

Epithelial Tissue

Objectives:

By the end of this lecture, you should be able to:

- Describe general characteristics of epithelial tissue.
- Discuss microscopic structure and distribution of different types of epithelial membranes.
- Classify glandular epithelium according to different parameters.
- Enumerate the functions of epithelial tissue.
- Understand the following clinical applications:
 - Immotile cilia syndrome (Kartagener's syndrome).
 - Metaplasia.

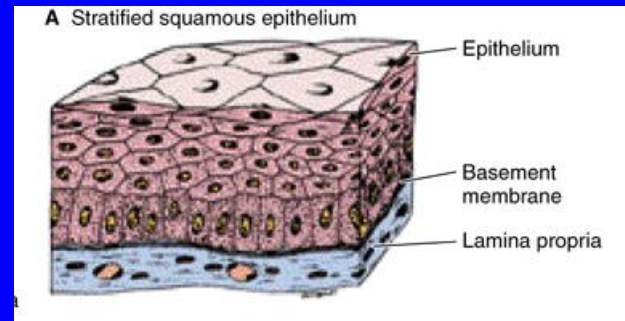
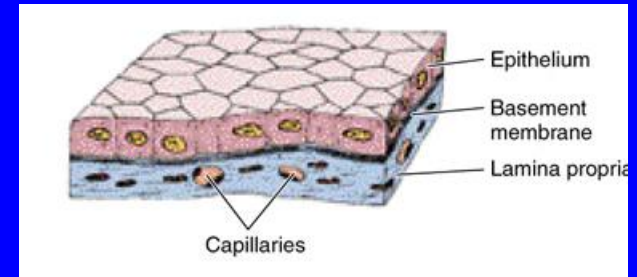
EPITHELIAL TISSUE

General characteristics:

- Cells are **tightly joined** with **little intercellular space**.
- Rest on a **basement membrane**.
- **Avascular**.
- High power of **regeneration**.

Classification:

- **Epithelial membranes:**
 - Simple epithelium: one layer.
 - Stratified epithelium: more than one layer.
- **Glands (Glandular Epithelium).**



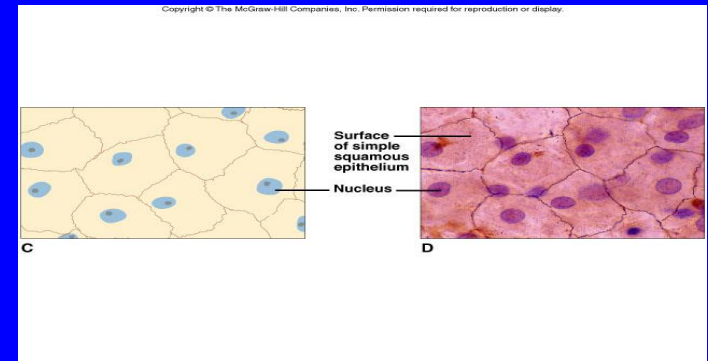
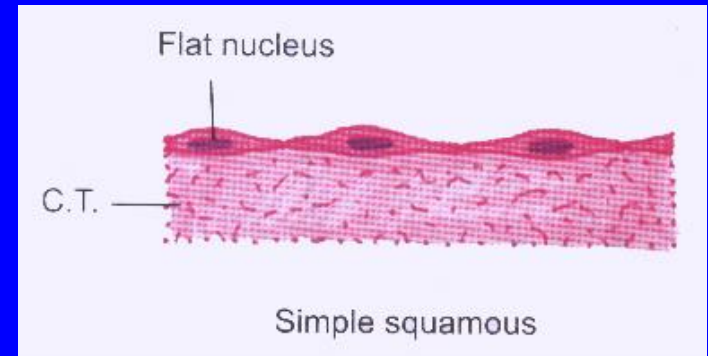
I. Simple Epithelium

1- Simple Squamous Epithelium:

One layer of flat cells with flat nuclei. Provides smooth thin surface.

Examples of sites:

- Endothelium (lining the Cardio vascular system- CVS).
- Alveoli of lung.



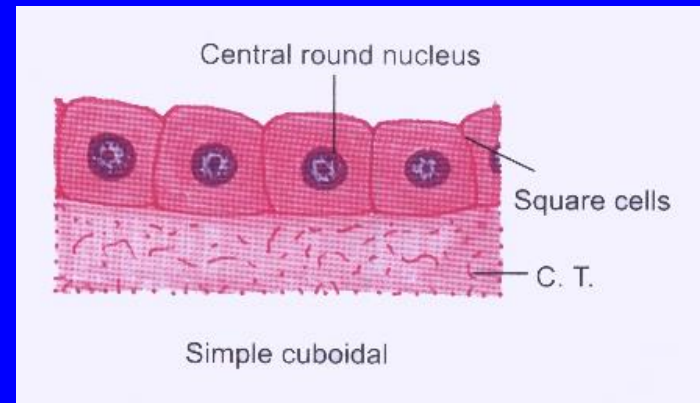
I. Simple Epithelium

2- Simple Cuboidal Epithelium:

One layer of cuboidal cells with central rounded nuclei.

Example of sites:

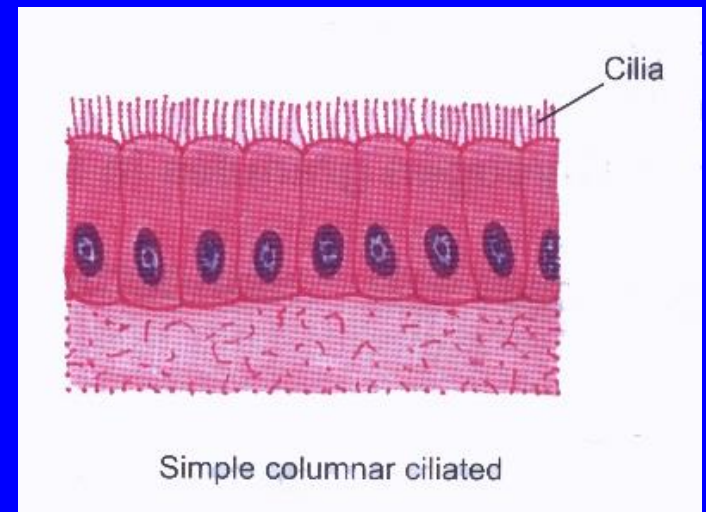
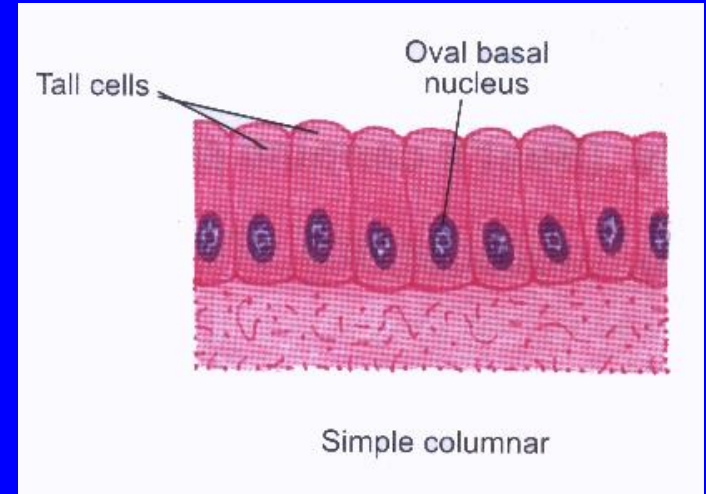
- Thyroid follicles.



I. Simple Epithelium

3- Simple Columnar Epithelium:

- One layer of columnar cells with basal oval nuclei.
- Types:
 - » Non-ciliated:
Example of sites: Lining of stomach, gall bladder & intestines (with goblet cells).
 - » Ciliated: with cilia on free surface.
Example of sites: Fallopian tubes.



I. Simple Epithelium

4- Pseudo-Stratified Columnar:

- One layer of columnar cells.
- Some cells are tall.
- Others are short and don't reach the surface.
- All cells rest on the basement membrane.
- Nuclei appear at different levels.

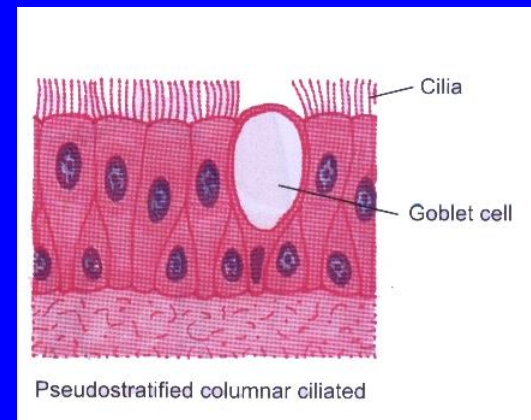
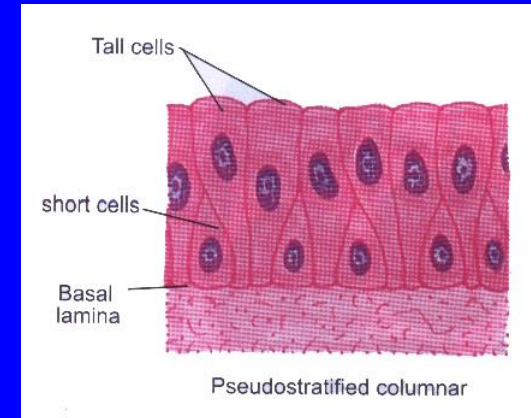
■ Types:

» Non-ciliated:

Example of sites: vas deferens.

» Ciliated with Goblet Cells:

Example of sites (Respiratory Epithelium): trachea & bronchi.



II. Stratified Epithelium

1- Stratified Squamous Epithelium:

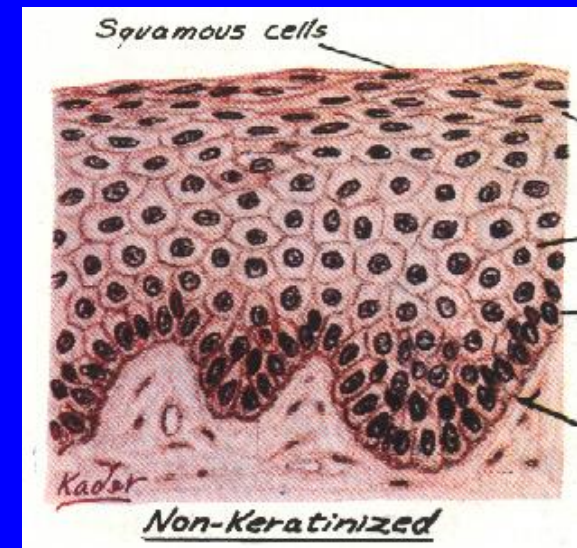
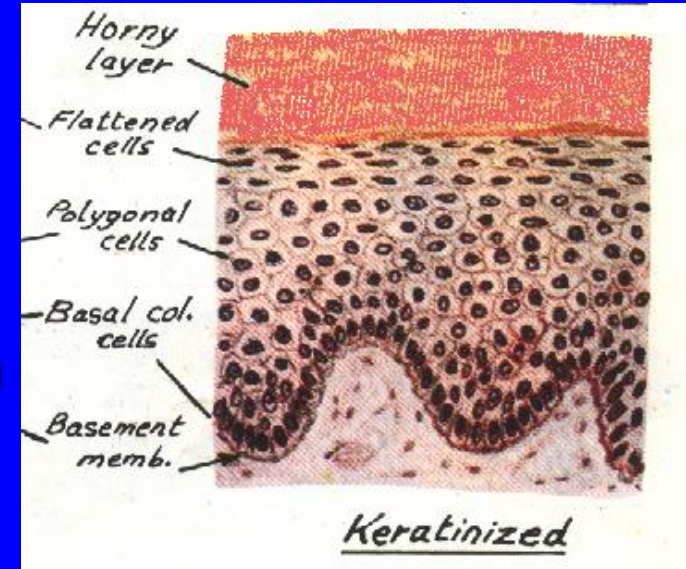
- Multiple layers of cells.
- Basal cells are columnar with basal oval nuclei.
- Intermediate cells are polygonal with central rounded nuclei.
- Surface cells are flat with flattened nuclei.
- Types:

» Keratinized: with a layer of keratin on the surface.

Example of sites: epidermis of skin.

» Non-keratinized: without a layer of keratin on the surface.

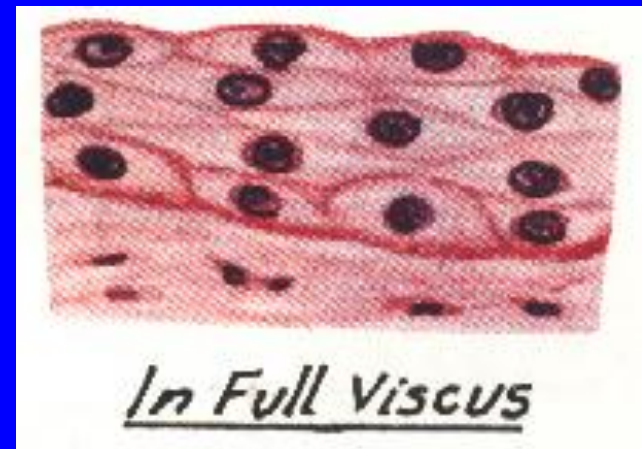
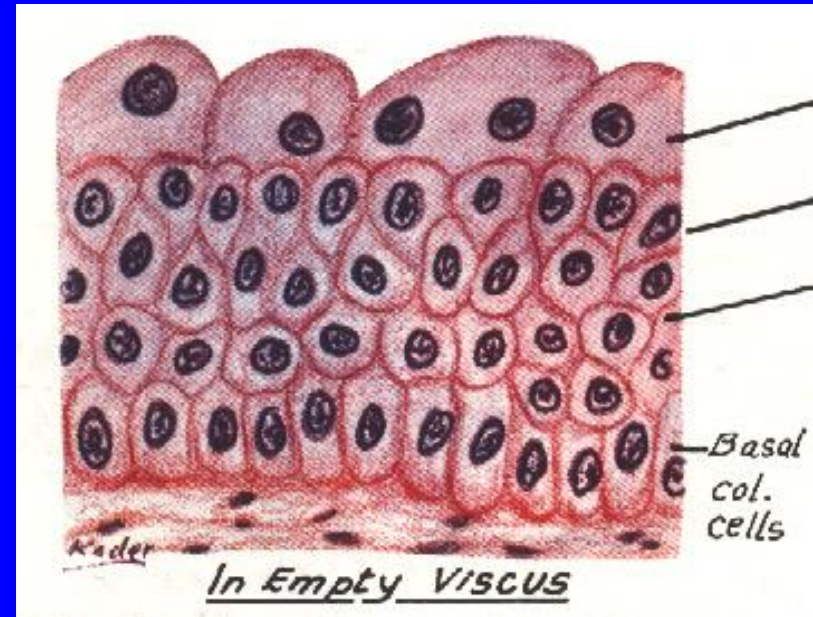
Example of sites: esophagus.



II. Stratified Epithelium

2- Transitional Epithelium:

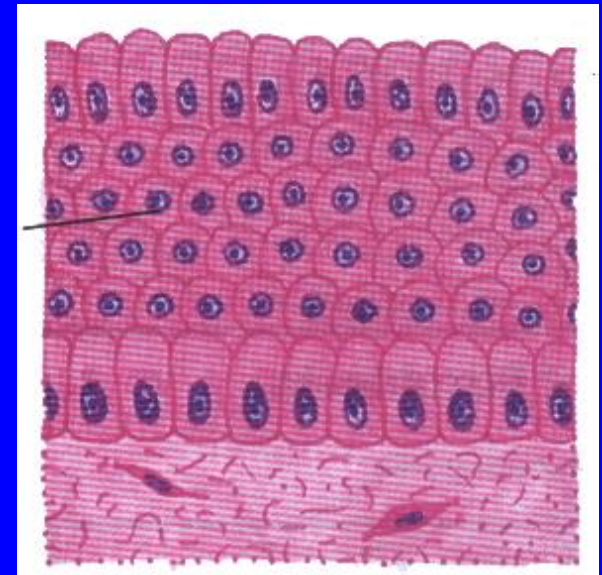
- Multiple layers of cells.
- Basal cells are columnar.
- Intermediate cells are polygonal.
- Surface cells large cuboidal with convex free surface and may be binucleated.
- Example of sites: Urinary bladder.



II. Stratified Epithelium

3- Stratified Columnar Epithelium:

- Multiple layers of cells.
- Basal cells are columnar.
- Intermediate cells are polygonal.
- Surface cells are columnar.
- Example of sites: large ducts of glands.



GLANDS (Glandular Epithelium)

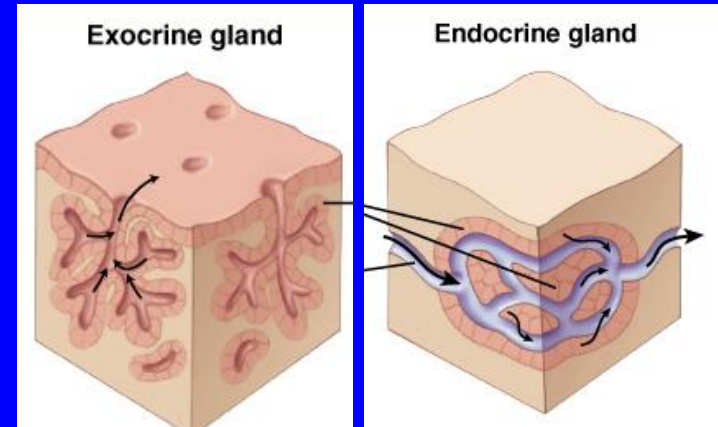
Classification:

1- According to presence or absence of ducts:

- a. Exocrine: e.g. salivary glands.
- b. Endocrine: e.g. thyroid gland.
- c. Mixed: e.g. pancreas.

2- According to number of cells:

- a. Unicellular: e.g. goblet cells.
- b. Multicellular: e.g. salivary glands.

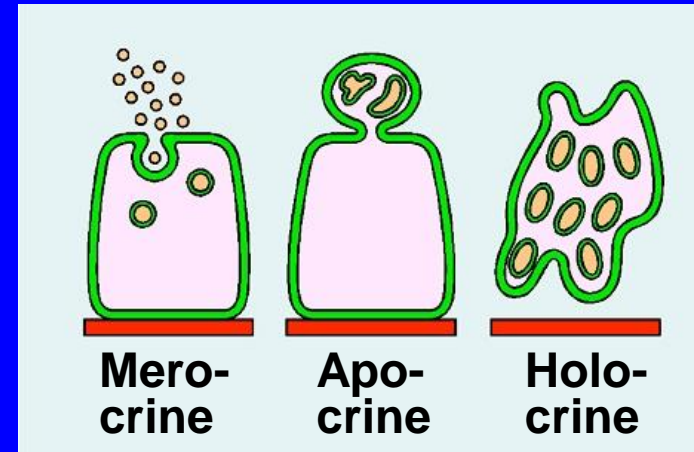


GLANDS (Glandular Epithelium)

Classification:

3- According to mode of secretion:

- a. Merocrine: No part of the cell is lost with the secretion, e.g. salivary glands.
- b. Apocrine: The top of the cell is lost with the secretion, e.g. mammary gland.
- c. Holocrine: The whole cell detaches with the secretion, e.g. sebaceous glands.

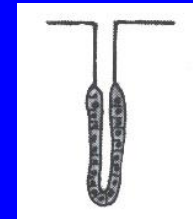


GLANDS (Glandular Epithelium)

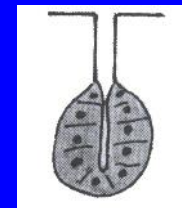
Classification:

4- According to shape of secretory part:

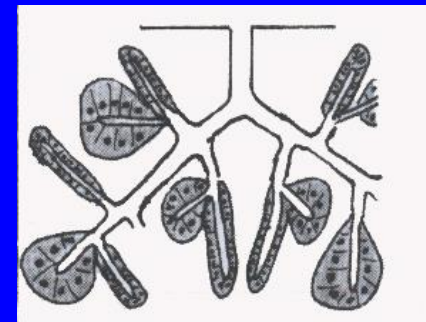
1. Tubular: e.g. intestinal gland.



2. Alveolar (acinar): e.g. mammary gland.



3. Tubulo-alveolar: e.g. pancreas.

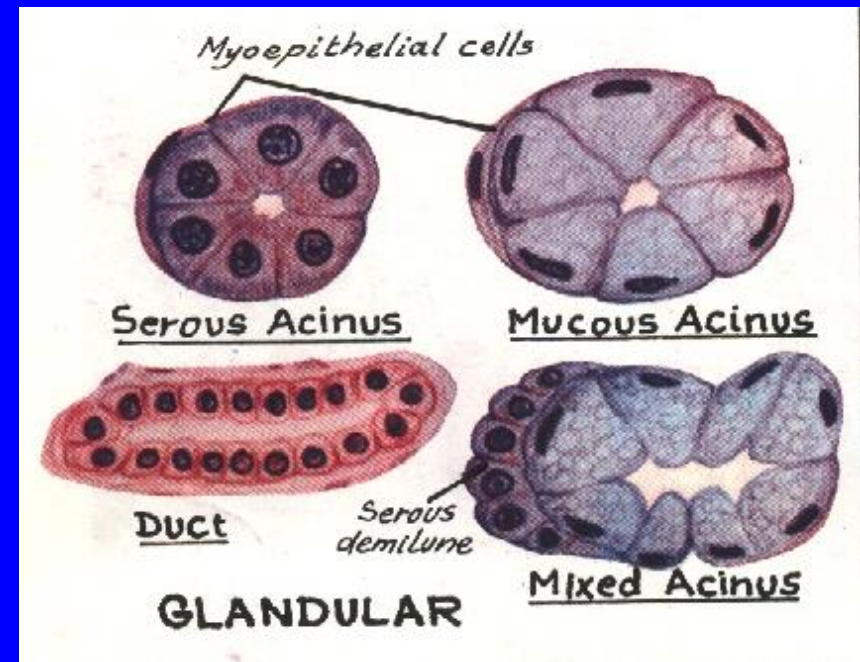


GLANDS (Glandular Epithelium)

Classification:

5- According to nature of secretion:

- a. Serous: e.g. parotid gland.
- b. Mucous: e.g. goblet cells.
- c. Muco-serous:
e.g. sublingual gland.
- d. Watery: e.g. sweat gland.



FUNCTIONS OF EPITHELIUM

- 1- Protection as in epidermis of skin.
- 2- Secretion as in glands.
- 3- Absorption as in small intestine.
- 4- Excretion as in kidney.
- 5- Reproduction as in gonads.
- 6- Smooth lining as in blood vessels.

Clinical Applications

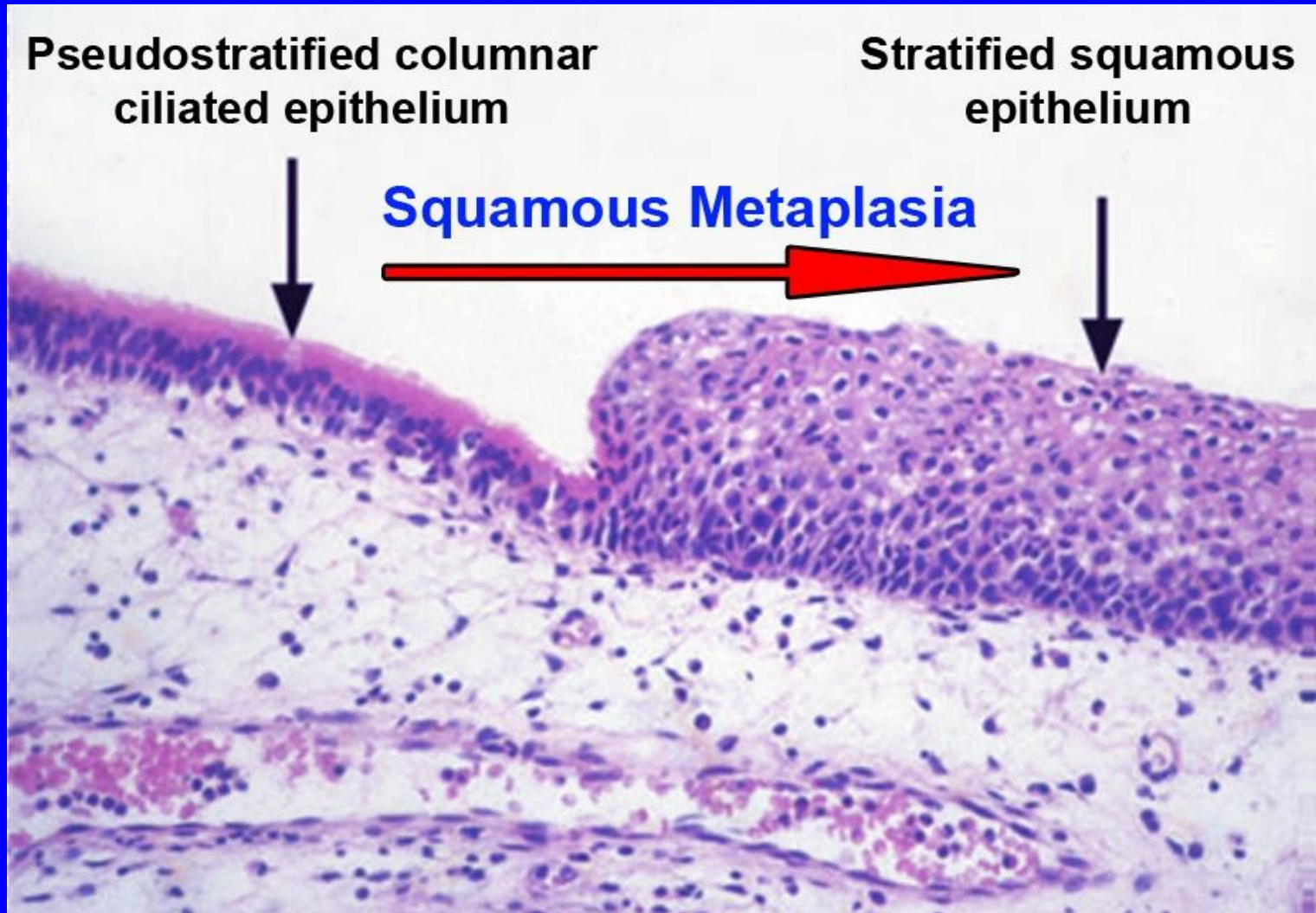
- **Immotile cilia syndrome (Kartegener's syndrome):**
 - Disorder that causes infertility in male and chronic respiratory tract infection in both sexes.
 - It is caused by immobility of cilia and flagella induced by **deficiency of dynein**.
 - Dynein protein is responsible for movements of cilia and flagella.

Clinical Applications

■ Metaplasia:

- It is the **transformation of one type of tissue to another** in response to injury. This condition is usually reversible if the injury is removed.
- Example: pseudostratified ciliated columnar epithelium of the respiratory passages, e.g. trachea, of heavy smokers may undergo squamous metaplasia, transforming into stratified squamous epithelium.

Squamous Metaplasia



Thank You