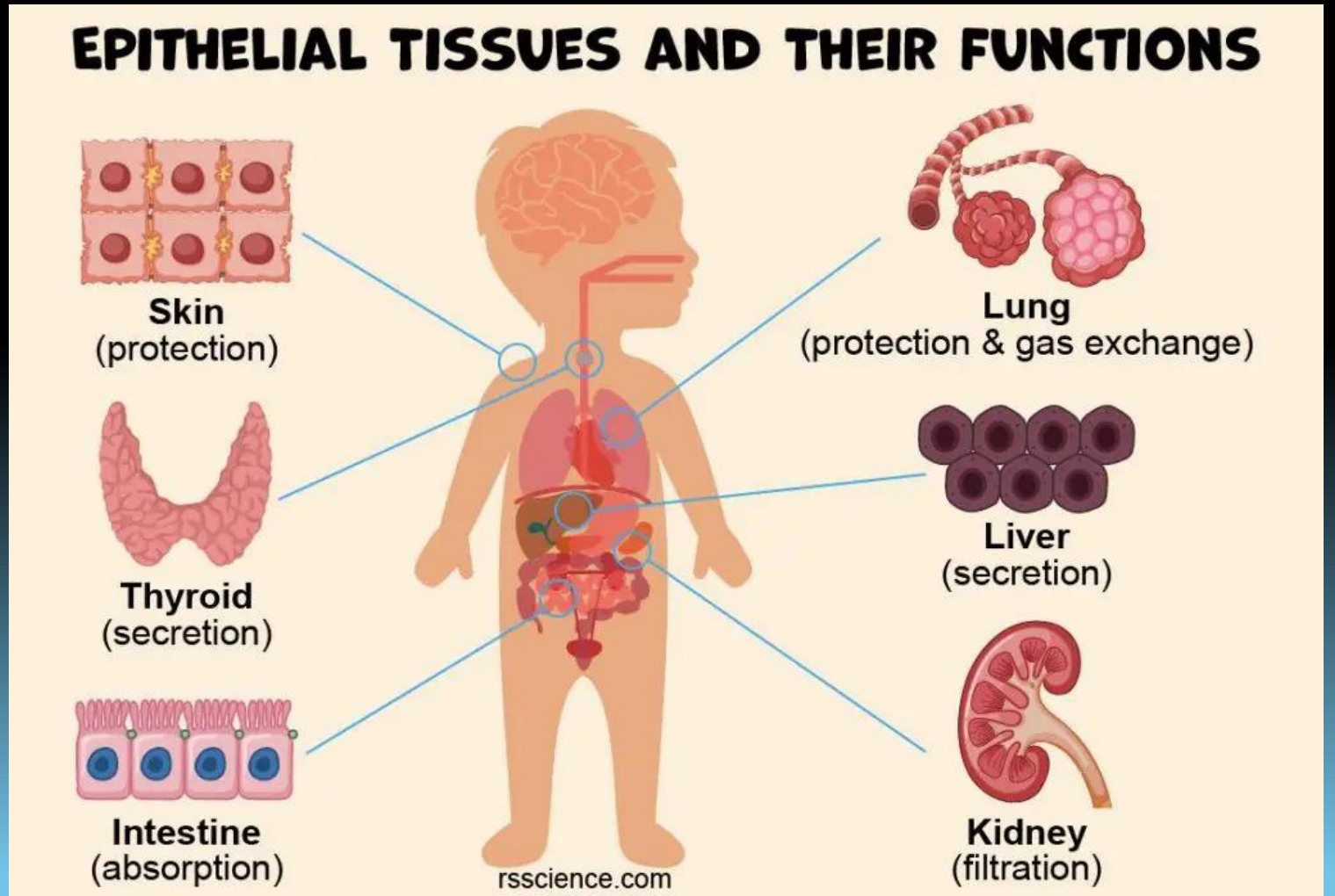


**MORPHOLOGY AND
FUNCTIONAL
SPECIALIZATION OF
EPITHELIA:
RESPIRATORY,
ABSORBENT, AND
PROTECTIVE**



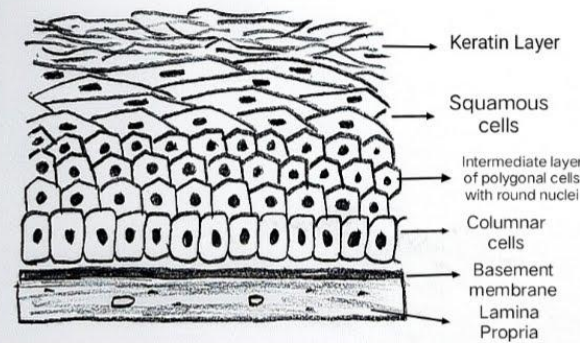
Epithelia represent highly specialized cellular surfaces that separate the organism from the external environment or from internal cavities.

Although they share a common general structure—closely adherent and polarized cells—they differ in morphology and function, adapting to the needs of different anatomical regions.

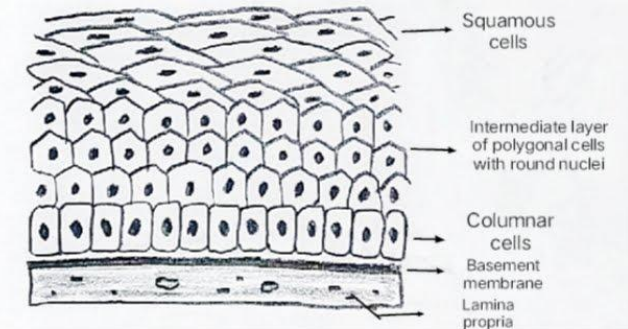
PROTECTIVE EPITHELIUM GENERAL MORPHOLOGY

- Tightly packed cells, often stratified.
- * Low permeability and abundance of occluding junctions and desmosomes.
- * Presence of keratin (keratinized squamous epithelium) in areas subject to mechanical stress.

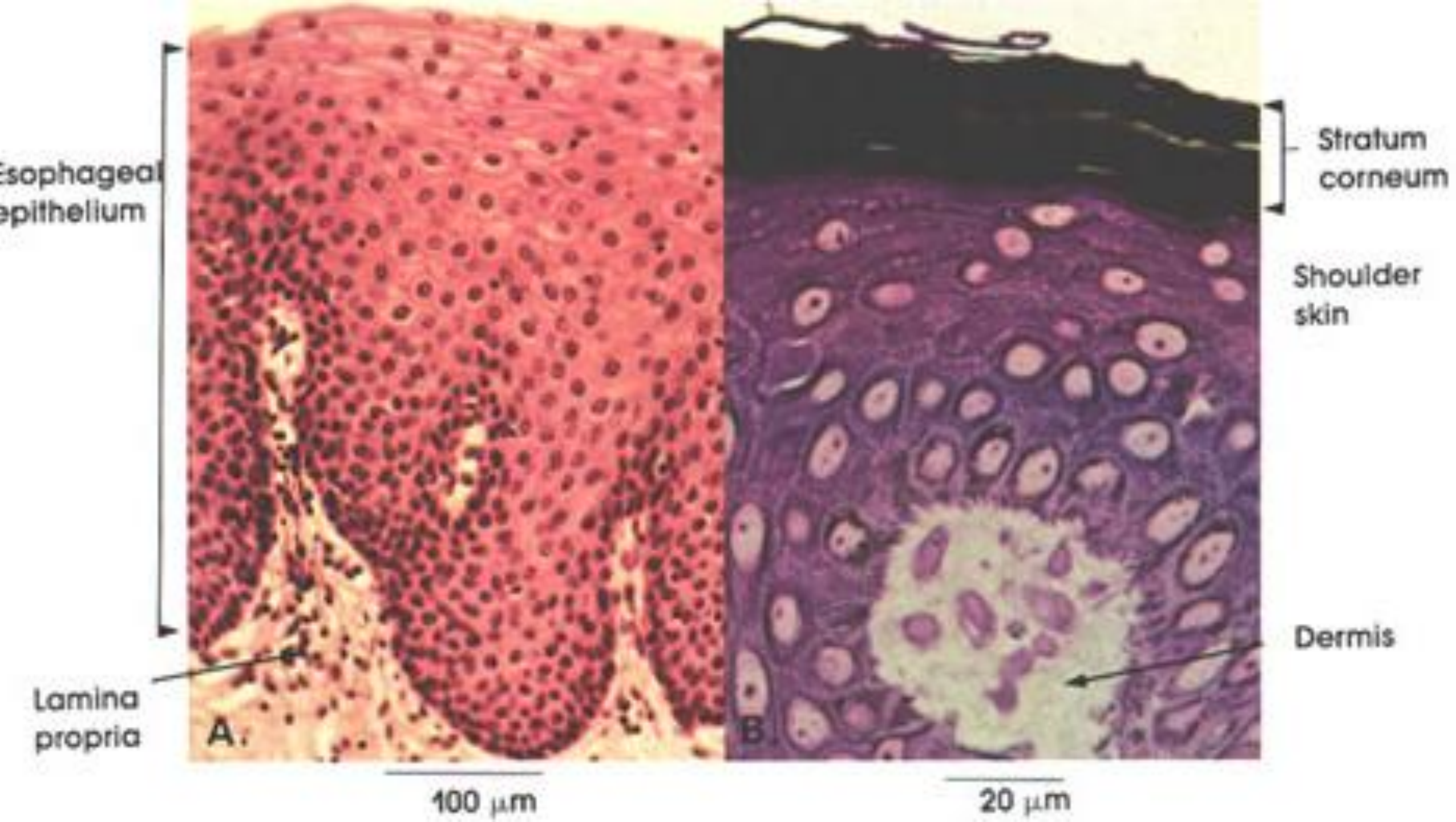
Stratified Squamous Epithelium Diagram with Label



Keratinized



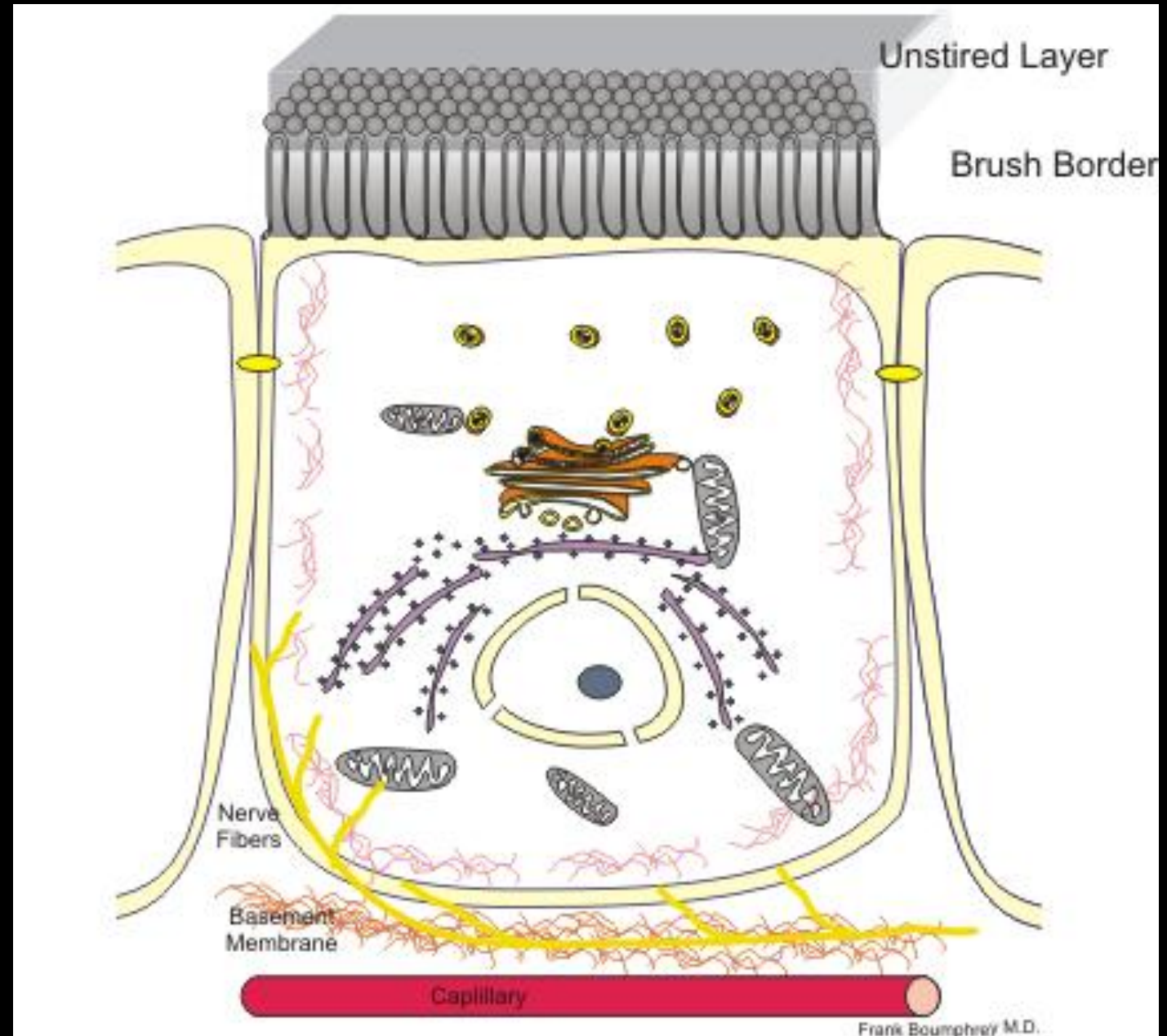
Non-keratinized

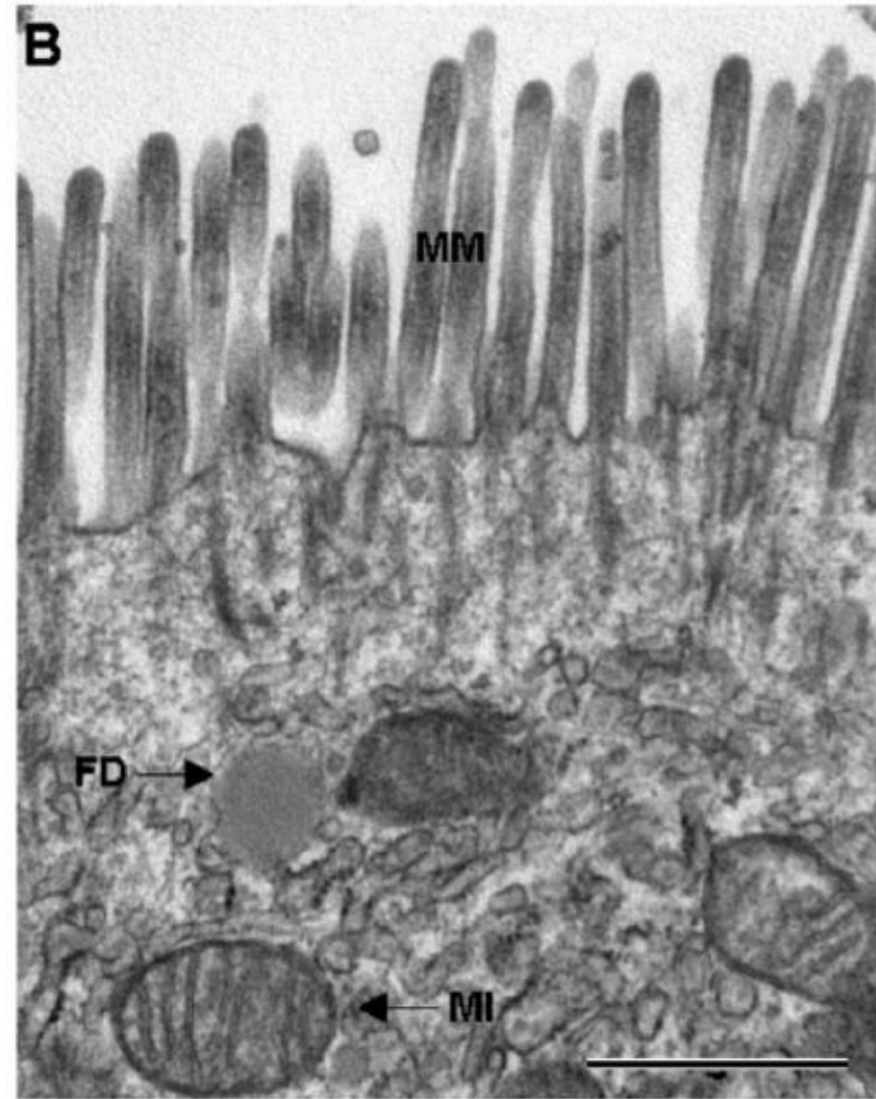
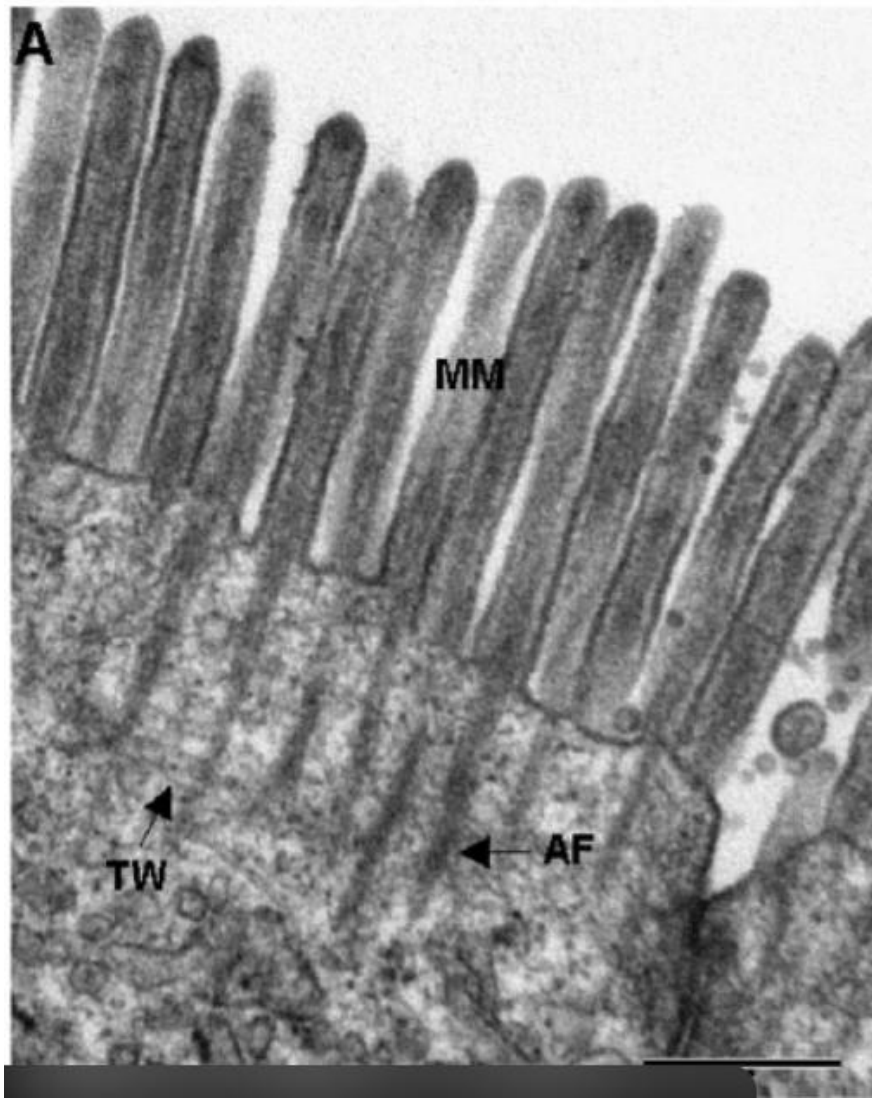


ABSORBENT EPITHELIAGENERAL MORPHOLOGY

Single layer of cells with apical specializations:

- **Microvilli** (forming the brush border) → increase the surface area for absorption.
- **Tight junctions** → maintain functional polarity.
- **Cytoplasm rich in mitochondria** → high level of active metabolism.
- **Functional basolateral polarity** (Na^+/K^+ -ATPase transporters).





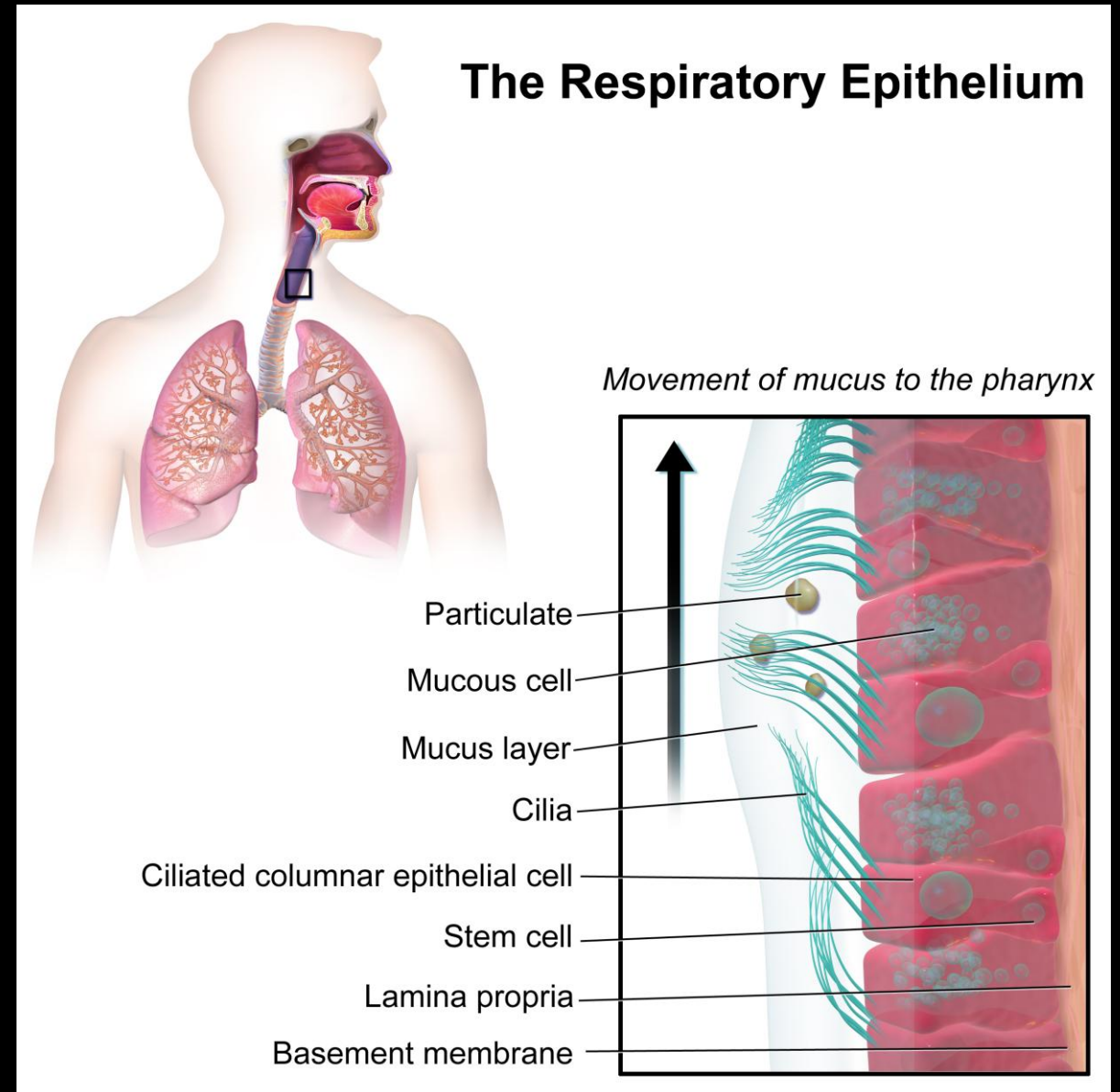
Ultrastructure of the brush border and terminal web region of a small intestinal enterocyte

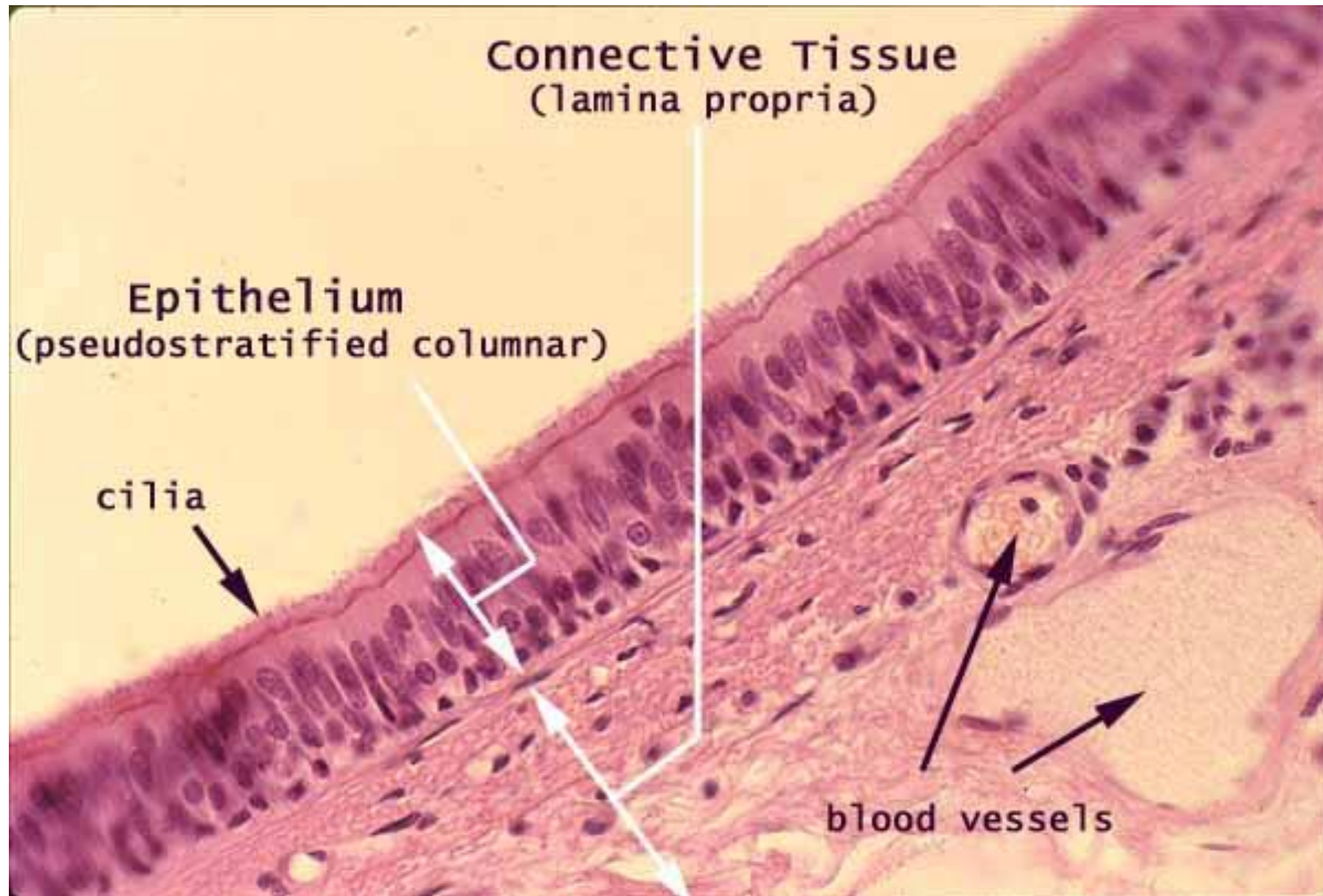
RESPIRATORY EPITHELIAGENERAL MORPHOLOGY

PSEUDOSTRATIFIED CYLINDRICAL CILIATED EPITHELIUM

Main cells:

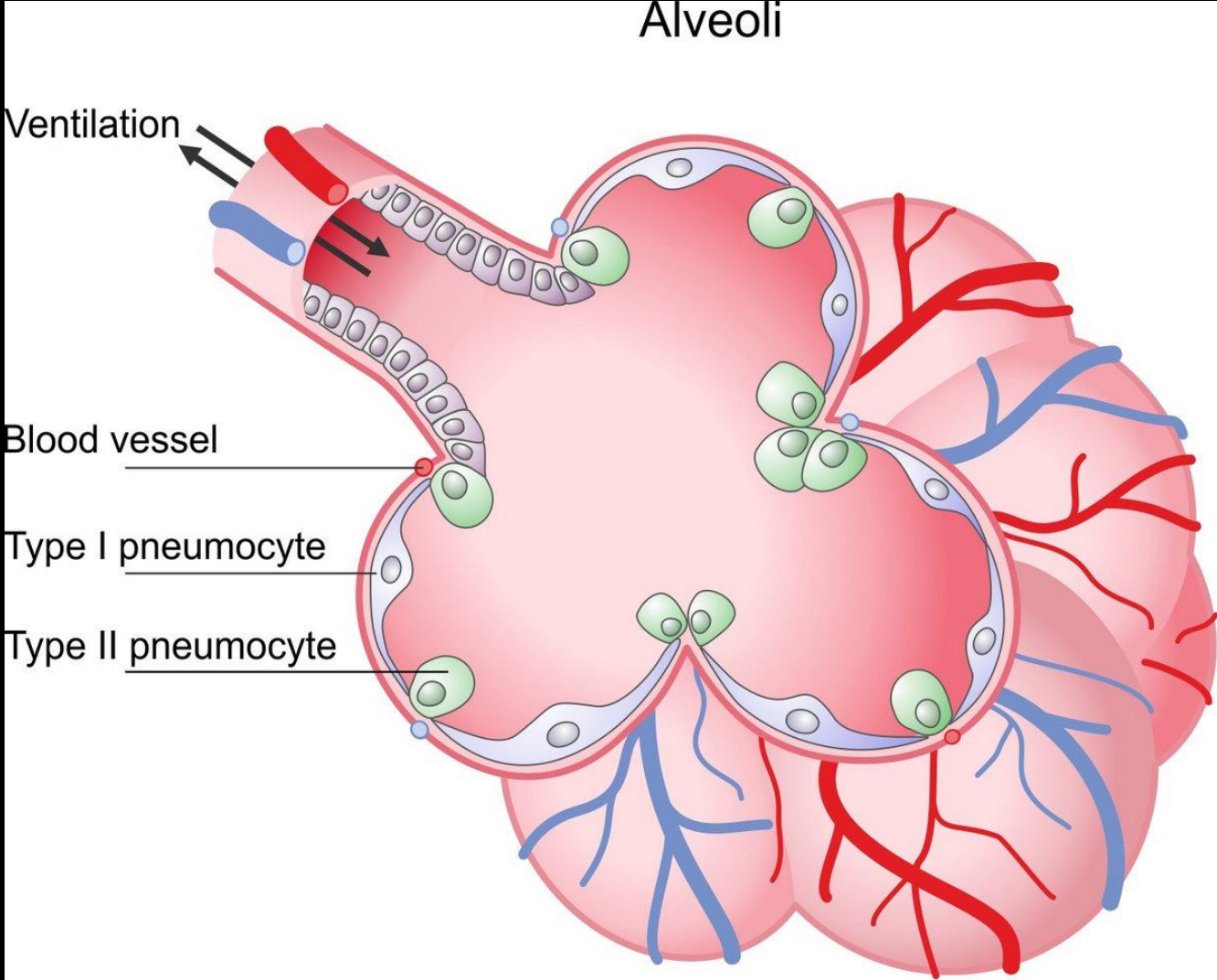
- **CILIATED CELLS** → mucociliary movement..
- **GOBLET CELLS** → secretion of protective mucus..
- **BASAL CELLS** → epithelial stem cells.



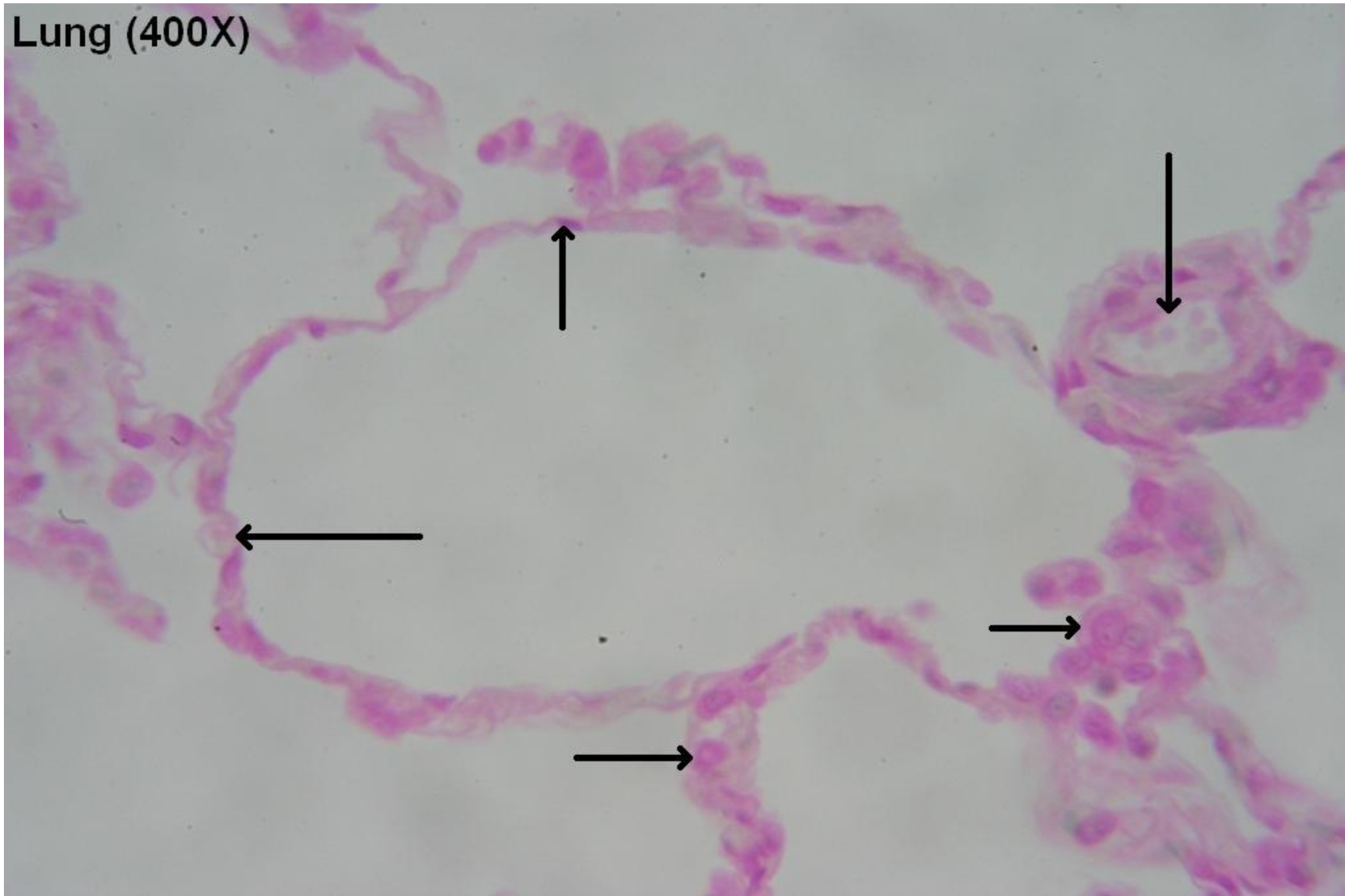


**RESPIRATORY EPITHELIA
GENERAL MORPHOLOGY-
LUNG ALVEOLI -**

SIMPLE SQUAMOUS EPITHELIUM



Lung (400X)

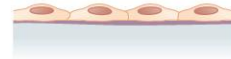

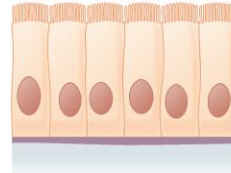
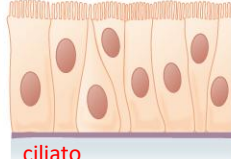
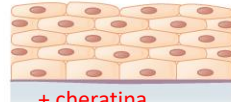
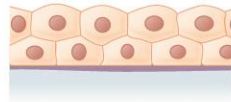
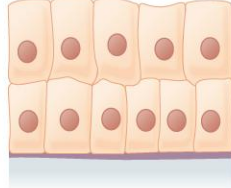
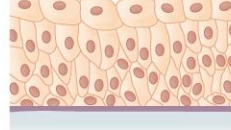


MORPHOLOGICAL AND FUNCTIONAL INTEGRATION

CONCLUSIVE SYNTHESIS

- Cell morphology (height, polarity, organelles) reflects the predominant function:
- Flat cells = barrier.
- height all and rich in microvilli = absorption.
- Ciliated and mucous = transport and defense.

“FORM IS THE PLASTIC IMAGE OF FUNCTION”
Georges Cuvier (1769–1832)

Cells	Location	Function
Simple squamous epithelium 	Air sacs of lungs and the lining of the heart, blood vessels, and lymphatic vessels	Allows materials to pass through by diffusion and filtration, and secretes lubricating substance
Simple cuboidal epithelium  + microvilli e polarità	In ducts and secretory portions of small glands and in kidney tubules e intestino tenue	Secretes and absorbs
Simple columnar epithelium 	Ciliated tissues are in bronchi, uterine tubes, and uterus; smooth (nonciliated tissues) are in the digestive tract, bladder	Absorbs; it also secretes mucous and enzymes
Pseudostratified columnar epithelium  ciliato	Ciliated tissue lines the trachea and much of the upper respiratory tract	Secretes mucus; ciliated tissue moves mucus
Stratified squamous epithelium  + cheratina	Lines the esophagus, mouth, and vagina ed epidermide ed esofago	Protects against abrasion
Stratified cuboidal epithelium 	Sweat glands, salivary glands, and the mammary glands	Protective tissue
Stratified columnar epithelium 	The male urethra and the ducts of some glands	Secretes and protects
Transitional epithelium 	Lines the bladder, urethra, and the ureters	Allows the urinary organs to expand and stretch