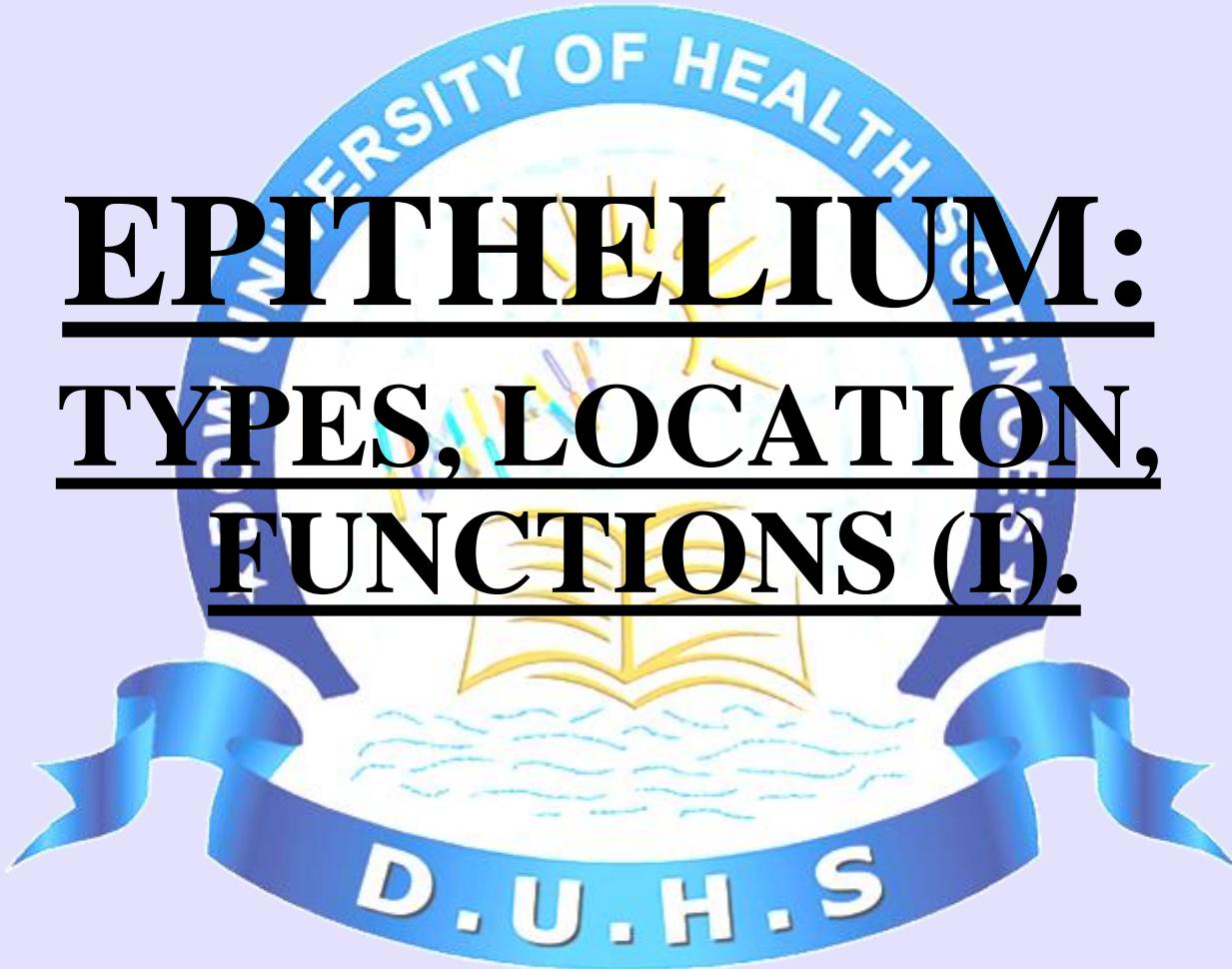


EPITHELIUM:

TYPES, LOCATION,

FUNCTIONS (I).



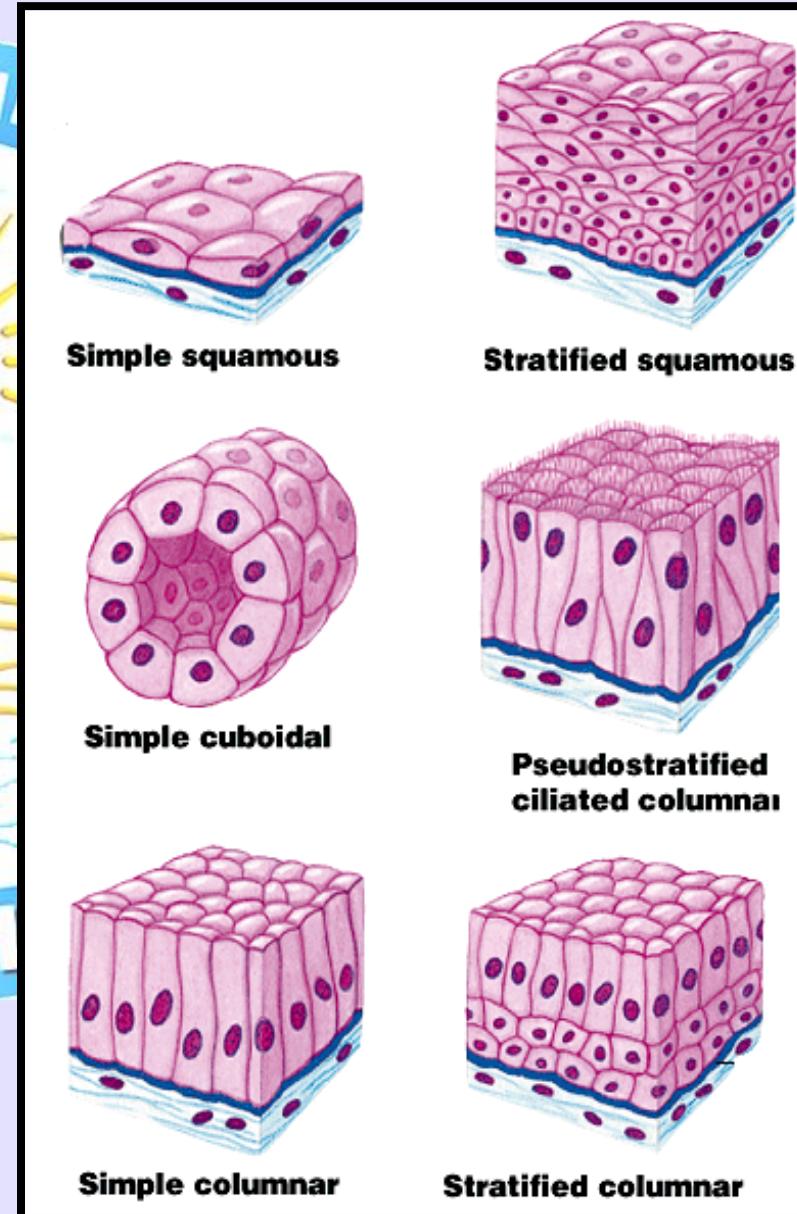
LEARNING OBJECTIVES

➤ At the end of the lecture, students should be able to:

- Define epithelium.
- Discuss general features of Epithelial cells (basal, apical and lateral surfaces).
- Describe the classification of covering epithelium.
- Describe the different types of simple epithelium.
- Describe the location and function of different types of simple epithelium.
- Differentiate between basement membrane and basal lamina.

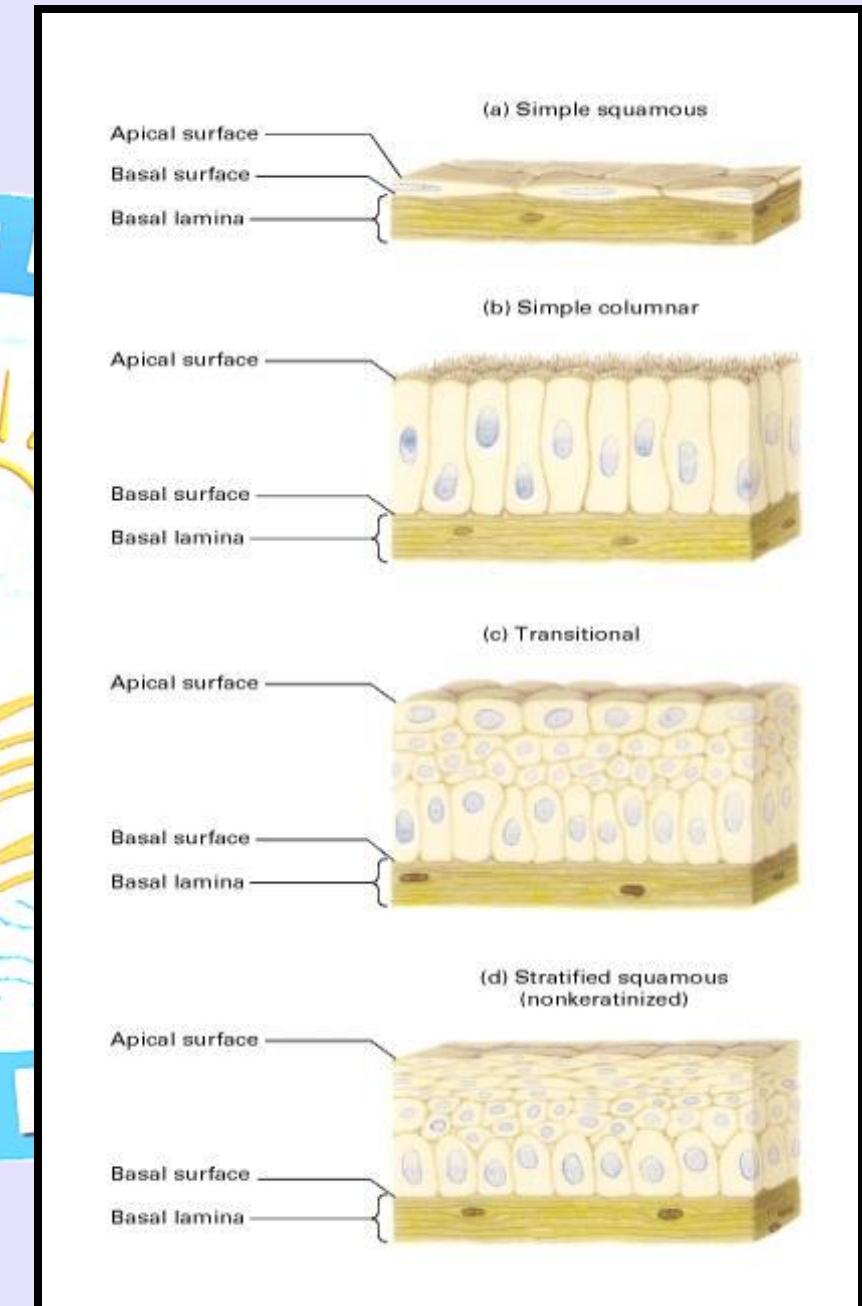
EPITHELIUM OR EPITHELIAL TISSUE

- Epithelium is a tissue composed of cells that line the cavities and surfaces of structures throughout the body.
- Epithelium itself is avascular, but supported by loose connective tissue containing many blood vessels..



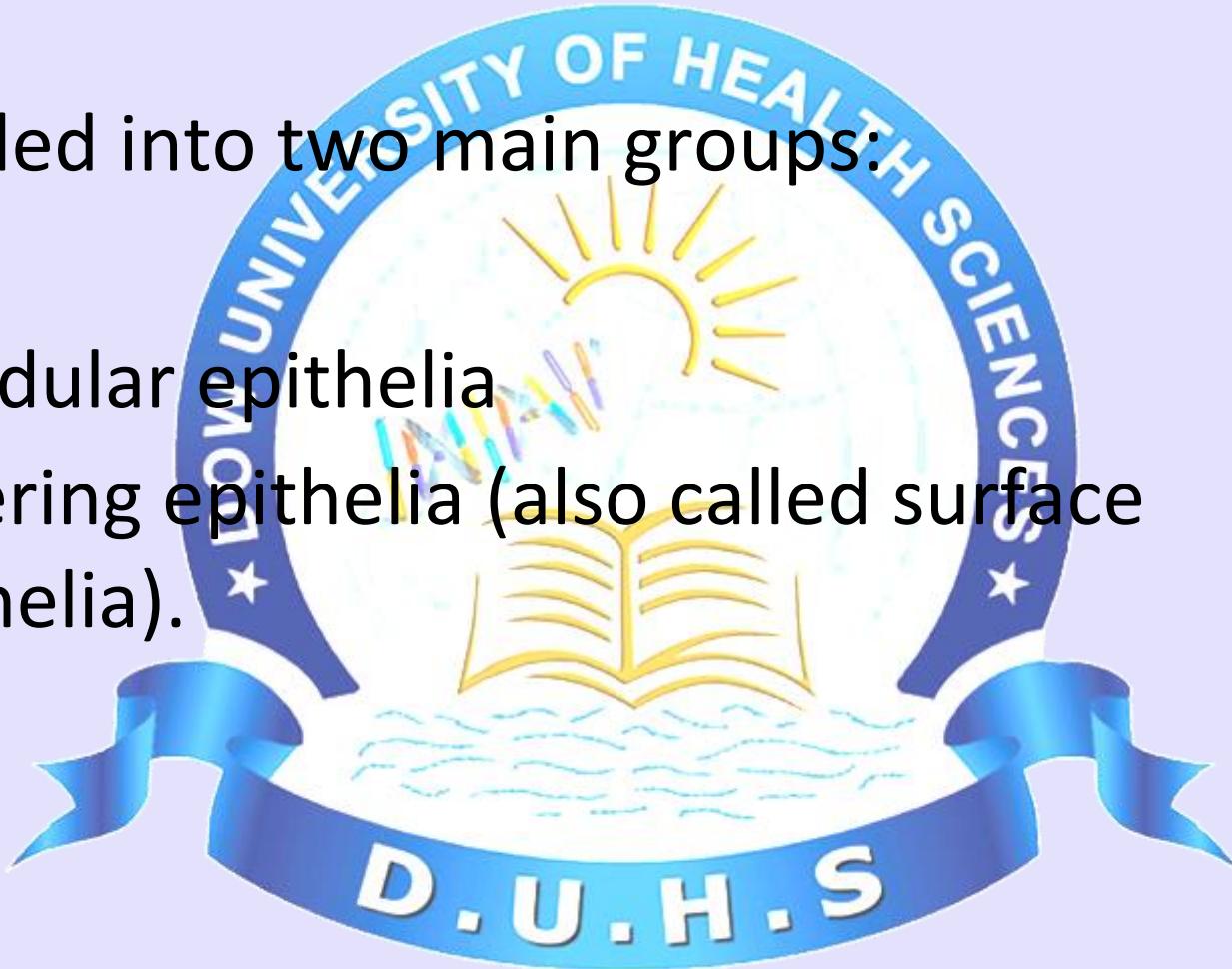
EPITHELIUM

- Epithelium is resting and supported by a membrane, called as Basement Membrane
- This pole or surface of epithelium is called as **attached pole or surface or Base**.
- The pole or surface of epithelium lies away from the basement membrane is called as **free pole or surface or Apex**.
- **The cell surface between two adjacent cells is a lateral surface**
- These arrangement in cells is called as Polarity of cells.



EPITHELIUM

- Divided into two main groups:
 1. Glandular epithelia
 2. Covering epithelia (also called surface epithelia).



GLANDULAR EPITHELIUM

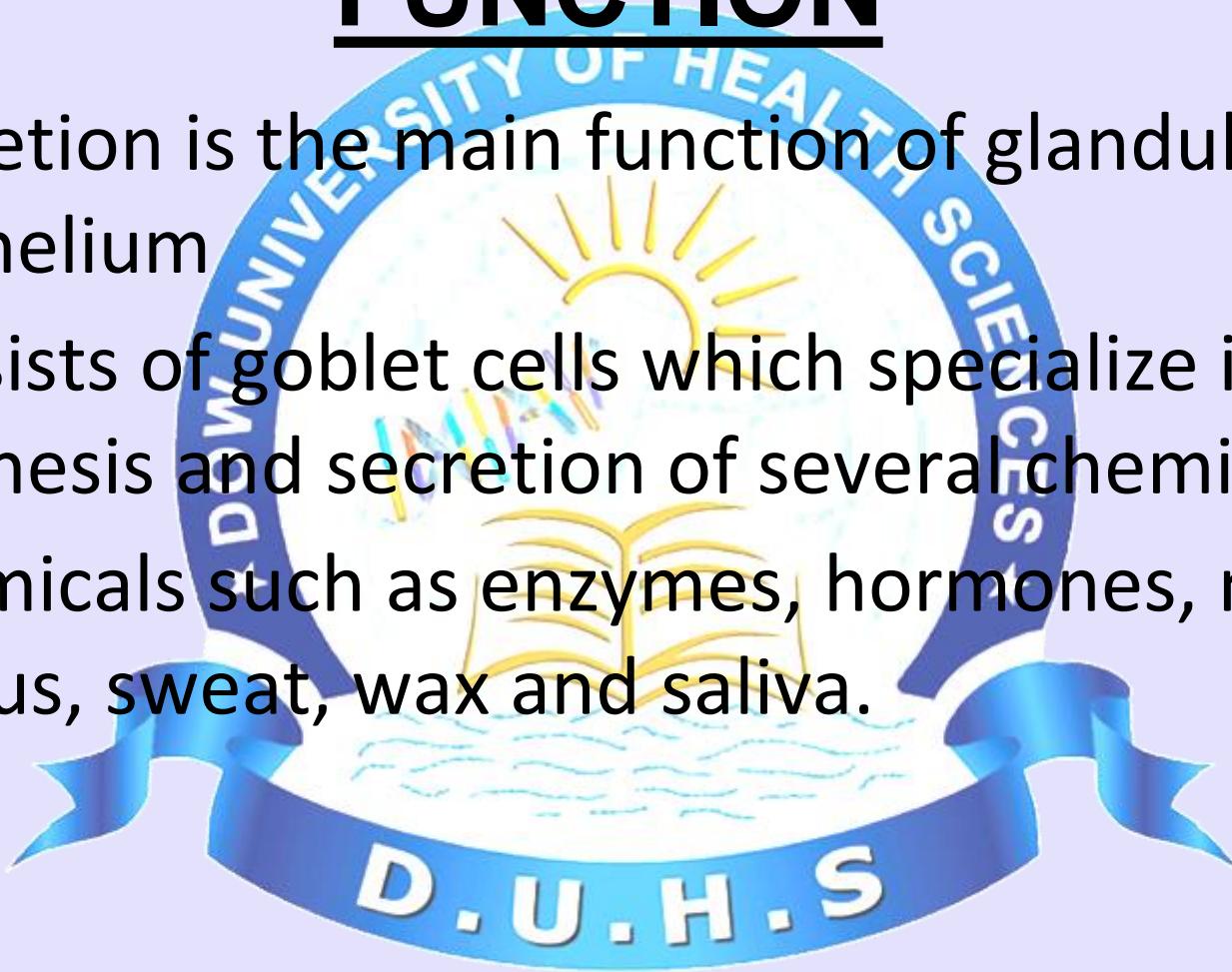
CHARACTERISTICS.

- One peculiar characteristic of epithelial cell is that the cells are closely packed together, with little or no intracellular spaces.
- The cells are cuboidal in shape with multiple layers.
- Cells are filled with substantial amount of clear, transparent cytoplasm.
- The cells multiply by the process of simple mitosis.

GLANDULAR EPITHELIUM

FUNCTION

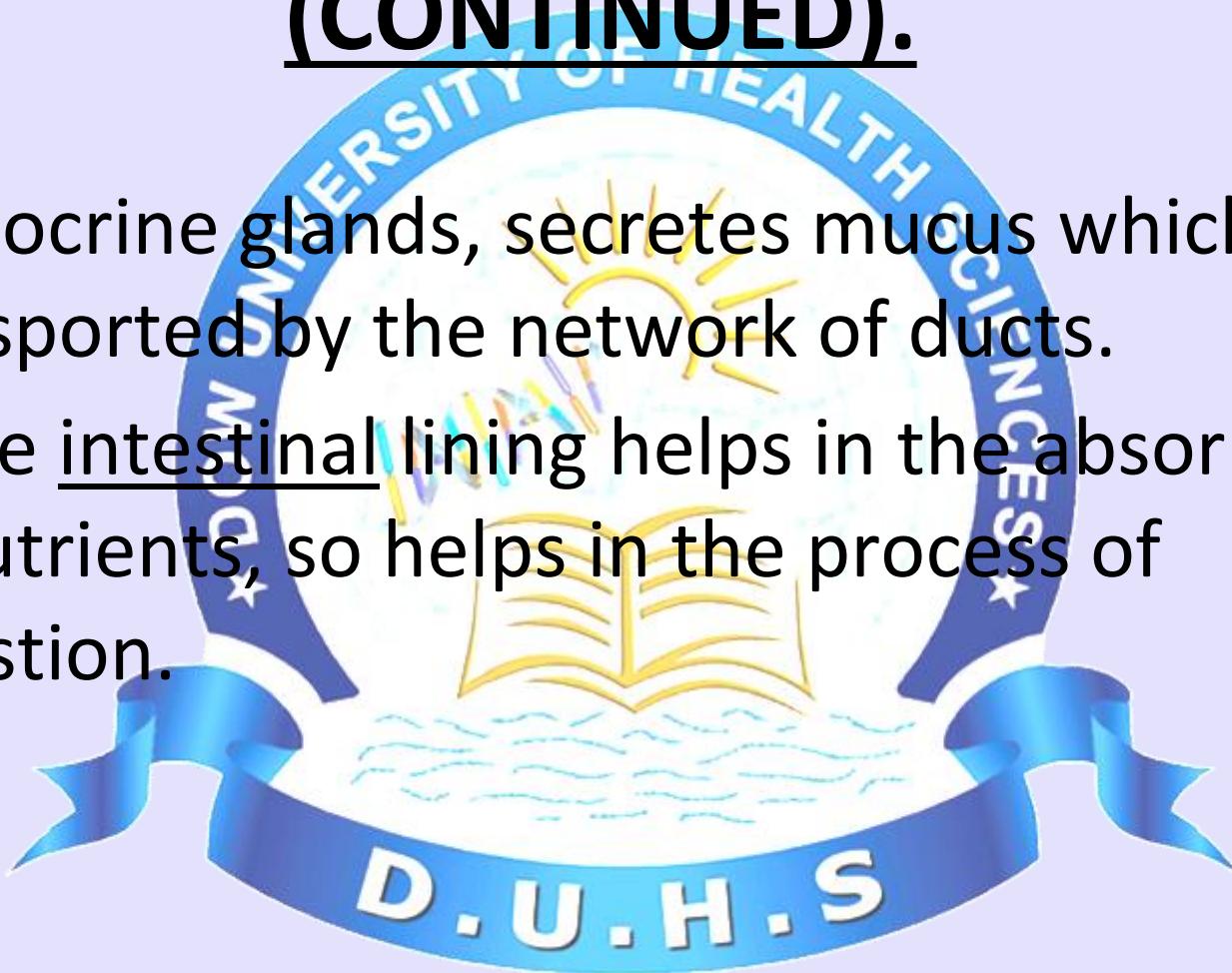
- Secretion is the main function of glandular epithelium
- Consists of goblet cells which specialize in synthesis and secretion of several chemicals.
- Chemicals such as enzymes, hormones, milk, mucus, sweat, wax and saliva.



GLANDULAR EPITHELIUM FUNCTION.

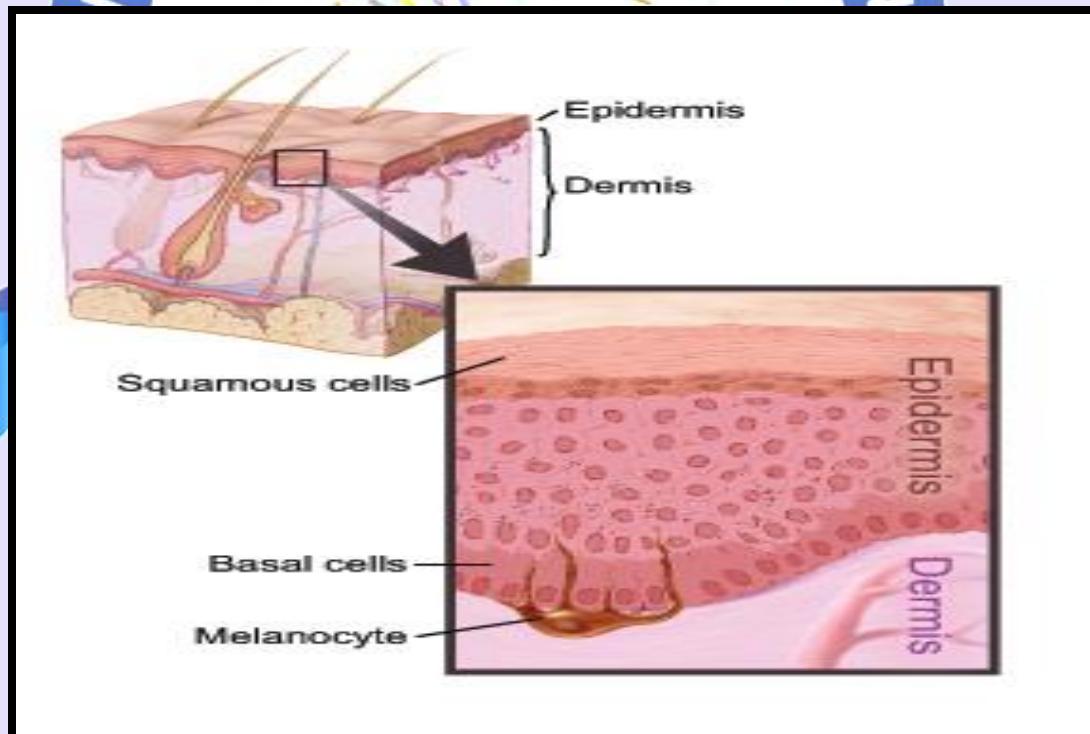
(CONTINUED).

- In exocrine glands, secretes mucus which is transported by the network of ducts.
- In the intestinal lining helps in the absorption of nutrients, so helps in the process of digestion.



COVERING EPITHELIA

- In which cells are organized in layers.
- Most obvious example is the epidermis of skin.
- It covers the external surface of body.



CLASSIFICATION

- BASIS:
- NUMBER OF CELLS:

- Single.
- Stratified.
- Pseudo-stratified

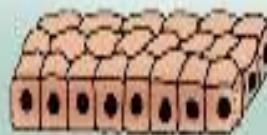
- SHAPE OF CELLS:

- Squamous.
- Cuboidal.
- Columnar.

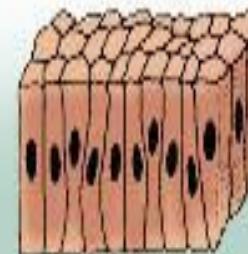
Types of Epithelium



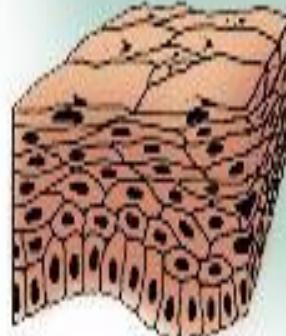
Simple squamous



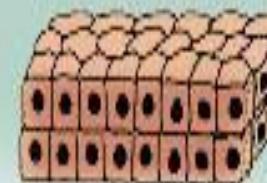
Simple cuboidal



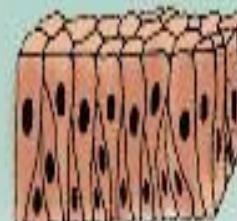
Simple columnar



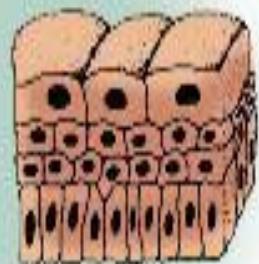
Stratified squamous



Stratified cuboidal



Pseudostratified columnar



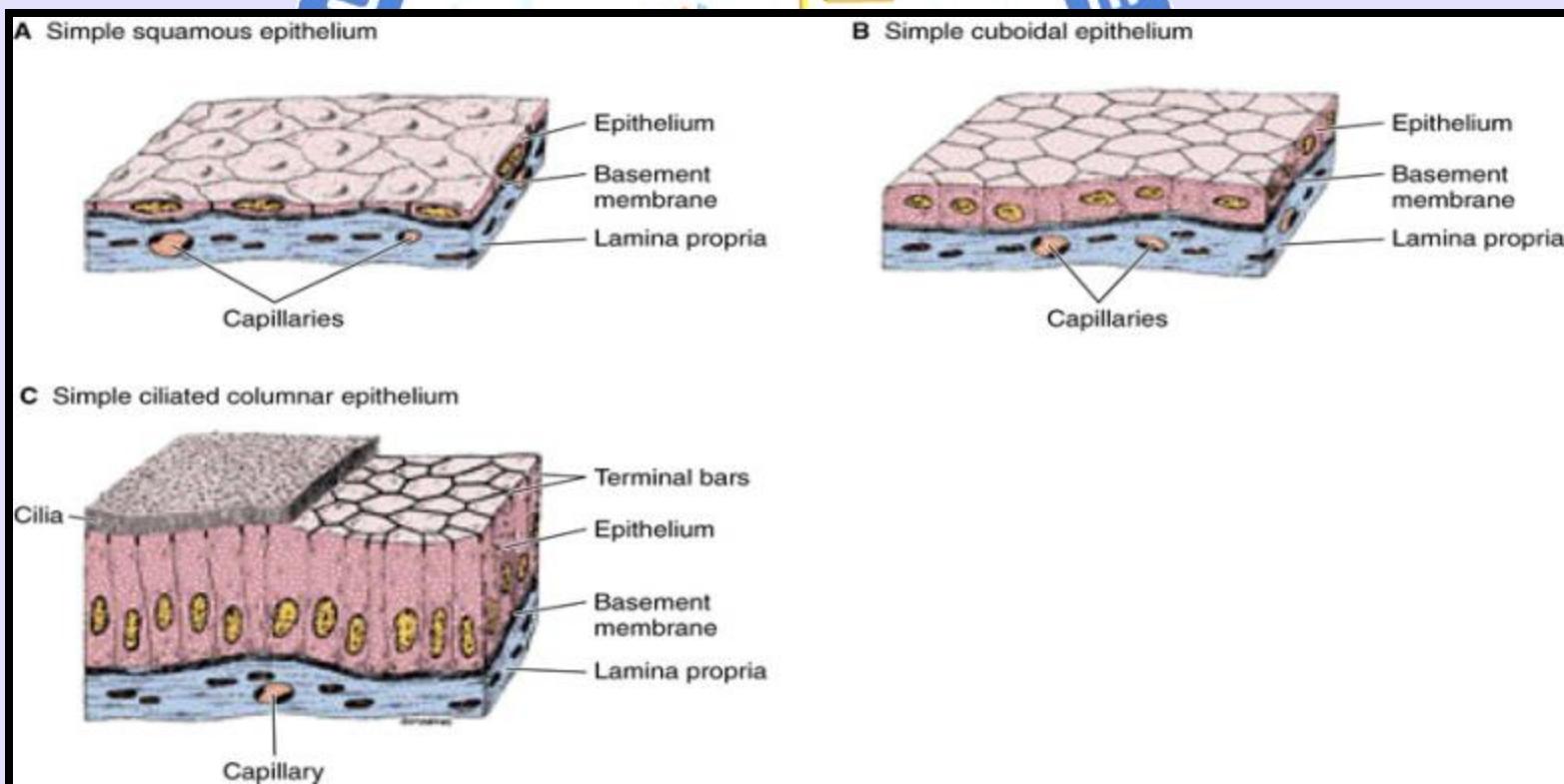
Transitional

CLASSIFICATION OF COVERING EPITHELIUM

- According to the number of the layers, covering epithelia can be classified into:-
- **Simple Epithelium**:- It contains only one layer of cells, resting on the basement membrane.
- **Stratified Epithelium**:- It contains more than one layers of the cells.
- **Pseudostratified Epithelium**:- It is a single layer epithelium, but under the microscope gives a false impression of stratification.

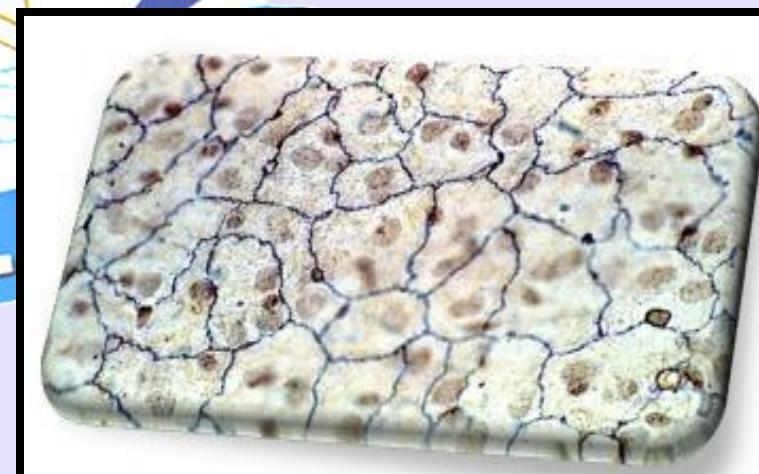
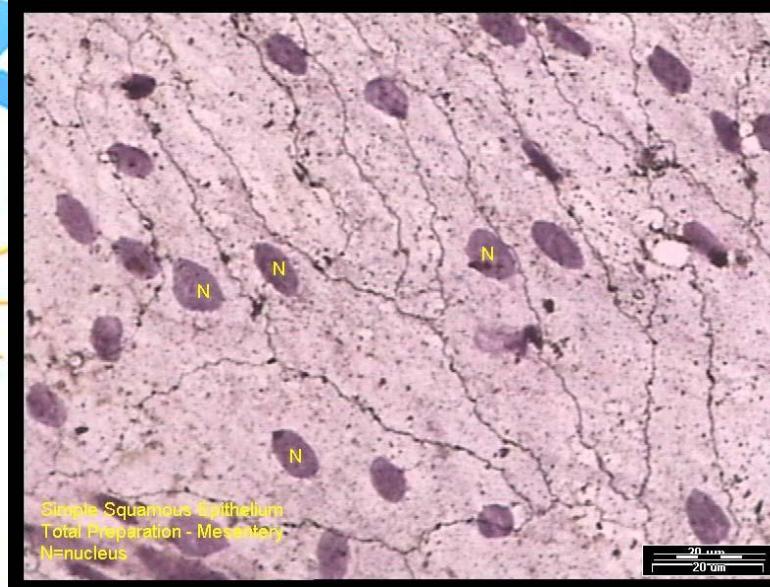
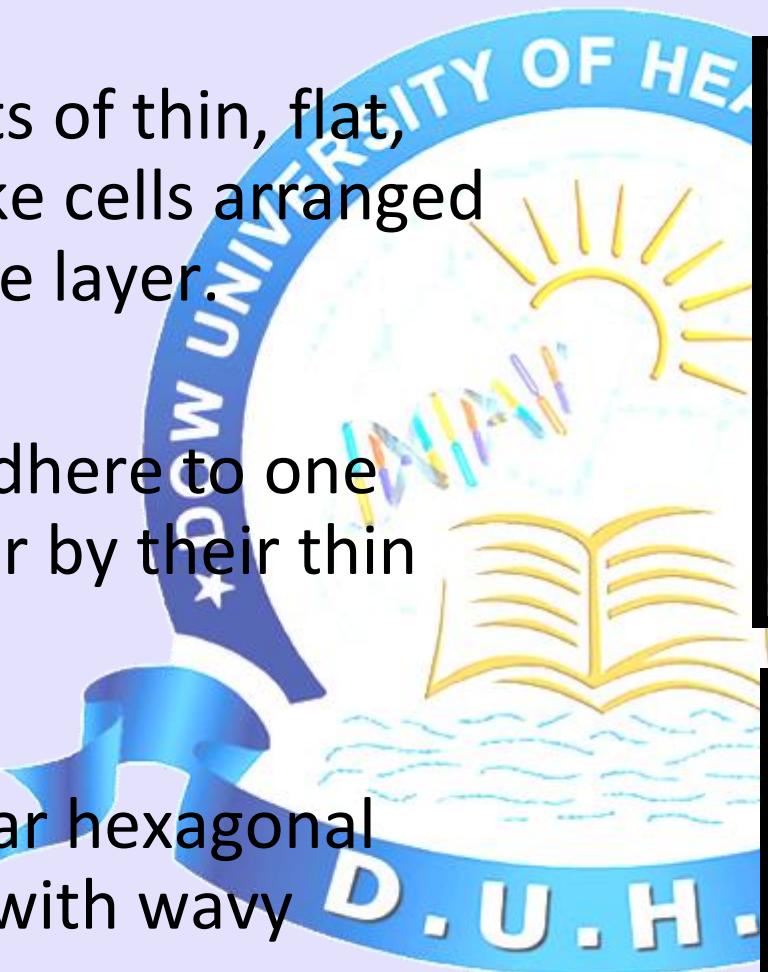
CLASSIFICATION OF SIMPLE EPITHELIUM

- According to the shape of the cells, it can be classified into:-
- Simple Squamous Epithelium.
 - Simple Cuboidal Epithelium.
 - Simple Columnar Epithelium.



SIMPLE SQUAMOUS EPITHELIUM.

- Consists of thin, flat, platelike cells arranged in single layer.
- They adhere to one another by their thin edges.
- Irregular hexagonal shape with wavy outline.



DISTRIBUTION OF SIMPLE SQUAMOUS EPITHELIUM

1. Lining of :-

- (a) Pleural, pericardial & peritoneal cavities (Mesothelium).
- (b) Heart and all blood & lymph vessels (Endothelium).
- (c) Alveoli of Lung.
- (d) Membranous labyrinth of internal Ear.
- (e) Internal surface of Ear-drum.

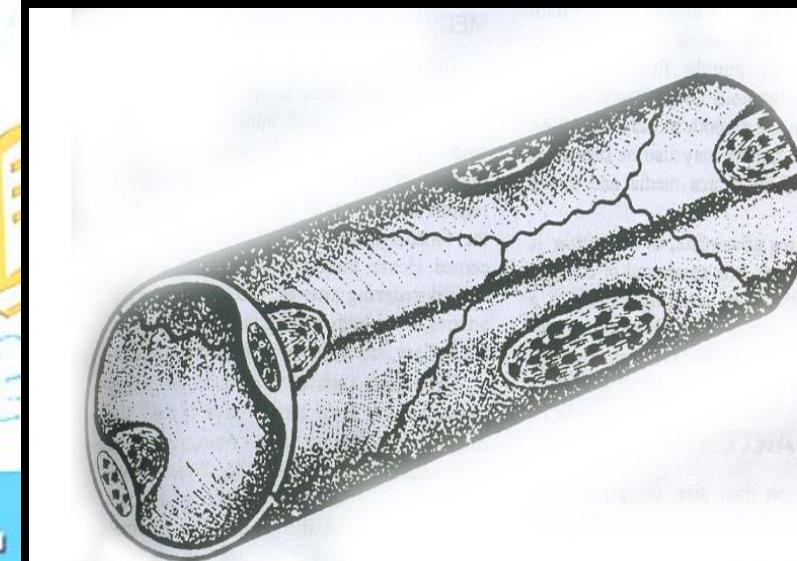


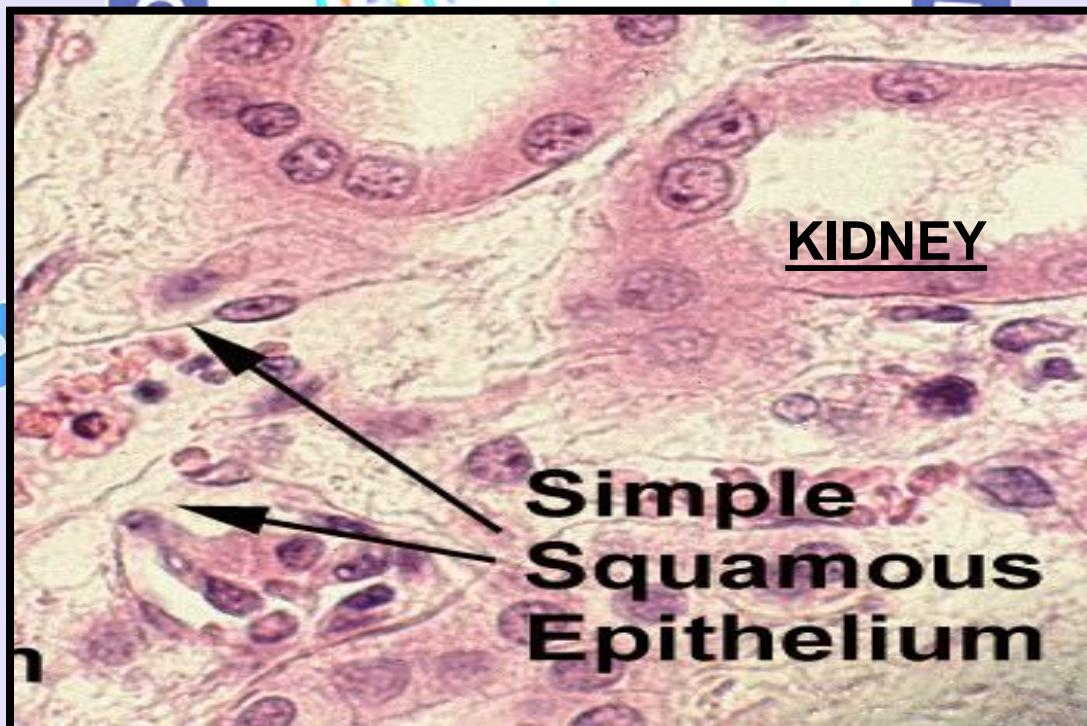
Diagram illustrating the arrangement of endothelial cells forming the wall of a capillary.

DISTRIBUTION OF SIMPLE SQUAMOUS EPITHELIUM

(CONTINUED).

2. In Kidney:-

- Parietal layer of Bowman's capsule.
- Thin segment of Loop of Henle.

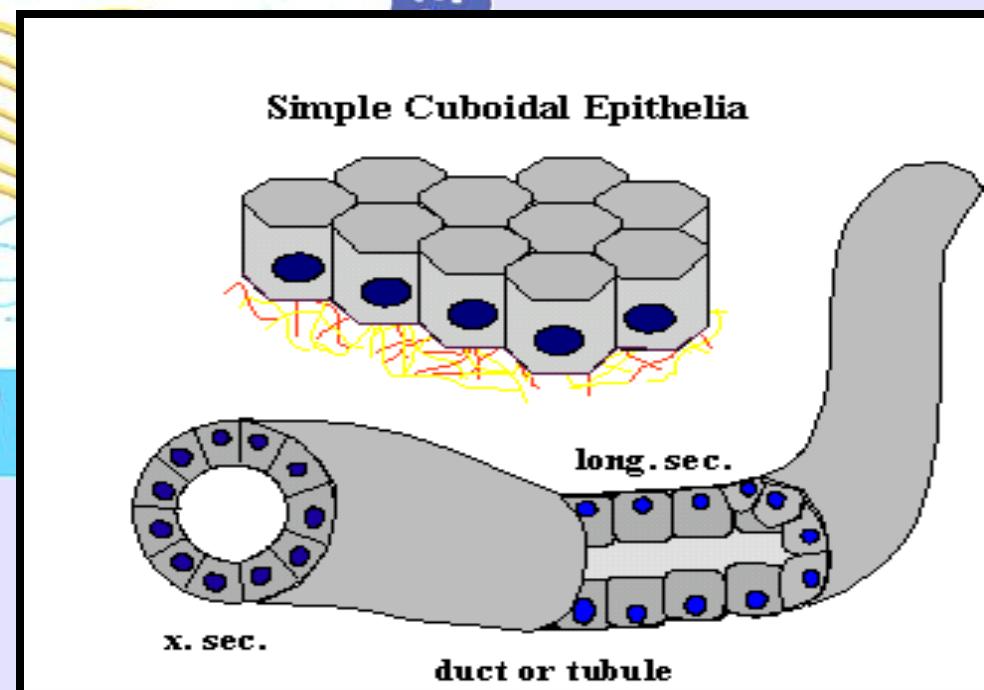
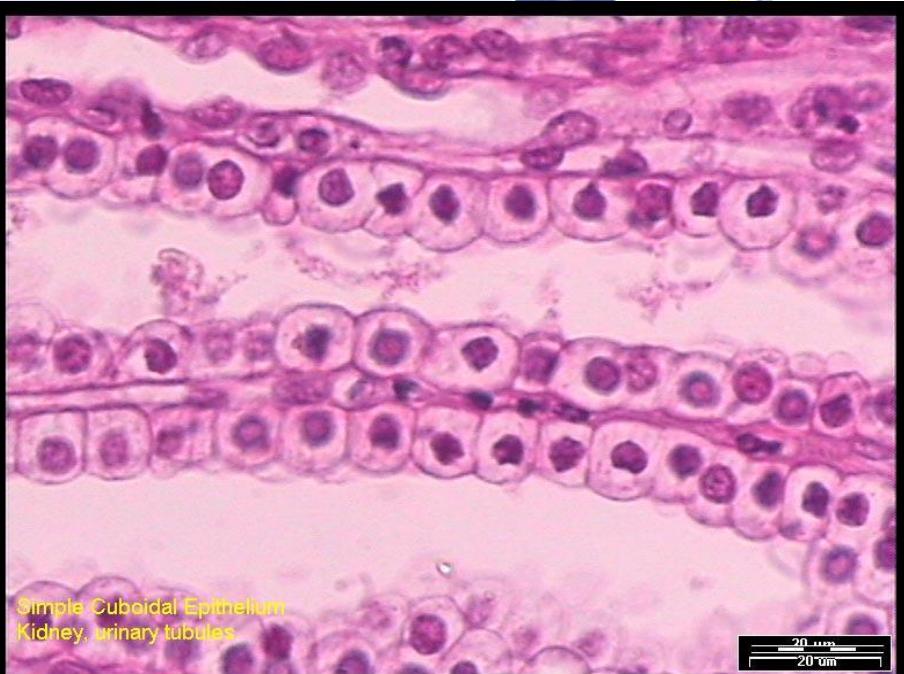


SIMPLE CUBOIDAL EPITHELIUM

- single layer of cells that have equal height and width.
- Nucleus is round and centrally located.



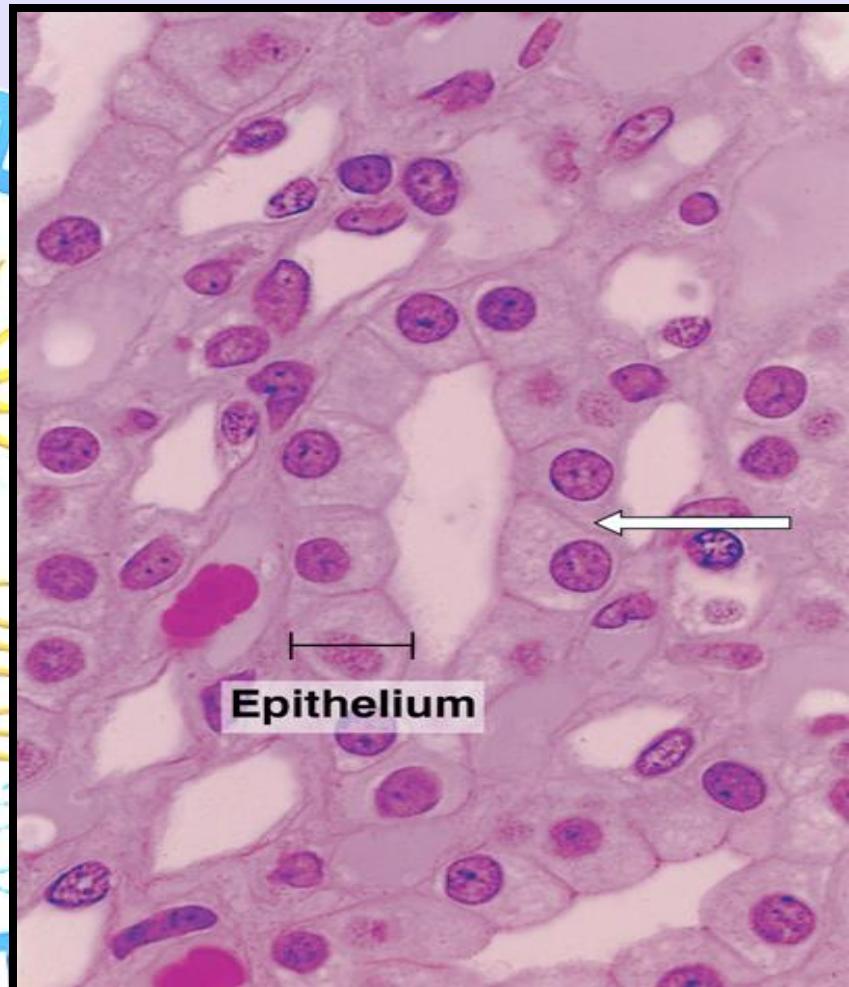
Simple Cuboidal Epithelium



SIMPLE CUBOIDAL EPITHELIUM

- **Distribution:-**

1. Covering epithelium of ovary (germinal epithelium).
2. Alveoli (acini) & tubules of many glands.
3. Follicles of inactive Thyroid gland.
4. Inner surface of lens.
5. Choroids plexuses.
6. Pigment cell layer of Retina.



Simple cuboidal epithelium
(arrow) from kidney collecting
tubules.

SIMPLE COLUMNAR EPITHELIUM

- It consists of single layer of tall cells, resting on a continuous basement membrane.
- The height of the cells are greater than the thickness.



SIMPLE COLUMNAR EPITHELIUM

- Distribution :-

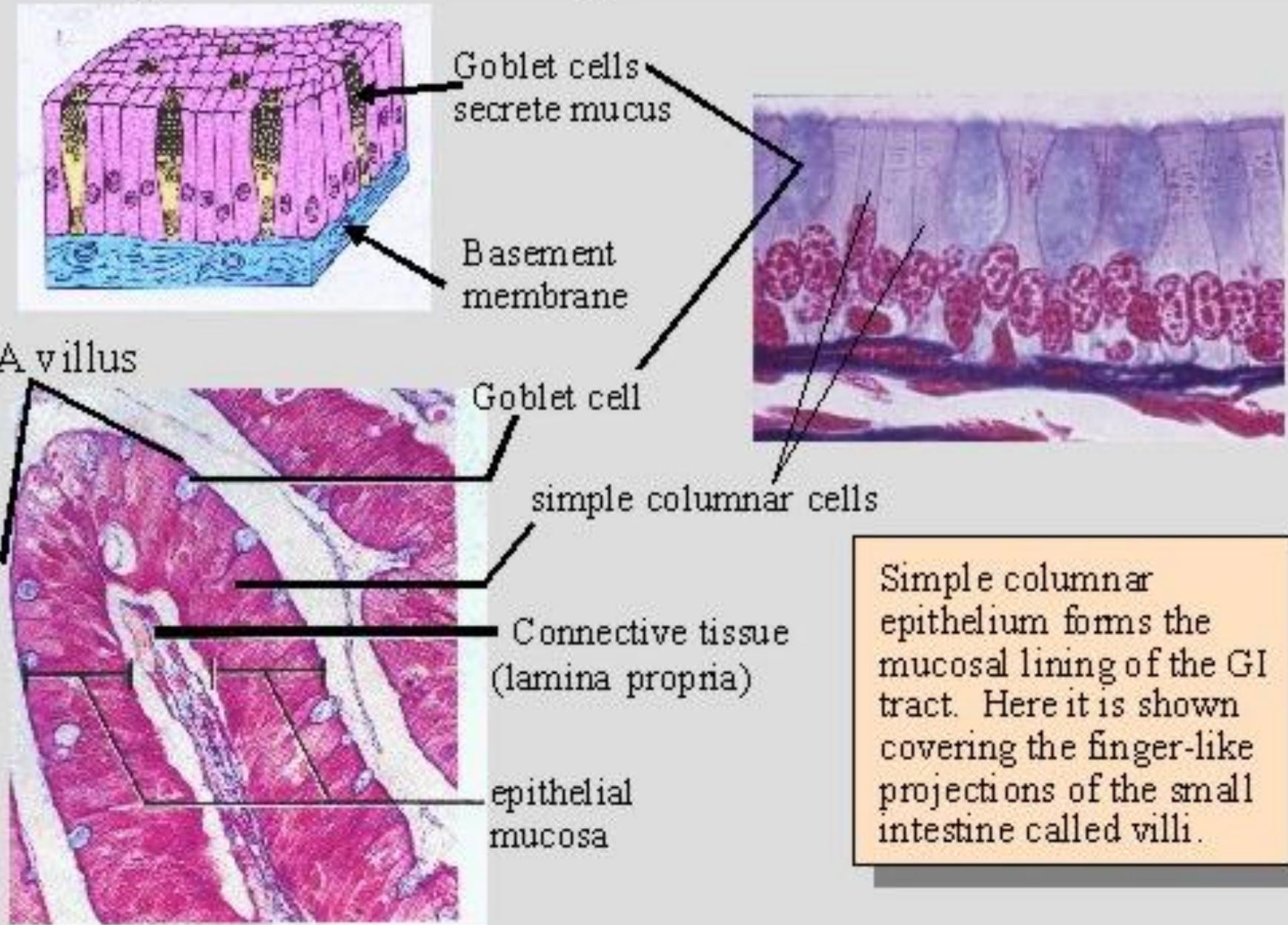
(A) Generally :-

1. GIT (from stomach to rectum).
2. Gallbladder.



Simple columnar epithelium formed by long cells with elliptical nuclei. The epithelium rests on the loose connective tissue of the lamina propria. A basal lamina (not visible) is interposed between the epithelial cells and the connective tissue. The round nuclei within the epithelial layer belong to lymphocytes that are migrating through the epithelium (arrows).

Simple Columnar Epithelium in the GI Tract

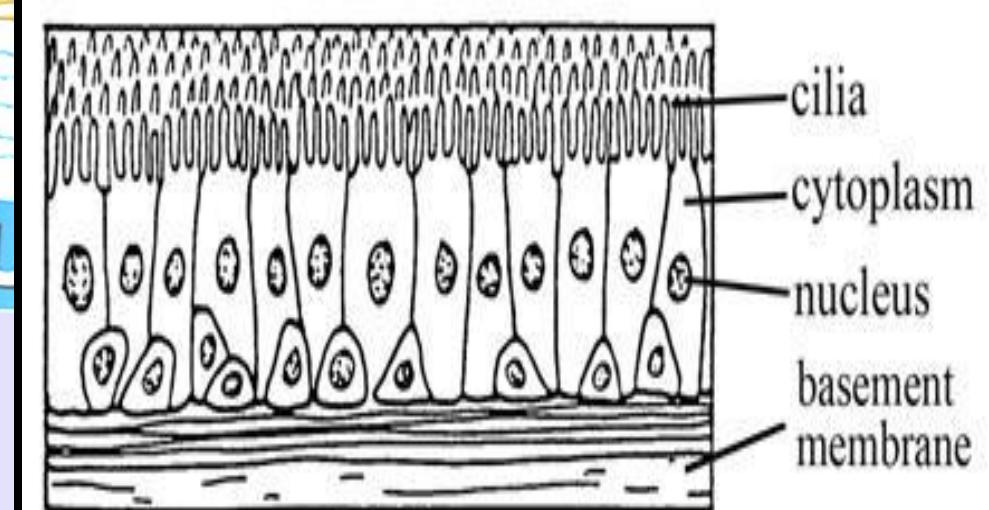
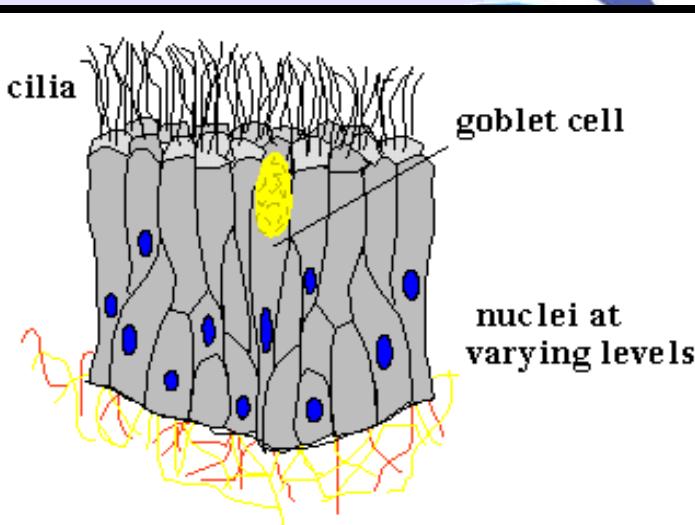


PSEUDOSTRATIFIED EPITHELIUM.

- It is a modification of simple columnar epithelium.
- Nuclei of cells lie at different levels, giving false appearance of being stratified.

Mainly lines:

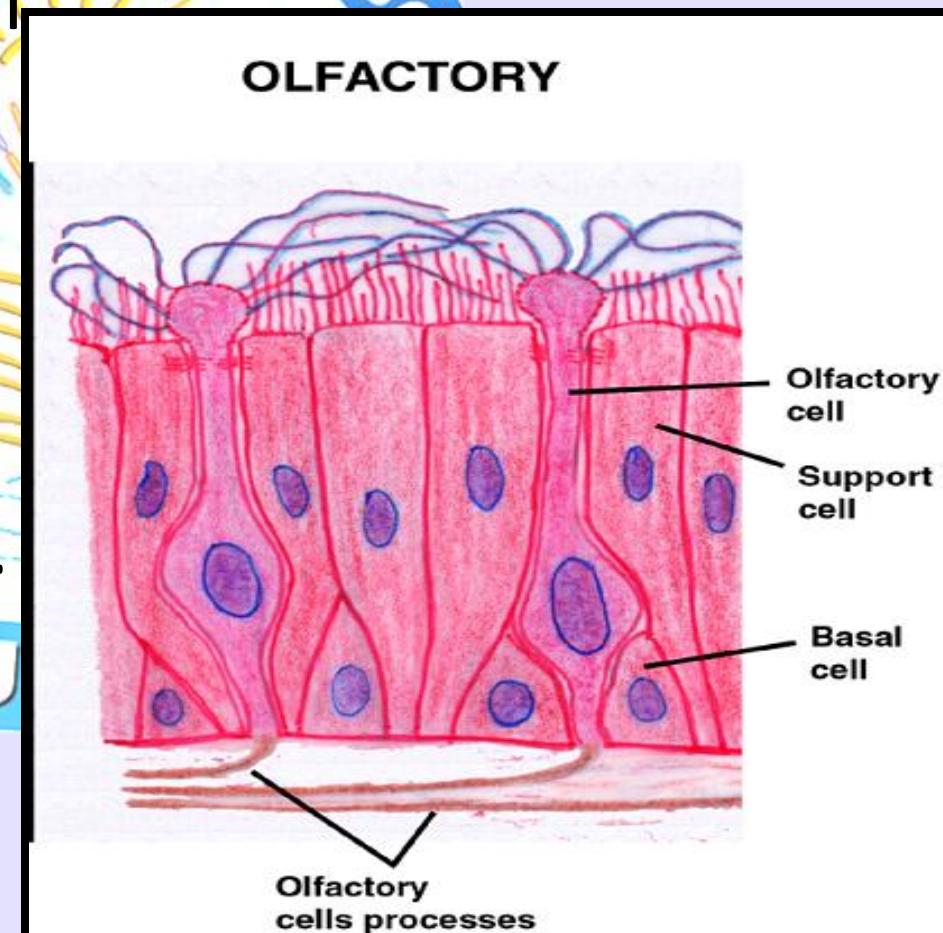
- the conducting part of respiratory system.
- Male genital tracts.



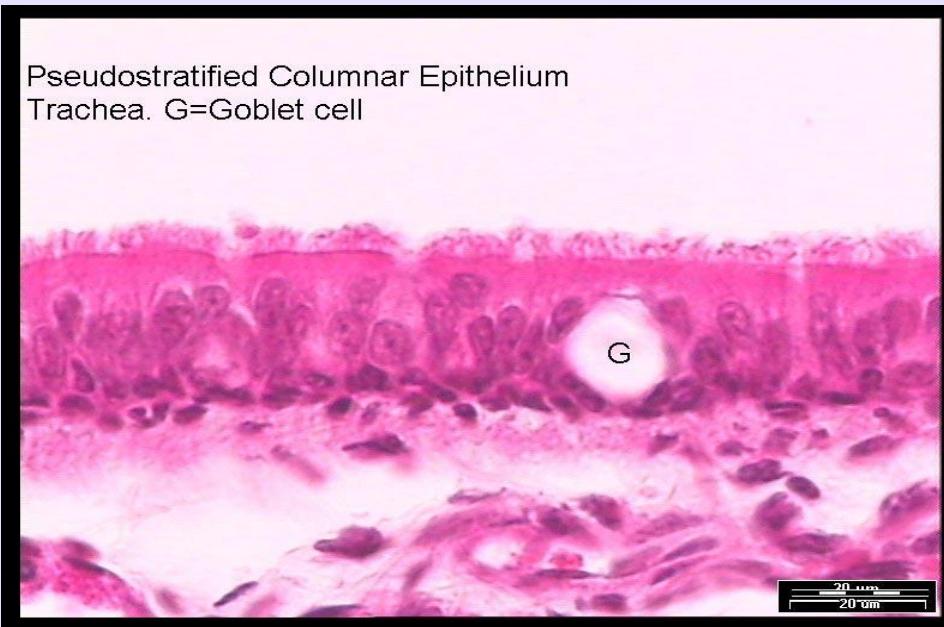
Modifications of Simple Columnar Epithelium (continued)

2. Neuroepithelium:-

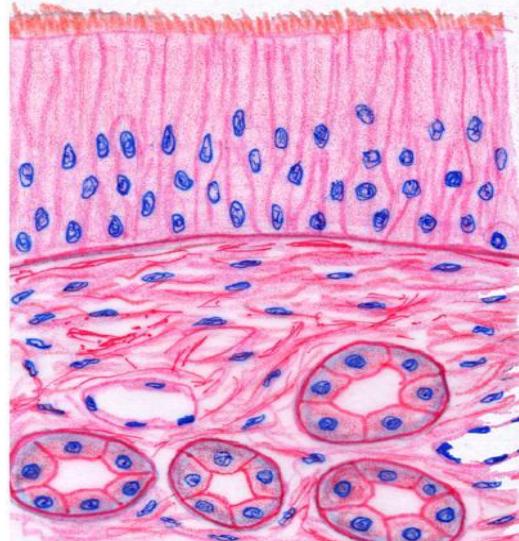
- It is usually consist of tall columnar cells.
- These cells have specialized sensory functions, eg.
 - a) Olfactory Epithelium.
 - b) Cells of Taste bud.



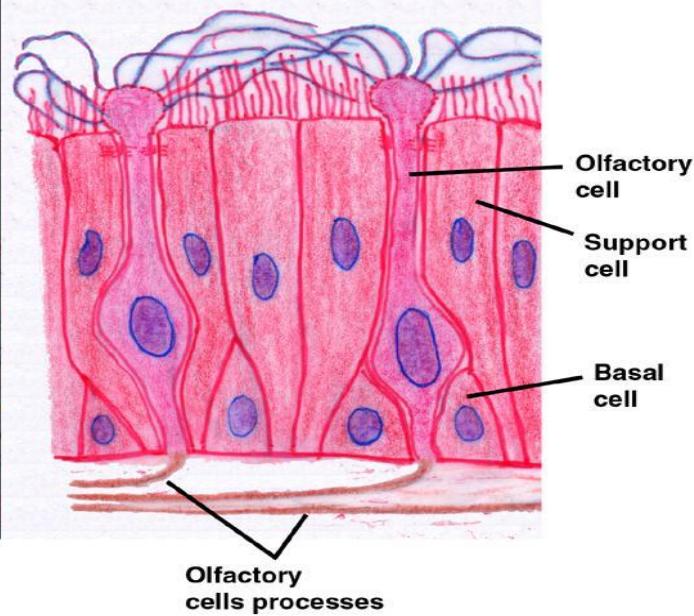
Pseudostratified Columnar Epithelium
Trachea. G=Goblet cell



RESPIRATORY



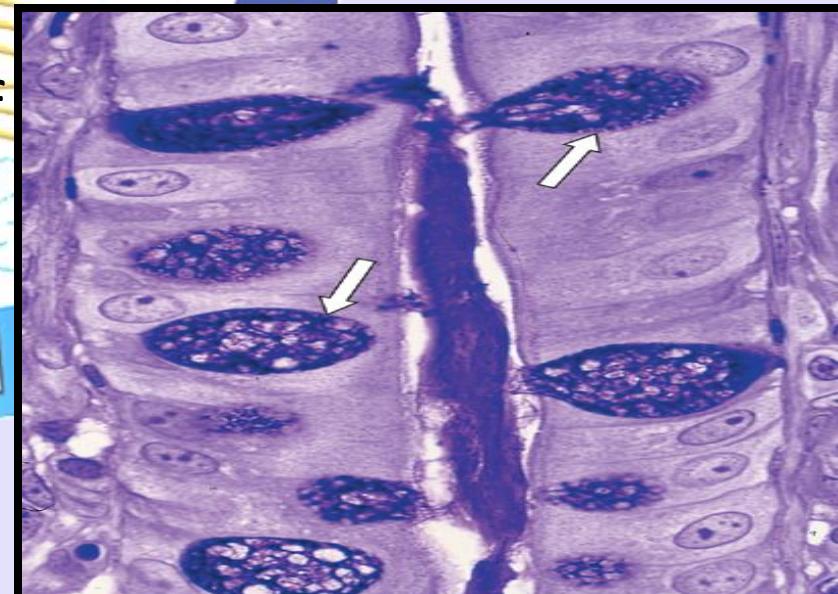
OLFACTORY



MODIFICATIONS OF SIMPLE COLUMNAR EPITHELIUM

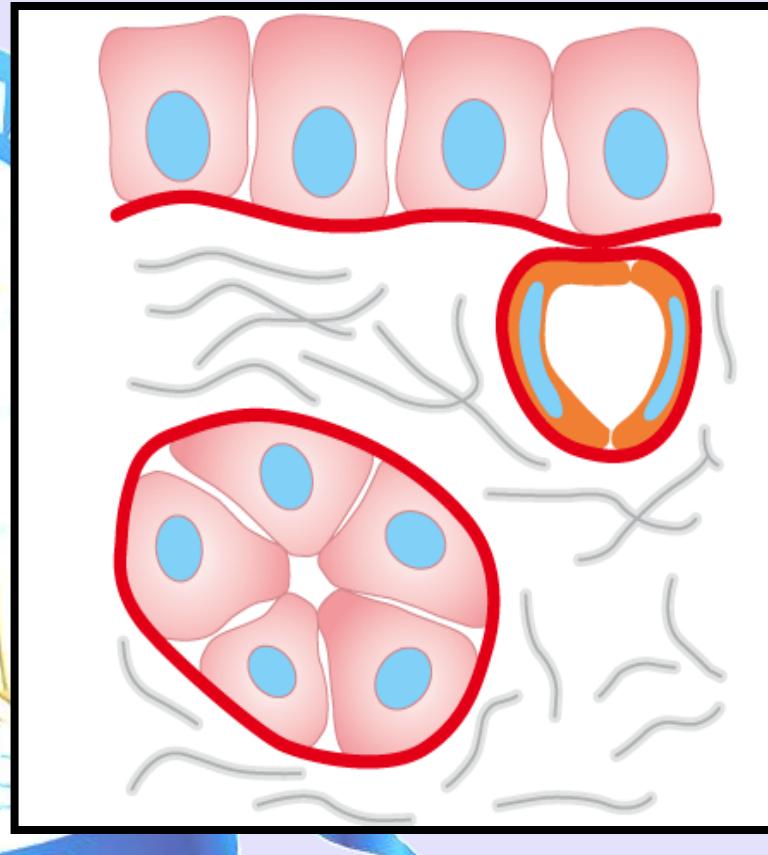
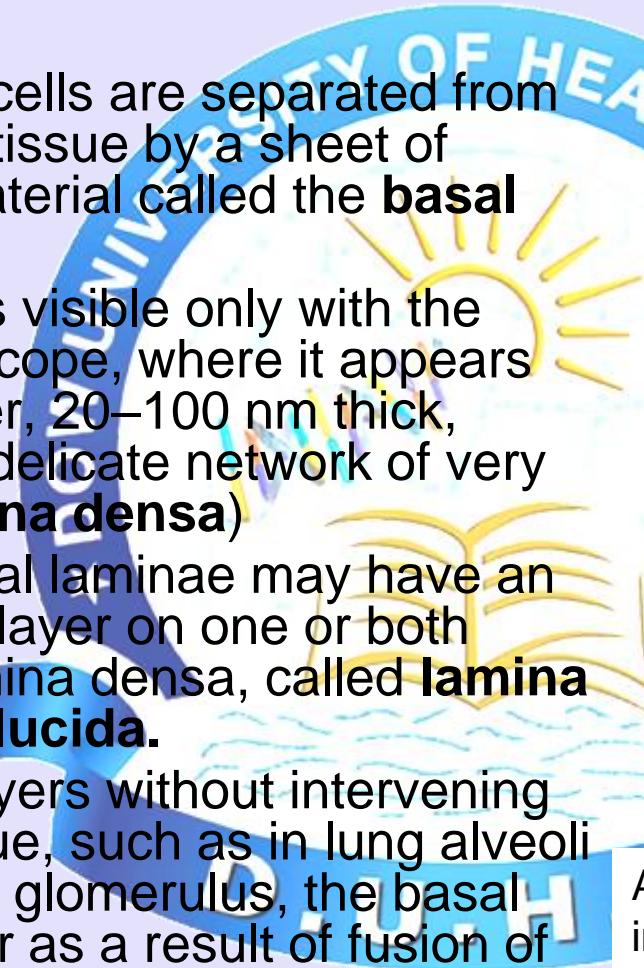
1. Goblet cell:-

- In which membrane bound mucin droplets accumulate in the apical part of cell and push the nucleus & most of remaining cytoplasm towards the base.
- Thus cell assume the shape of “Goblet”, eg. Mostly found in
 - a) GIT. (Gastro-intestinal Tract).
 - b) Respiratory system.



BASAL LAMINA & BASEMENT MEMBRANE

- Most epithelial cells are separated from the connective tissue by a sheet of extracellular material called the **basal lamina**
- This structure is visible only with the electron microscope, where it appears as a dense layer, 20–100 nm thick, consisting of a delicate network of very fine fibrils (**lamina densa**)
- In addition, basal laminae may have an electron-lucent layer on one or both sides of the lamina densa, called **lamina rara** or **lamina lucida**.
- Between cell layers without intervening connective tissue, such as in lung alveoli and in the renal glomerulus, the basal lamina is thicker as a result of fusion of the basal laminae of each epithelial cell layer. .



A basal lamina always lies at the interface between epithelial cells and connective tissue. Two basal laminas can fuse in places where no intervening connective tissue is present.

REFERENCES.

BASIC HISTOLOGY BY JUNQUEIRA
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