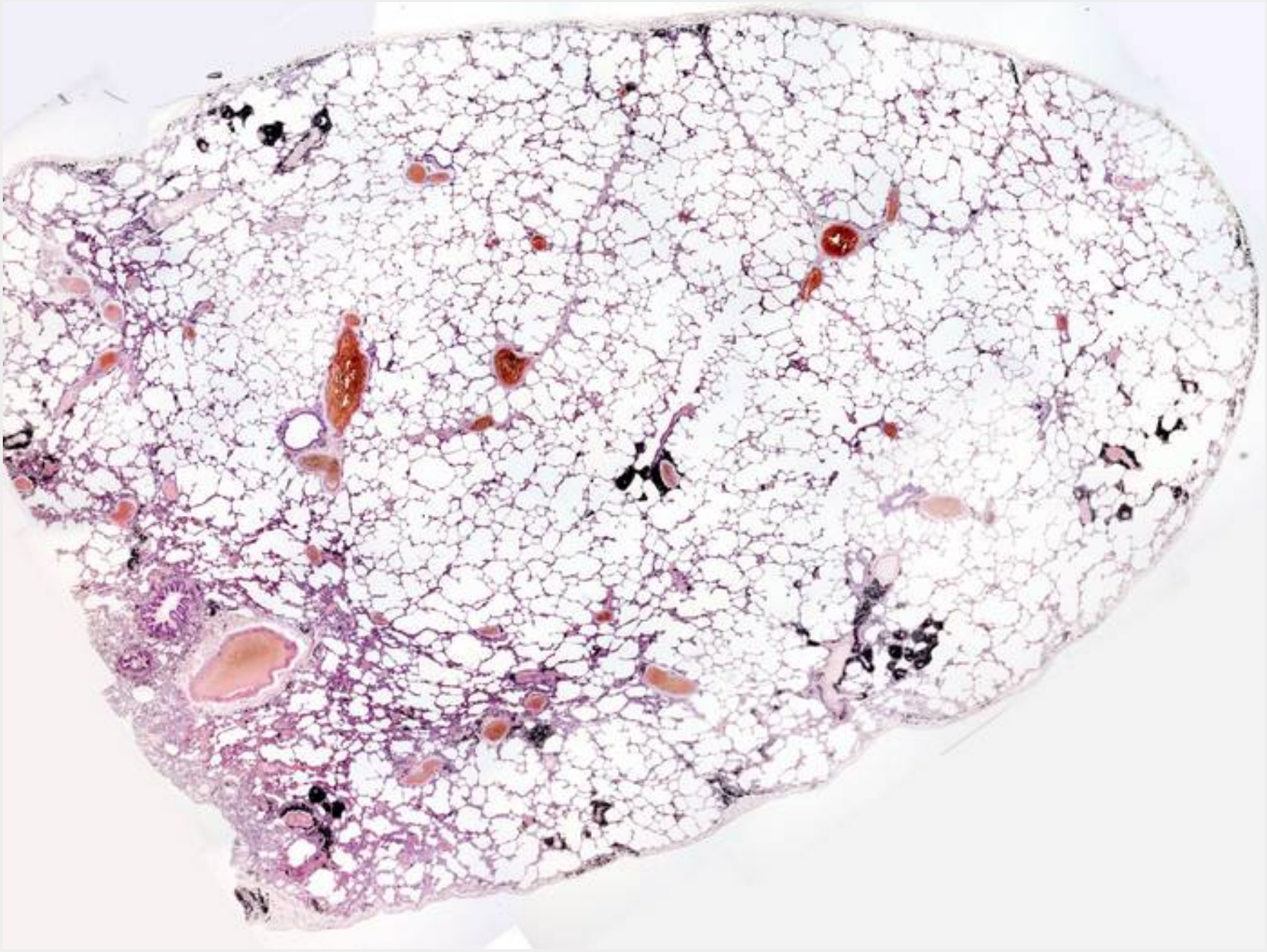
Q10b: Smooth muscle fibers – elongated spindle nuclei



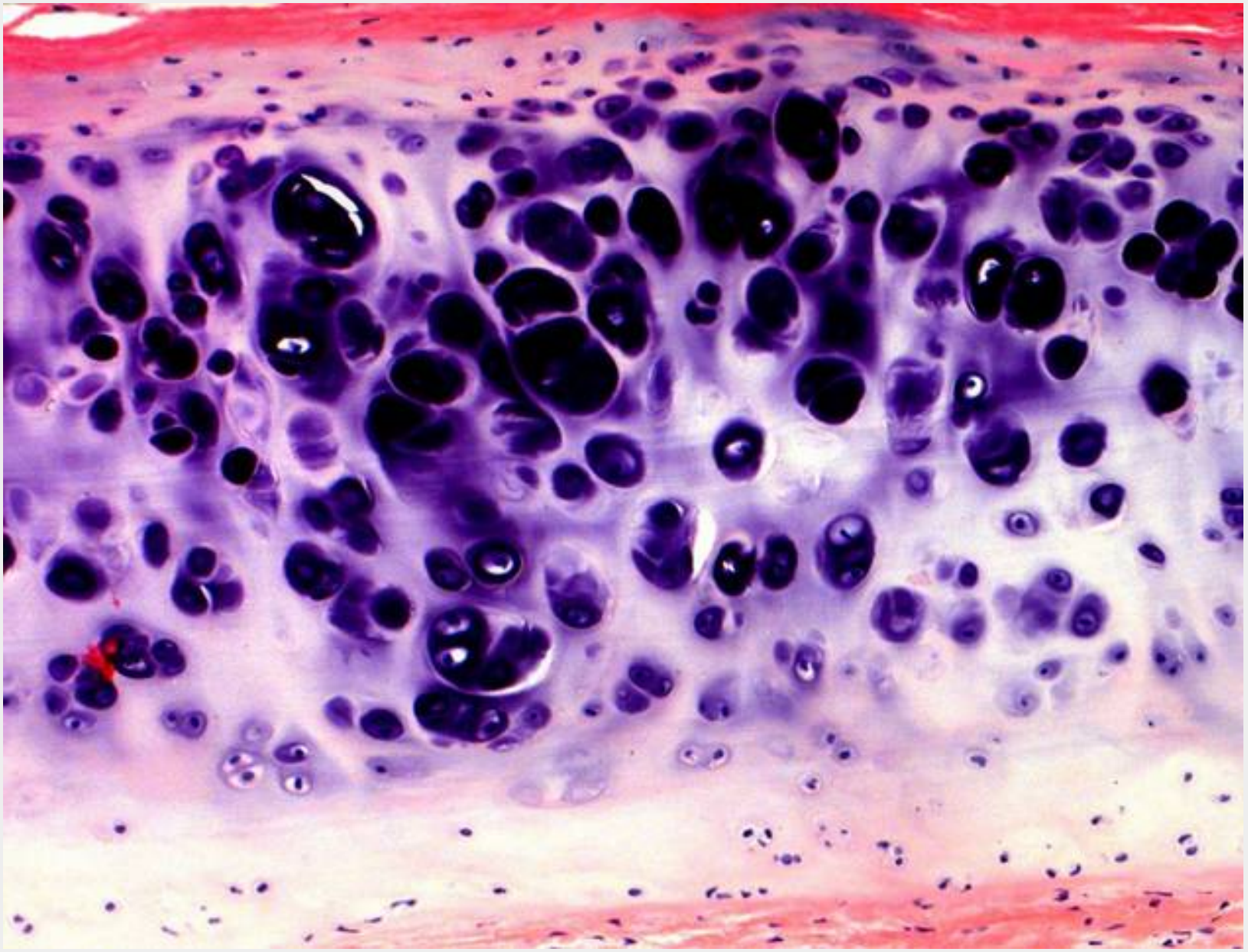
Q11a: Endothelium



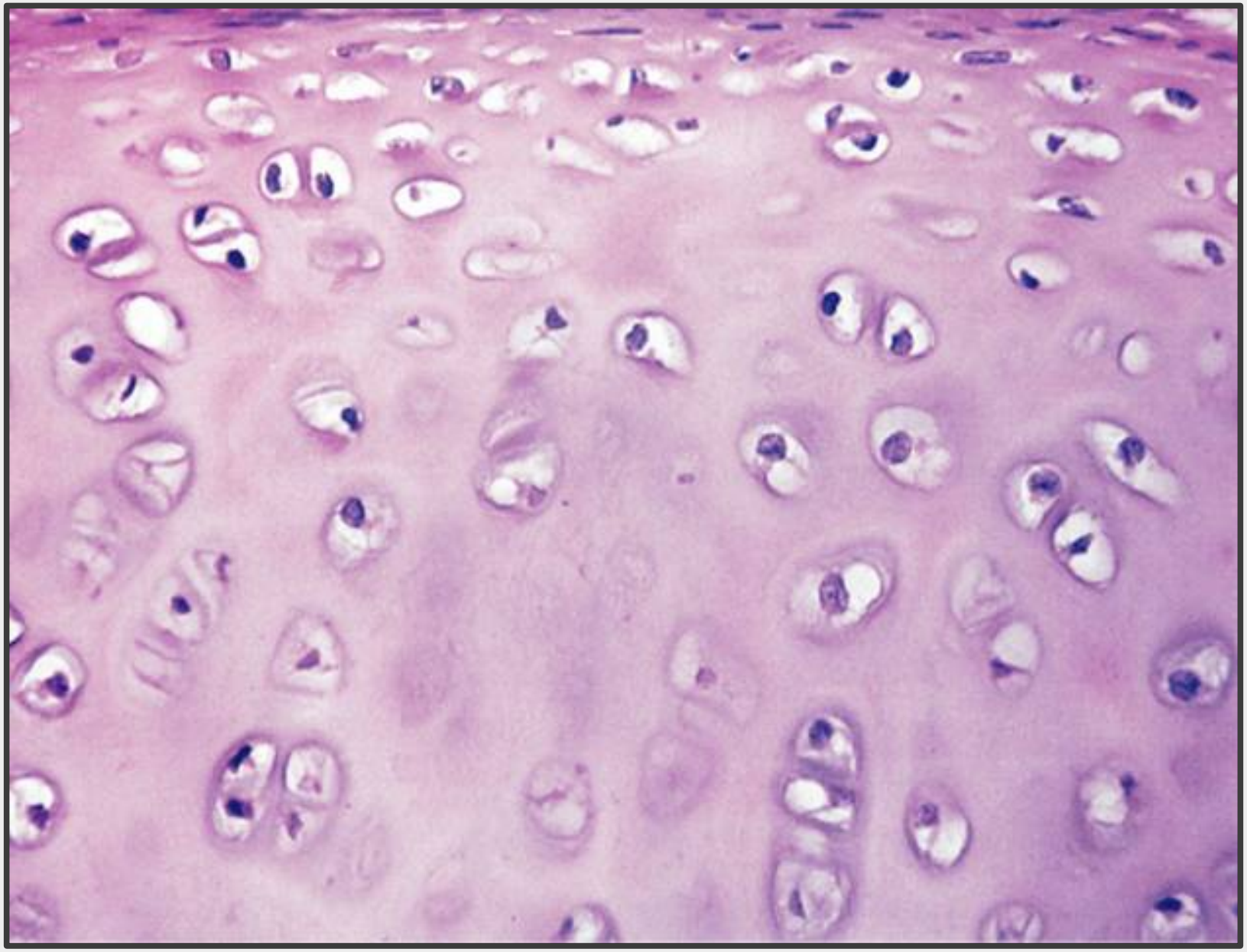
Q11b: Simple squamous (including endothelium)



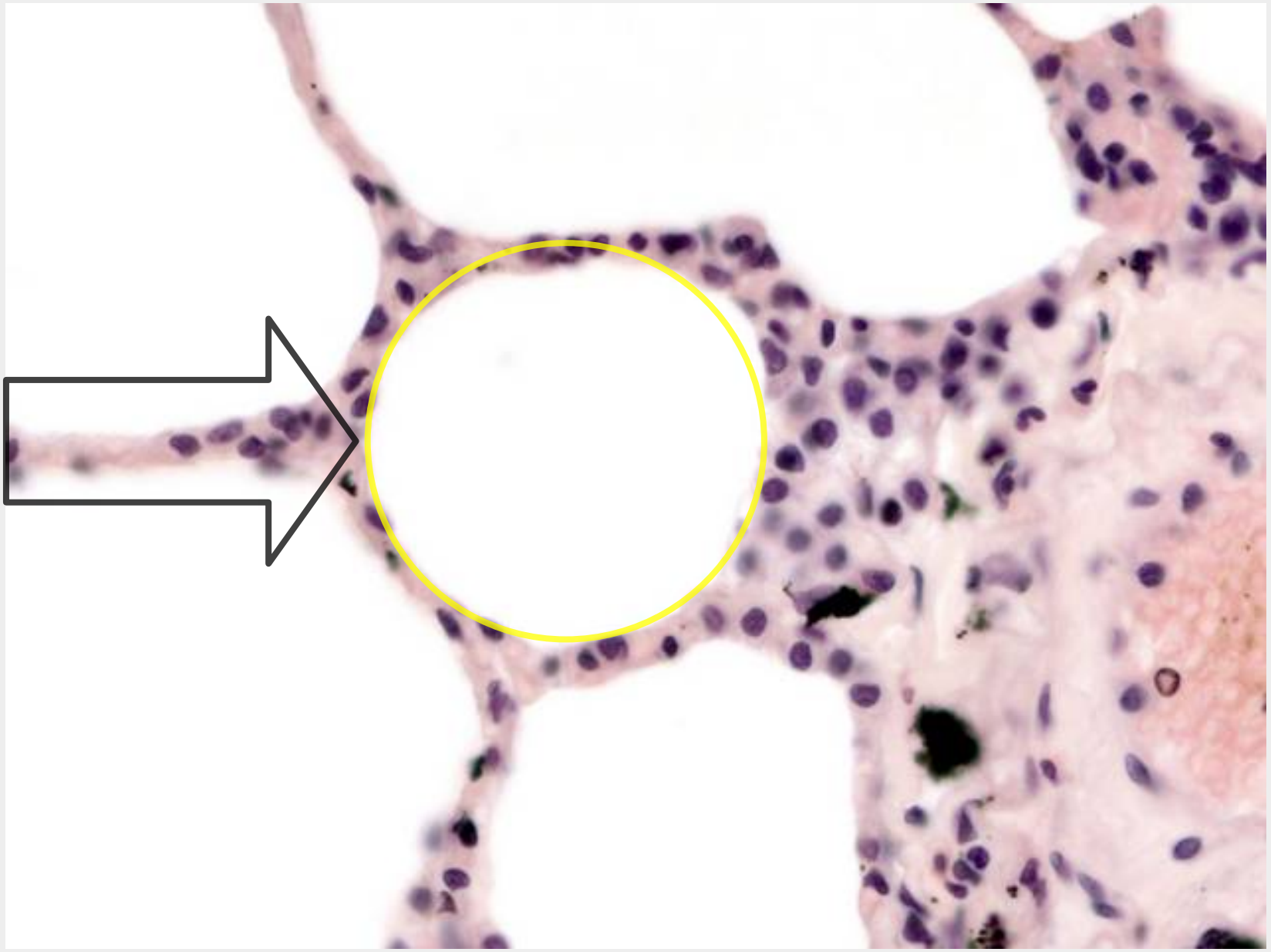
Q12a: Hyaline cartilage



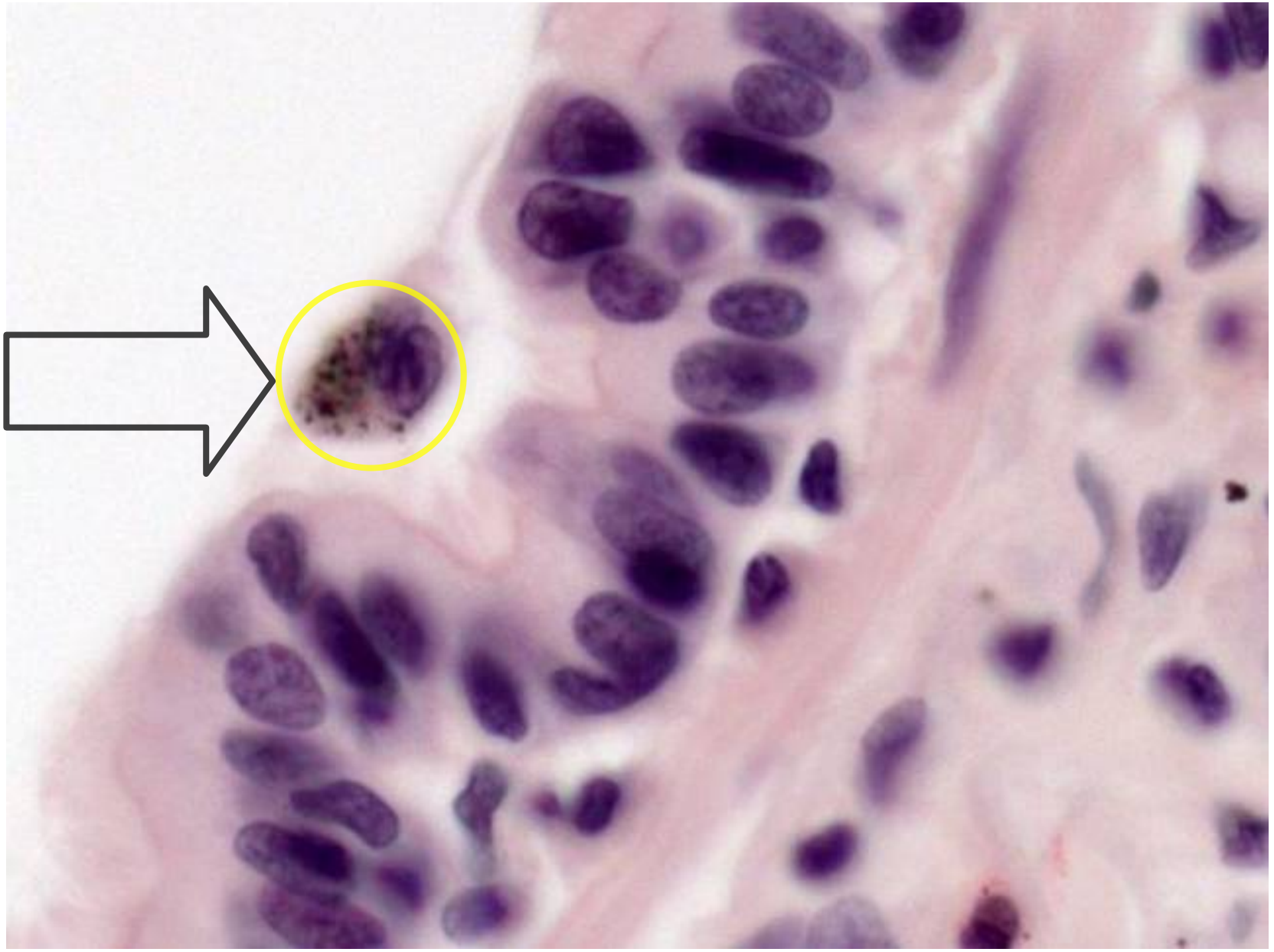
Q12b: Hyaline cartilage



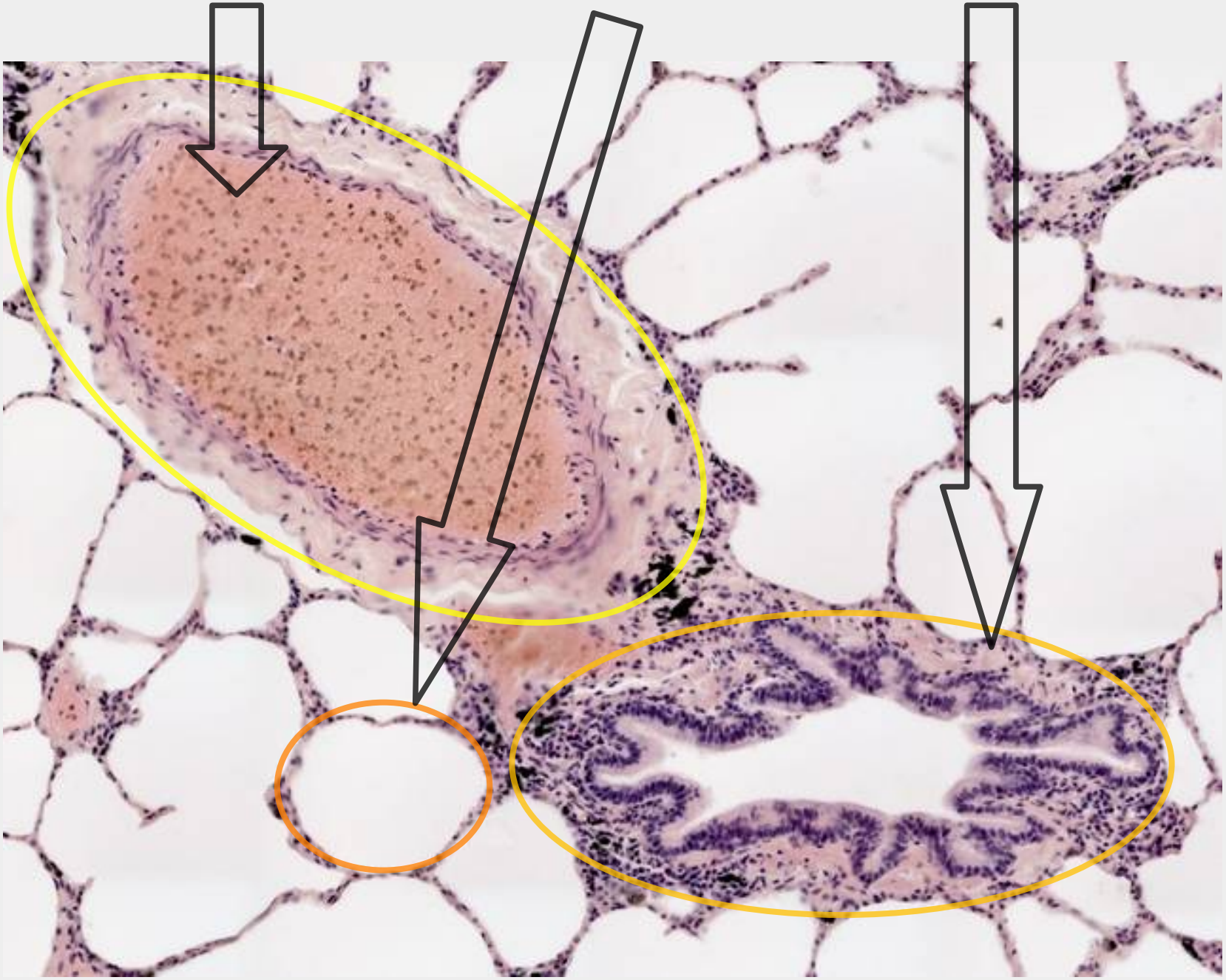
Q13a+b: Alveolus



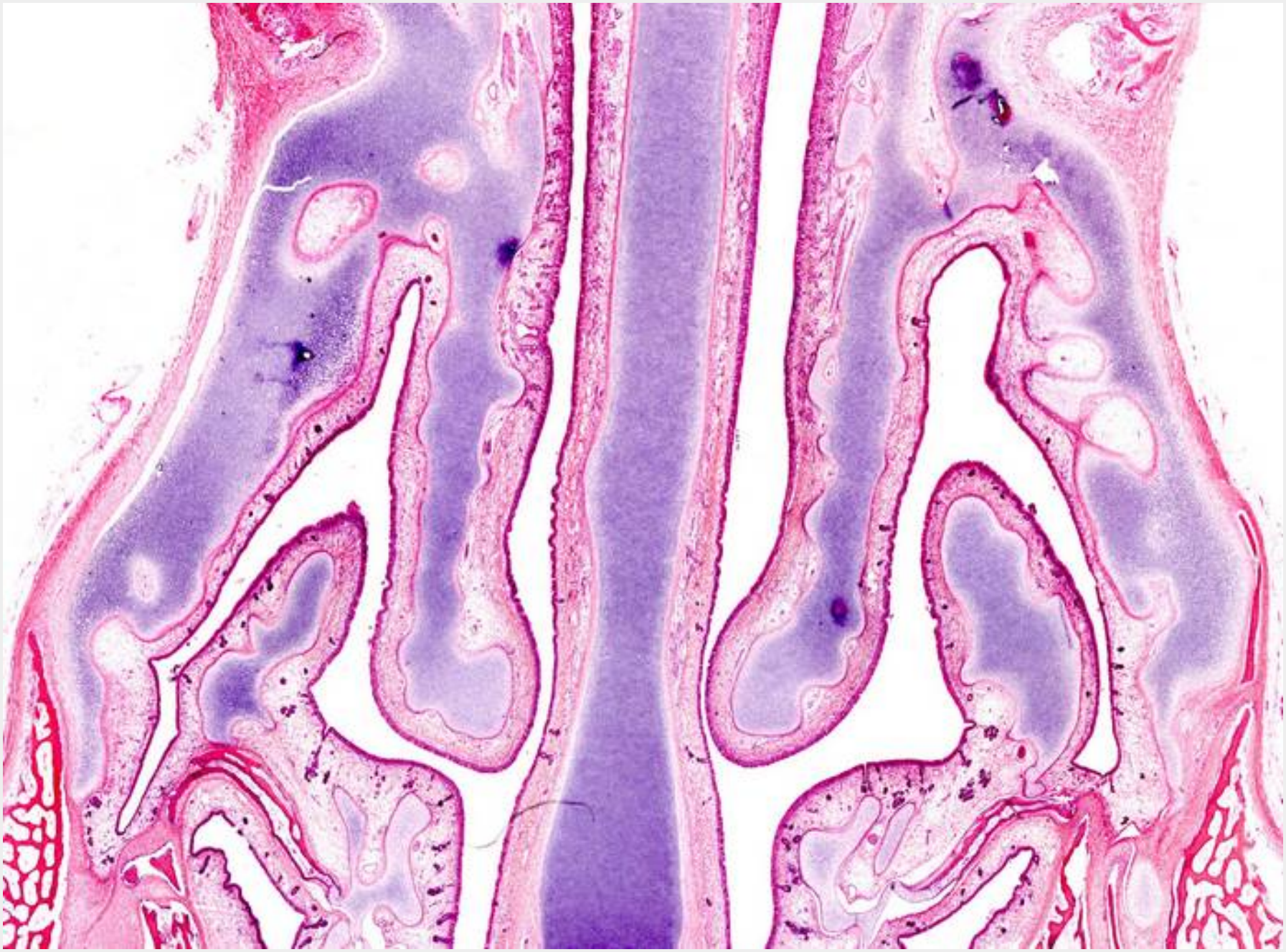
Q14a+b: Macrophage – filled with carbon



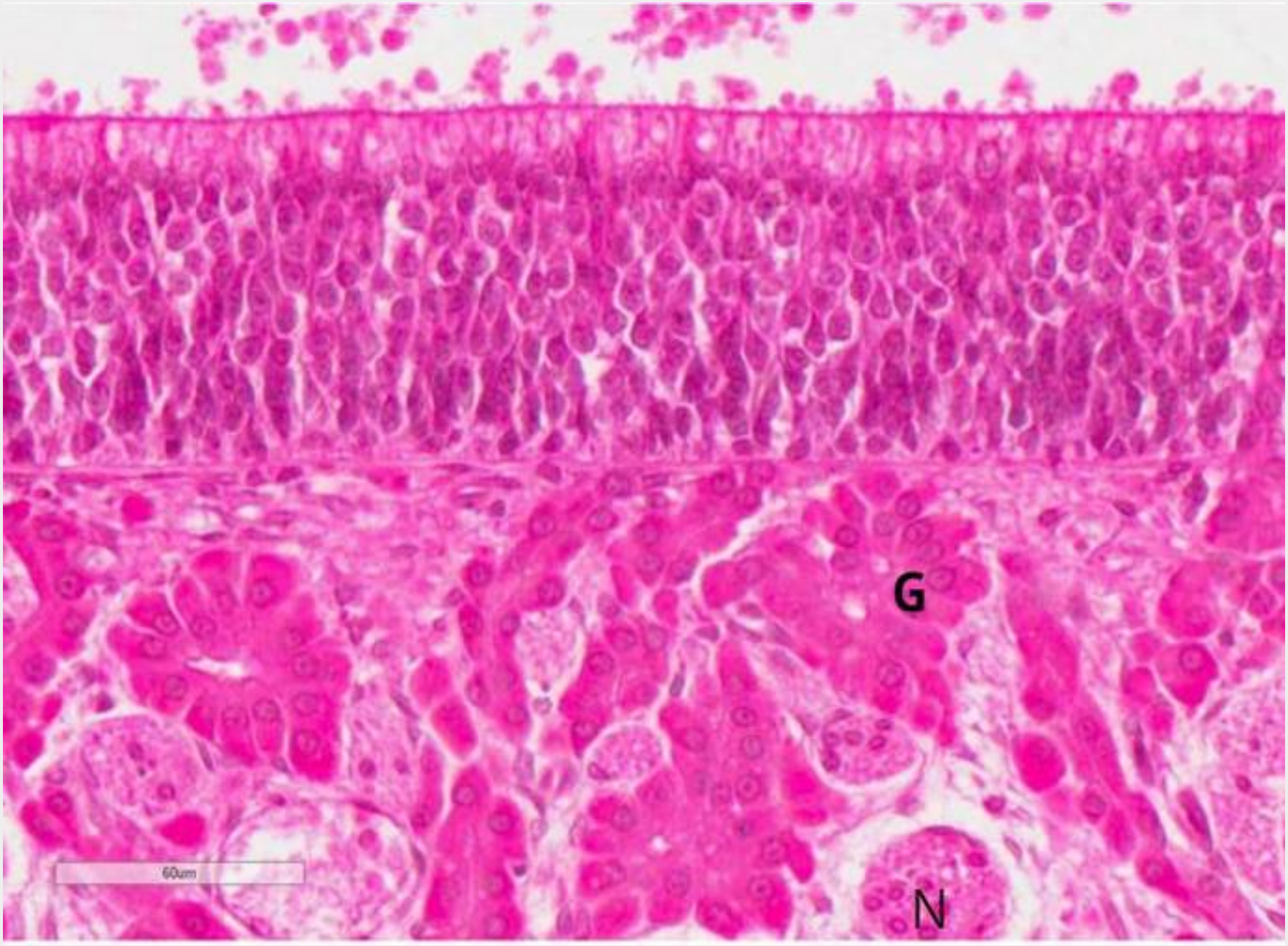
Q15a+b: Blood vessel, alveolus, bronchiole, nerves, lymph vessels



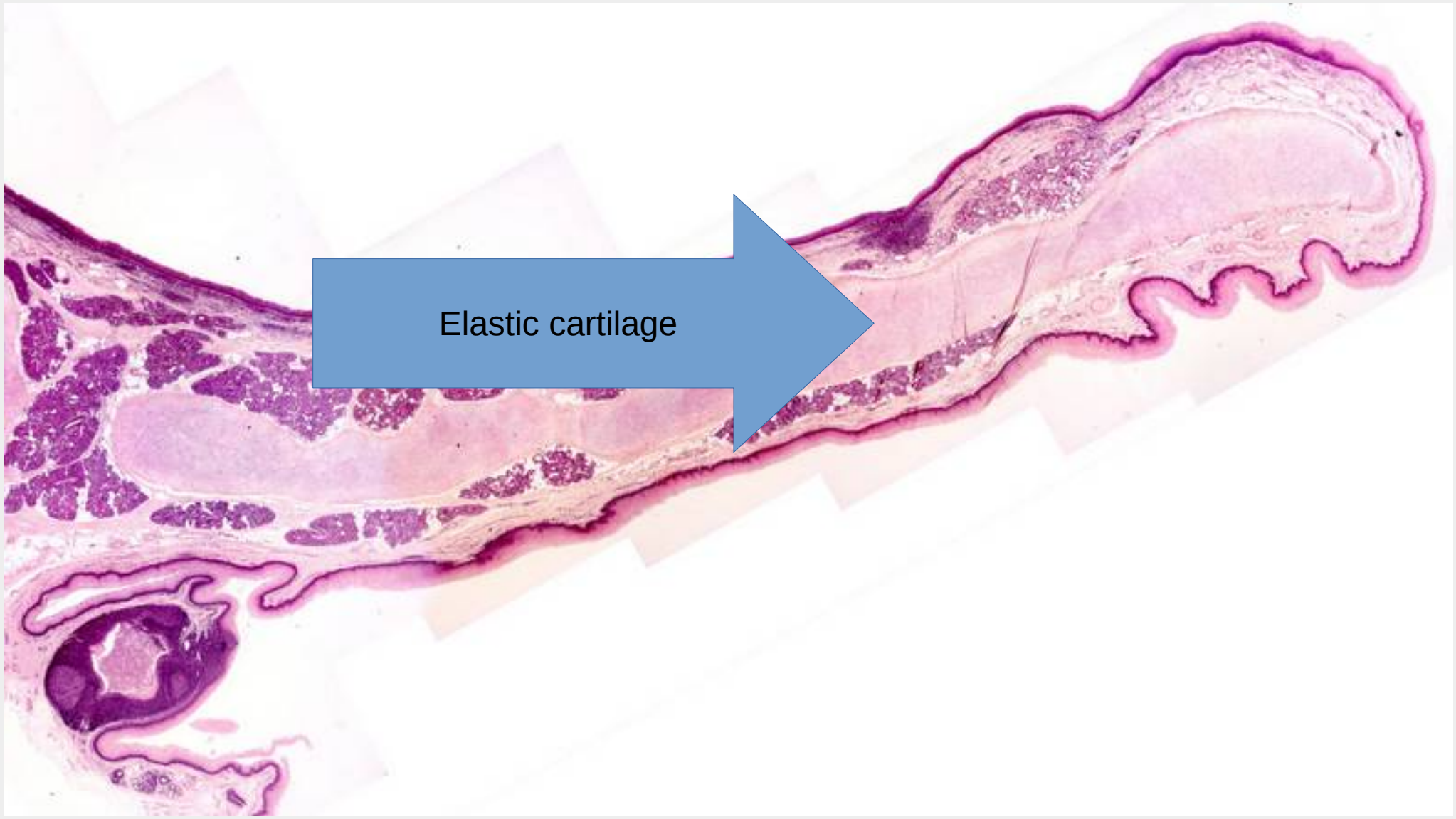
Q16a: Olfactory epithelium



Q16b: Olfactory epithelium

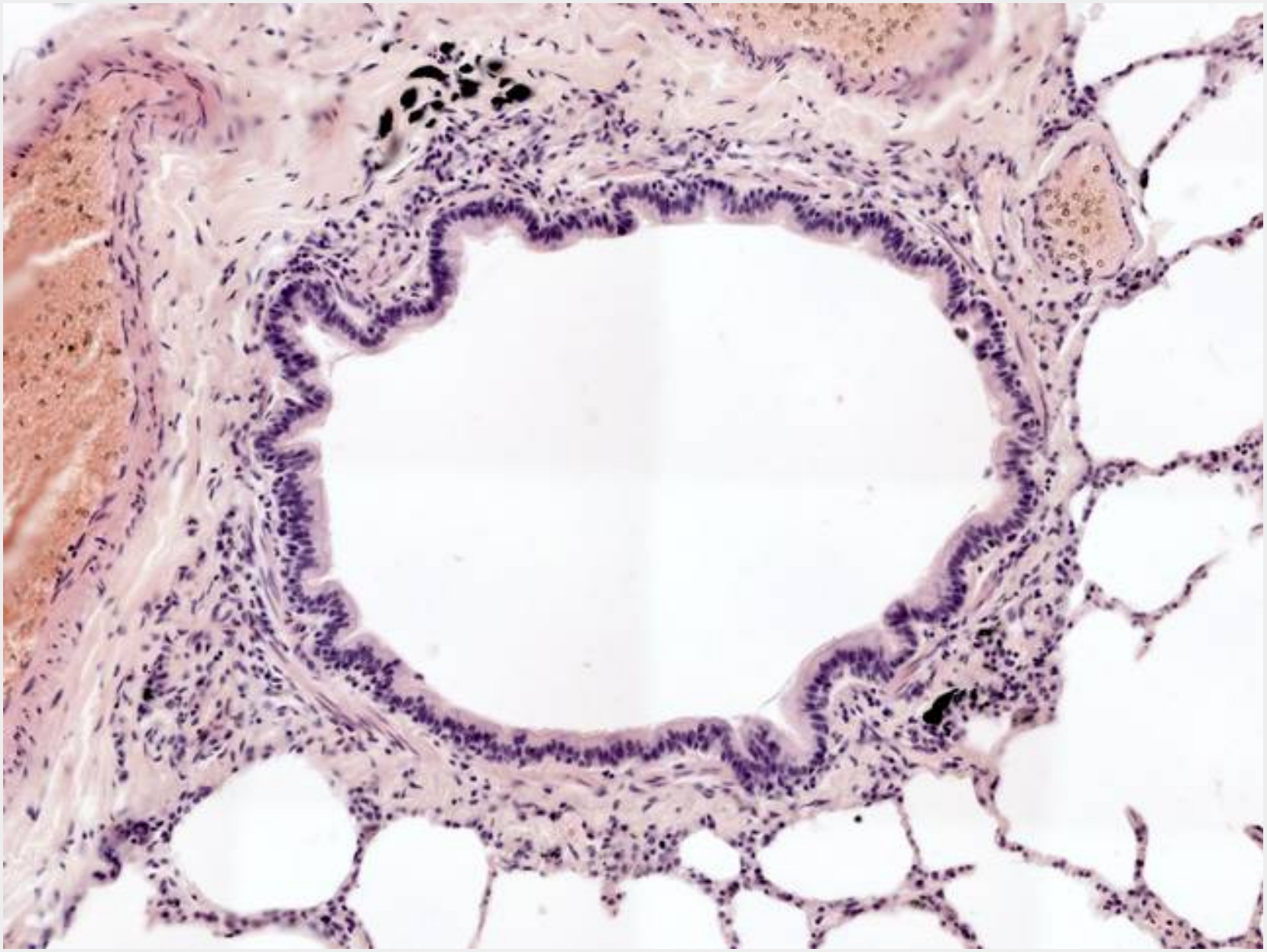


Q17a: Epiglottis

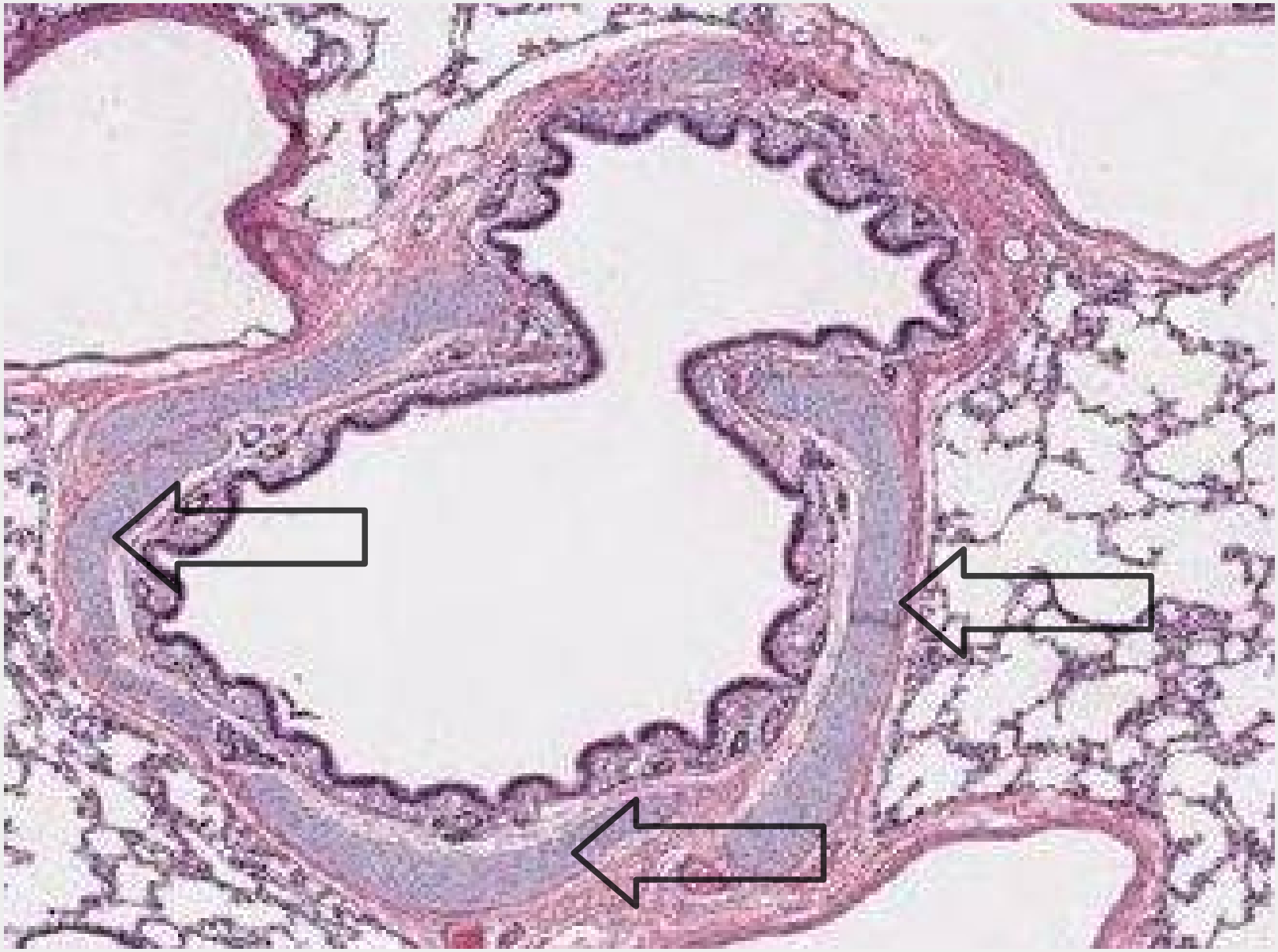


Q17b: Epiglottis

Q18a: Bronchiole



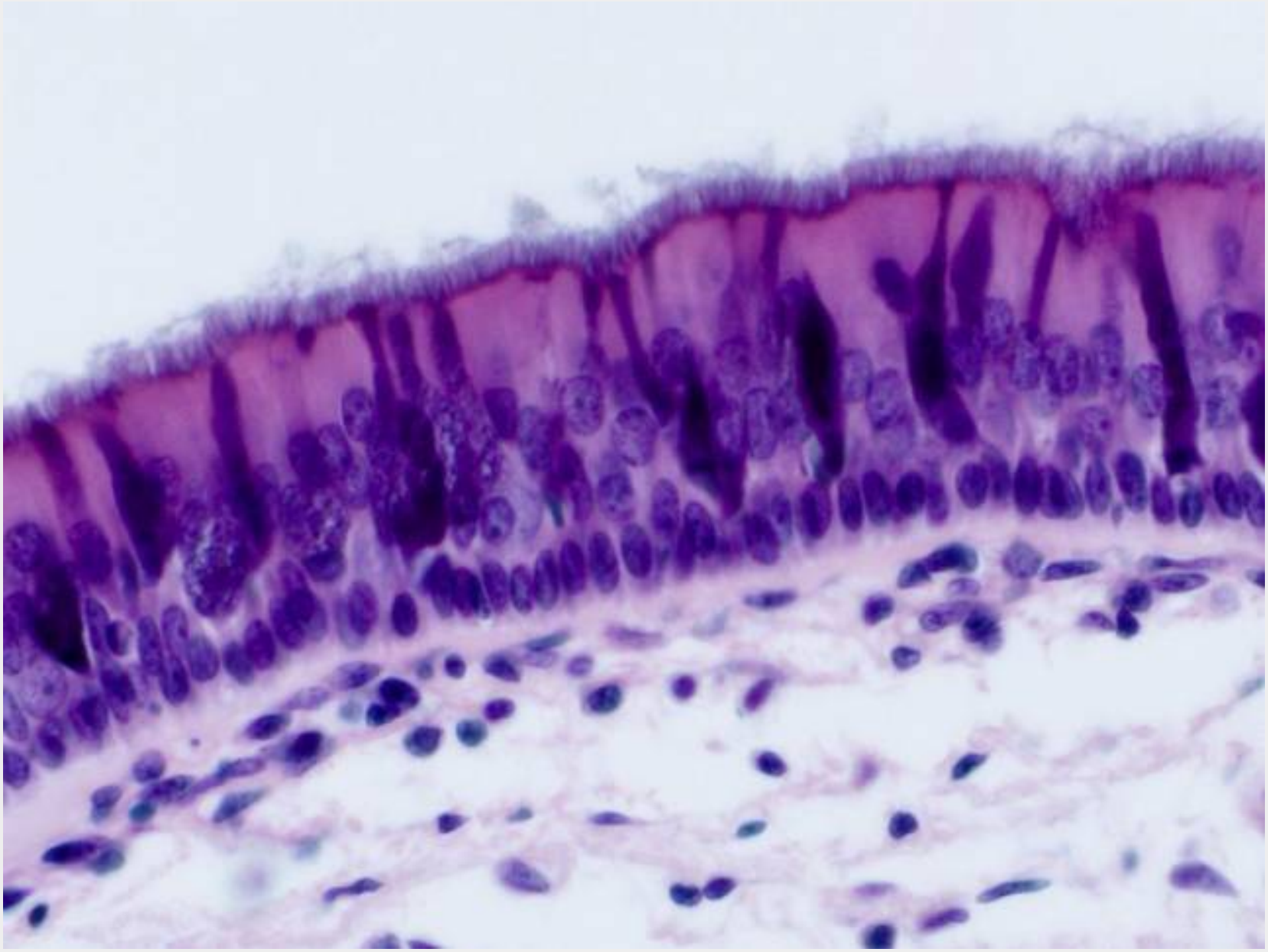
Q18b: Bronchus



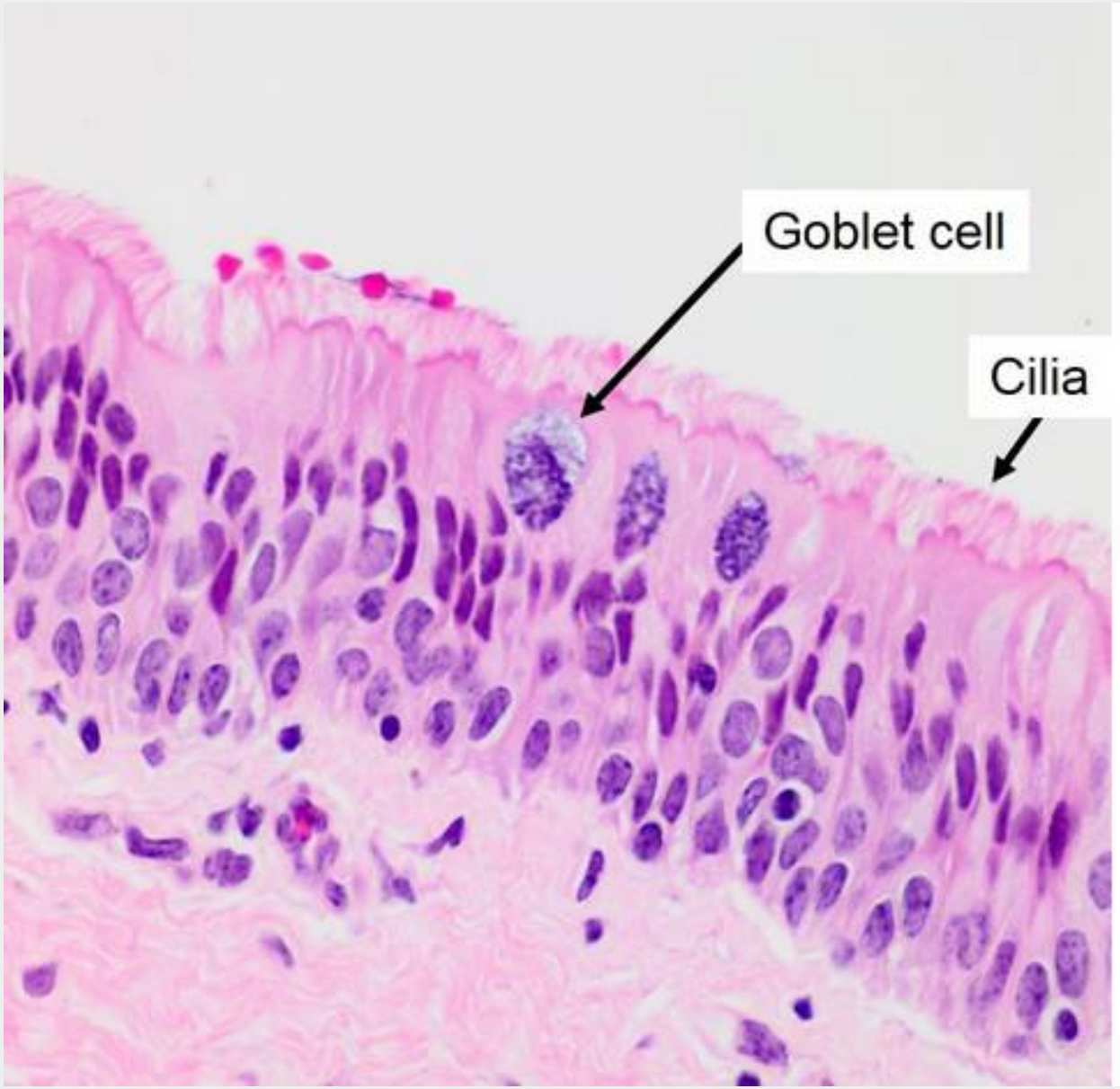
Q19a: Trachea

Q19b: Lymph nodule

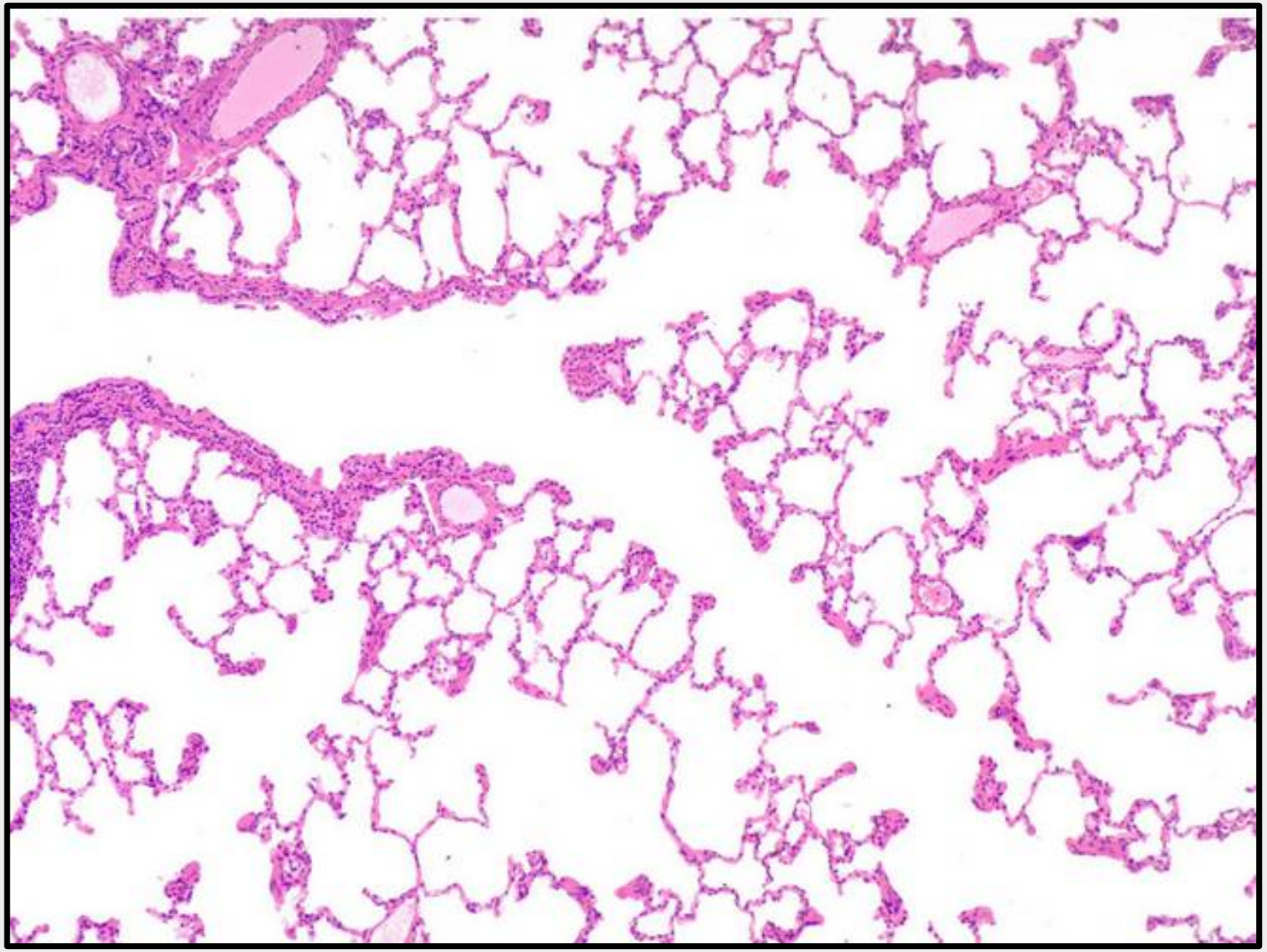
Q20a: Pseudostratified columnar epithelium



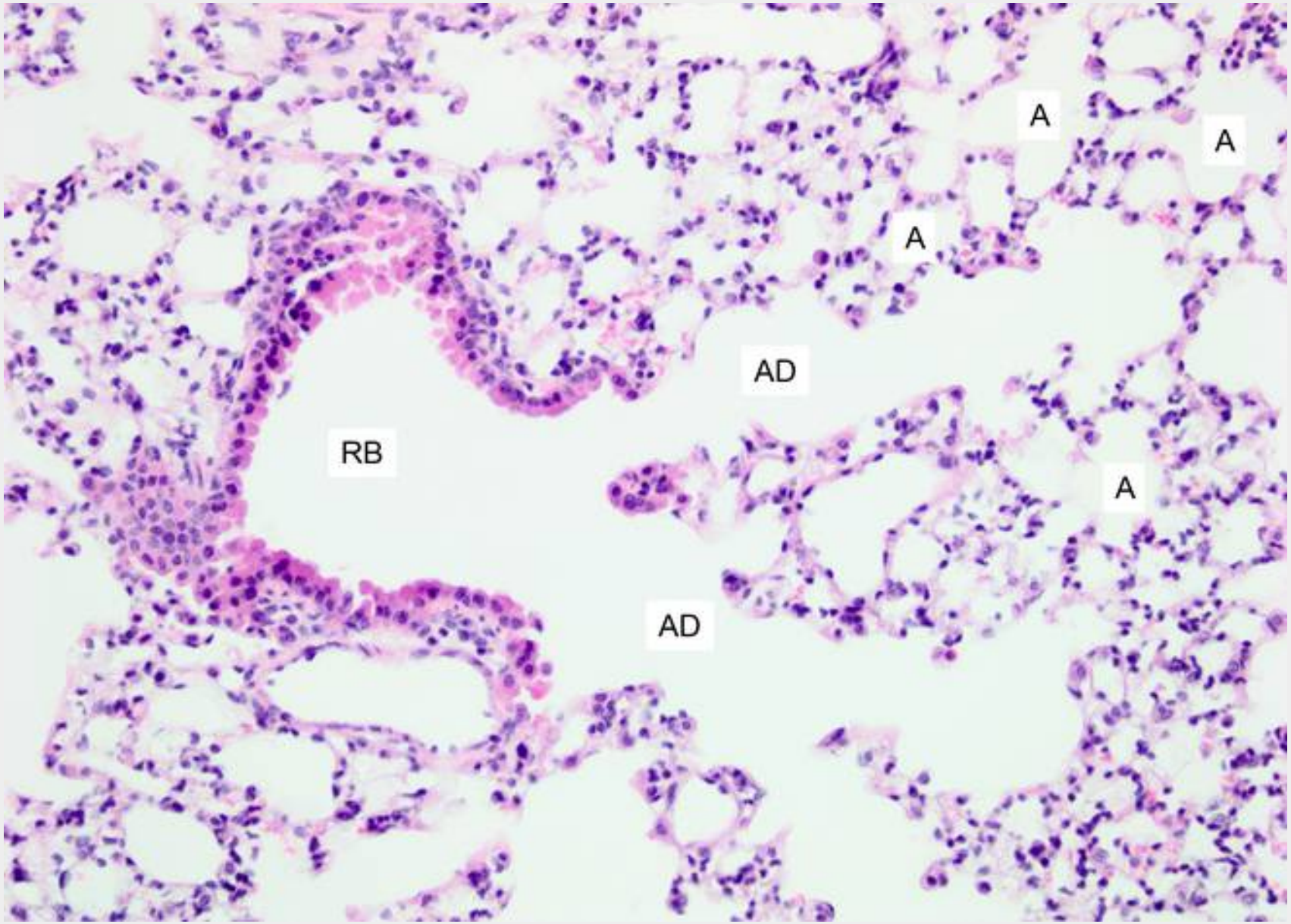
Q20b: Pseudostratified ciliated columnar epithelium



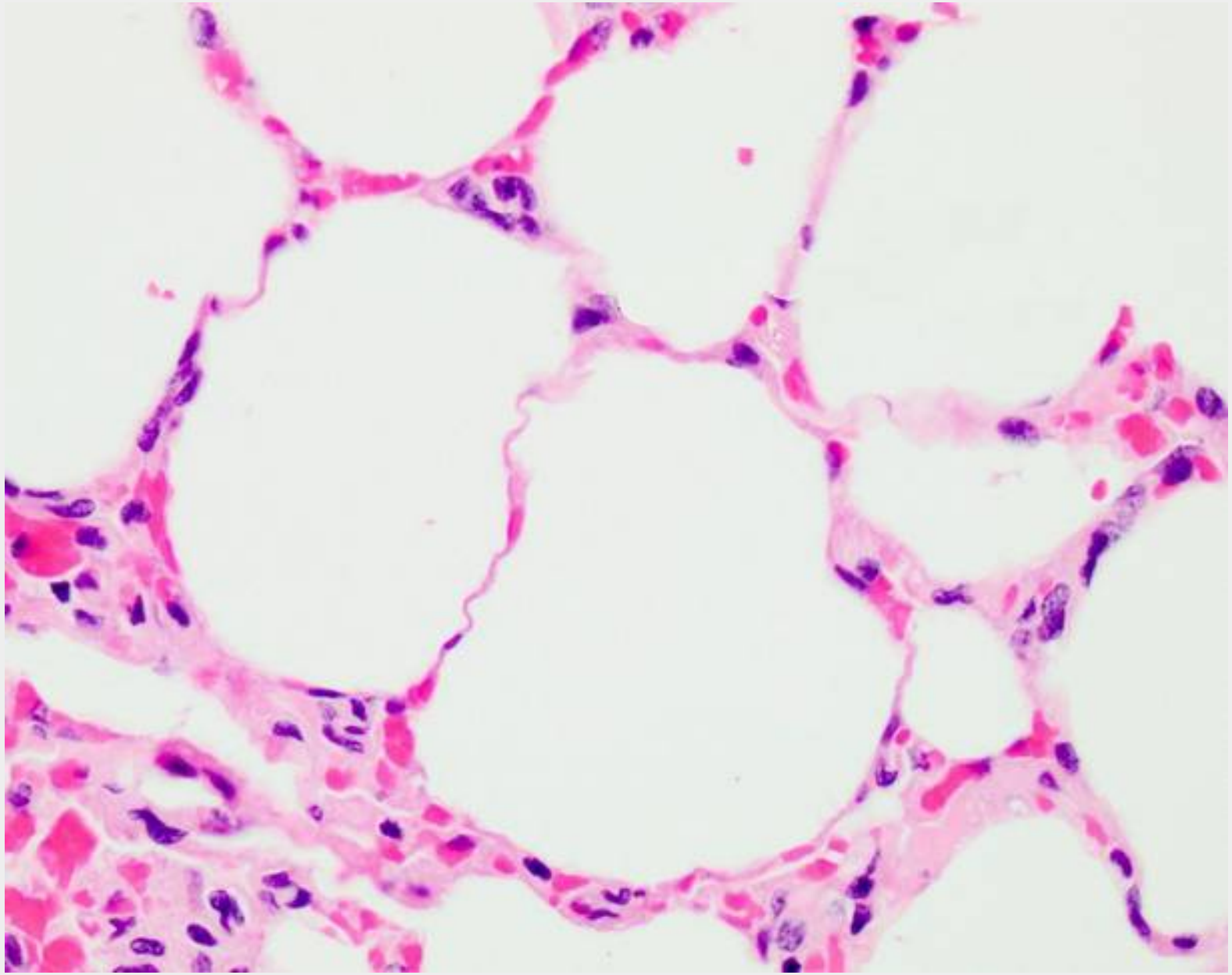
Q21a: Respiratory bronchiole, Alveolus & Blood-Air Barrier



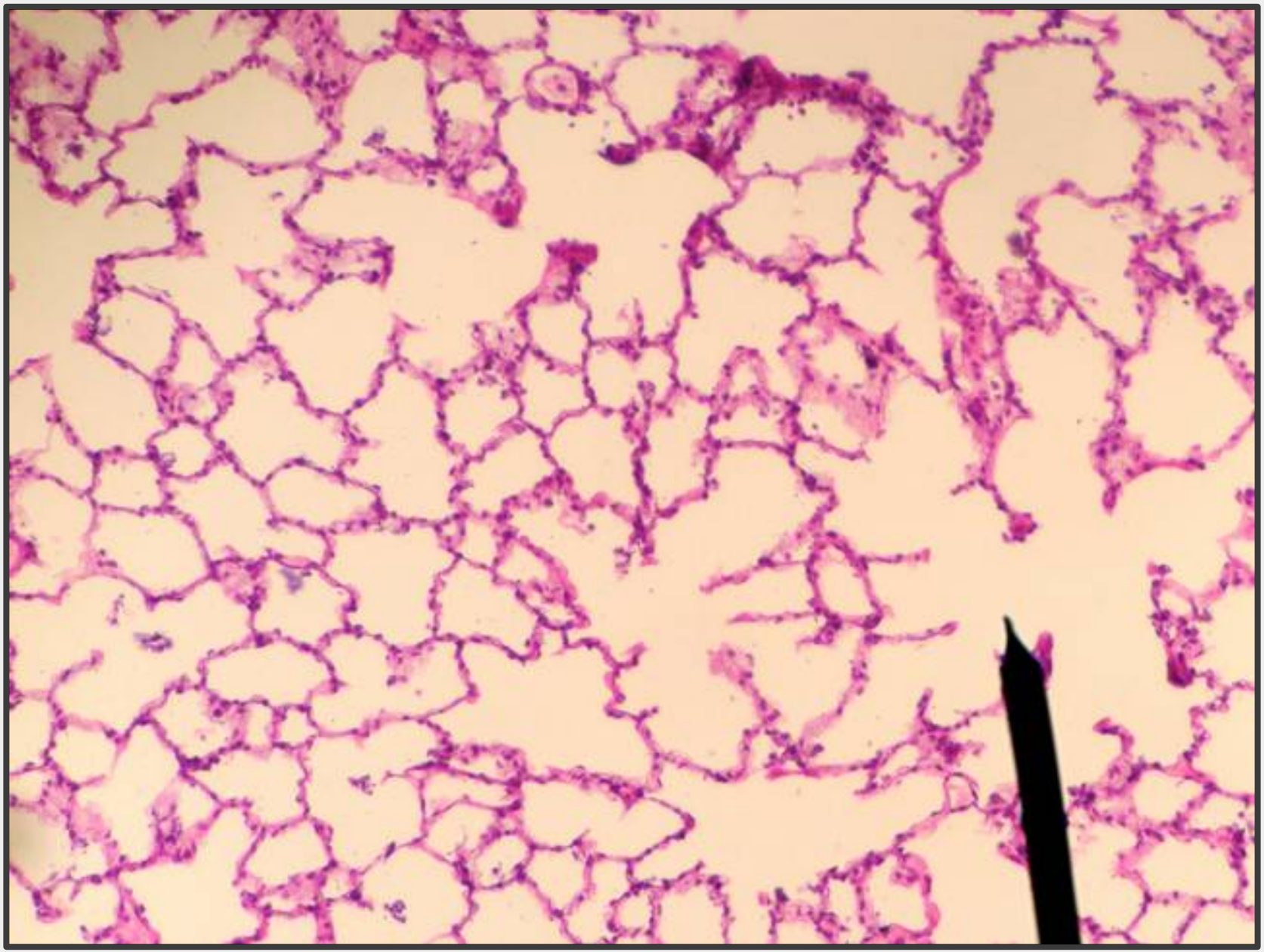
Q21b: Respiratory bronchiole, Alveolus & Blood-Air Barrier



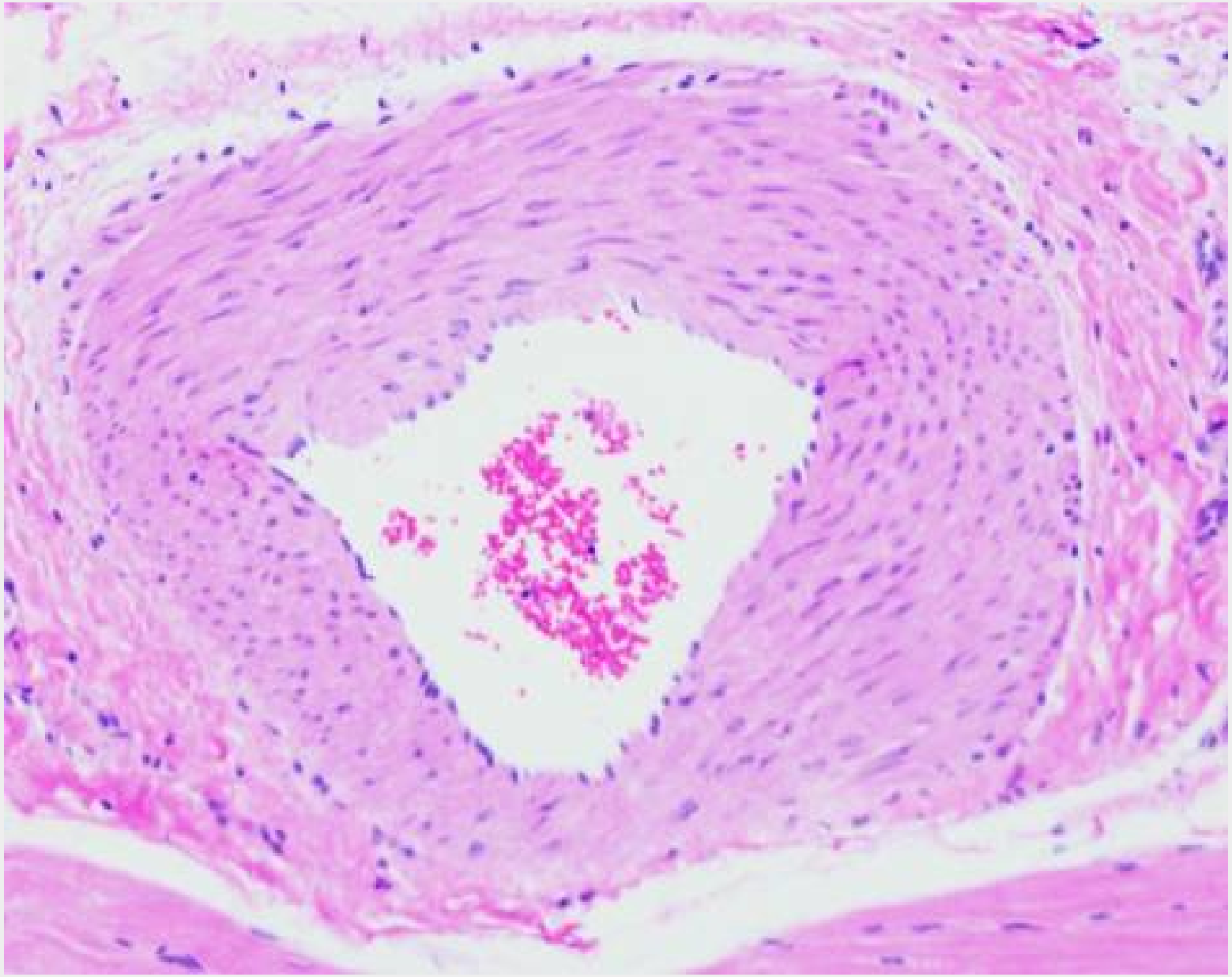
Q22a: Lung



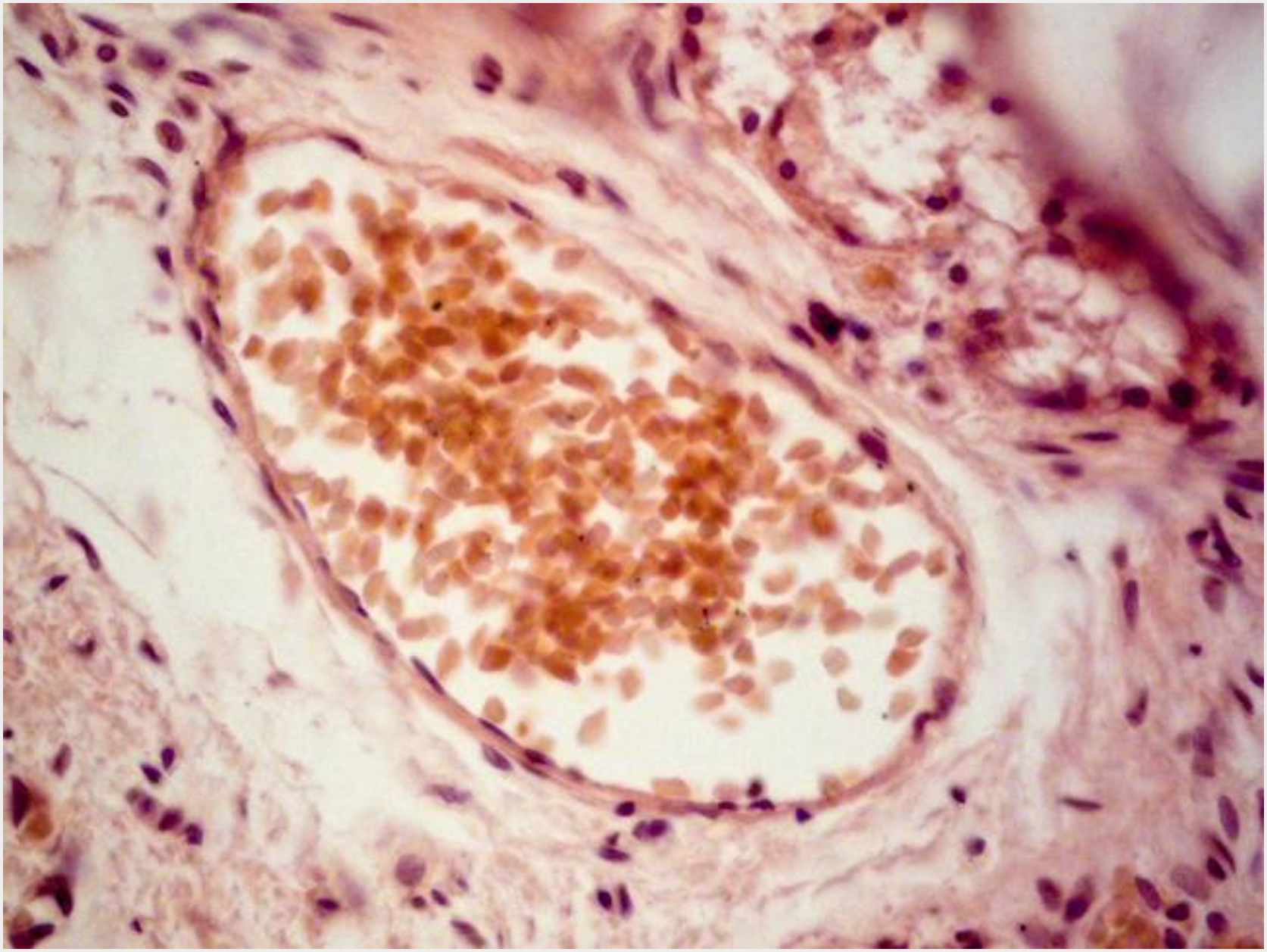
Q22b: Lung



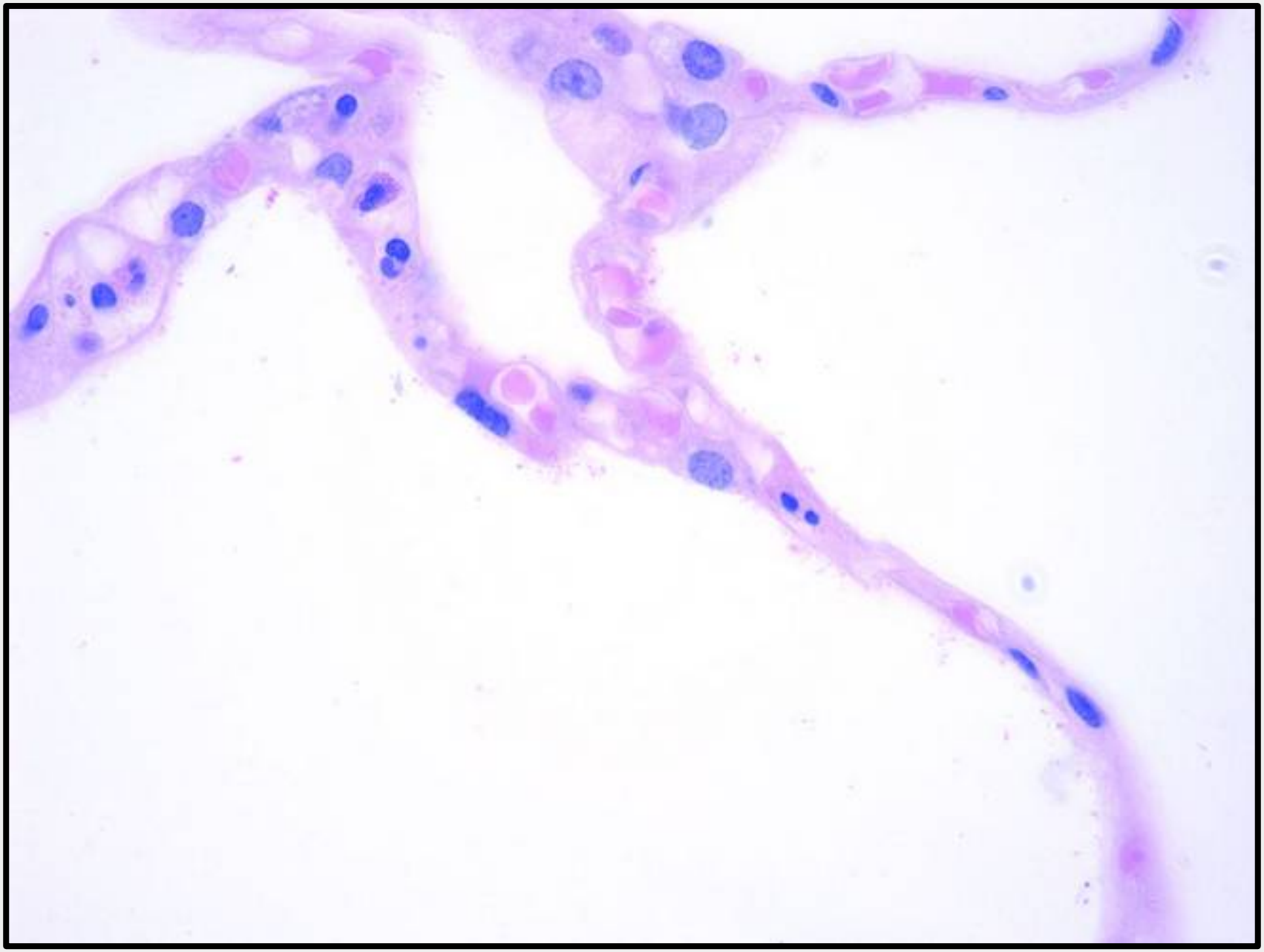
Q23a: Blood vessel – artery.



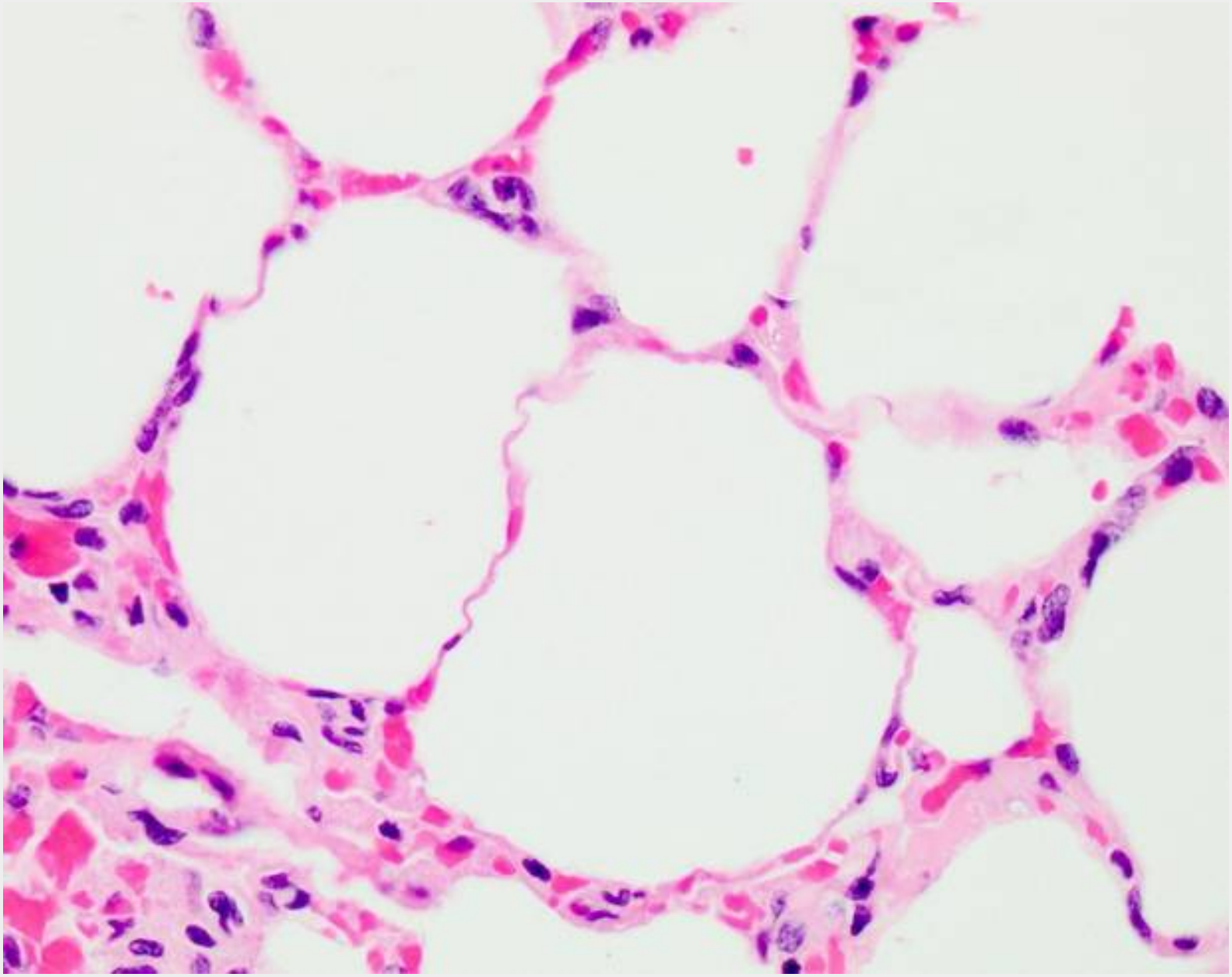
Q23b: Blood vessel = vein



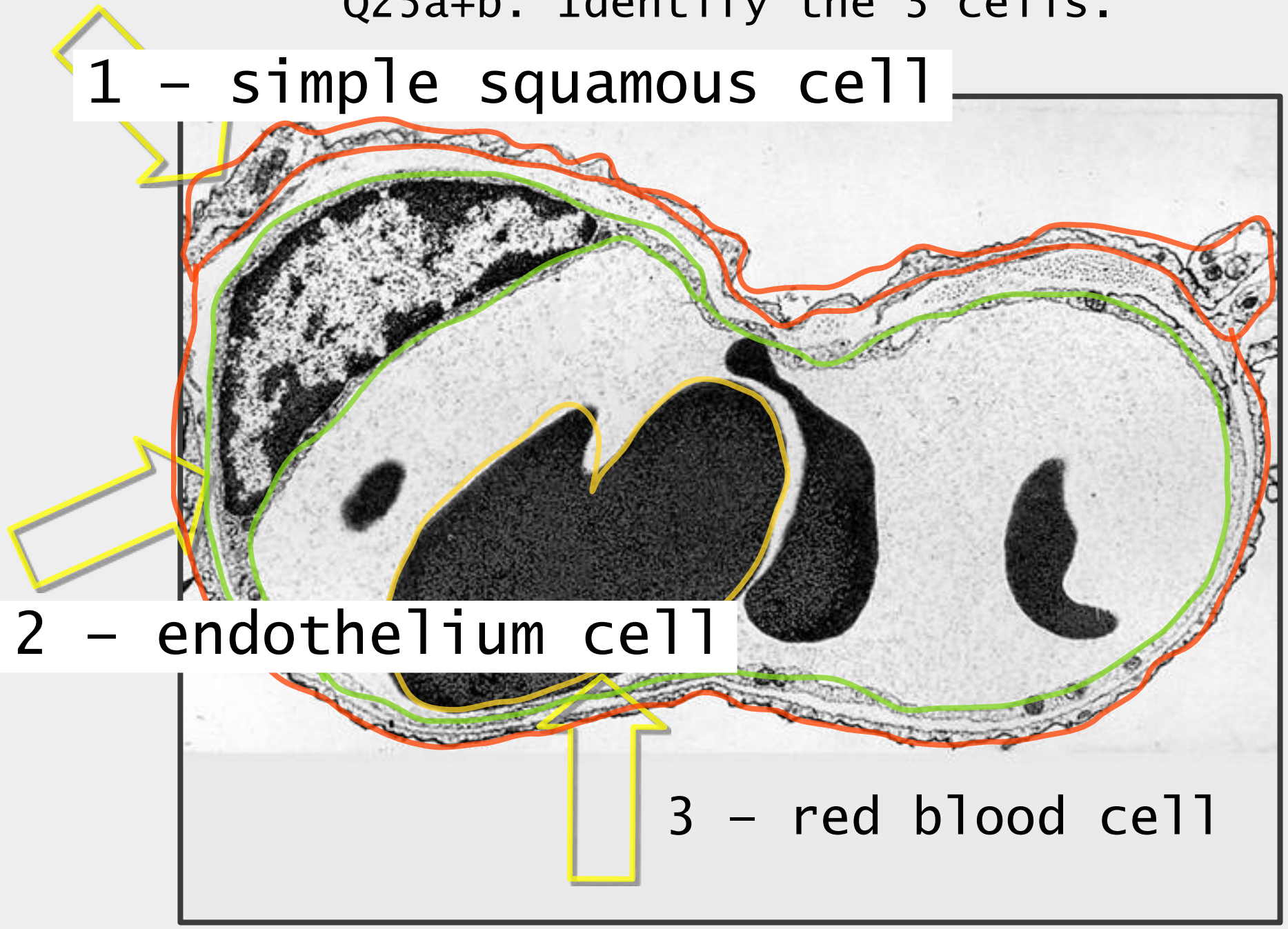
Q24a: Blood-Air Barrier & Alveolus



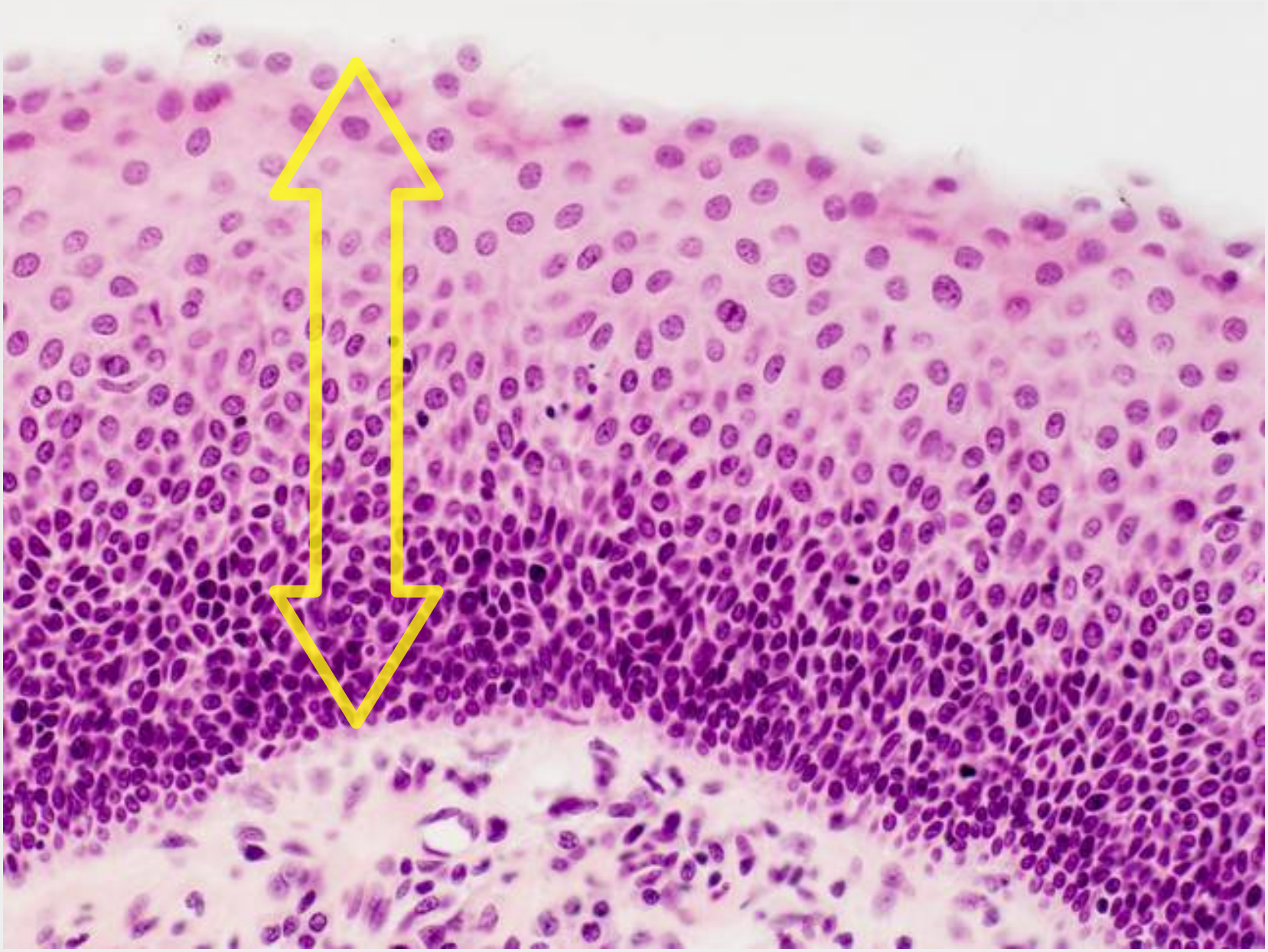
Q24b: Gas exchange – O2 in CO2 out



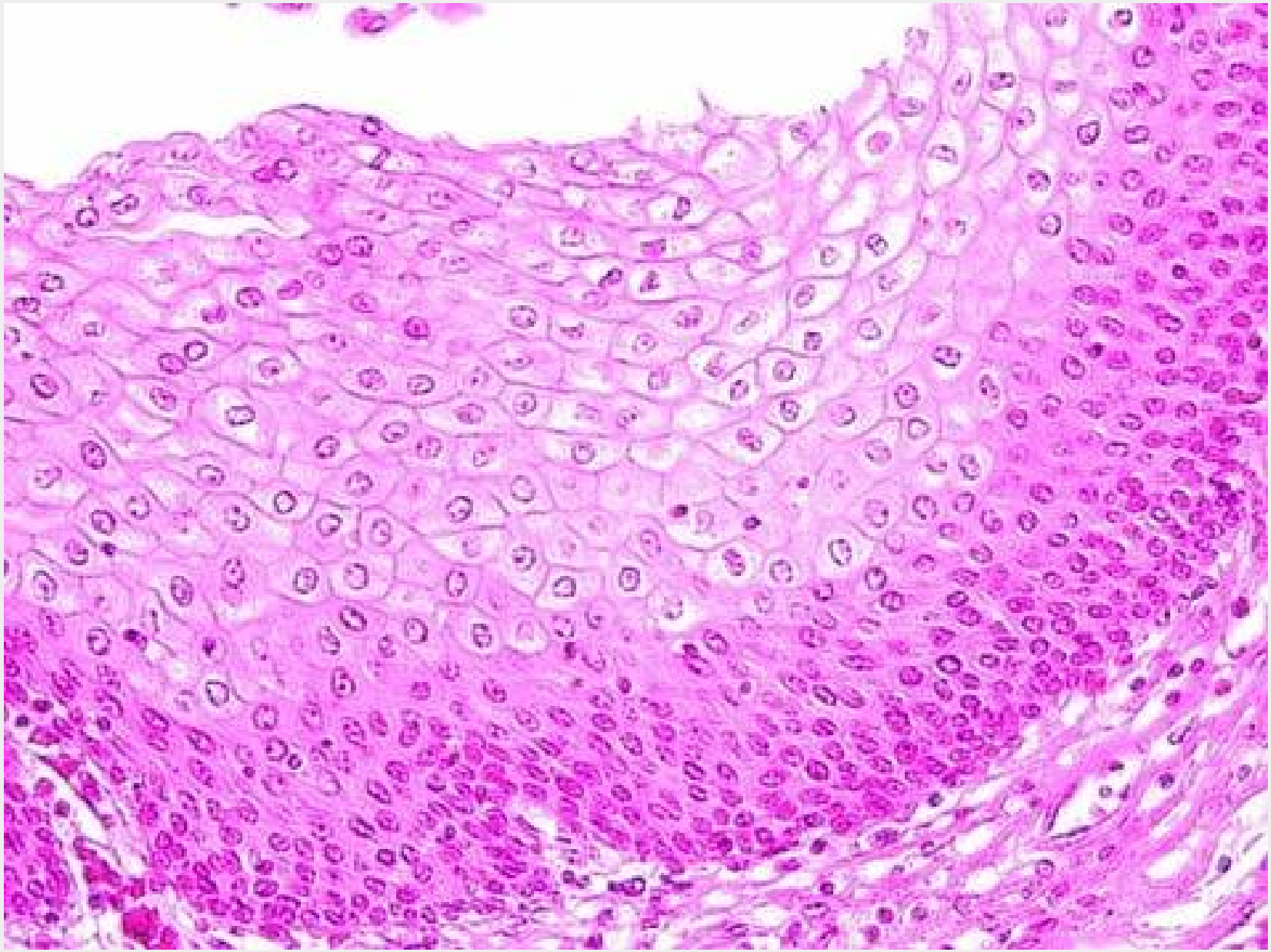
Q25a+b: Identify the 3 cells.



Q26a: Stratified squamous epithelium

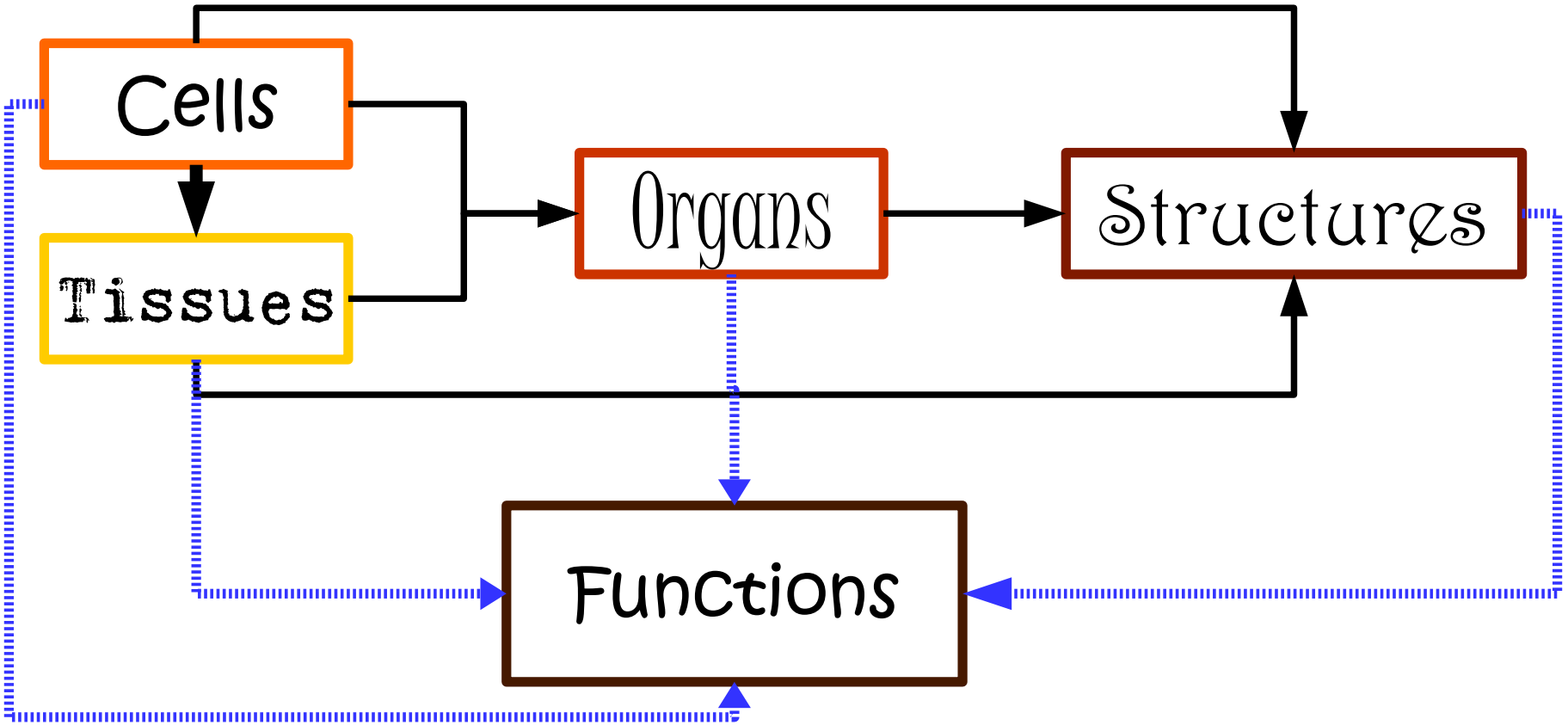


Q26b: Stratified squamous epithelium



Reflection

Is this a good reflection of your knowledge?


Cells
Tissues
Organs
Structures
Functions

Respiratory System

Concepts

Transitions

External nose

V

v

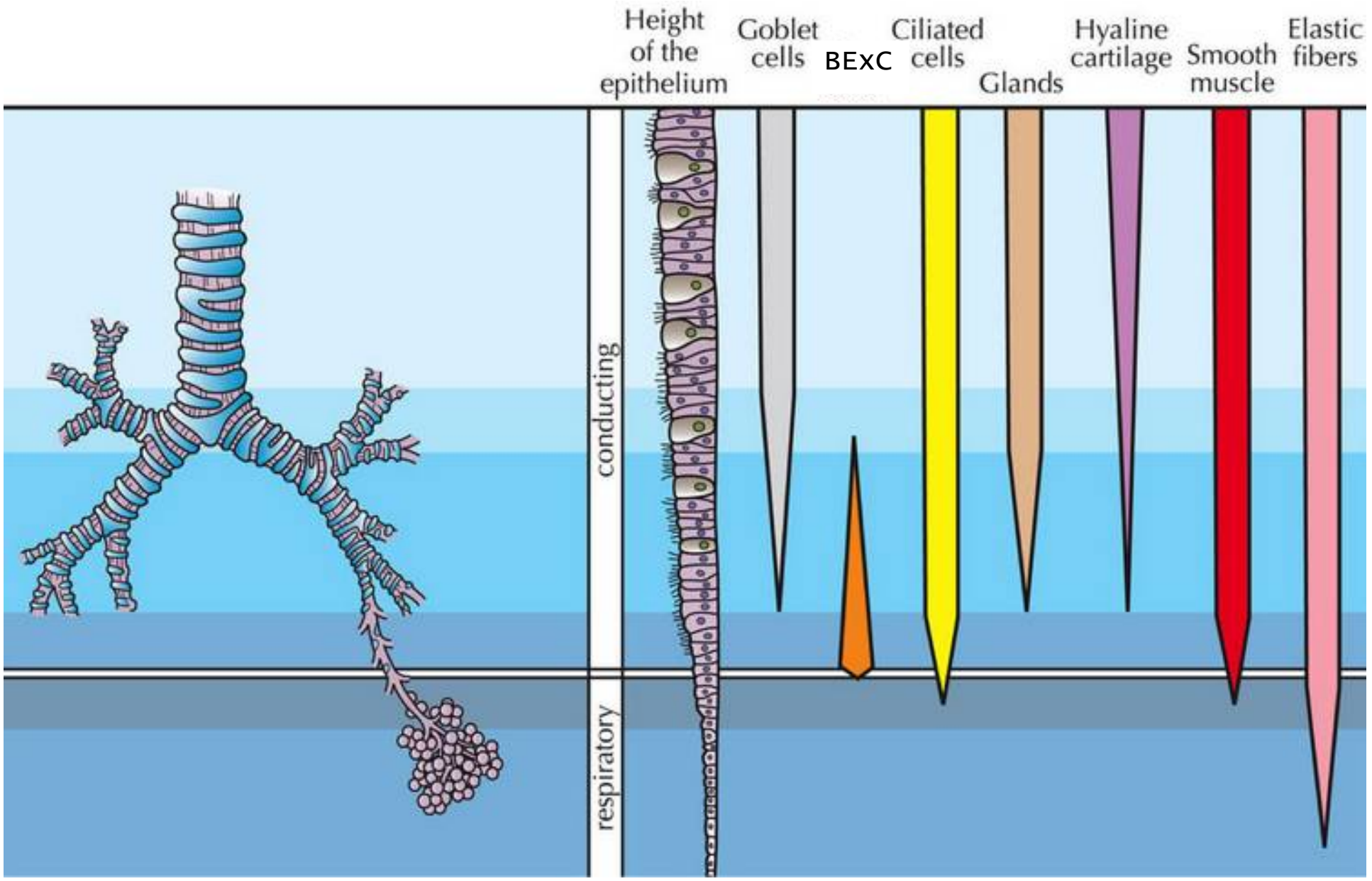
Alveolus

Transitions and Barriers

- Keep dust & pathogens out
- Let clean air in
  - Stay open
  - Expand and contract
- Make gas exchange possible

General principles of transitions in the Respiratory system:

Barrier	Thick	Medium	Thin
Epithelium	Stratified squamous	Pseudostratified columnar	Simple Squamous
Support	Muscle Bone	Cartilage Smooth muscle	Surfactant


Height of the epithelium
Goblet cells
BExC
Ciliated cells
Glands
Hyaline cartilage
Smooth muscle
Elastic fibers
conducting
respiratory

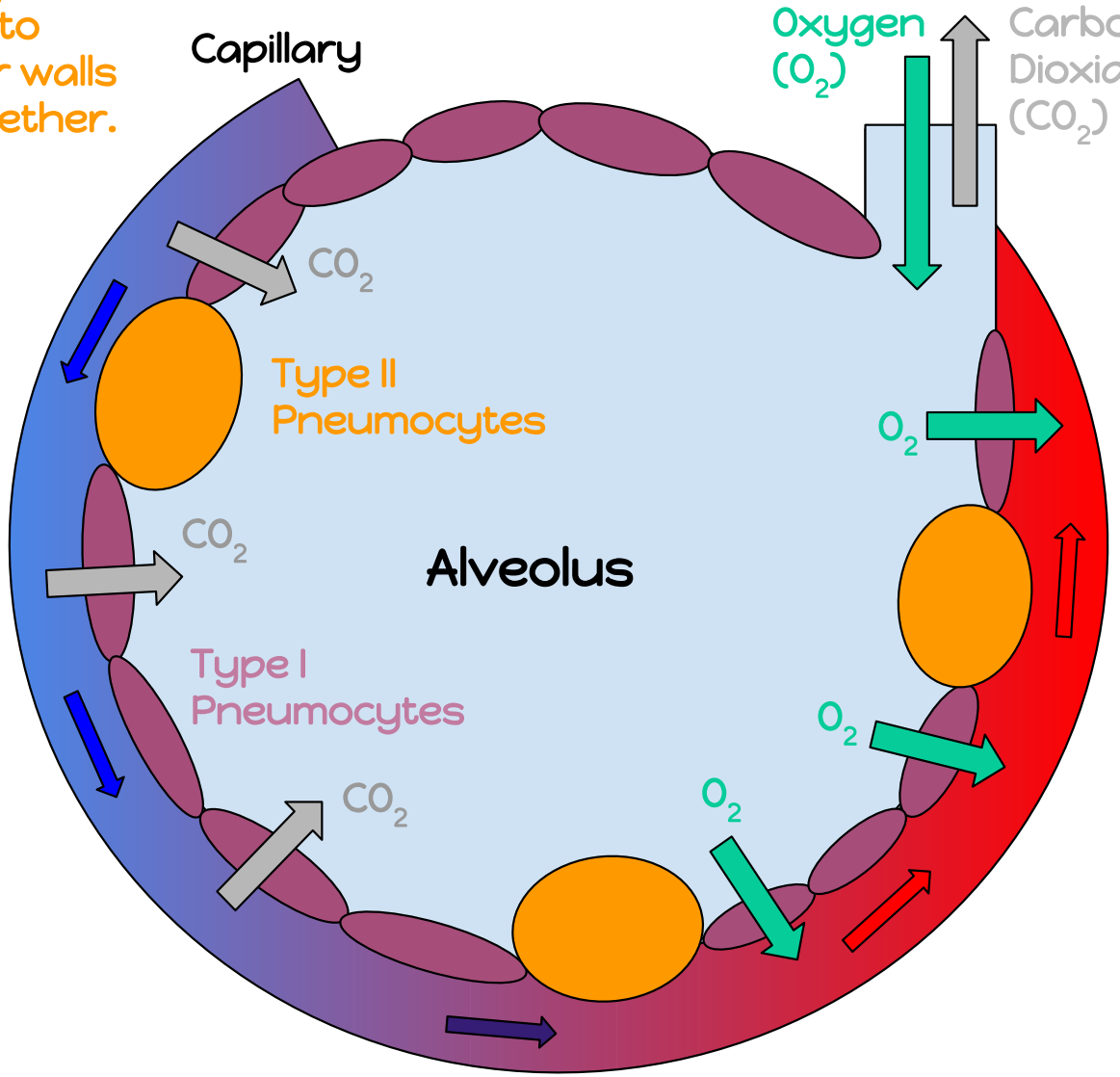
Blood-Air Barrier

Components?

Other barrier systems in the body?

Type II pneumocytes secrete surfactant to prevent the collapse of the alveolus and to prevent the inner walls from sticking together.

Deoxygenated blood coming from heart



Oxygenated blood going to heart

Type I Pneumocytes are thin, flat cells which allow gas exchange between the alveolus and capillaries.

Barriers

- Skin
- Blood-air
- Blood-brain
- Blood-retinal
- Blood-thymus
- Blood-testis
- Placental barrier

Q07: Function of the nasal cavity?

Warm up air

Add moisture

Clean – dust & pathogens

Smell


N°5
CHANEL
PARIS
EAU DE PARFUM
VAPORISATEUR SPRAY
50 ml
1.7 FL.OZ.

Q07: Function of the nasal cavity?

- Warm
- Moisture
- Filter
- Smell

Revision Exercise

Go with the flow

Trace the air flow of respiratory system starting with the nostrils.

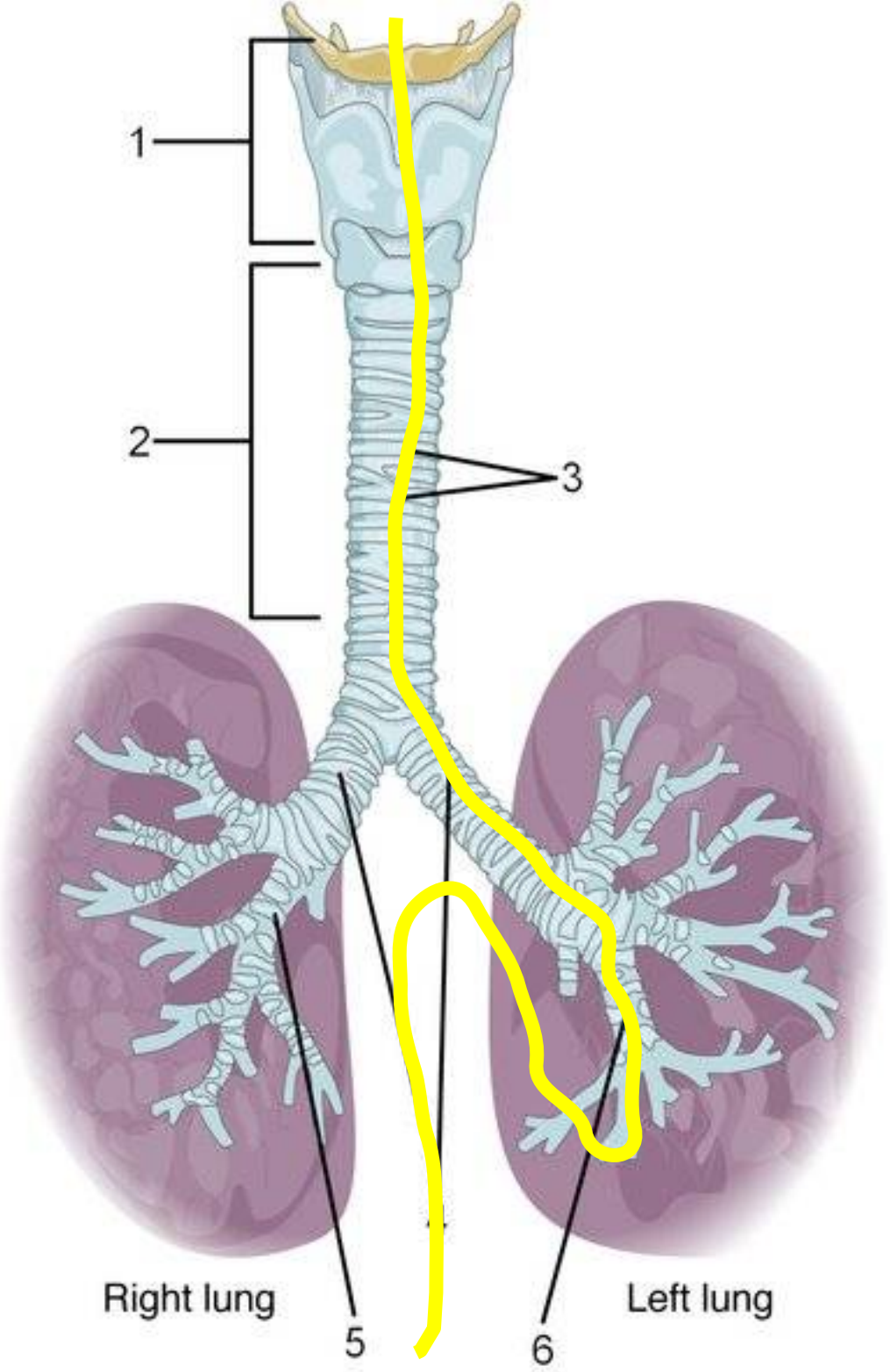
What path does a molecule of oxygen take to reach the blood?

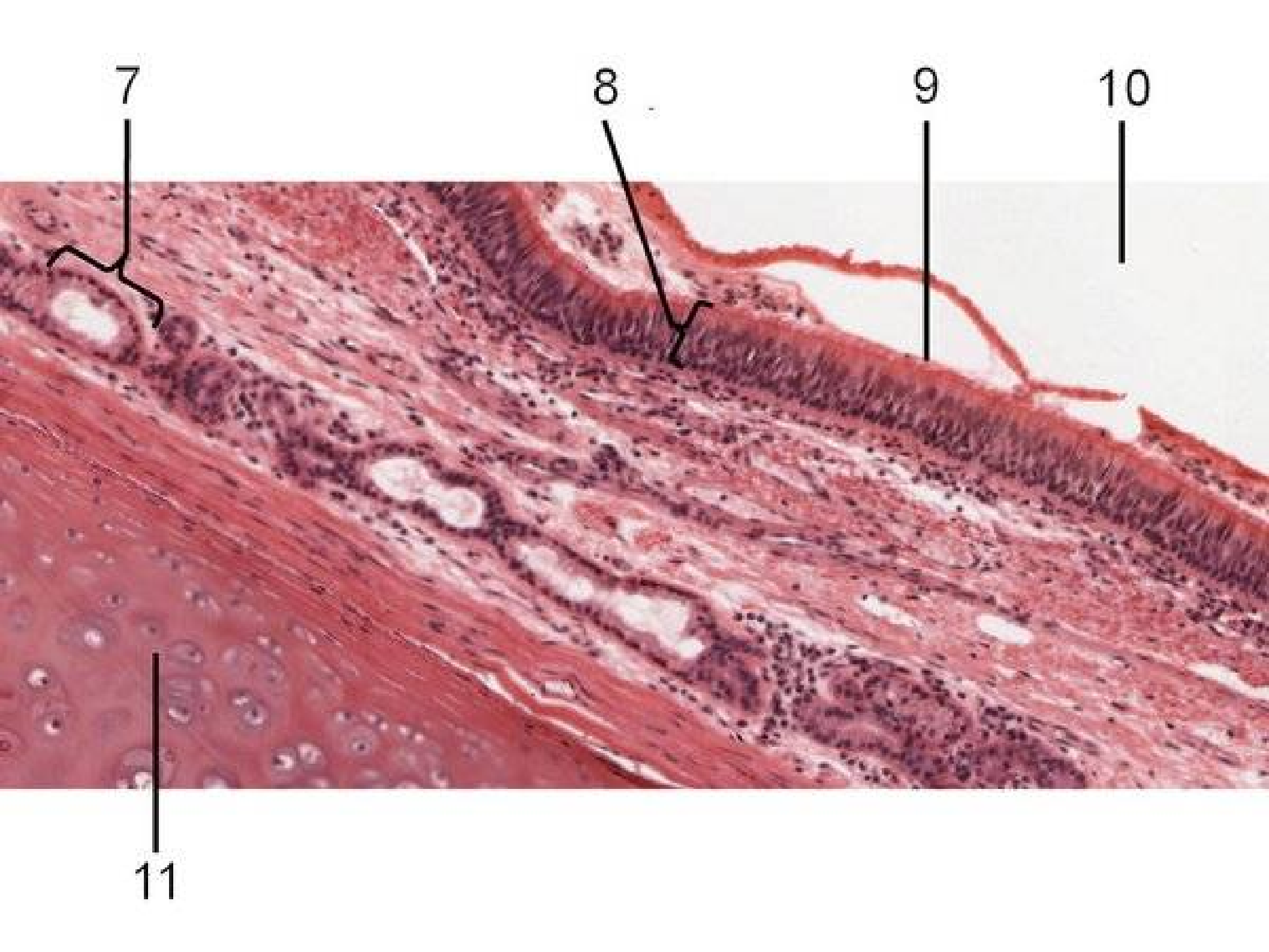
What sights will it see along the way?

1. Outside air
2. ??
3. ...
4. Toes

Path of O2

- List complete
- With layers
- And cells
- And function of each
- By studying and labelling images


1
2
3
Right lung
5
6
Left lung

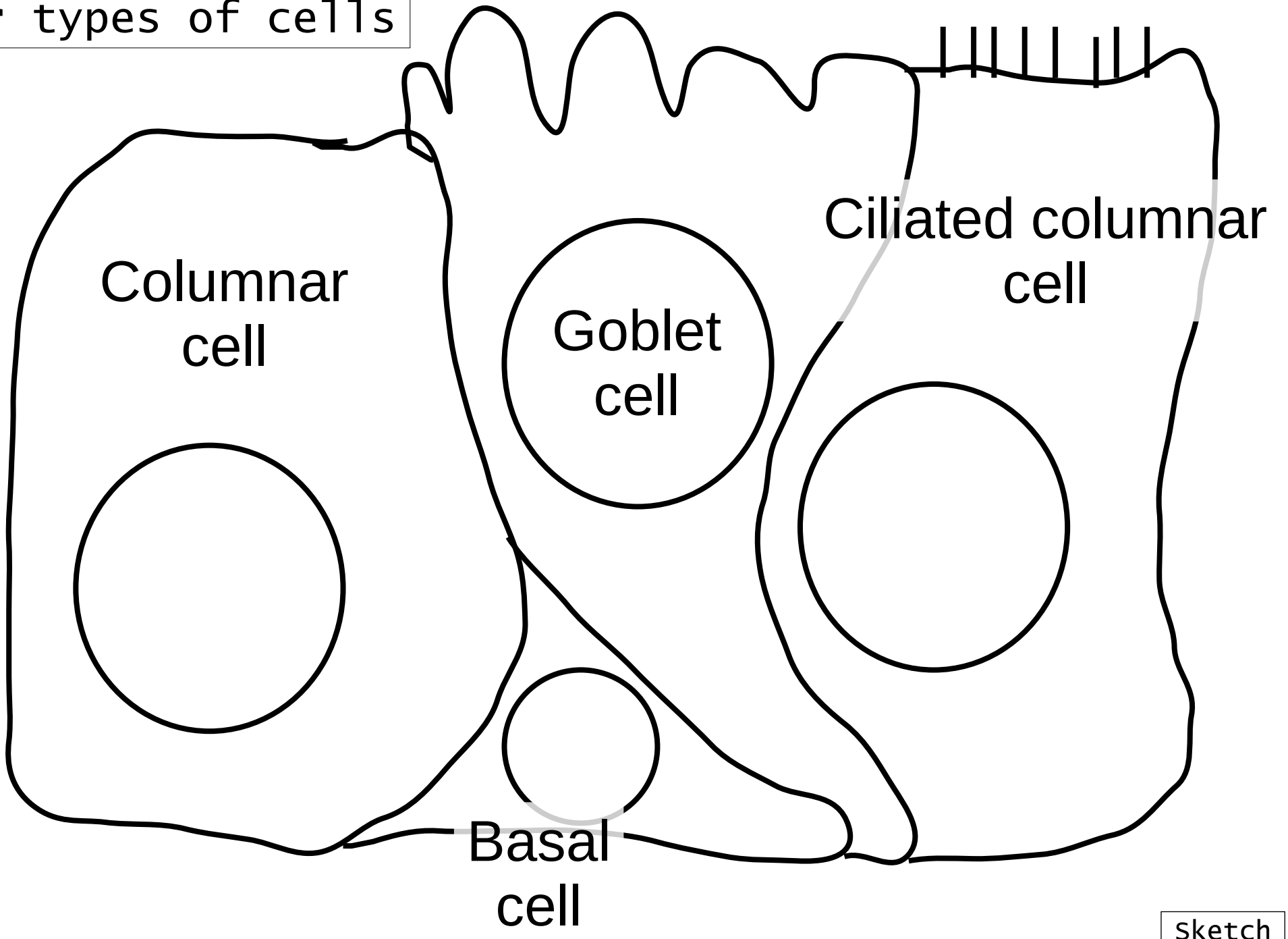

7
8
9
10
11

Pseudostratified columnar epithelium

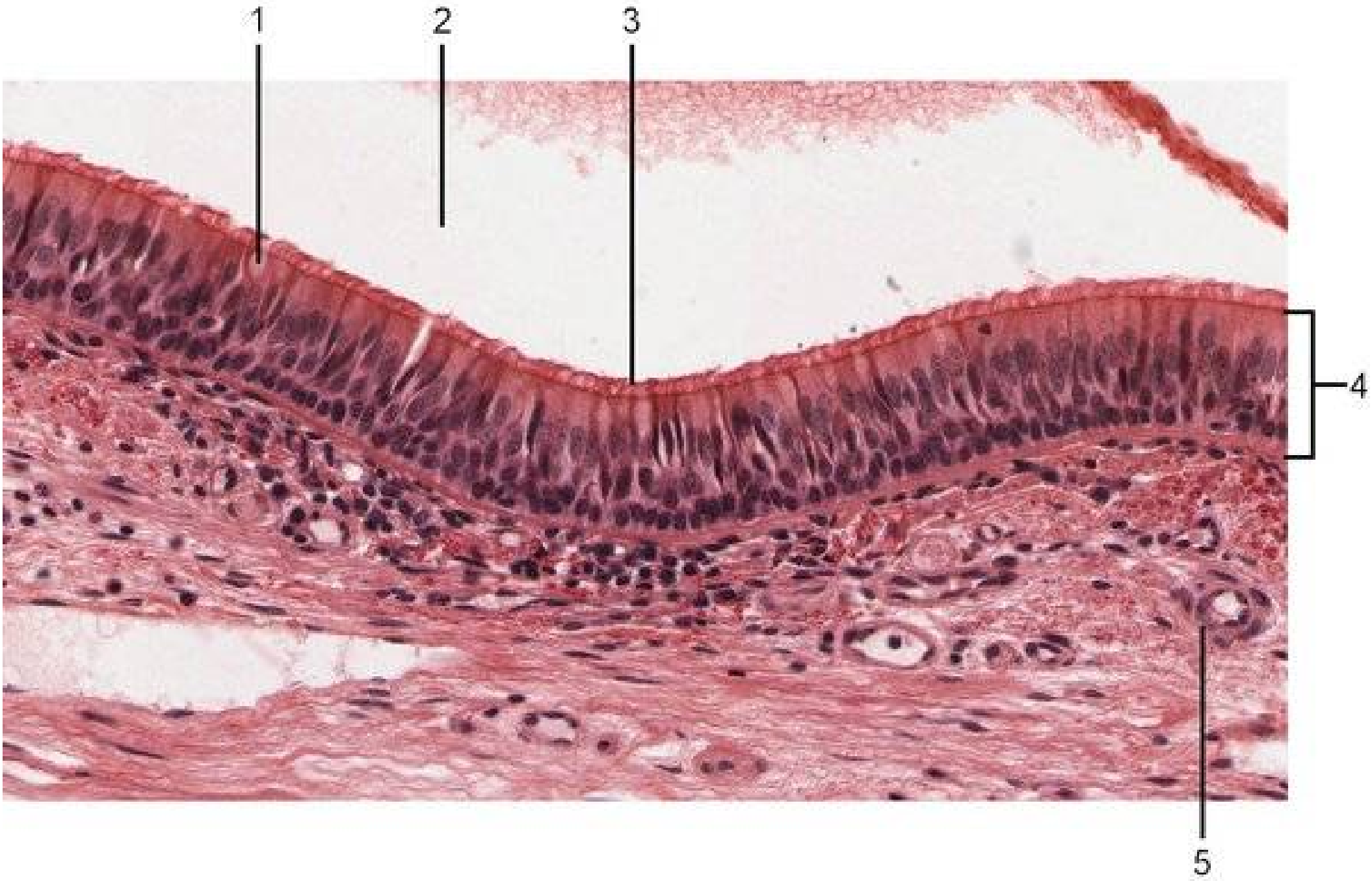
What cells are present?

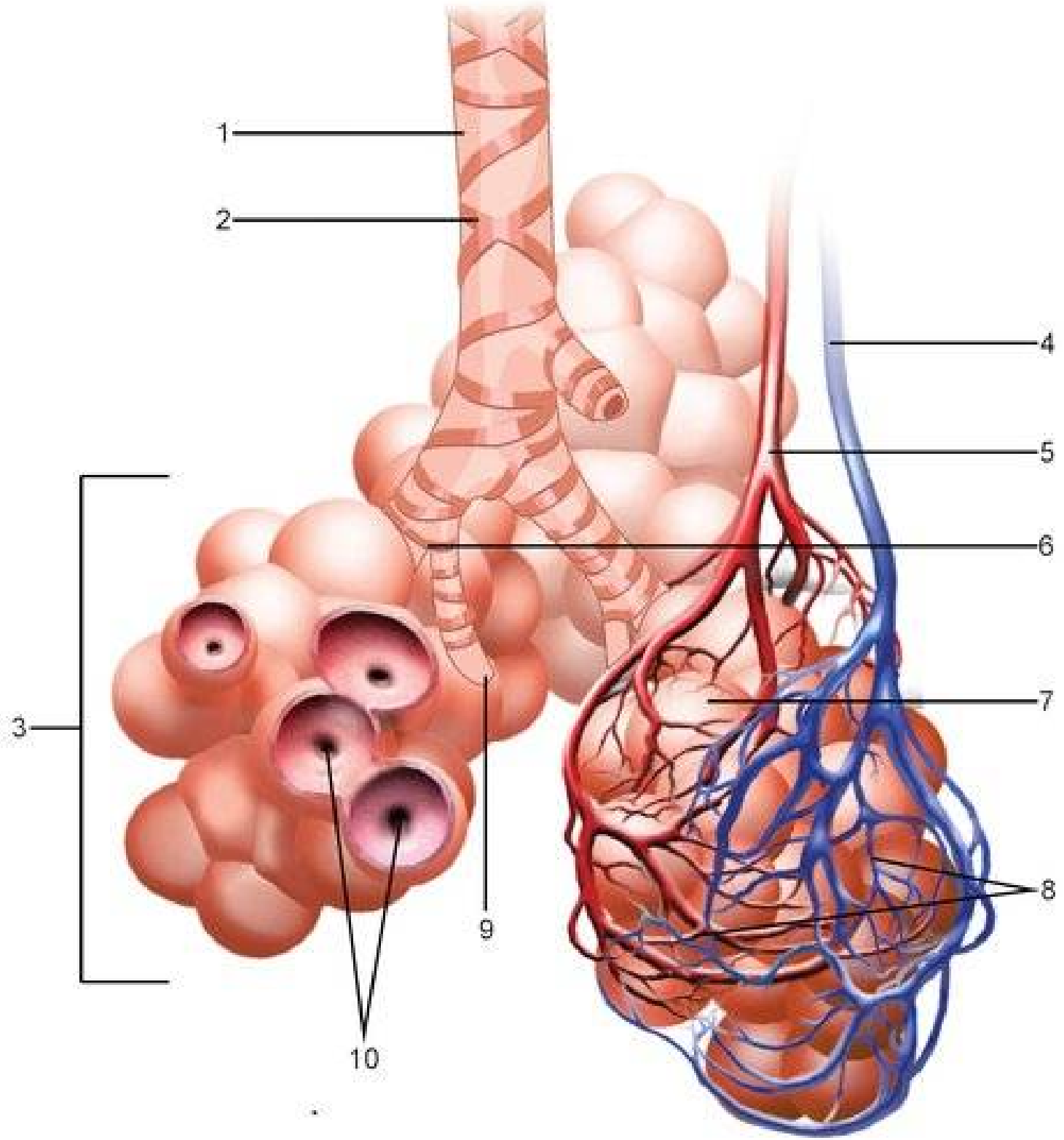
Pseudostratified columnar epithelium

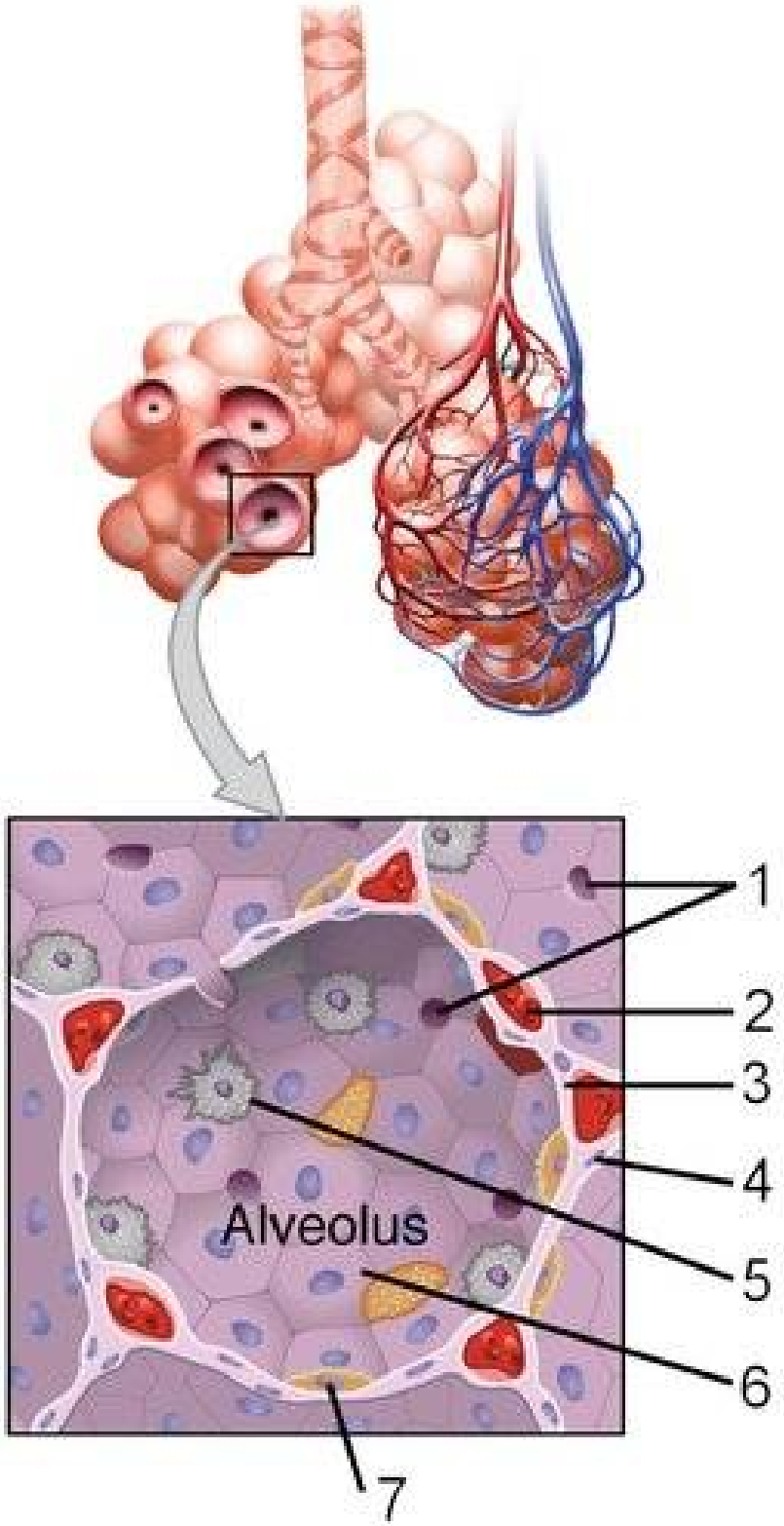
Four types of cells

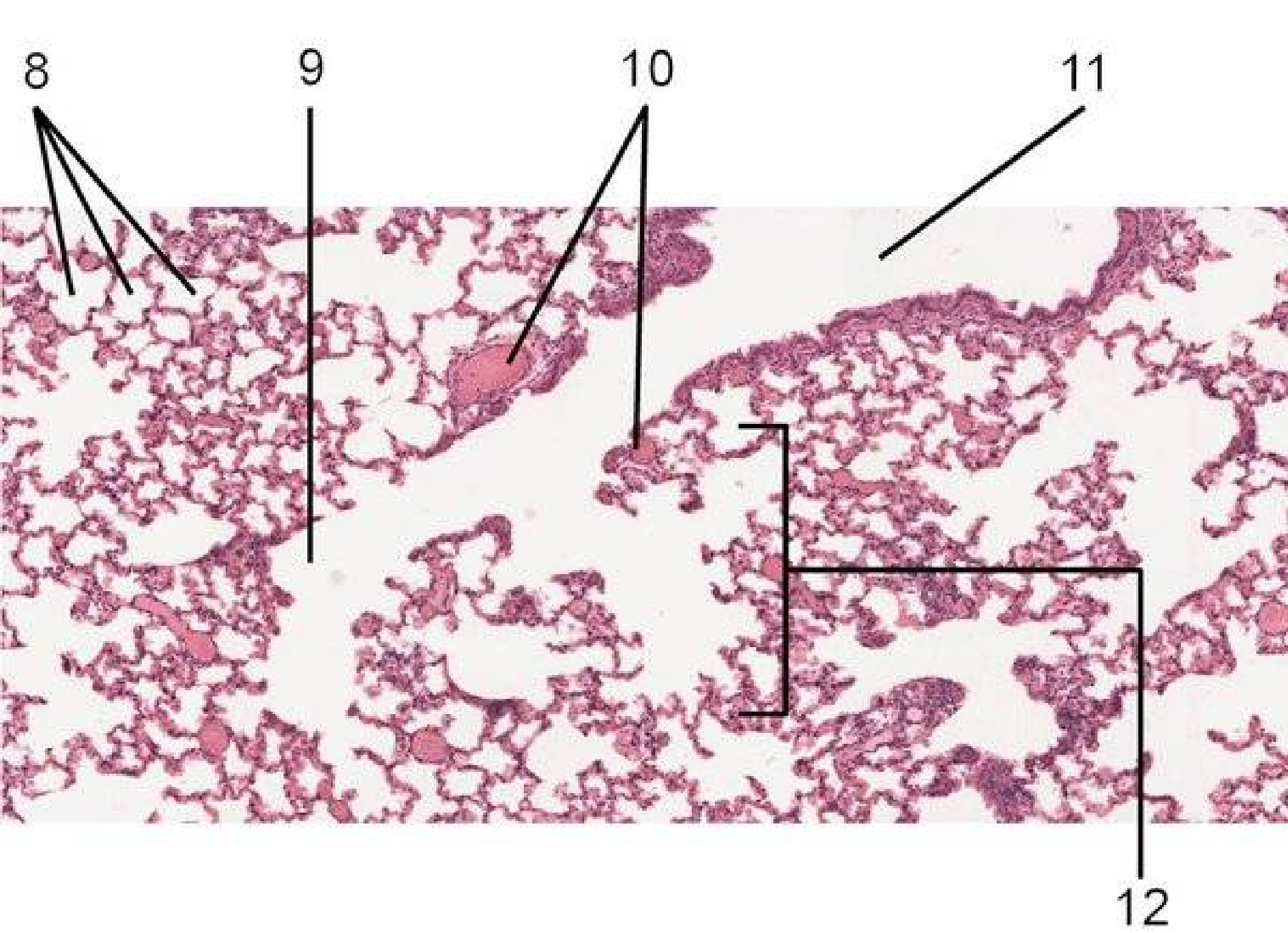


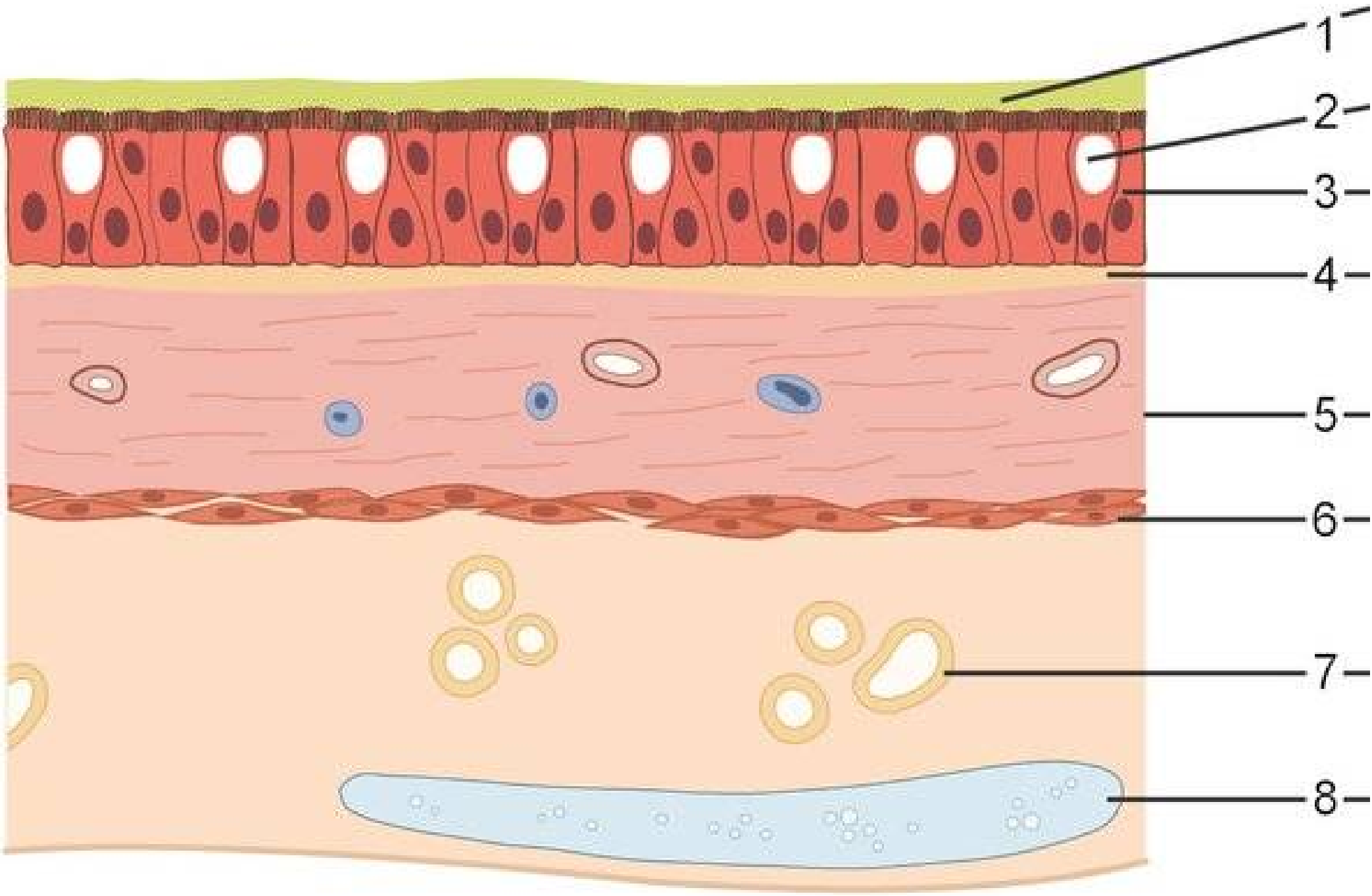
Sketch

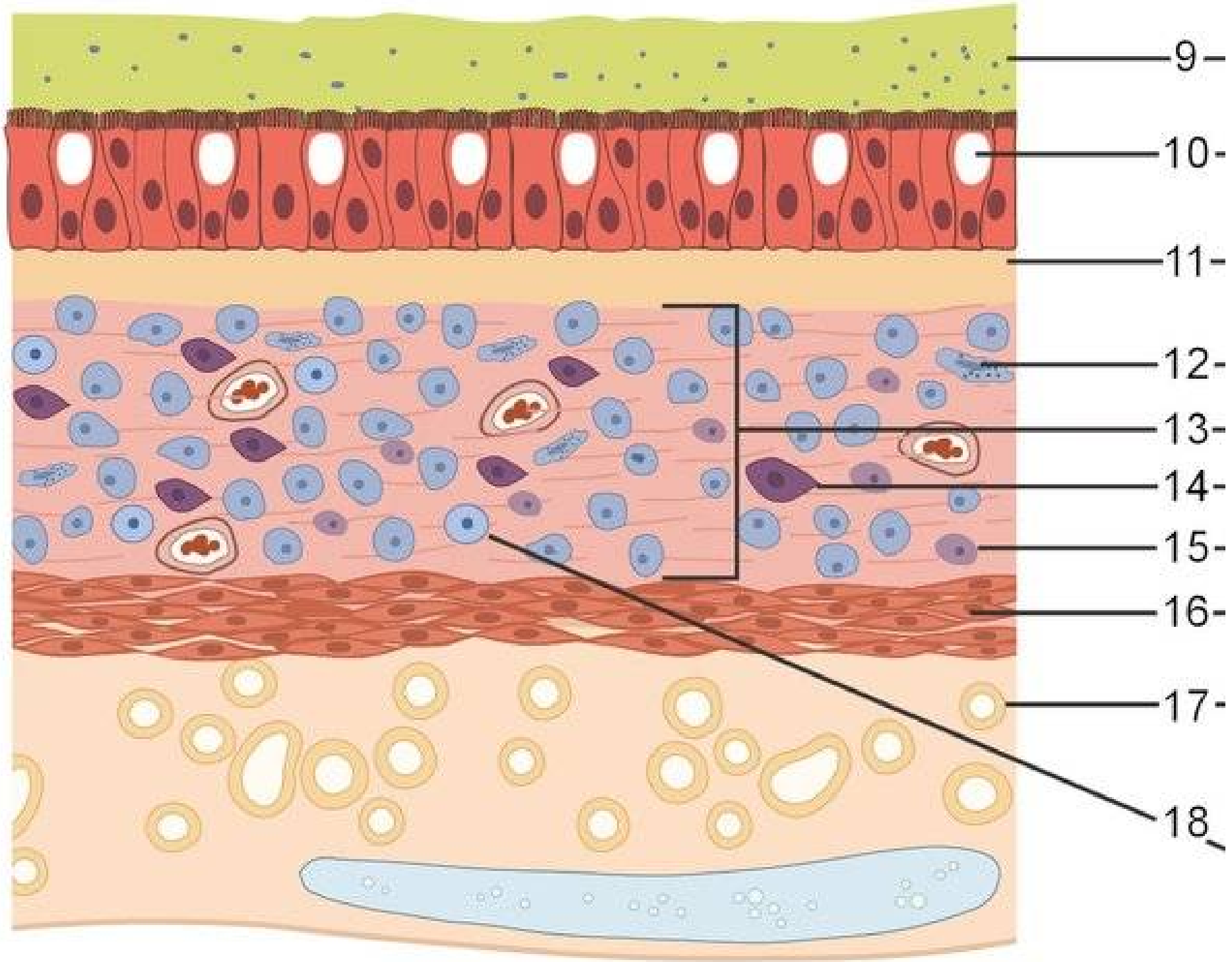

1
2
3
4
5

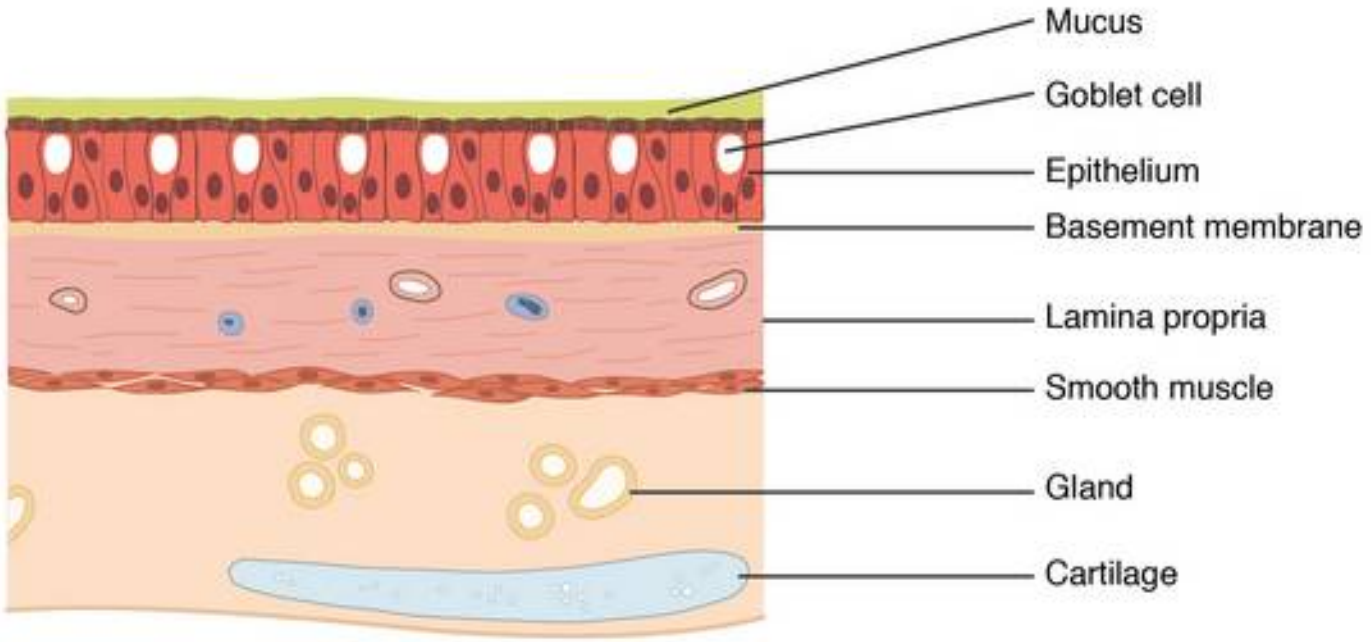

1
2
3
4
5
6
7
8
9
10


Alveolus
1
2
3
4
5
6
7

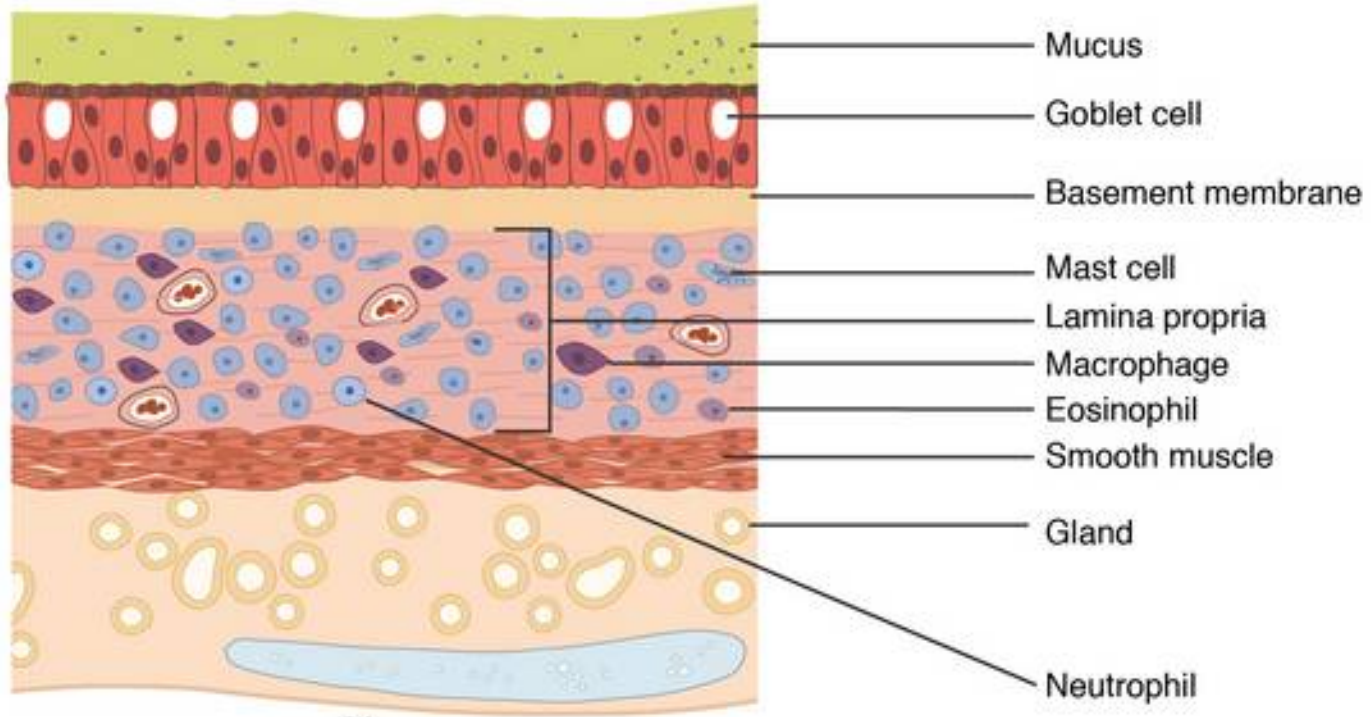

8
9
10
11
12


1
2
3
4
5
6
7
8


9
10
11
12
13
14
15
16
17
18


Mucus
Goblet cell
Epithelium
Basement membrane
Lamina propria
Smooth muscle
Gland
Cartilage

(a)


Mucus
Goblet cell
Basement membrane
Mast cell
Lamina propria
Macrophage
Eosinophil
Smooth muscle
Gland
Neutrophil

(b)

Slides: Respiratory System

Nostril – slide 71

Olfactory epithelium – slide 108

Epiglottis – slide 111

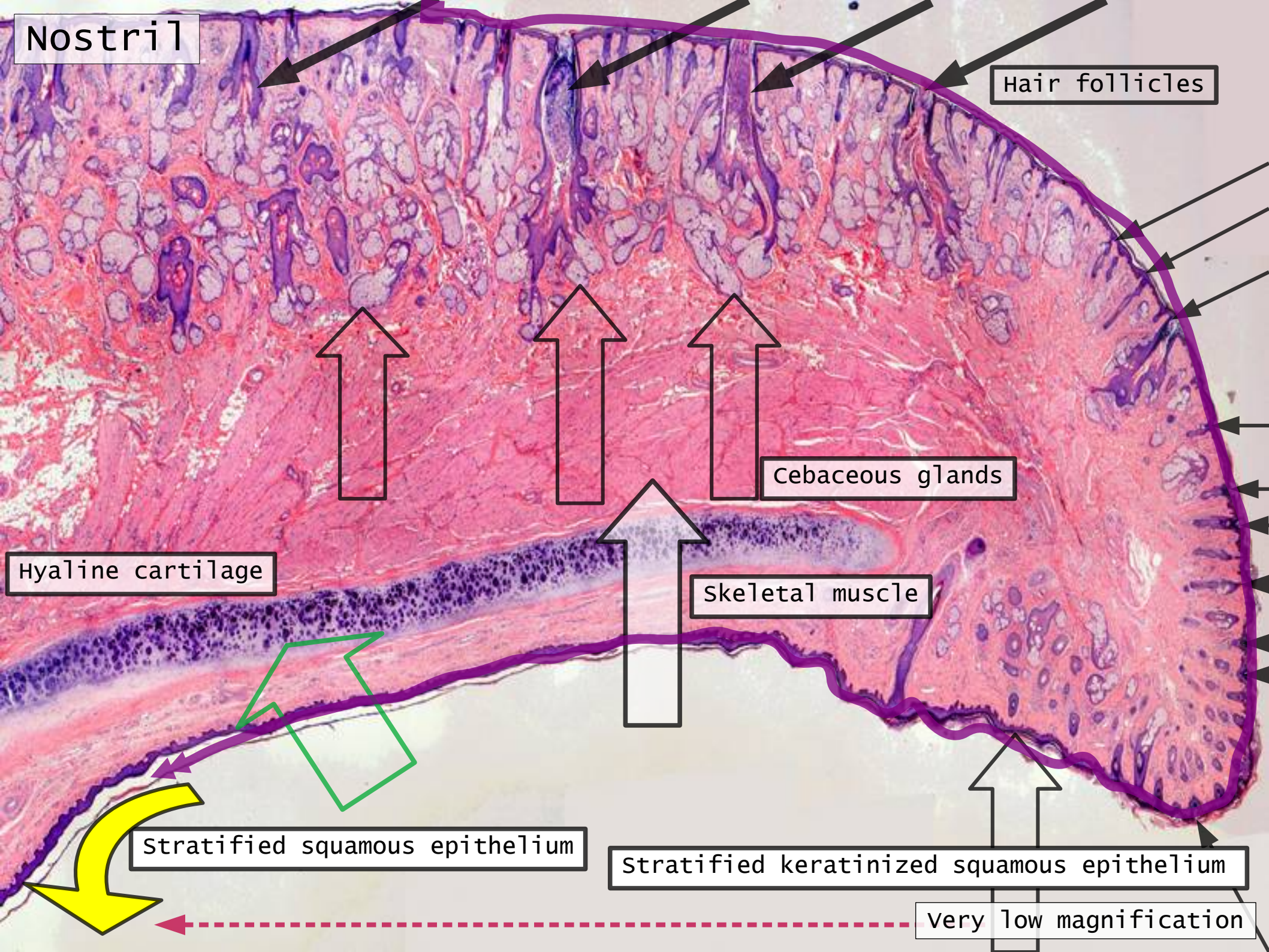
Trachea – slide 73

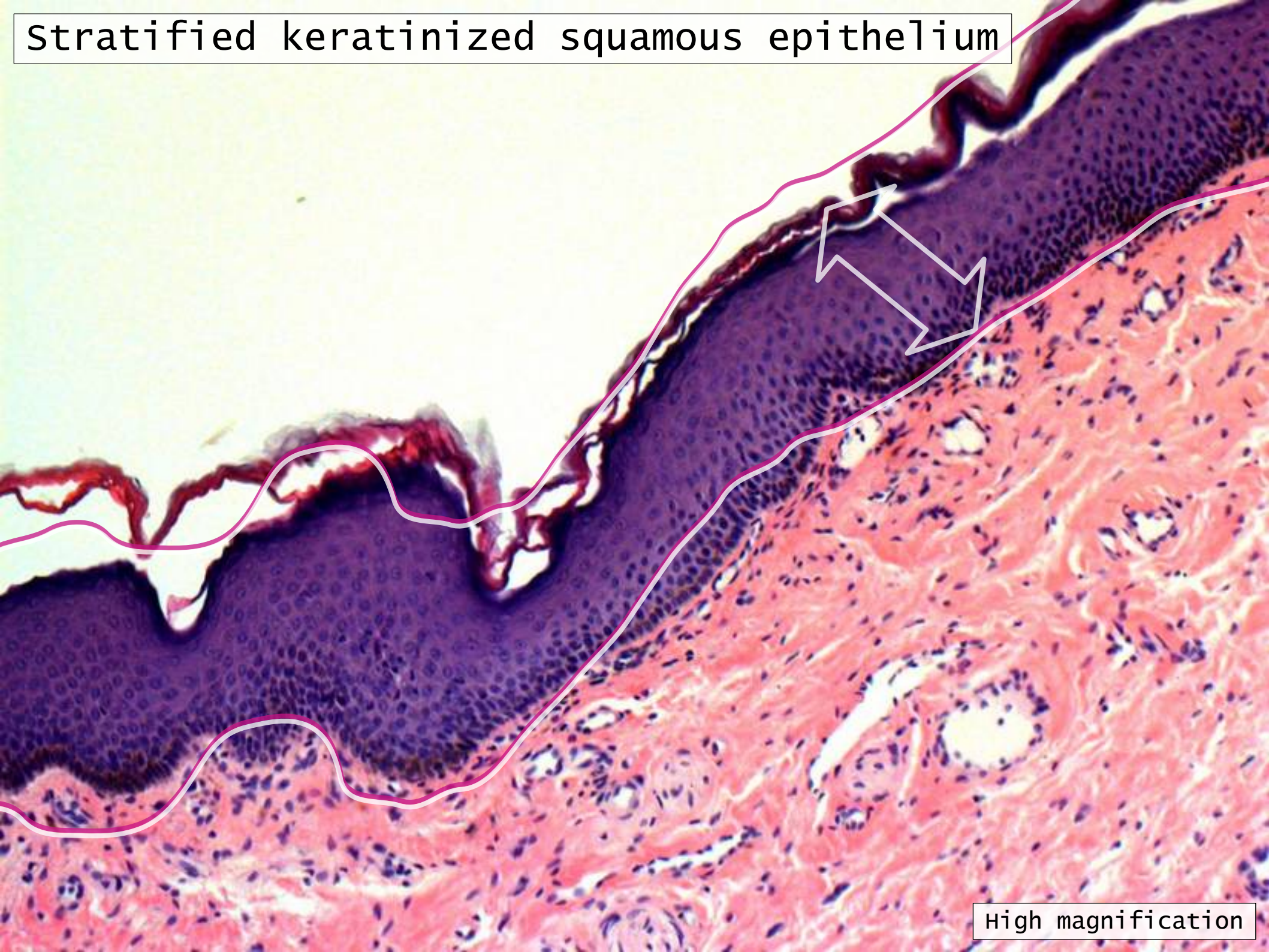
Lung – slide 72 & 74

Nostril

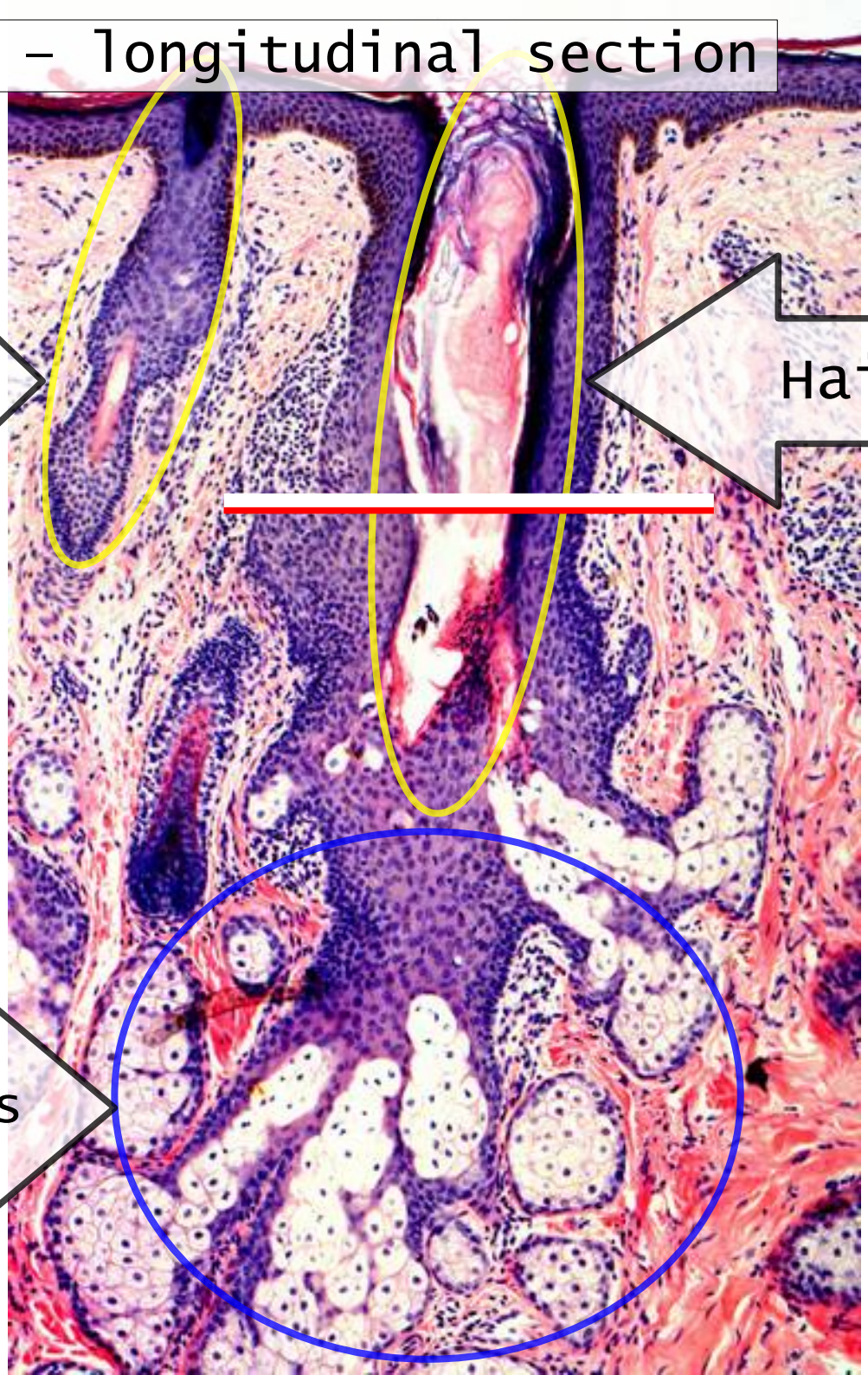
Slide 71


Nostril
Very low magnification


Nostril
Hair follicles
Cebaceous glands
Hyaline cartilage
Skeletal muscle
Stratified squamous epithelium
Stratified keratinized squamous epithelium
Very low magnification


Stratified keratinized squamous epithelium
High magnification

Hair follicle – longitudinal section

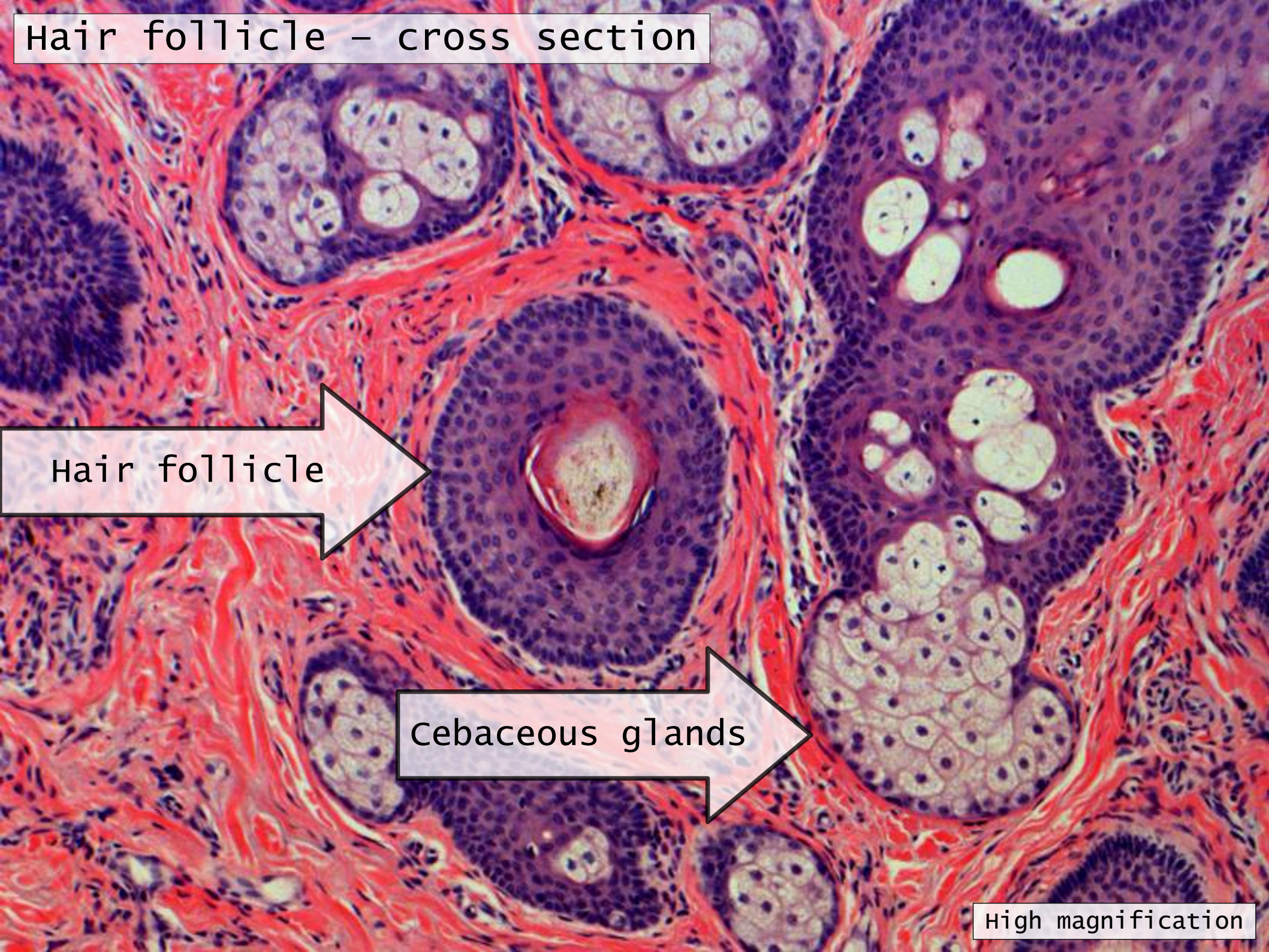


Hair follicle

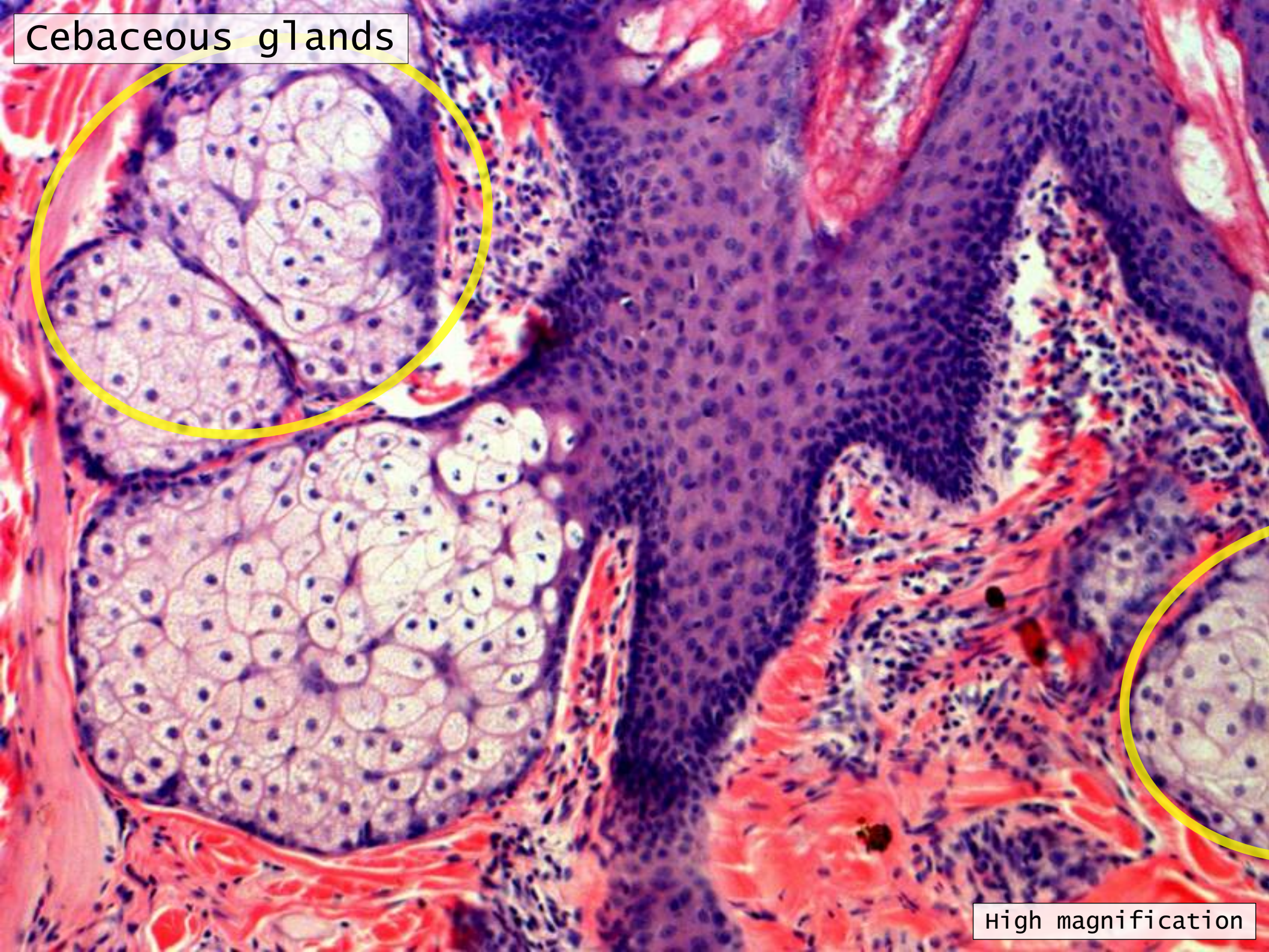
Hair follicle

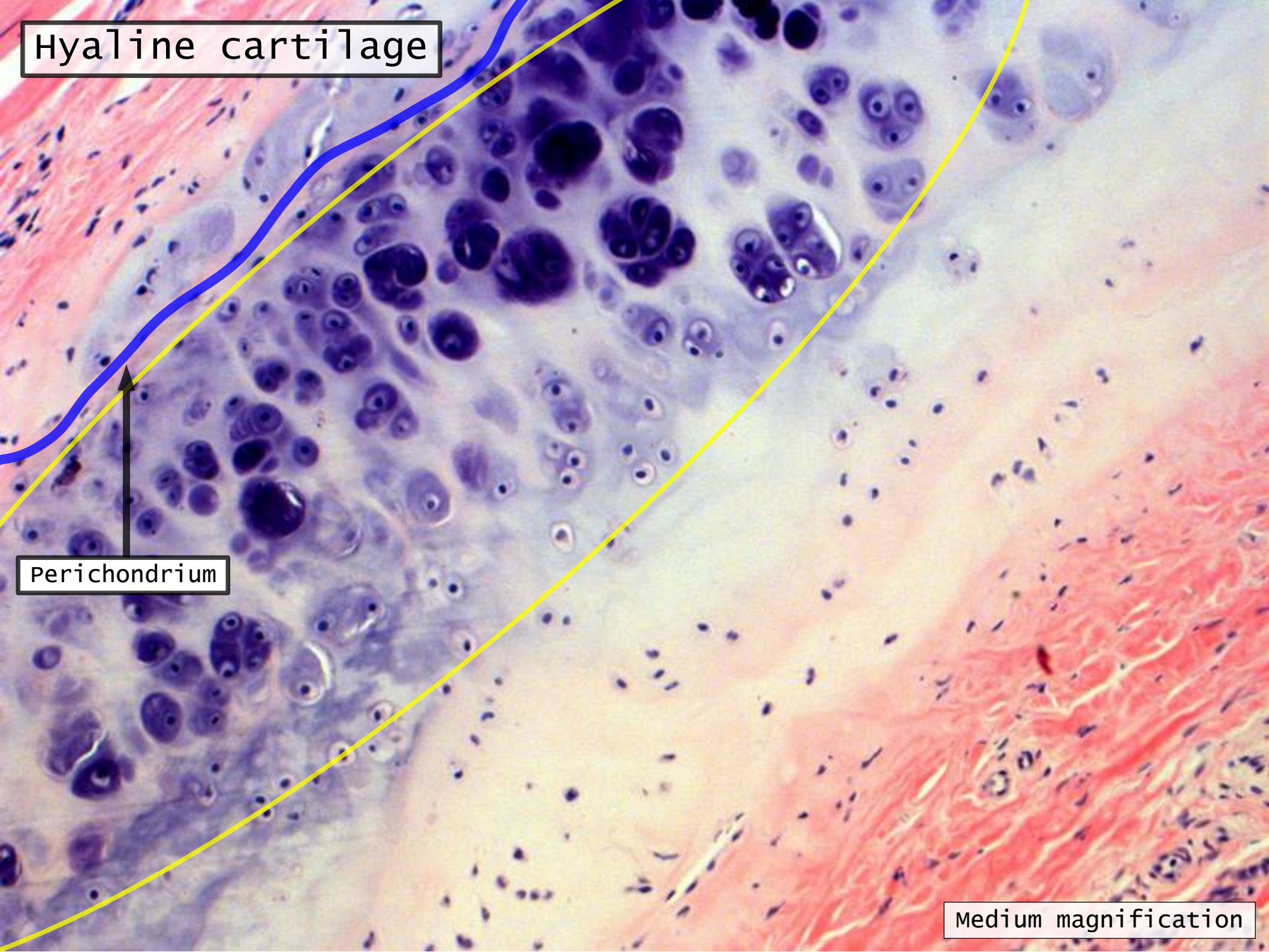
Cebaceous glands

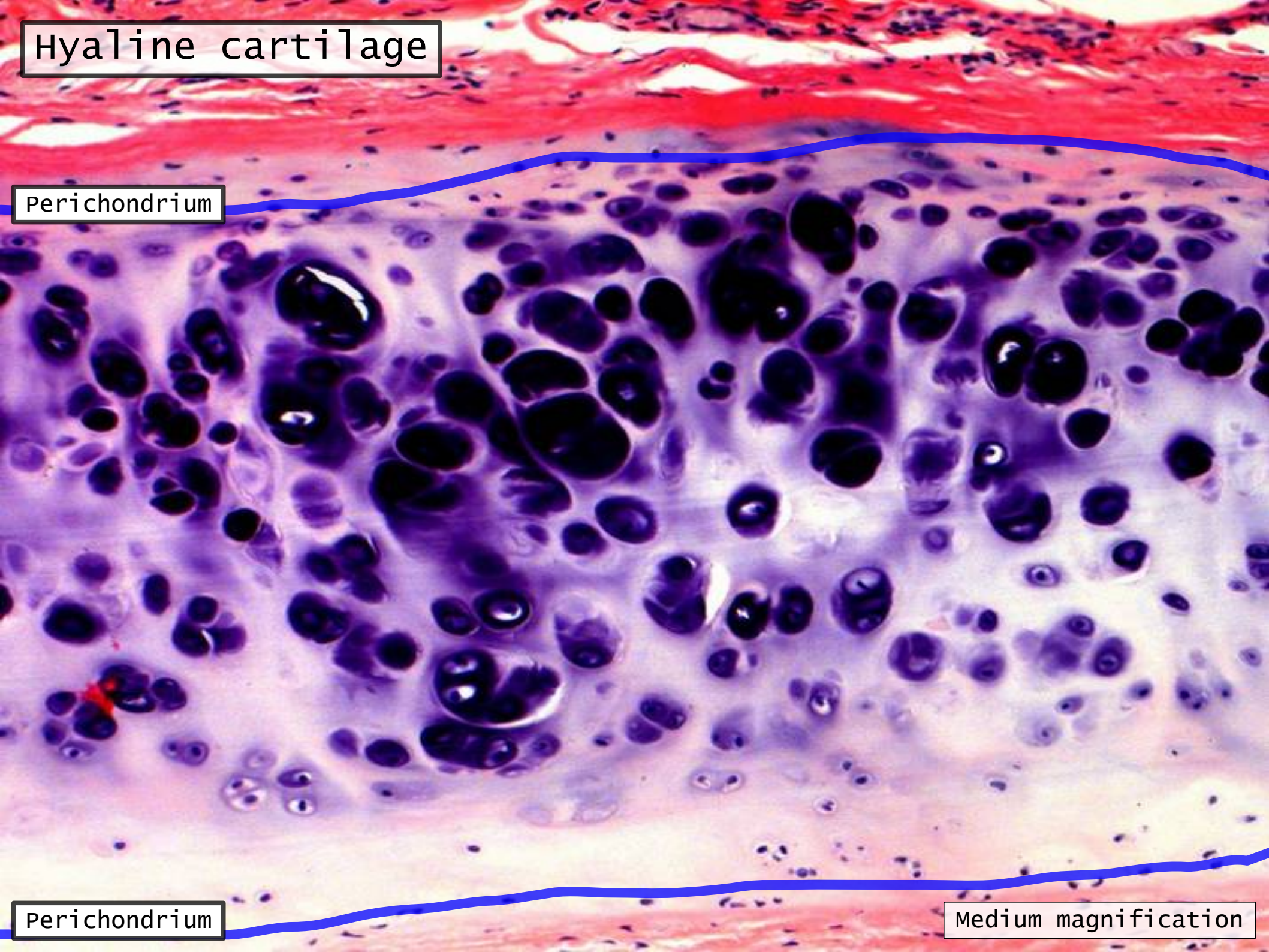
Medium magnification


Hair follicle – cross section
Hair follicle
Cebaceous glands
High magnification


Hair follicle
Longitudinal
Cross


Cebaceous glands
High magnification

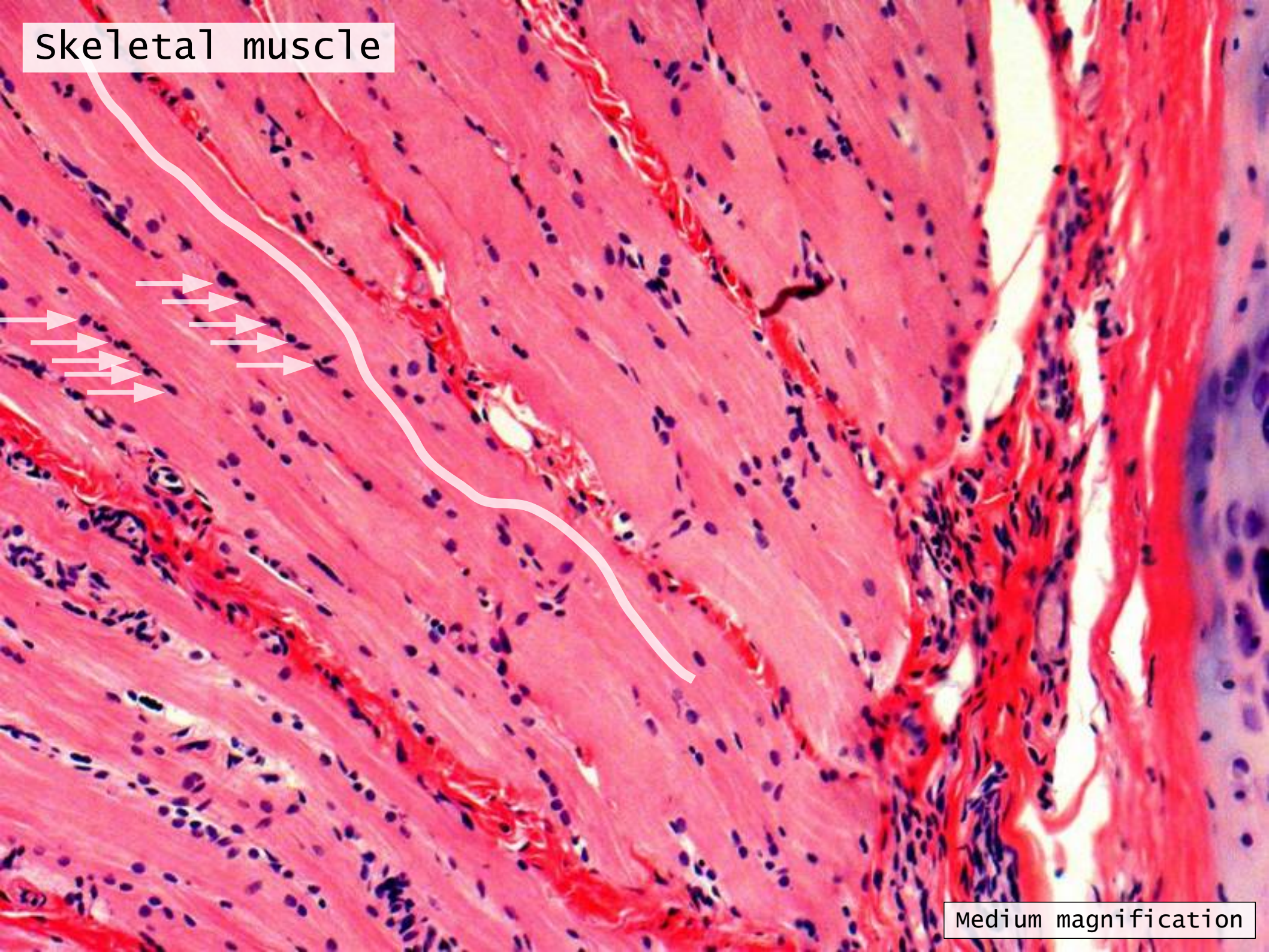

Hyaline cartilage
Perichondrium
Medium magnification

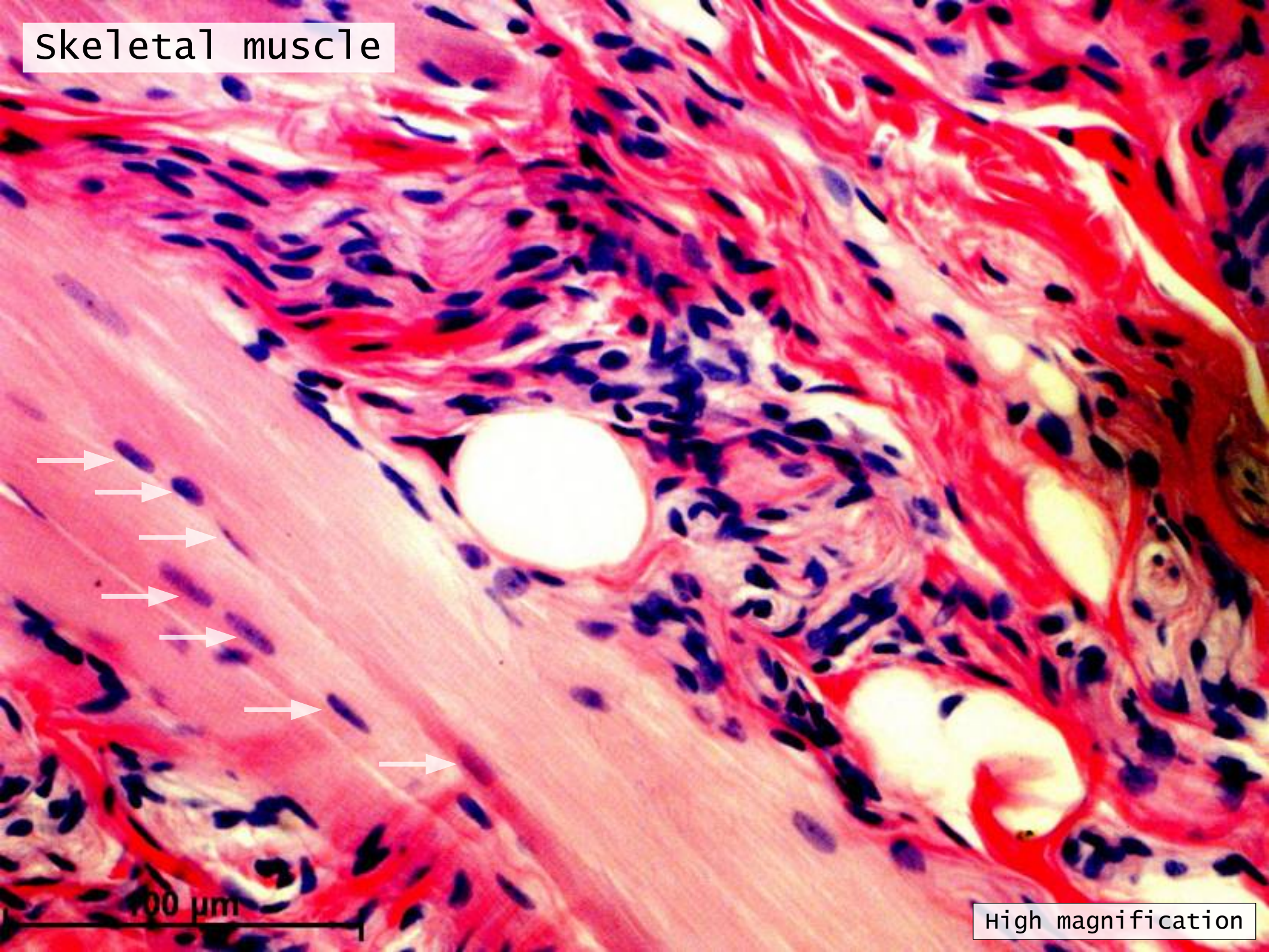

Hyaline cartilage
Perichondrium
Perichondrium
Medium magnification

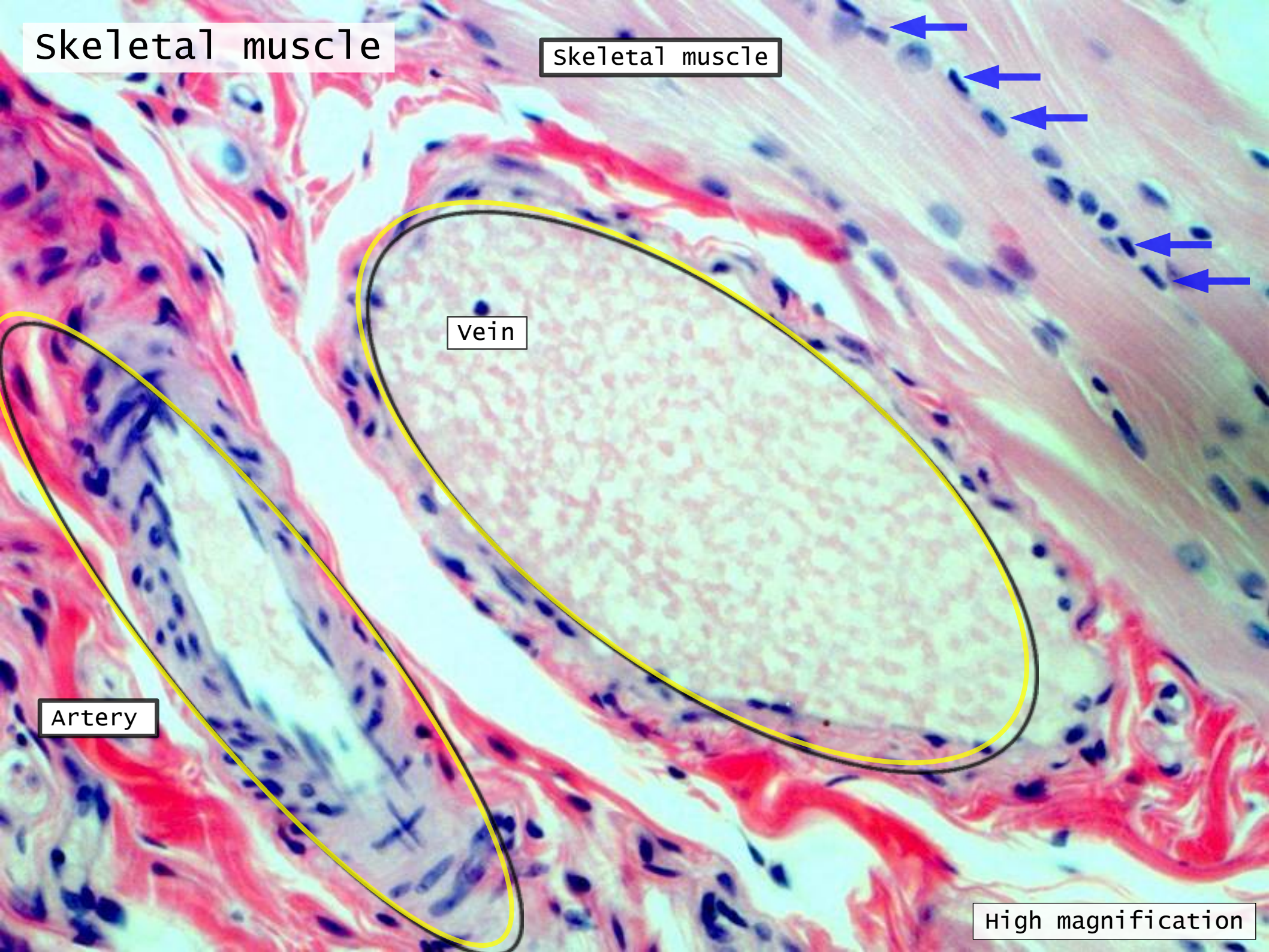
Smooth

Cardiac

skeletal

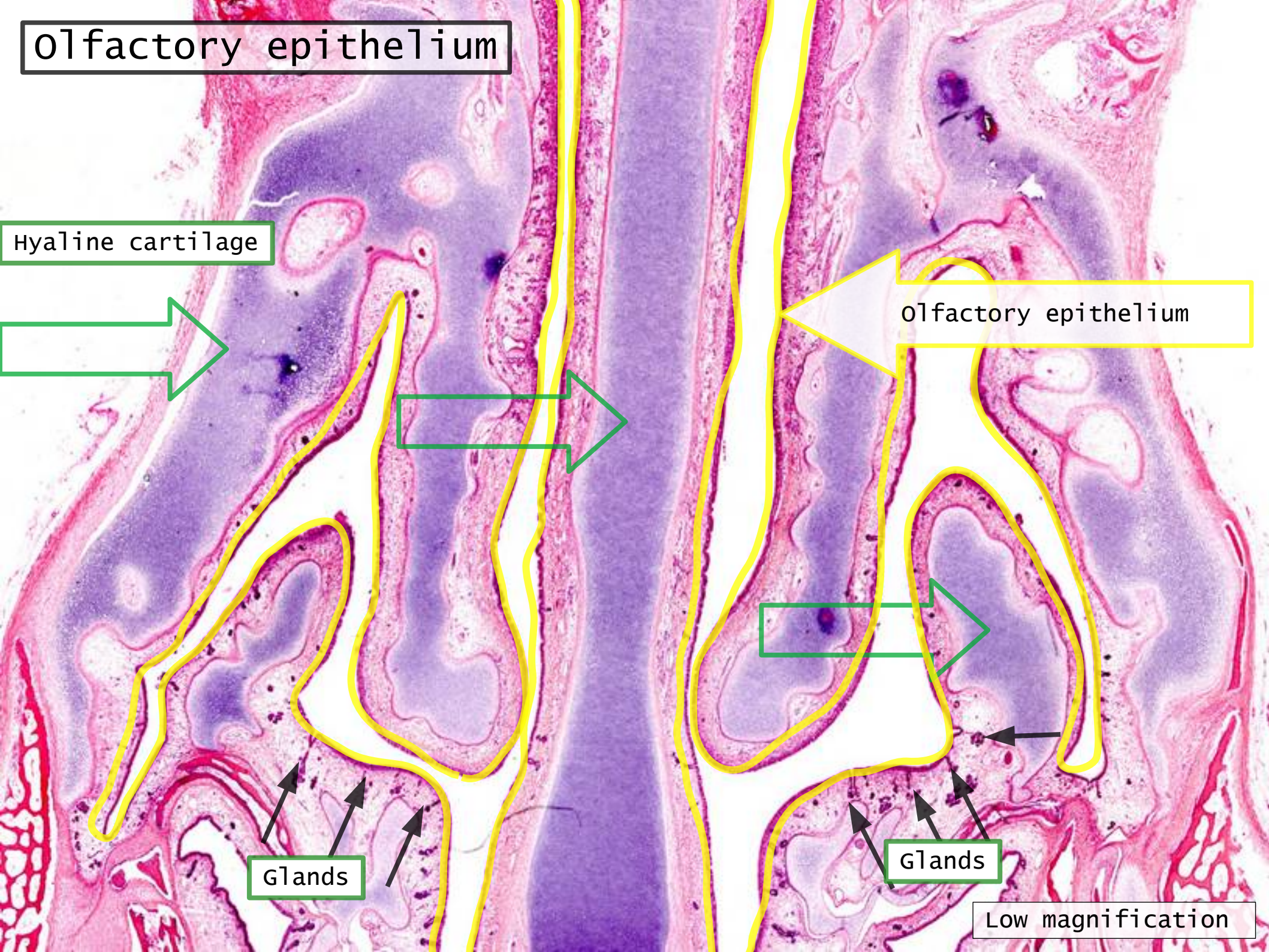

Skeletal muscle
Medium magnification

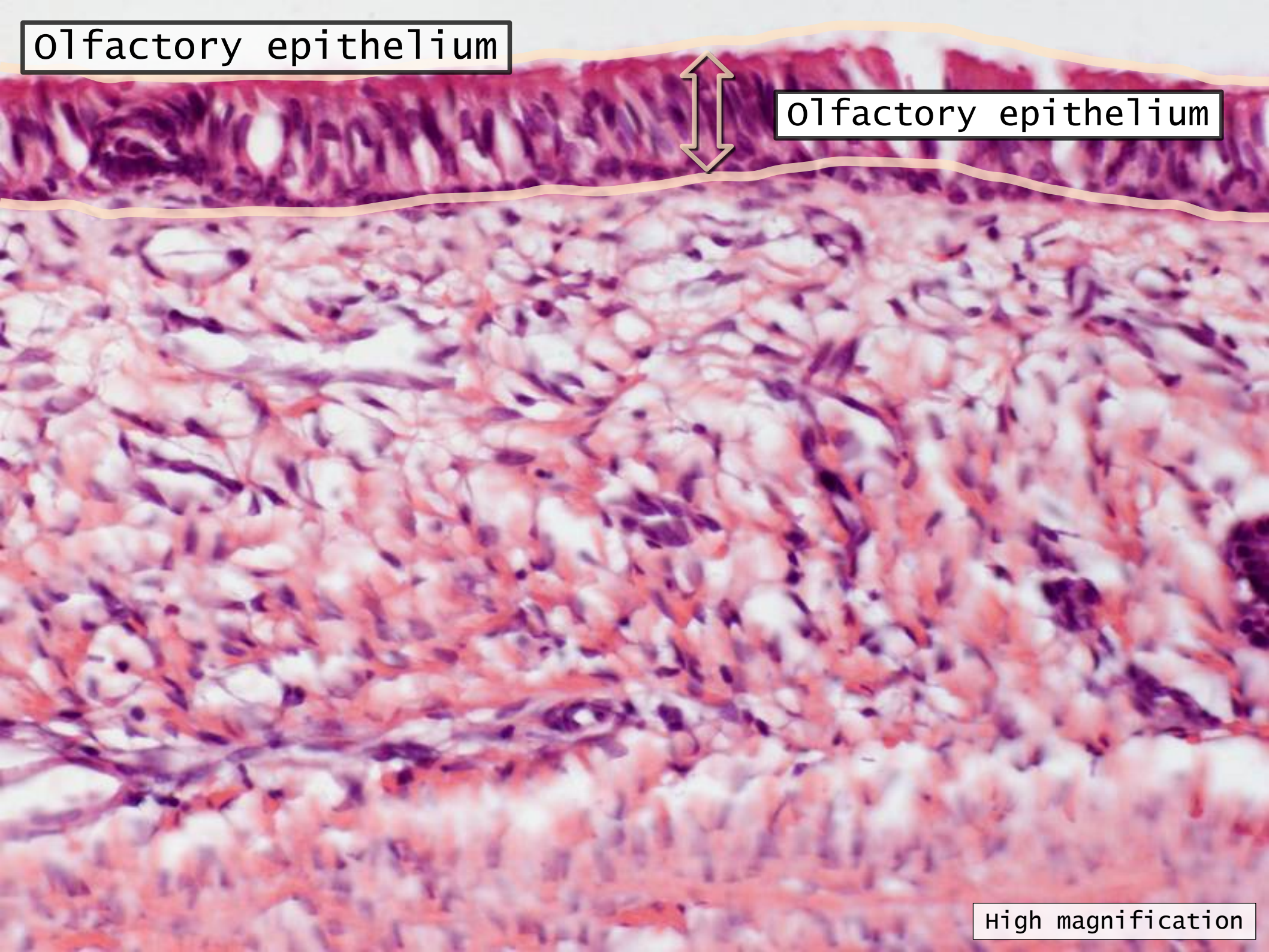

Skeletal muscle
100 µm
High magnification

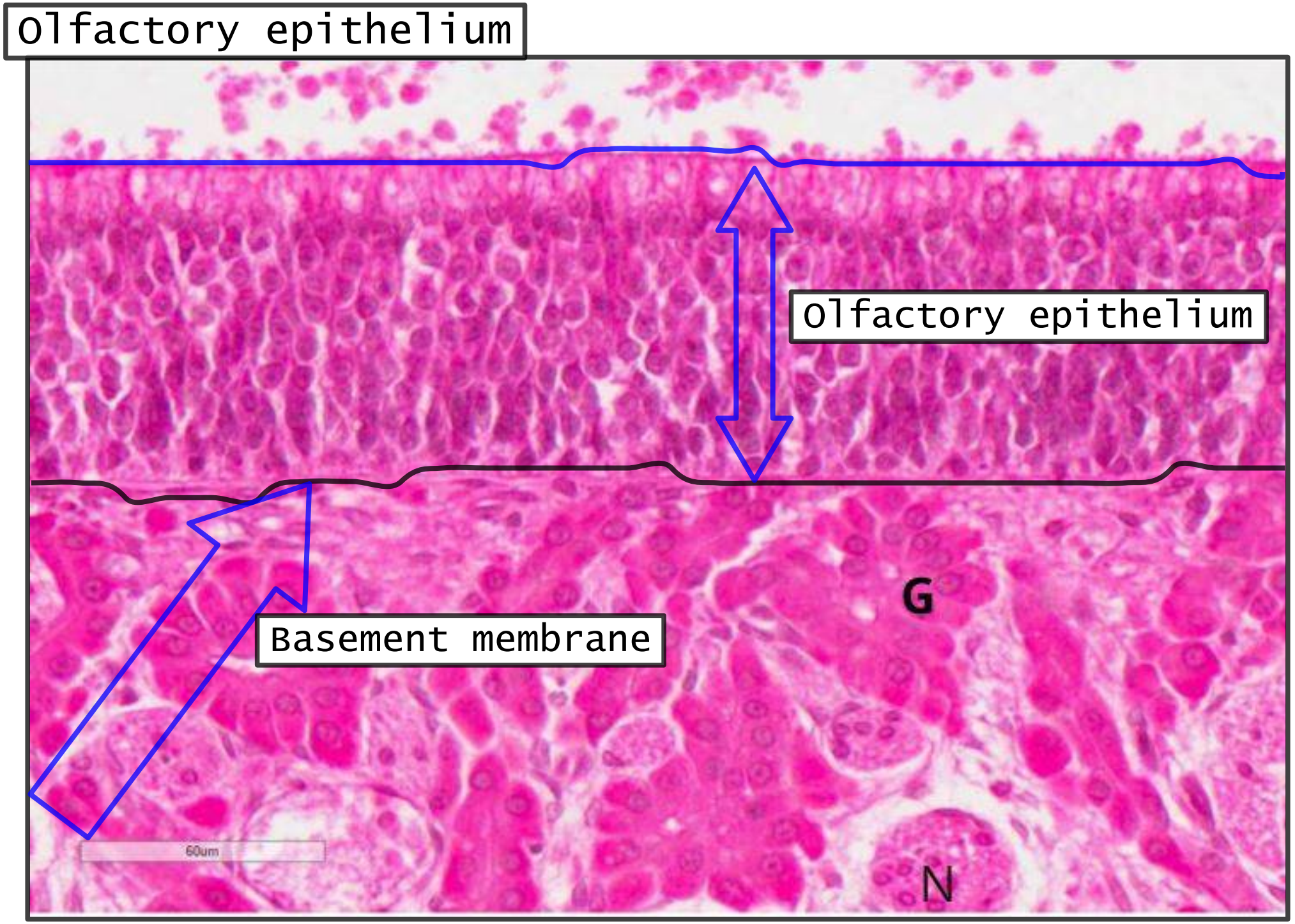

Skeletal muscle
Skeletal muscle
Vein
Artery
High magnification

Olfactory epithelium

Slide 108


Olfactory epithelium
Hyaline cartilage
Olfactory epithelium
Glands
Glands
Low magnification


Olfactory epithelium
Olfactory epithelium
High magnification



High magnification


Hyaline cartilage
Medium magnification

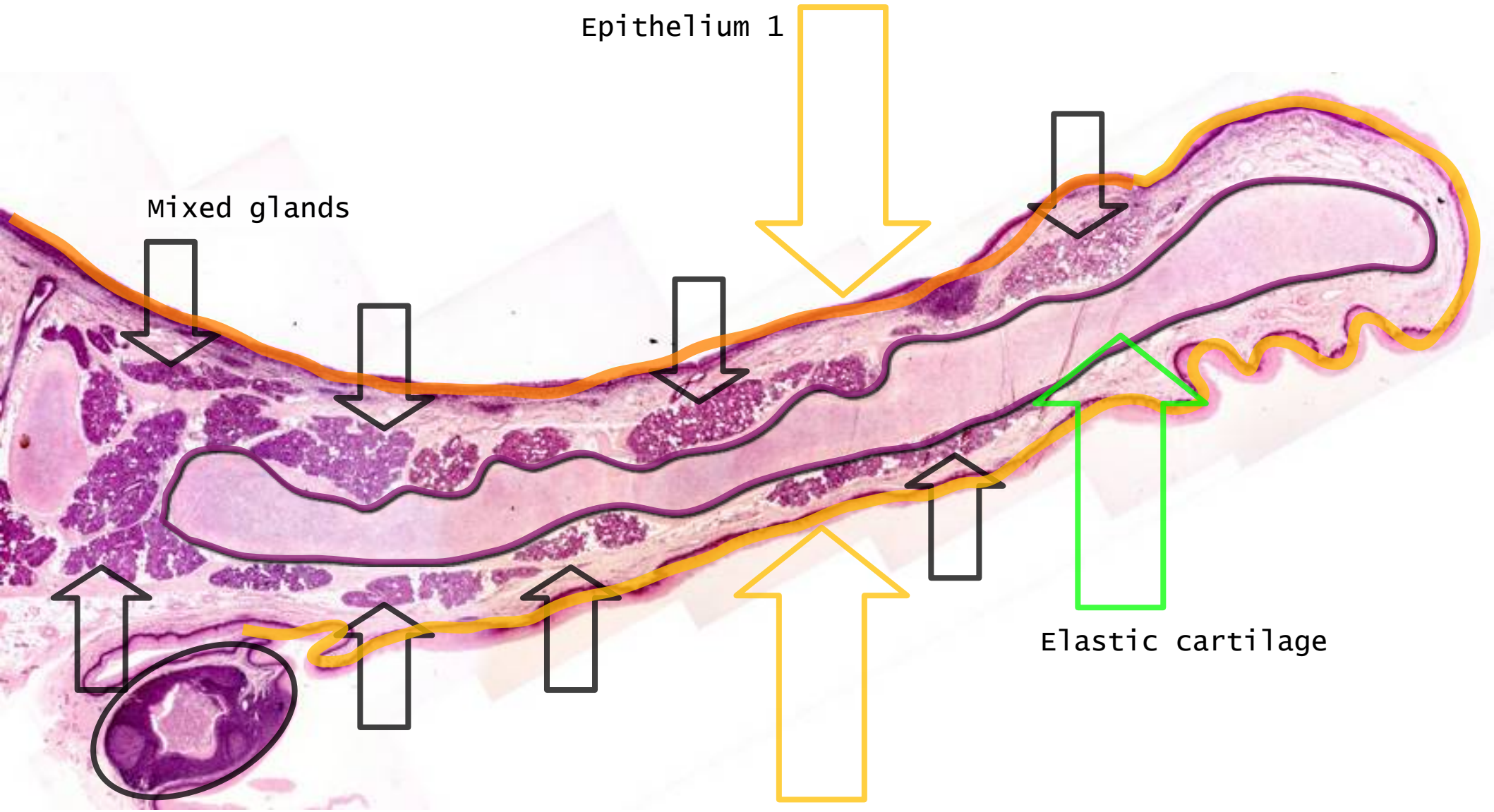
Epiglottis

Slide 111

Epiglottis – Low magnification

Very low magnification

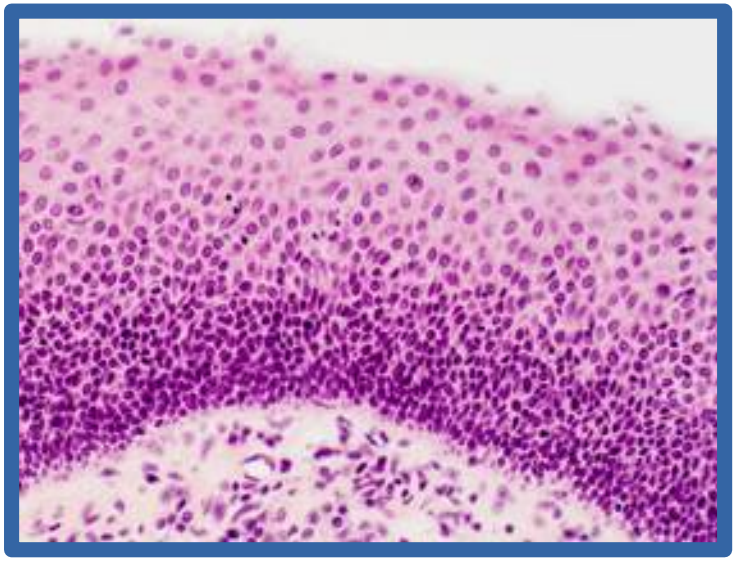
Epiglottis – Low magnification



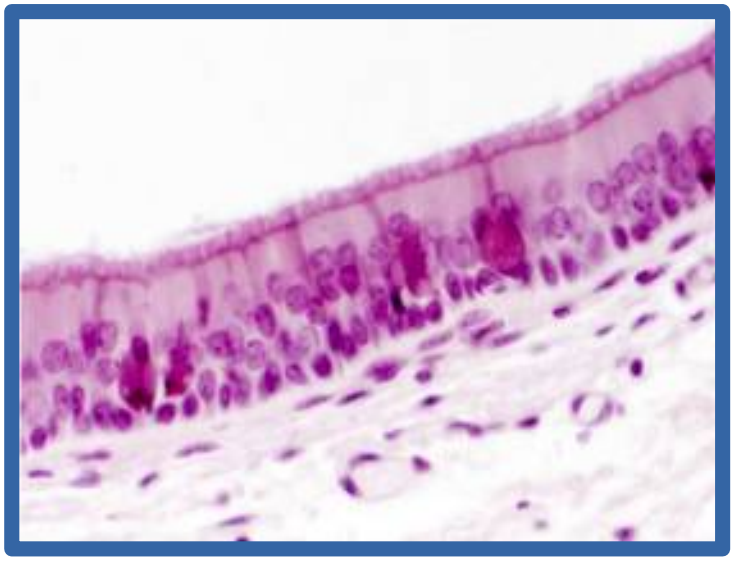
Very low magnification

2 Types of epithelium

- Superior surface
  - Stratified squamous

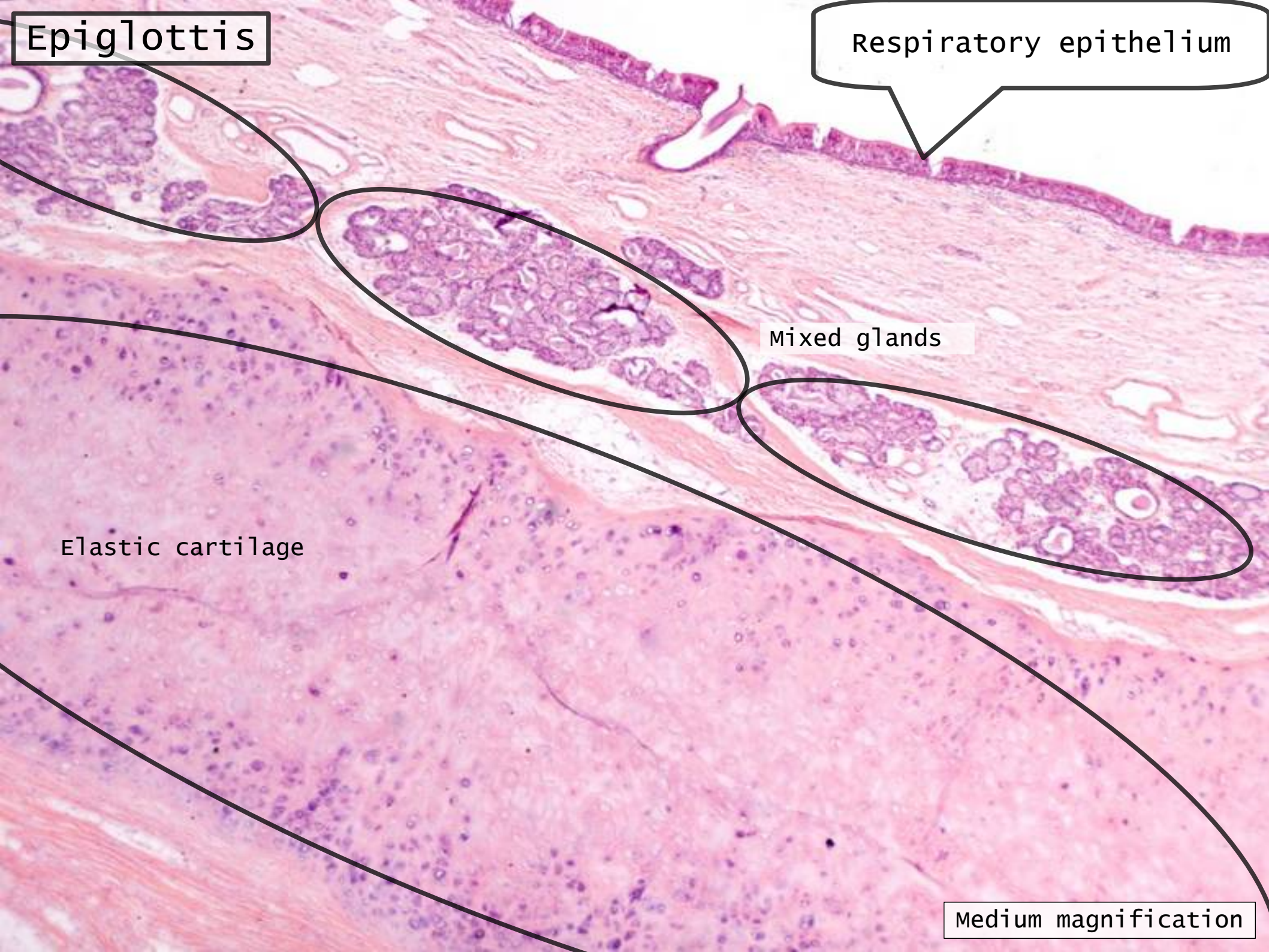


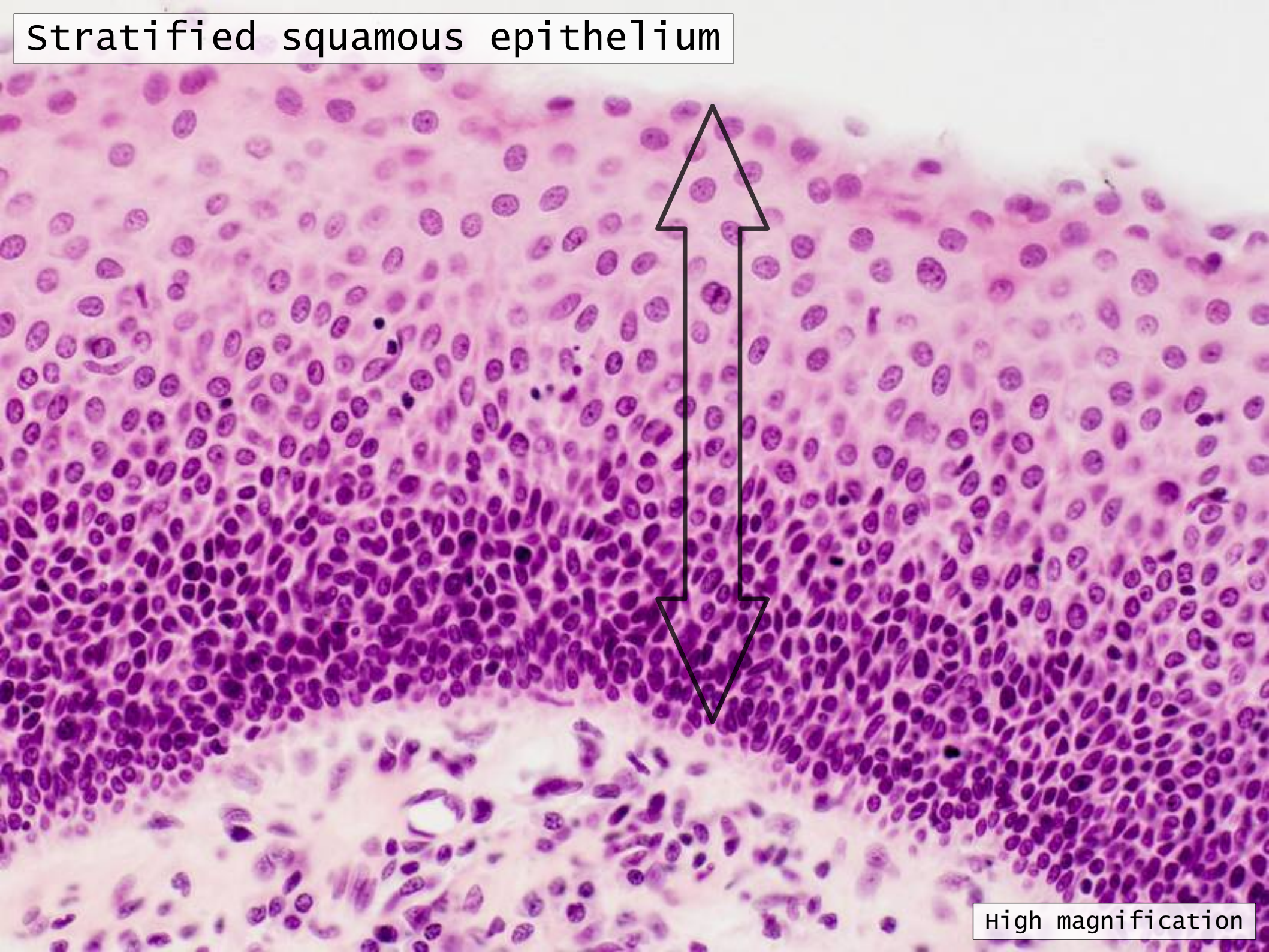
- Inferior surface
  - Respiratory epithelium

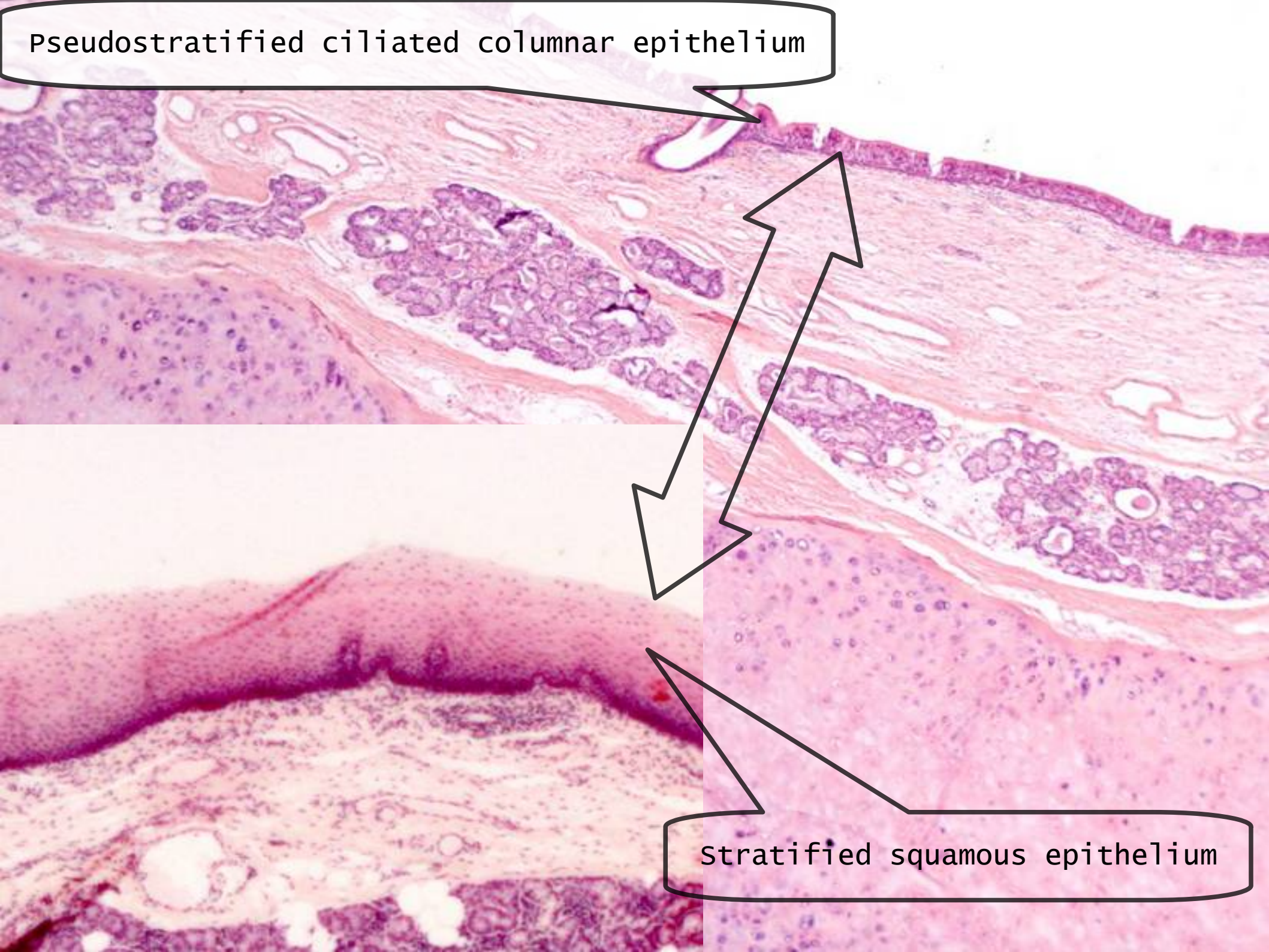


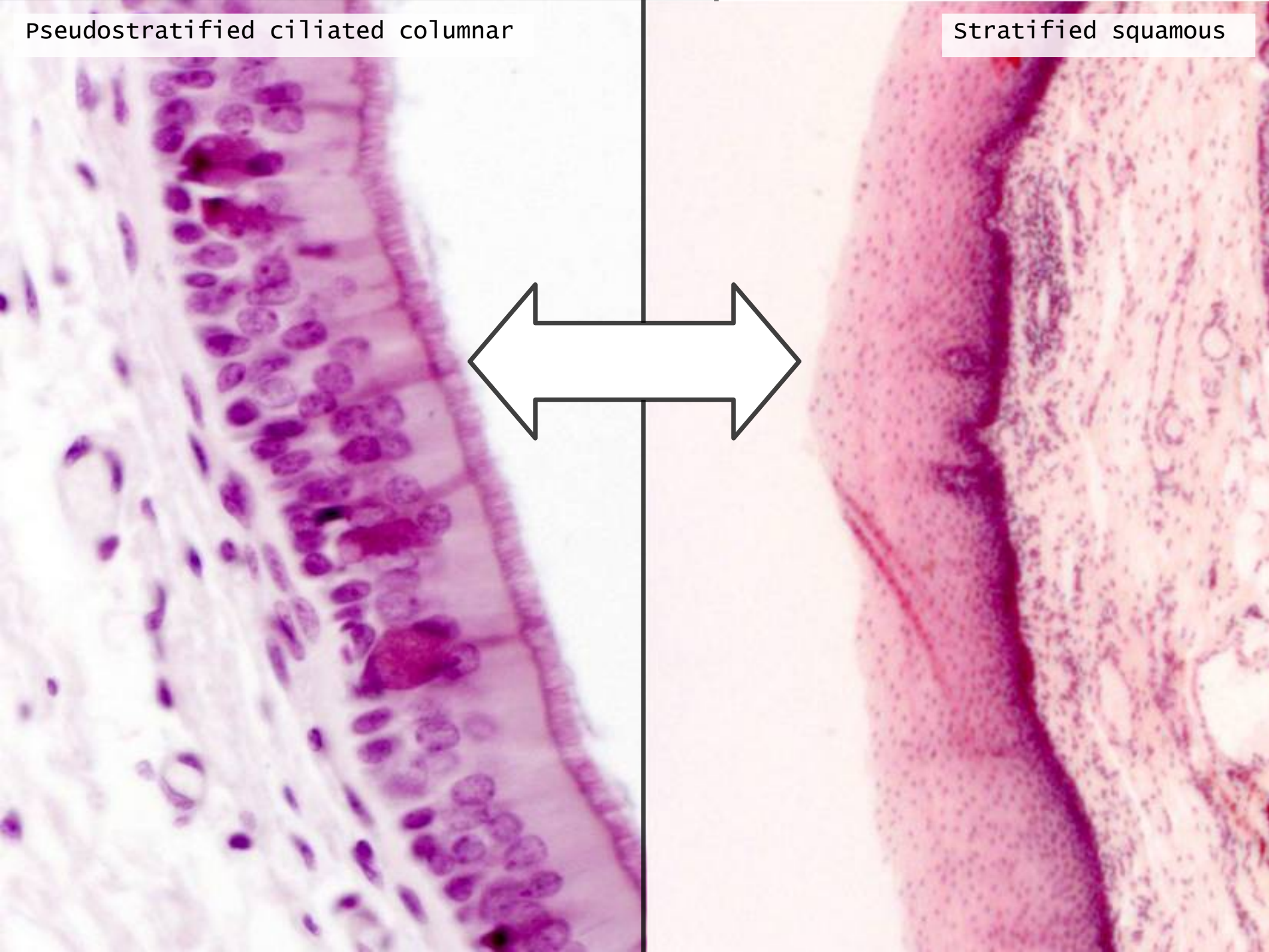
Respiratory epithelium

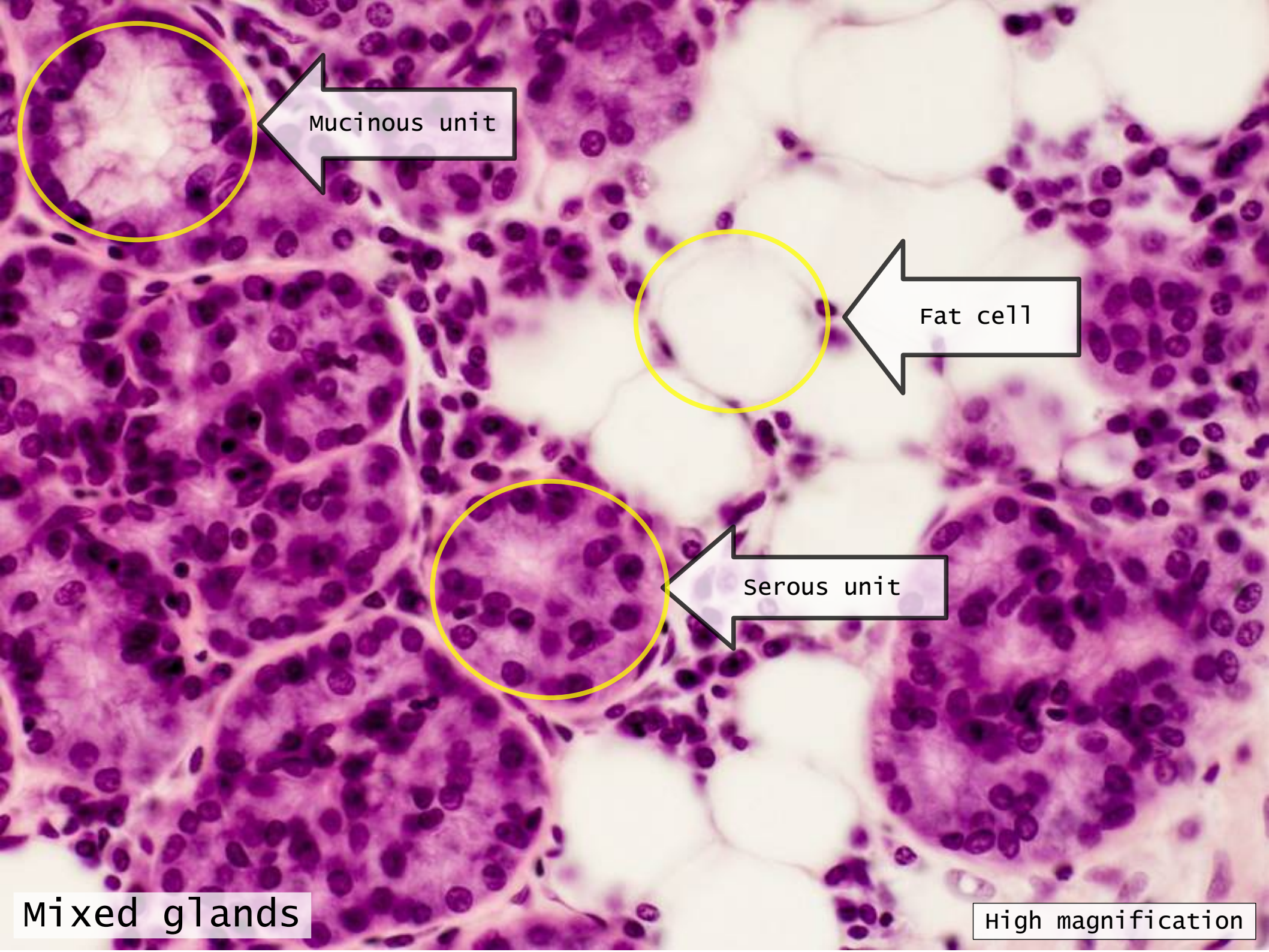
- Pseudostratified
- Ciliated
- Columnar
- Epithelium with
- 4 Cells
  - Ciliated columnar cells
  - Non-ciliated columnar cells
  - Goblet cells
  - Basal cells

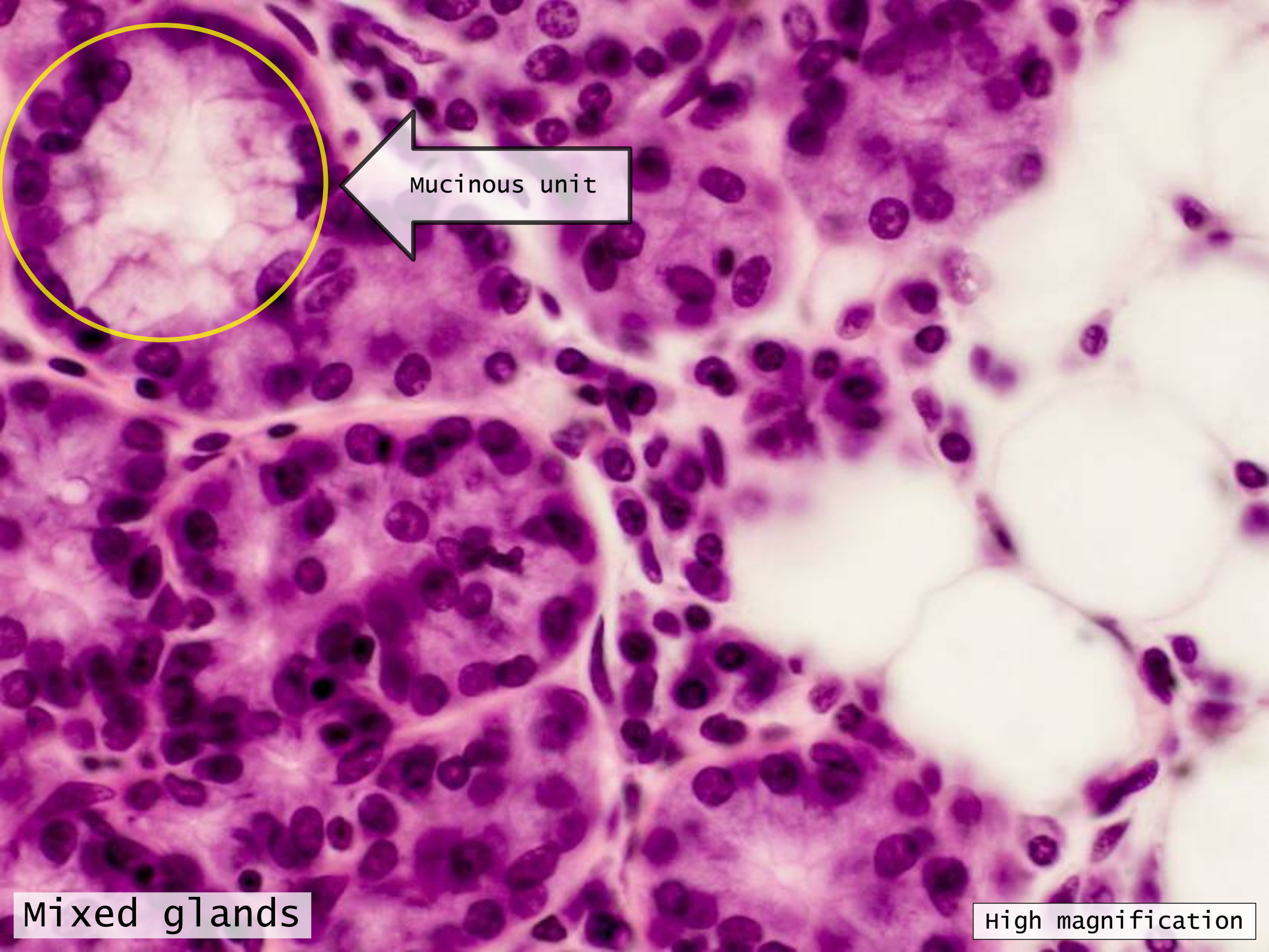

Epiglottis
Respiratory epithelium
Mixed glands
Elastic cartilage
Medium magnification


Stratified squamous epithelium
High magnification


Pseudostratified ciliated columnar epithelium
Stratified squamous epithelium


Pseudostratified ciliated columnar
Stratified squamous


Mucinous unit
Fat cell
Serous unit
Mixed glands
High magnification


Mucinous unit
Mixed glands
High magnification


Elastic cartilage
High magnification

Trachea

Slide 73

For

Pseudostratified ciliated columnar epithelium
Hyaline cartilage
Trachea

Trachea

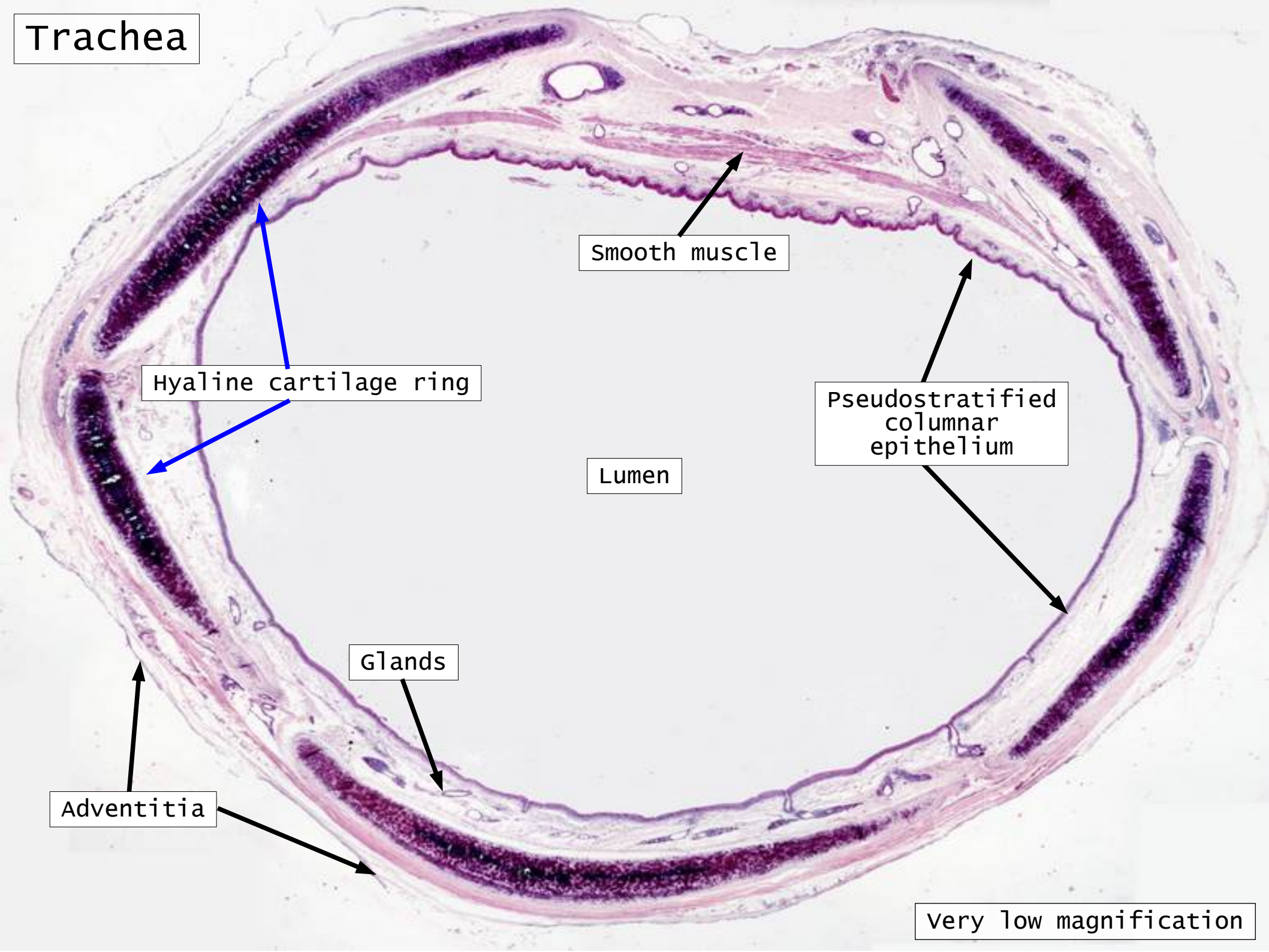
Very low magnification

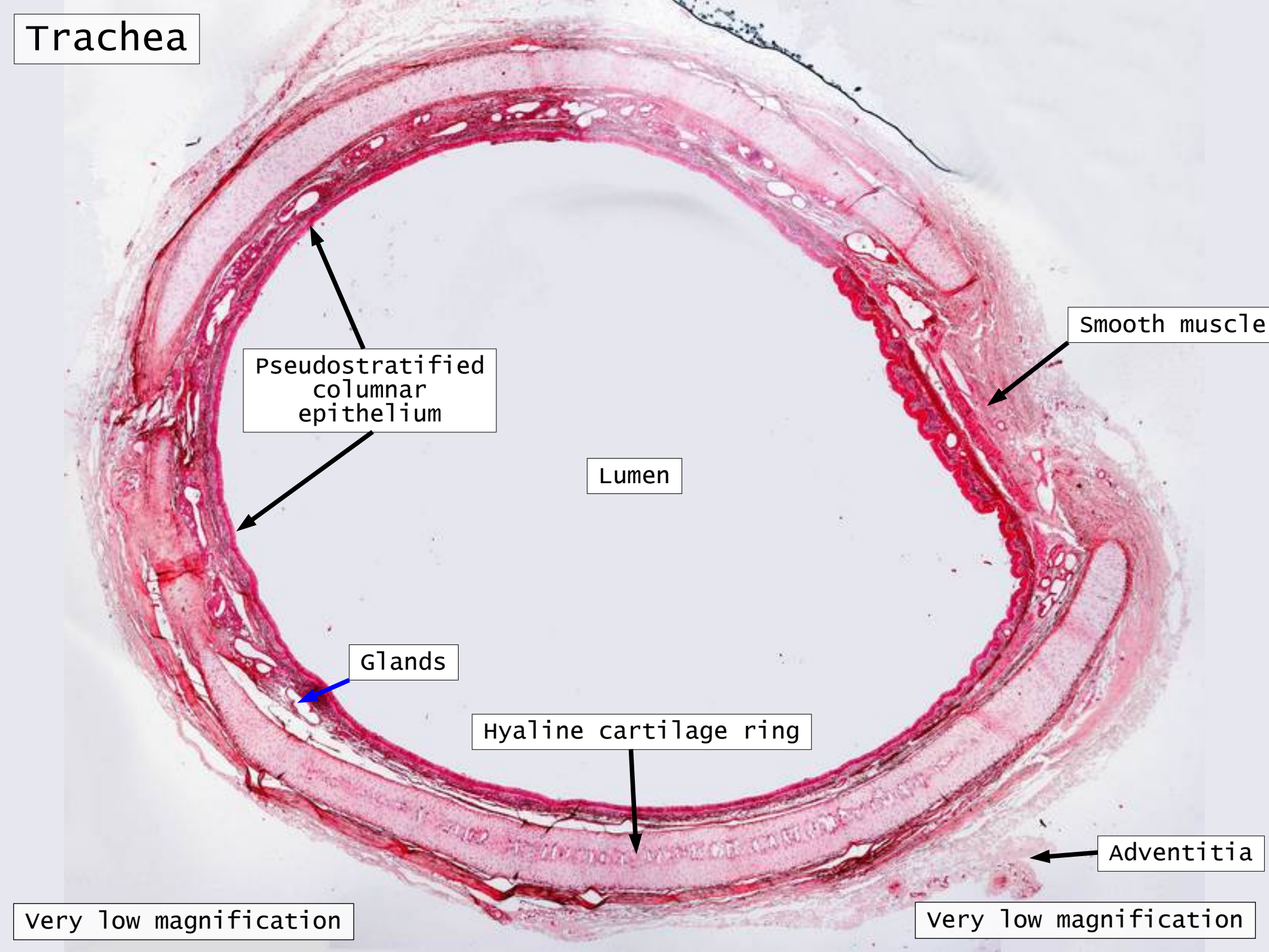
Trachea

Very low magnification

Hyaline cartilage

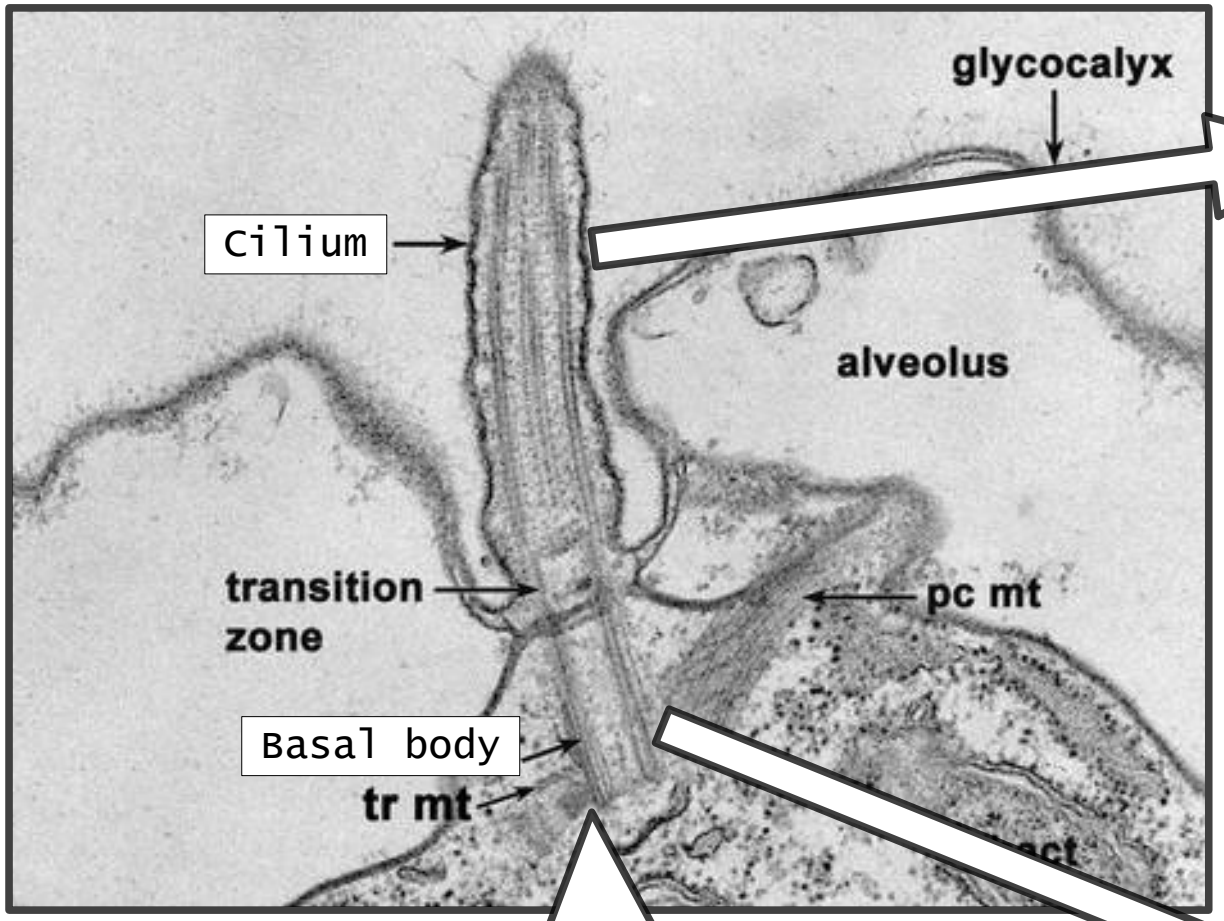
- Perichondrium except articular surfaces
  - Outer fibrous layer – fibroblasts & blood vessels
  - Inner cellular layer – chondrogenic cells
  - Chondrogenic cells differentiate – chondroblasts
- Chondrocytes
- Mature chondroblasts
  - Inside lacunae surrounded by matrix
  - Oval (superficially) to spherical (deep)
  - Multiple cells in lacunae = growth
  - Degeneration – hypertrophy → die → calcify
- Most common
  - Articular ends, nose, larynx, trachea, bronchi

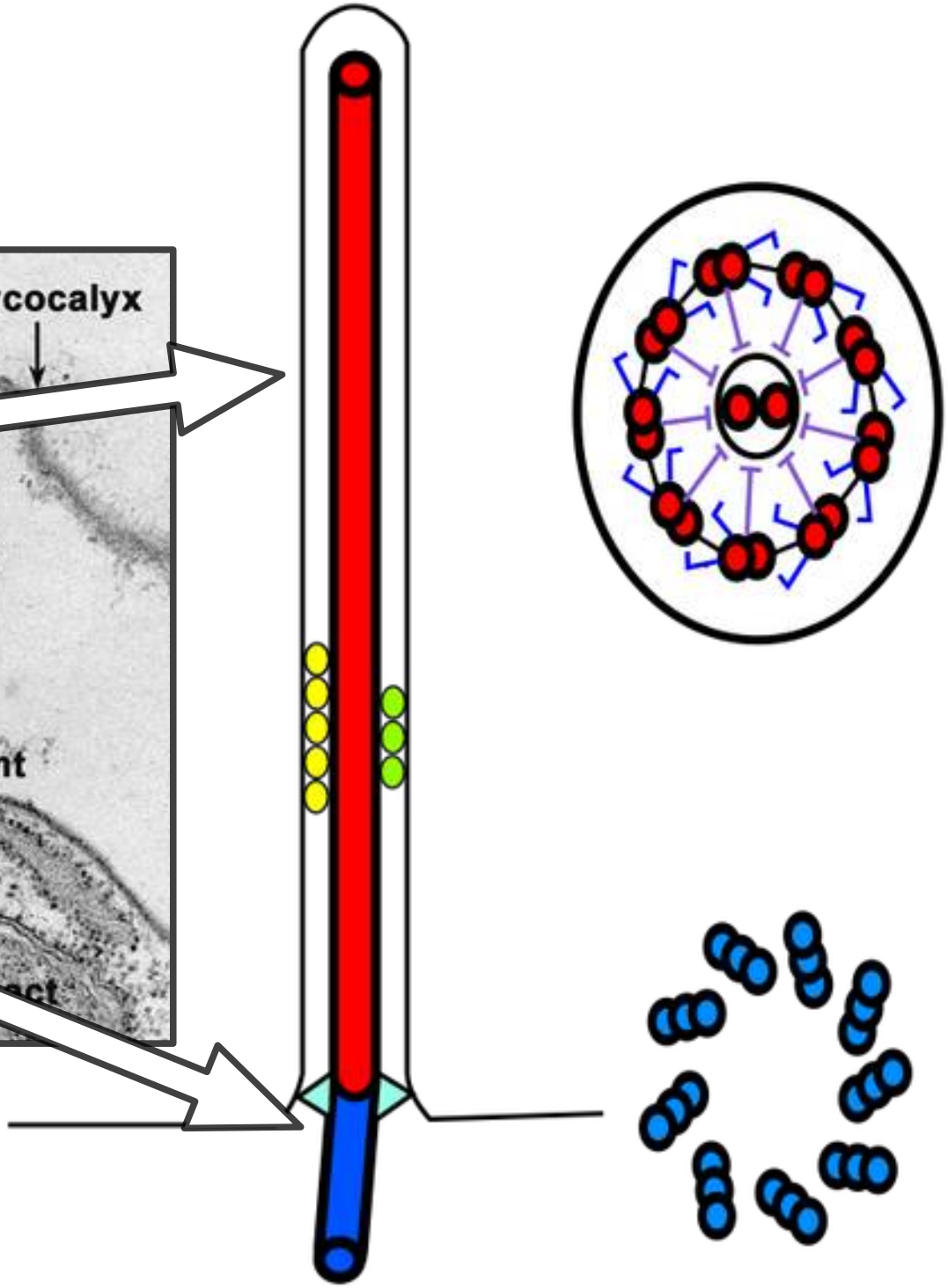

Trachea
Smooth muscle
Hyaline cartilage ring
Pseudostratified columnar epithelium
Lumen
Glands
Adventitia
Very low magnification


Trachea
Pseudostratified columnar epithelium
Lumen
Smooth muscle
Glands
Hyaline cartilage ring
Adventitia
Very low magnification
Very low magnification

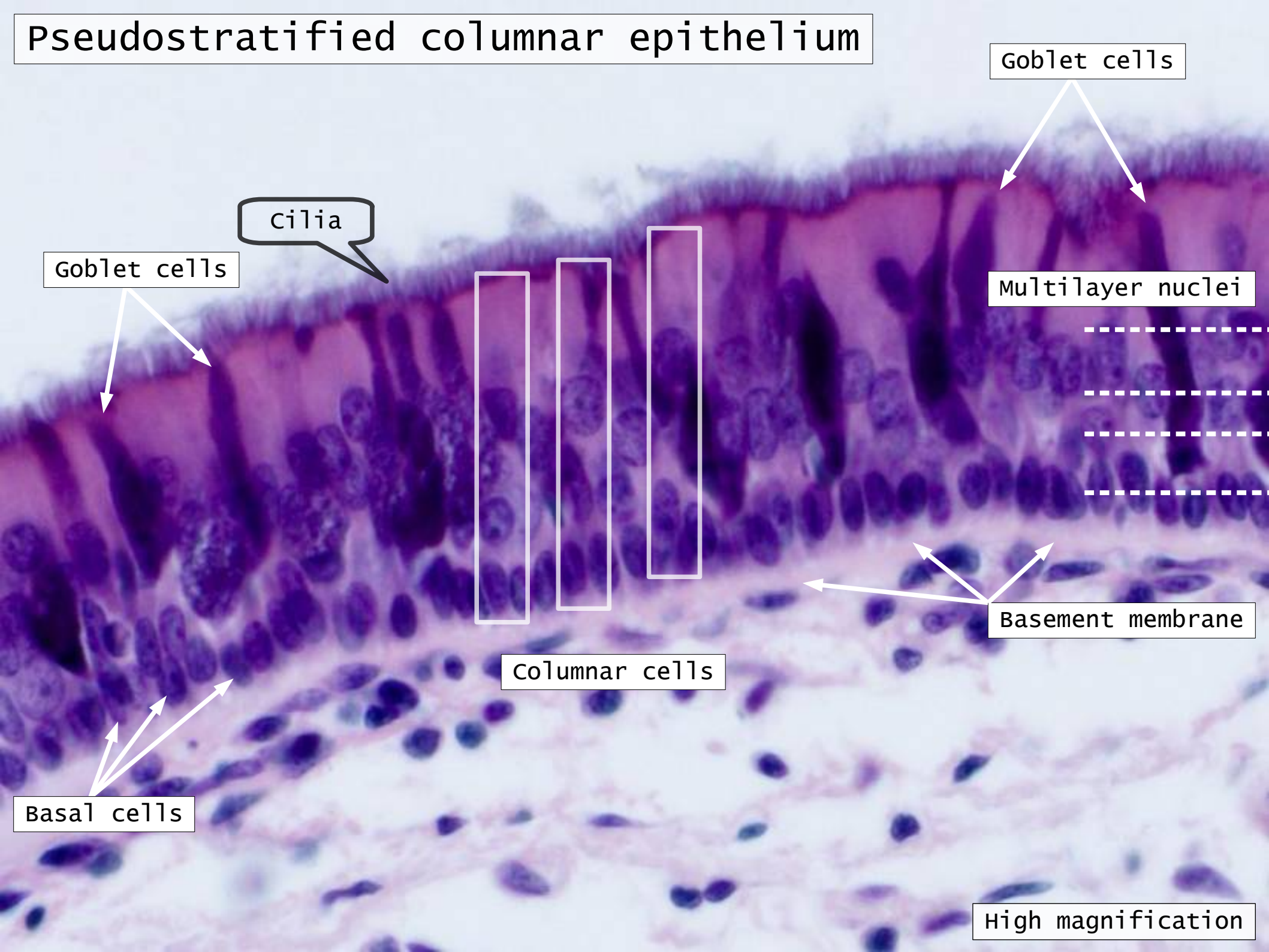
Cilia and basal bodies

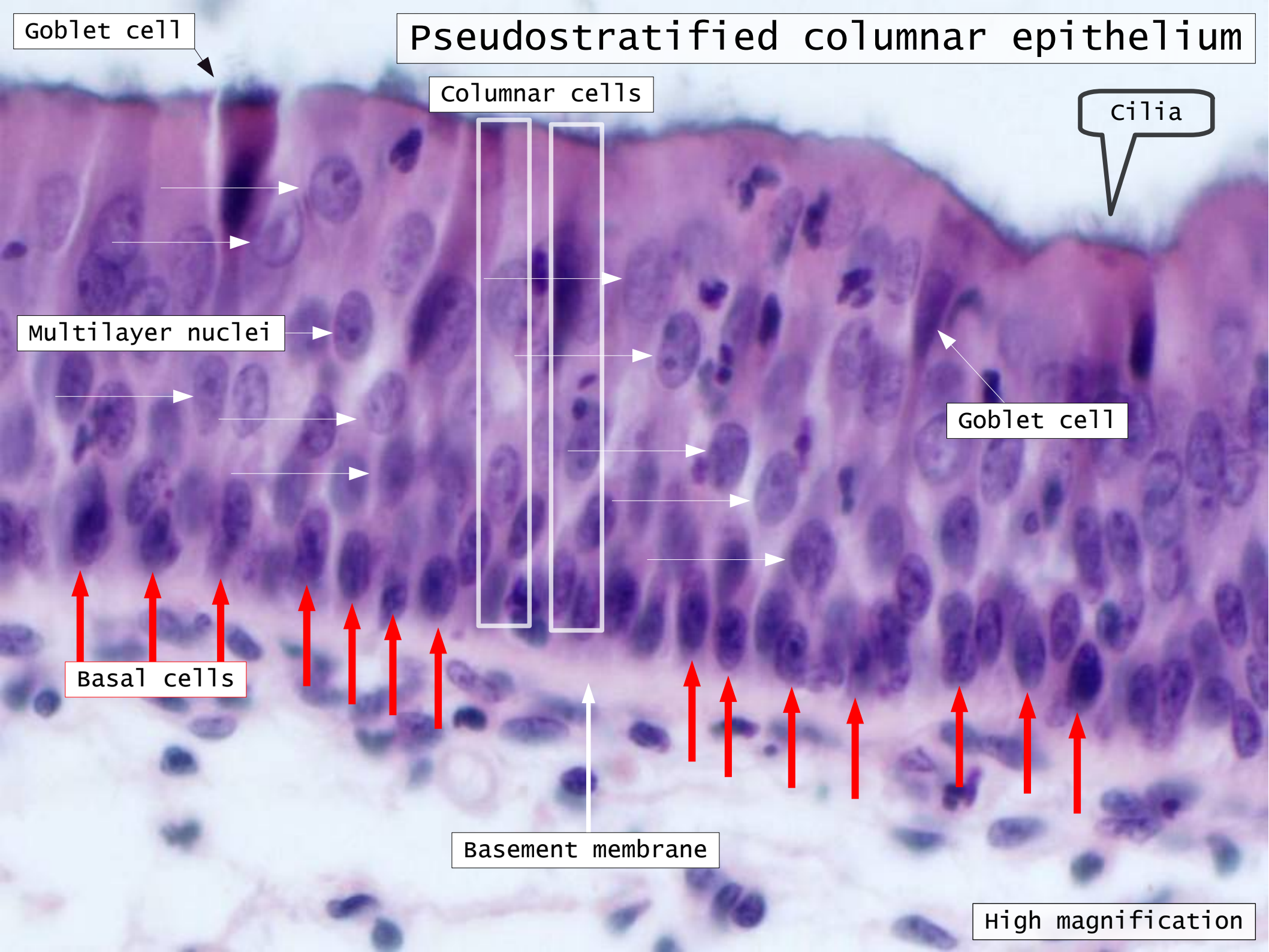
Cilium



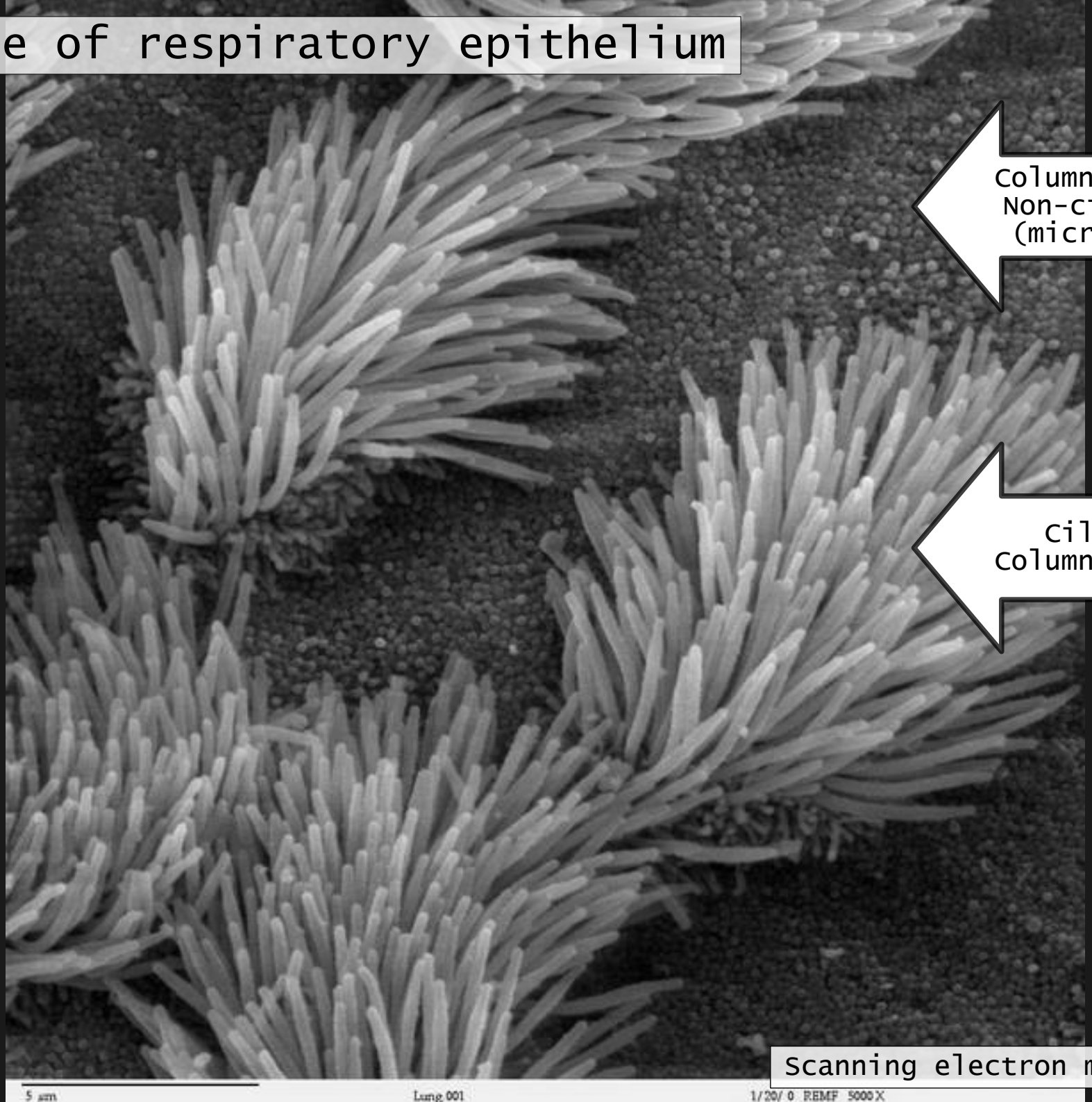


Visible line with LM


Pseudostratified columnar epithelium
Goblet cells
Cilia
Goblet cells
Multilayer nuclei
Basement membrane
Columnar cells
Basal cells
High magnification

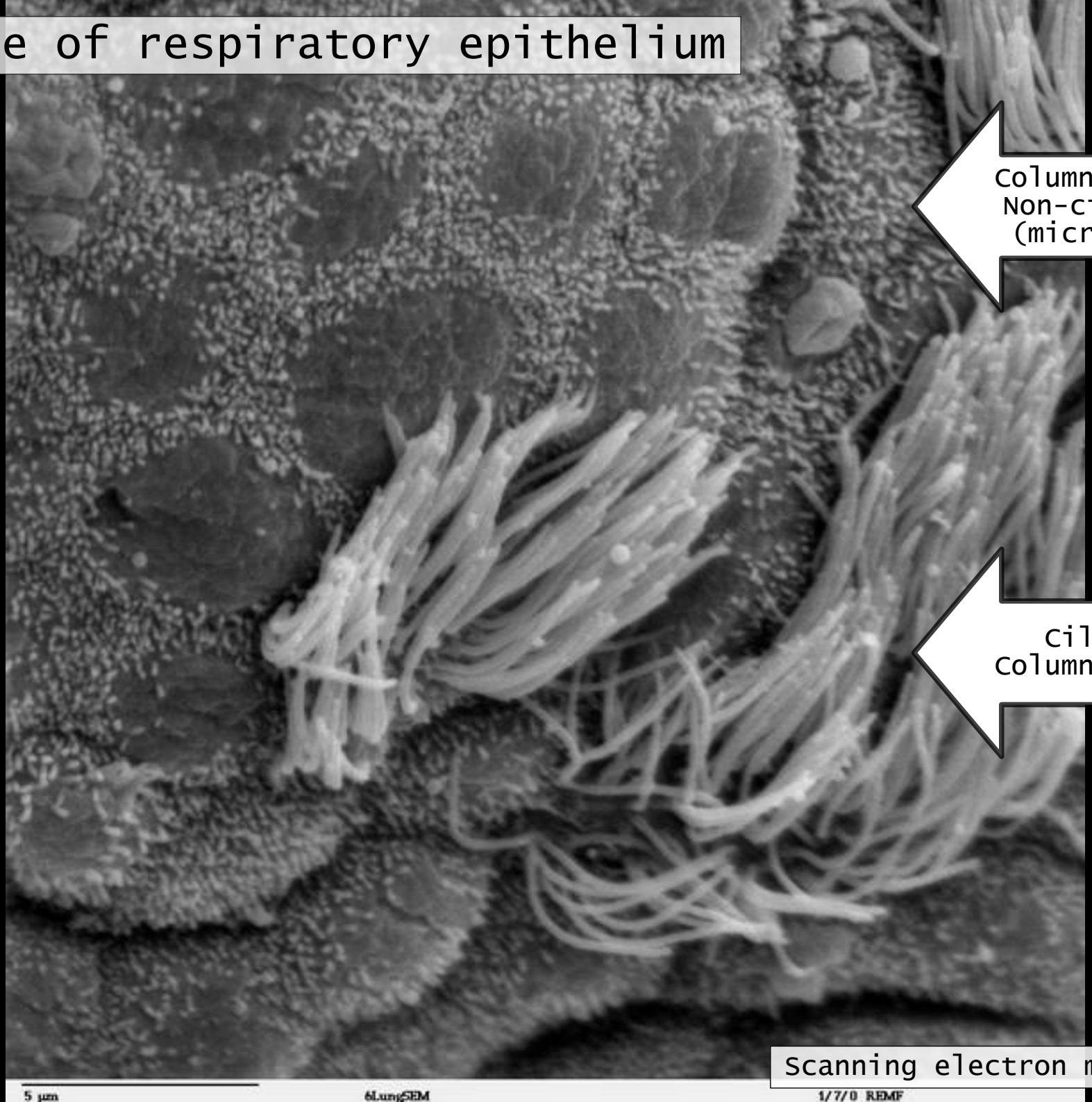

Pseudostratified columnar epithelium
Goblet cell
Columnar cells
Cilia
Multilayer nuclei
Goblet cell
Basal cells
Basement membrane
High magnification

Surface of respiratory epithelium



Scanning electron microscope

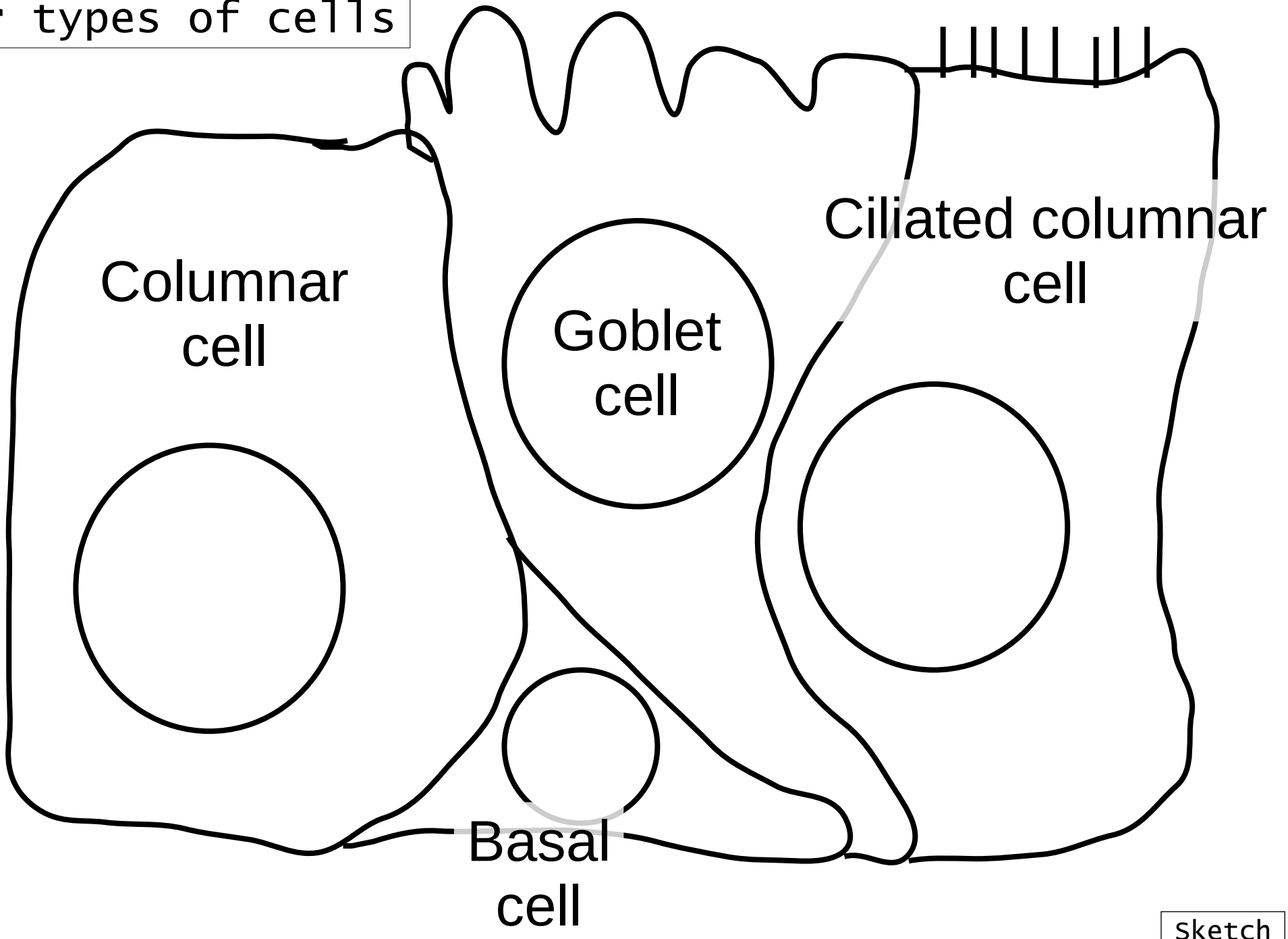
Surface of respiratory epithelium



Scanning electron microscope

Pseudostratified columnar epithelium

Four types of cells



Sketch

Figure 33.9 Simple columnar epithelial cells;
Biology 2e 25 March 2018; OpenStax; CC-BY 4.0

Two types of cells

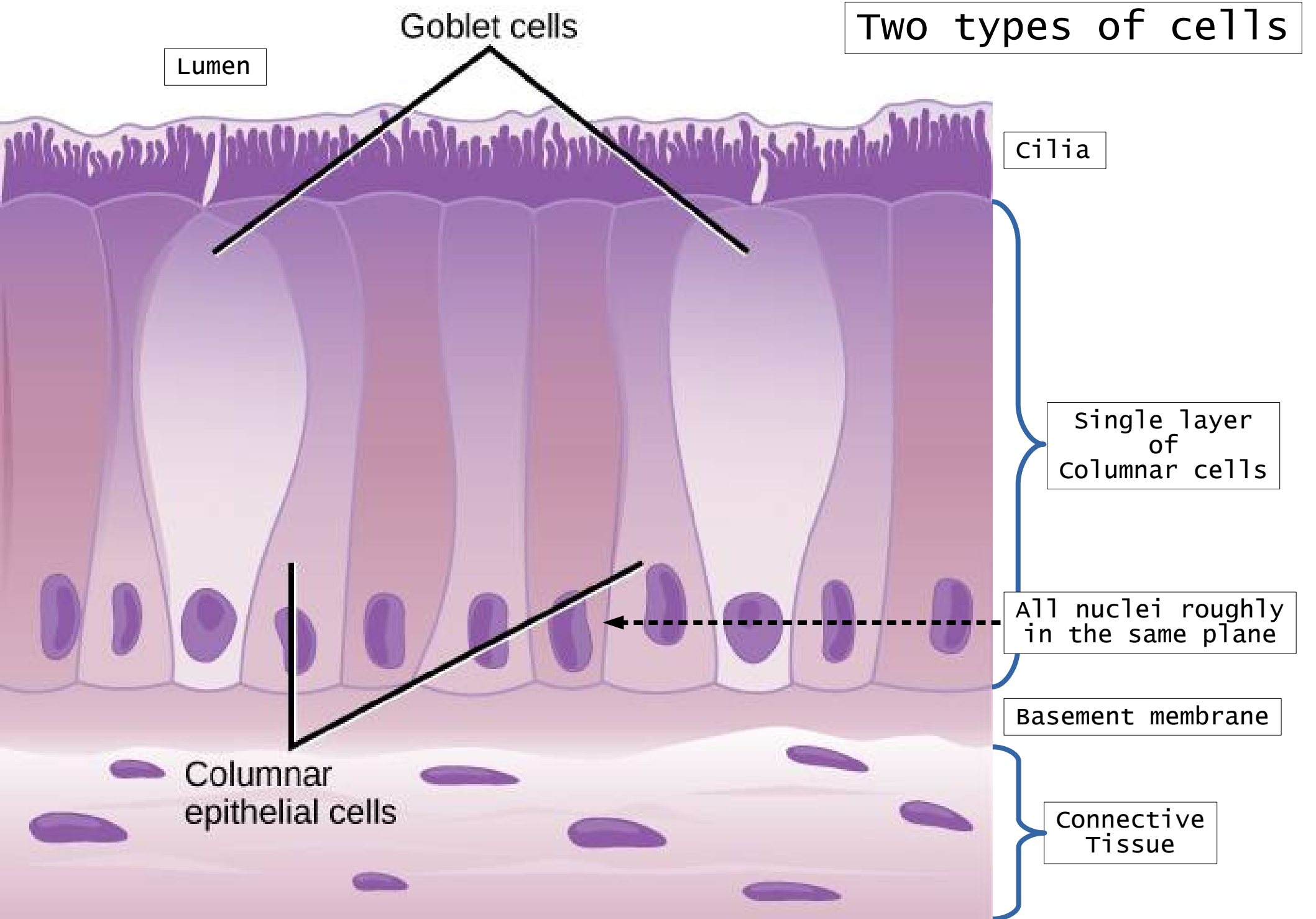
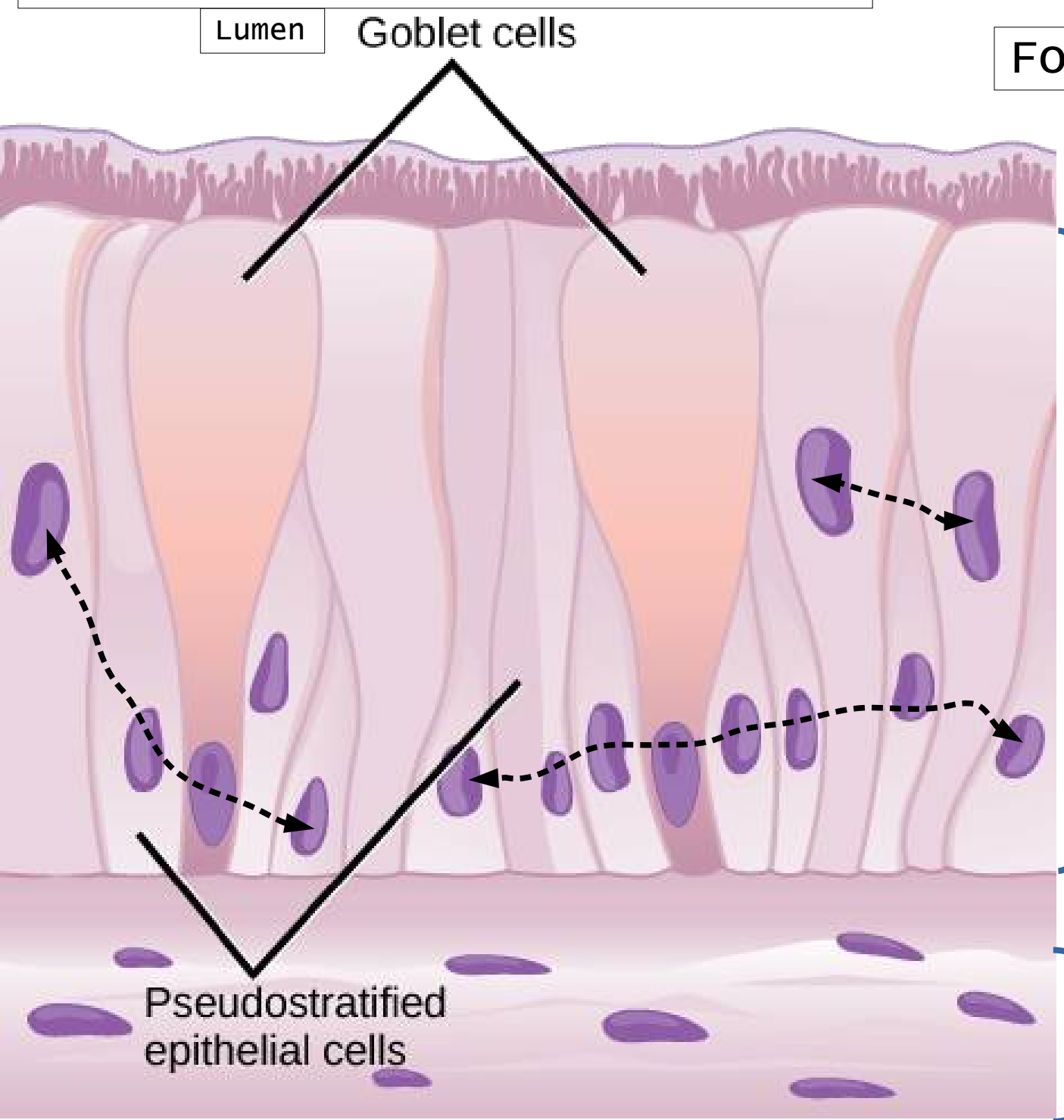


Figure 33.10 Pseudostratified columnar epithelium; Biology 2e 25 March 2018; OpenStax; CC-BY 4.0



Four types of cells

Cilia

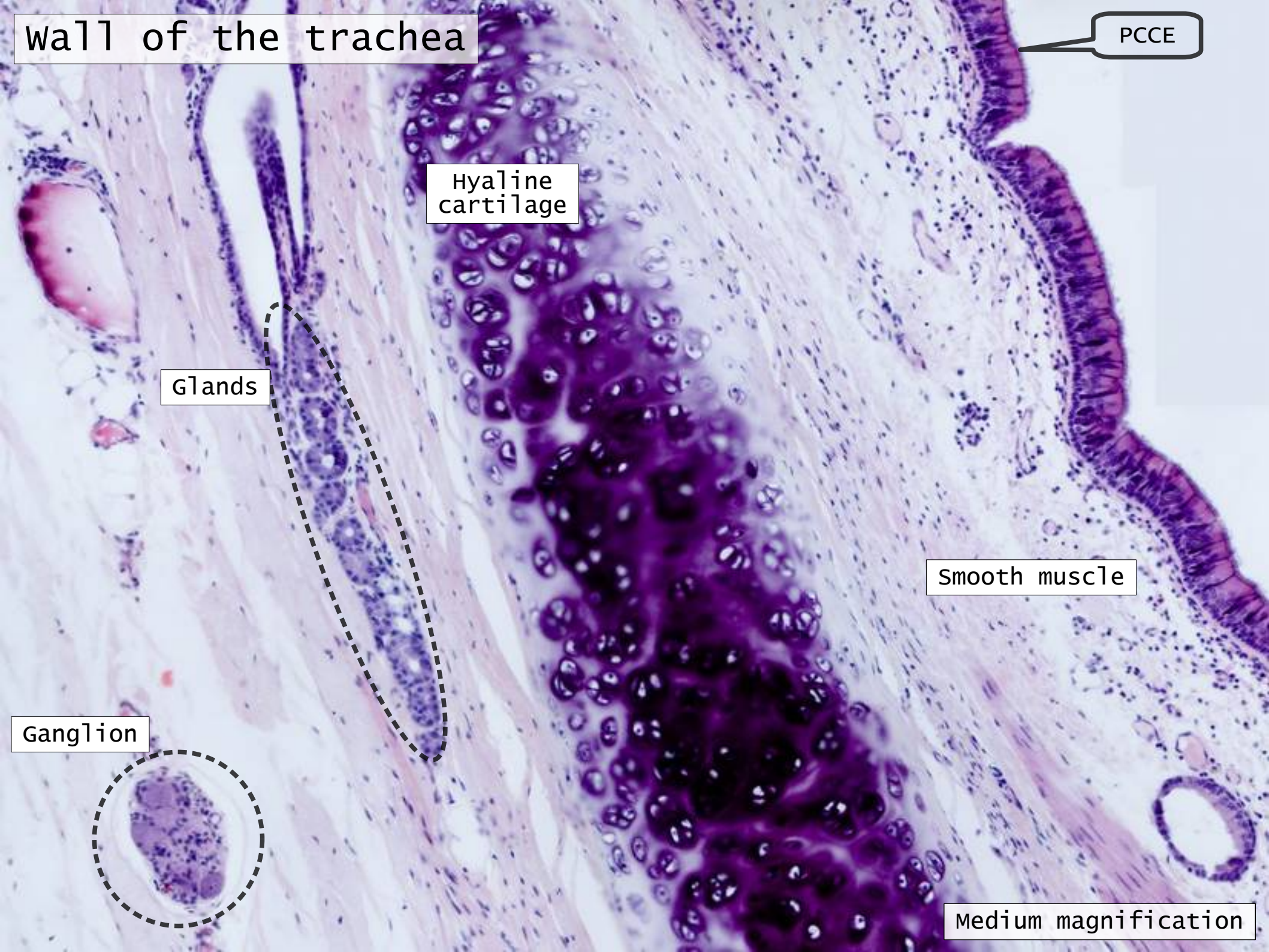
Figure 33.9 Simple columnar epithelial cells; Biology 2e 25 March 2018; OpenStax; CC-BY 4.0

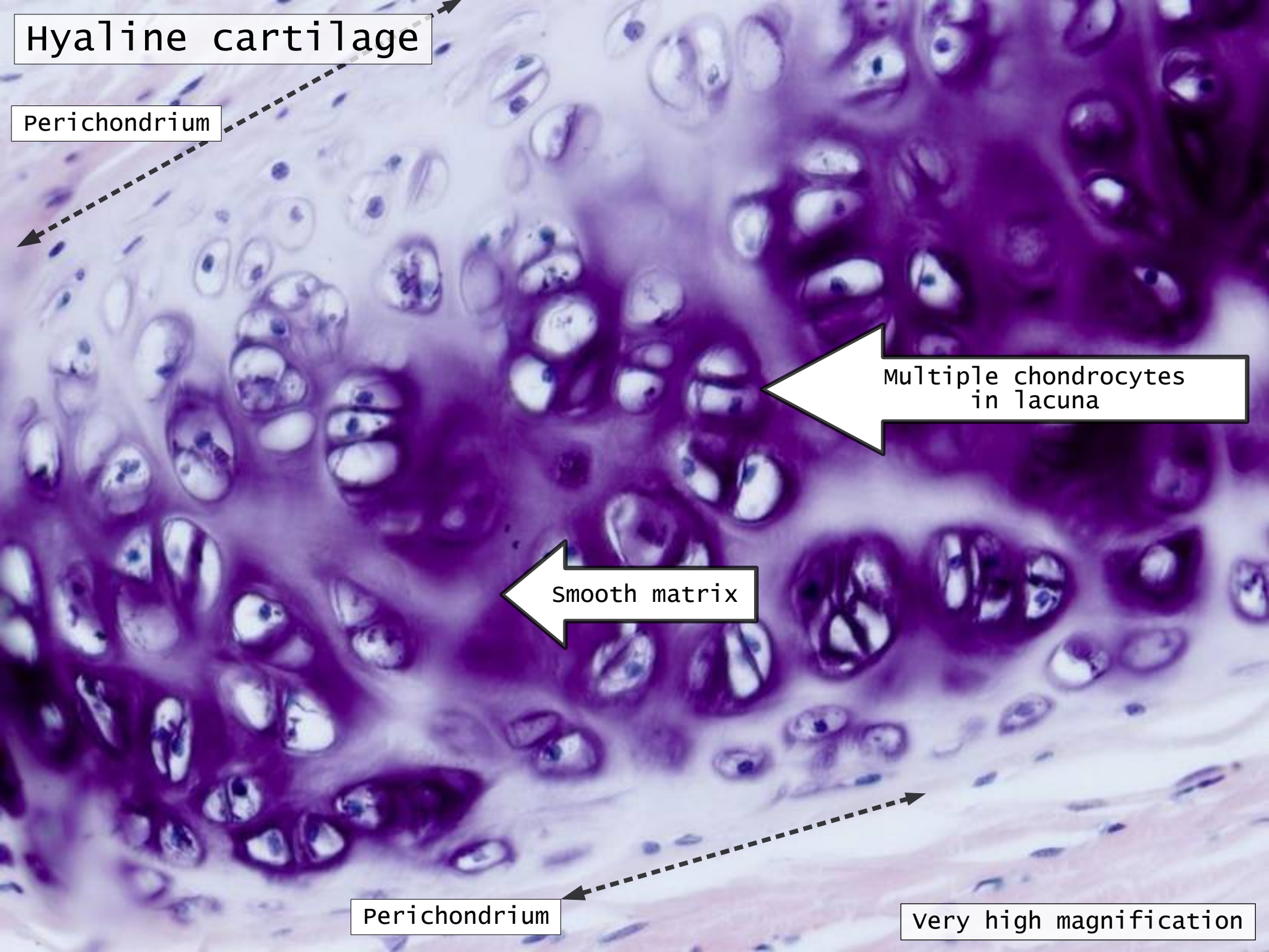
Single layer of cells

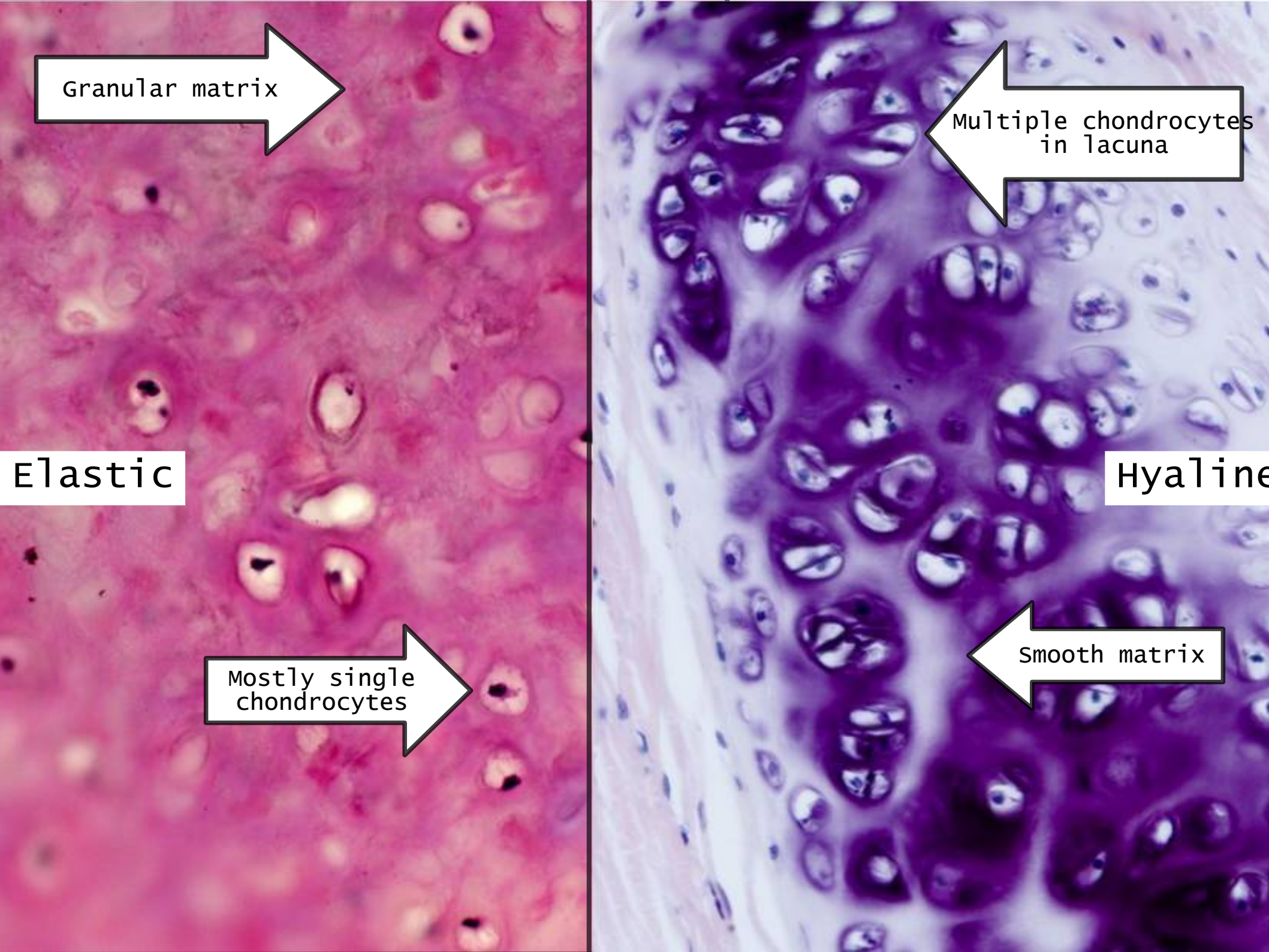
Nuclei on different planes

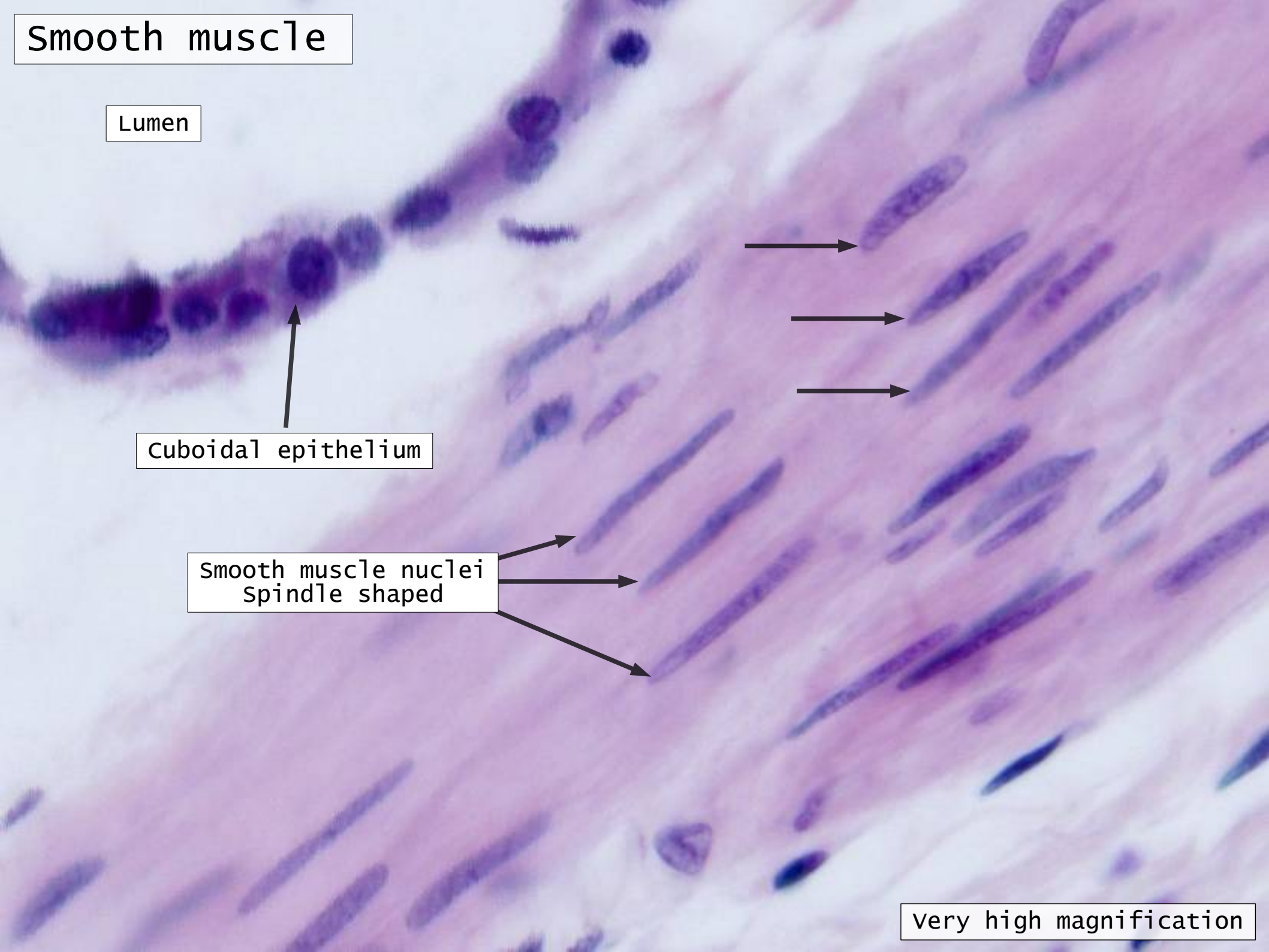
Basement membrane

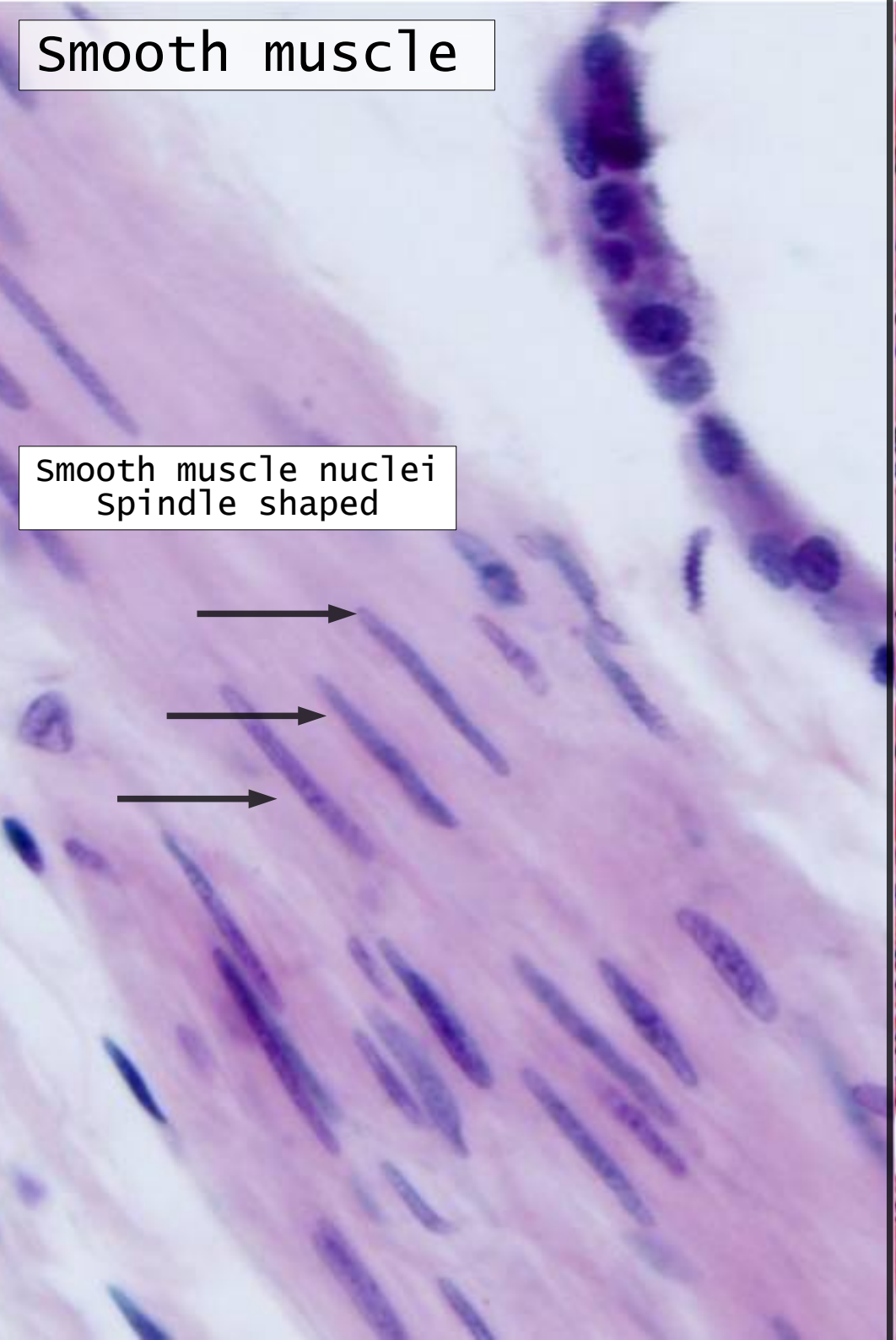
Connective Tissue


Wall of the trachea
PCCE
Hyaline cartilage
Glands
Smooth muscle
Ganglion
Medium magnification

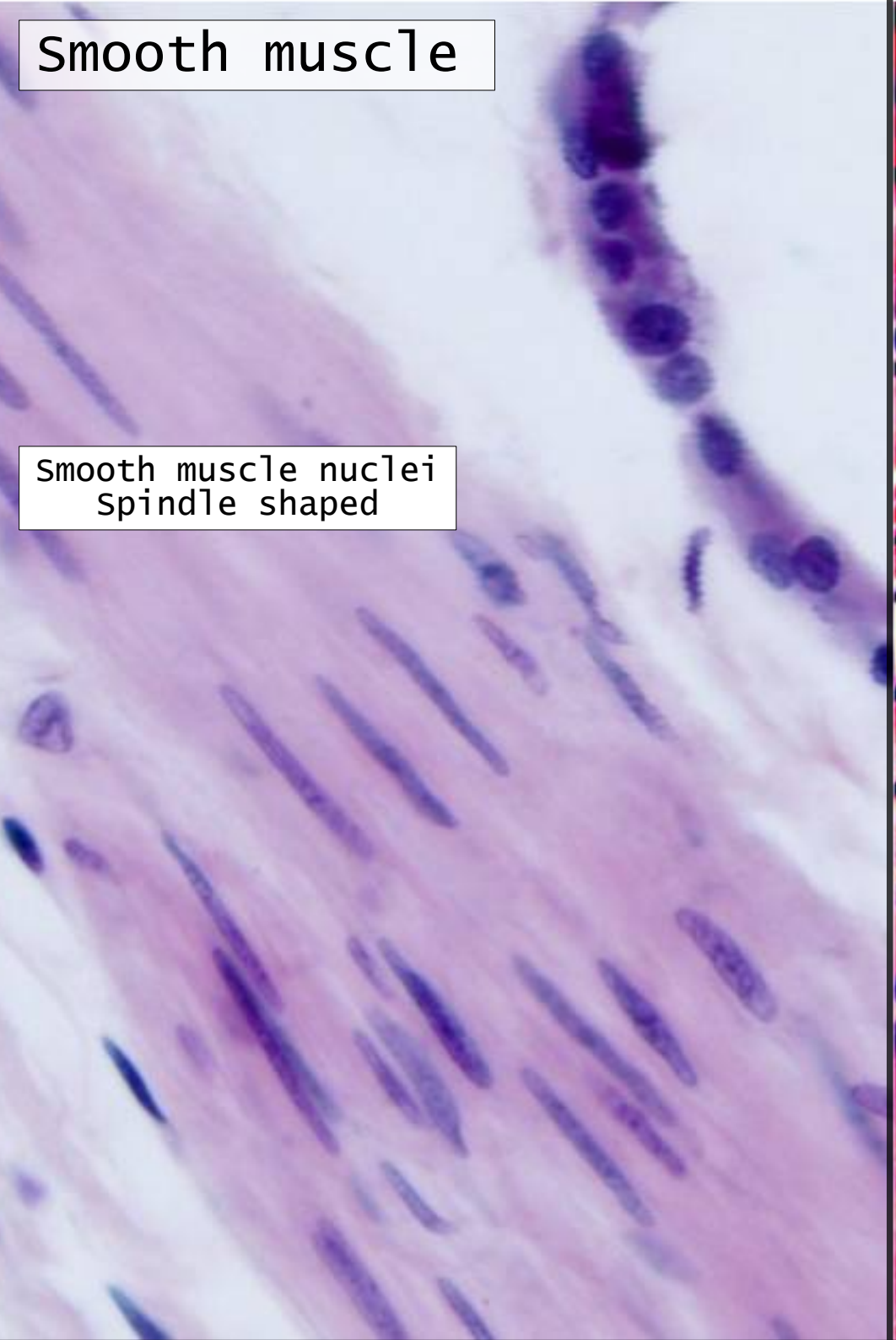

Hyaline cartilage
Perichondrium
Multiple chondrocytes in lacuna
Smooth matrix
Perichondrium
Very high magnification

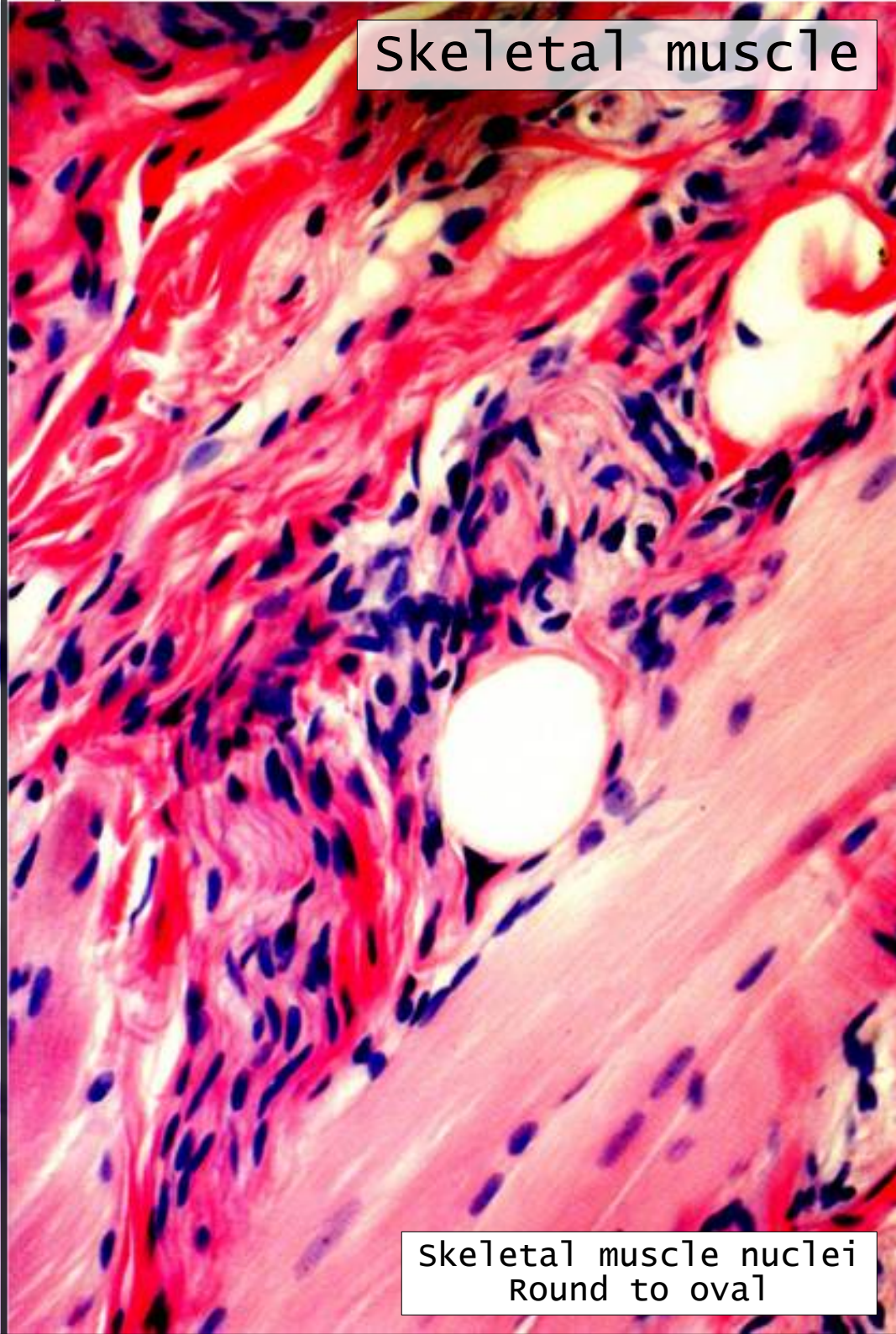

Granular matrix
Elastic
Mostly single chondrocytes
Multiple chondrocytes in lacuna
Hyaline
Smooth matrix

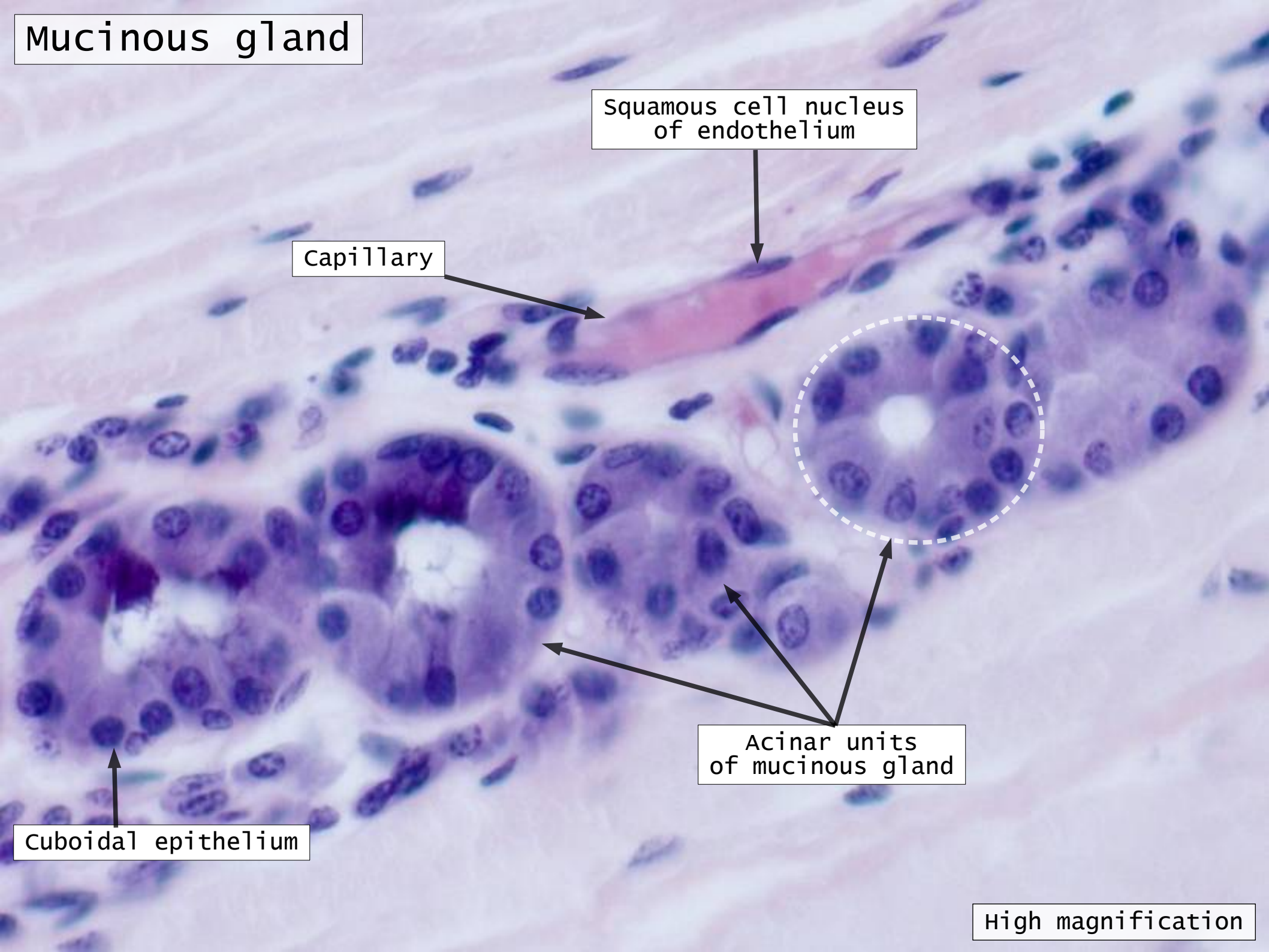

Smooth muscle
Lumen
Cuboidal epithelium
Smooth muscle nuclei
Spindle shaped
Very high magnification

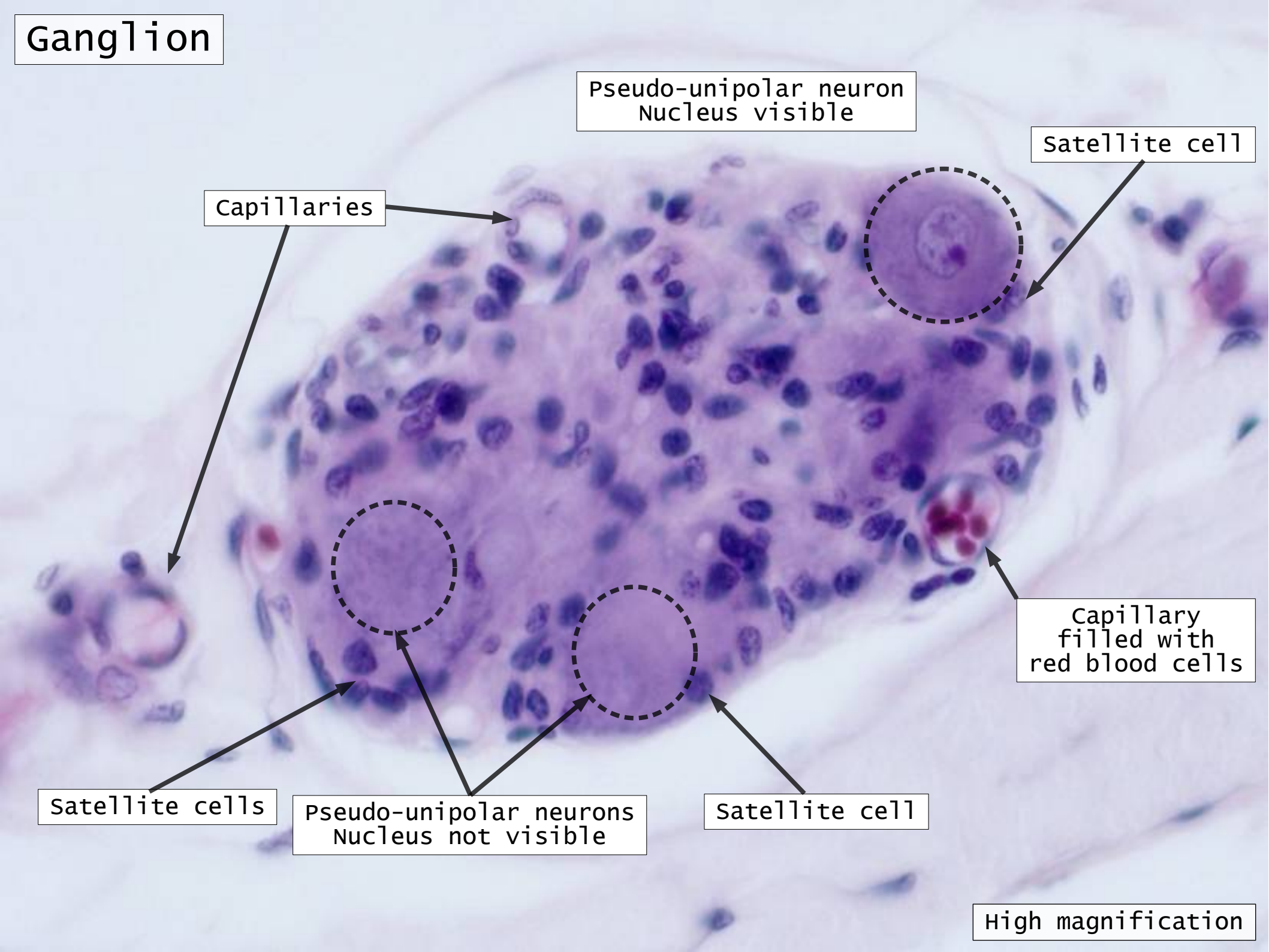

Smooth muscle
Smooth muscle nuclei
Spindle shaped

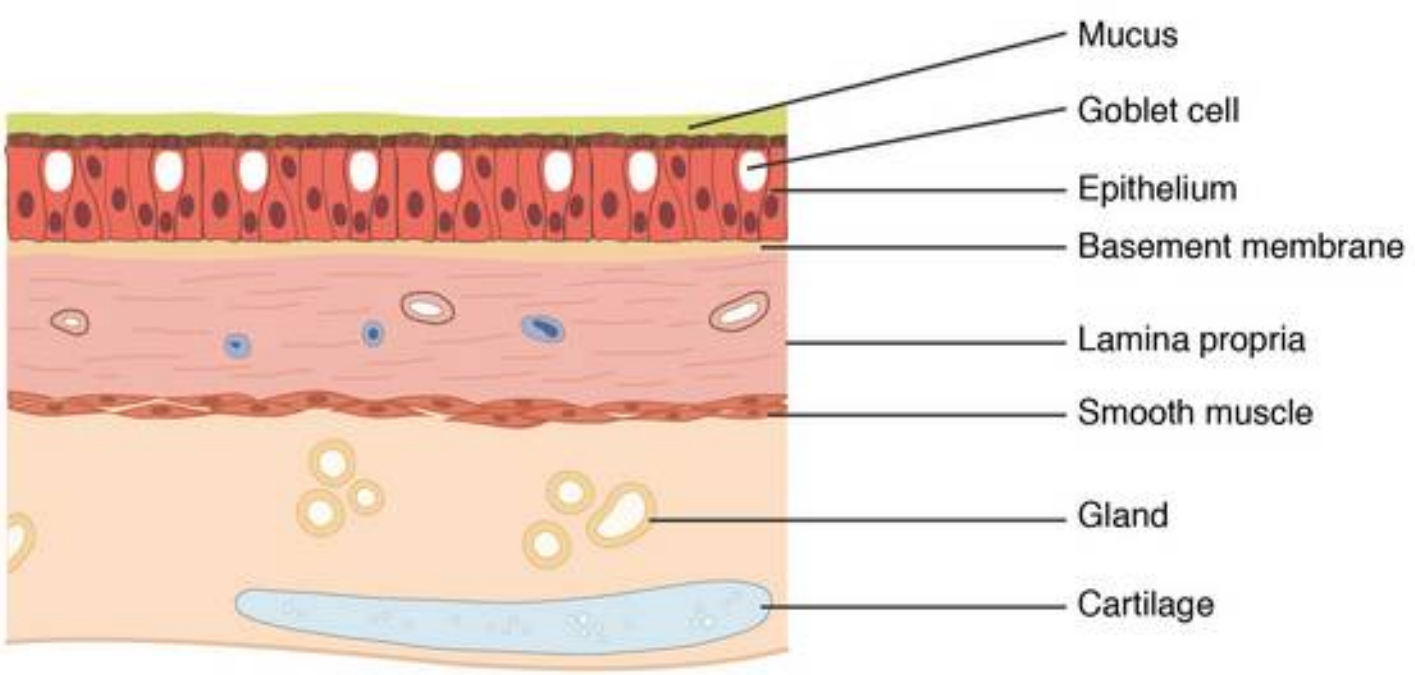

Skeletal muscle
Skeletal muscle nuclei
Round to oval


Smooth muscle
Smooth muscle nuclei
Spindle shaped

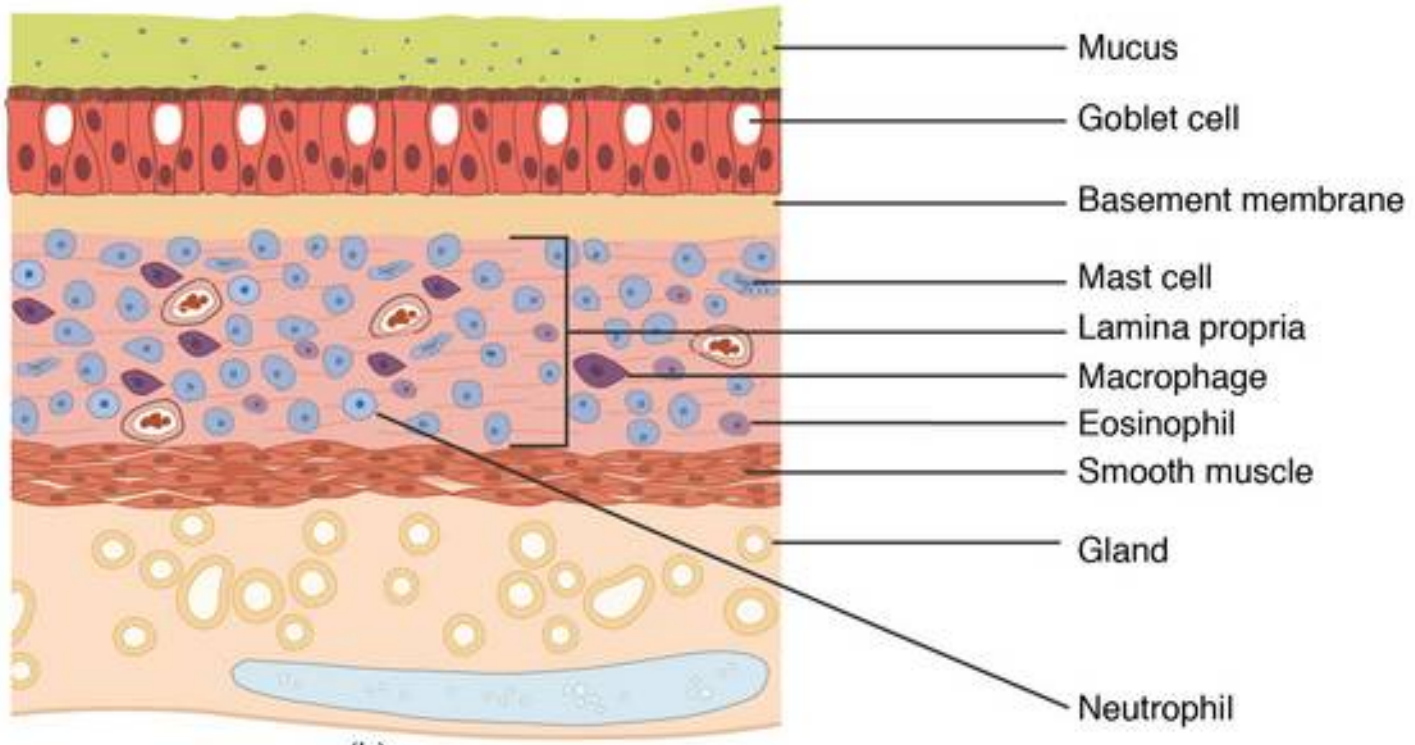

Skeletal muscle
Skeletal muscle nuclei
Round to oval


Mucinous gland
Squamous cell nucleus of endothelium
Capillary
Acinar units of mucinous gland
Cuboidal epithelium
High magnification

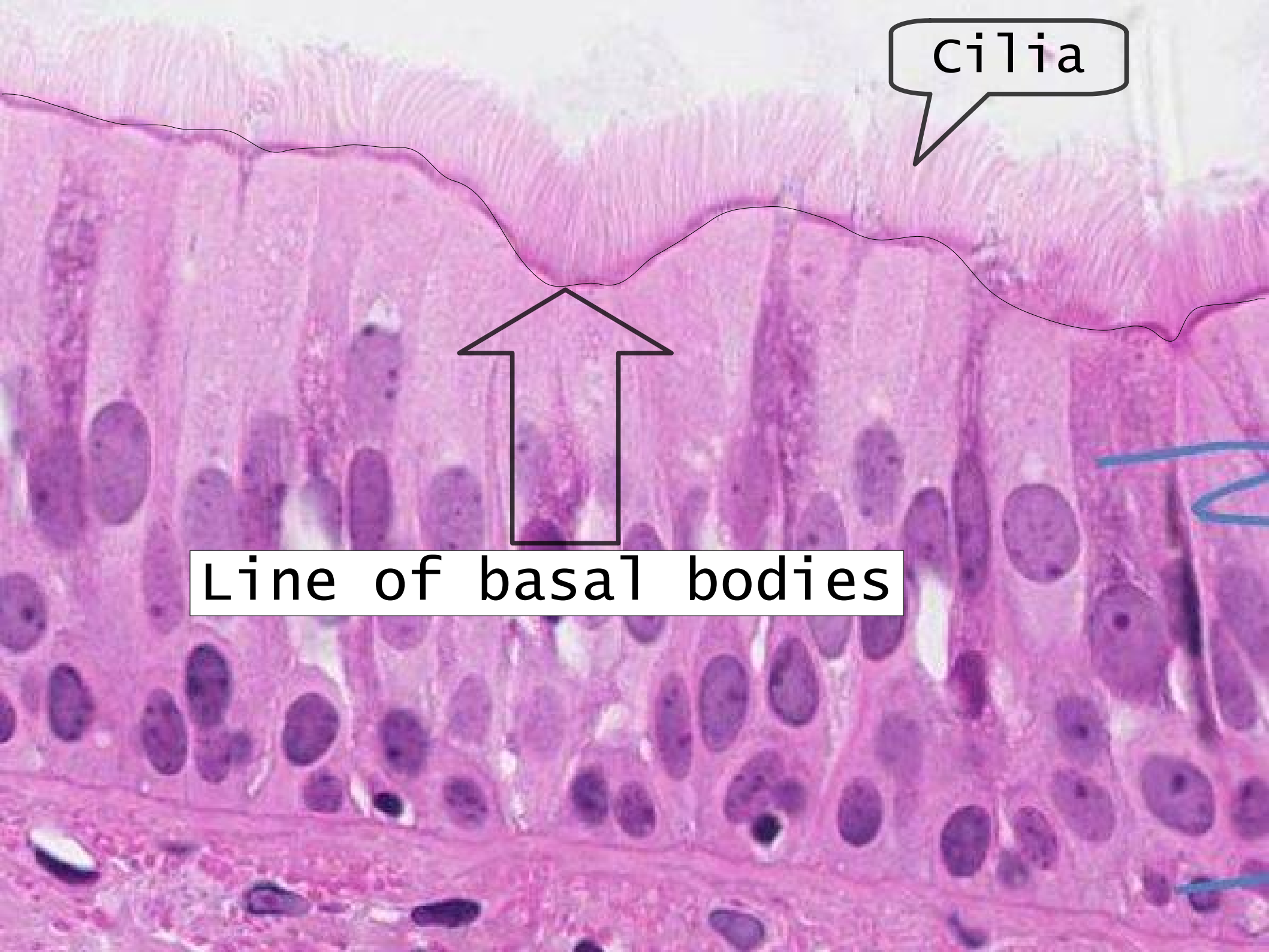

Ganglion
Pseudo-unipolar neuron
Nucleus visible
Satellite cell
Capillaries
Capillary
filled with
red blood cells
Satellite cells
Pseudo-unipolar neurons
Nucleus not visible
Satellite cell
High magnification


Mucus
Goblet cell
Epithelium
Basement membrane
Lamina propria
Smooth muscle
Gland
Cartilage

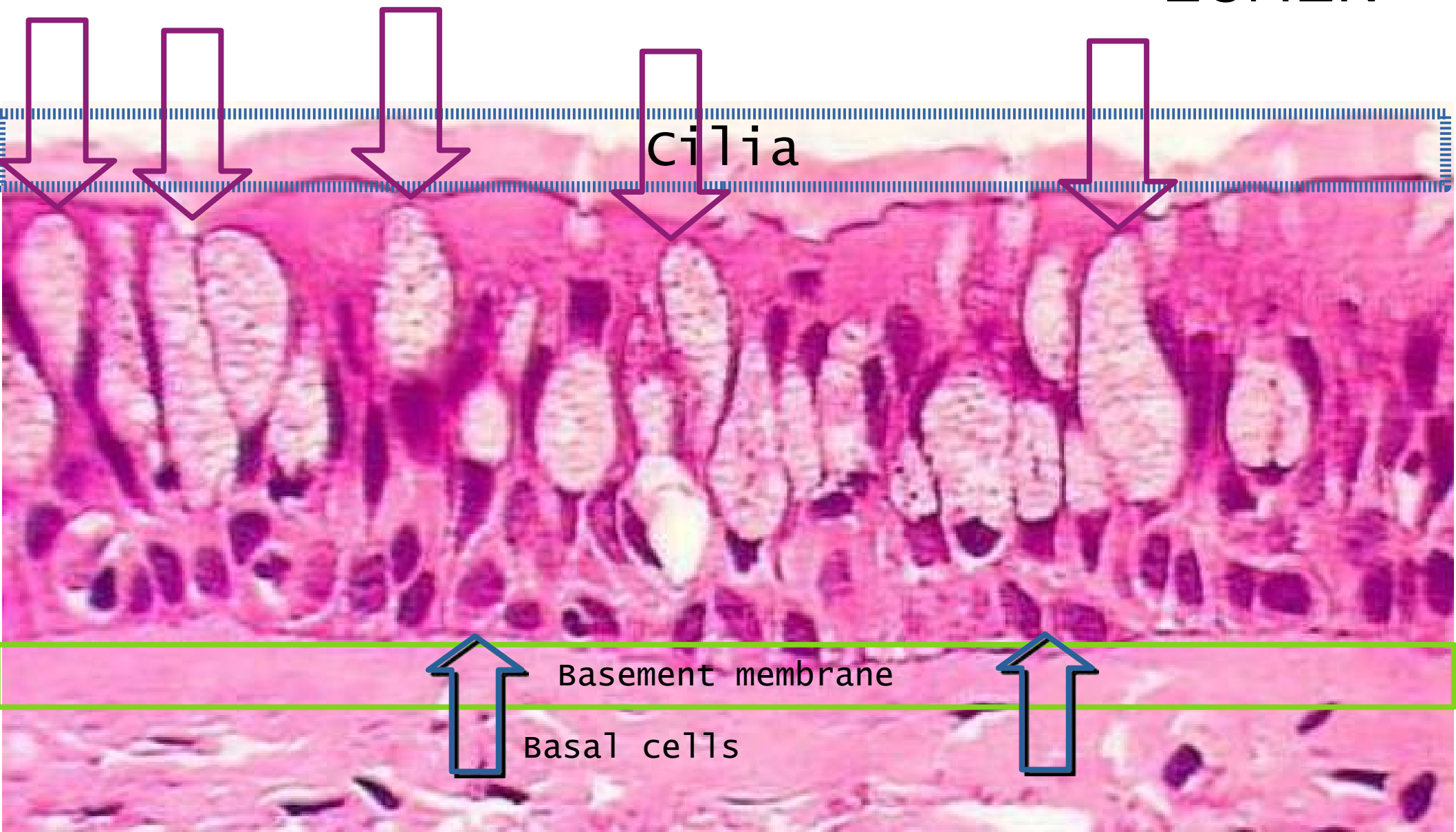
(a)


Mucus
Goblet cell
Basement membrane
Mast cell
Lamina propria
Macrophage
Eosinophil
Smooth muscle
Gland
Neutrophil

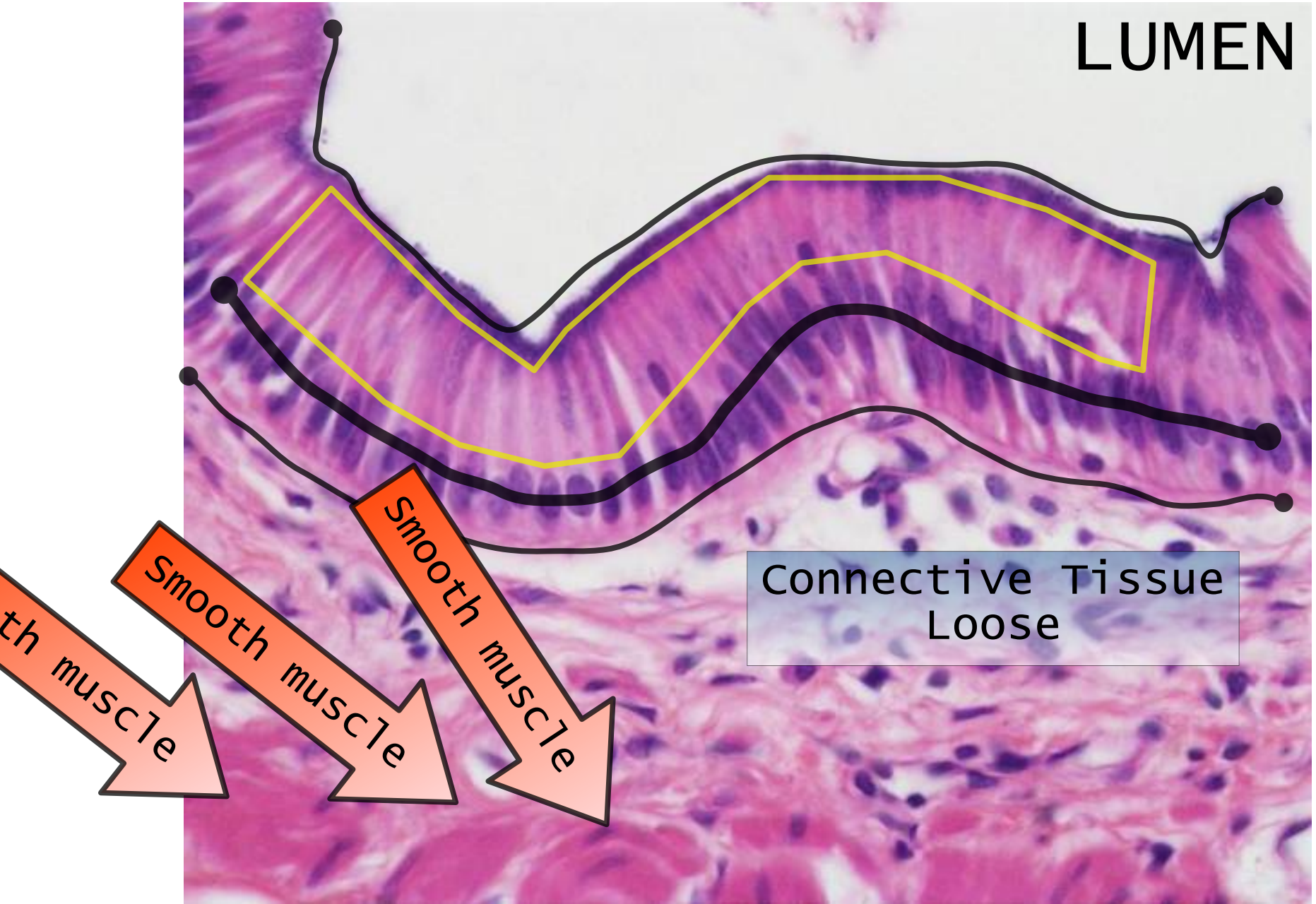
(b)


Cilia
Line of basal bodies

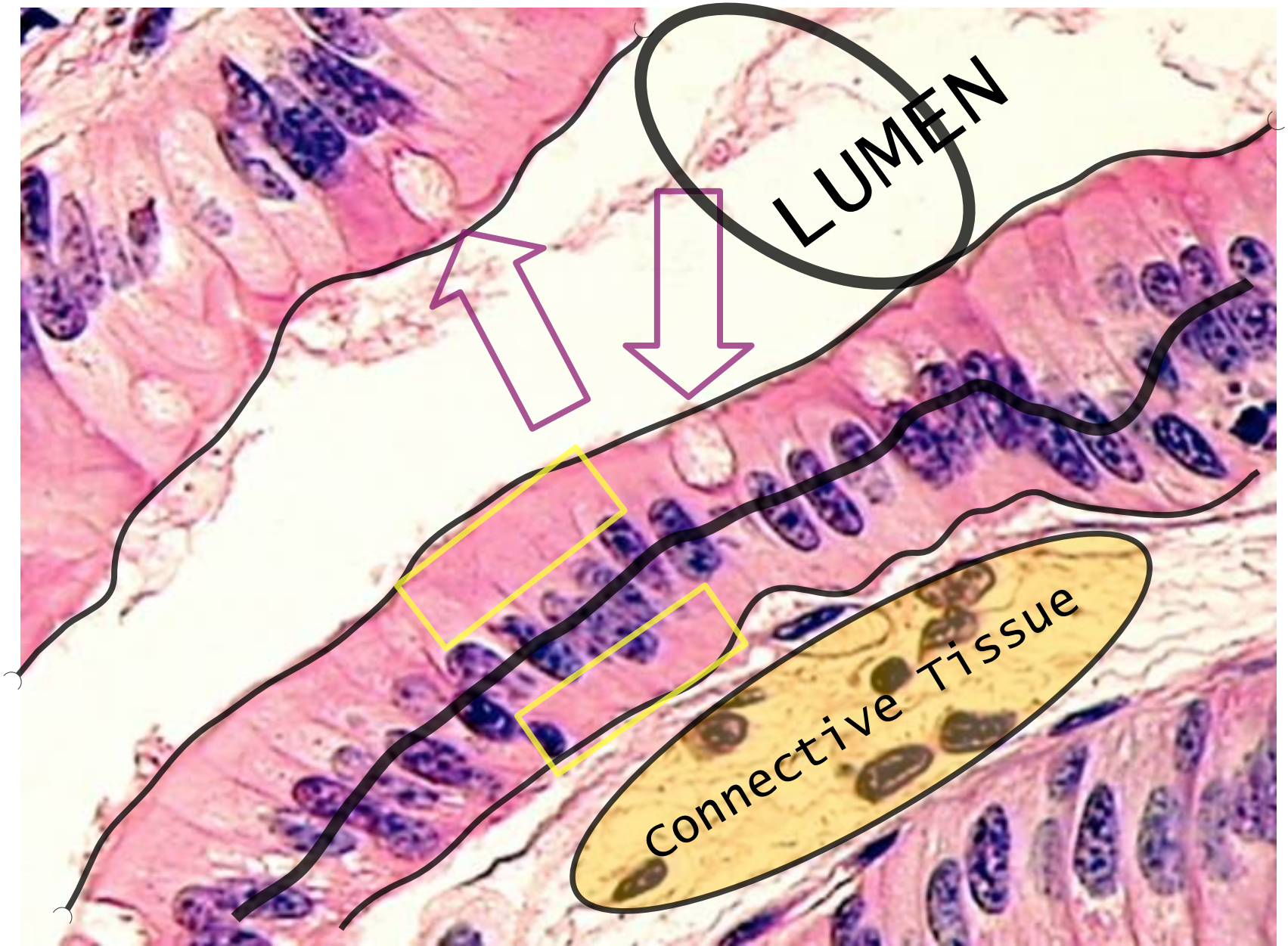
Pseudostratified columnar



Columnar epithelium



Columnar epithelium



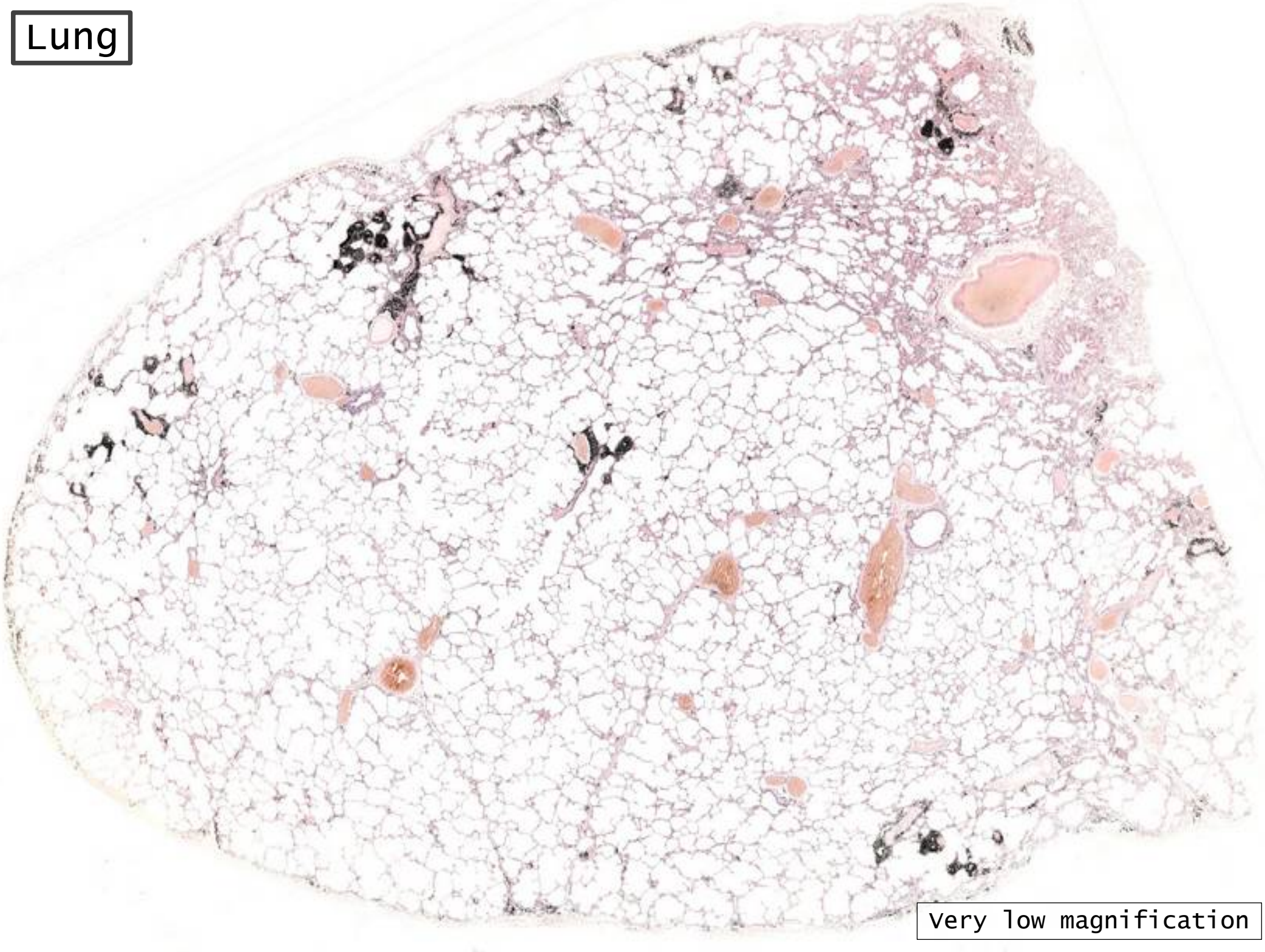
Transitions

- Intrapulmonary
  - Irregular cart
  - Respiratory ep
  - Glands
- Bronchioles
  - Smooth muscle
  - Ciliated colum
  - NO glands – go
- Terminal bronc
  - Smooth muscle
  - Ciliated cuboi
  - Secretory cell
-
  - Cond
  - Simple cub
  - Secretory cells
  - Alveoli

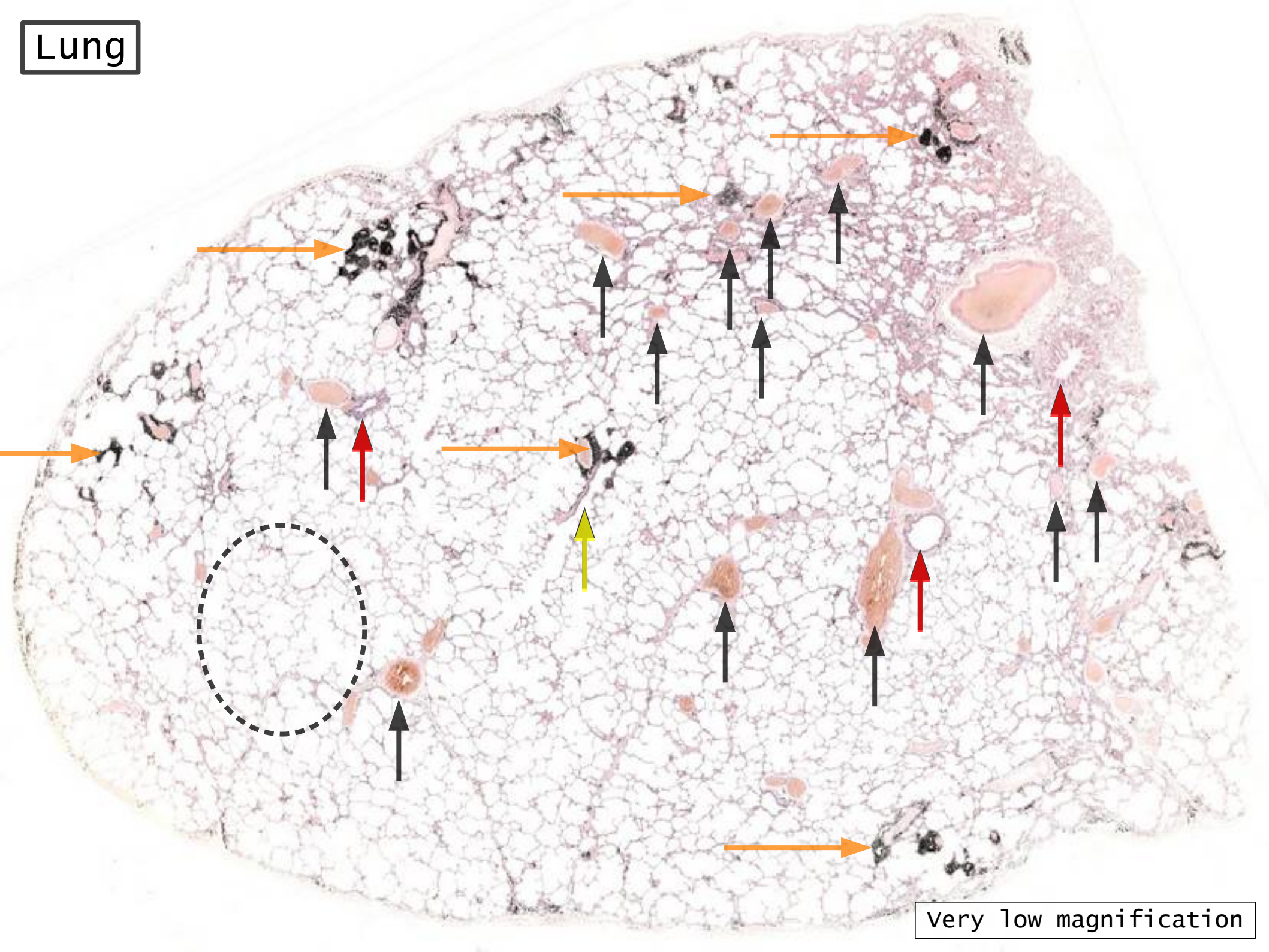
Lung

Slides 72 & 74

Lung



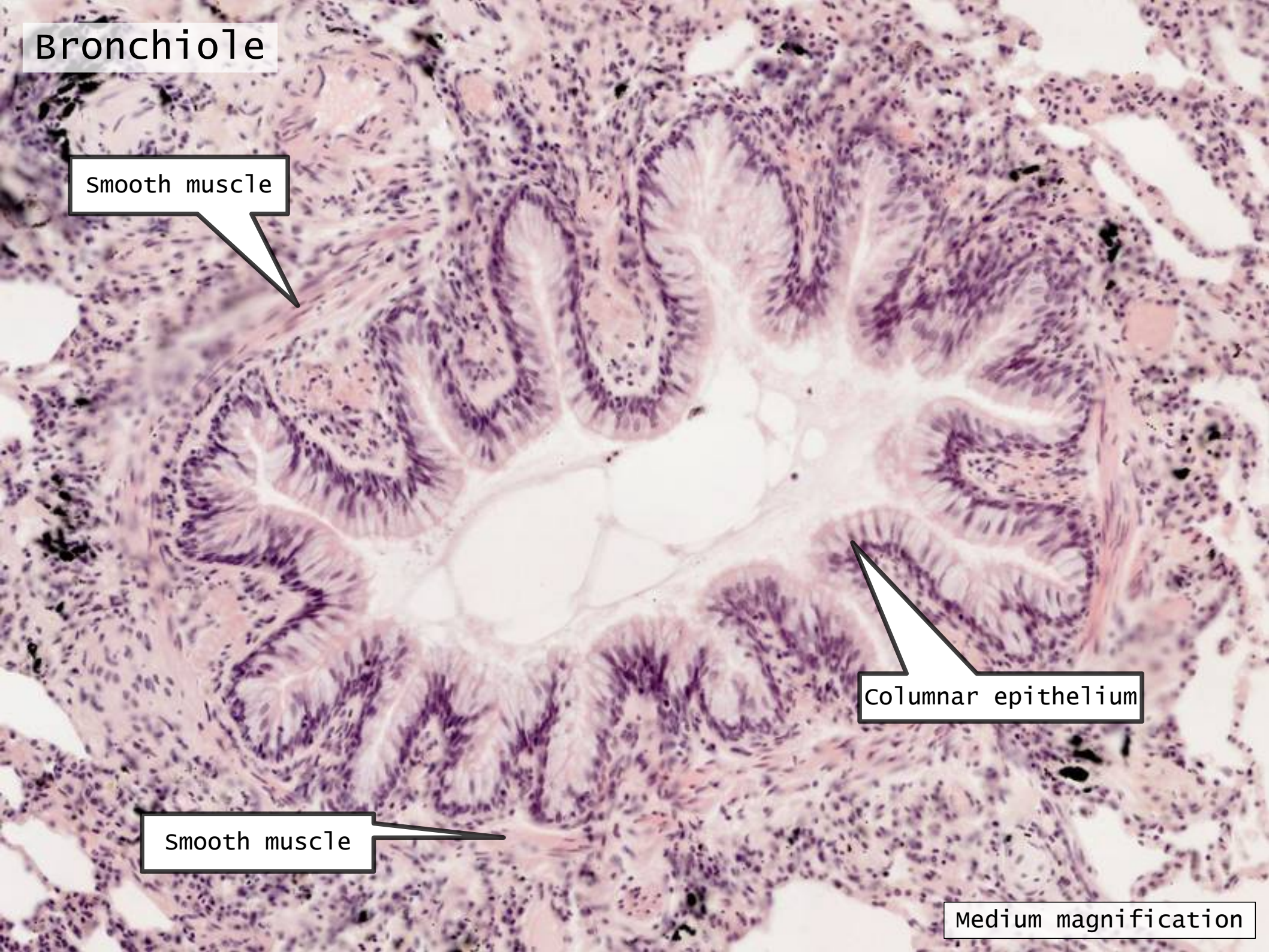
Very low magnification


Lung
Very low magnification

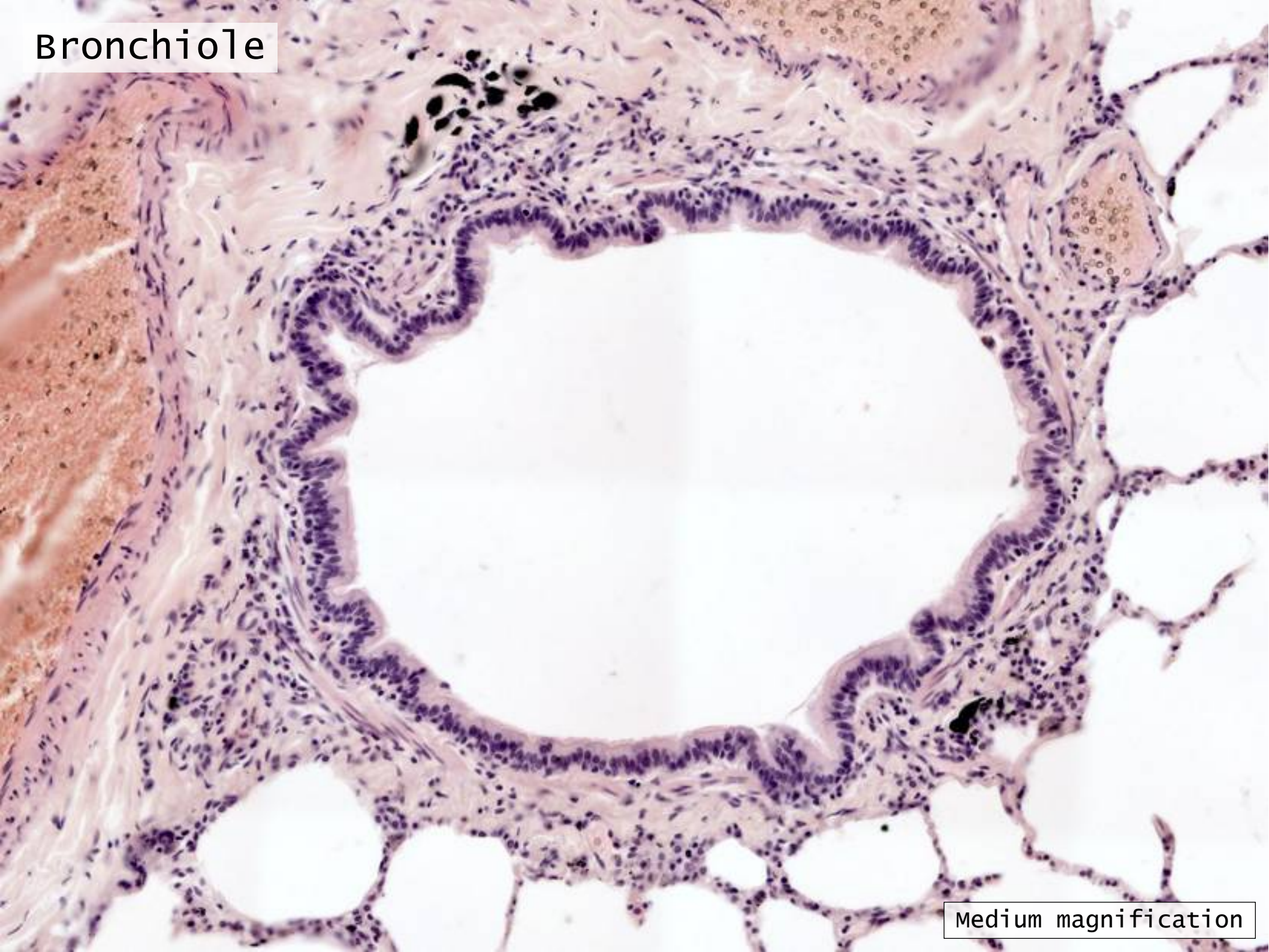

Bronchiole
Medium magnification

Bronchi

- Intrapulmonary bronchi
  - Irregular cartilage
  - Respiratory epithelium
  - Glands
- Bronchioles
  - Smooth muscle REPLACE cartilage
  - Ciliated columnar → Ciliated cuboidal
  - NO glands – goblet cells → secretory cells
- Terminal bronchioles
  - Smooth muscle
  - Ciliated cuboidal epithelium
  - Secretory cells
- Respiratory bronchioles
  - Conducting → Respiratory
  - Simple cuboidal epithelium
  - Secretory cells
  - Alveoli

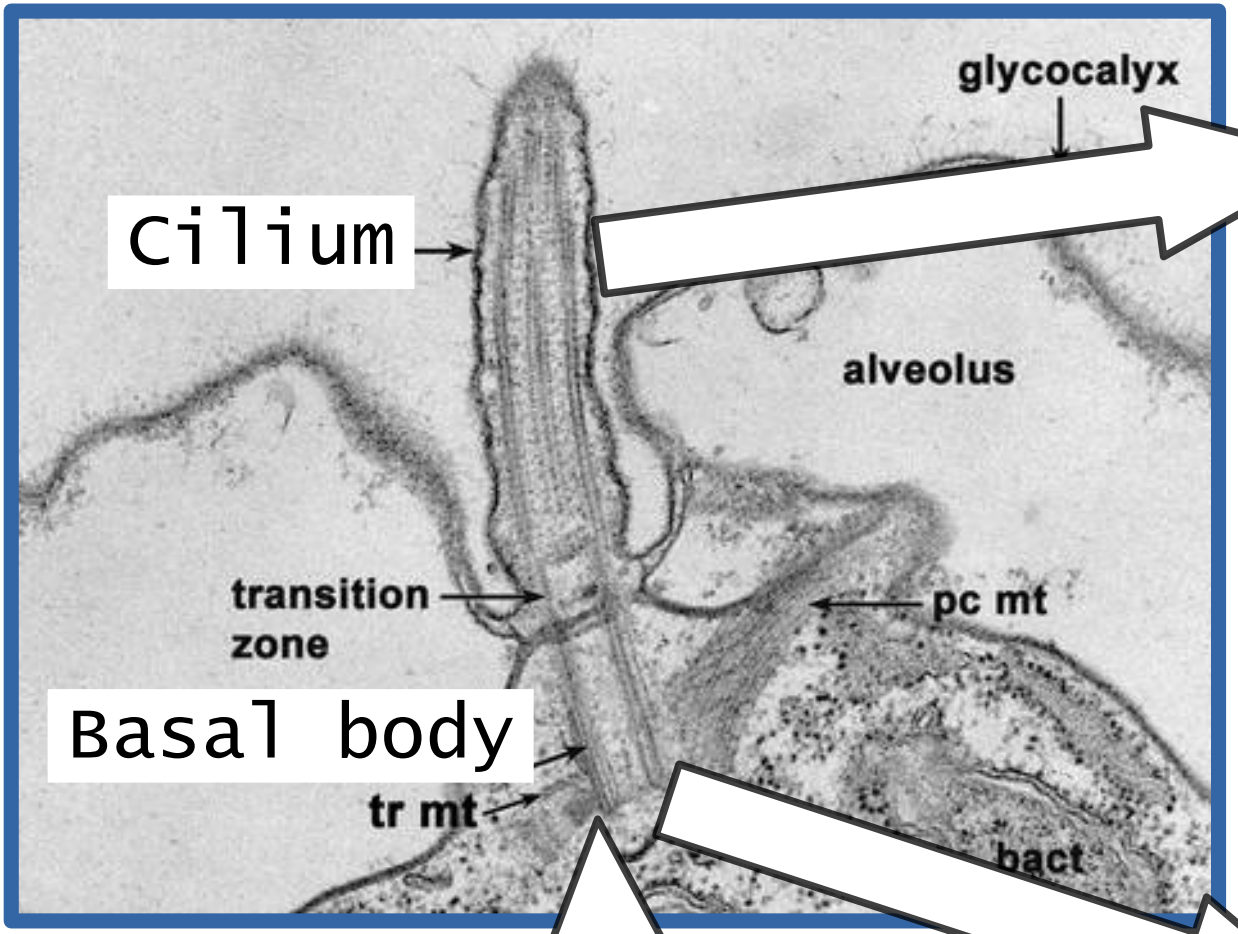

Bronchiole
Smooth muscle
Columnar epithelium
Smooth muscle
Medium magnification

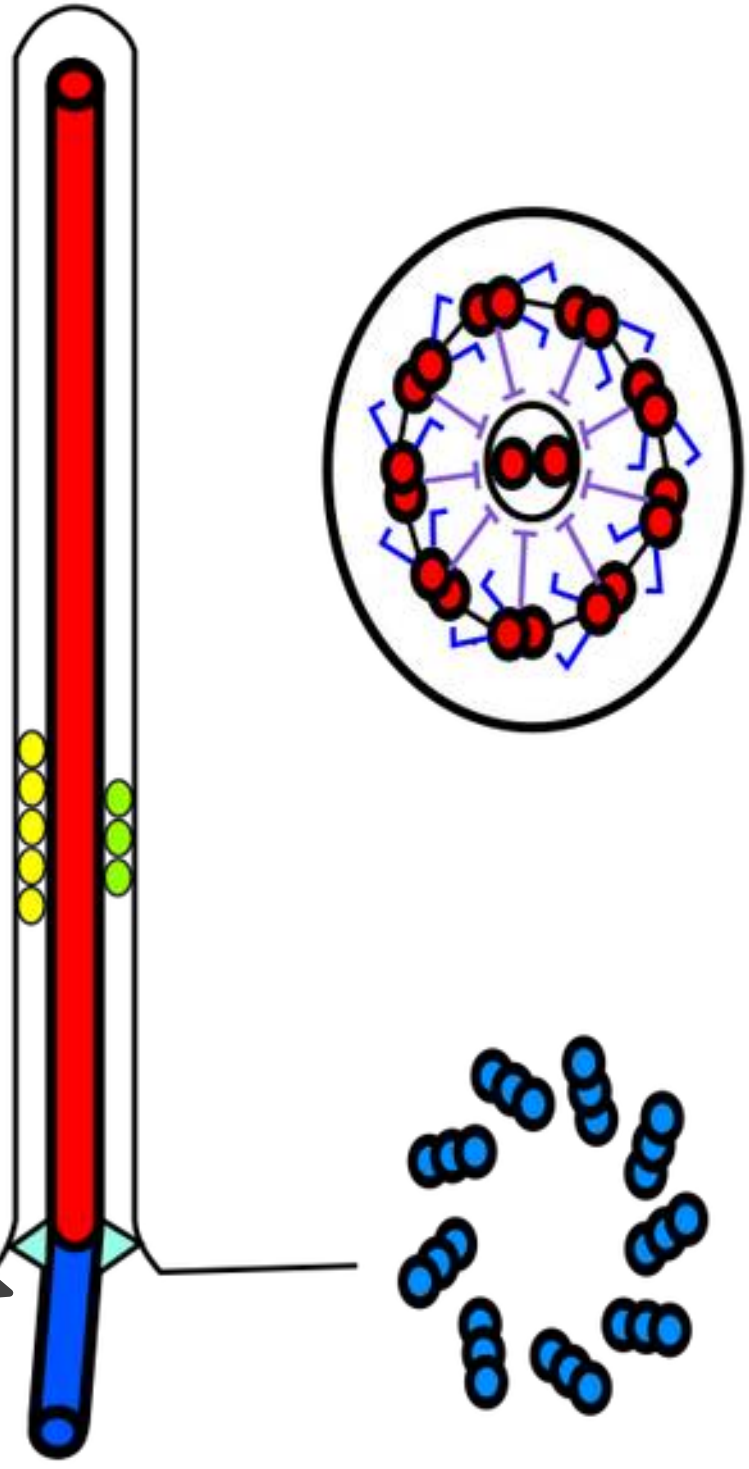

Bronchiole
Goblet cells
Columnar cells
Smooth muscle
High magnification


Bronchiole
Medium magnification


Bronchiole
Blood vessel
High magnification

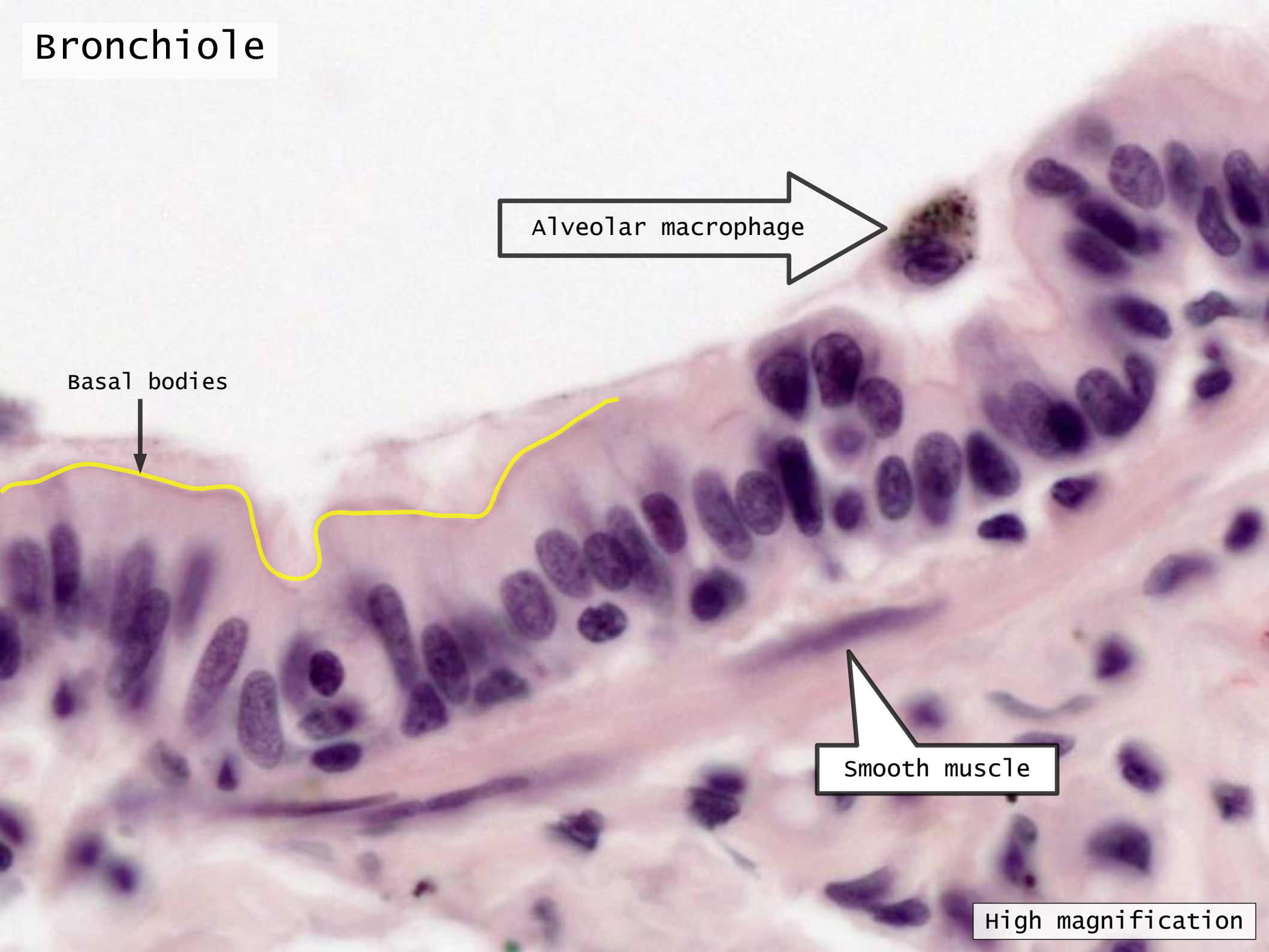
Cilia and basal bodies



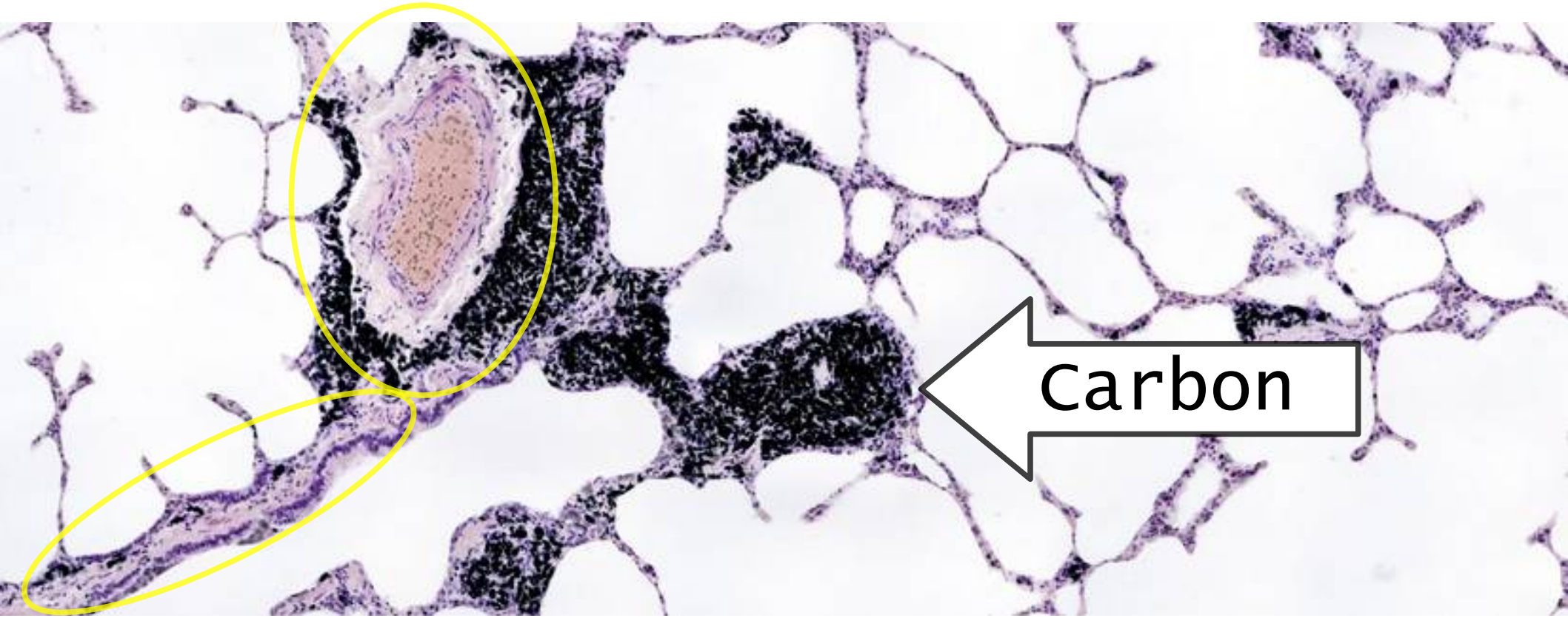


Visible line with LM

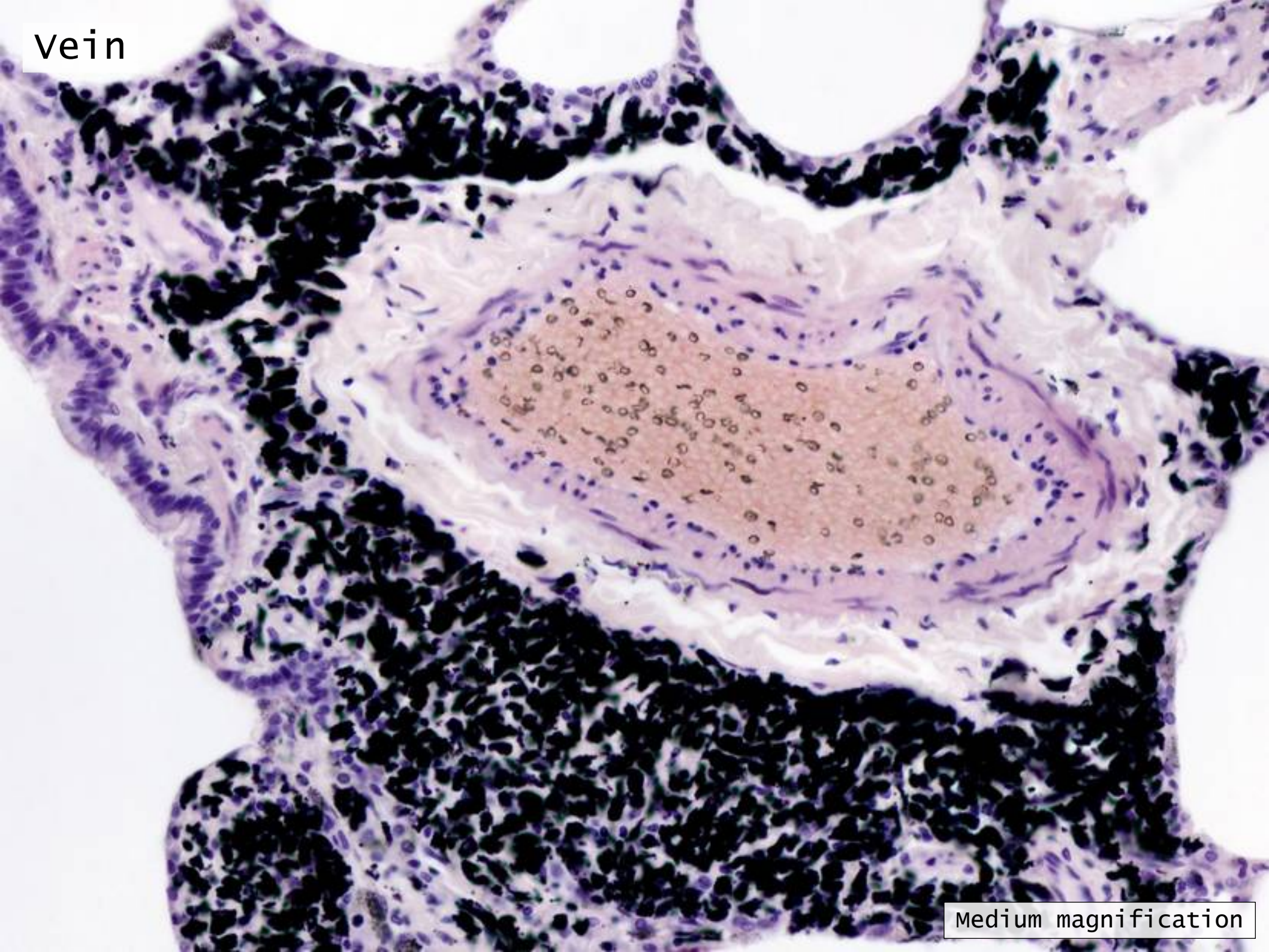
Bronchiole

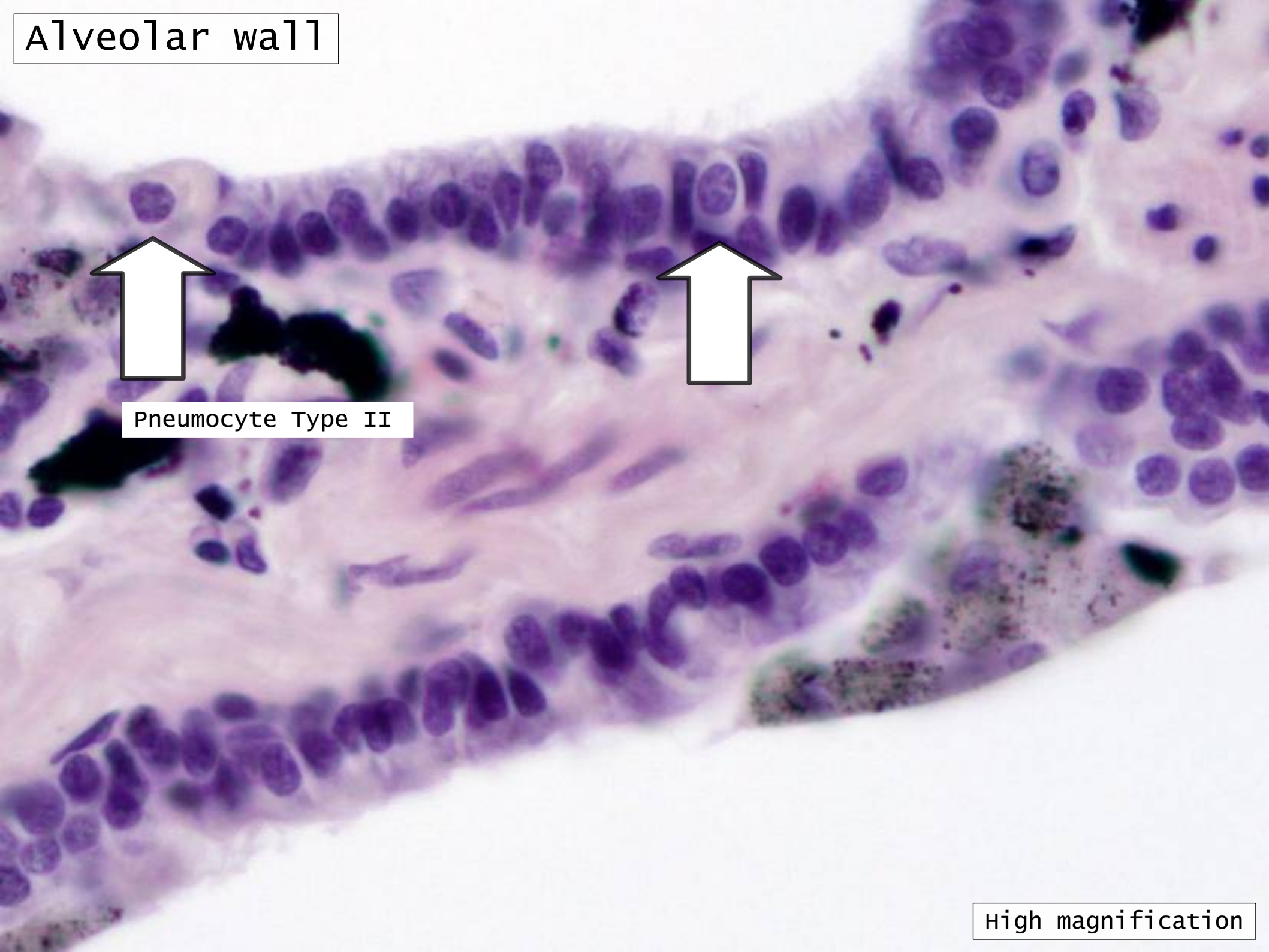

Alveolar macrophage
Basal bodies
Smooth muscle
High magnification

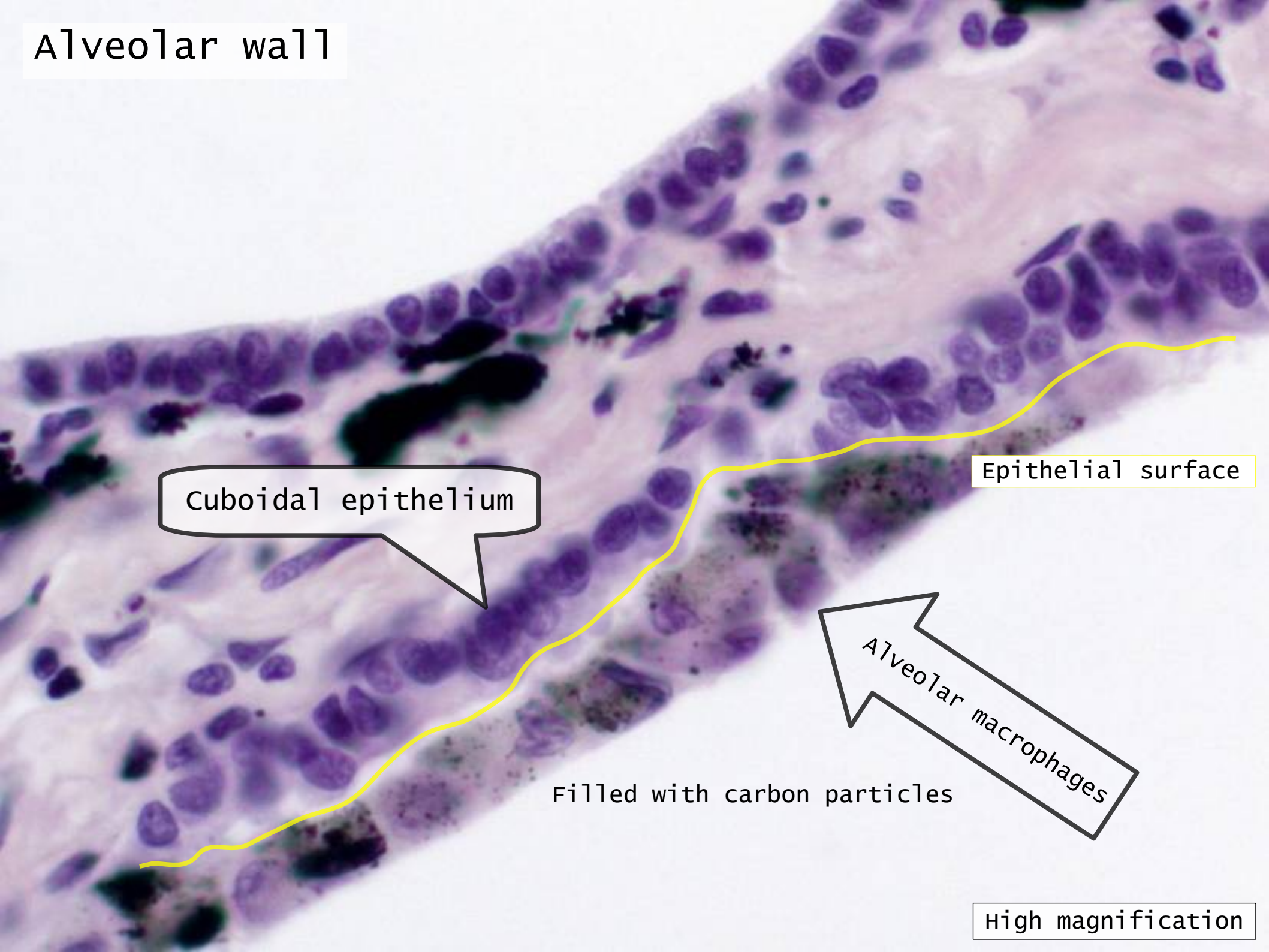
Lung

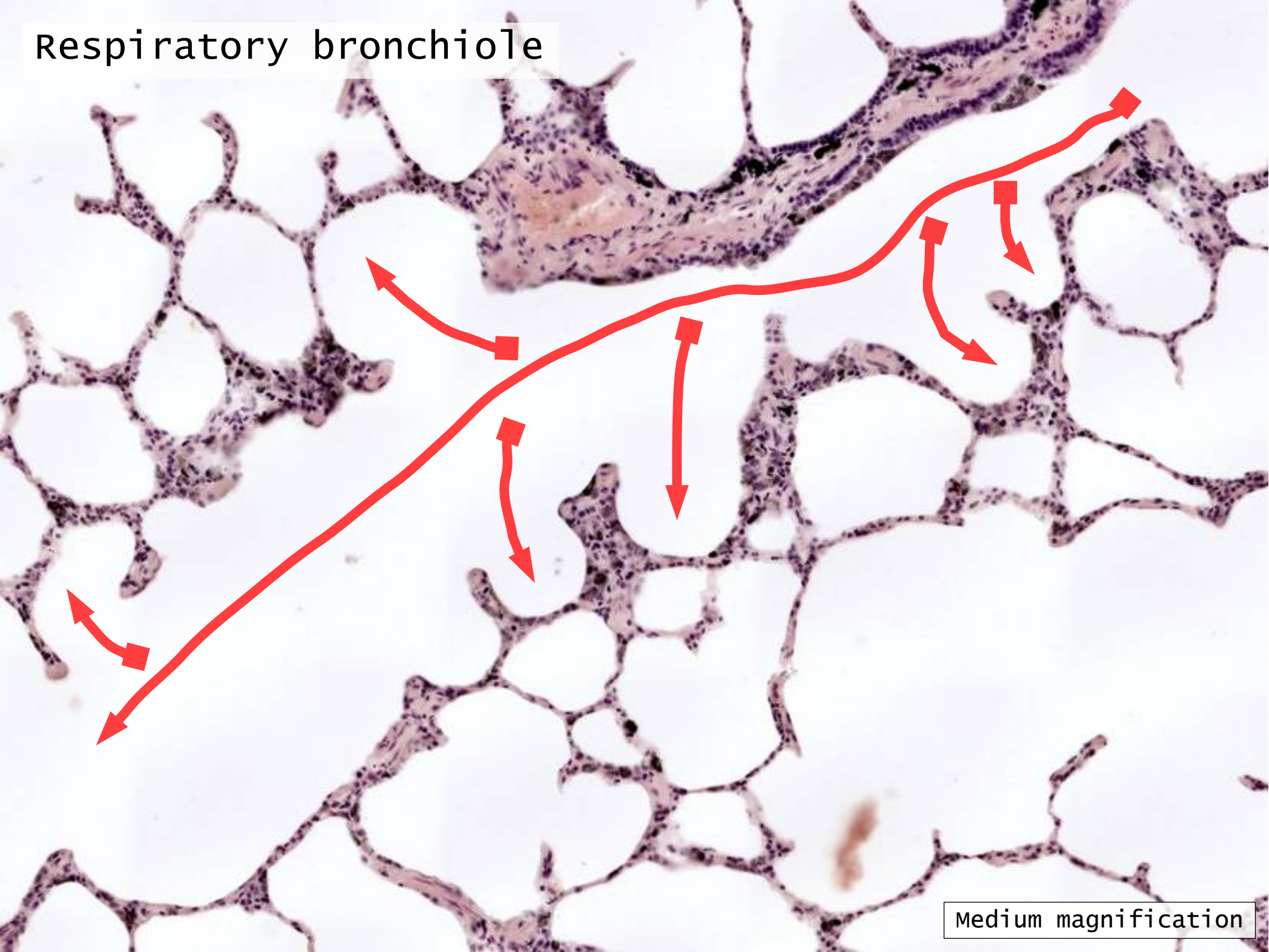


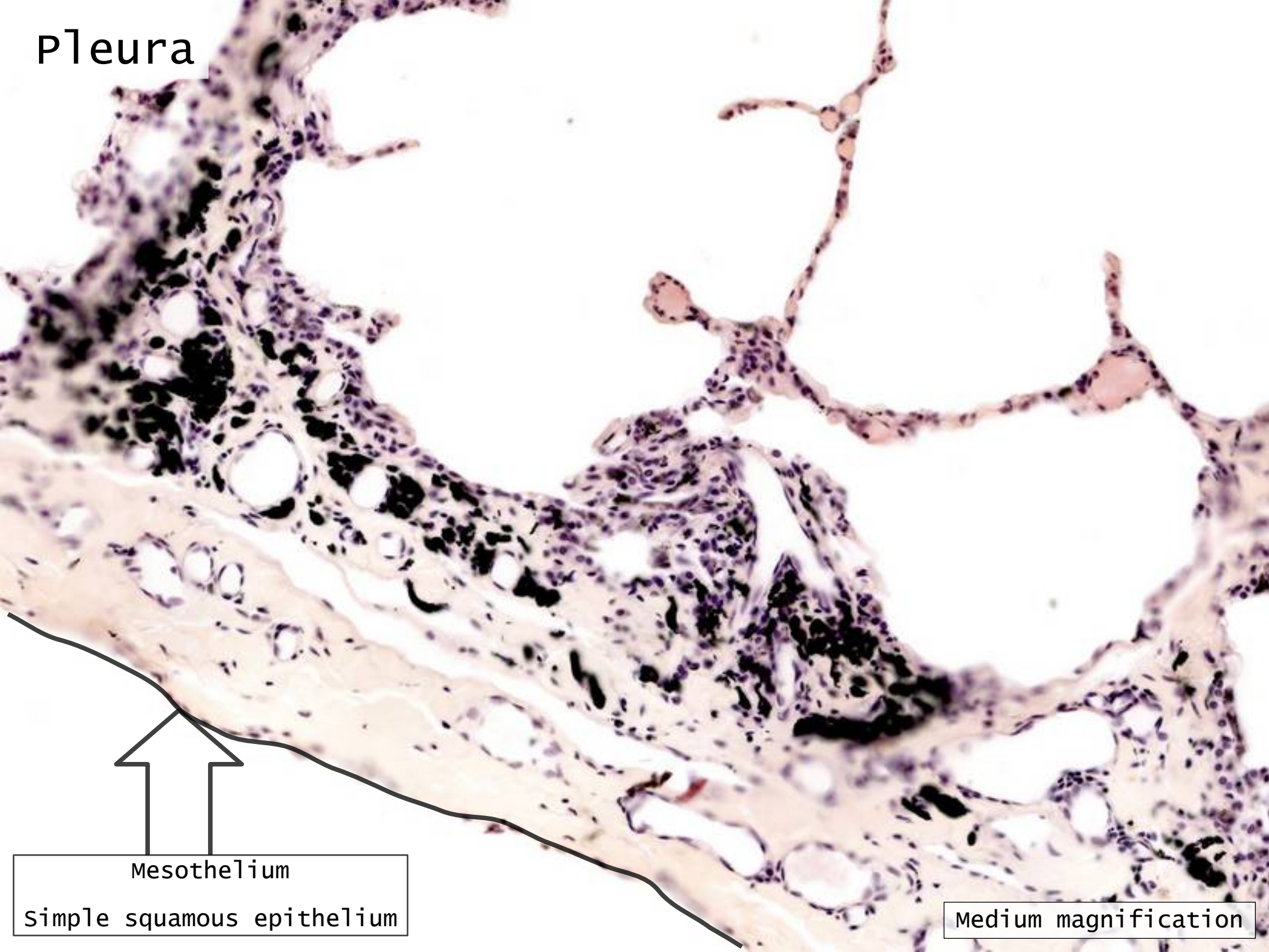
Medium magnification


Vein
Medium magnification

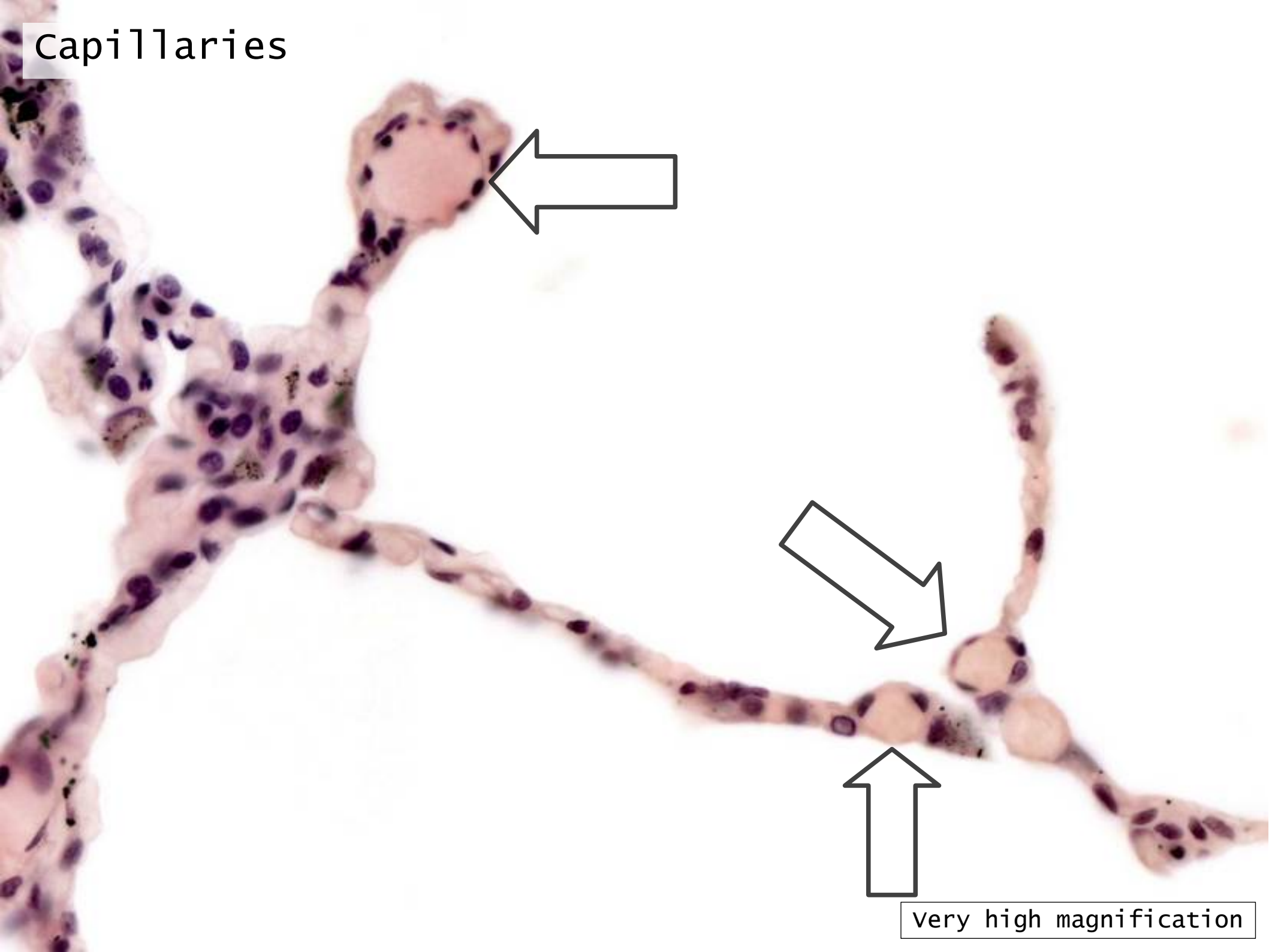

Alveolar wall
Pneumocyte Type II
High magnification


Alveolar wall
Cuboidal epithelium
Epithelial surface
Alveolar macrophages
Filled with carbon particles
High magnification

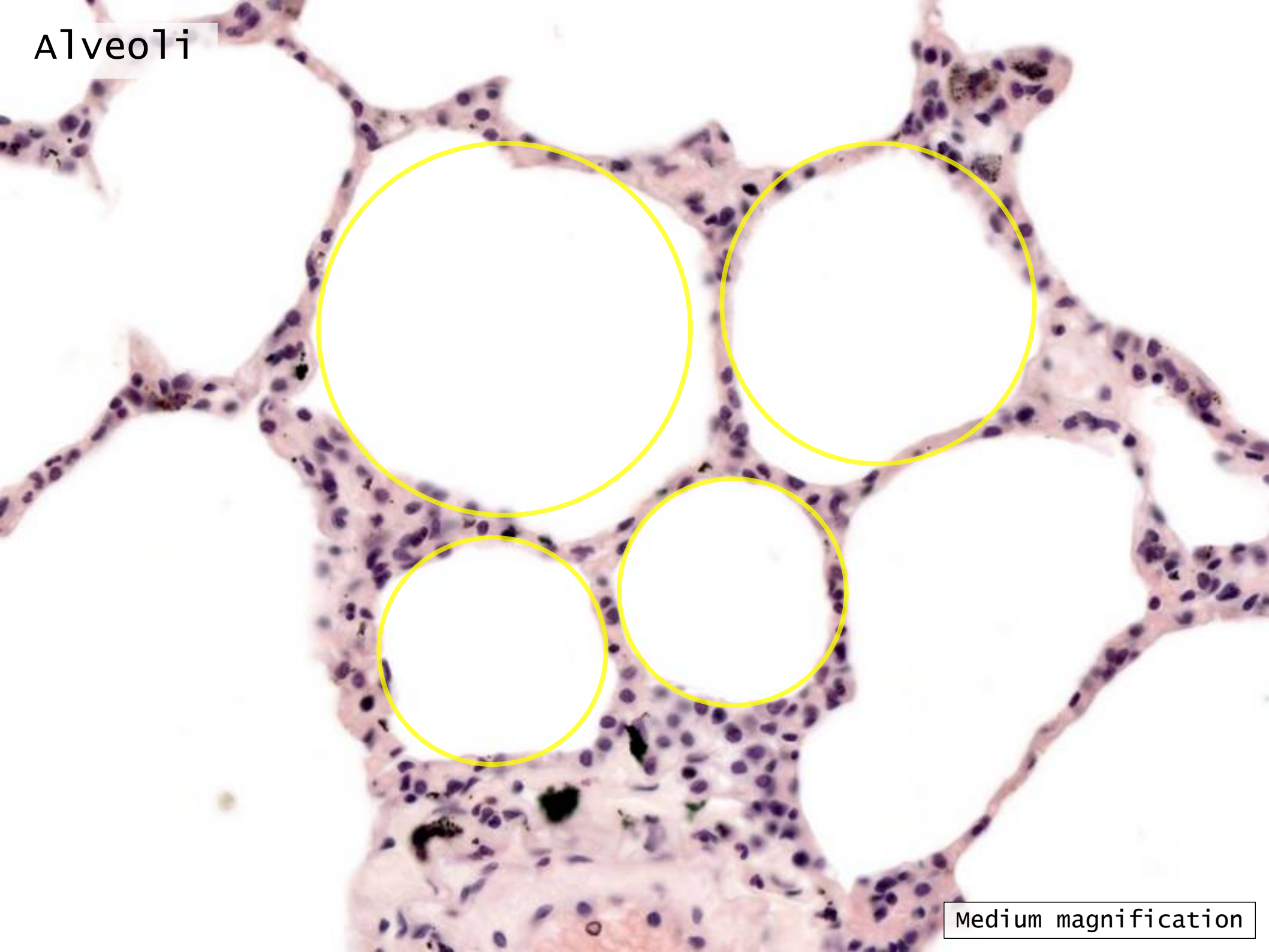

Respiratory bronchiole
Medium magnification

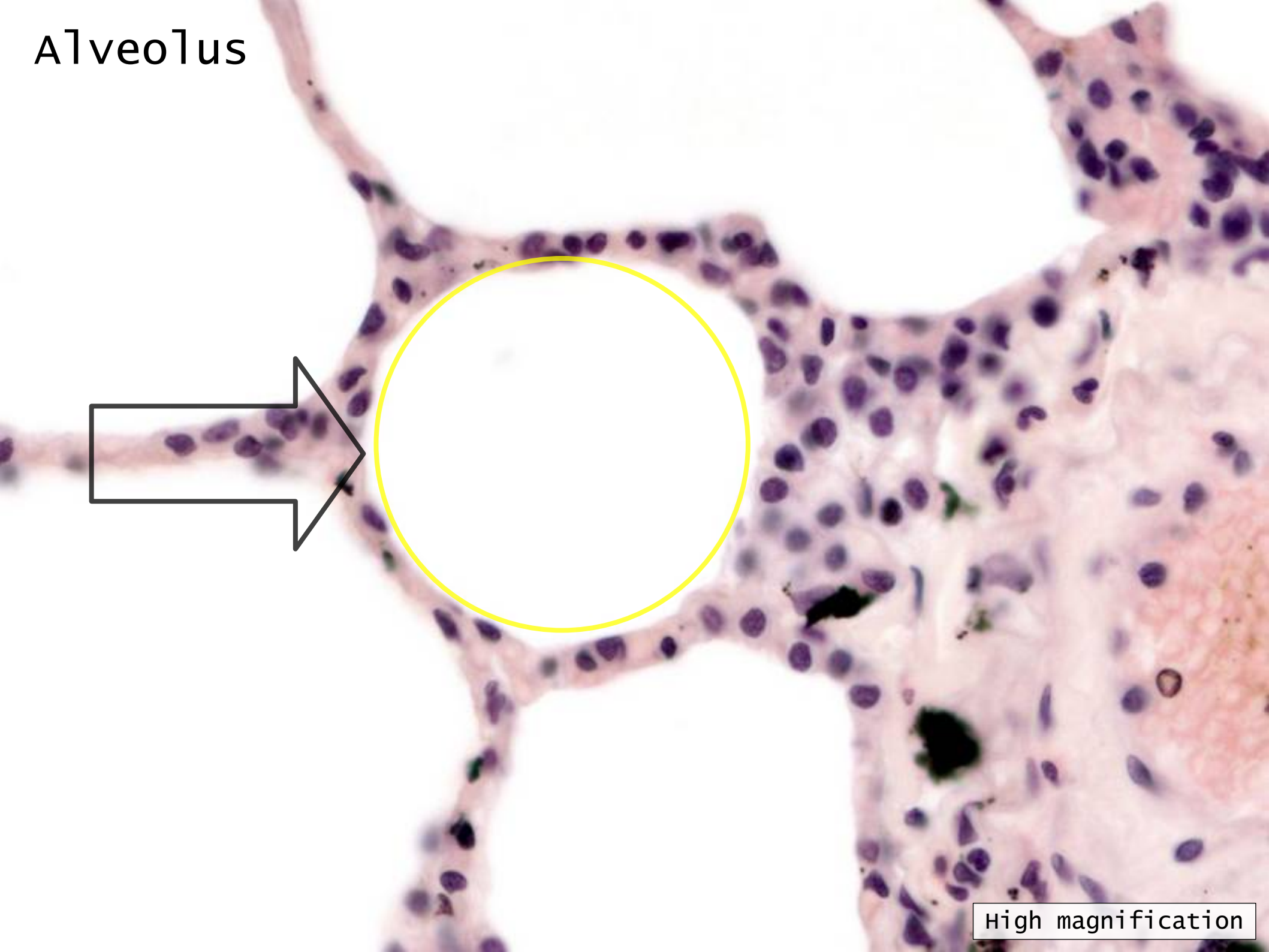

Pleura
Mesothelium
Simple squamous epithelium
Medium magnification

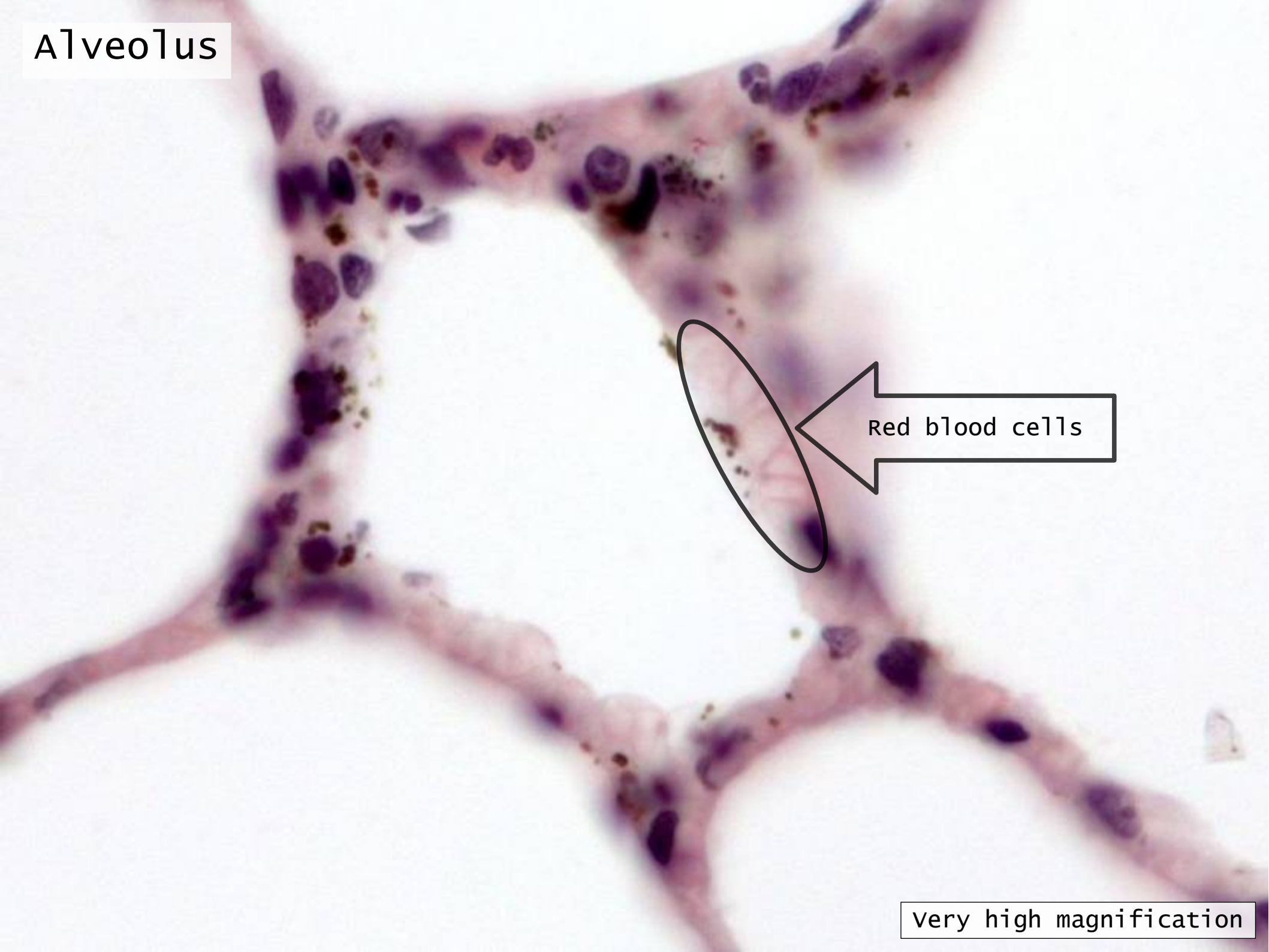
Capillaries

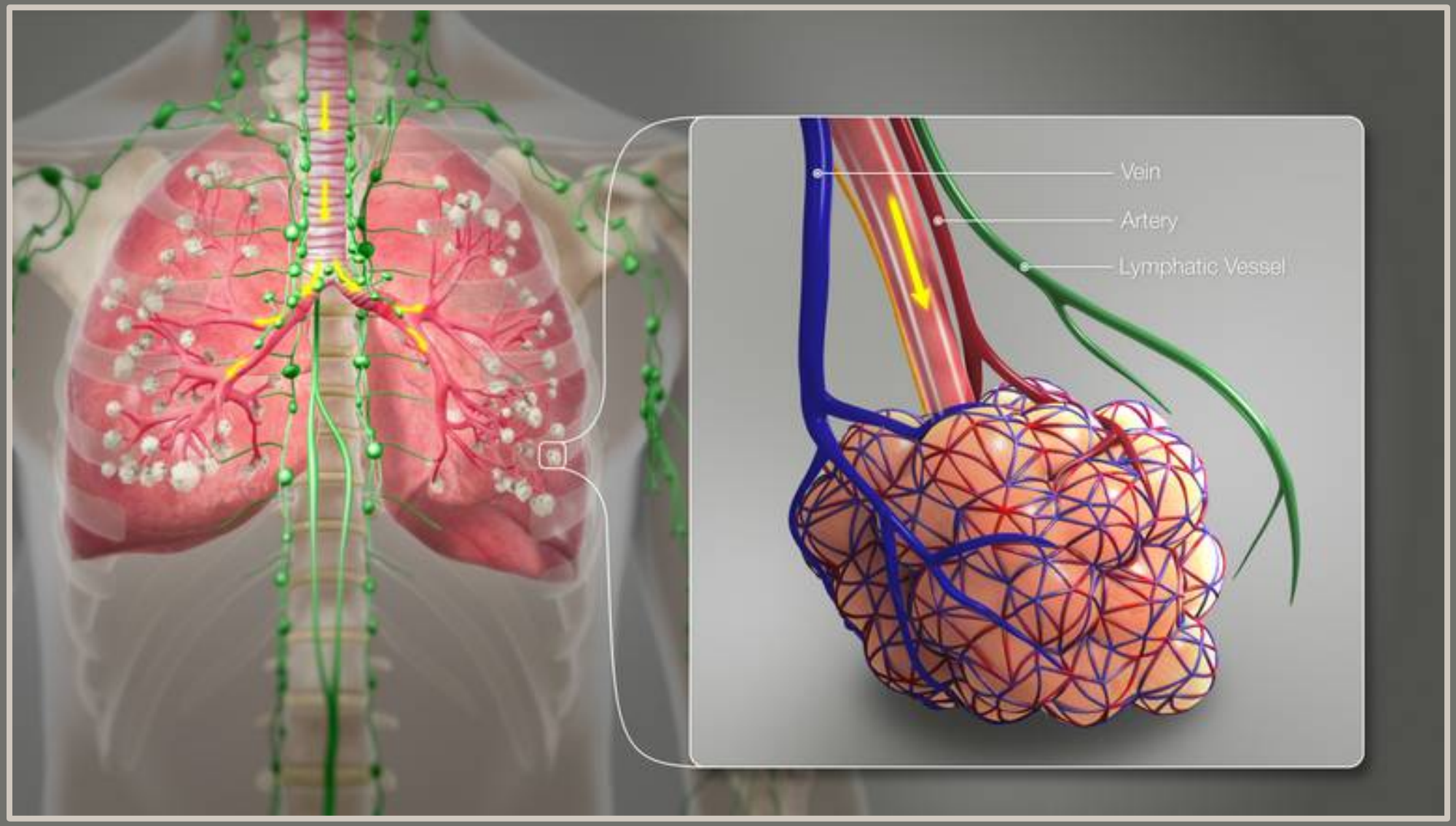


Very high magnification

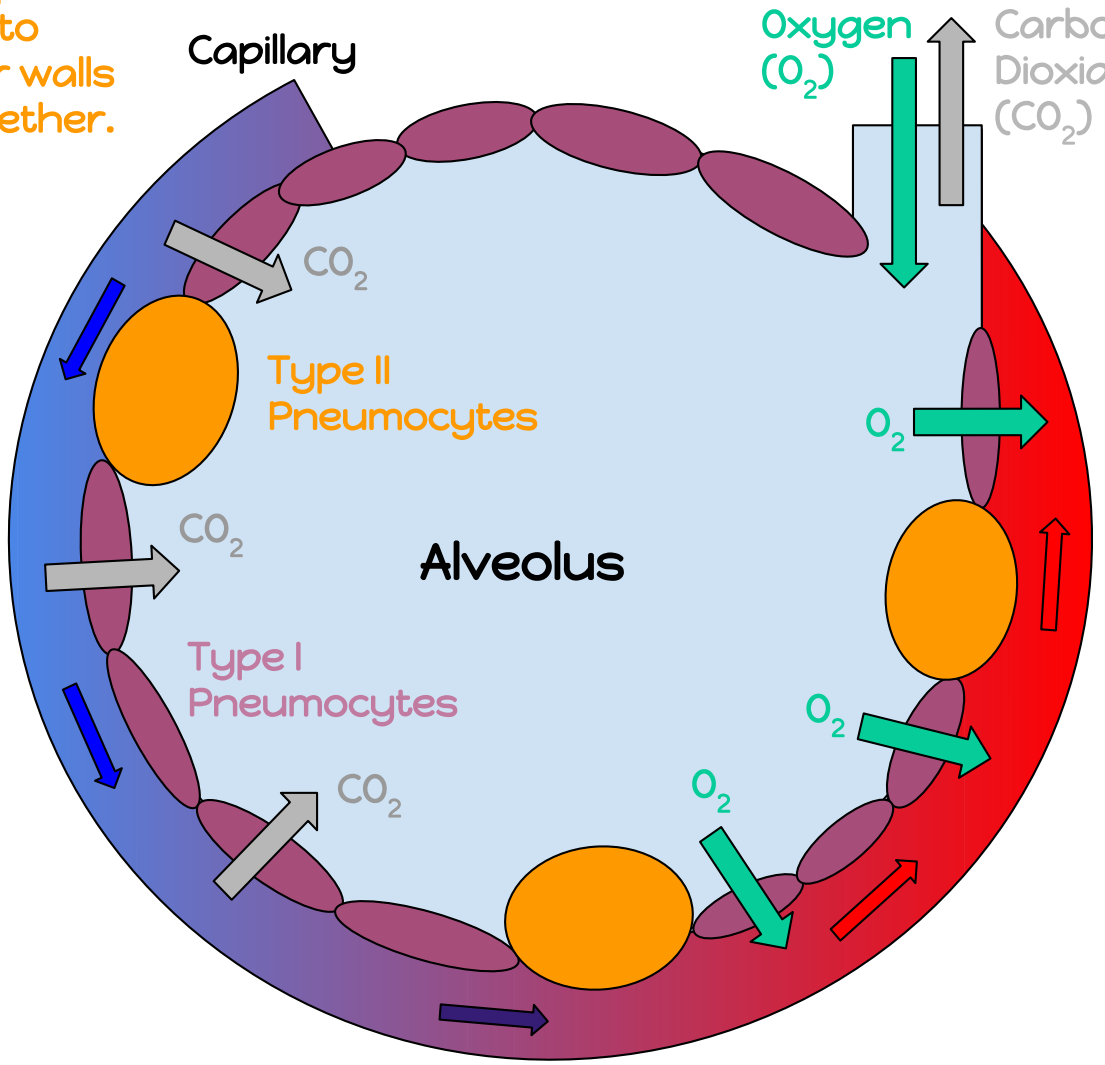

Alveoli
Medium magnification


Alveolus
High magnification


Alveolus
Red blood cells
Very high magnification


Vein
Artery
Lymphatic Vessel

Type II pneumocytes secrete surfactant to prevent the collapse of the alveolus and to prevent the inner walls from sticking together.

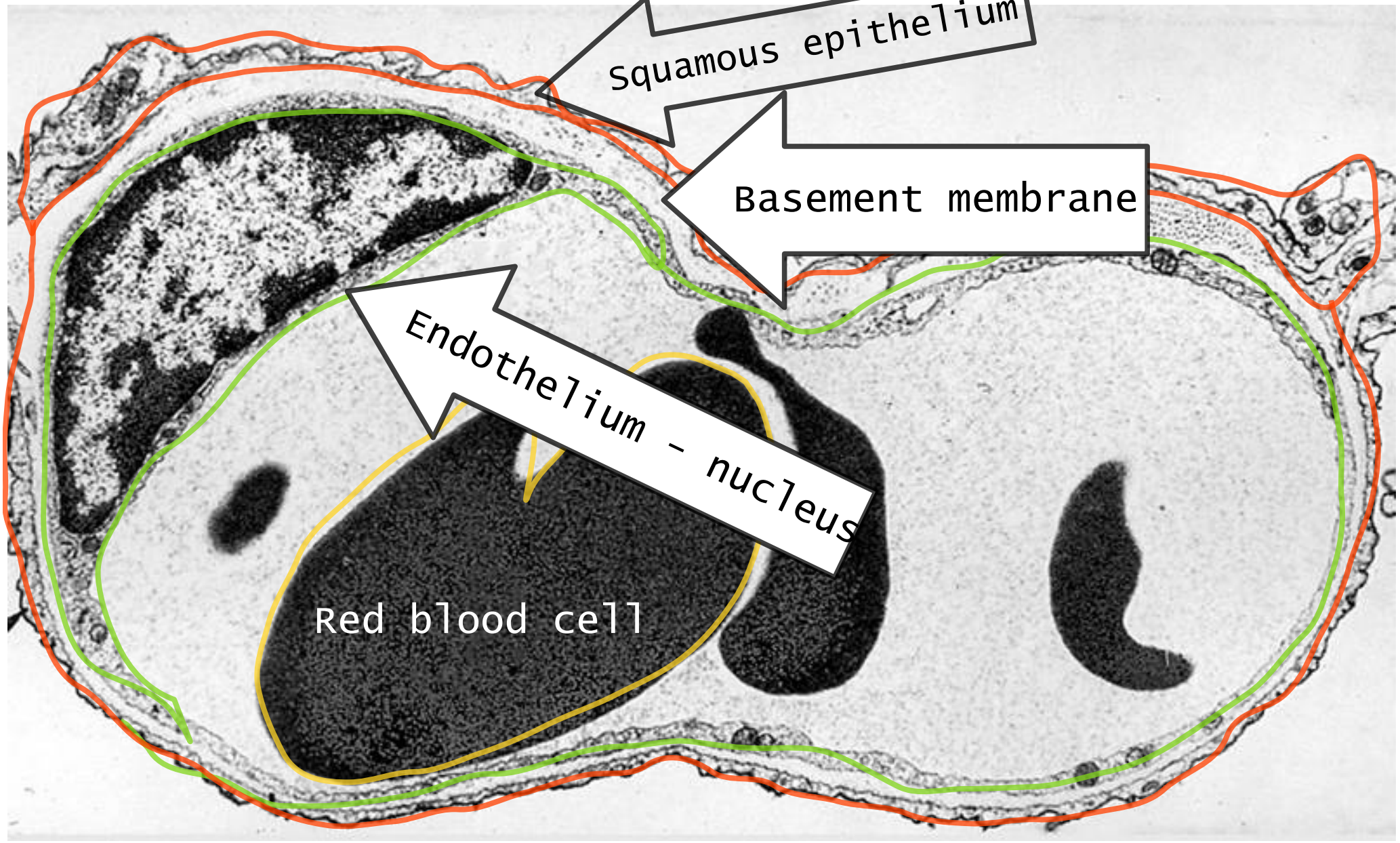


Deoxygenated blood coming from heart

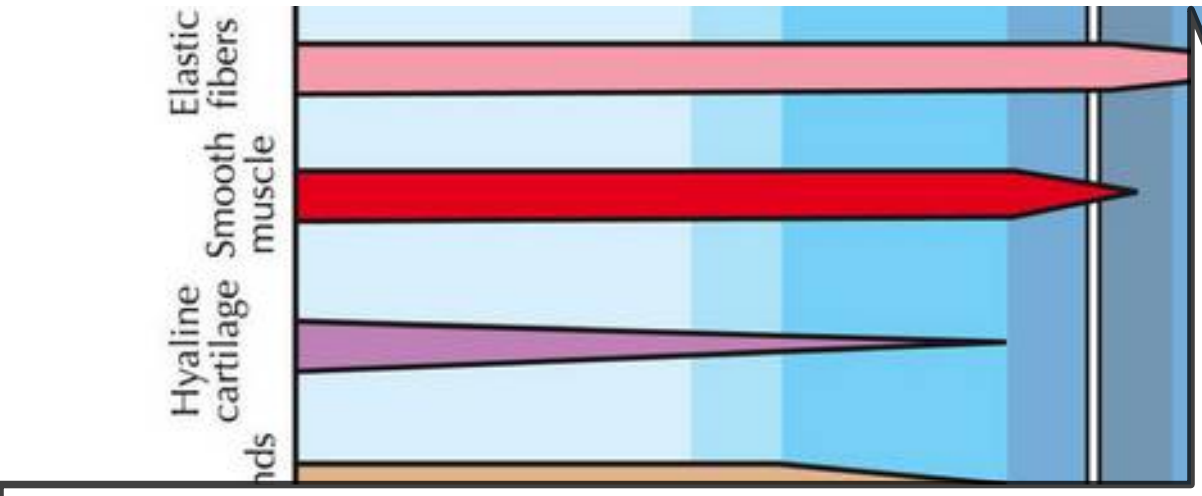
Oxygenated blood going to heart

Type I Pneumocytes are thin, flat cells which allow gas exchange between the alveolus and capillaries.

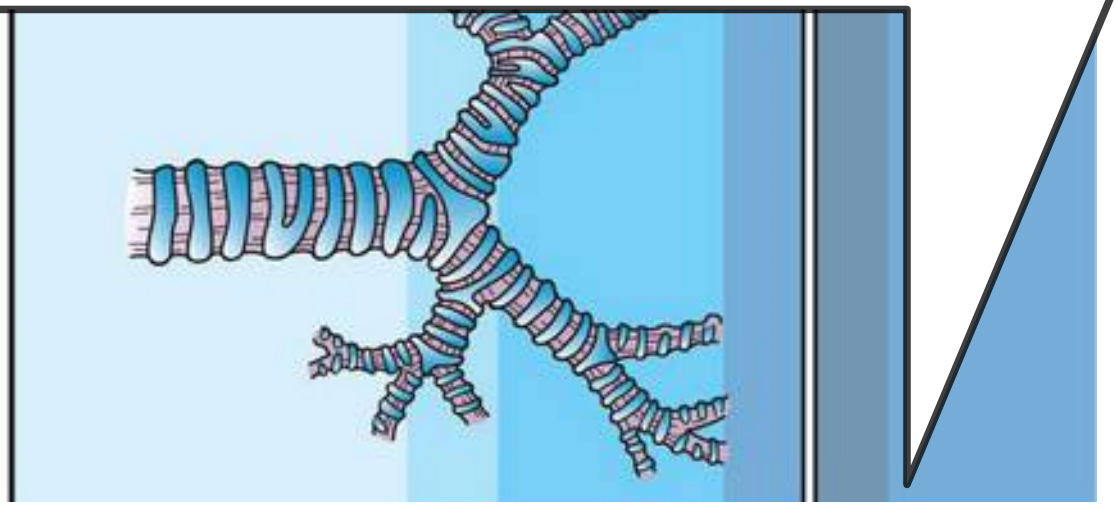
Blood-air barrier



Transmission electron microscope



Transitions



~~Clara cells~~

Bronchiolar exocrine cells

Clara Cells

What about Clara cells?

Non-ciliated bronchiolar secretory cells
Club cells
Bronchiolar exocrine cells

= Unciliated columnar cells (short microvilli)

Answering Questions

- Question
- THEN
- Add image
- THEN
- Evaluate each alternative