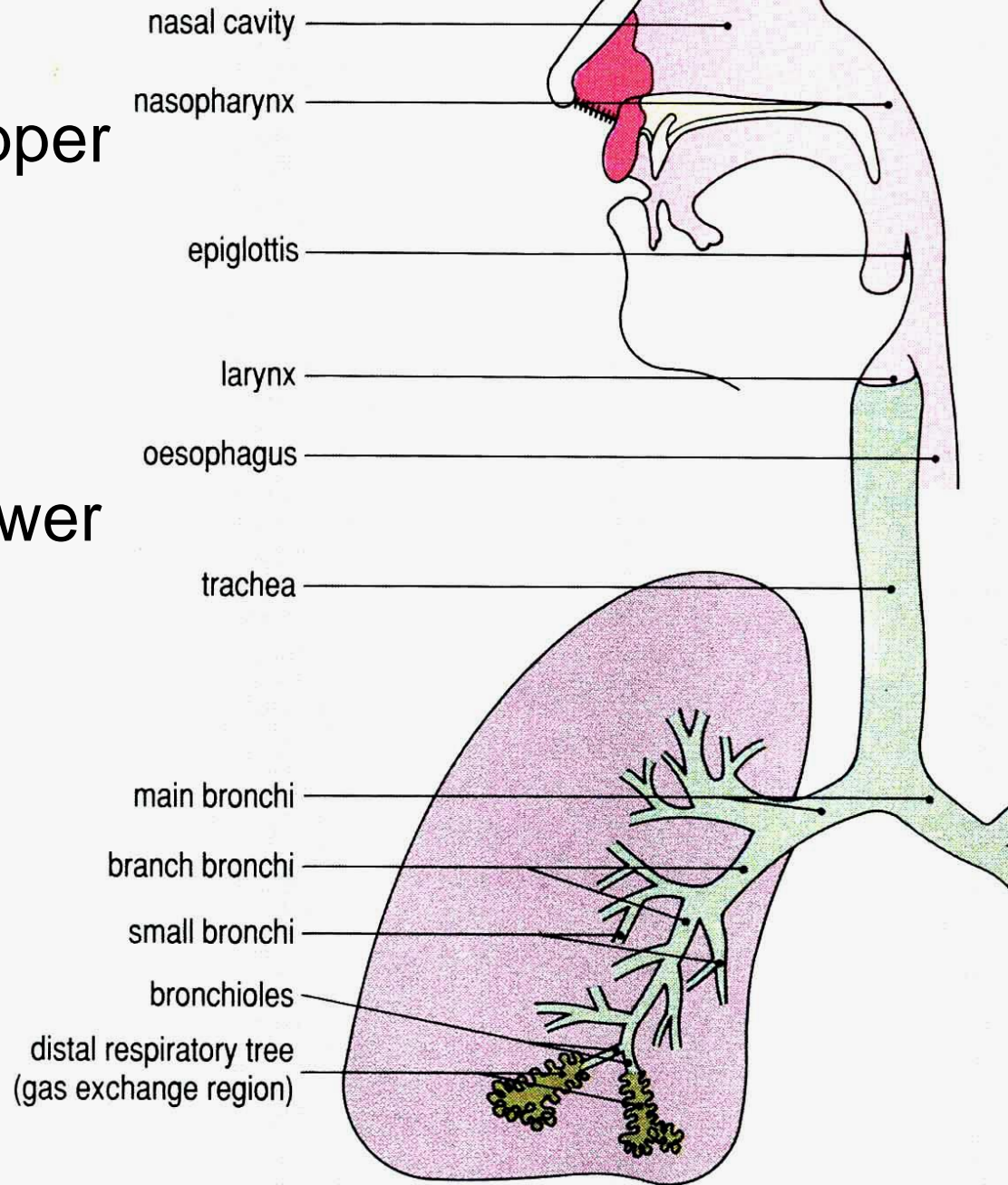


Respiratory system

**Conducting portion
(airways,
respiratory passages)**

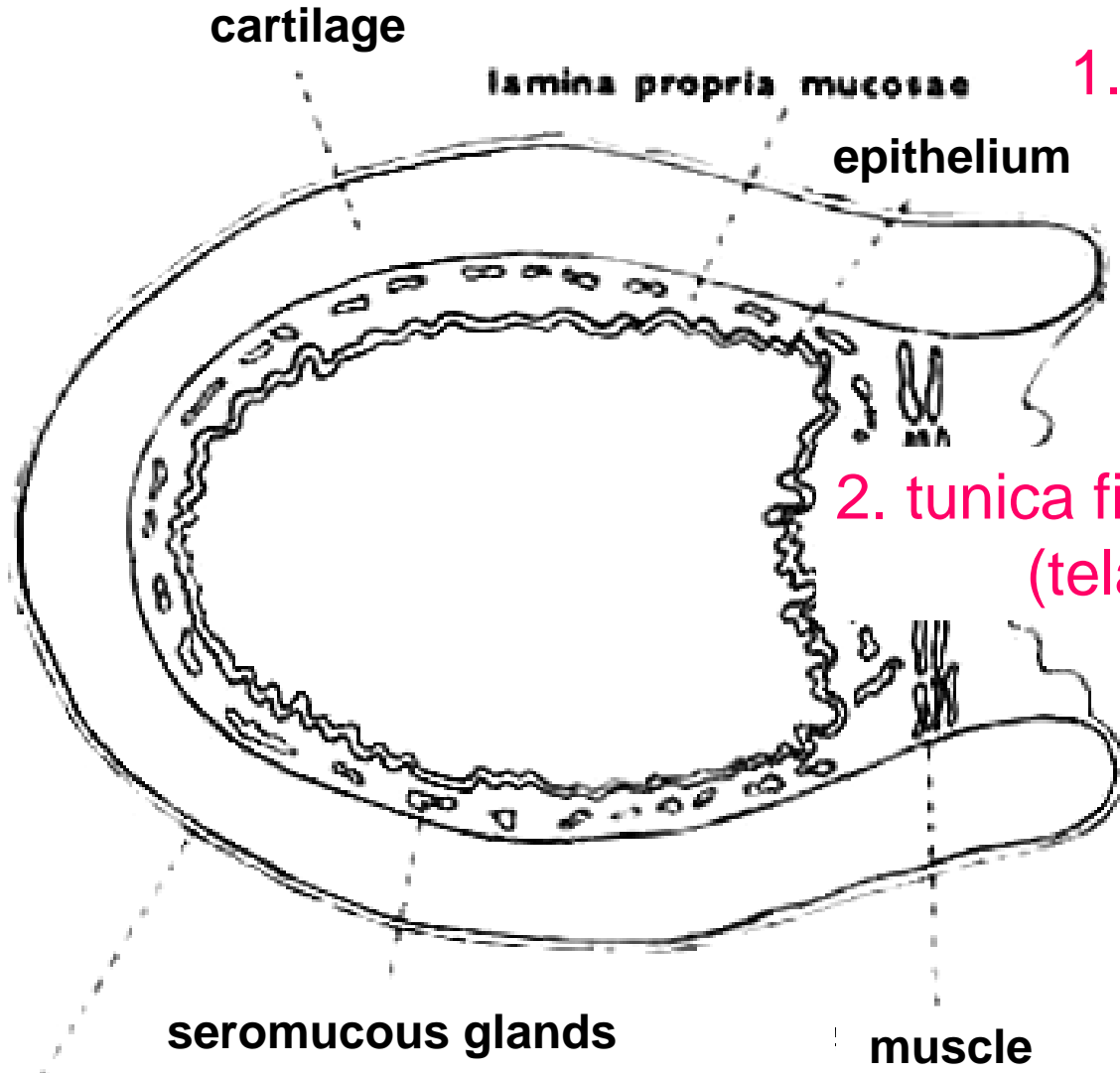
upper

lower



Respiratory portion

Schematic drawing of airway wall

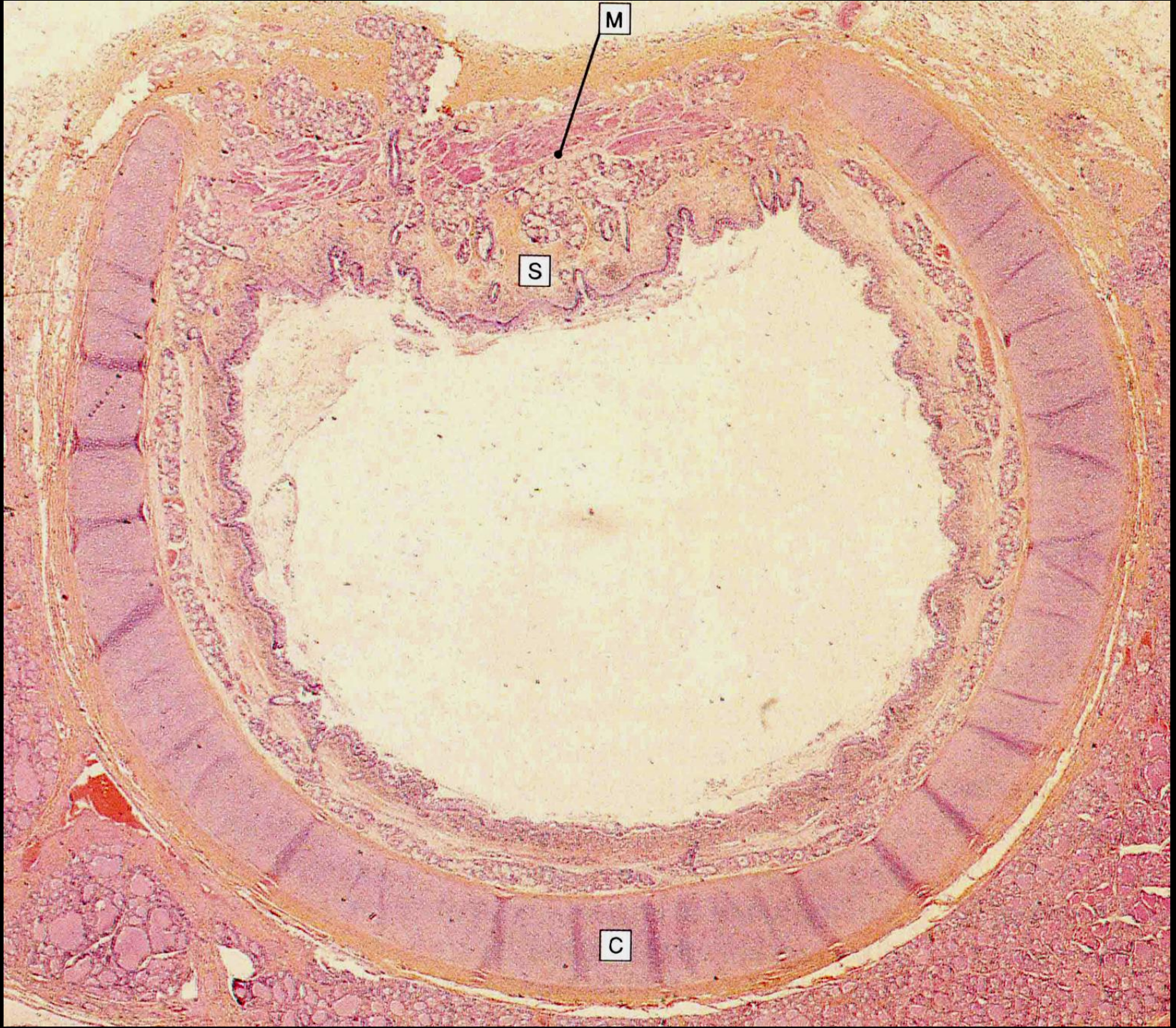


1. tunica mucosa

- lamina epithelialis mucosae
- lamina propria mucosae

2. tunica fibromusculocartilaginea (tela submucosa)

3. tunica adventitia



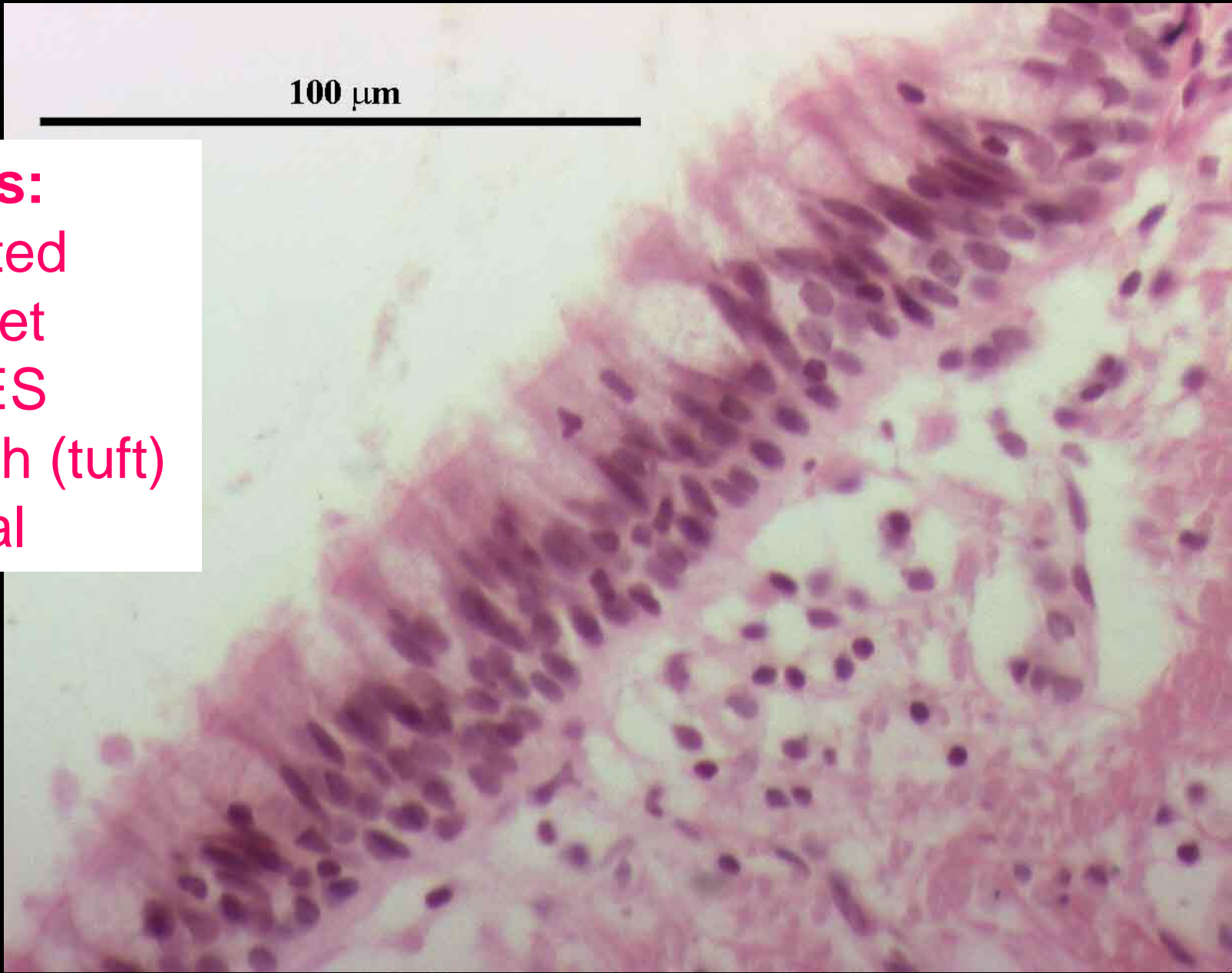
M

S

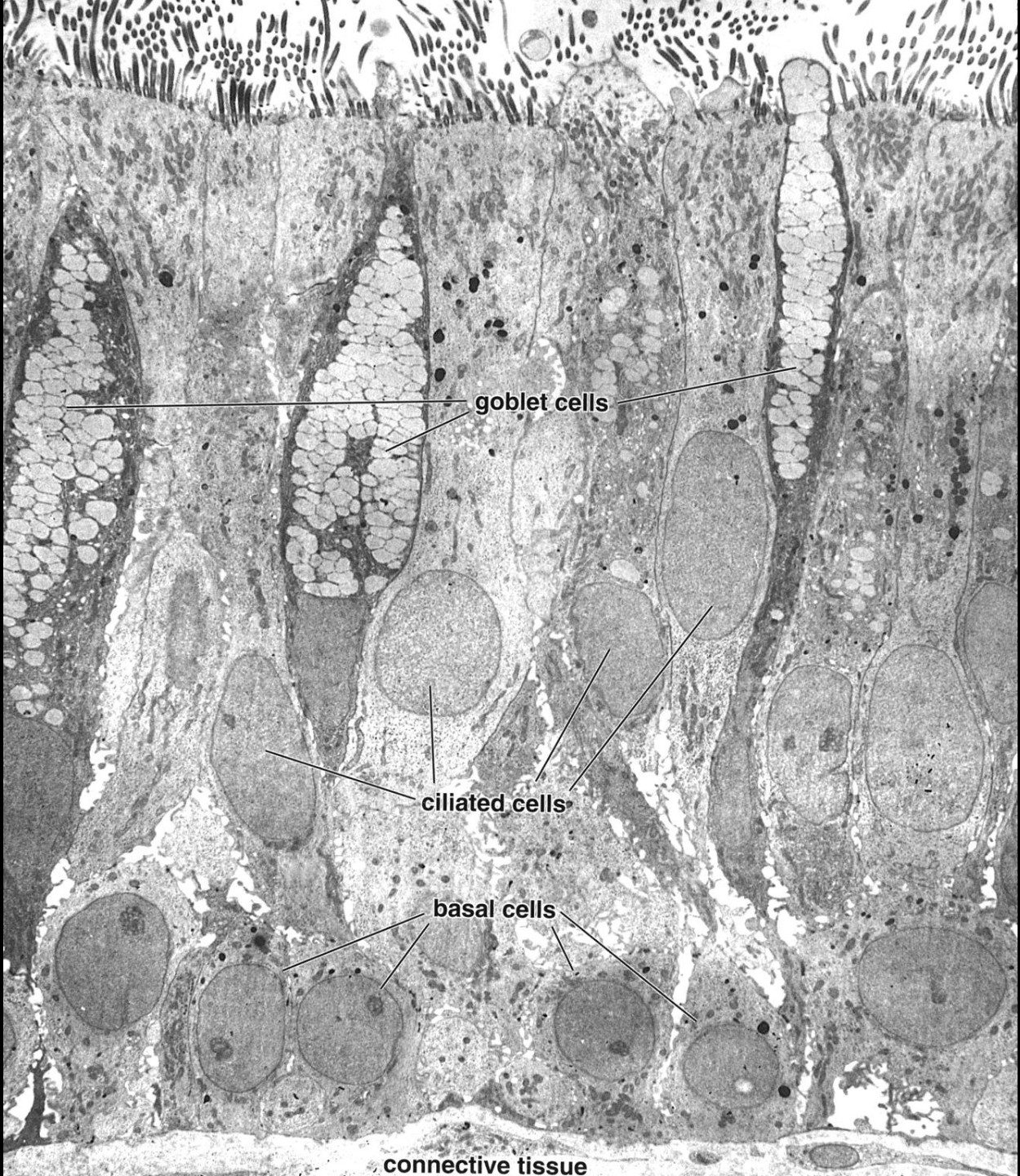
C

Airway epithelium – pseudostratified columnar ciliated

100 μm

A histological micrograph of airway epithelium. The image shows a cross-section of the airway wall with a prominent layer of pseudostratified columnar ciliated epithelium. The cells are arranged in a single layer, but their nuclei are at different heights, giving the appearance of multiple layers. The apical surface of the cells is covered with fine, hair-like cilia. The basal part of the cells is attached to a basement membrane. The underlying connective tissue is stained pink. A scale bar at the top left indicates 100 micrometers.

Cells:
ciliated
goblet
DNES
brush (tuft)
basal



goblet cells

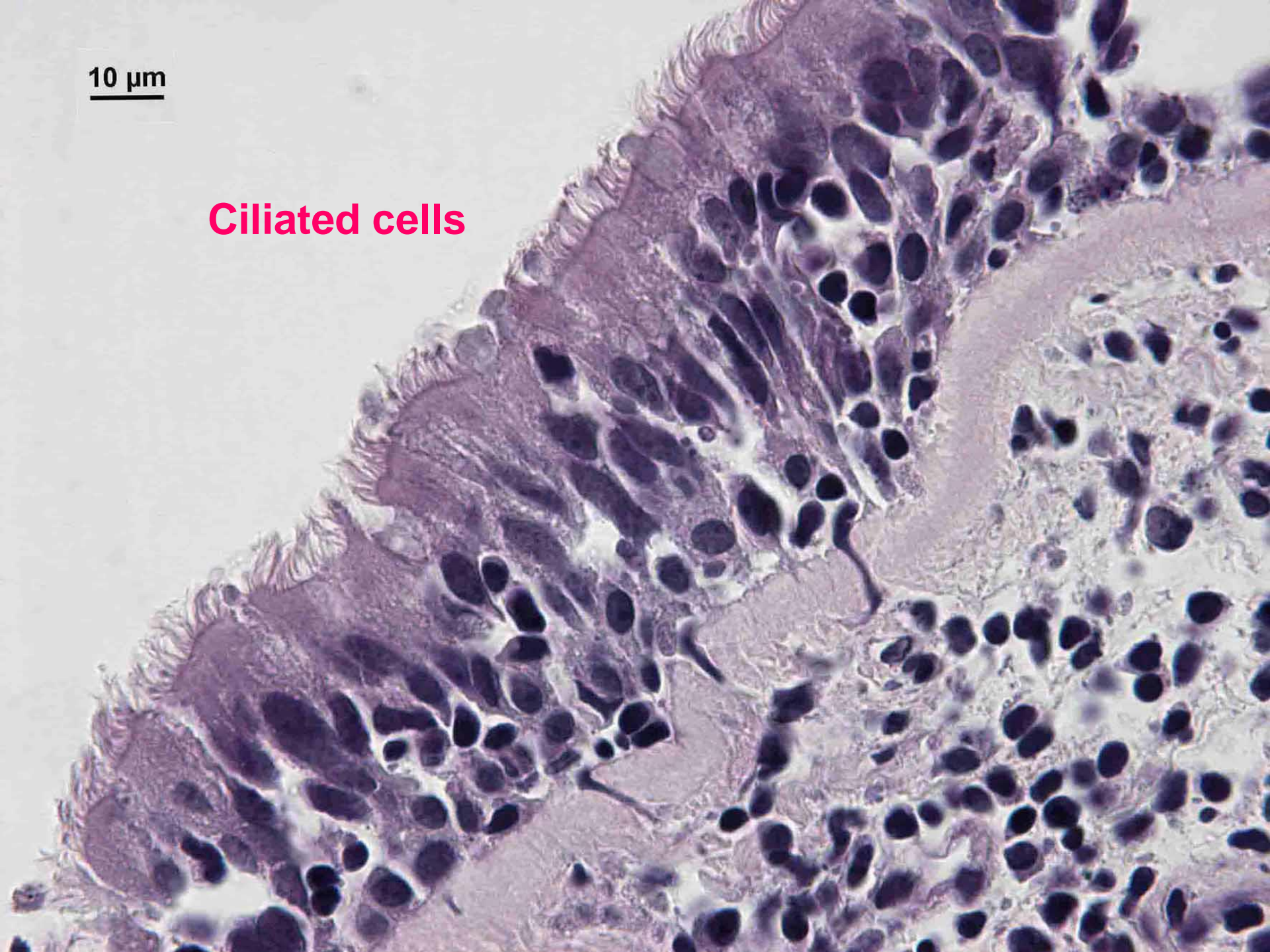
ciliated cells

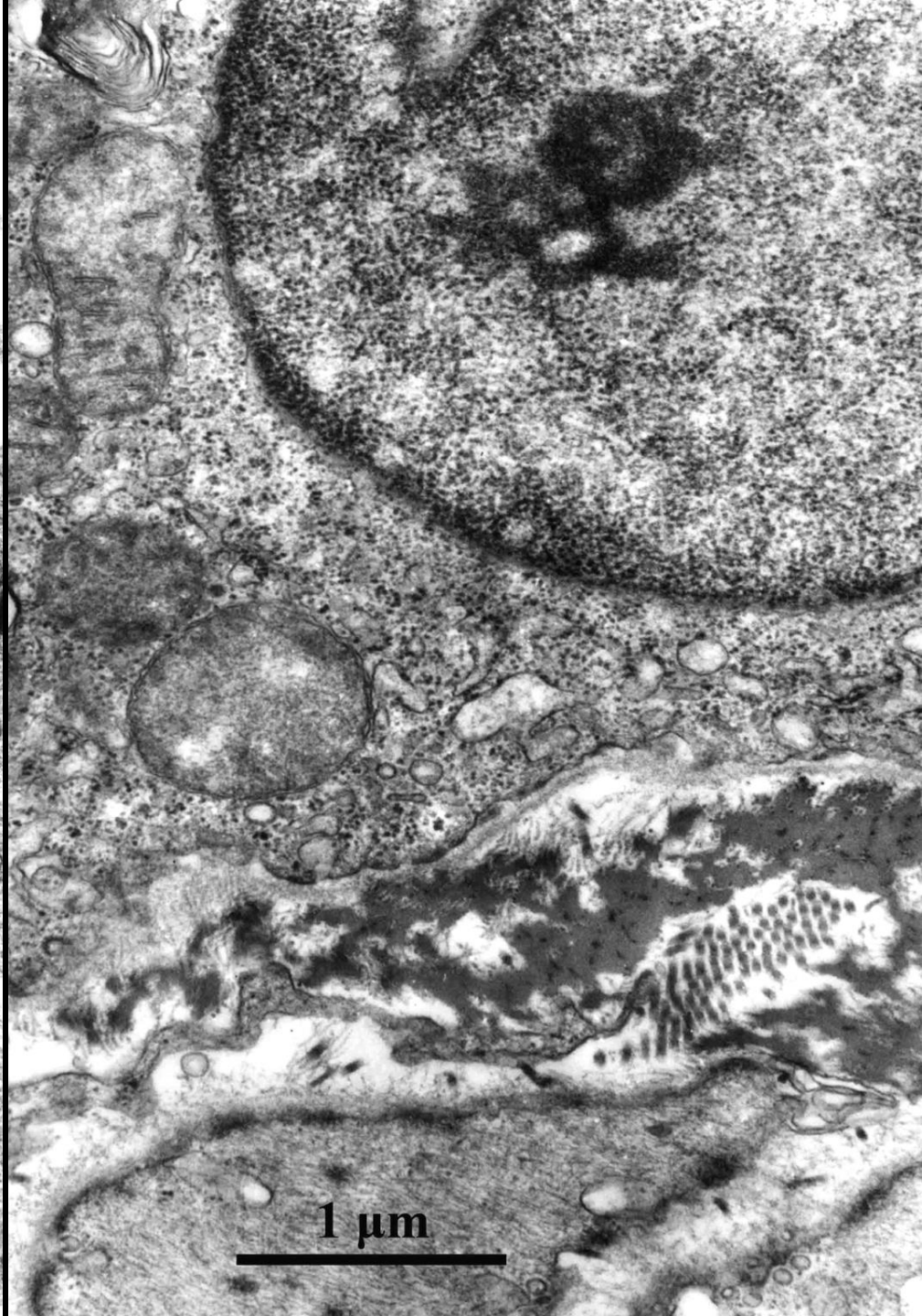
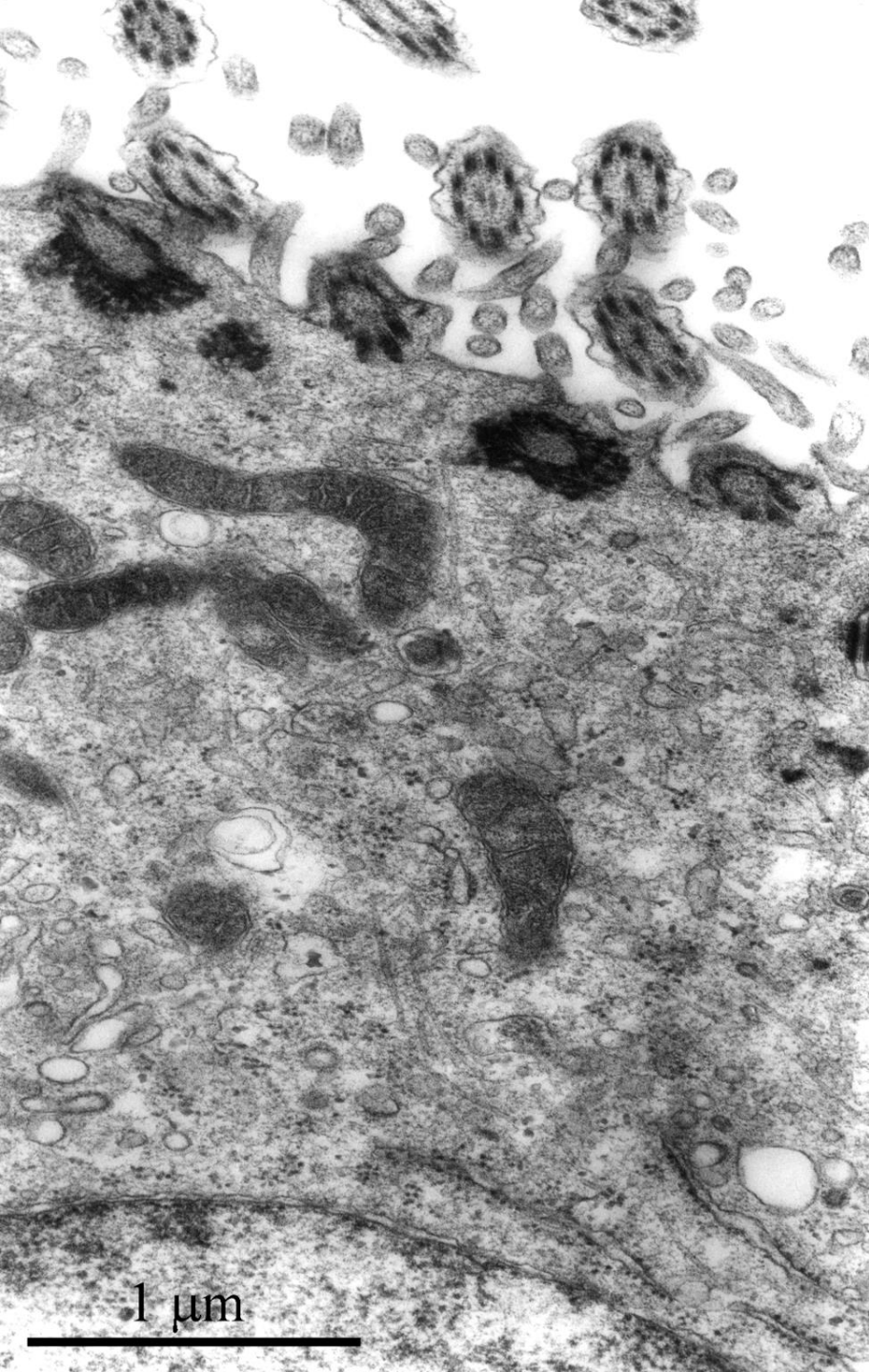
basal cells

connective tissue

10 μ m

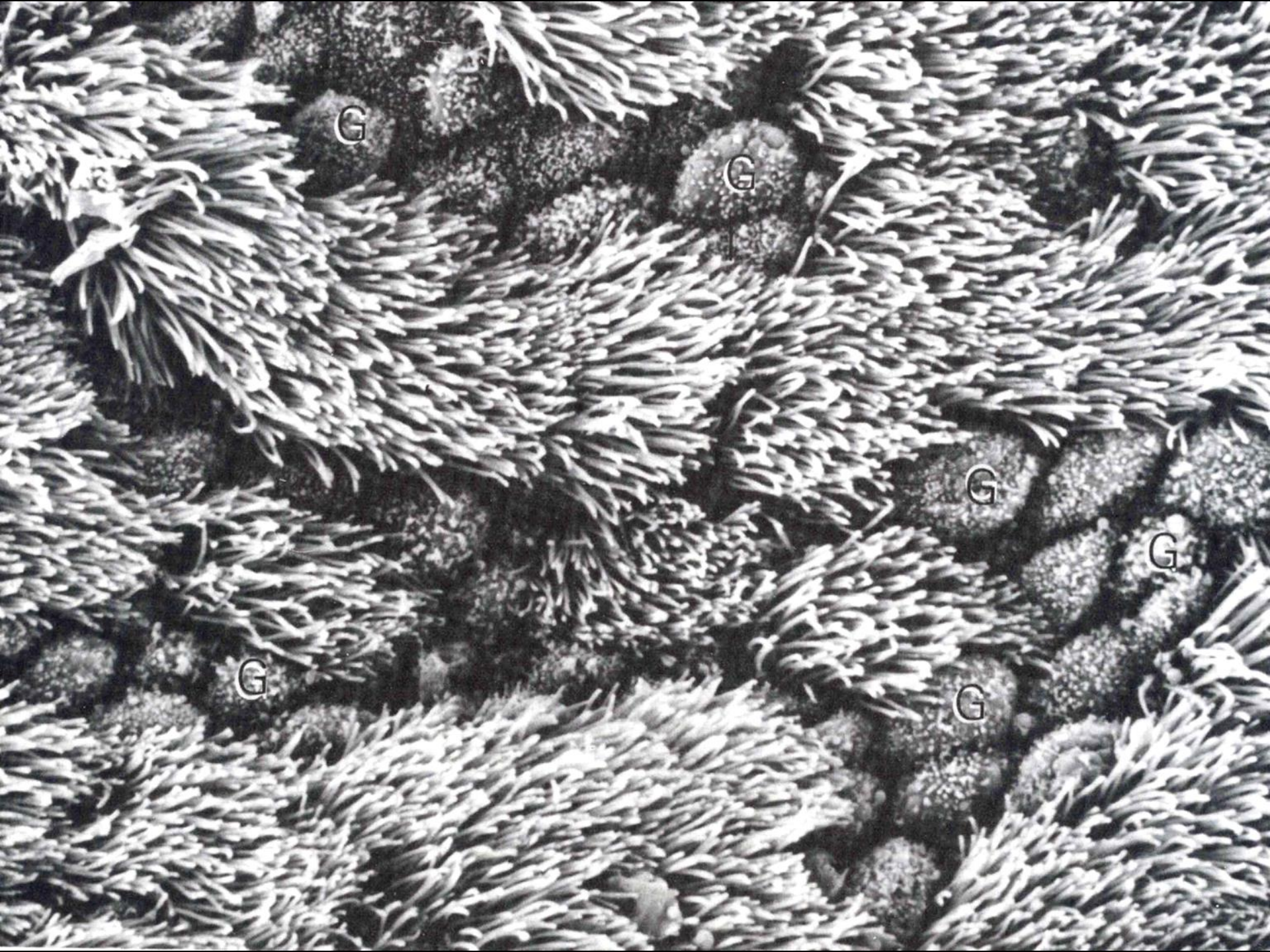
Ciliated cells

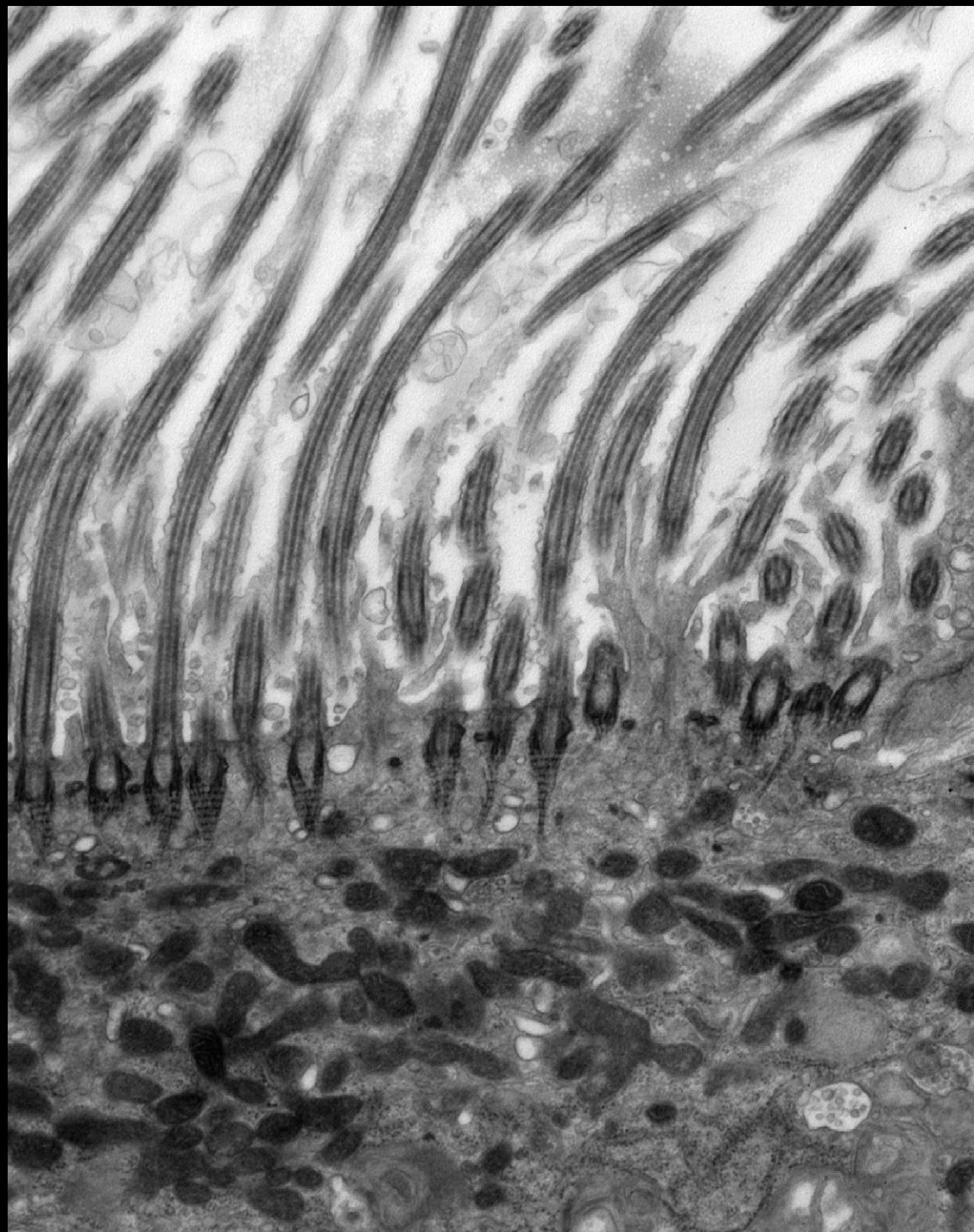


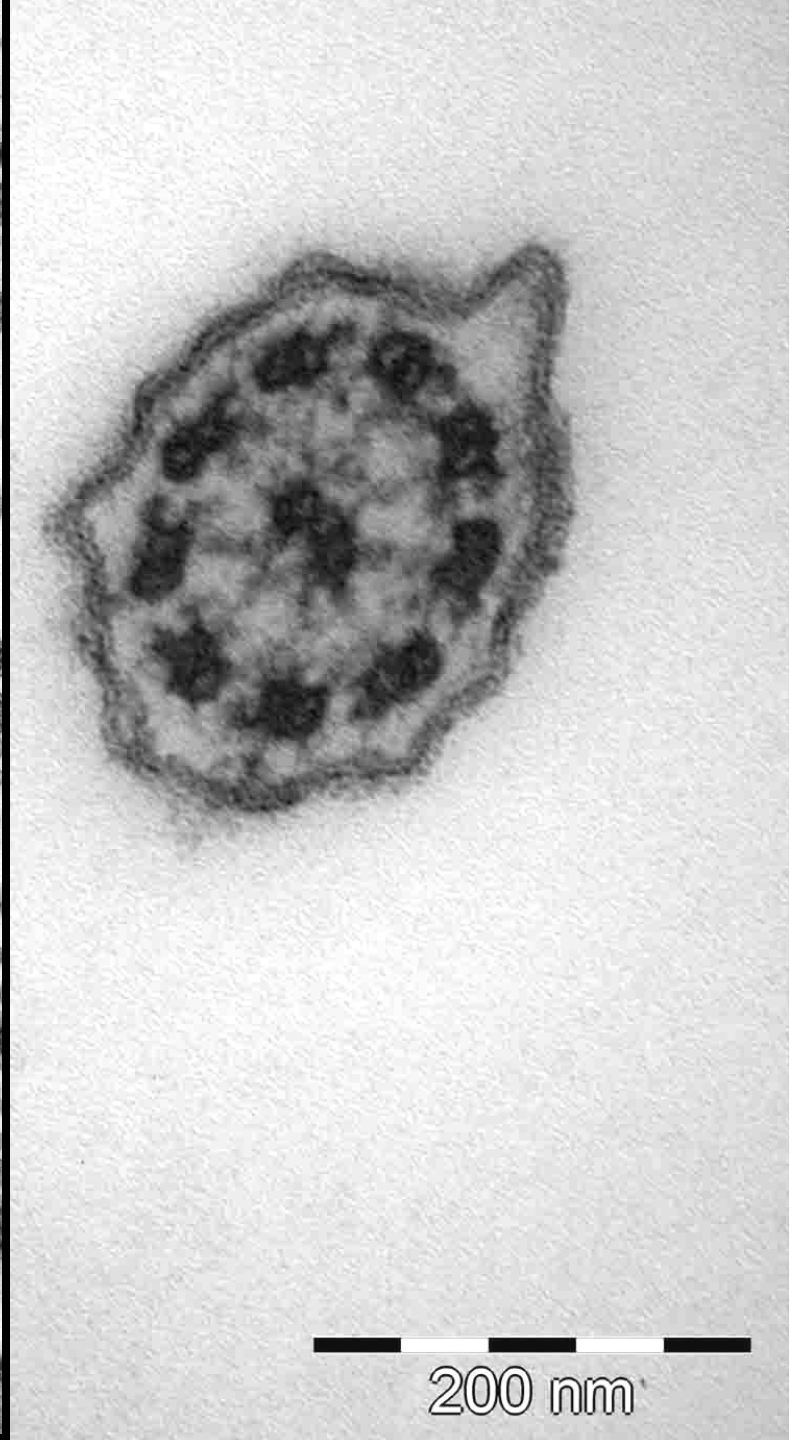
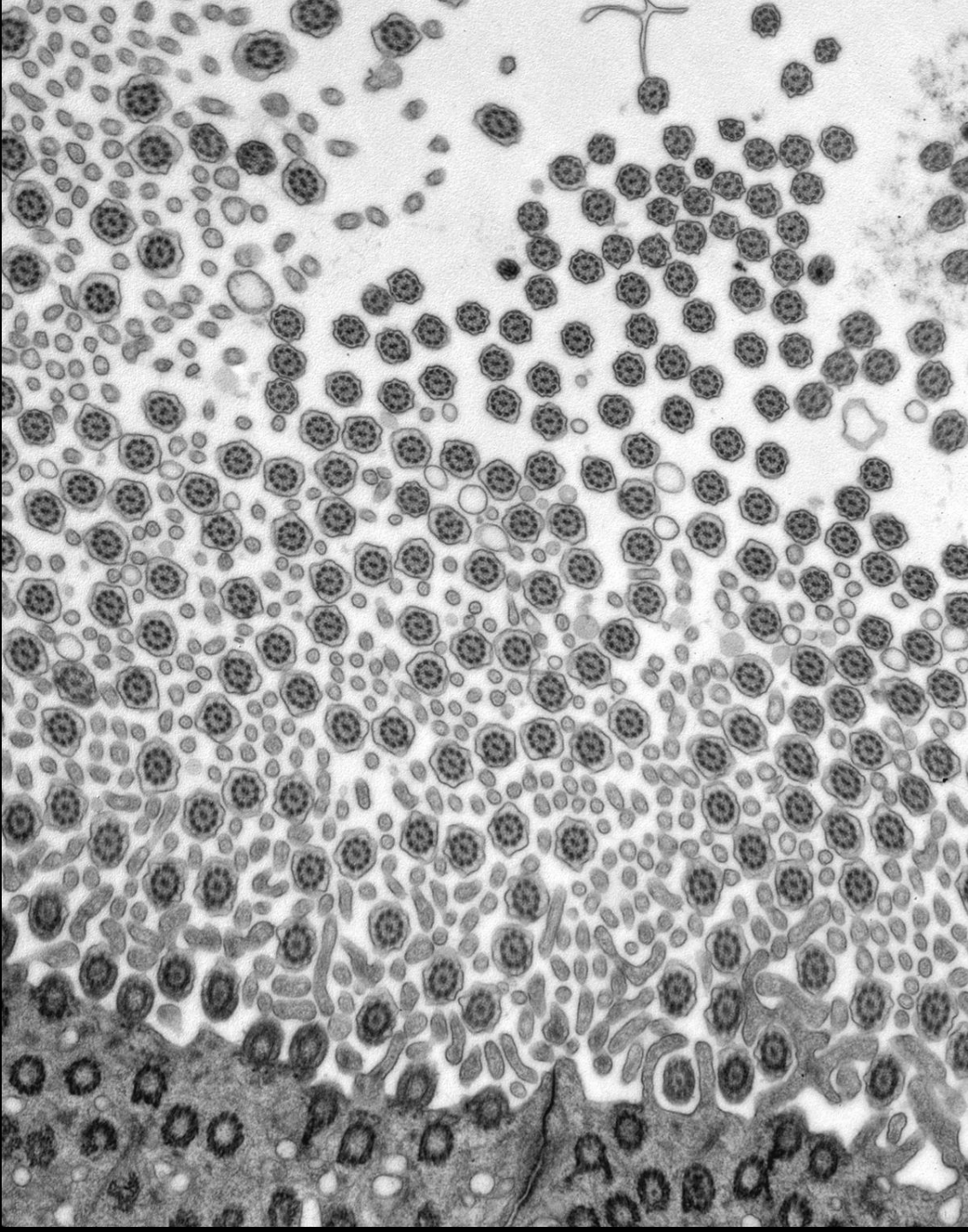


Ciliary border

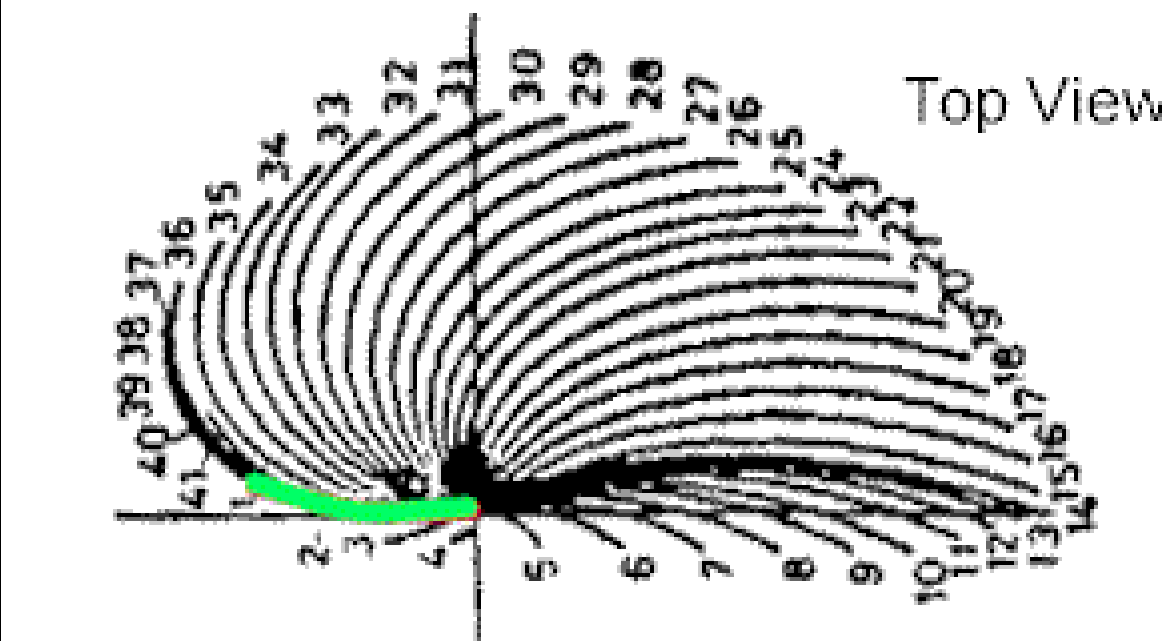
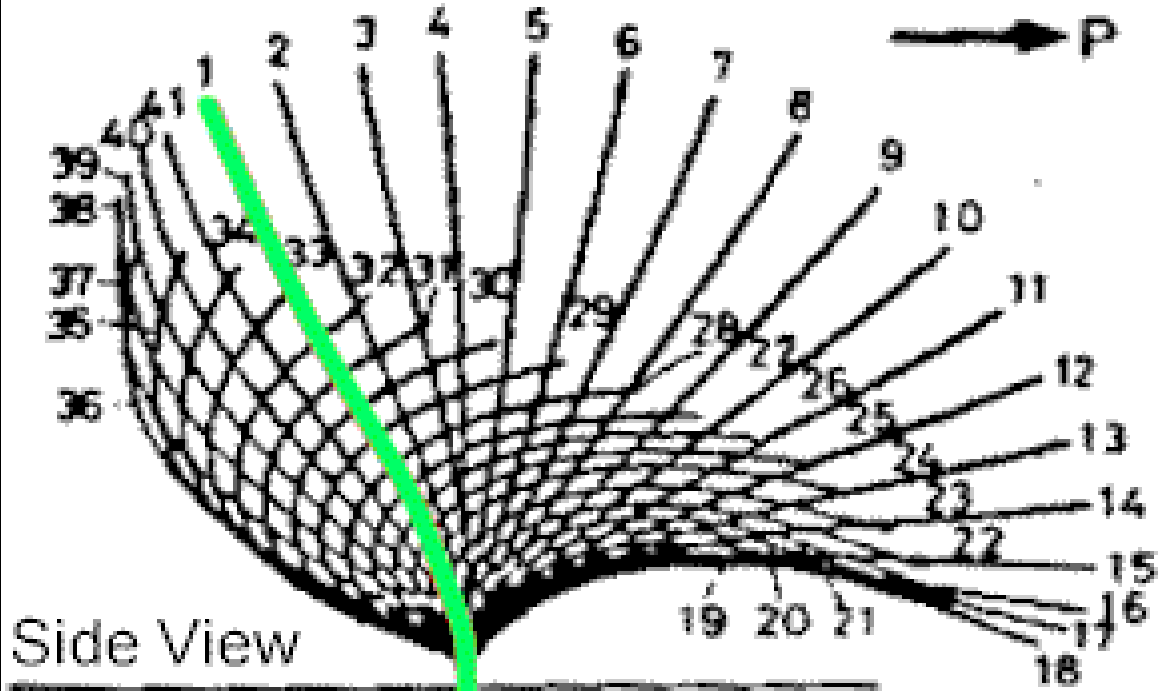




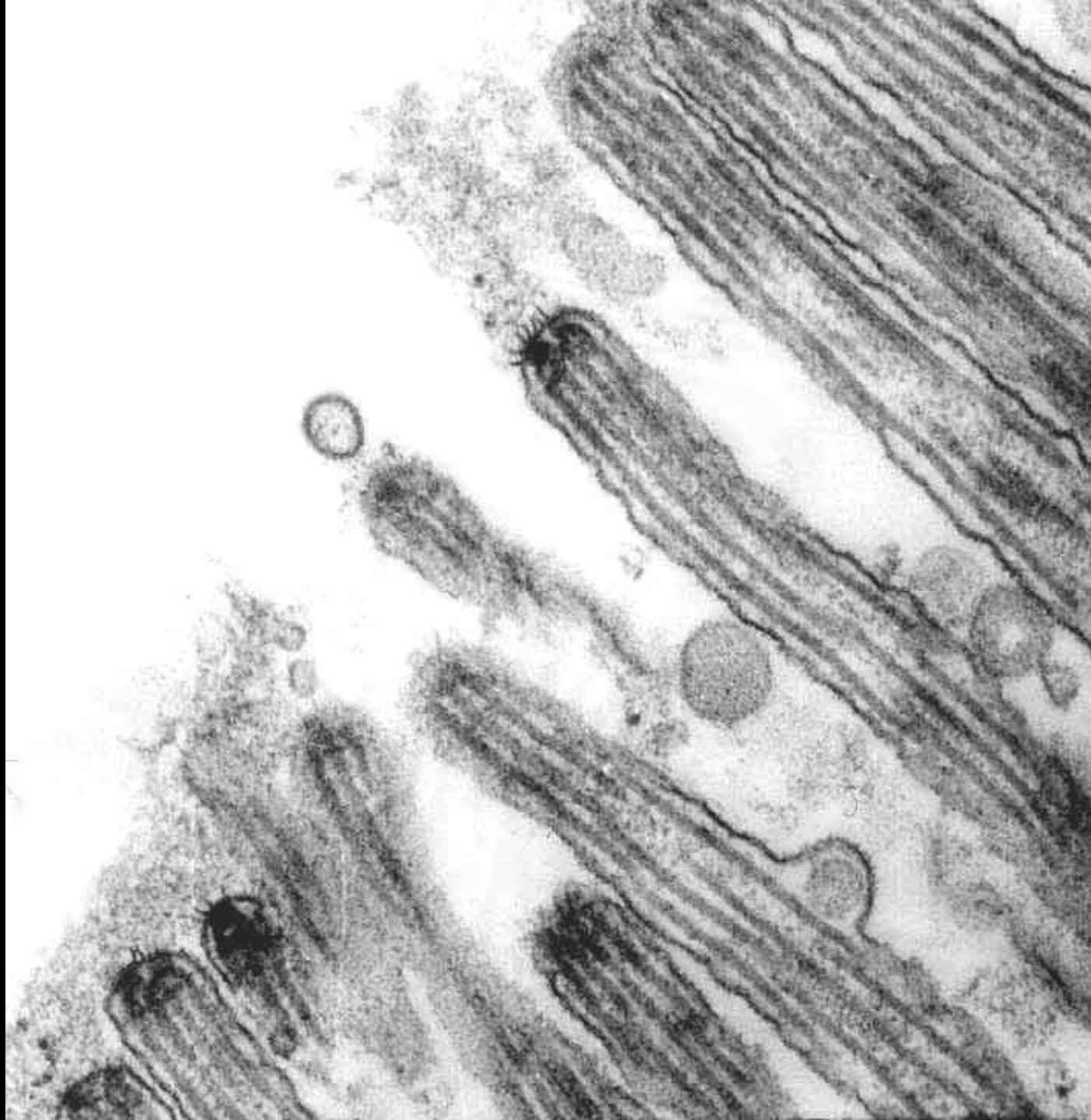


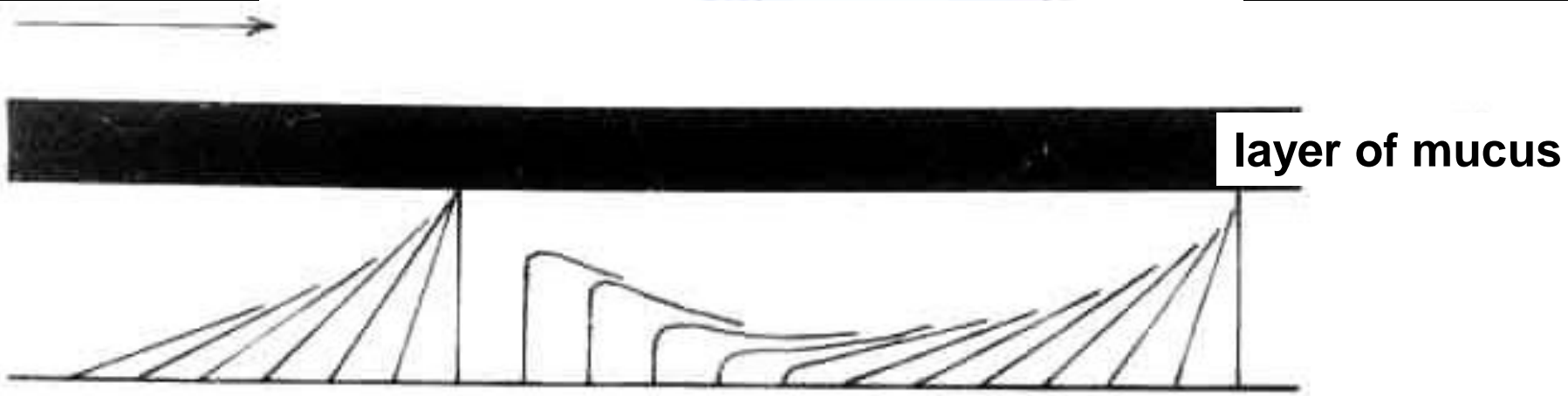
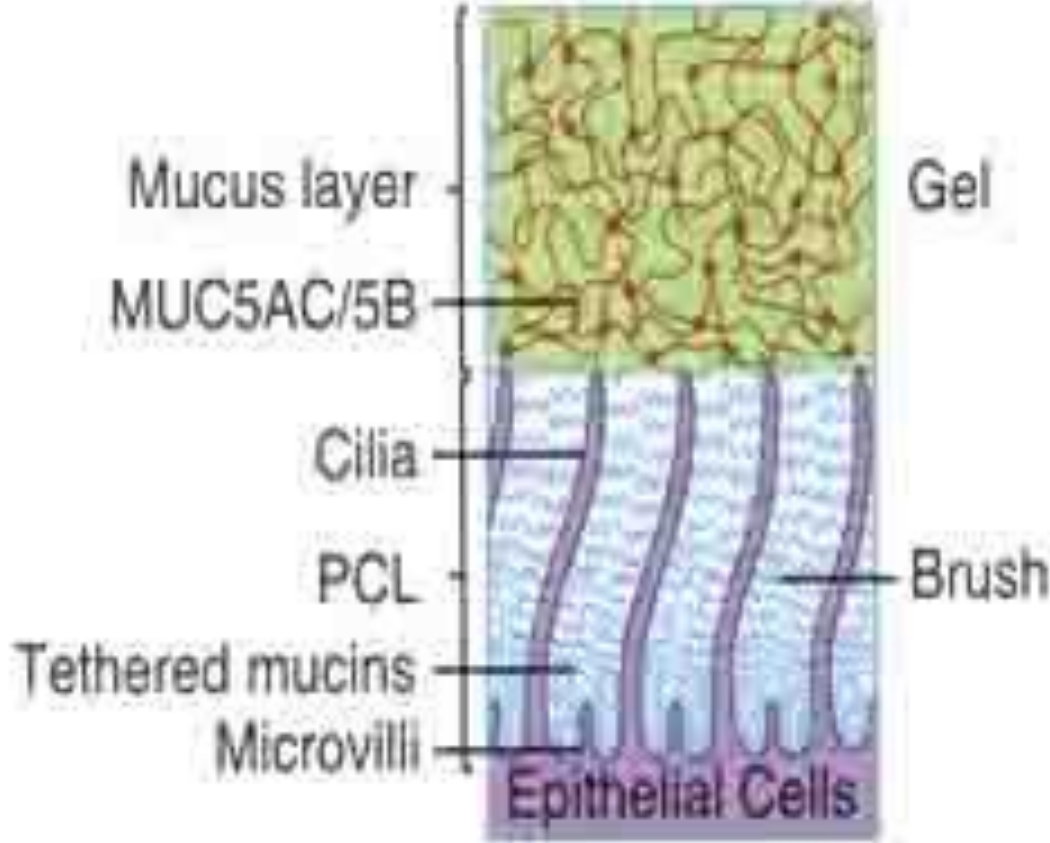


200 nm



UBC Dep. of Zoology
 (http://www.zoology.ubc.ca/courses/bio332/flagellar_motion.htm, Biology 332, Protistology Term 2, Flagellar motion in Paramecium)





Primary ciliary dyskinesia (PCD)

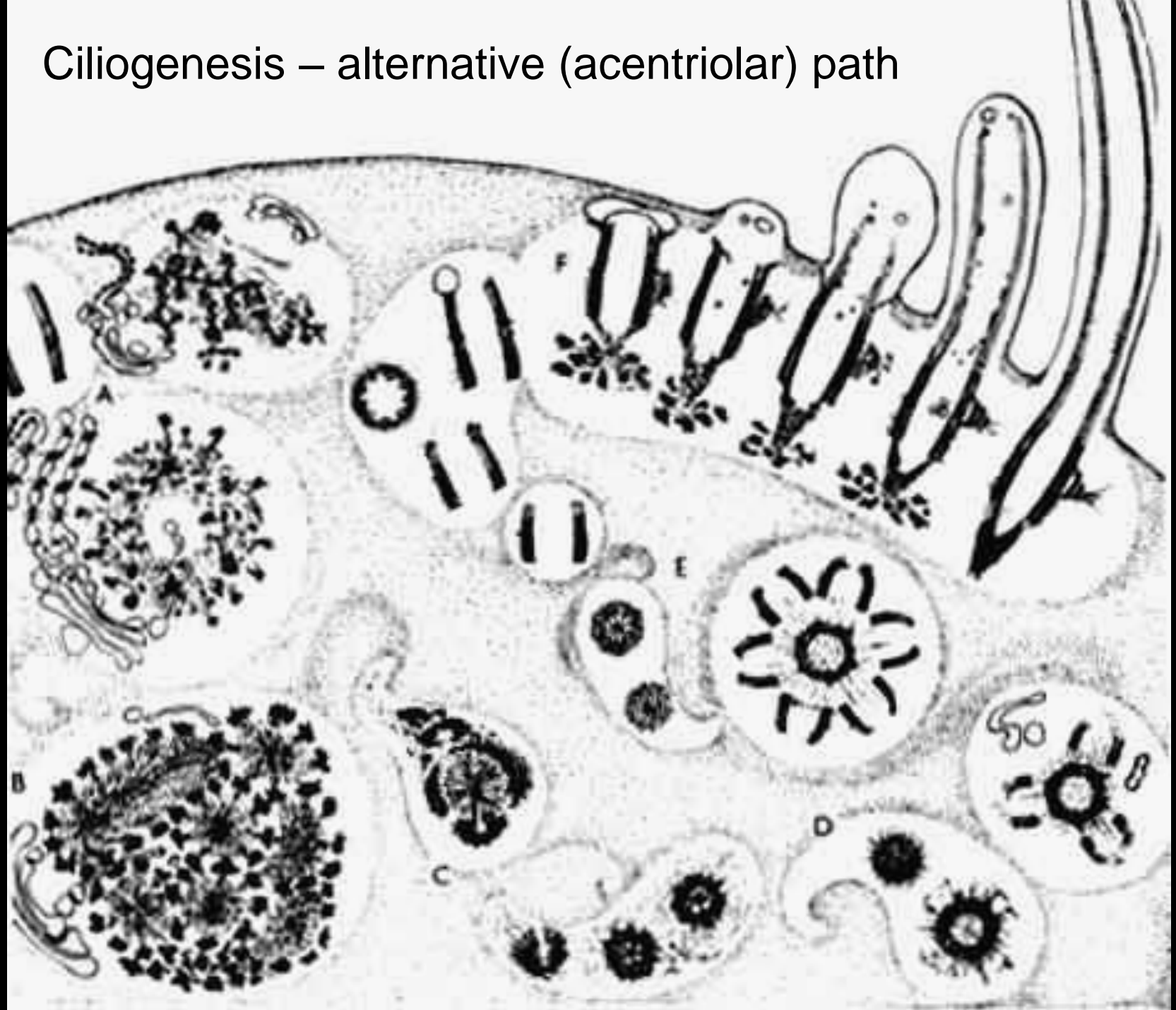
absence of dynein arms

Kartagener syndrome

- chronic sinusitis
- bronchiectasis
- situs viscerum inversus

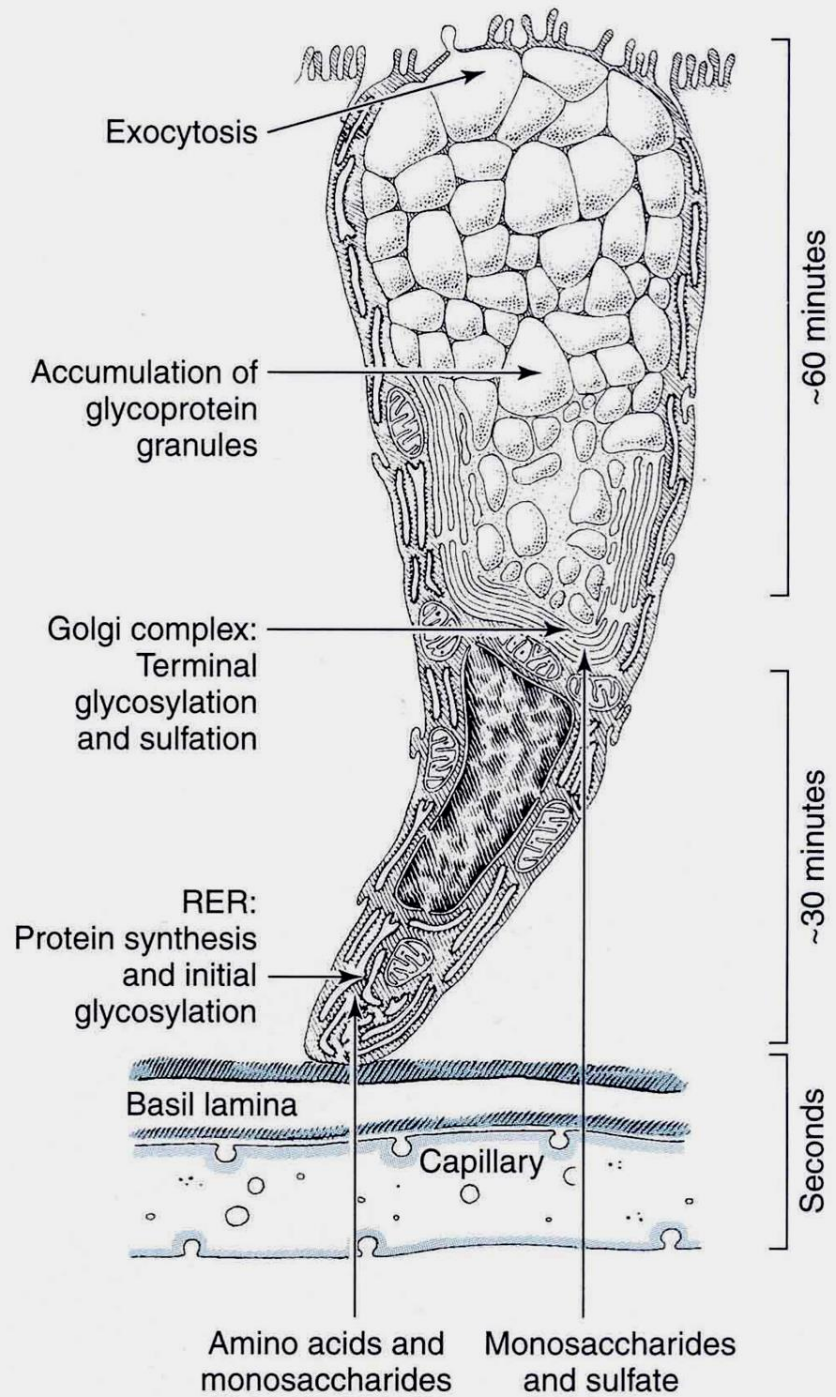
200 nm

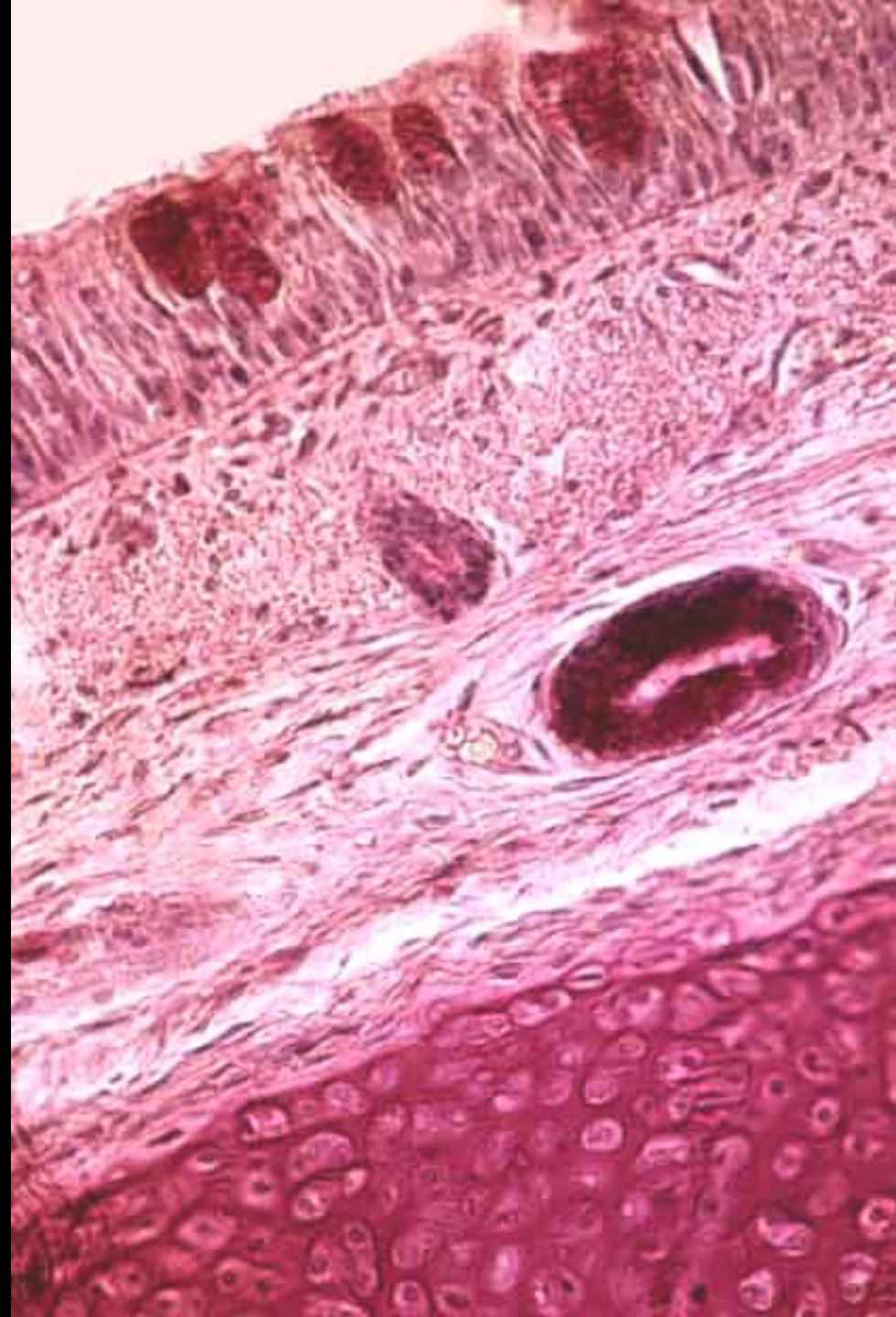
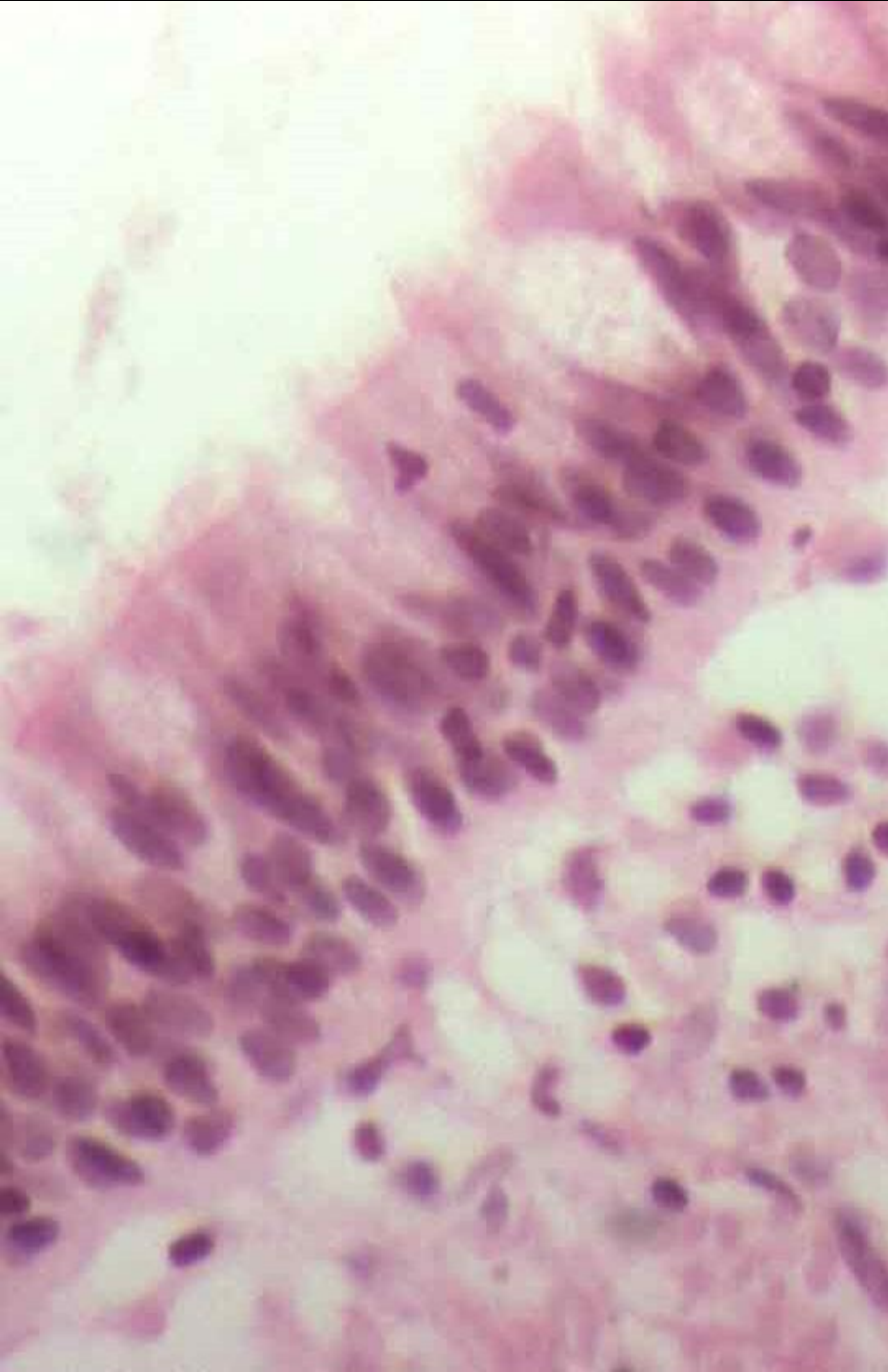
Ciliogenesis – alternative (acentriolar) path

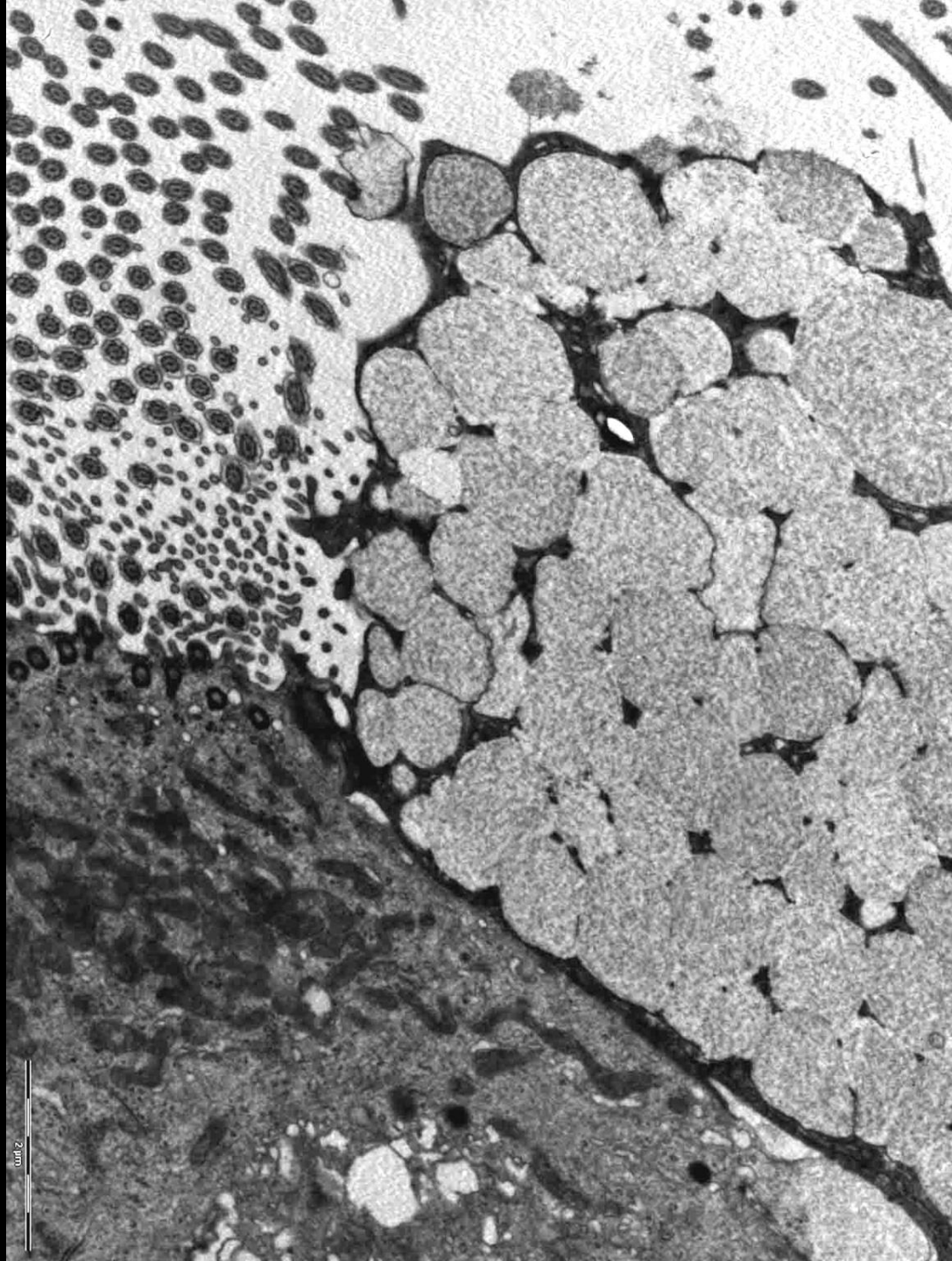


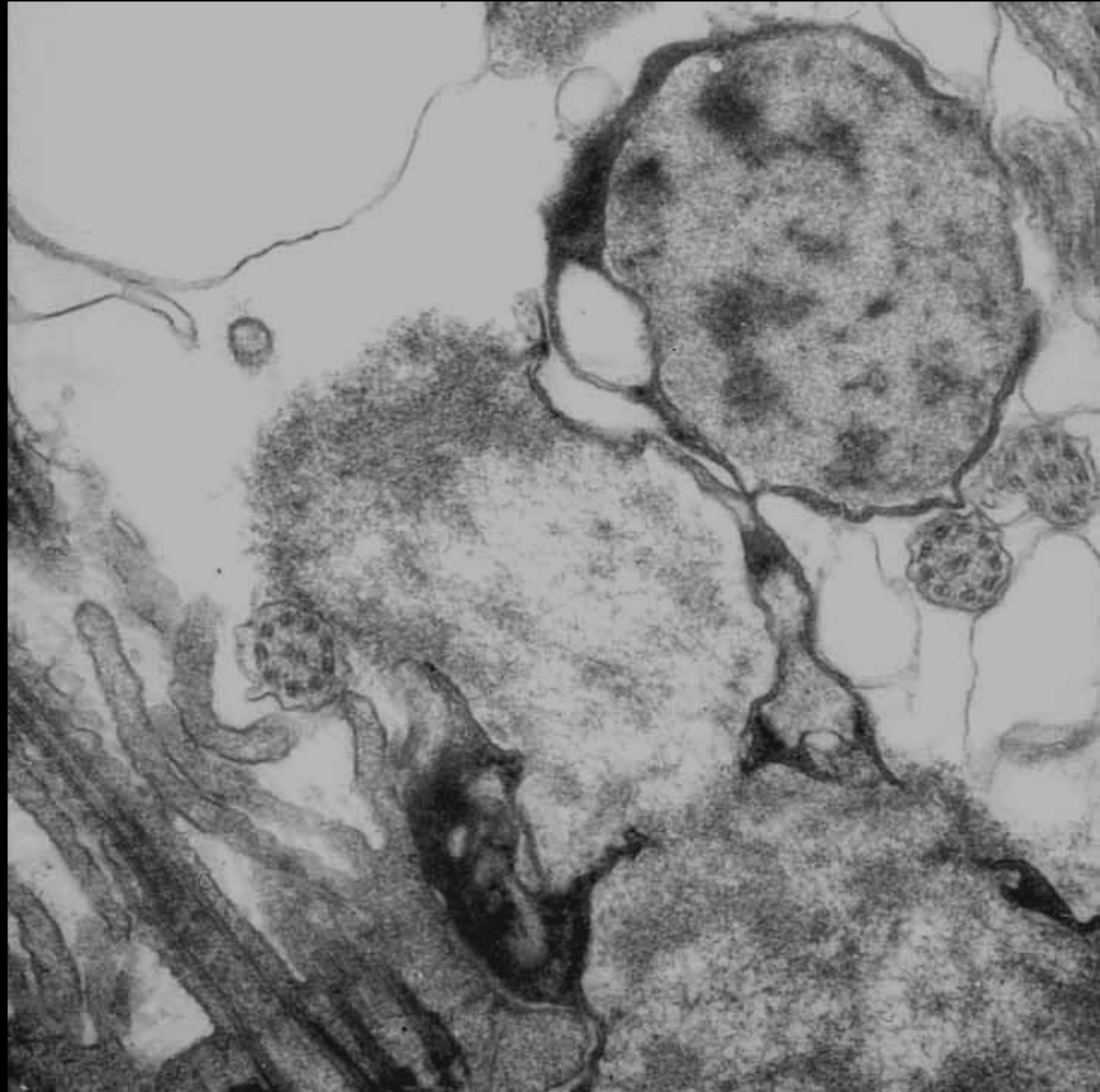


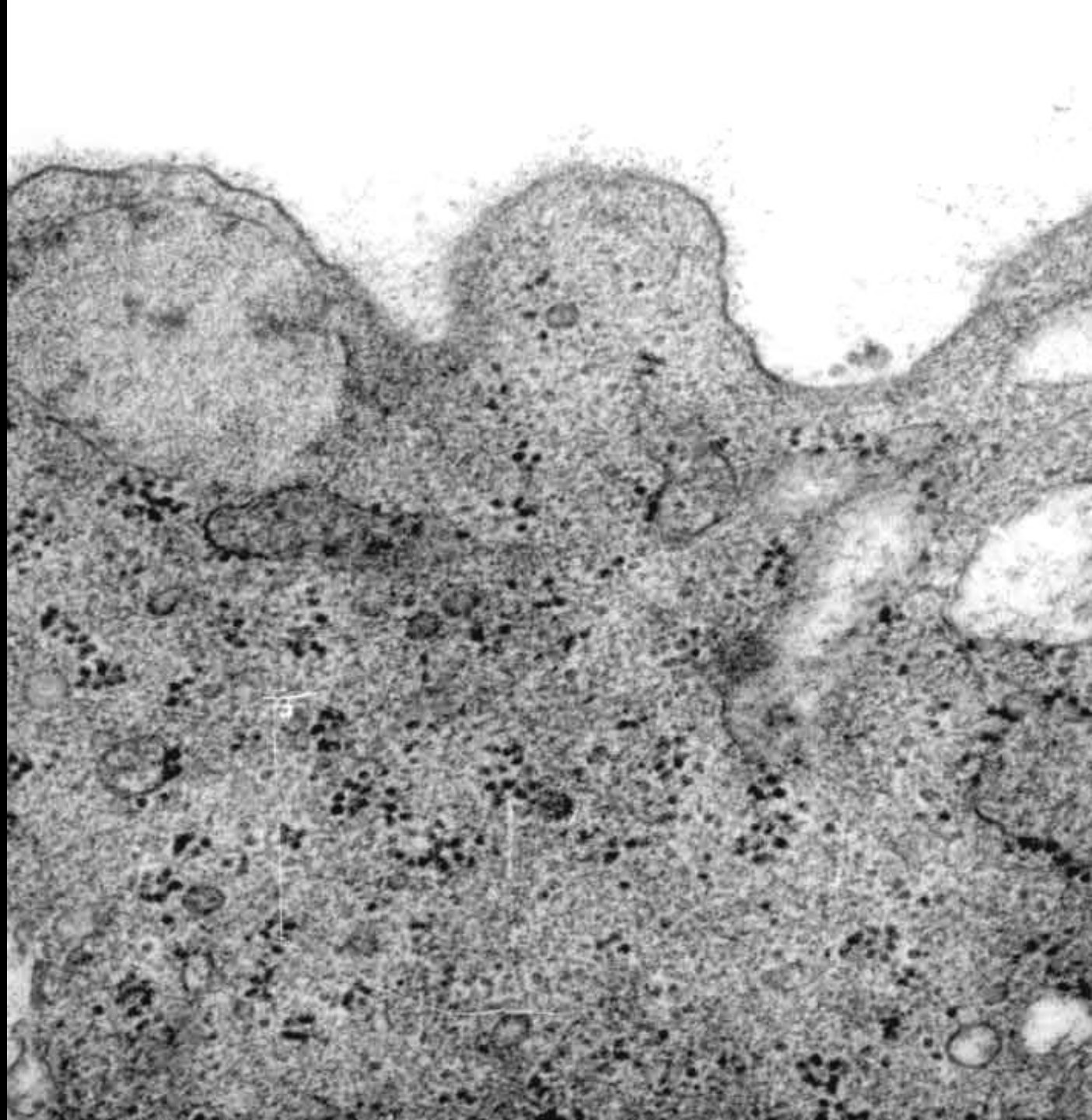
Goblet cells



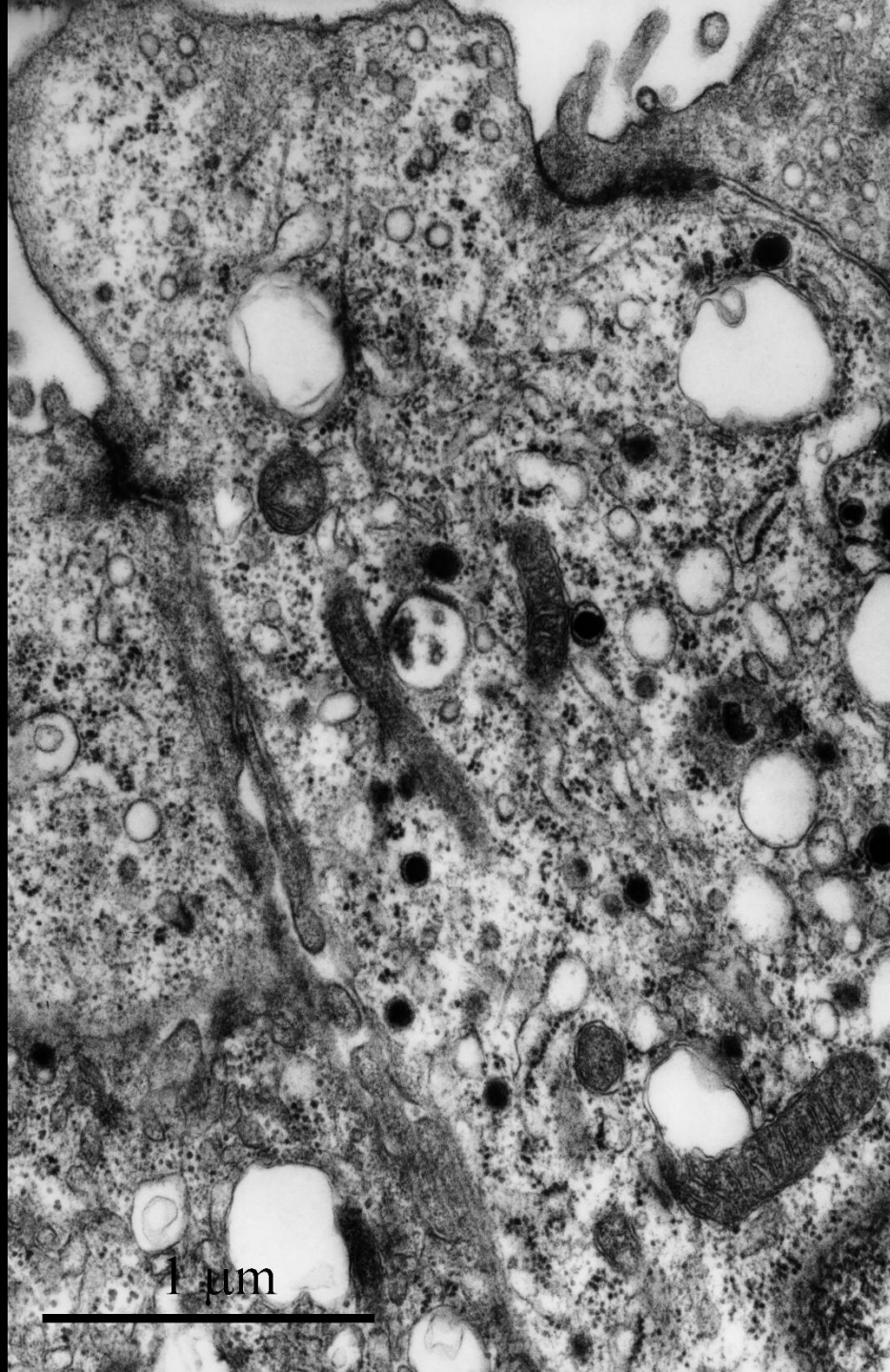


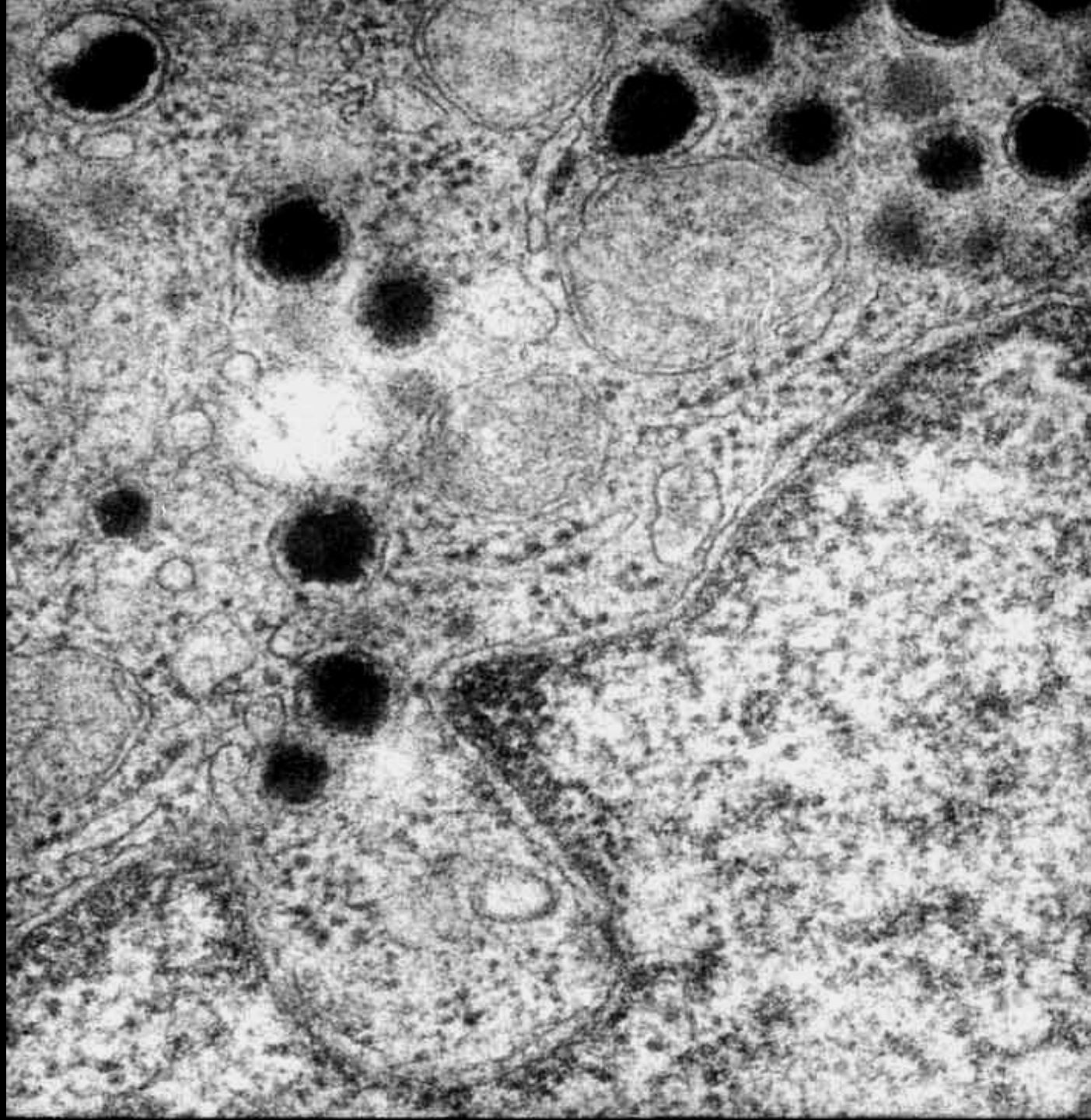






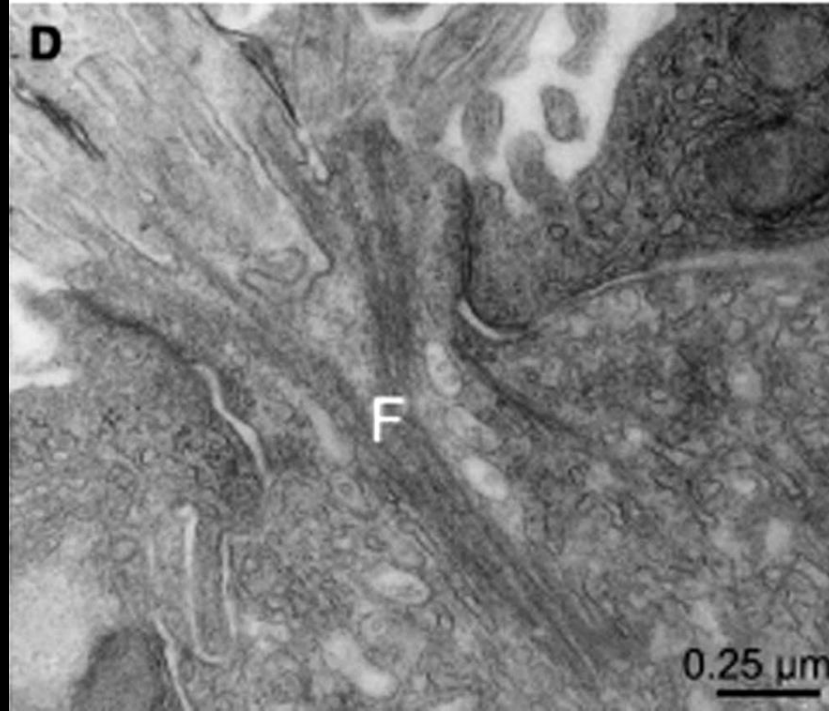
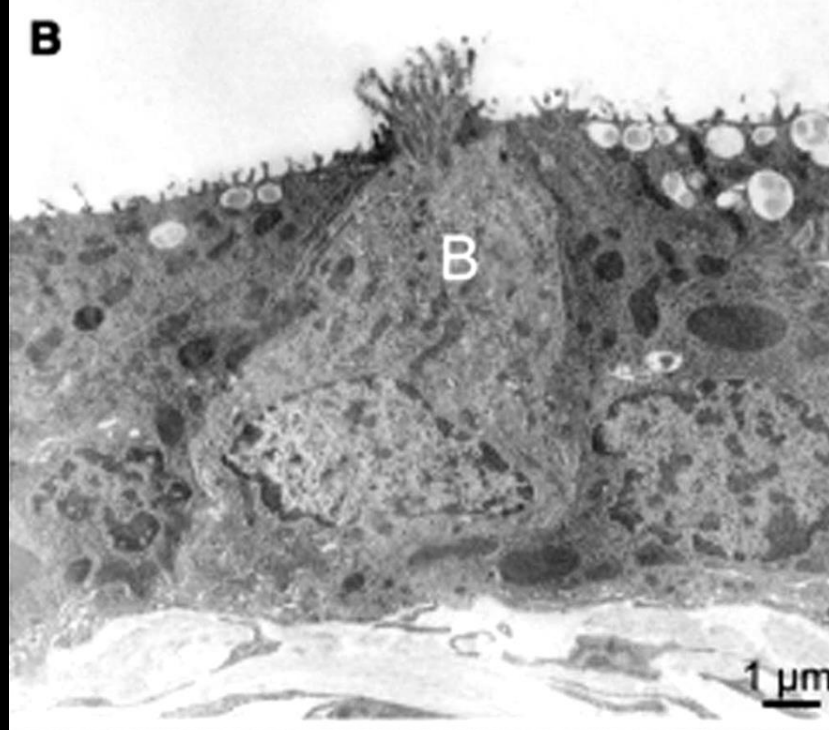
DNES cells



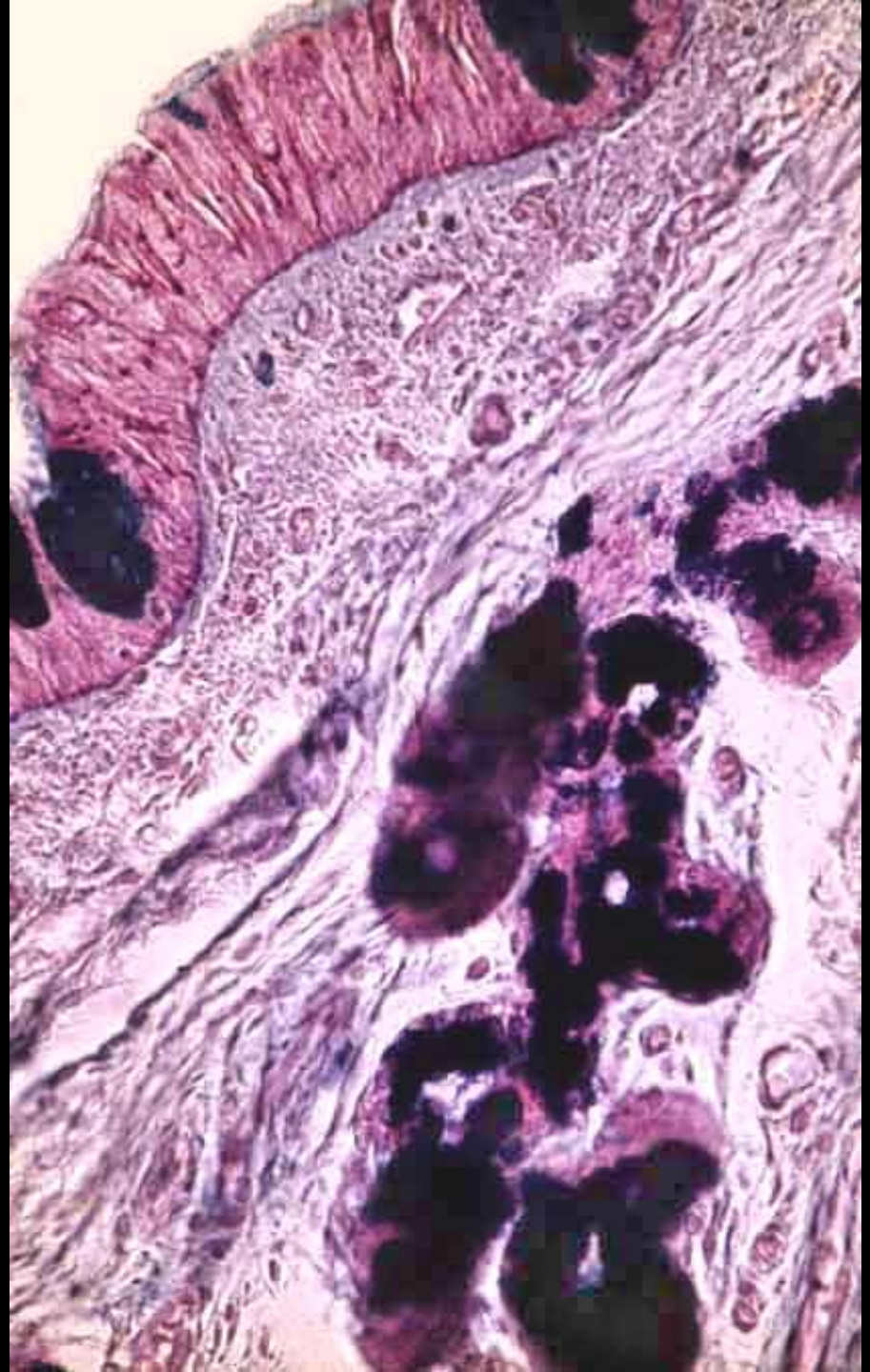
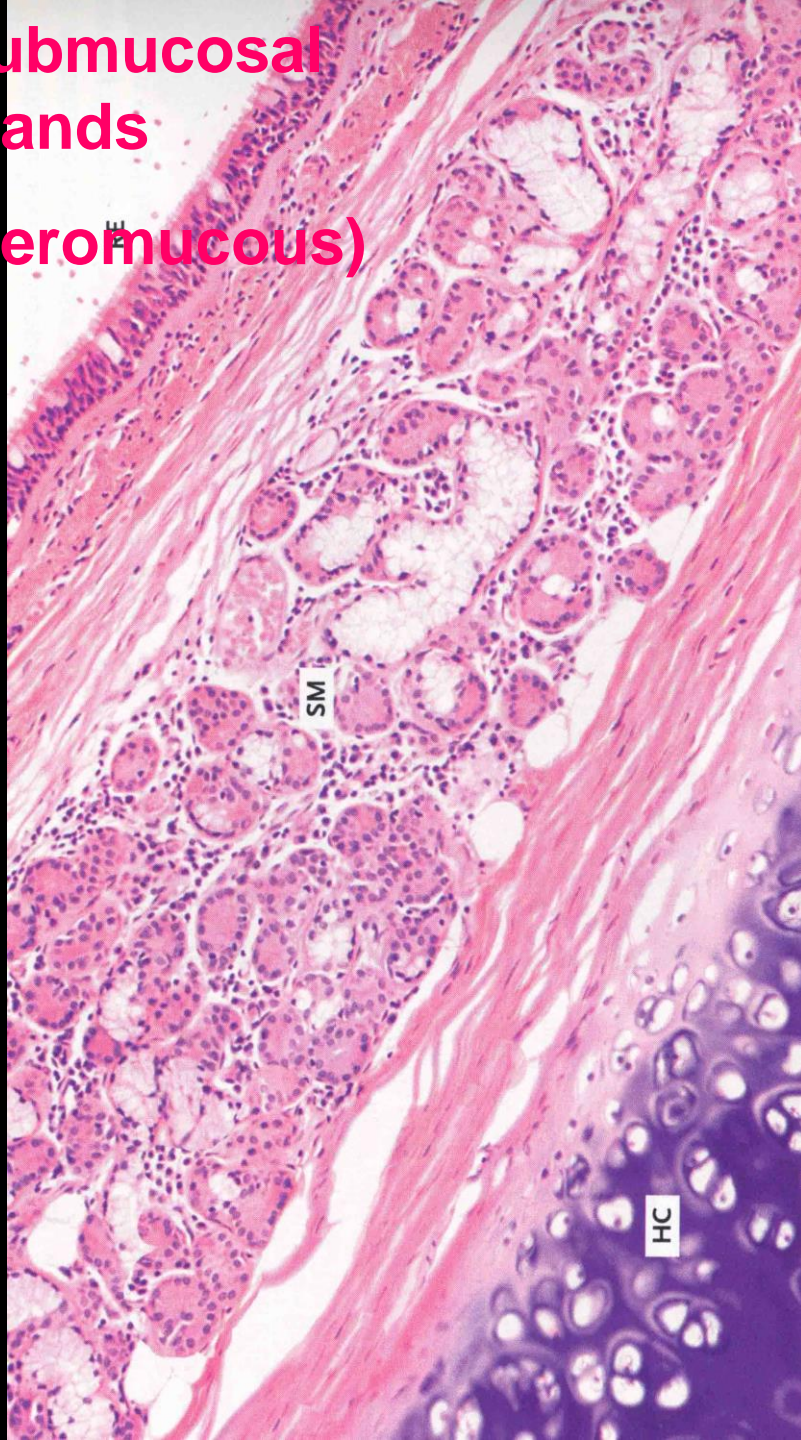


Brush (tuft) cells

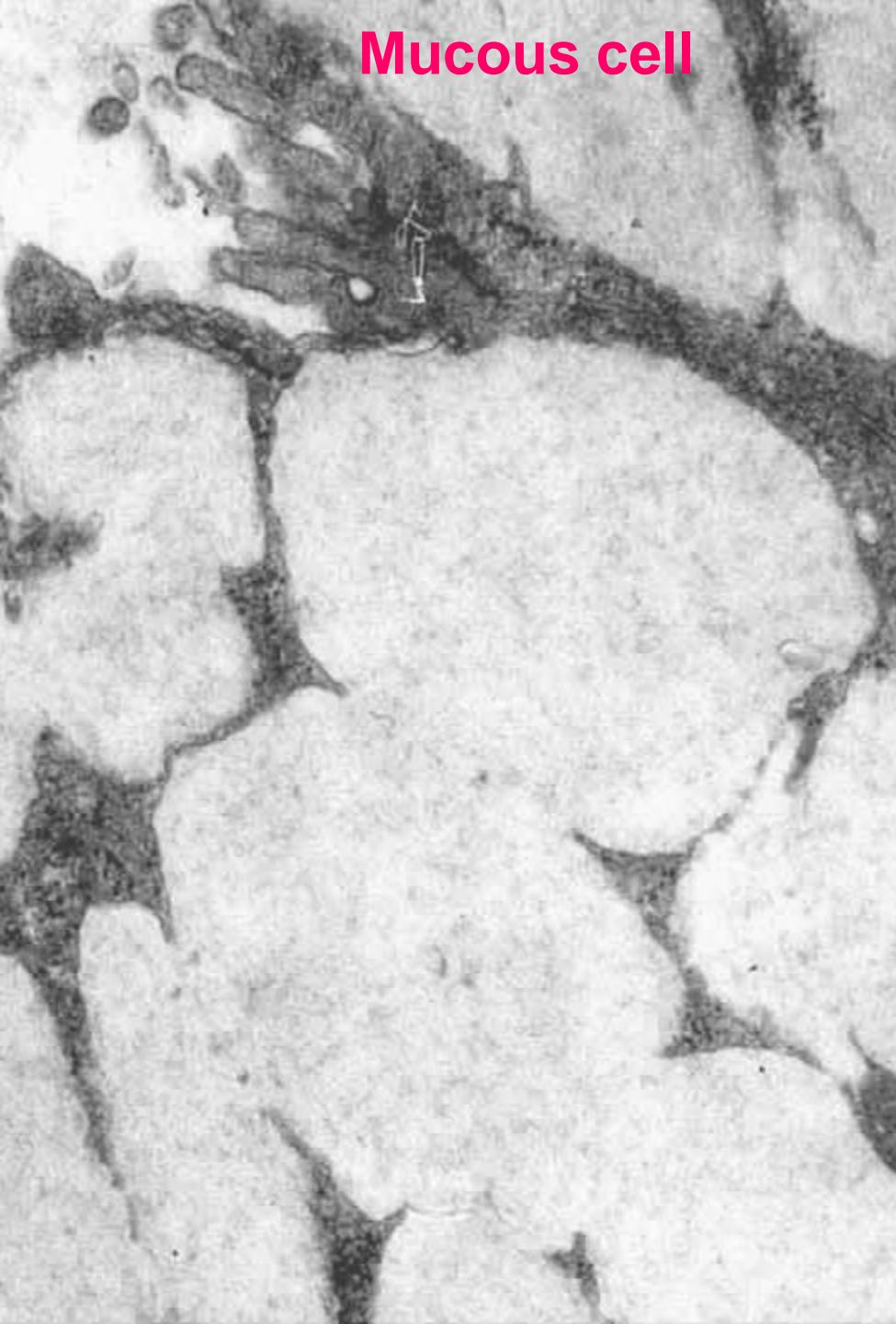
- chemosensory cells
- microvilli increase an area of their apical plasma membrane, they are anchored to cytoplasm by long bundles of microfilaments (F)
- membrane taste receptors (gustducin)
- cholinergic transmission of impulses to sensitive endings (n. vagus)
- they respond to „bitter taste“ of bacterial products and other potentially hazardous substances by triggering of defensive reflexes



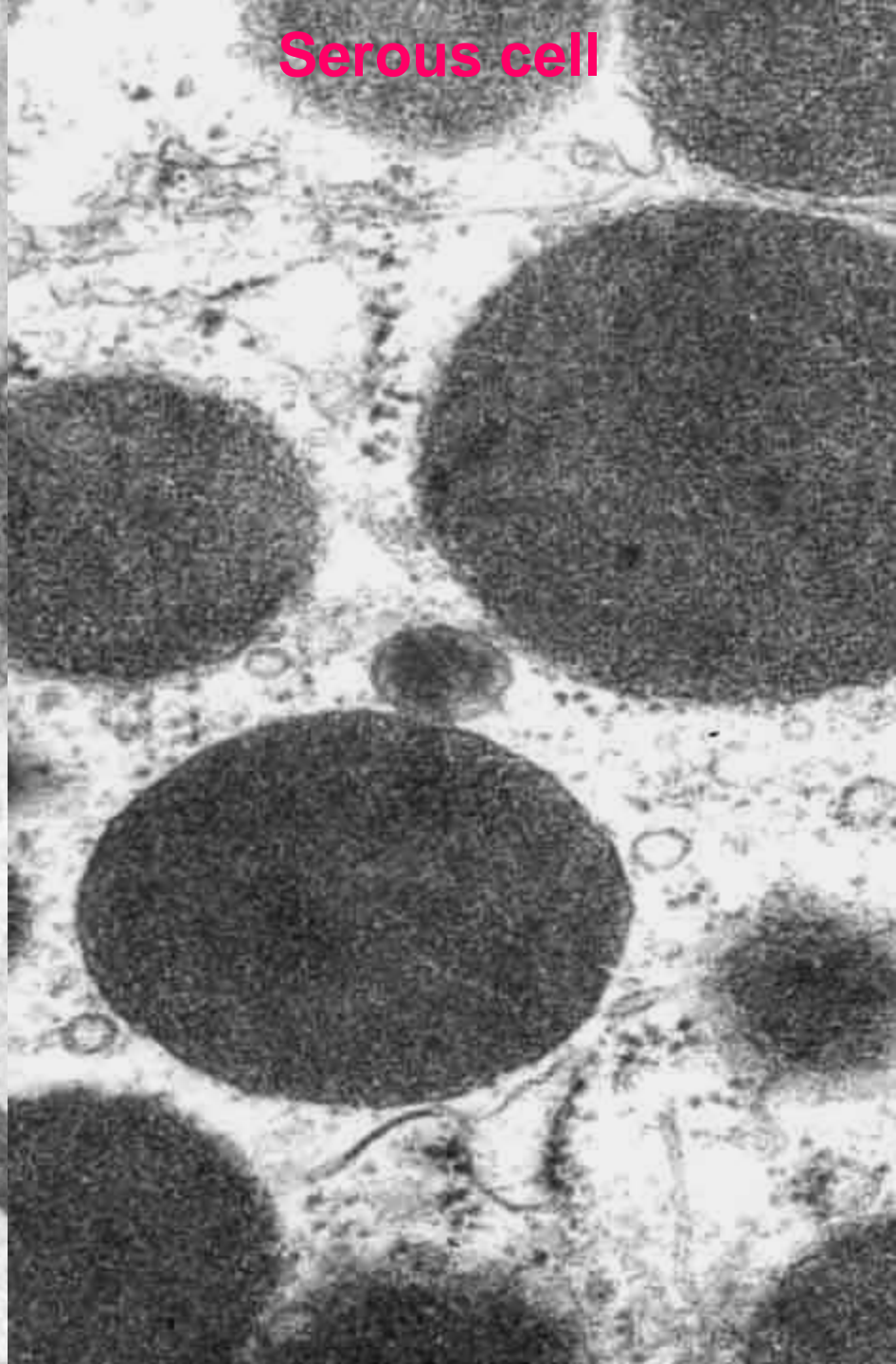
**Submucosal
glands
(seromucous)**



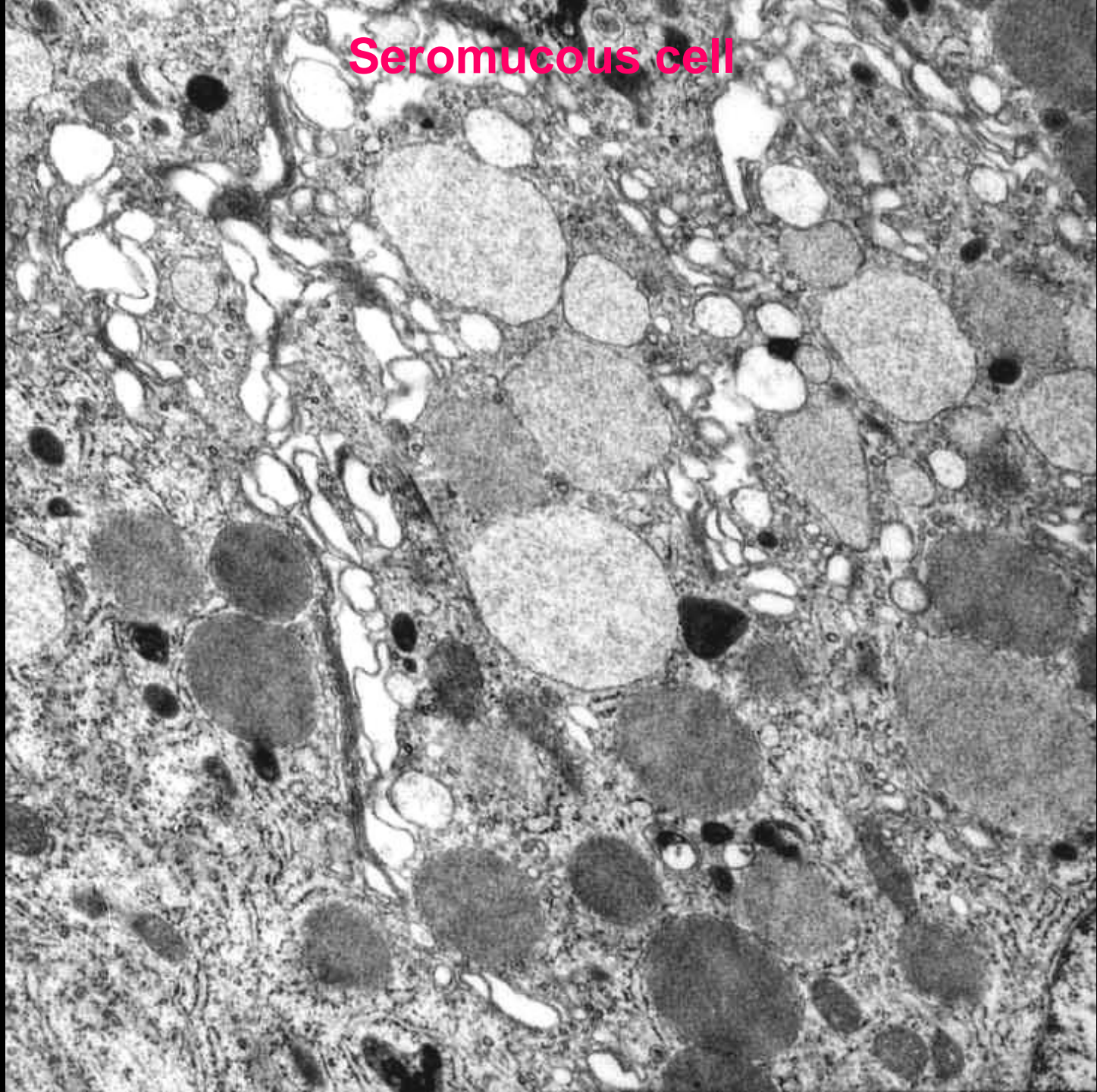
Mucous cell



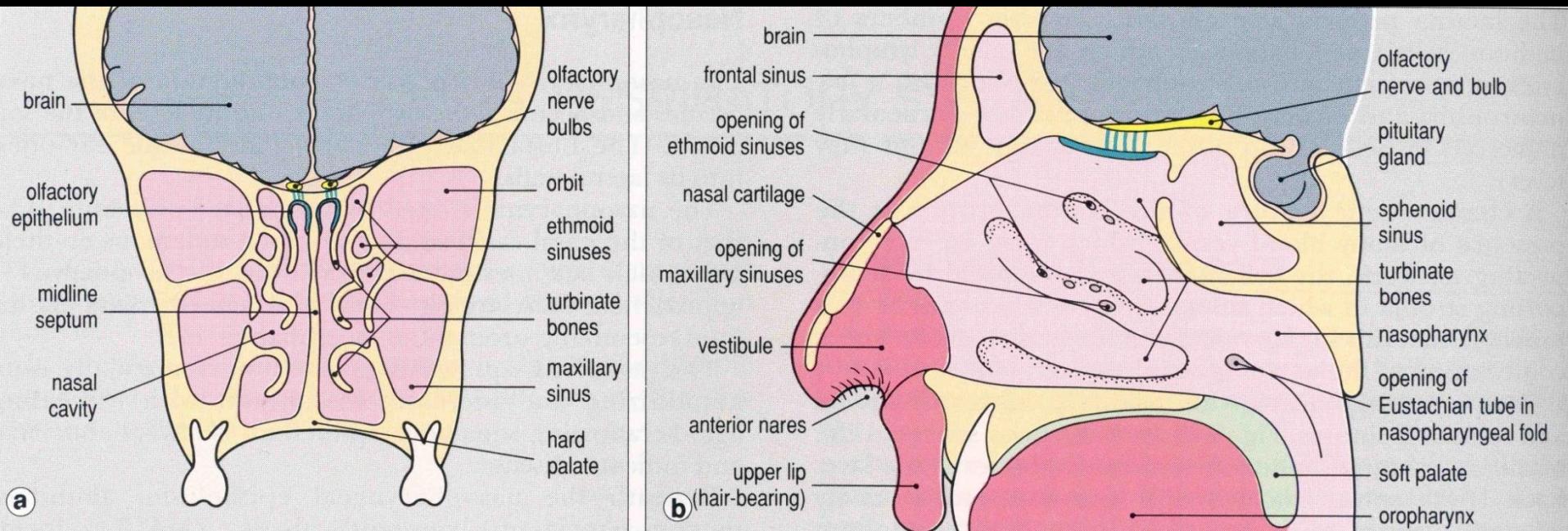
Serous cell



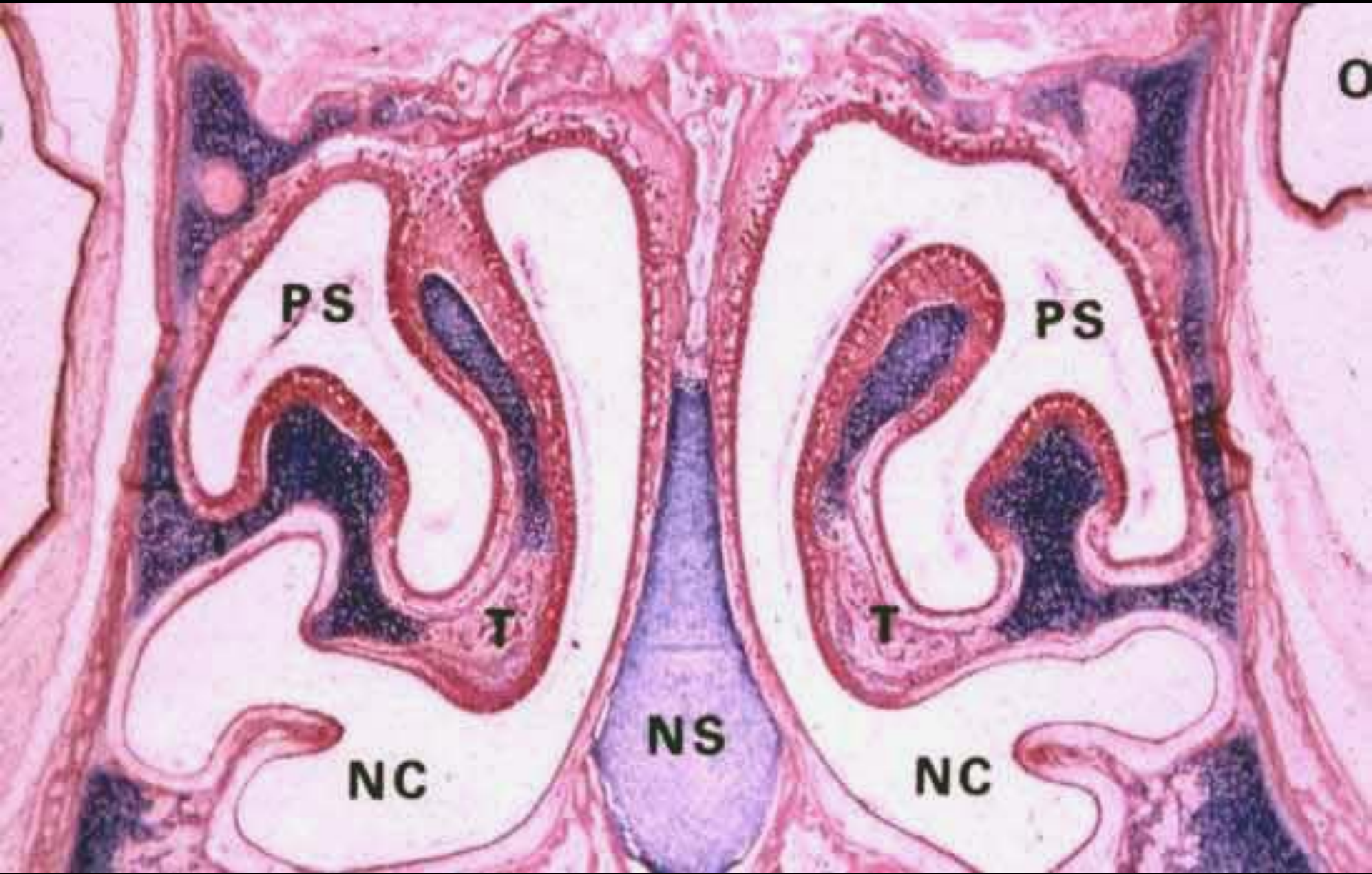
Seromucous cell

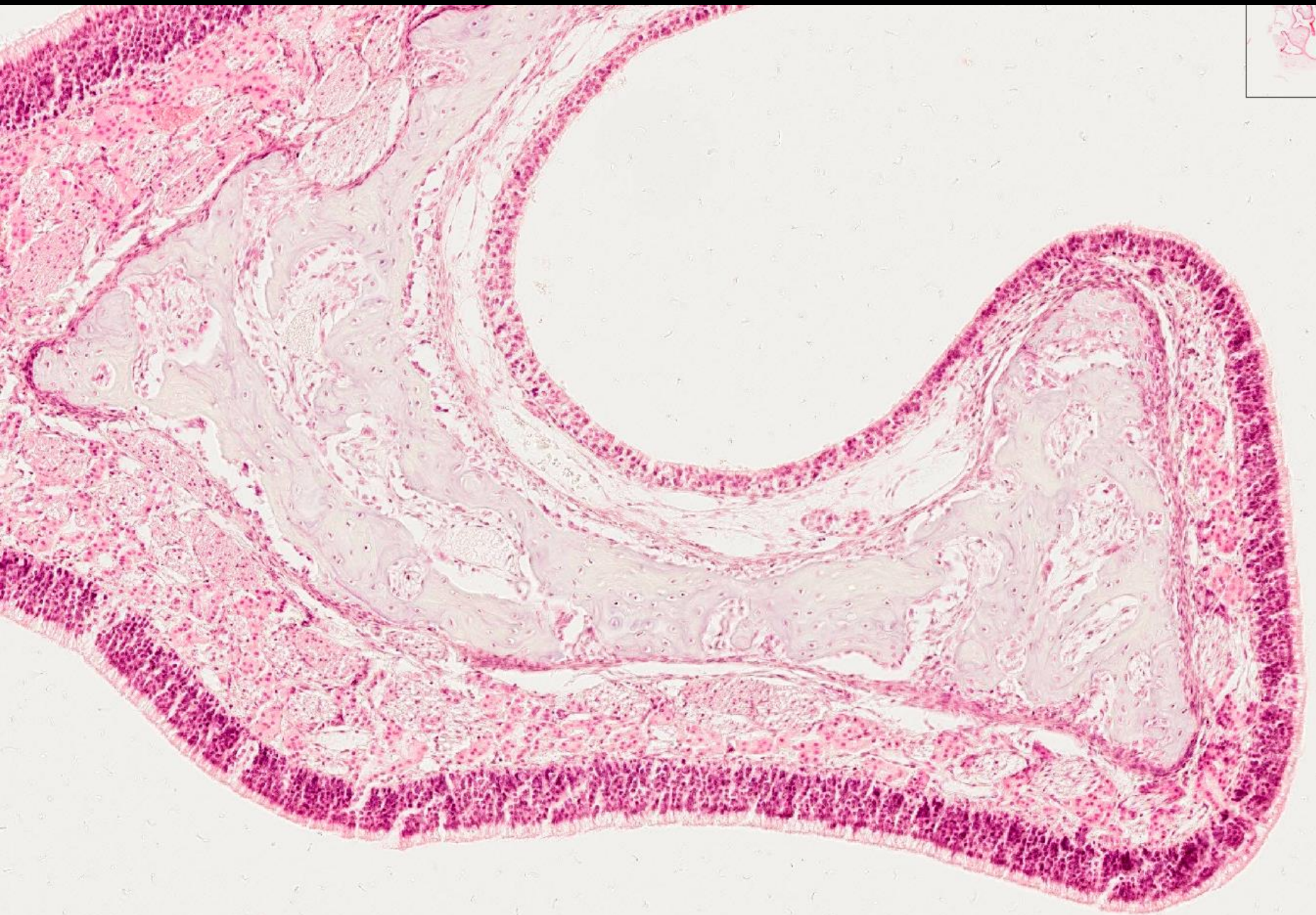


Upper airways



Nasal cavity

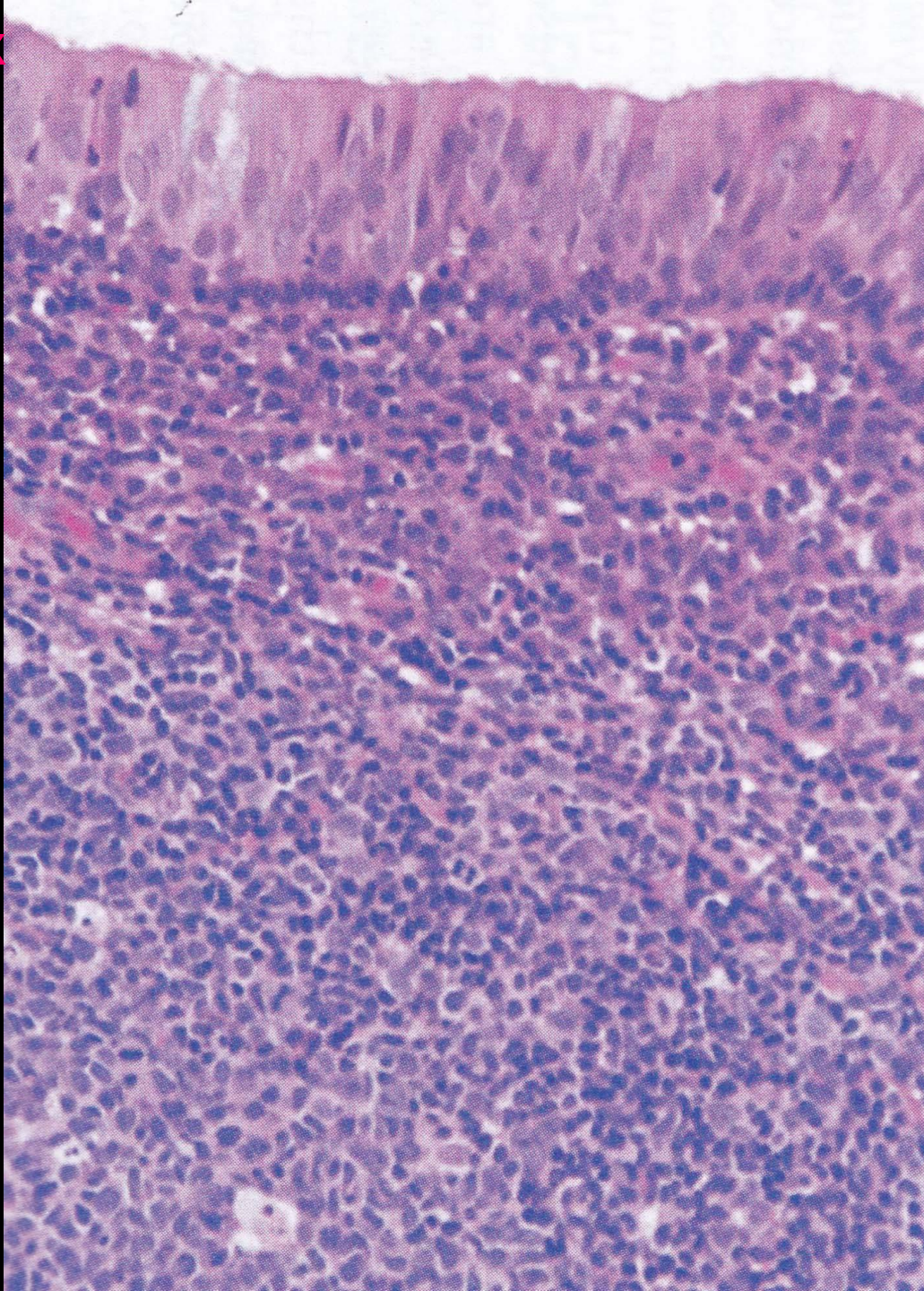


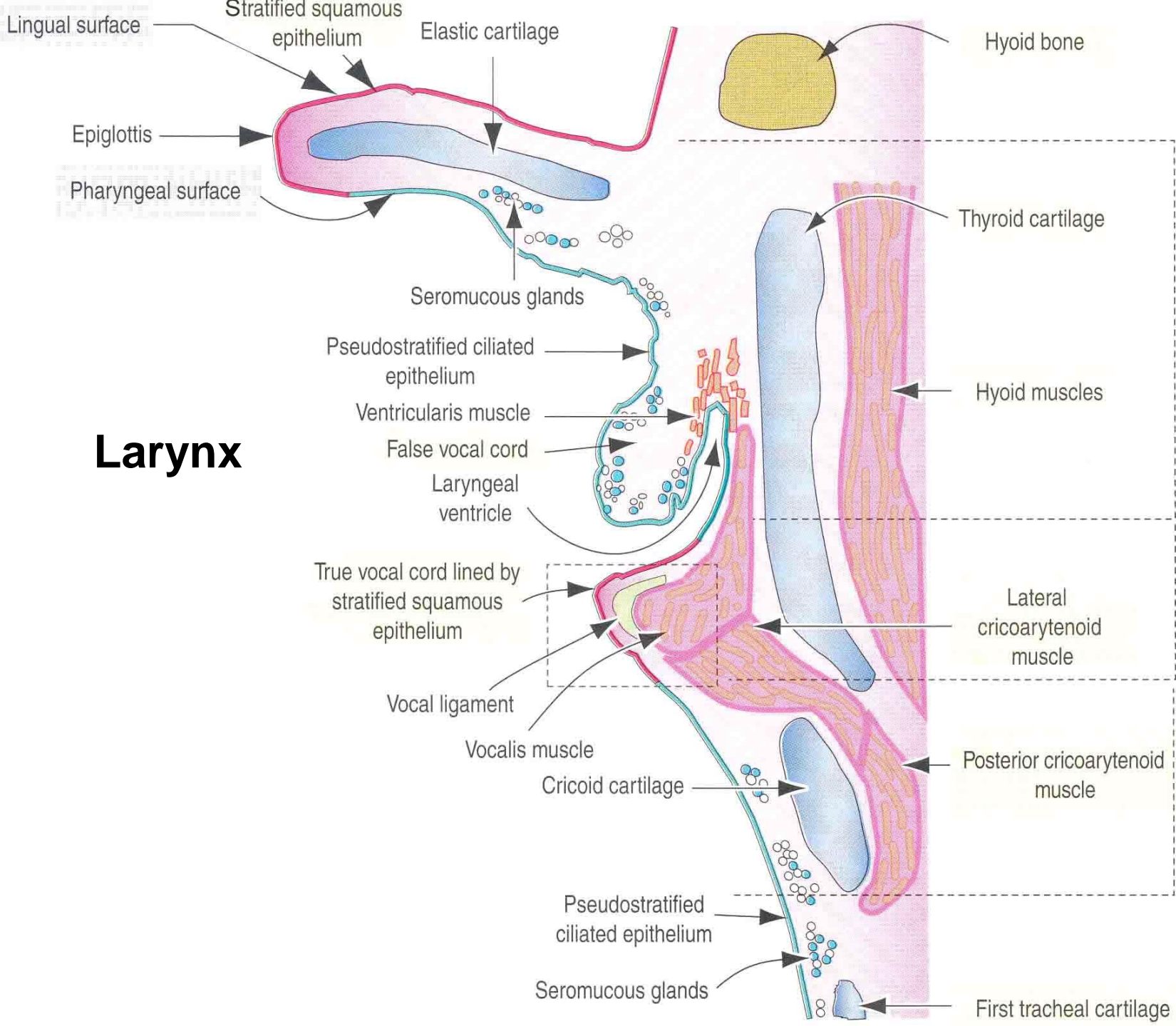


Nasal cavity



Nasopharynx





Larynx

Supraglottis

Glottis

Subglottis

Lingual surface

Stratified squamous epithelium

Elastic cartilage

Hyoid bone

Epiglottis

Pharyngeal surface

Seromucous glands

Thyroid cartilage

Pseudostratified ciliated epithelium

Hyoid muscles

Ventricularis muscle

False vocal cord

Laryngeal ventricle

True vocal cord lined by stratified squamous epithelium

Lateral cricoarytenoid muscle

Vocal ligament

Vocalis muscle

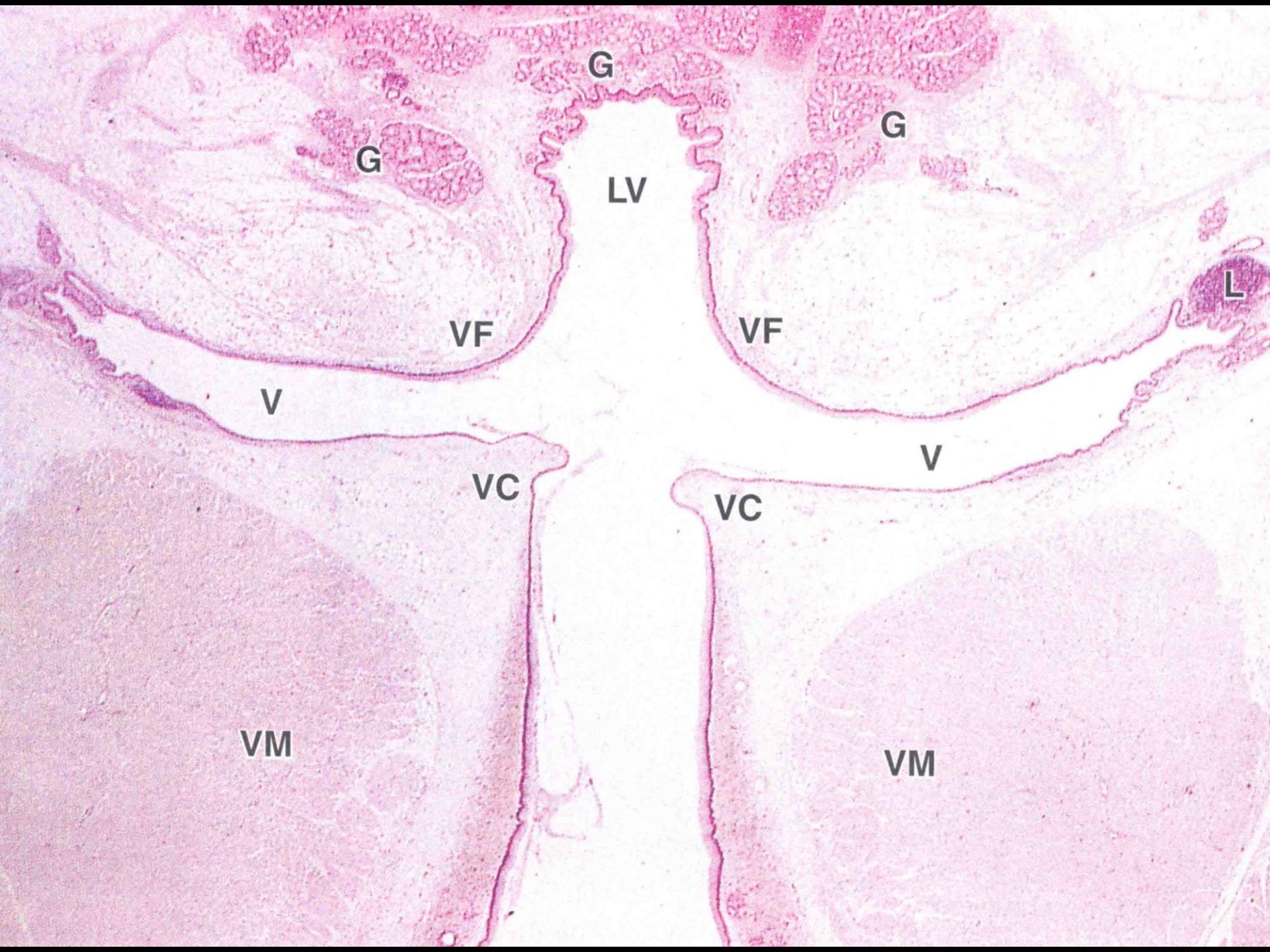
Posterior cricoarytenoid muscle

Cricoid cartilage

Pseudostratified ciliated epithelium

Seromucous glands

First tracheal cartilage



G

G

G

LV

L

VF

VF

V

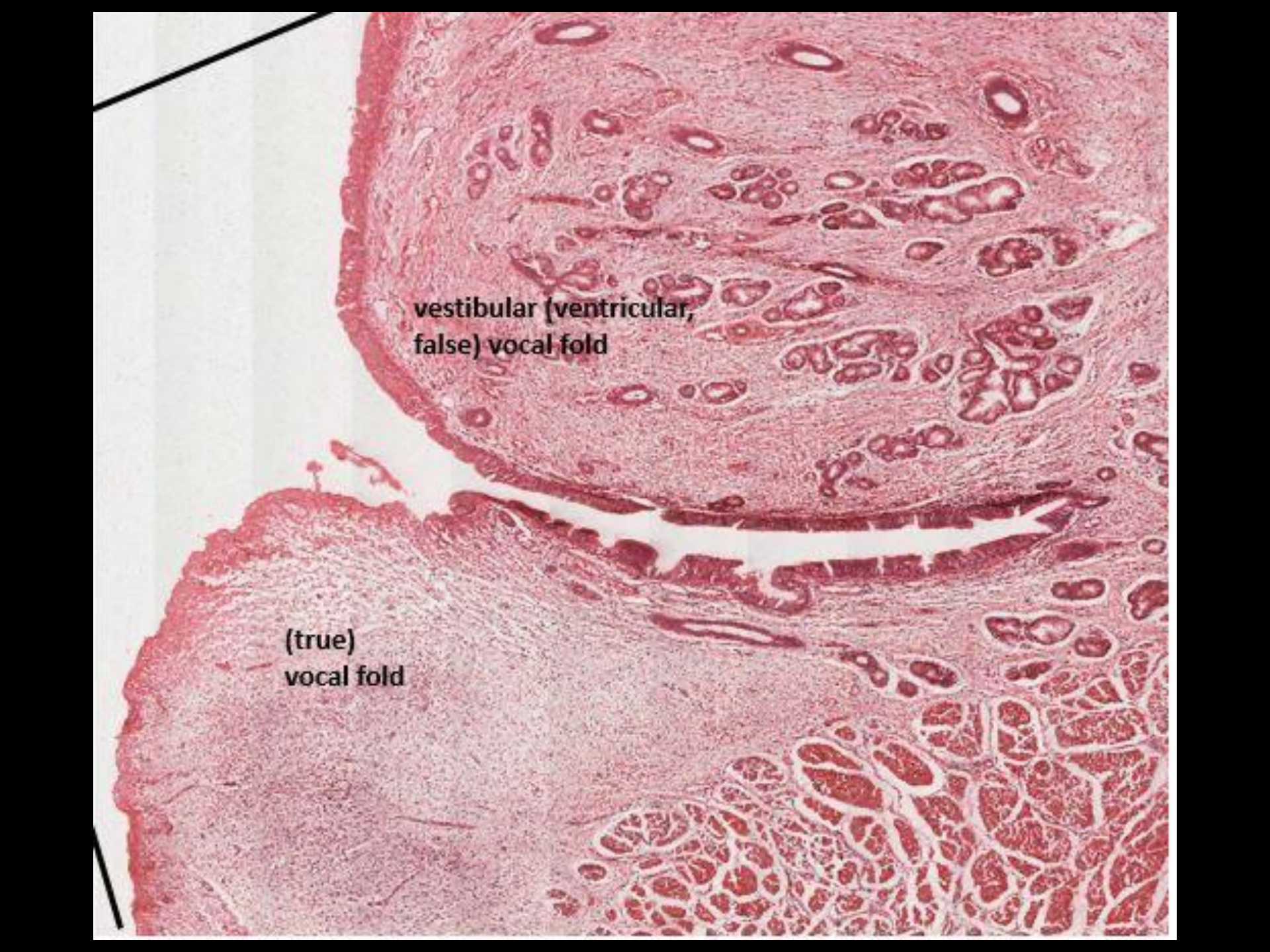
V

VC

VC

VM

VM

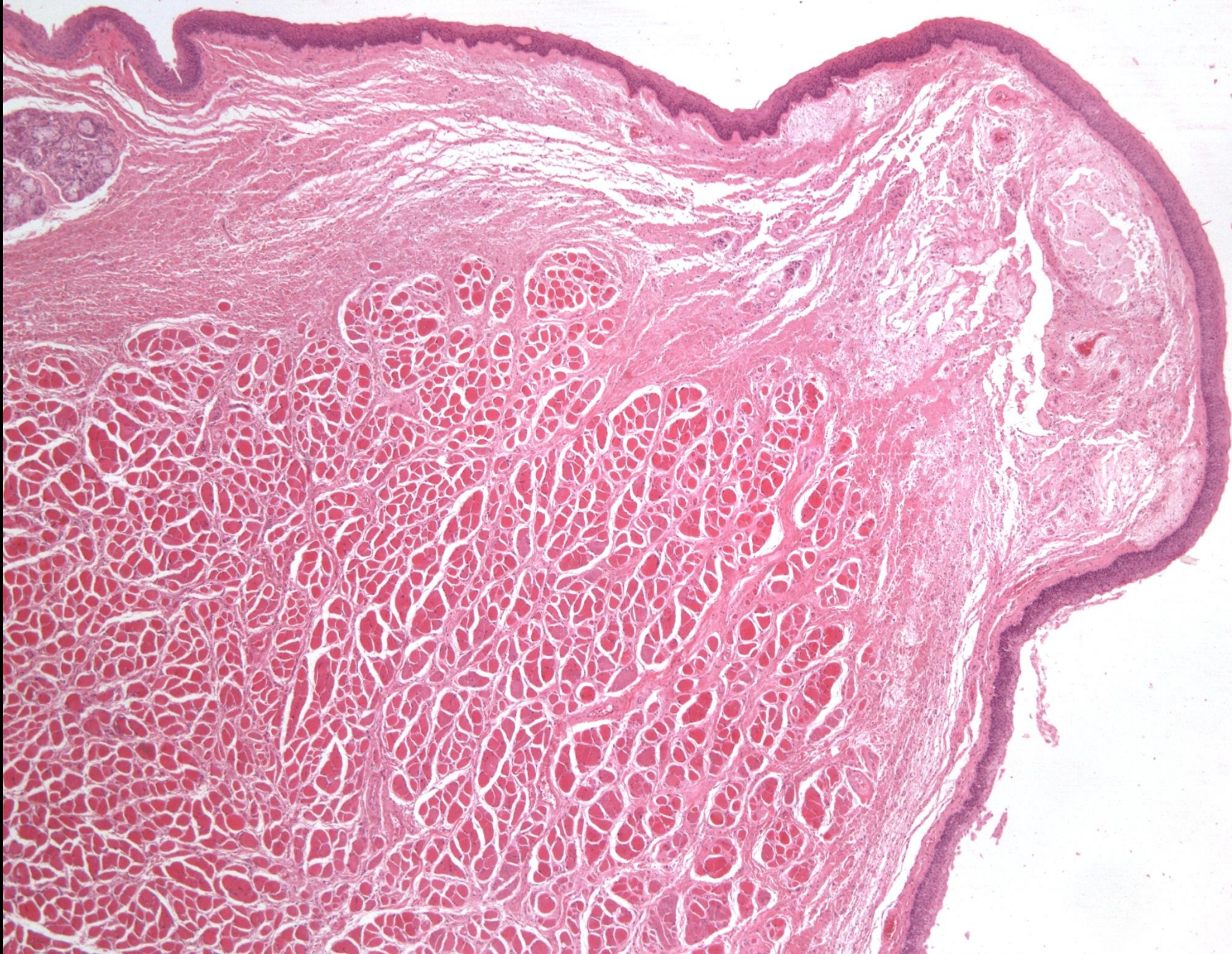


vestibular (ventricular,
false) vocal fold

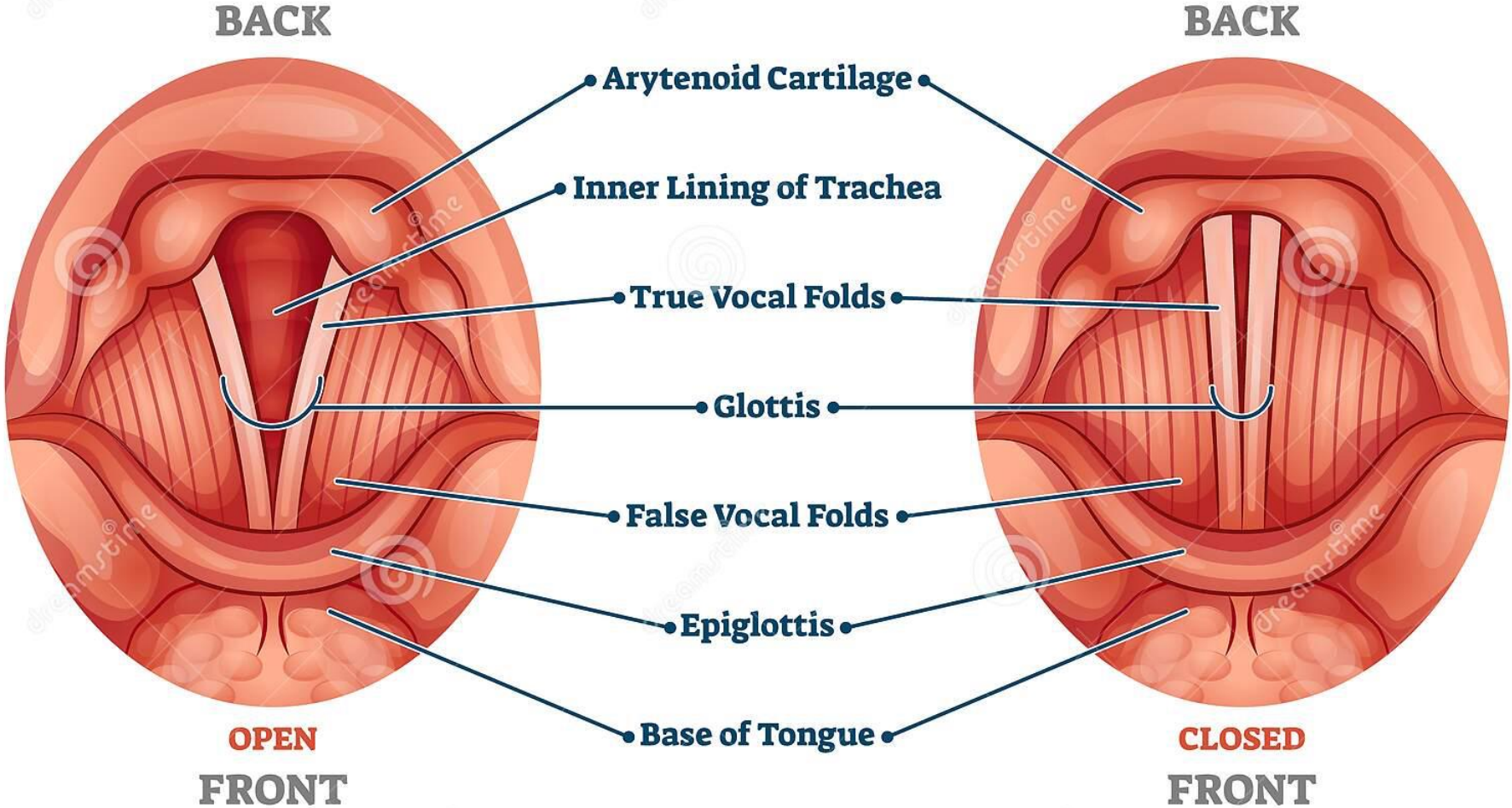
This histological section shows the larynx. The upper portion is the vestibular (false) vocal fold, which is thick and contains numerous small, circular glands. Below it is the (true) vocal fold, which is thinner and consists of a dense layer of connective tissue and muscle fibers. The space between them is the laryngeal ventricle. The lower portion of the image shows the laryngeal ventricle and the underlying laryngeal sac.

(true)
vocal fold

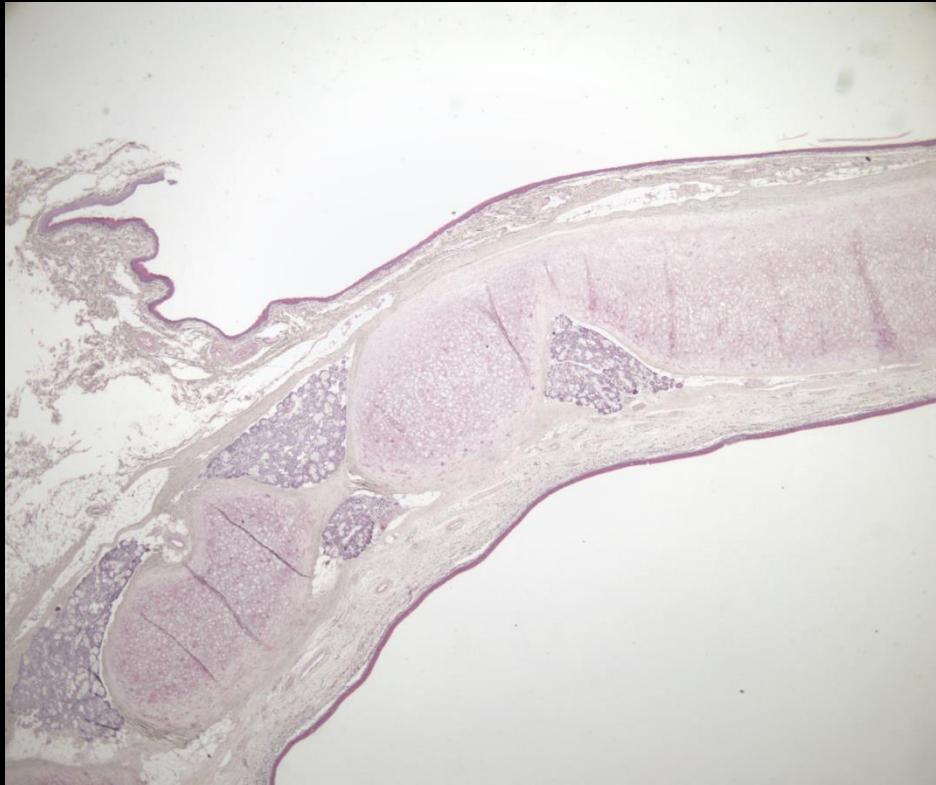
Plica vocalis

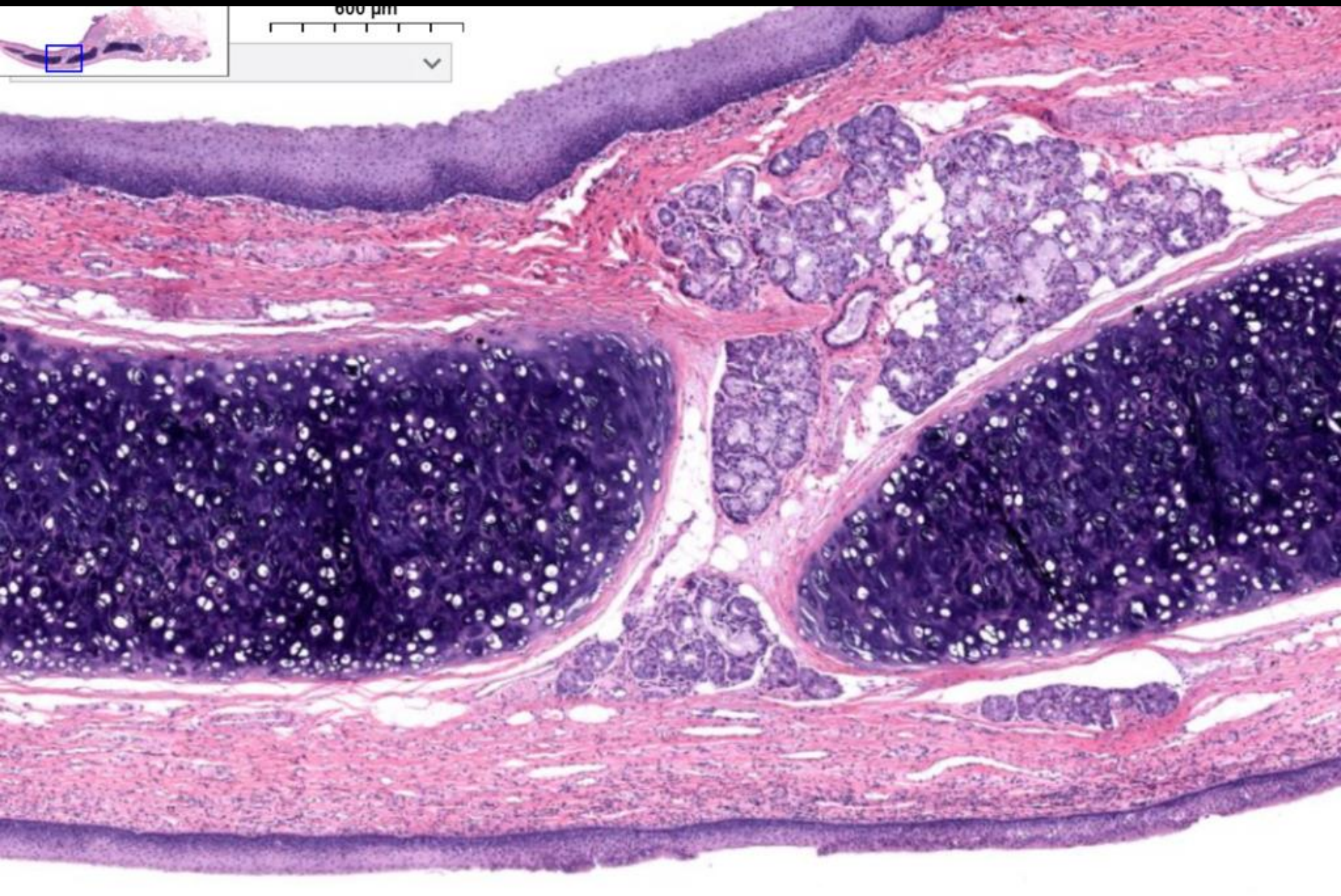


VOCAL CORDS

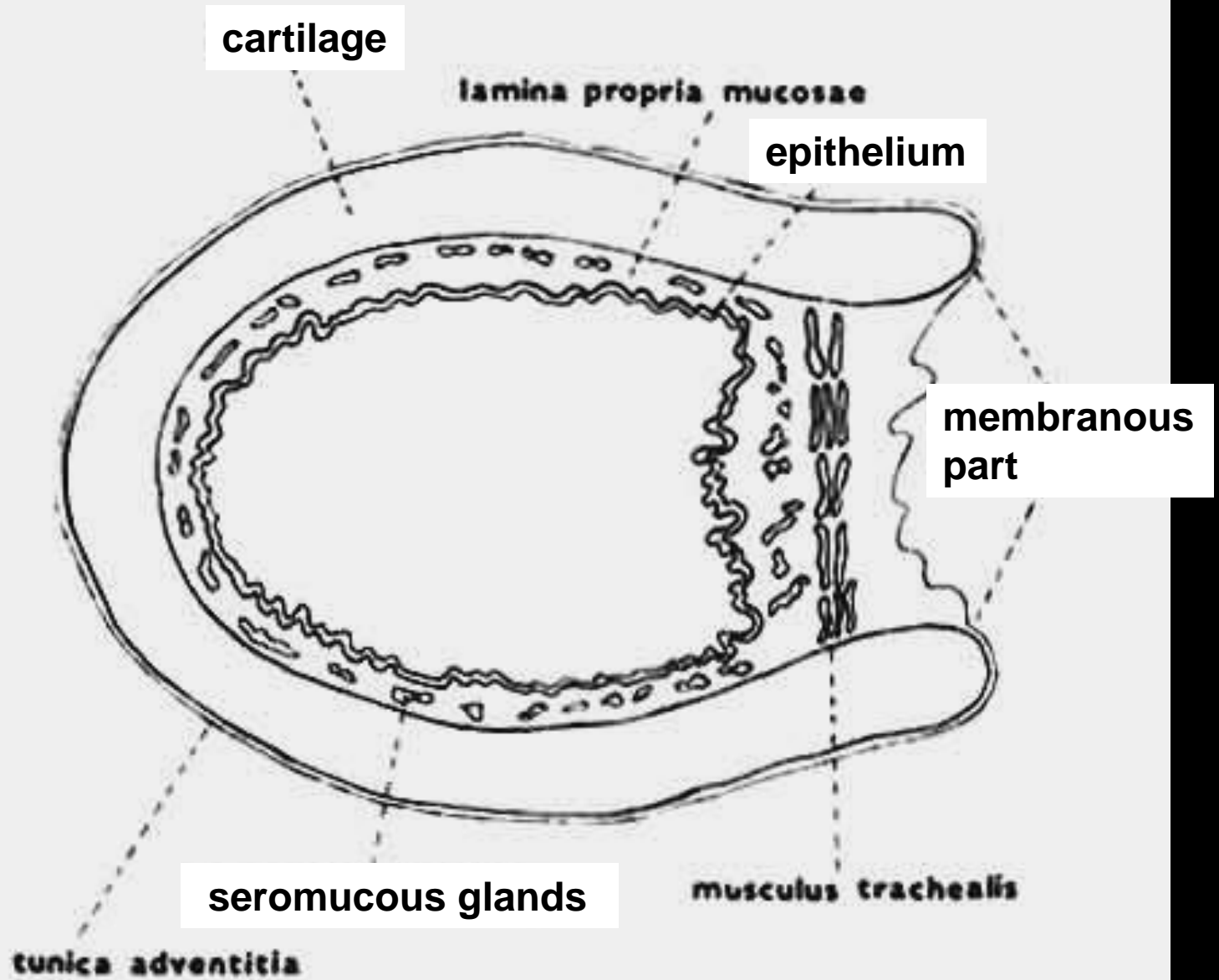


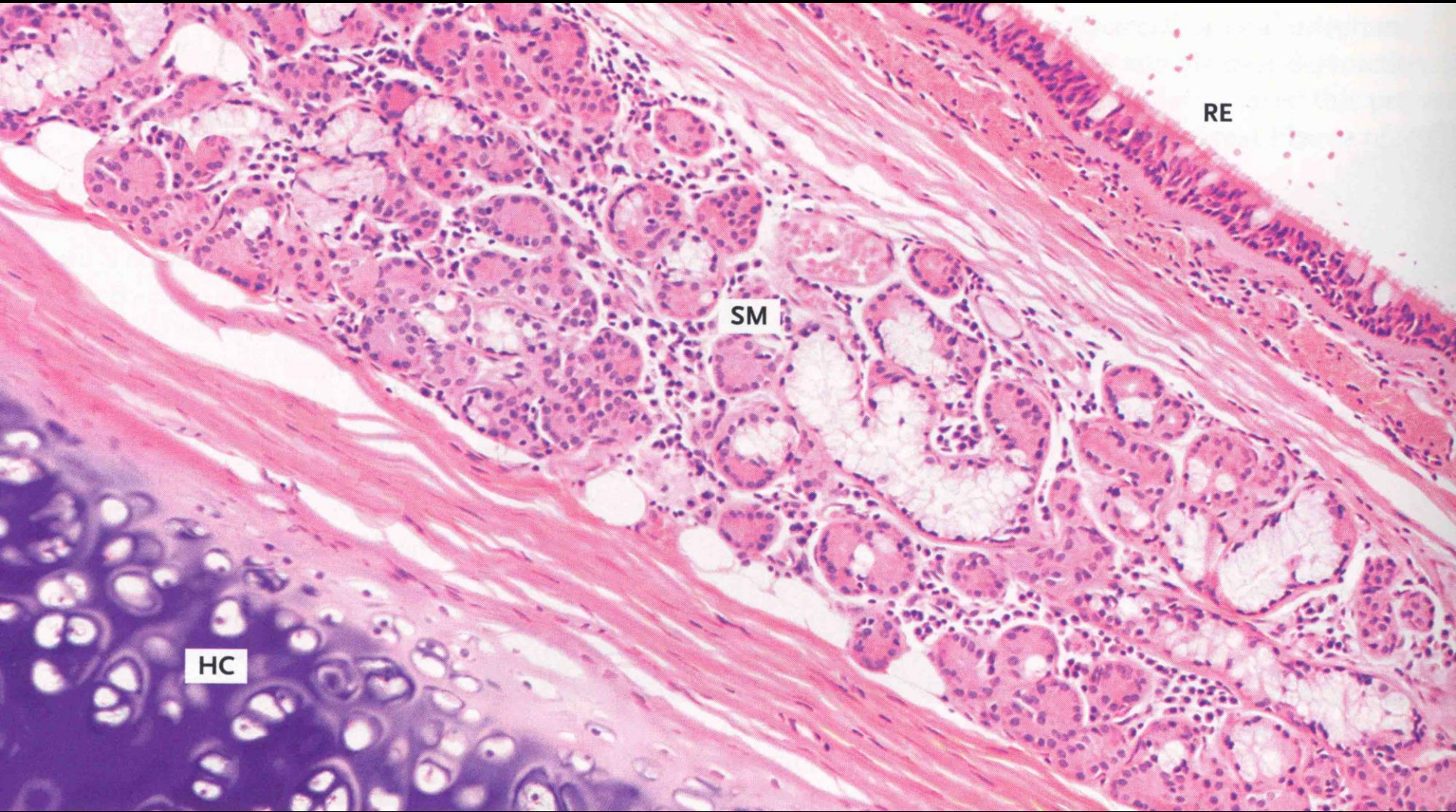
Epiglottis



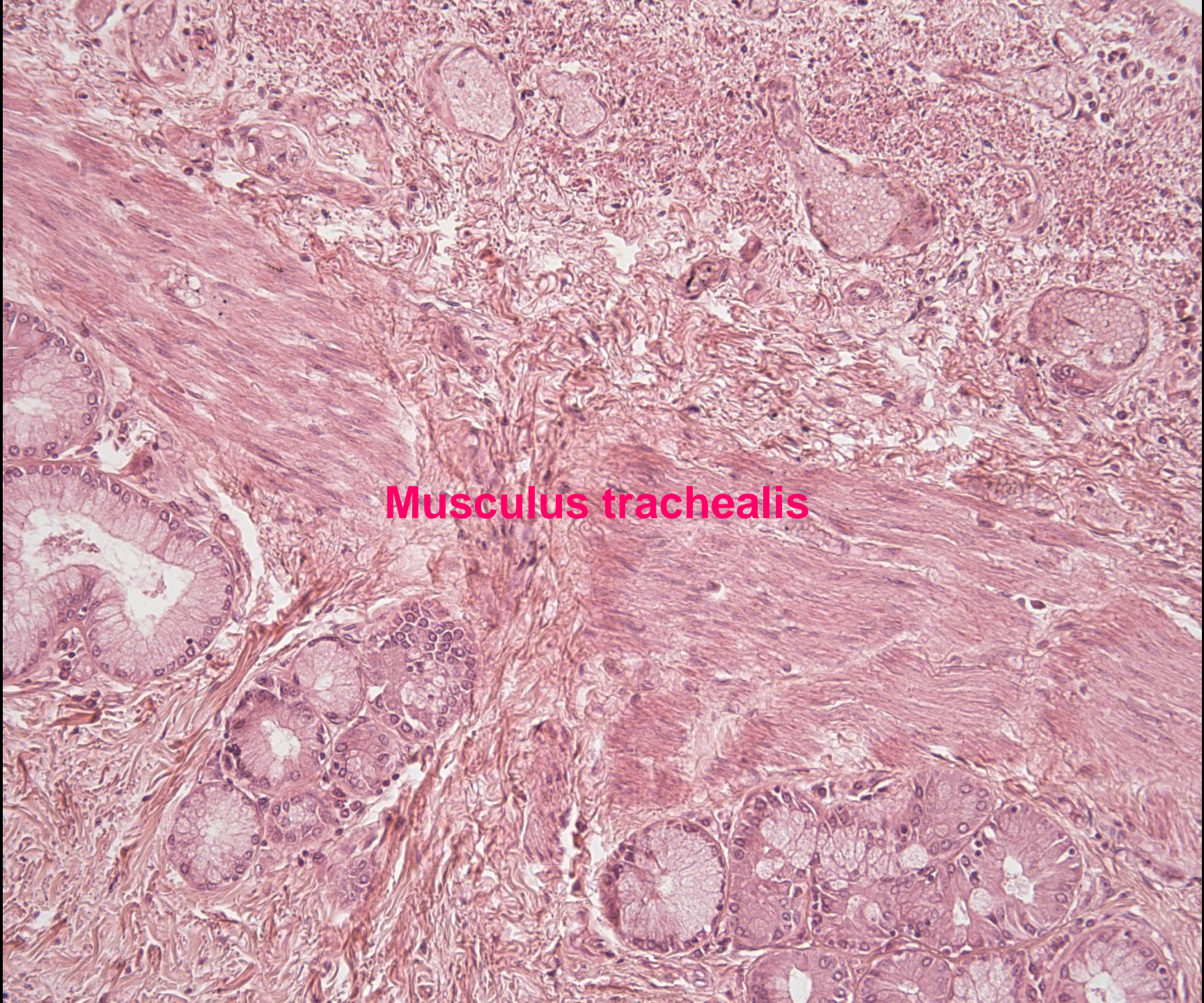


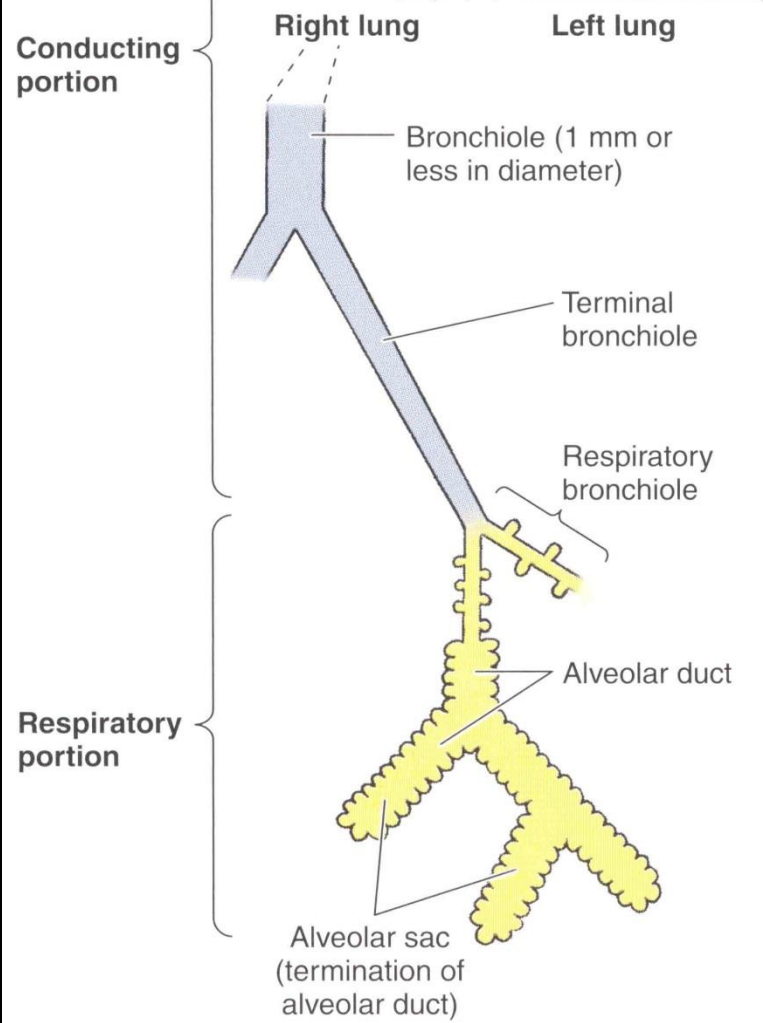
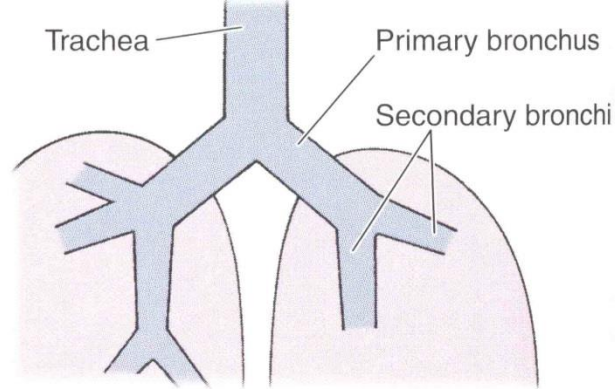
TRACHEA



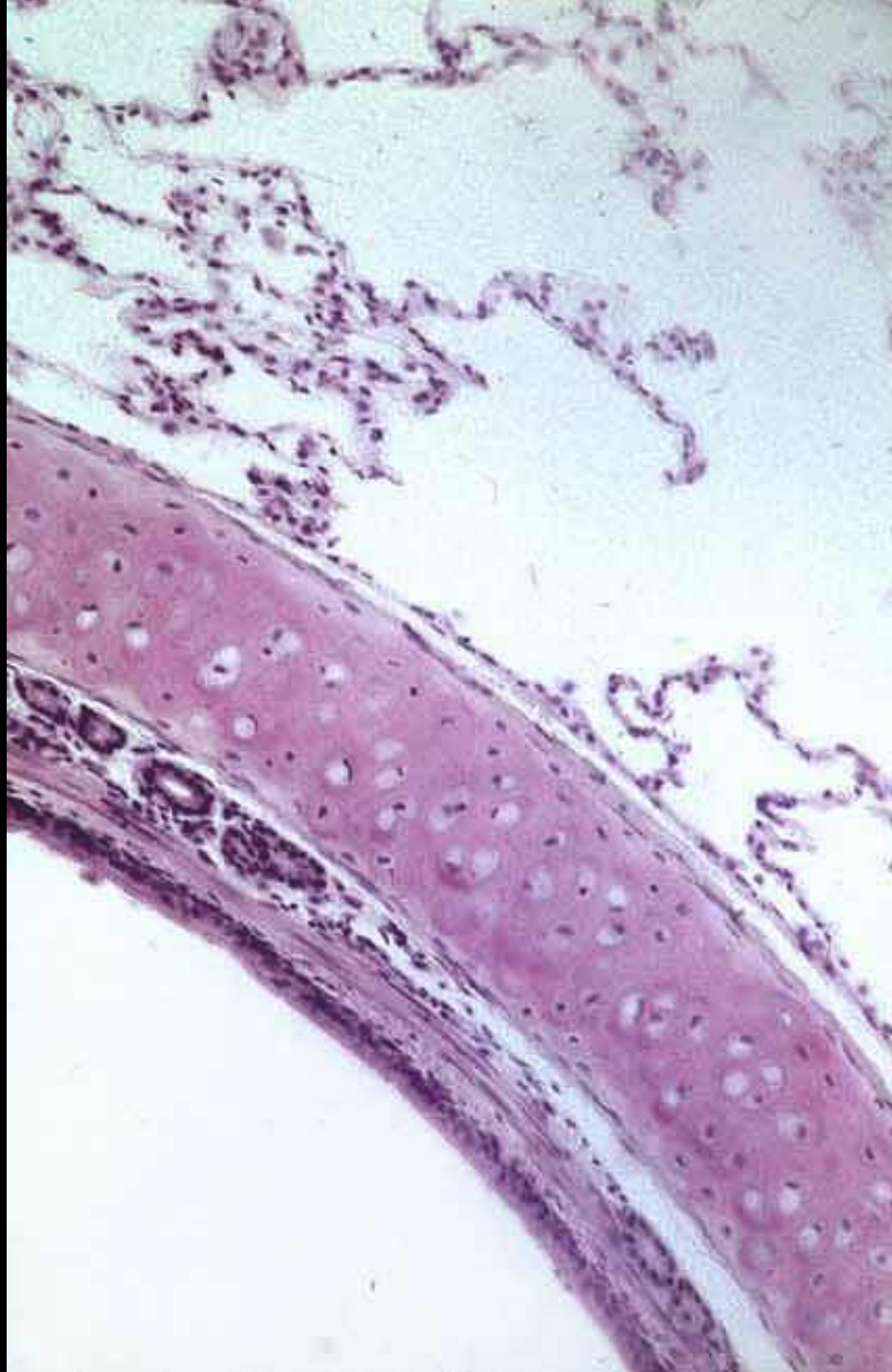


Musculus trachealis

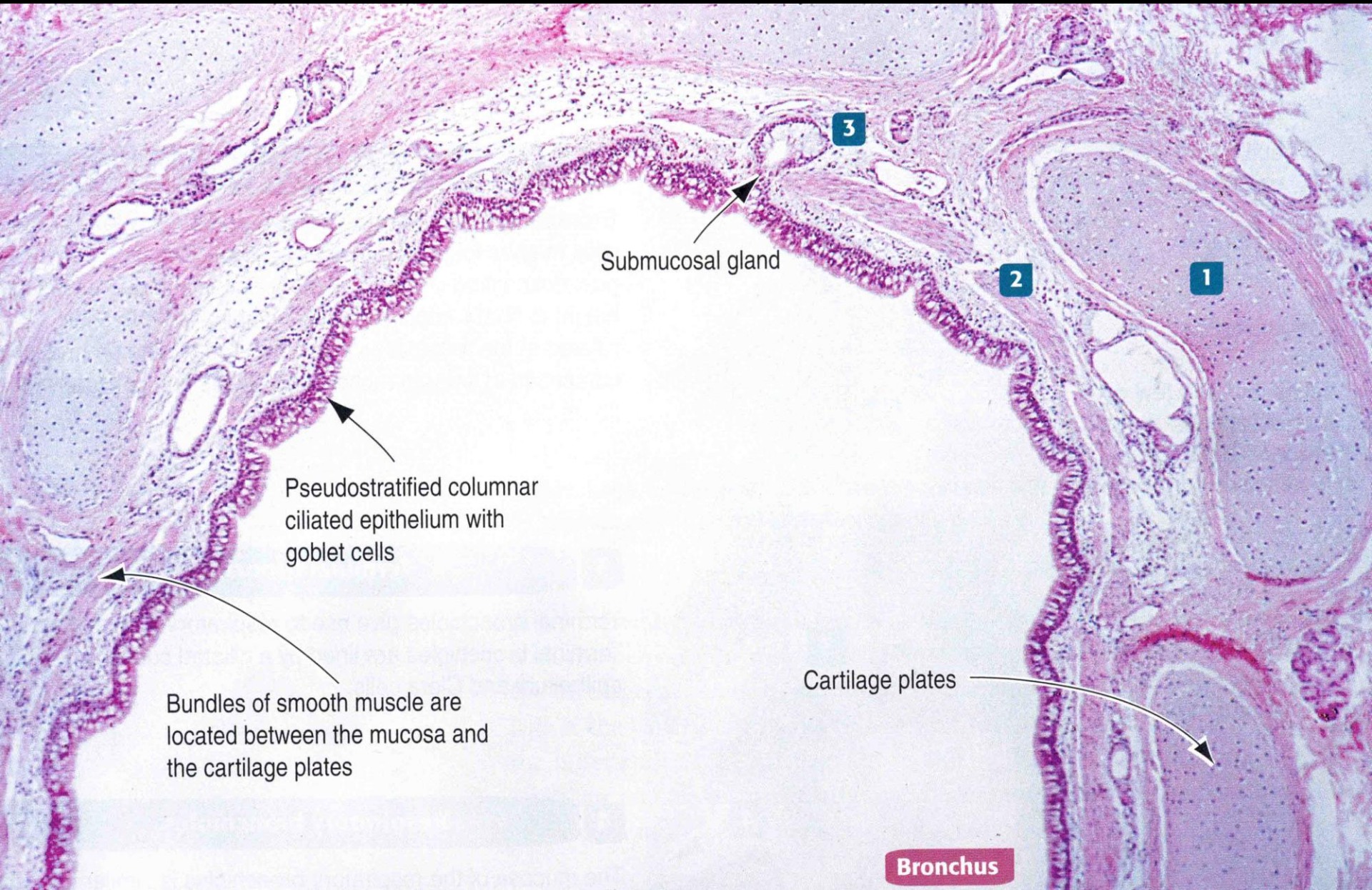


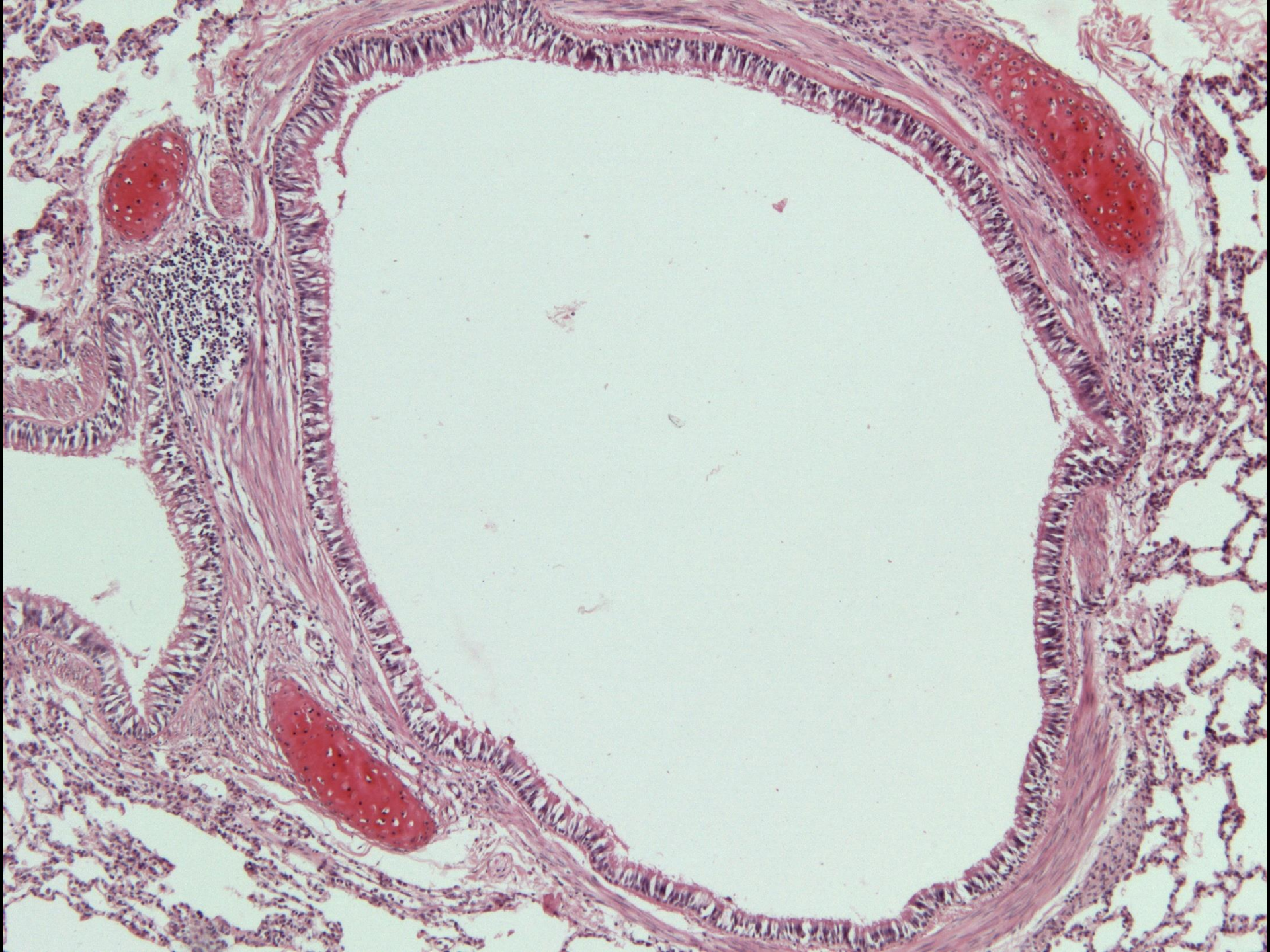


Large bronchus



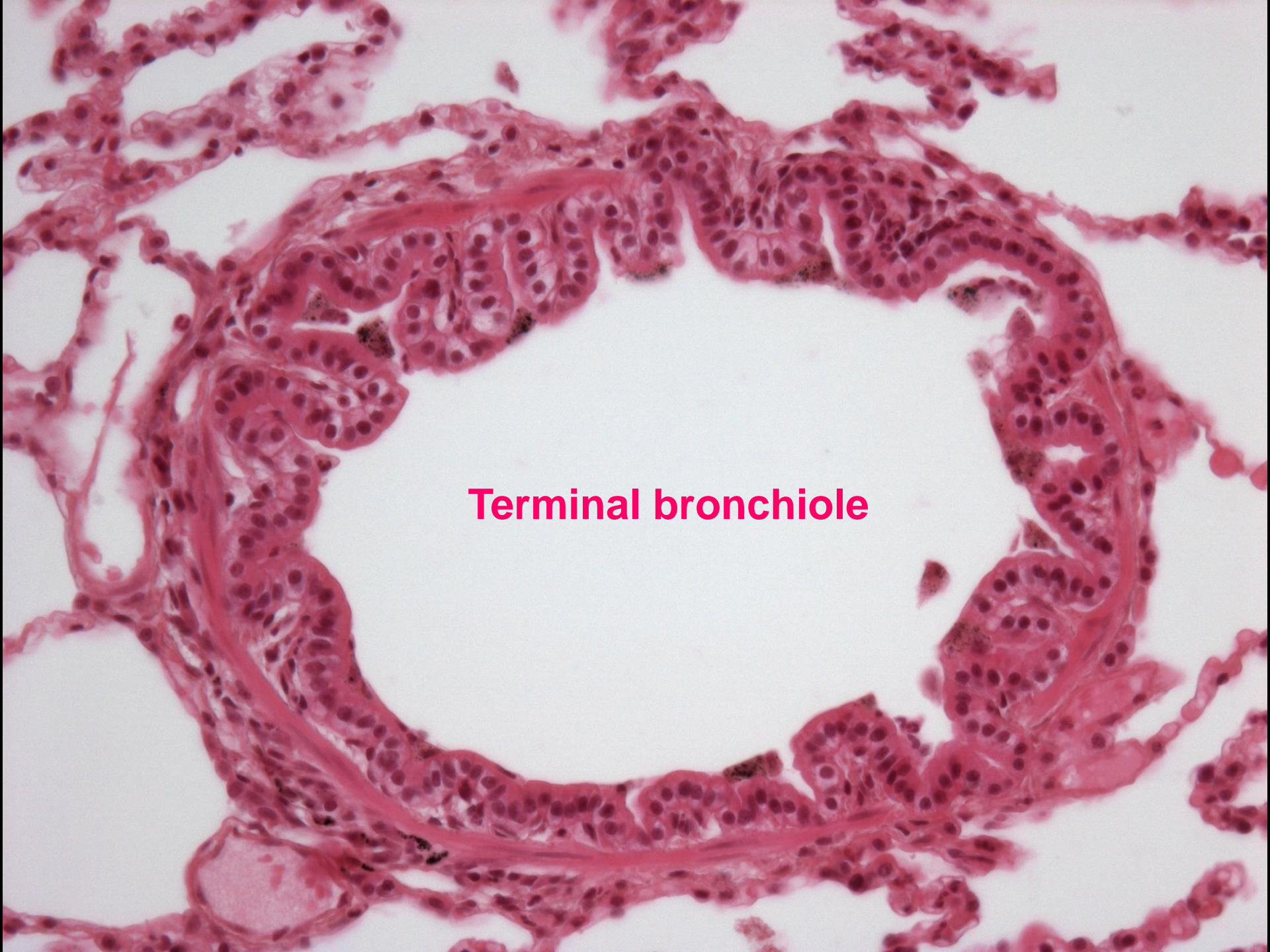
Small bronchus





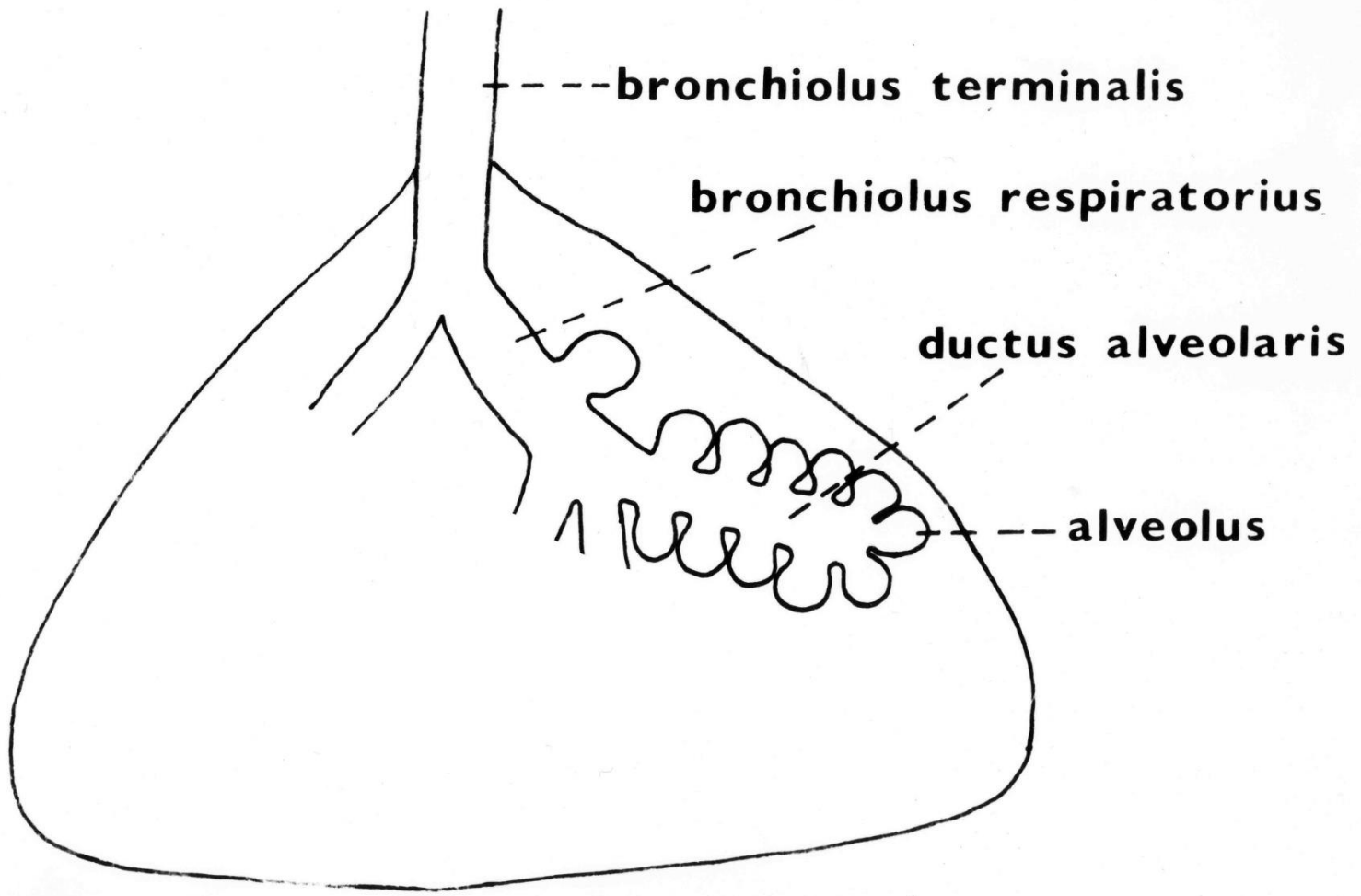


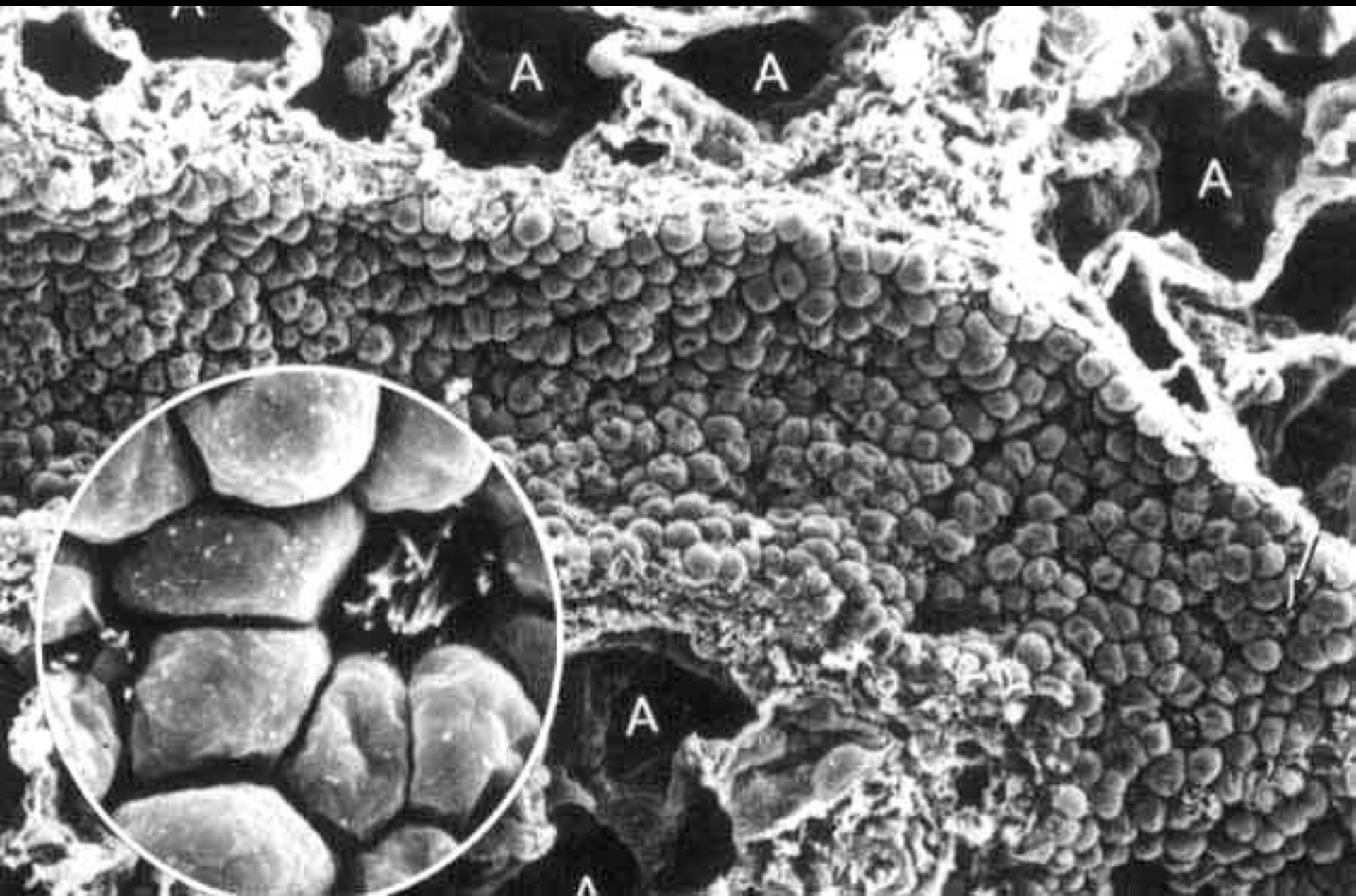
Bronchiole

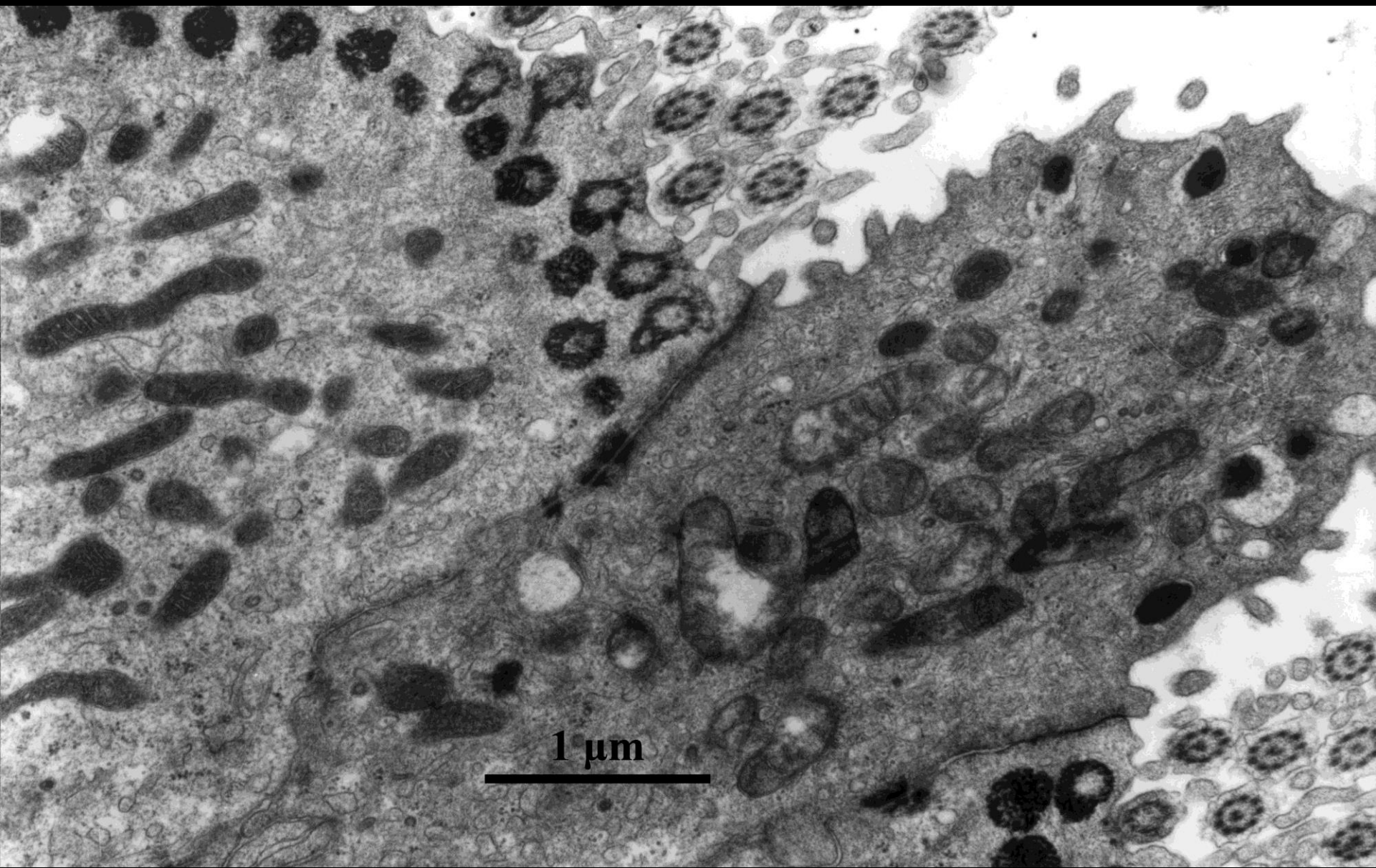


Terminal bronchiole

LOBULUS PULMONALIS

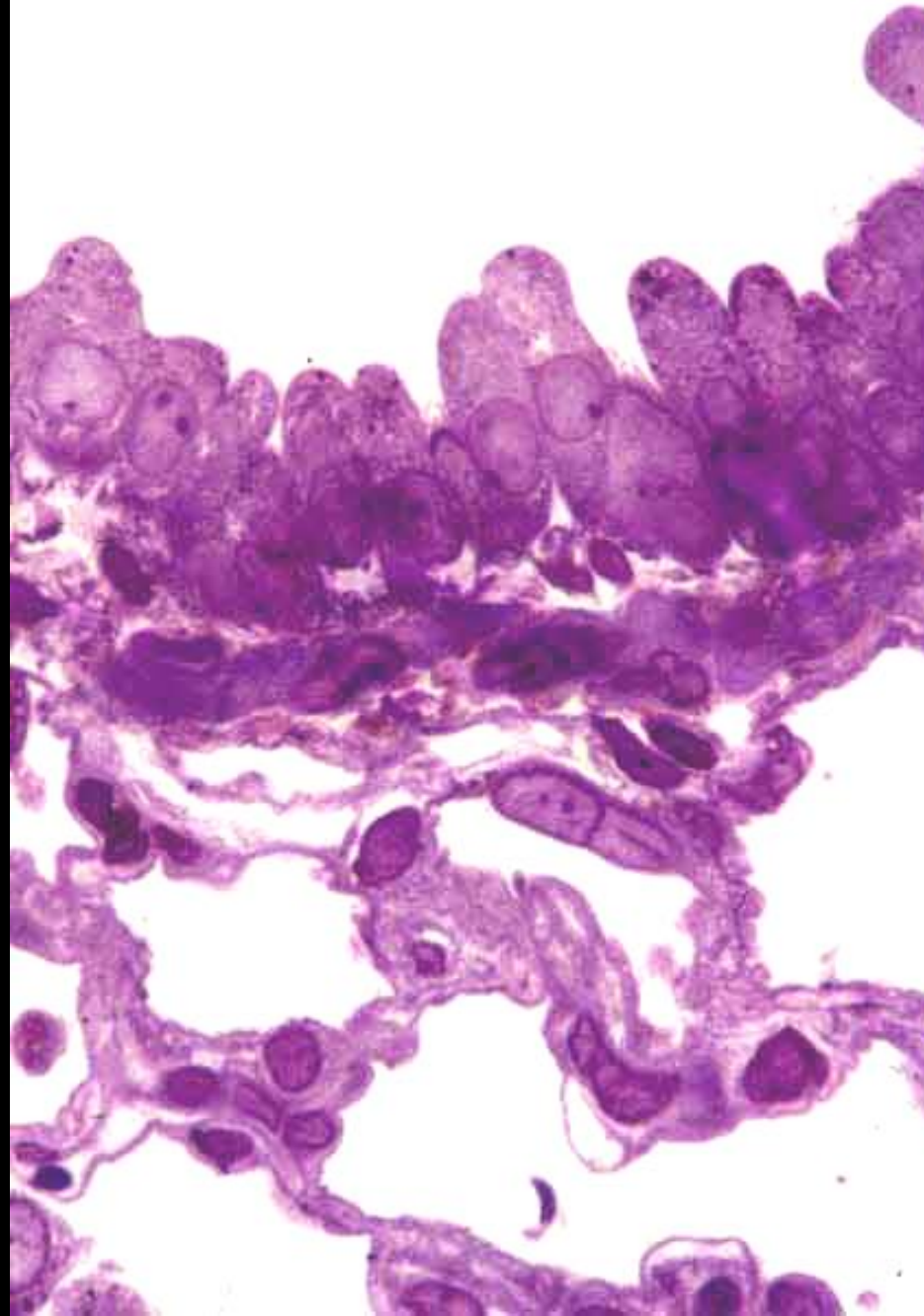


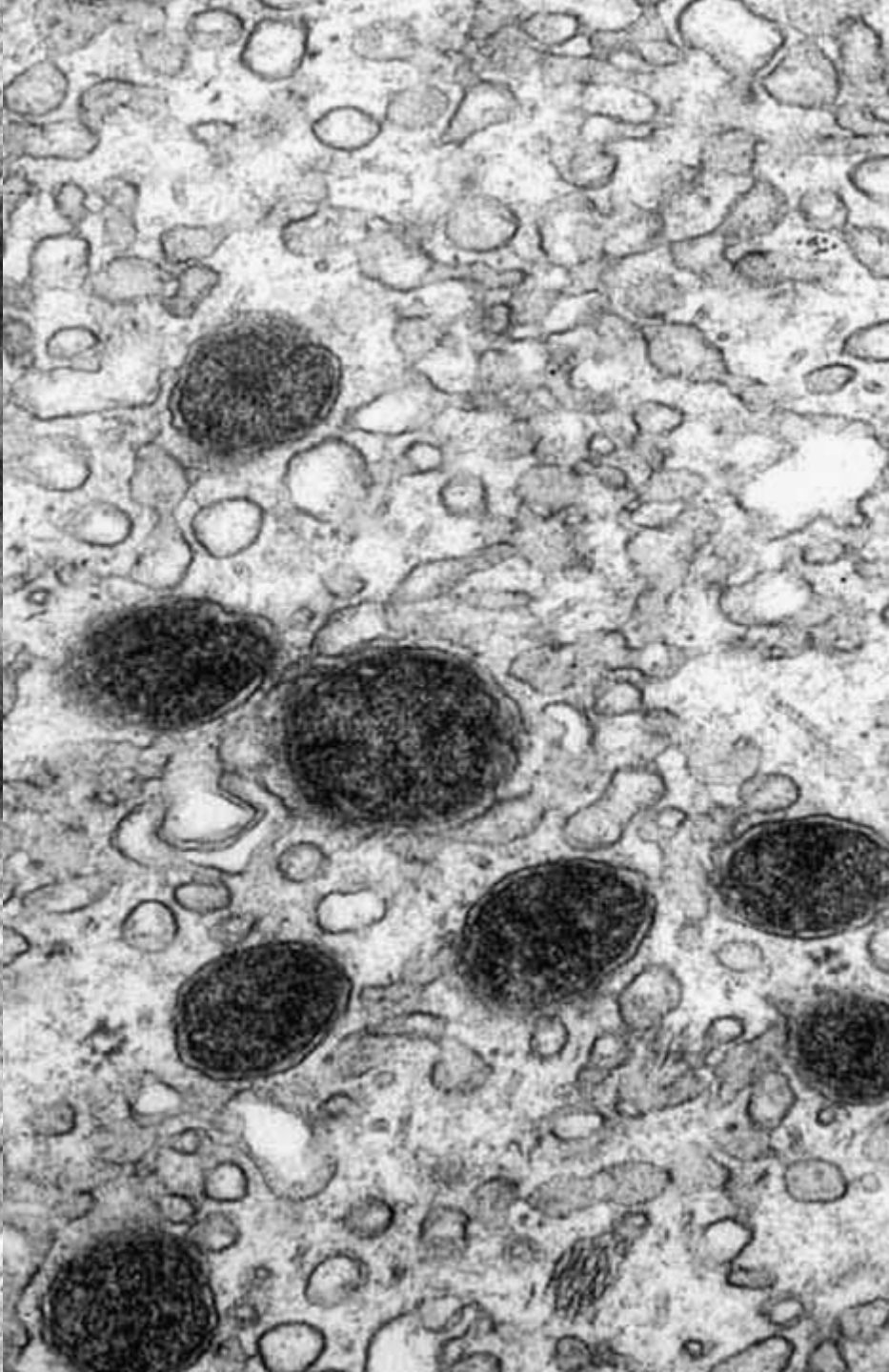
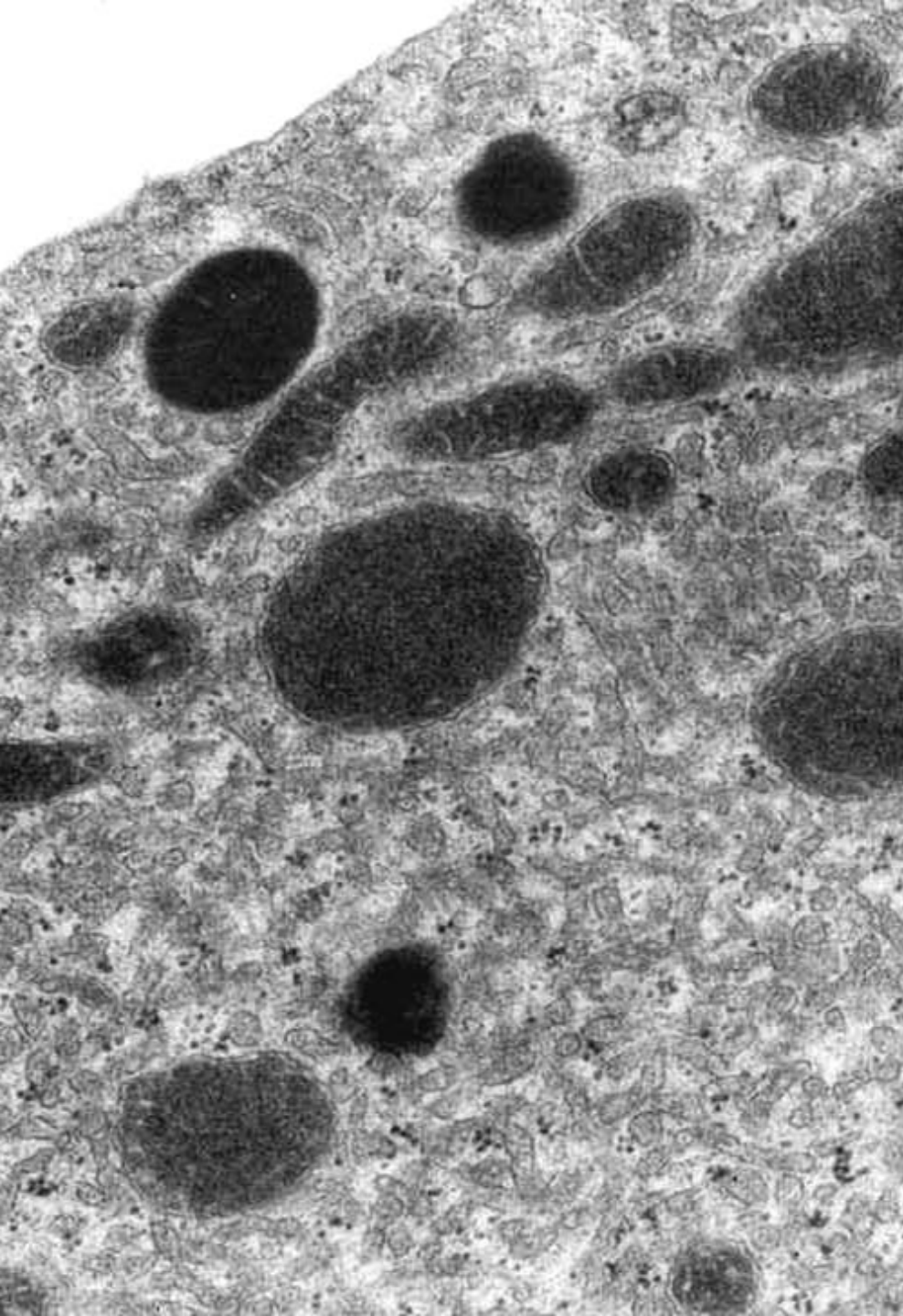




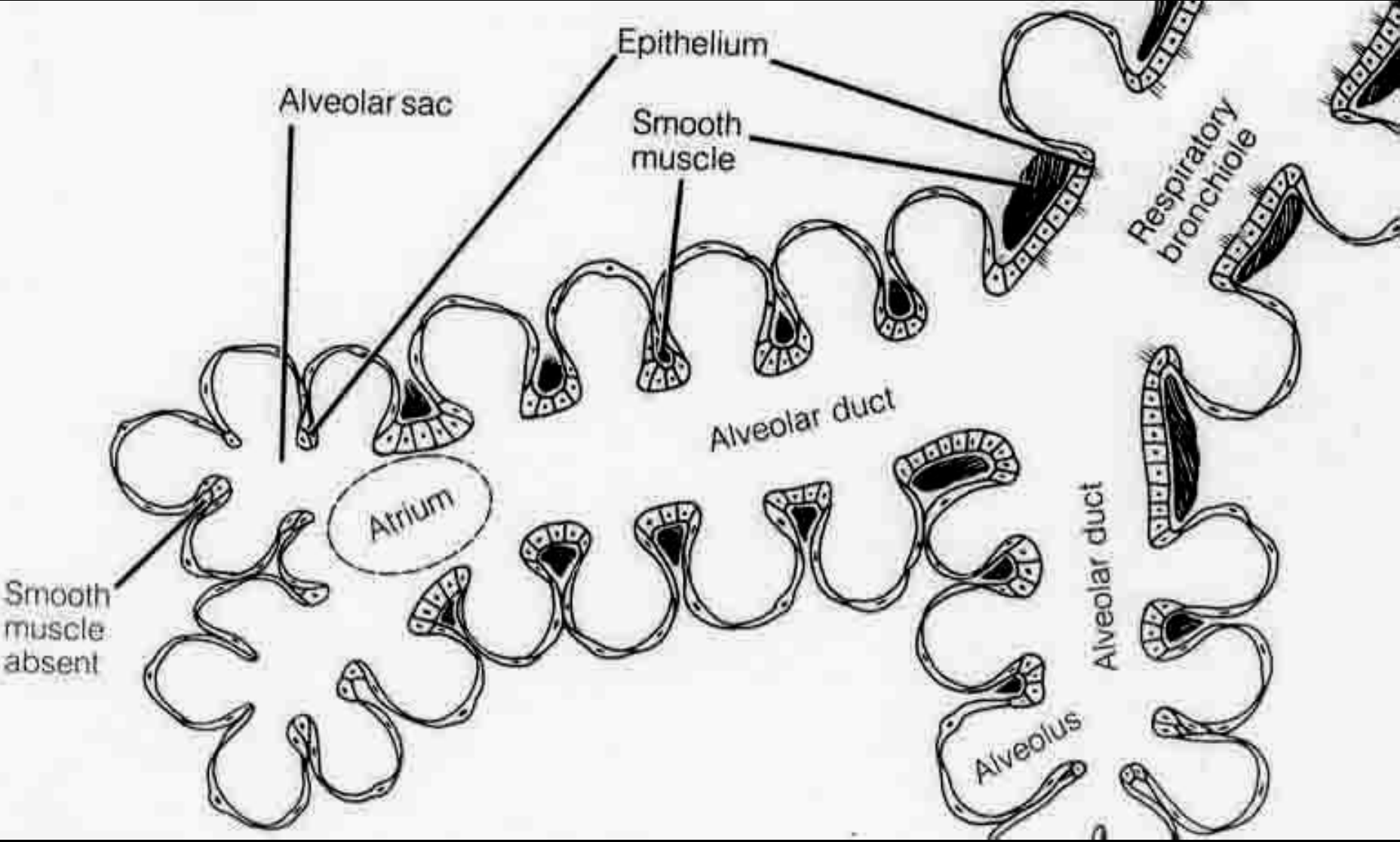
1 μm

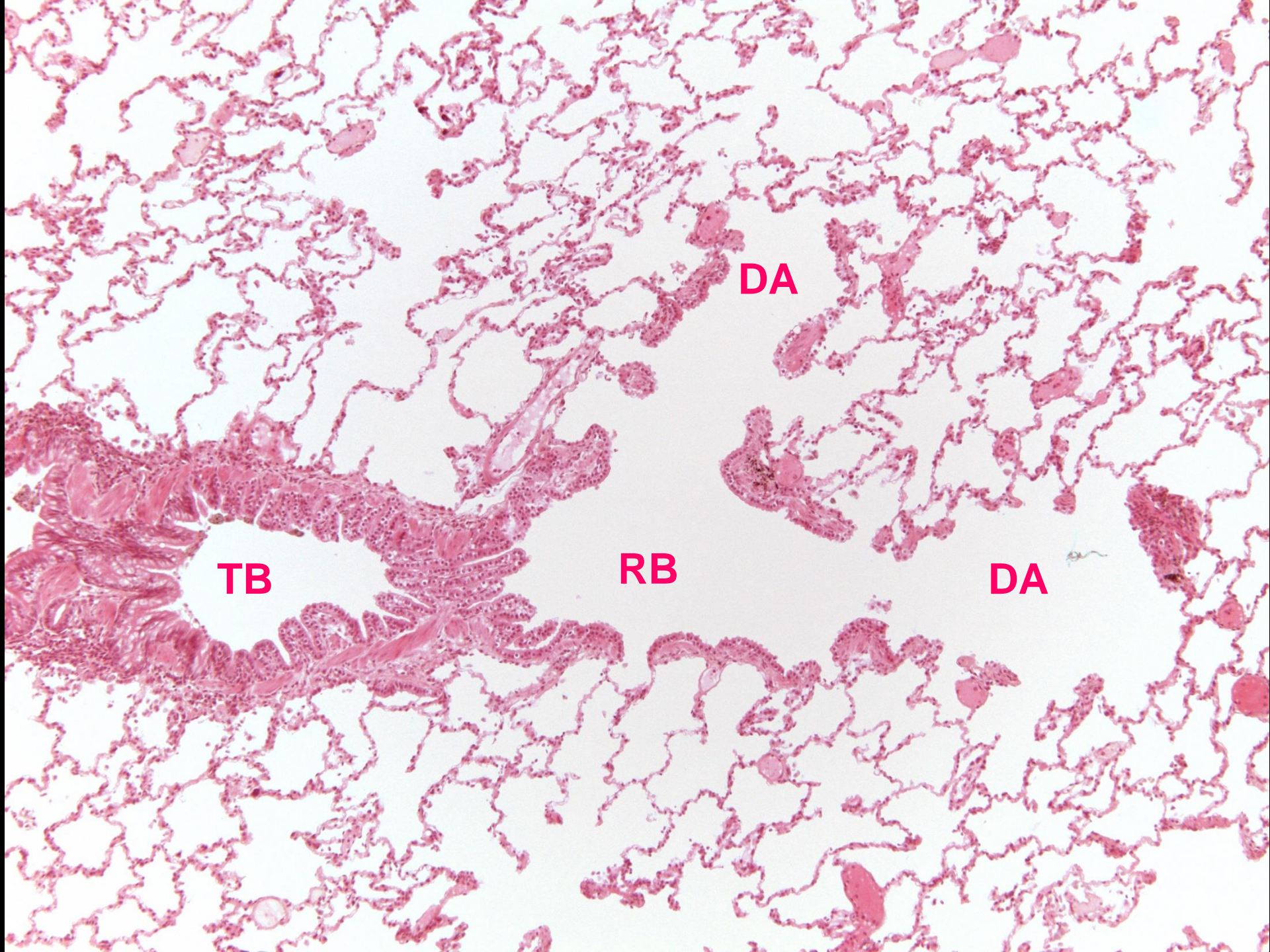
Club (Clara) cells





Respiratory portion





TB

RB

DA

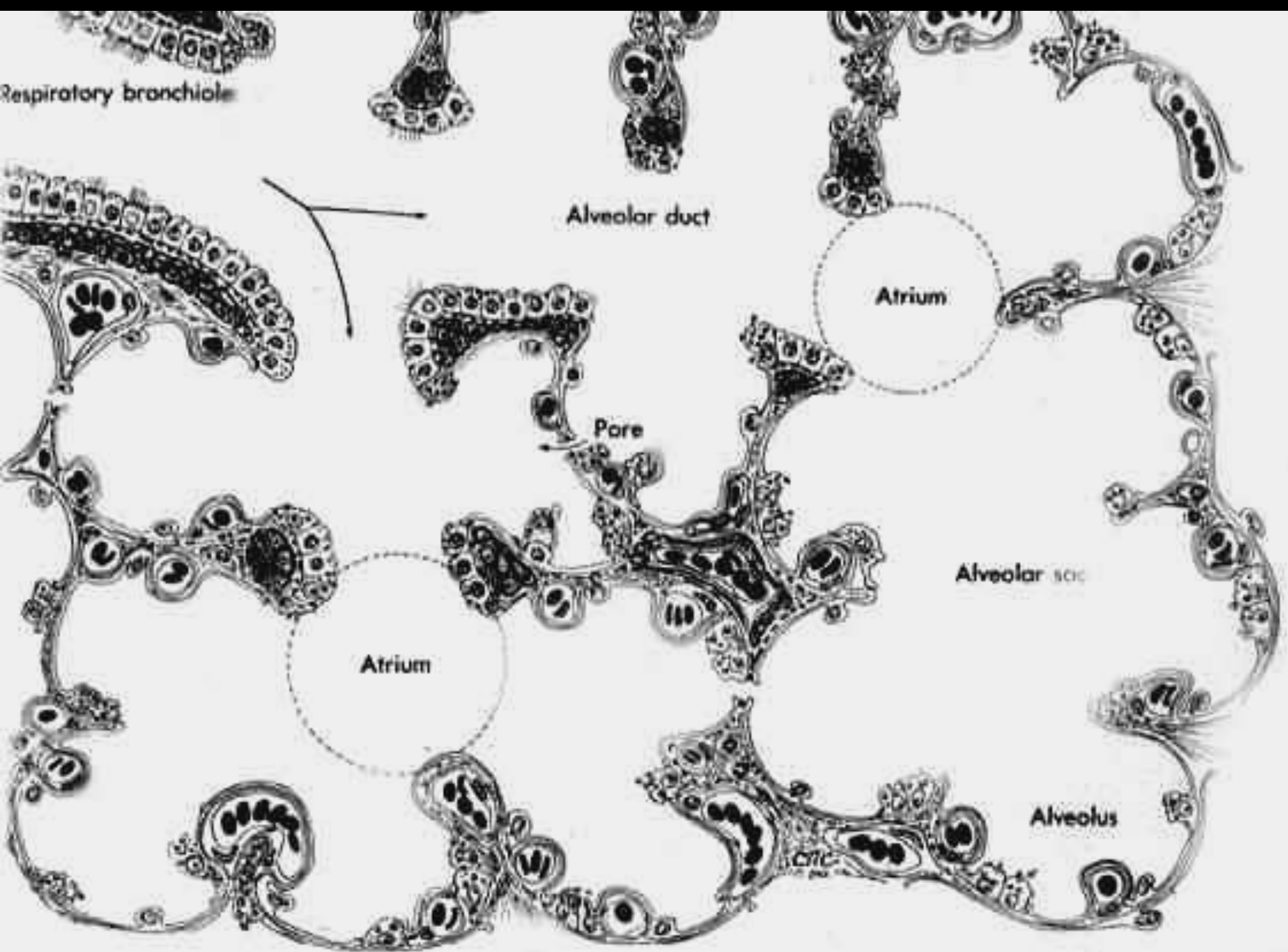
DA

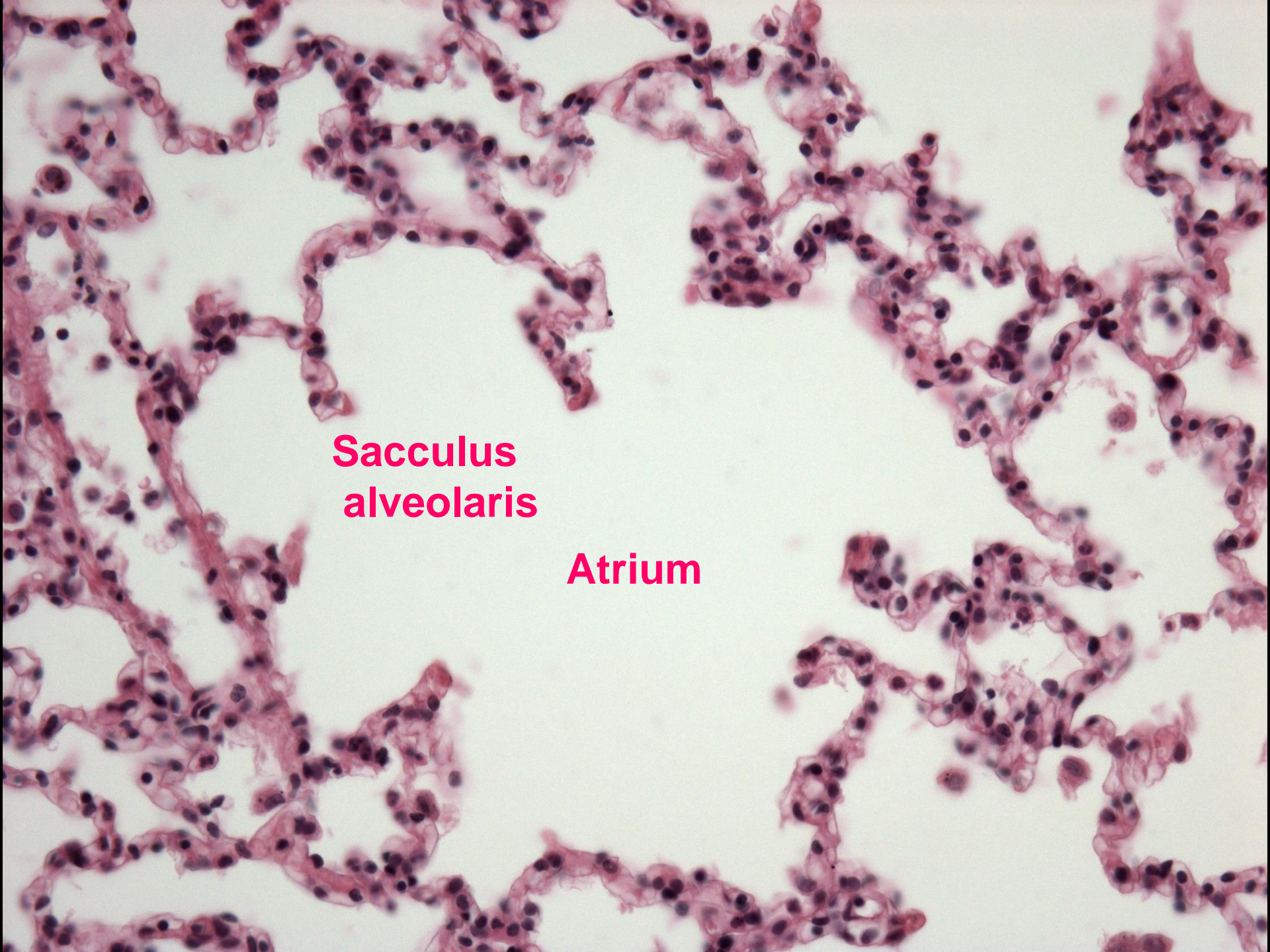


Respiratory bronchiole

A histological section of mammary gland tissue stained with hematoxylin and eosin (H&E). The image shows a complex network of ducts and alveoli. The ducts are lined by a single layer of cuboidal epithelial cells, and the alveoli are filled with secretory cells. The overall structure is highly branched and interconnected. The text "Ductus alveolaris" is overlaid in red in the center of the image.

Ductus alveolaris

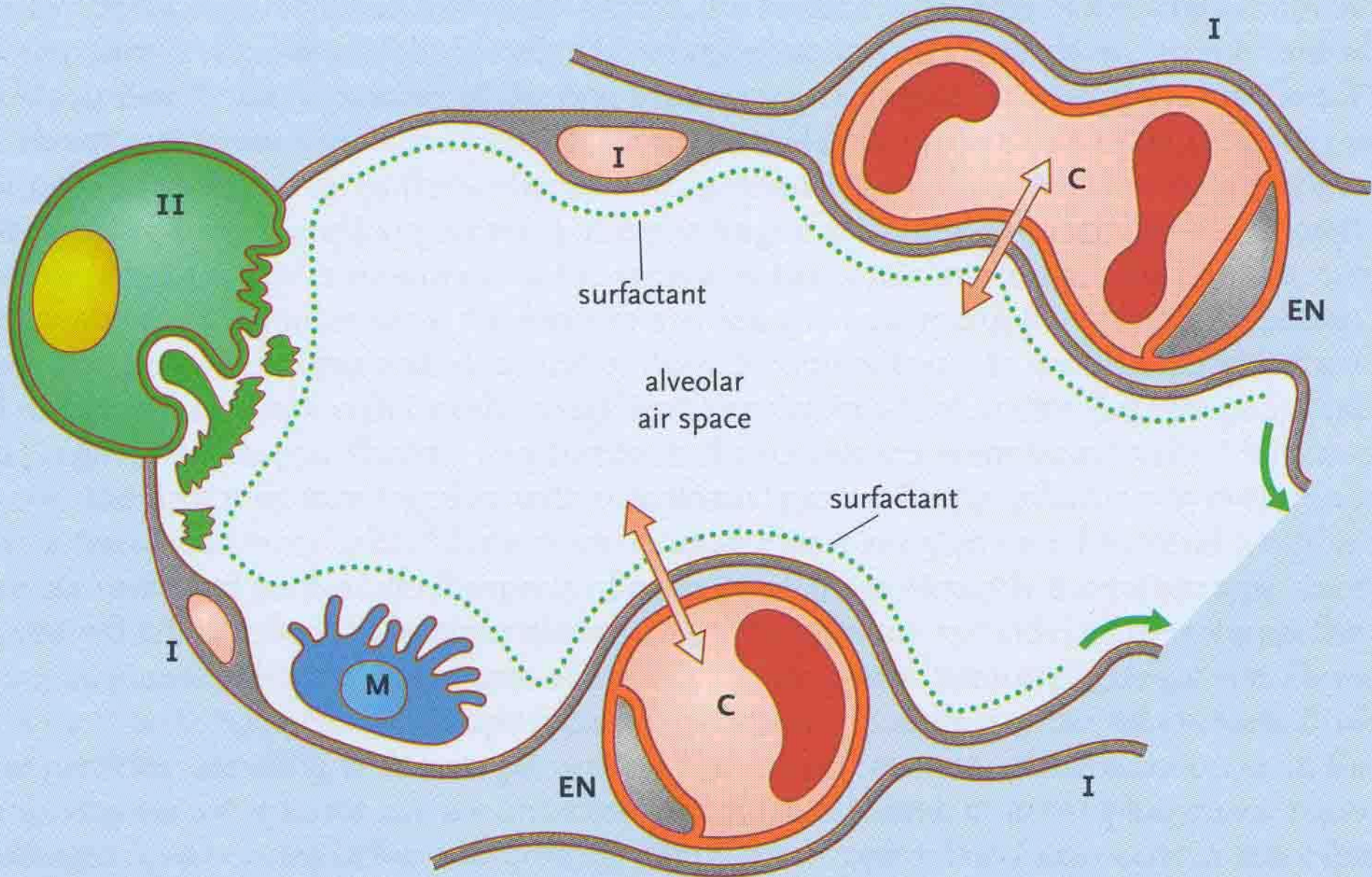




**Sacculus
alveolaris**

Atrium

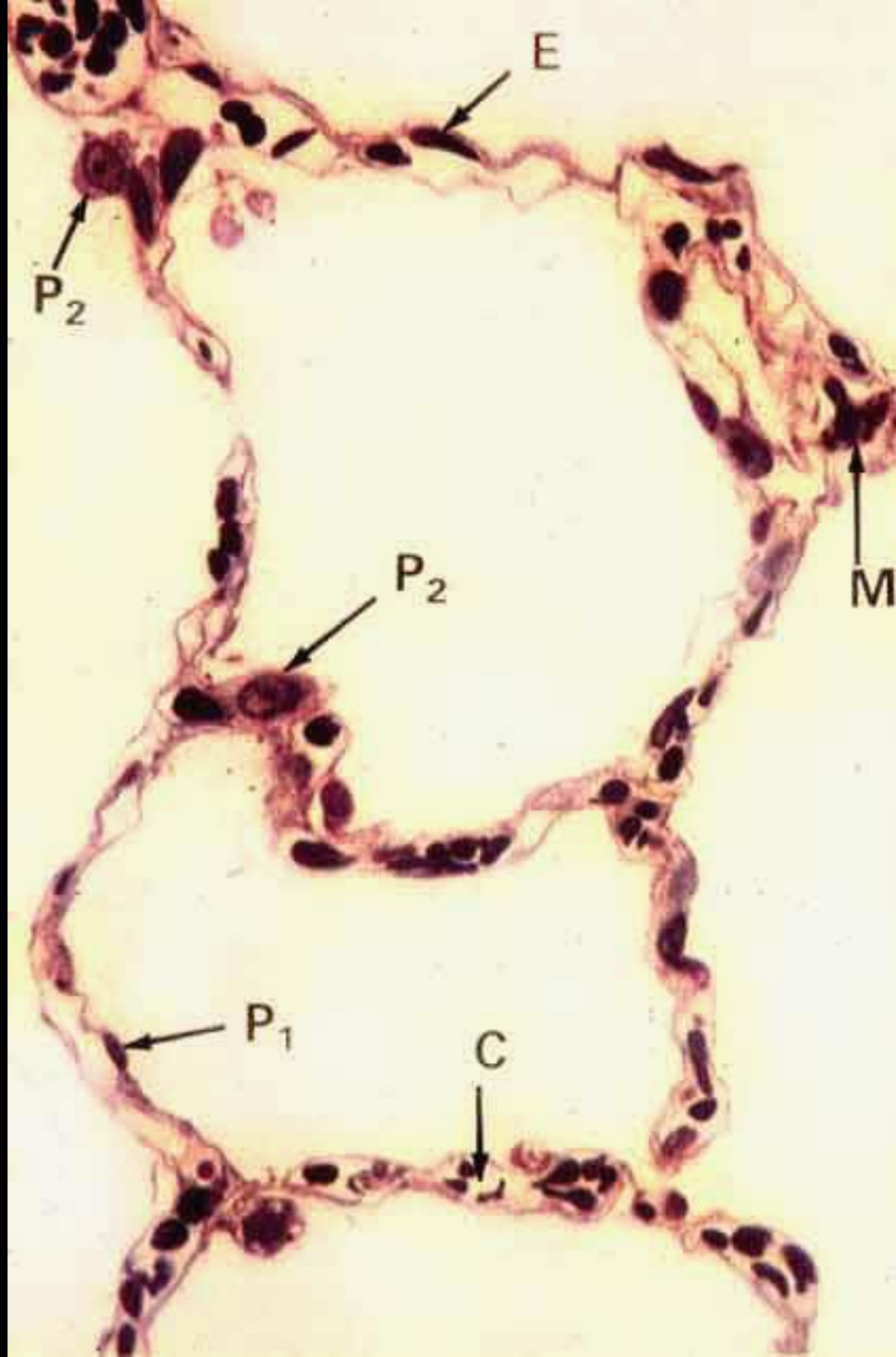
Pulmonary alveolus

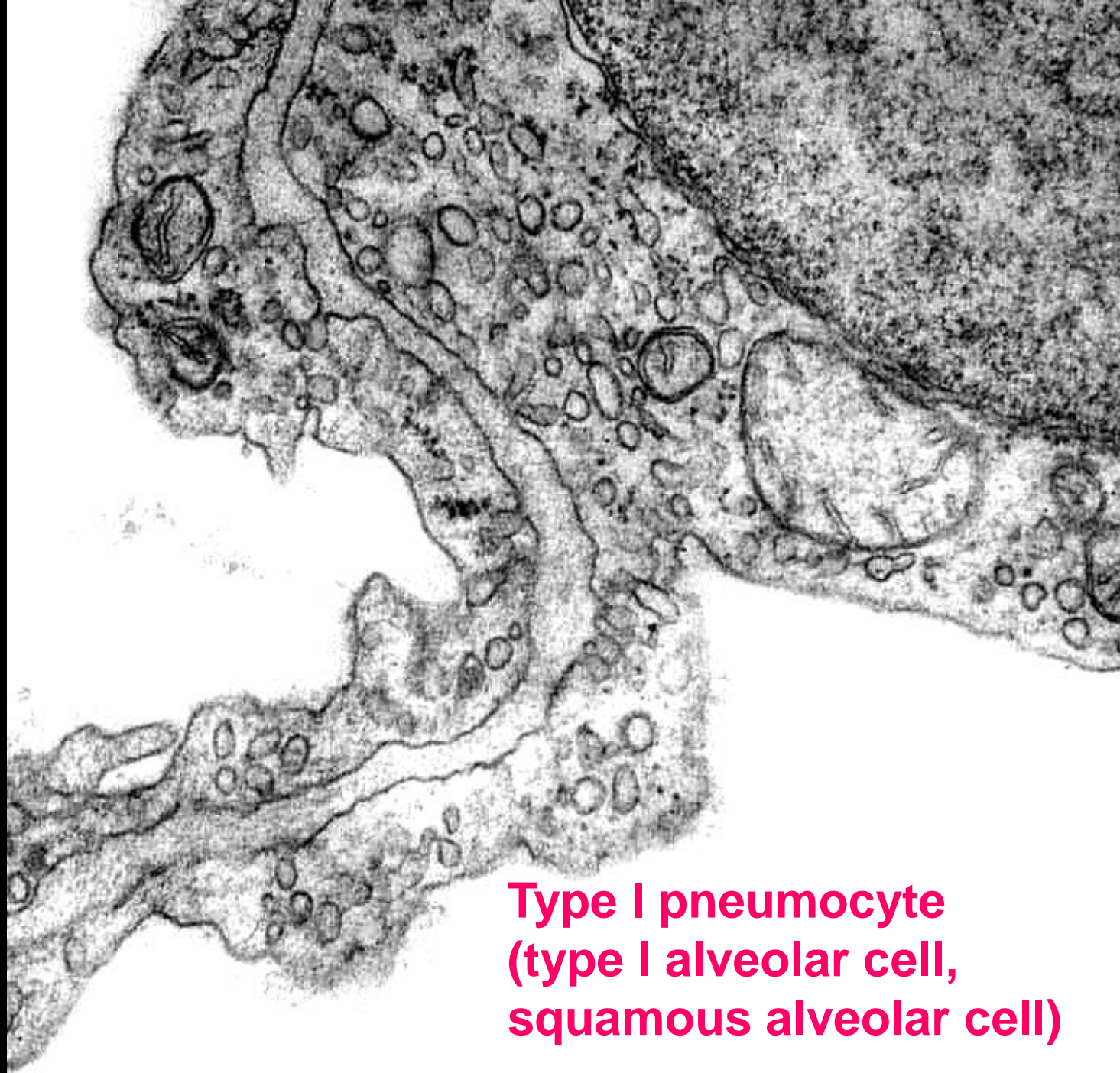


A microscopic image of lung tissue stained with hematoxylin and eosin (H&E). The image shows several alveoli, which are small air sacs. The walls of these alveoli are composed of a single layer of type I pneumocytes, which are large, flat cells that cover most of the surface area. The nuclei of these cells are stained dark purple, while the cytoplasm and extracellular matrix are stained pink. The overall structure is highly porous and interconnected.

10% OF CELL POPULATION
95% OF SURFACE AREA

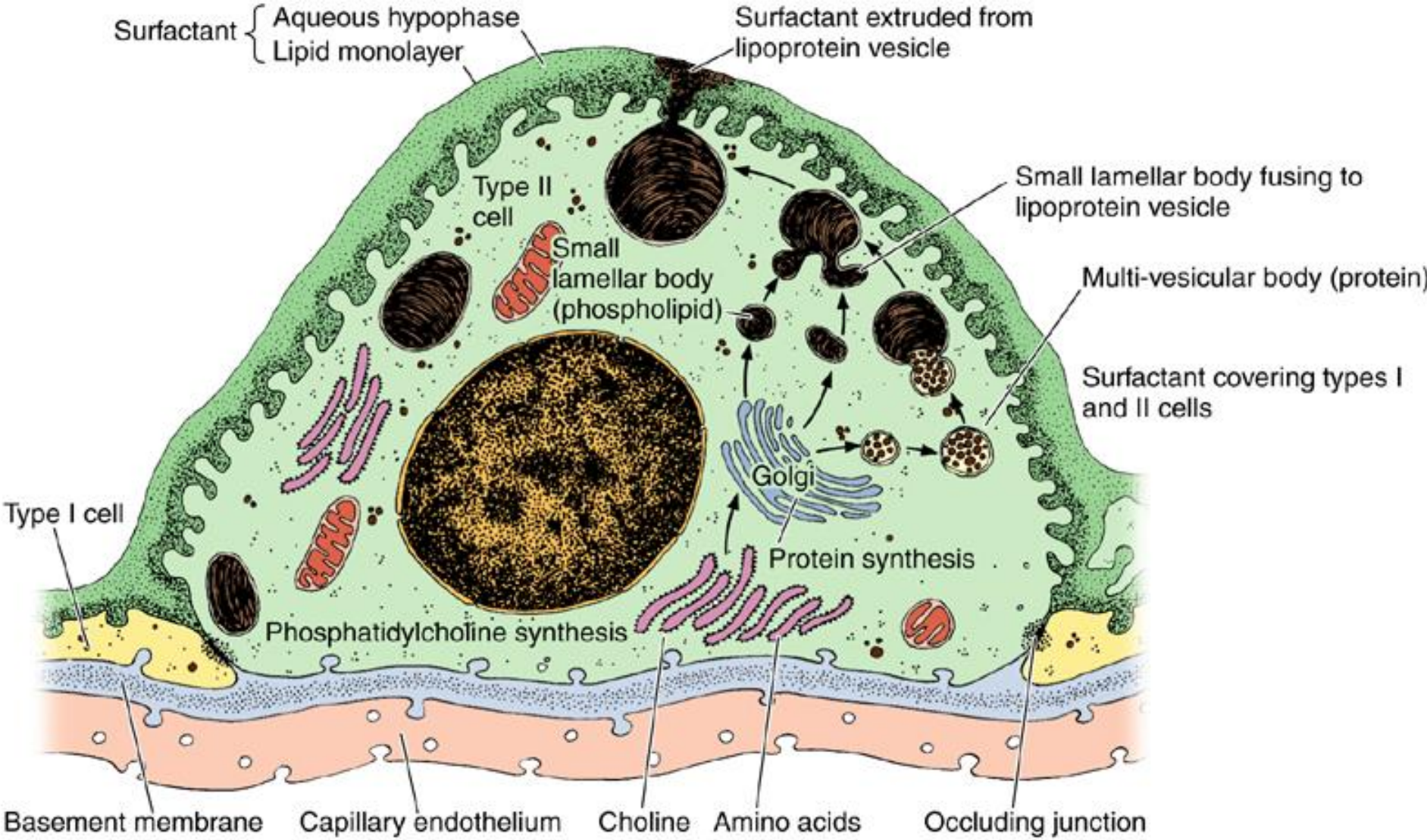
OCCUPY TYPE I PNEUMOCYTE

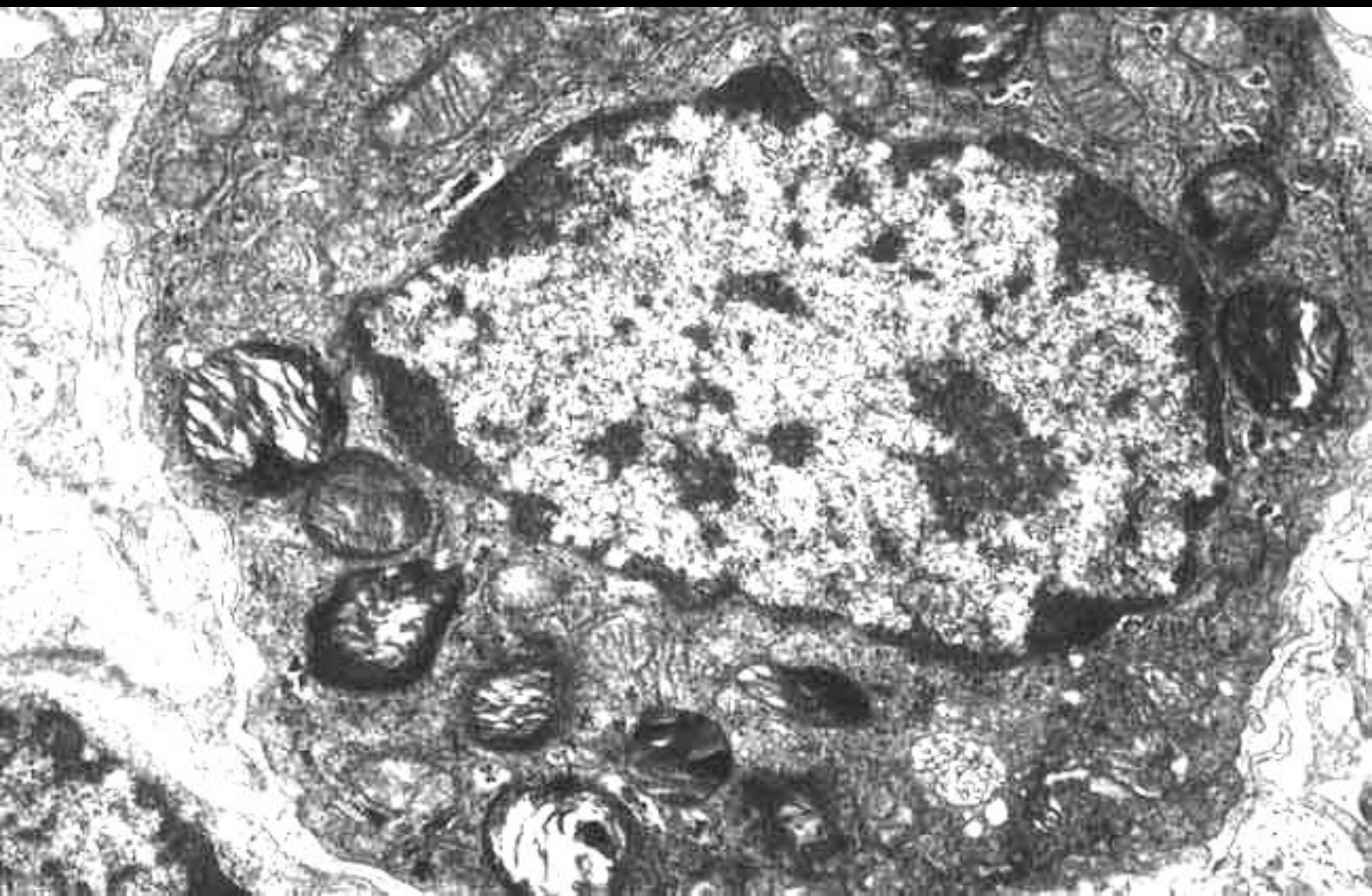


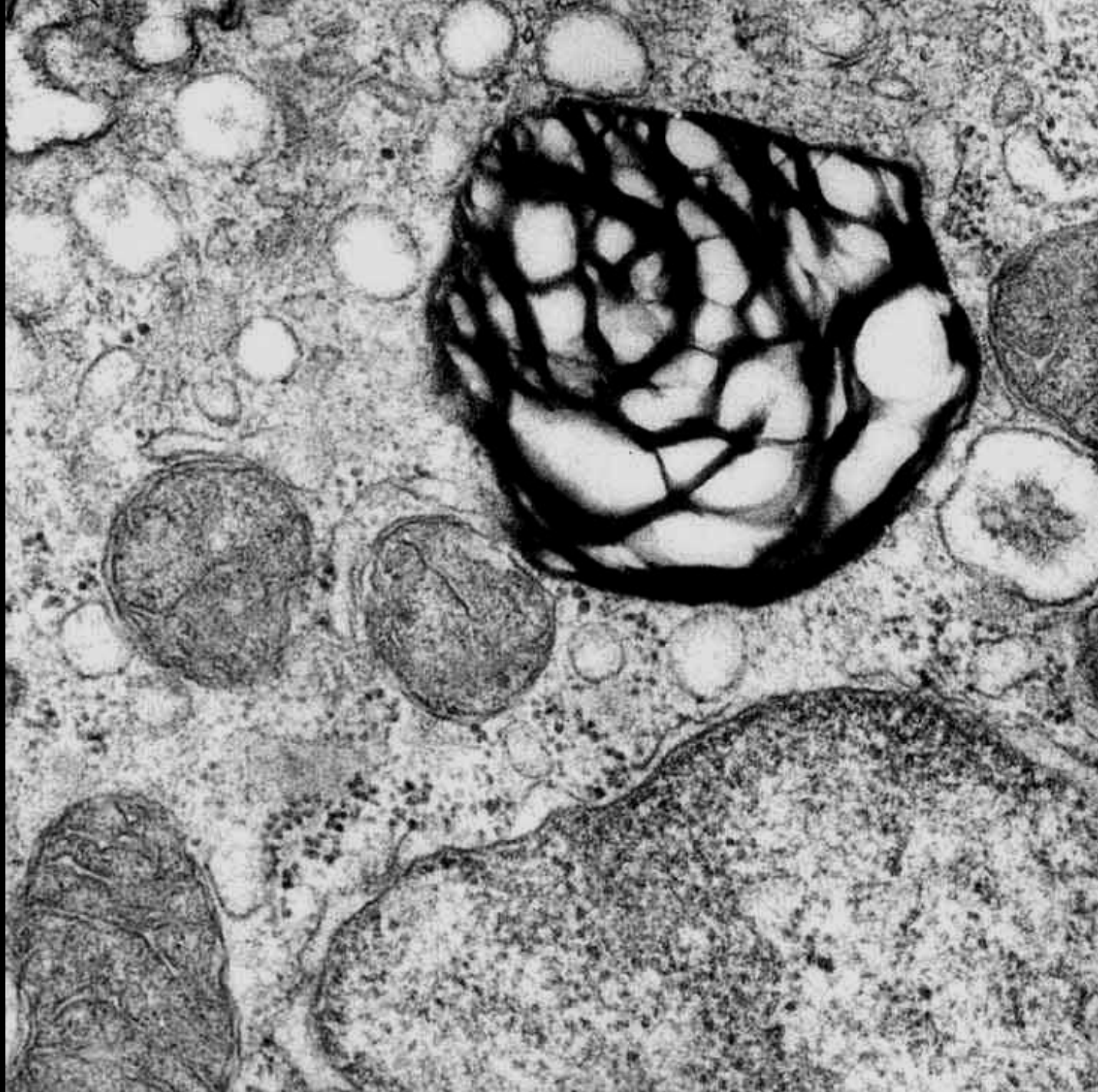


**Type I pneumocyte
(type I alveolar cell,
squamous alveolar cell)**

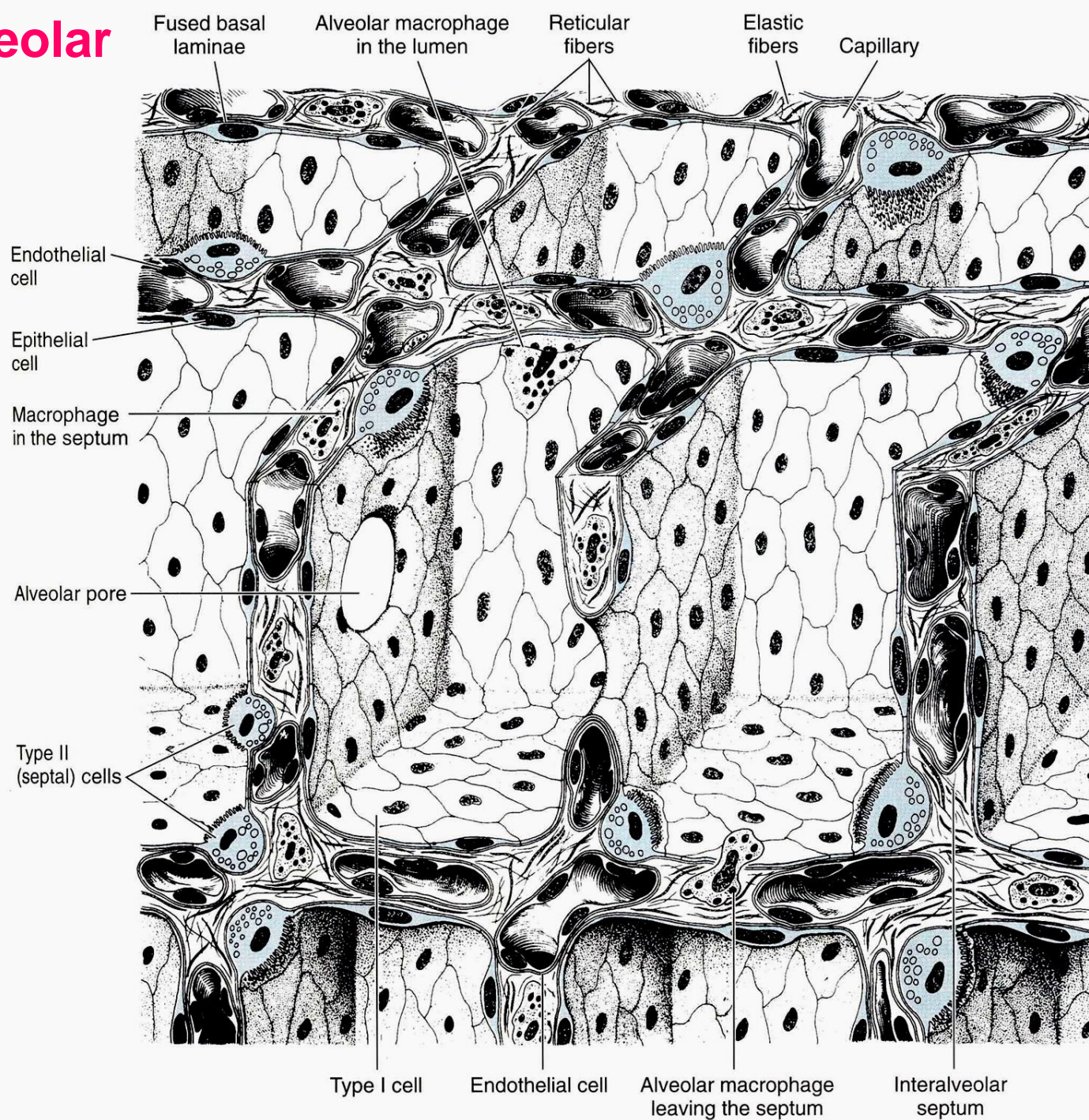
Type II pneumocyte (type II alveolar cell, granular alveolar cell)







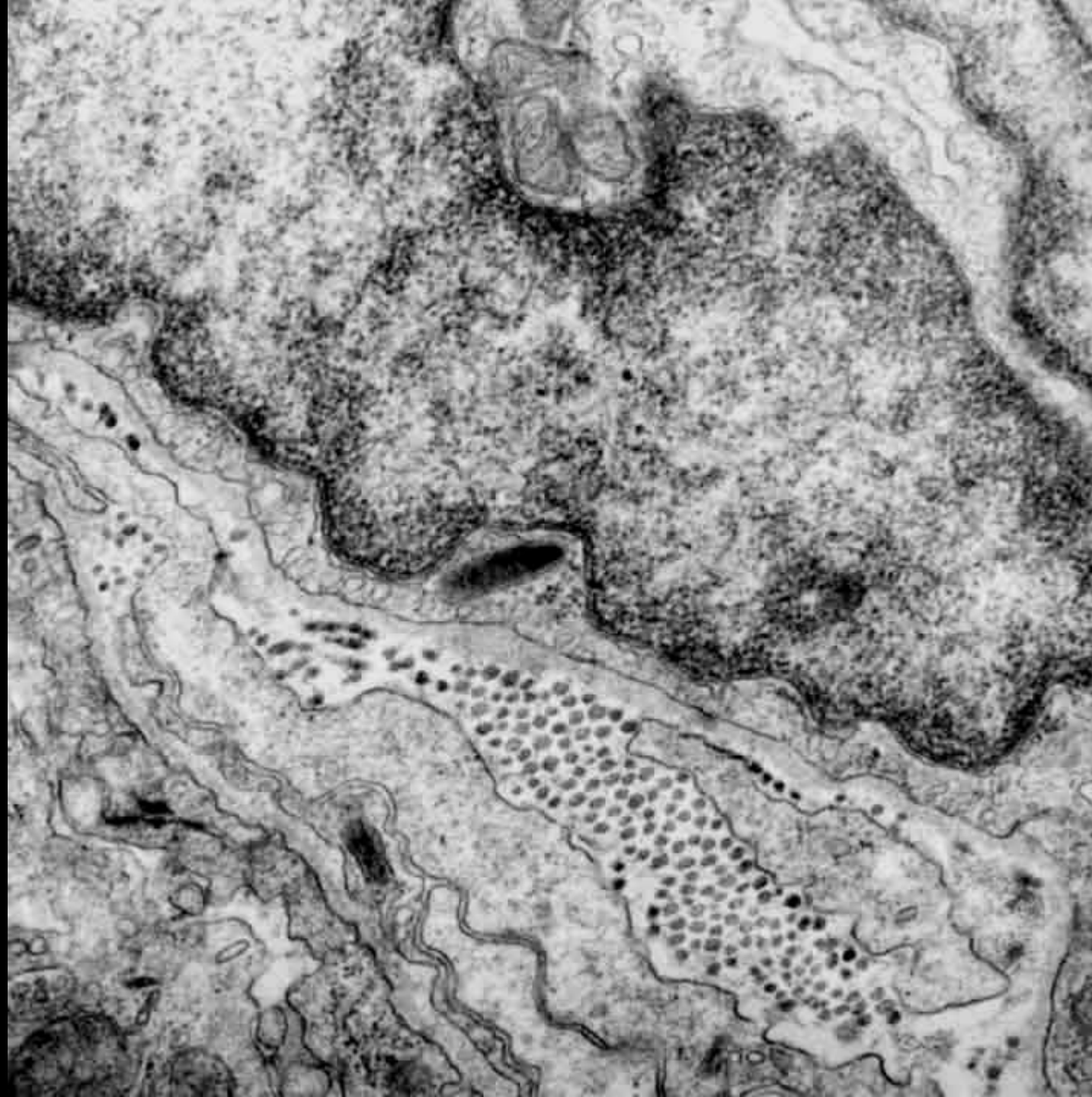
Interalveolar septa



A light micrograph showing a cross-section of a septum. The septum is composed of multiple layers of cells, appearing as a thick, wavy band of pinkish-brown tissue. The central part of the septum is notably thicker than the edges. In the interstitial space between the layers of the septum, there is a single, large, dark-staining cell, which is identified as an interstitial macrophage. The surrounding tissue is relatively clear and light-colored.

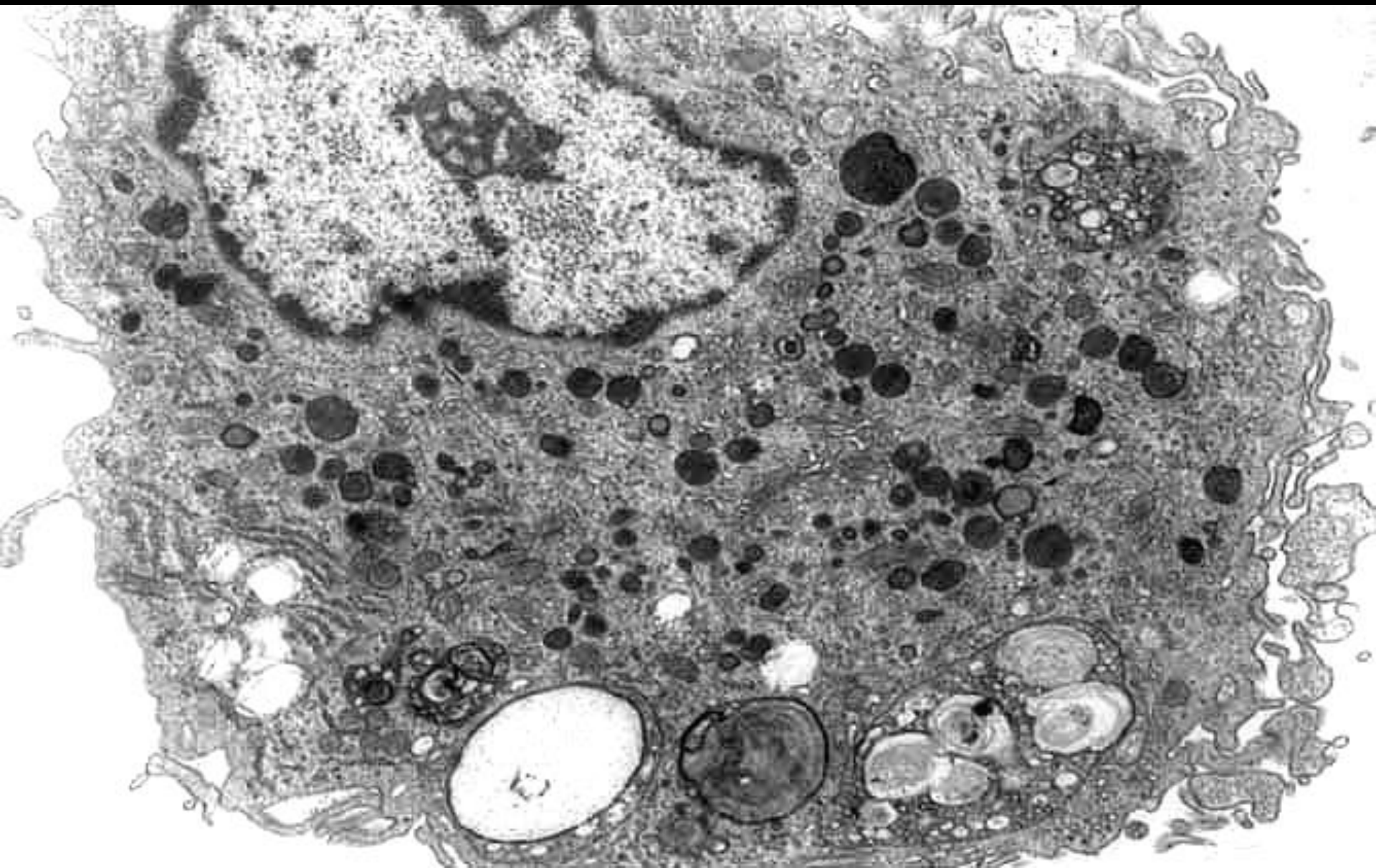
Thick portion of septum

**Interstitial
macrophage**



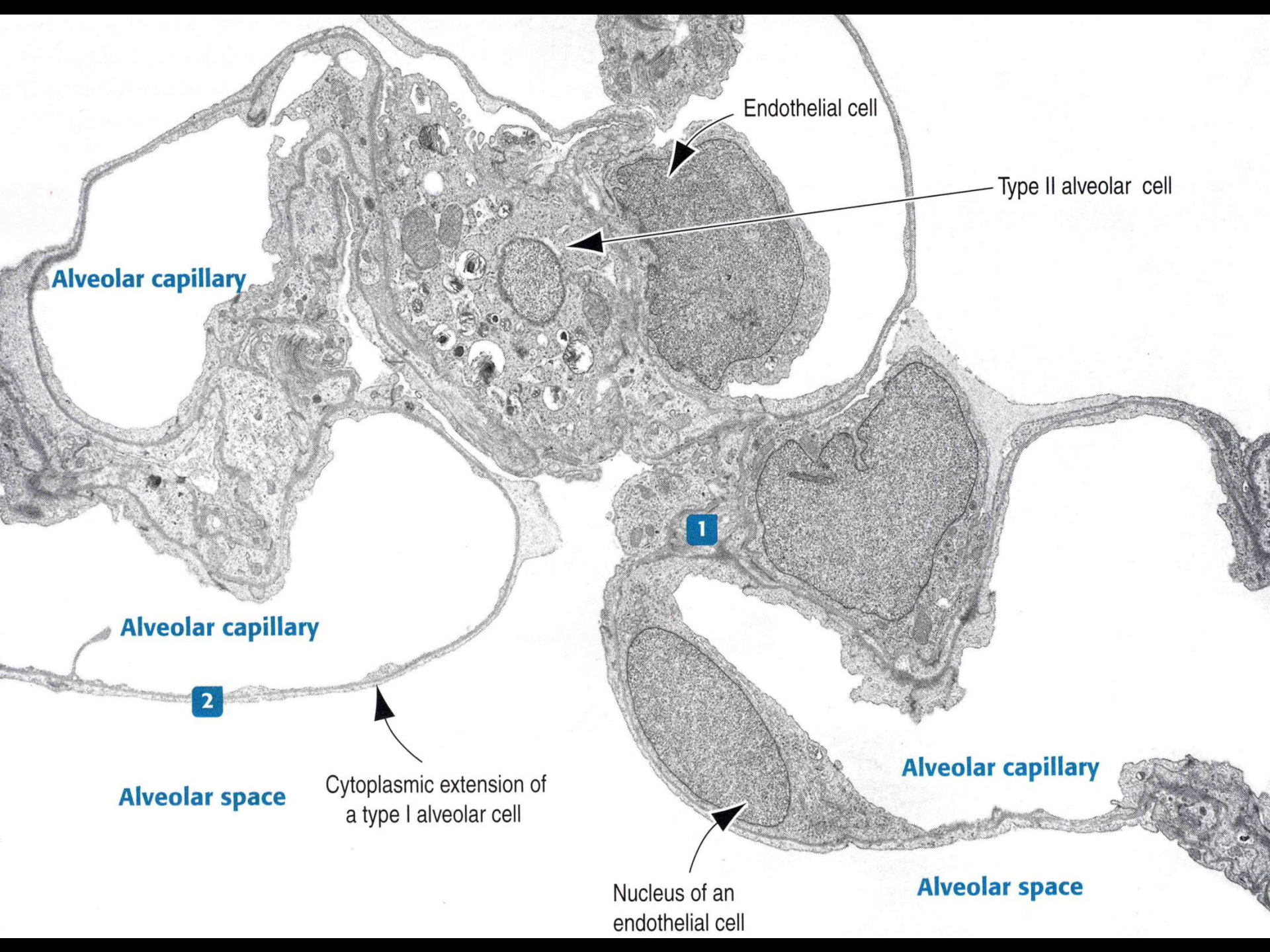
Alveolar macrophages





A light micrograph showing a cross-section of a biological structure, likely a septum. The image displays a network of pinkish, fibrous tissue with irregular, wavy borders. The central area is relatively clear, while the surrounding tissue is dense and stained. The overall appearance is that of a thin, porous membrane.

Thin portion of septum



Endothelial cell

Type II alveolar cell

Alveolar capillary

Alveolar capillary

2

Alveolar space

Cytoplasmic extension of a type I alveolar cell

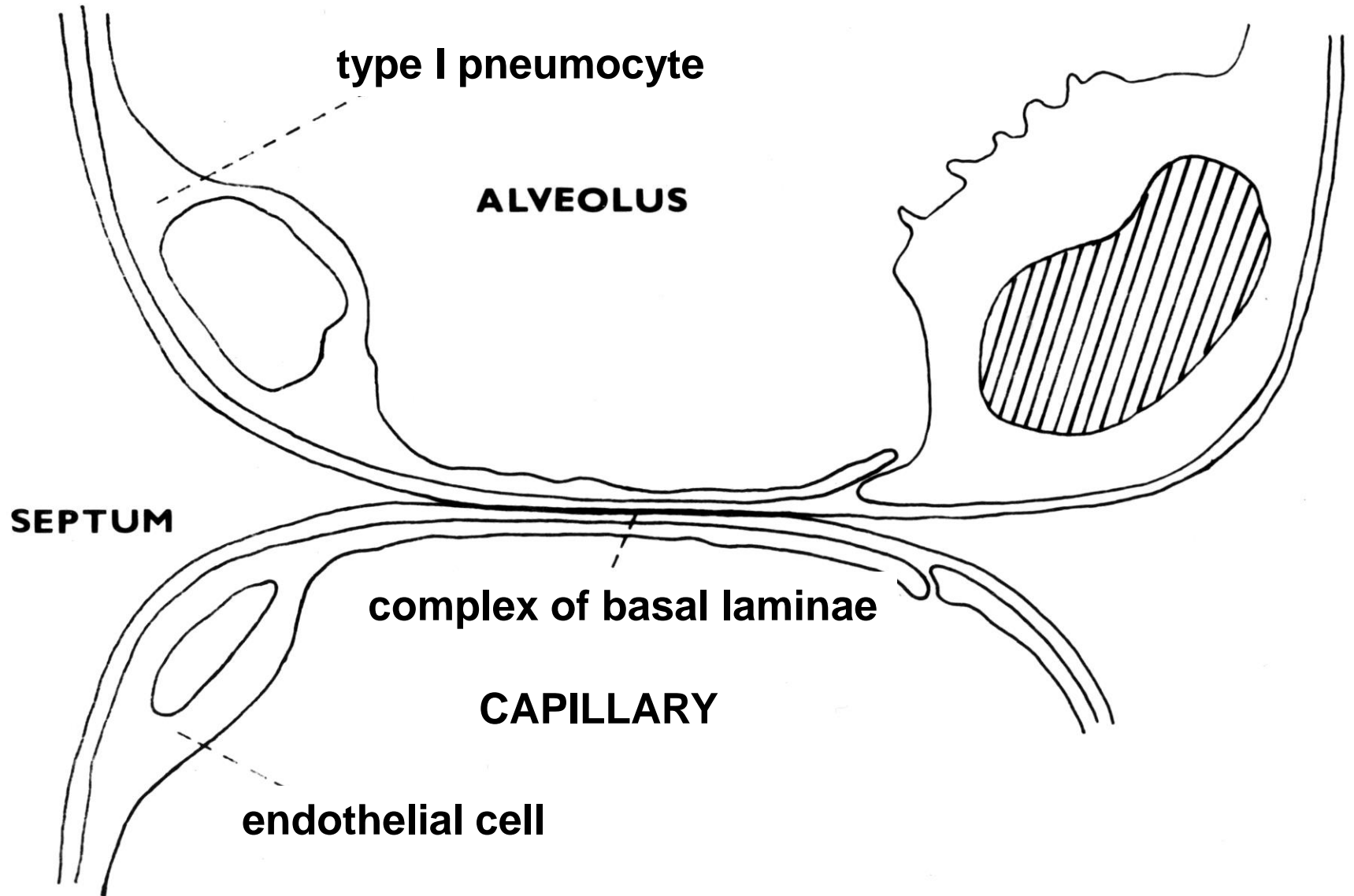
1

Nucleus of an endothelial cell

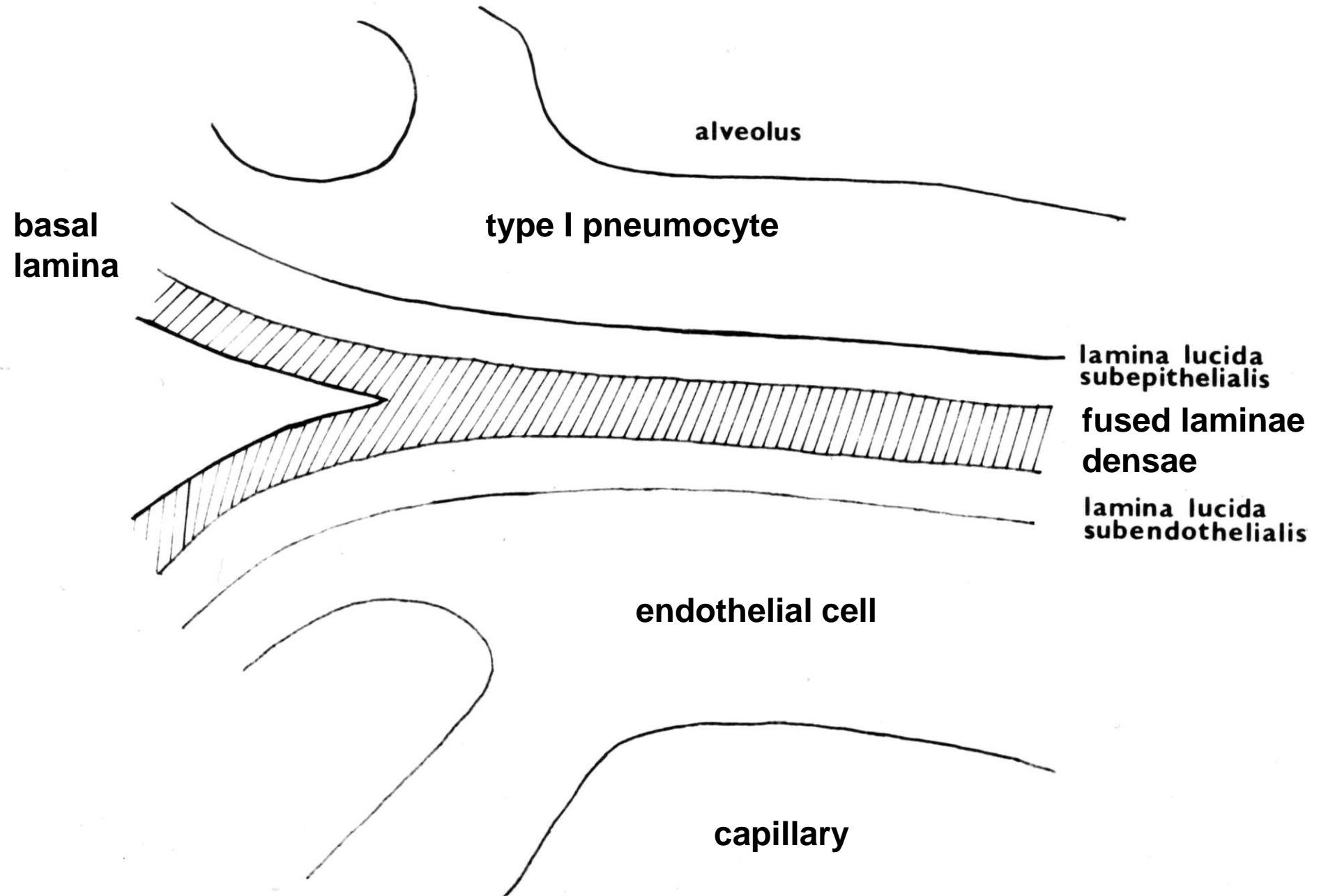
Alveolar capillary

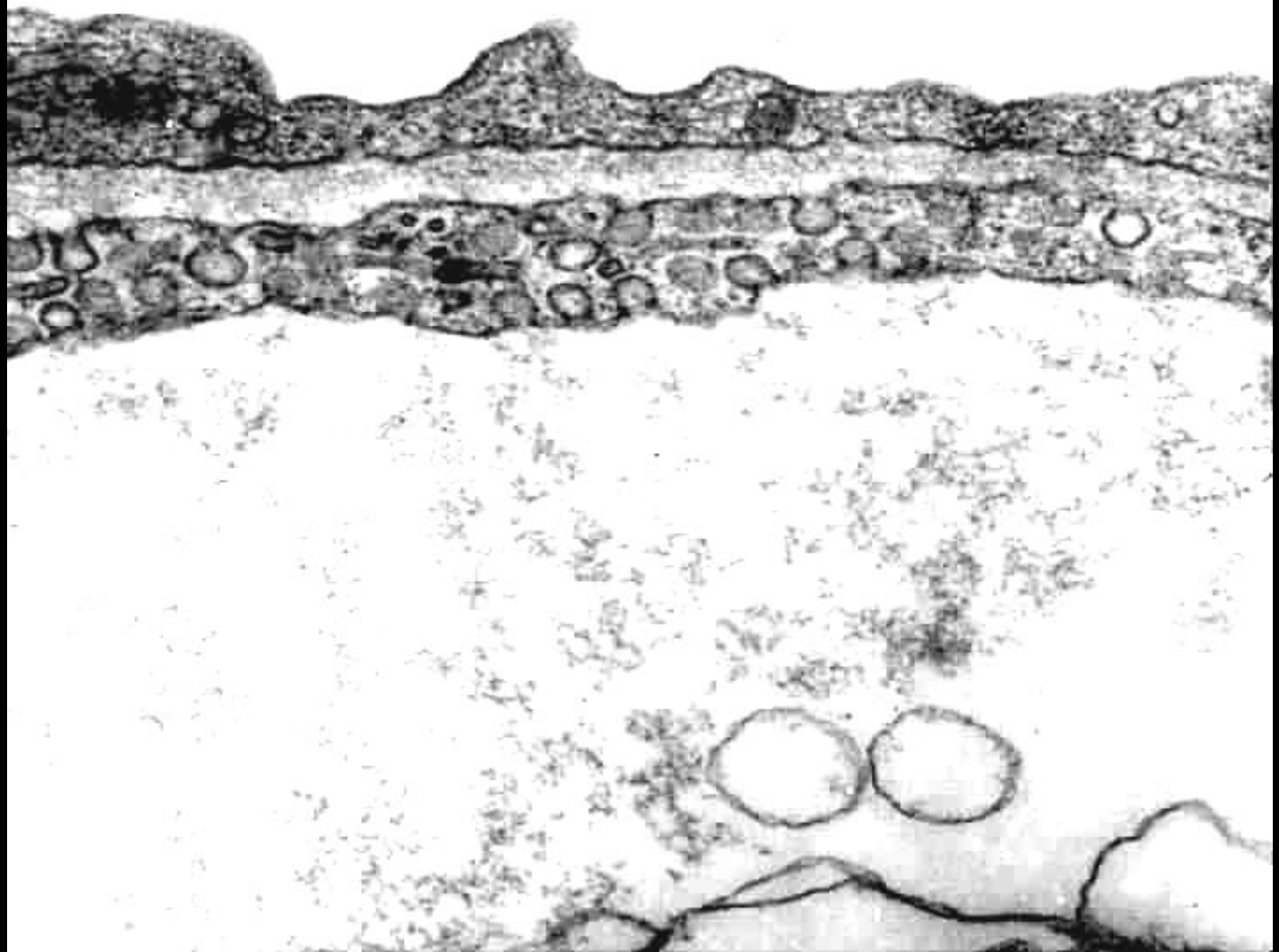
Alveolar space

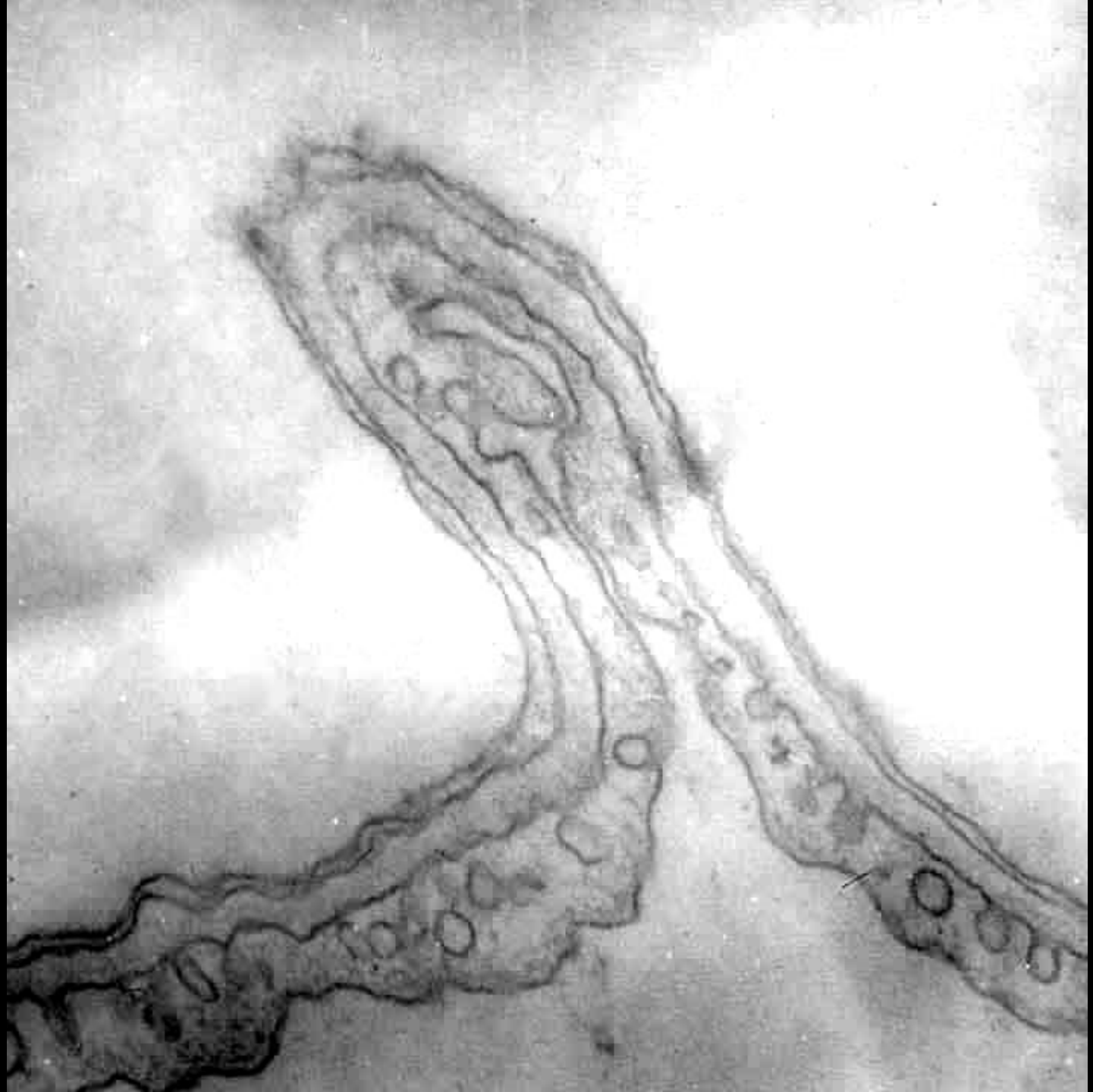
BLOOD-AIR BARRIER



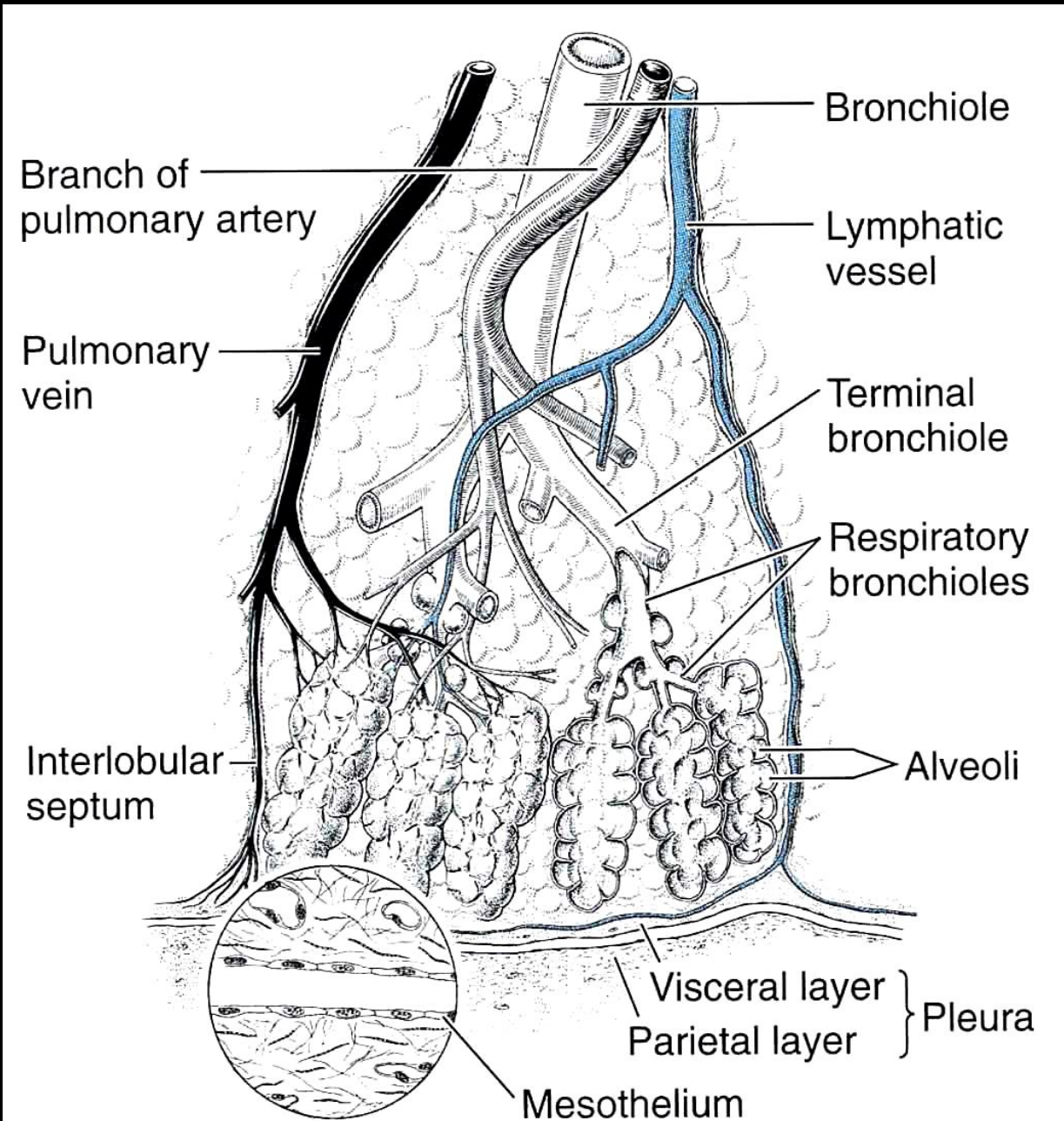
COMPLEX OF FUSED BASAL LAMINAE





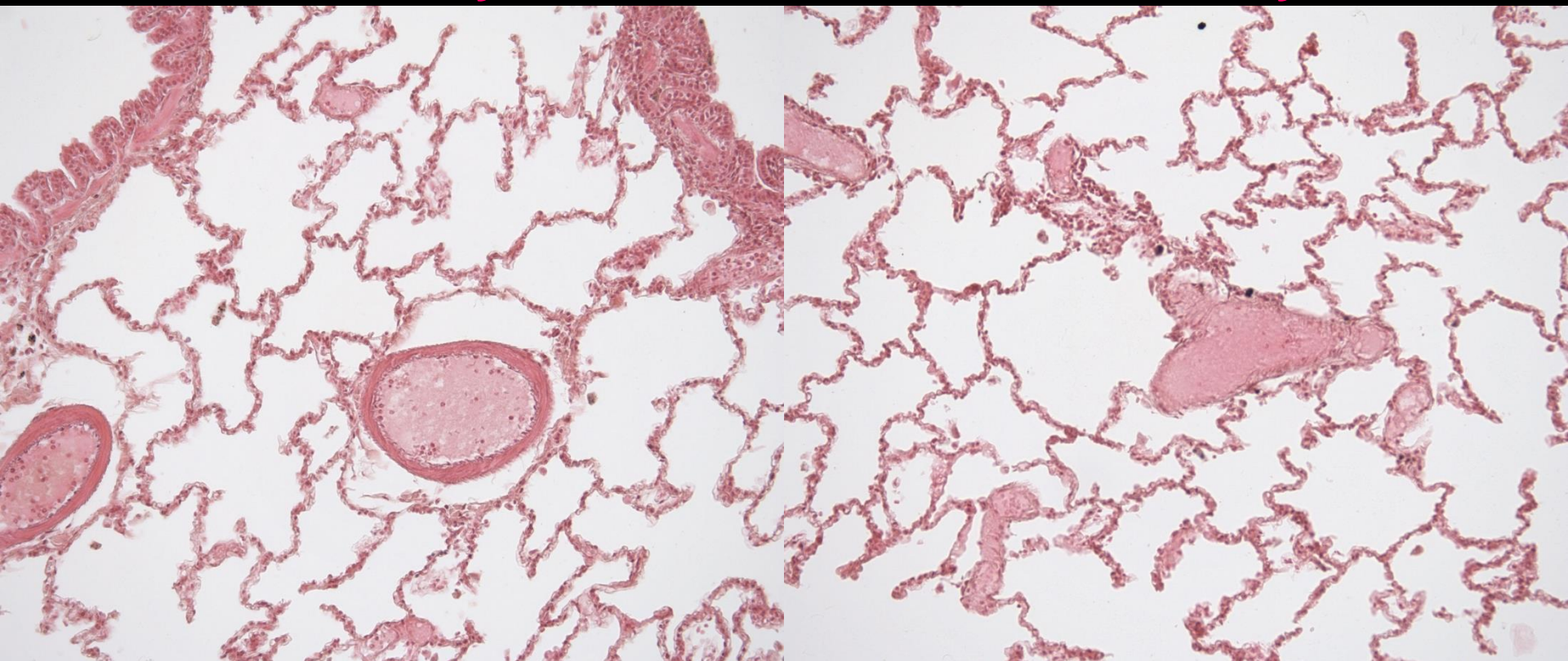


Blood and lymphatic supply of a pulmonary lobule



Pulmonary arteries

Pulmonary veins



Pleura

