

Types of Animal Tissue

Simple Epithelium - 4th Lab

➤ The tissue

- The tissue is defined as group of cells which has **common origin** and **development** to perform a particular **function**.
- There are **four main types of Animal Tissues**:
 1. **Epithelium**
 2. **Connective**
 3. **Muscle**
 4. **Nervous tissue**

Epithelial tissue

- Epithelial tissue is a group of cells that are arranged in layer(s) to form **external** or **internal covering** of the body or organs.

General Characters of Epithelial Tissue

- Epithelial tissue covers the **free surface** of the organs.
- It consists of compactly arranged cells which lie in **one or more layers**.
- There is little amount of **intercellular ground substances** between the cells.
- The Epithelia is set on a **thin, non-cellular, gelatinous basement membrane**.
- The Epithelial cells **lack** blood vessels, but they get food and oxygen through basement membrane.
- The plasma membranes of **adjacent** epithelial cells are held together by **interdigitations, tight junctions, desmosomes and intercellular bridges**.

Functions of Epithelial Tissue in different organs.

1. **Protect the underlying tissue.**
2. **Absorption.**
3. **Secretion.**
4. **Excretion.**
5. **Filtration.**

Types of Epithelial tissue

- **Based on structure and function**, Epithelial tissue is of **two types**:
 - A- **Covering epithelium.**
 - B- **Glandular epithelium (secretion).**

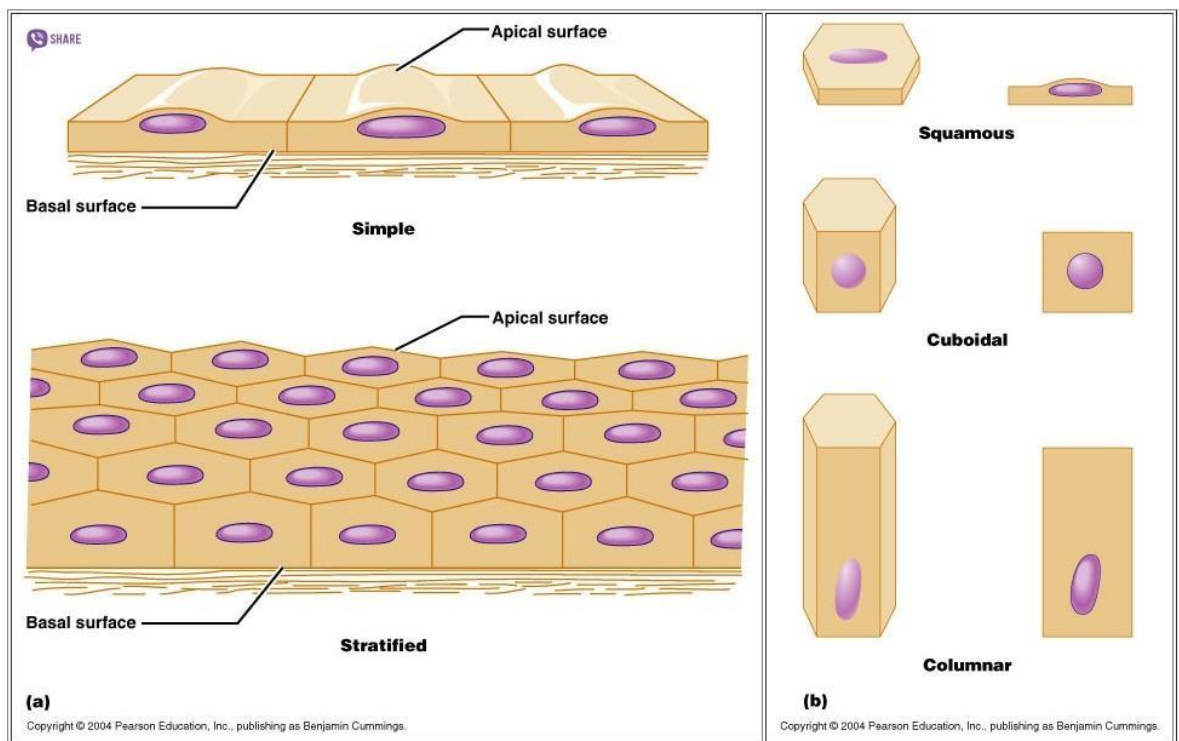
Terms

- Terms referring to the layers

- *Simple* = one layer
- *Stratified* = more than one layer
- *Pseudostratified* = false layered (appears to be more than one layer, but only one); *ciliated* = with cilia

- Terms referring to the cell shapes

- *Squamous* = flat
- *Cuboidal* = cube
- *Columnar* = like columns



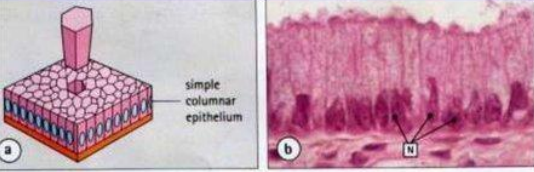
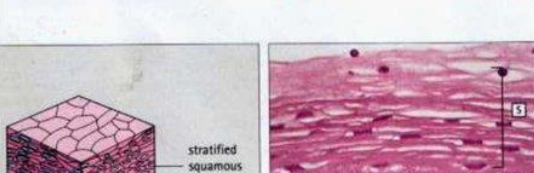



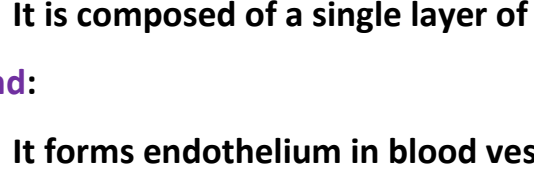
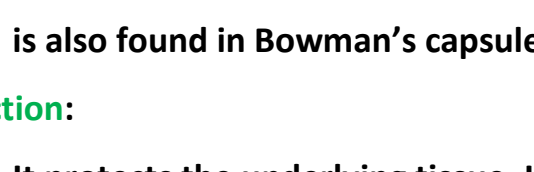
Covering Epithelium

- It covers both **external** and **internal free surfaces**.
- According to **number of cell layer**, it is divided into **two types**:
 1. **Simple** epithelium (made of **one** layer only).
 2. **Stratified** epithelium (made of **more** than one layer).

(1) Simple Epithelium:

- It is made up of a **single layer of cells**.
- It is of following type:
 1. **Simple epithelium**.
 2. **Cuboidal epithelium**.
 3. **Columnar epithelium**.
 4. **Pseudostratified columnar epithelium**.

THE LOCATION OF THE MAJOR TYPES OF EPITHELIA

	SIMPLE COLUMNAR	<ul style="list-style-type: none"> •BLOOD VESSELS •SEROUS MEMBRANES •Henle's loops OF KINDEY
	SIMPLE CUBOIDAL	<ul style="list-style-type: none"> •KIDNEY TUBULES •SMALL DUCTS OF GLANDS
	SIMPLE COLUMNAR WITH MICROVILLI	<ul style="list-style-type: none"> •STOMACH •GALL BLADDER & BILE DUCTS •INTESTINAL MUCOSA
	PSEUDOSTRITIFIED (CILIATED)	•RESPIRATORY PASSAGES
	STRATIFIED NONKERATINIZED	<ul style="list-style-type: none"> •ESOPHAGUS •ANTERIOR CORNEAL SURFACE •PART OF ORAL CAVITY
	STRATIFIED KERATINIZED	<ul style="list-style-type: none"> •SKIN •PART OF ORAL CAVITY
	TRANSITIONAL	•URINARY PASSAGES

(i) Simple squamous epithelium

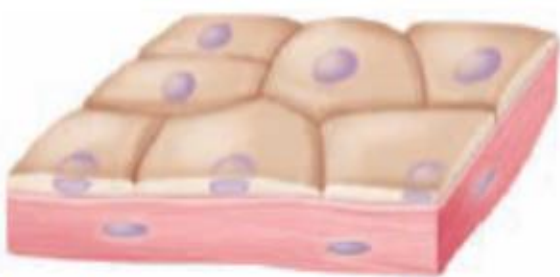
- It is composed of a single layer of **scale-like flat cells**.

Found:

- It forms endothelium in blood vessels, peritoneum in coelom, and lung alveoli. It is also found in Bowman's capsule and Henle's loop of nephron.

Function:

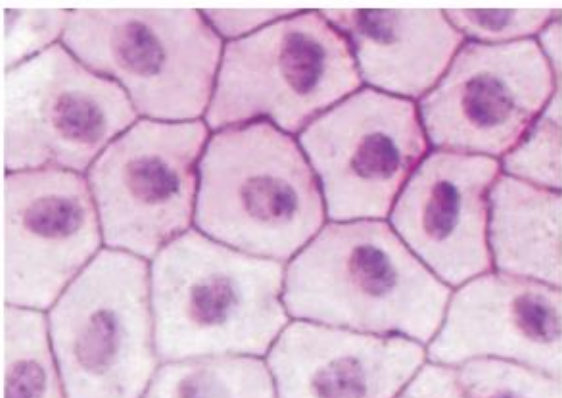
- It protects the underlying tissue. It has got filtering function. It allows easy passage of liquid or gases through it.

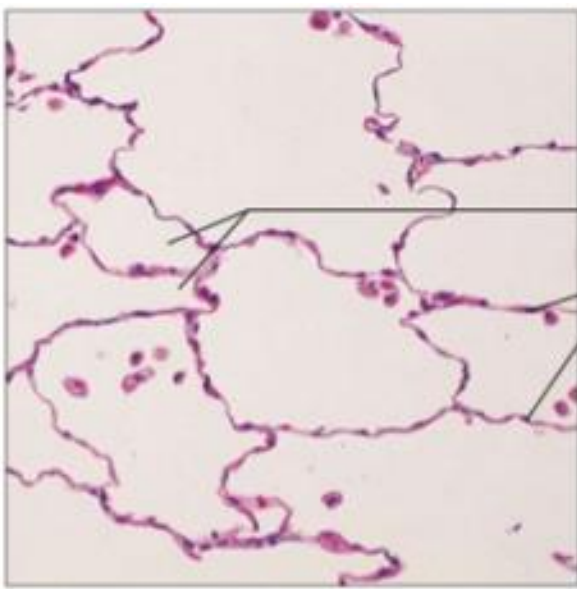


Simple squamous epithelium



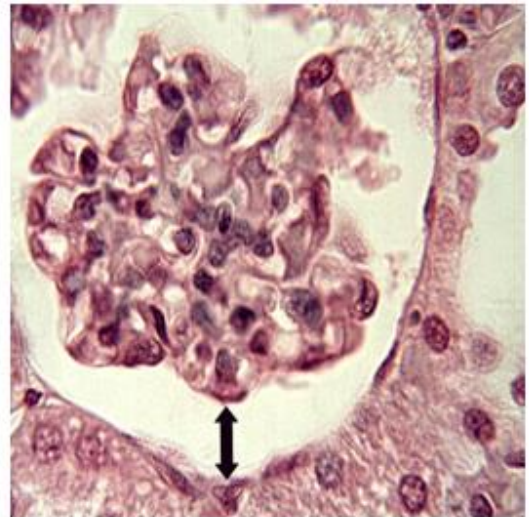
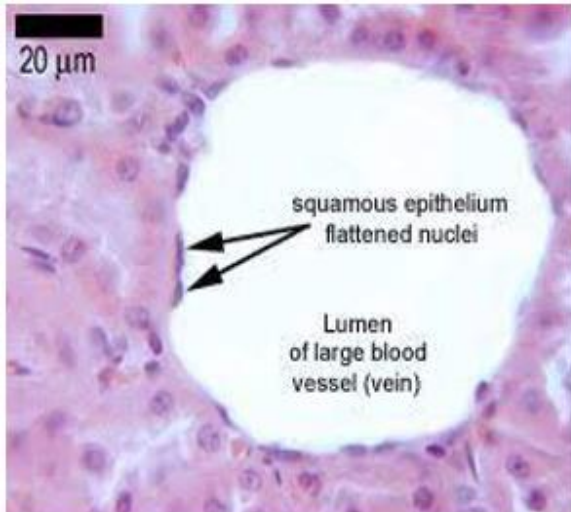
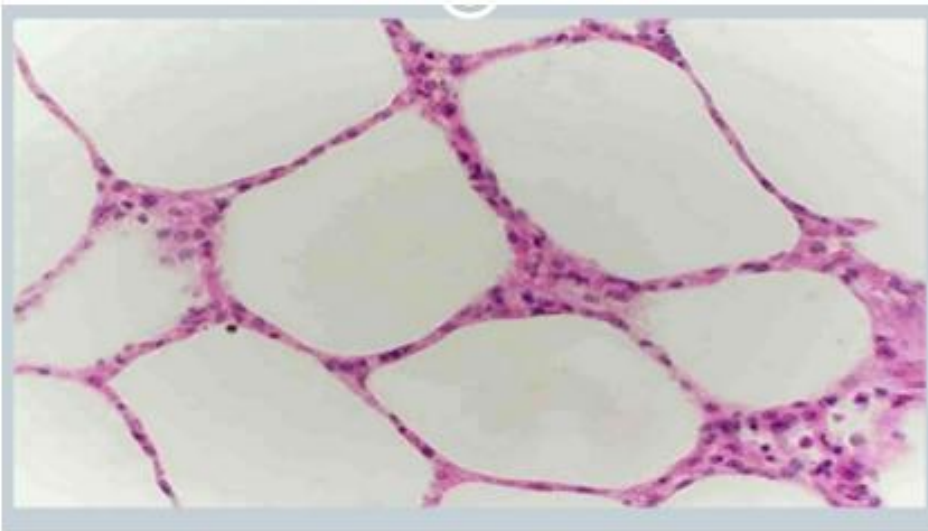
Simple squamous epithelium





Air sacs of lung tissue
Nuclei of squamous epithelial cells

Photomicrograph: Simple squamous epithelium forming part of the alveolar (air sac) walls (125x).



(i) Simple cuboidal epithelium

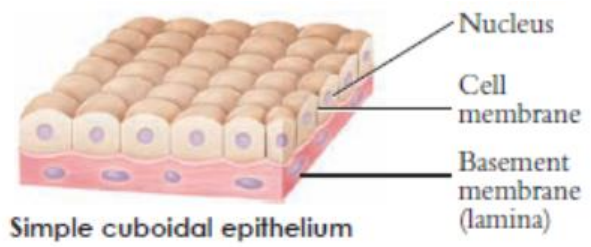
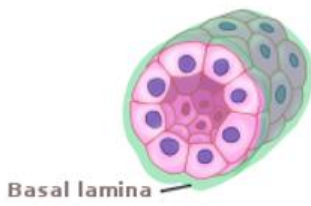
- It is made up of a single layer of **cubical cells** having same dimension on each side and placed on basement membrane.

Found:

- It forms germinal epithelium of ovary and inner part of digestive and salivary glands.

Function:

- Protection, secretion, storage of glycogen and metal ions are the functions of this tissue.



(iii) Simple columnar epithelium

- It is made up of **elongated tall cells** with **round** or **oval nuclei**, which are placed at the basal part.

Found:

- It is found in lining stomach, intestine, gall bladder, and proximal convoluted tubules of nephron.

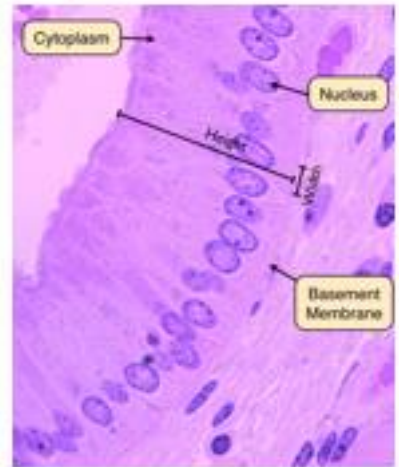
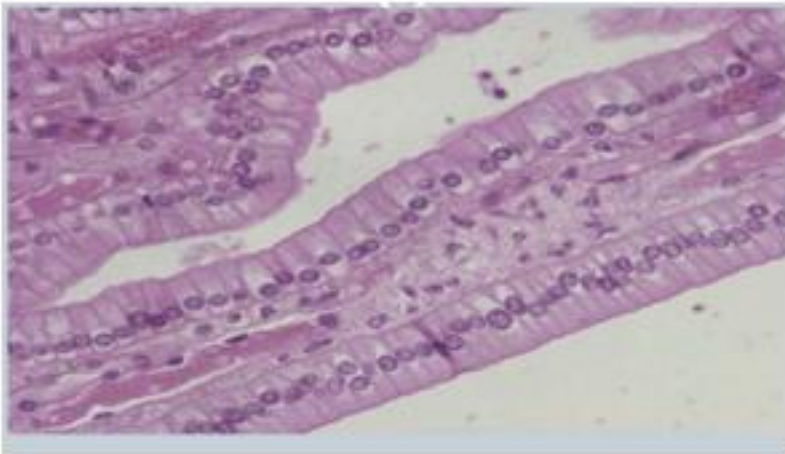
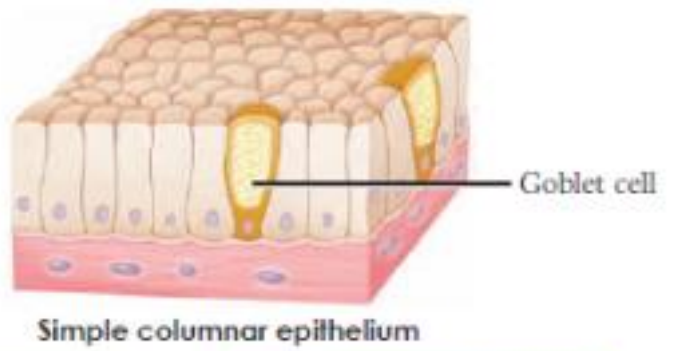
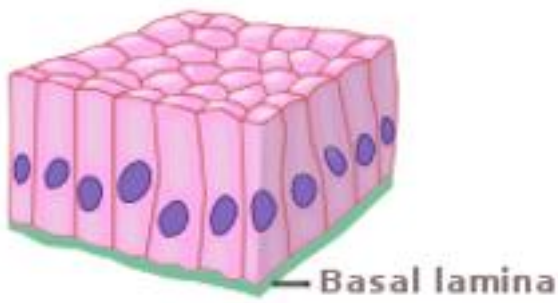
Function:

- Its chief function is absorption of digested food and secretion.

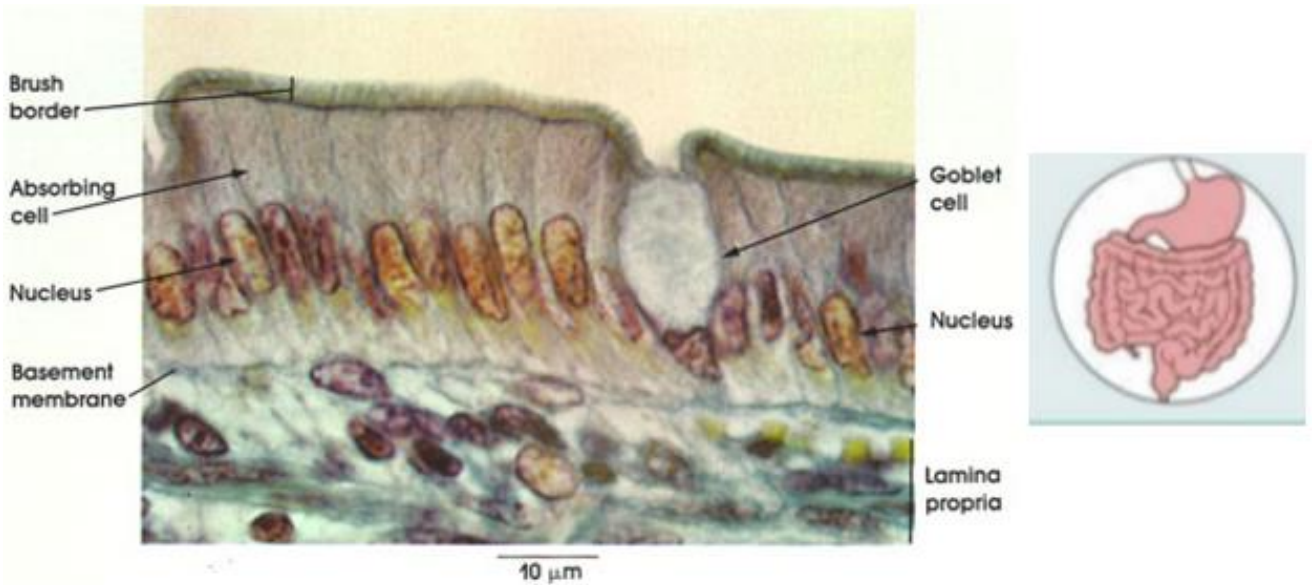
Special feature (**microvilli** or **brush border**)

- In alimentary canal and proximal convoluted tubules of **nephron**, their free borders are longitudinally **striated**. Hence called **brush border** epithelium.

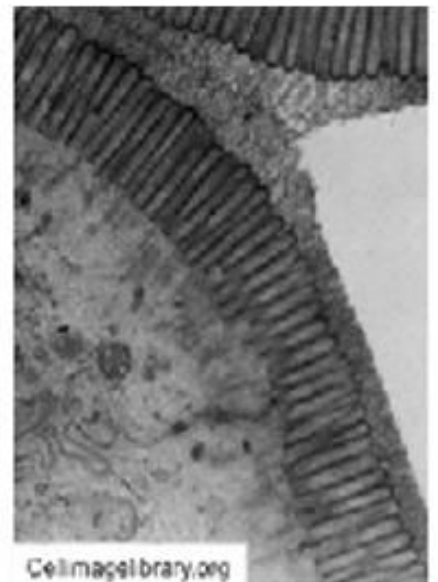
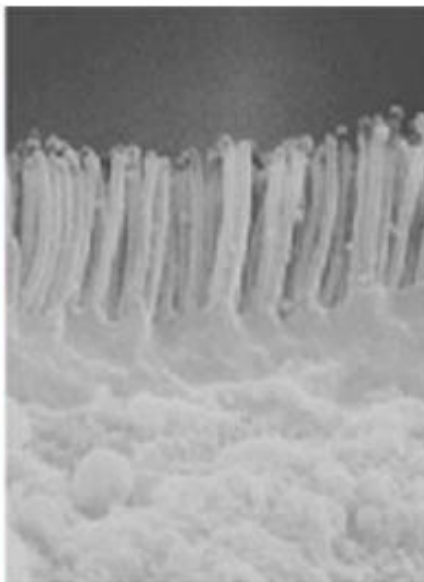
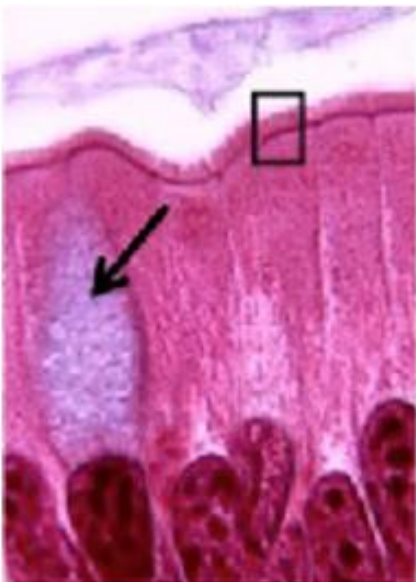




Simple Columnar epithelium with brush border



- Under electron microscope, the brush borders appear to be **finger-like projections** called **microvilli**.
- **Microvilli** increase **surface area** for absorption of food materials.



(IV) Pseudostratified columnar Epithelium

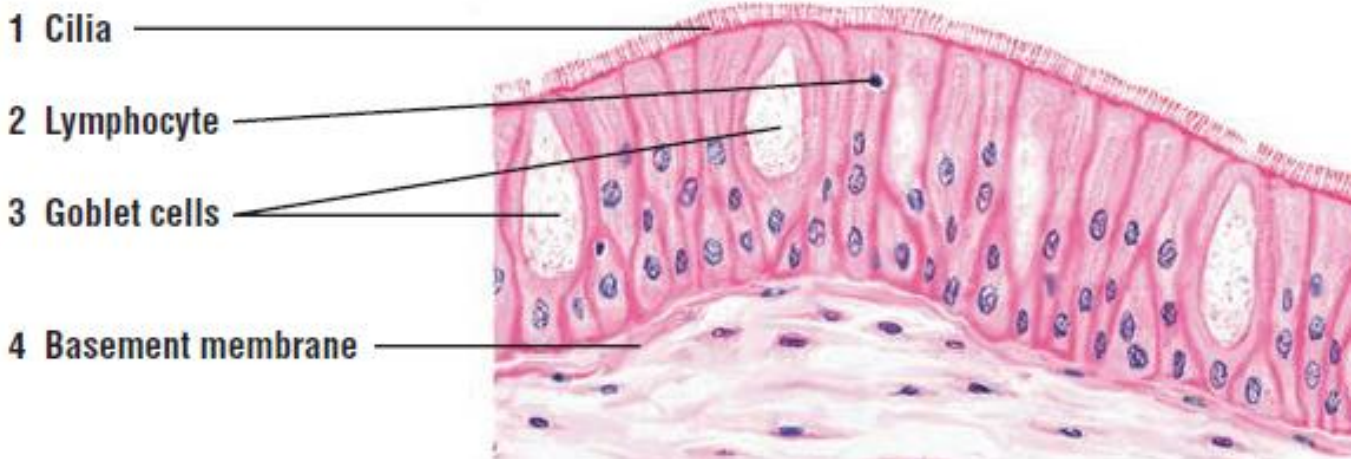
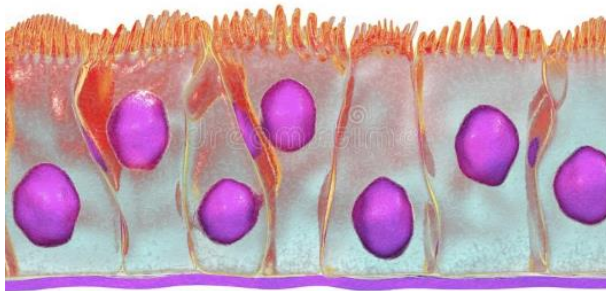
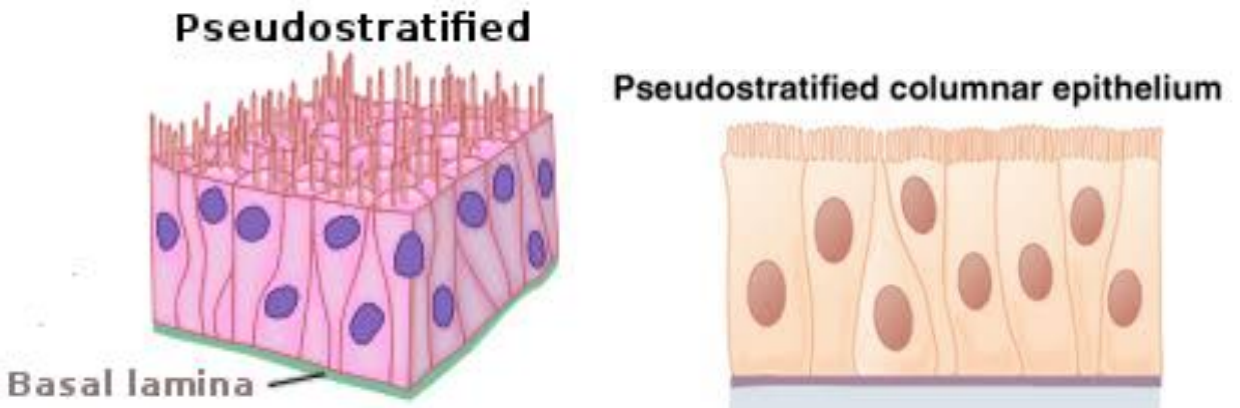
- It is made up of **single-layered cells**. It looks many layered due to **unequal height** of the cells.
- They are usually **ciliated**.

Found:

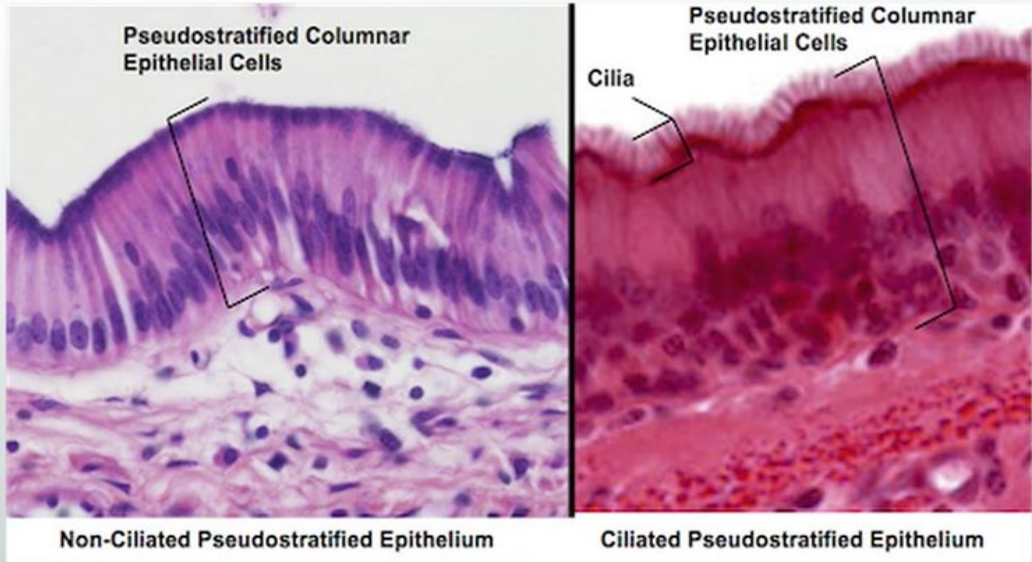
- It is found in urethra and trachea.

Function:

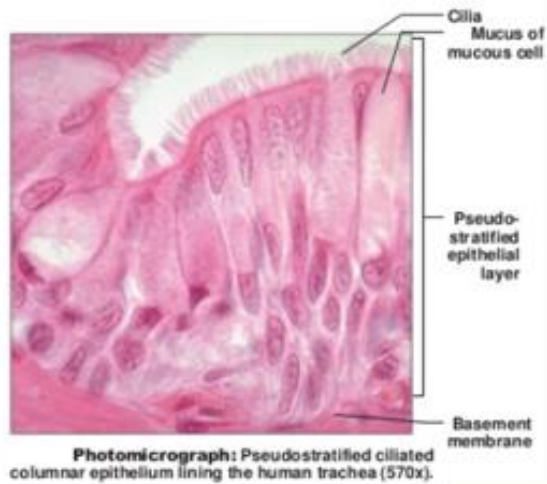
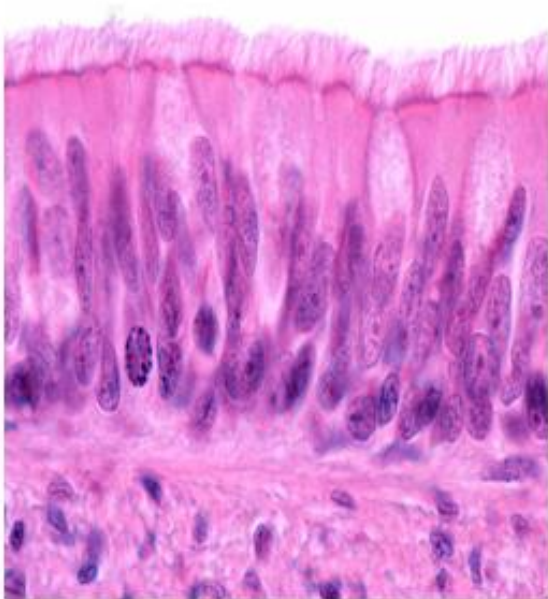
- It conducts different substances like ciliated epithelium.



CILIATED VERSUS NON-CILIATED



Ciliated pseudostratified columnar Epithelium



Photomicrograph: Pseudostratified ciliated columnar epithelium lining the human trachea (570x).

(B) Glandular Epithelium

- A **gland** is an organ of **secretion**.
- It is classified into **two**: **unicellular gland** and **multicellular gland**.
- **Goblet cells** are unicellular gland and they secrete **mucous**.

