

The background of the slide is a collage of microscopic images of various epithelial tissues. At the top left, there is a blue-tinted image of a simple cuboidal epithelium. To its right is a pink-tinted image of a simple squamous epithelium. Below the blue image is a pink-tinted image of a simple columnar epithelium. In the center, there is a square inset with a purple border showing a pink-tinted image of a stratified squamous epithelium. At the bottom right, there is a yellow-tinted image of a simple cuboidal epithelium. The text '■ Epithelial Tissue' is overlaid in the center in a large, bold, red serif font.

■ Epithelial Tissue

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- A microscopic image of tissue, likely showing glandular structures with numerous small, dark-stained nuclei and surrounding intercellular material.
- **Tissue** → Collection of cells with a similar structure and function.
 -
 - Tissue cells are often separated by non-living, intercellular materials that cells produce. This substance is called the **matrix**.
 -
 - The study of tissues is known as **histology**

■ Basic tissues types

Table 1: Main characteristics of the four basic types of tissues

Tissue	Cells	Extracellular matrix	Main function
<i>Epithelial</i>	Aggregated polyhedral cells	Very small amount	Lining of surface or body cavities, glandular secretion.
<i>Connective</i>	Several types of fixed and wandering cells	Abundant amount	Support and protection
<i>Muscle</i>	Elongated contractile cells	Moderate amount	Movement
<i>Nervous</i>	Intertwining elongated processes	None	Transmission of nervous impulses

A microscopic image of epithelial tissue, showing a layer of cells with prominent nuclei and a clear boundary between the cells and the underlying connective tissue.

■ Epithelial Tissue

● Types and locations

– Epithelium is divided into two types:

- Membranous (covering or lining) epithelium
- Glandular epithelium

– Locations

- Membranous epithelium covers the body and some of its parts; lines the body cavities, blood and lymphatic vessels, and respiratory, digestive, and genitourinary tracts
- Glandular epithelium: secretory units of endocrine and exocrine glands

● Functions

- Protection
- Sensory functions
- Secretion
- Absorption
- Excretion

A microscopic image of stratified epithelial tissue, likely from the skin. It shows multiple layers of cells. The top layer consists of a single layer of cells (epithelium) resting on a basement membrane. Below this, there are several layers of cells (dermis) that are more loosely organized. The cells are stained with hematoxylin and eosin (H&E), showing pink cytoplasm and purple nuclei.

● General Features

1. Highly cellular Layer
2. No Blood Supply
3. Touching Each Other
4. Rapid Rate of Cell Reproduction
5. Most rest on basement membrane which:
 - a) Provides support and attachment for the epithelial cells
 - b) Selective diffusion barrier



Lining and Covering Epithelial Tissues

- **Method of Classification**

- **Classification by number of layers:**

- Simple epithelium*

1. One cell layer thick
2. All cells rest on the basement membrane (basal surface) and all cells face the free surface.

- Stratified epithelium*

- 1) More than one cell layer thick
- 2) Only the deepest layer of cells contacts the basement membrane and only the superficial-most cells have a free surface.

- **Classification by shape of cells surface:**

- a. Squamous*

- 1) Cells are much wider than tall, resembling a “fried egg.”
- 2) Nucleus is highly flattened.

- b. Cuboidal*

- 1) Cells are of equal height and width.
- 2) Nucleus is spherical.

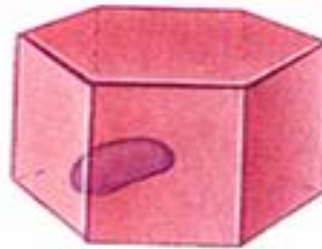
- a. Columnar*

- 3) Cells are much taller than they are wide.
- 4) Nucleus is oval shaped, generally located toward the base of the cell.

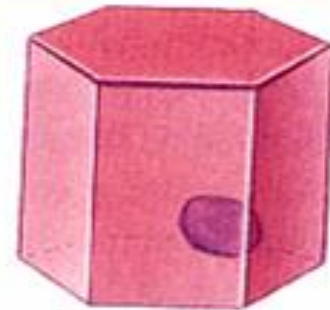
Shape



Squamous



Cuboidal



Columnar

Layer

1. Simple



(simple squamous)



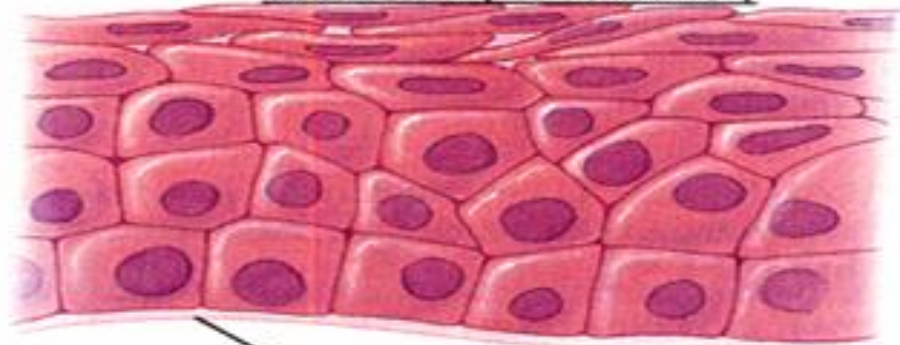
(simple cuboidal)



(simple columnar)

2. Stratified

Stratified (transitional)



Basement membrane

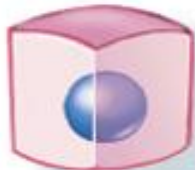
Table 2: common types of covering or lining epithelial tissues

Type	Cell form	Examples of distribution	Main function
Simple	<i>Squamous</i>	Mesothelium: lines serous cavities (peritoneal, pleural, and pericardial cavities), Endothelium: lines the lumen of heart and blood vessels. alveoli of the lungs, thin section of loop of Henle	Facilitates the viscera movement, active transport, and secretion of biologically active molecules.
	<i>Cuboidal</i>	Glands, duct portion of kidney tubules, thyroid gland.	Covering and secretion
	<i>Columnar</i>	Lining intestine, gallbladder, stomach, uterine tubes.	Protection, lubrication, absorption, and secretion.
<i>Pseudostratified</i>	<i>Columnar</i>	Lining of tracheae, bronchi, and nasal cavities	Protection and secretion: cilia mediated transport of particles trapped in mucus
Stratified	<i>Keratinized Squamous (dry)</i>	Epidermis and skin	Protection: prevent water loss.
	<i>Non-keratinized Squamous (moist)</i>	Mouth, esophagus, larynx, vagina, anal canal	Protection: prevent water loss.
	<i>Cuboidal</i>	Sweat gland, developing of ovarian follicles.	Protection and secretion
	<i>Columnar</i>	Conjunctiva	Protection
	<i>Transitional</i>	Urinary bladder, ureters and renal calyces	Protection: protects organ walls from tearing

CELL SHAPES



Squamous

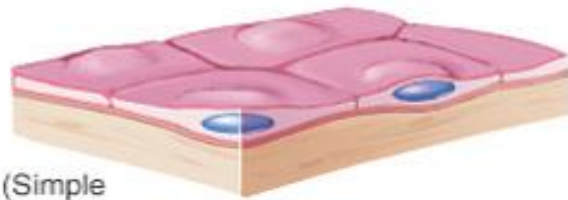


Cuboidal

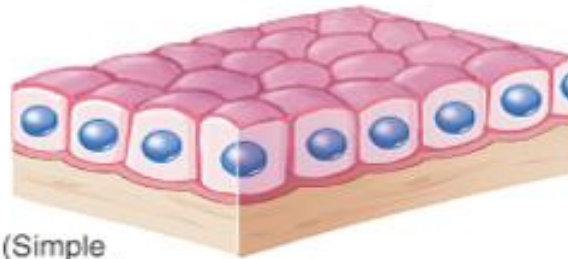


Columnar

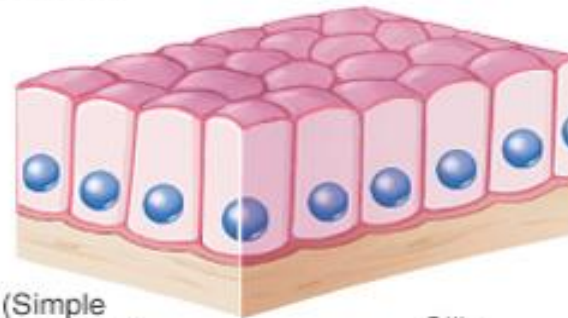
SIMPLE



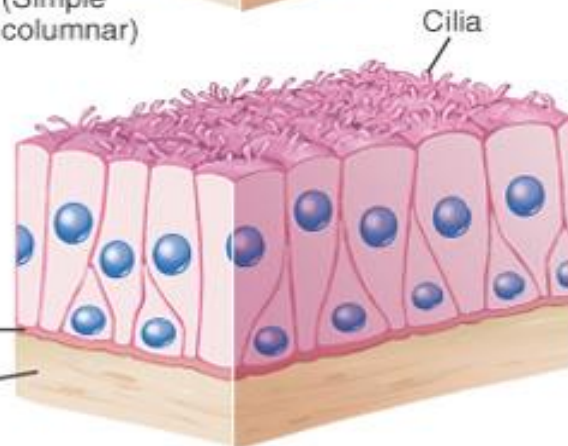
(Simple squamous)



(Simple cuboidal)



(Simple columnar)

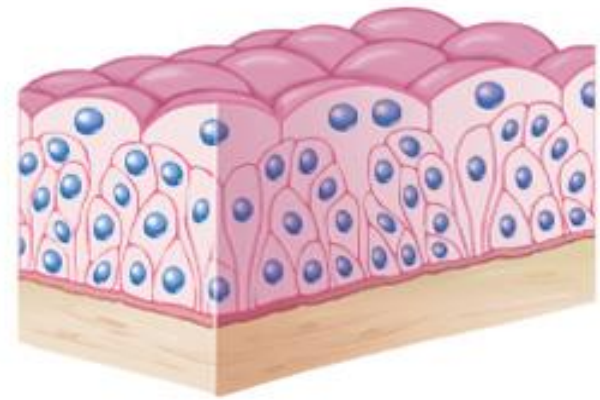


(Pseudostratified)

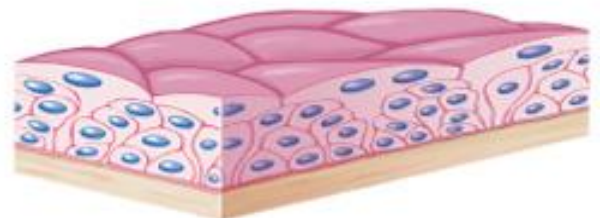
STRATIFIED



(Stratified squamous)



(Transitional, relaxed)



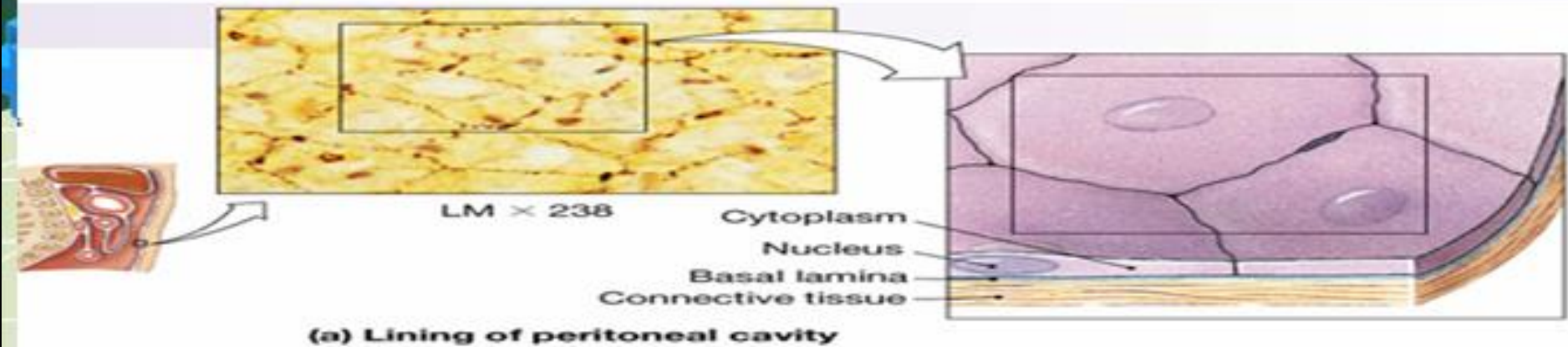
(Transitional, stretched)

Basement
membrane

Connective
tissue

Cilia

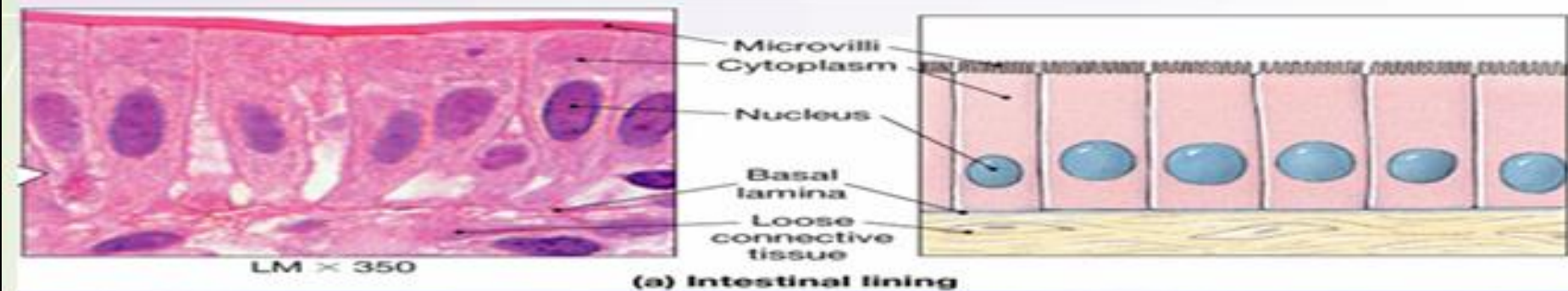
Simple Squamous Epithelia



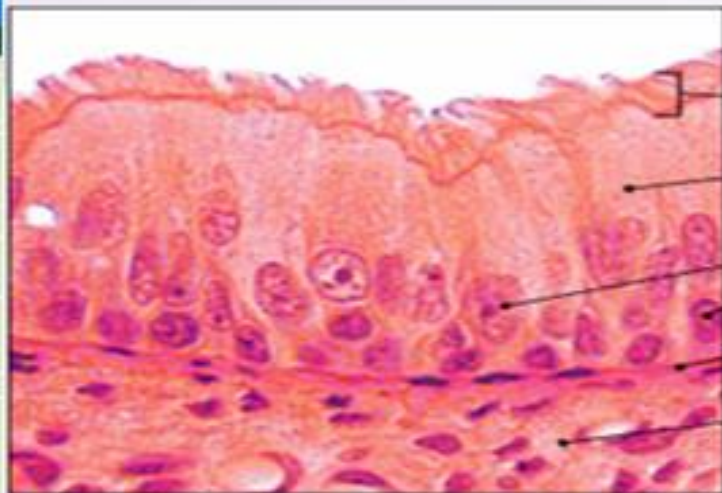
Simple Cuboidal Epithelia



Simple Columnar Epithelia



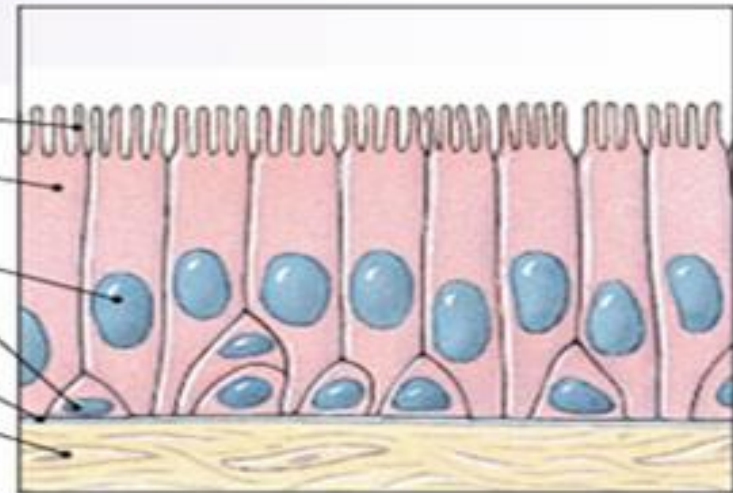
Pseudostratified ciliated Columnar Epithelia



LM $\times 290$

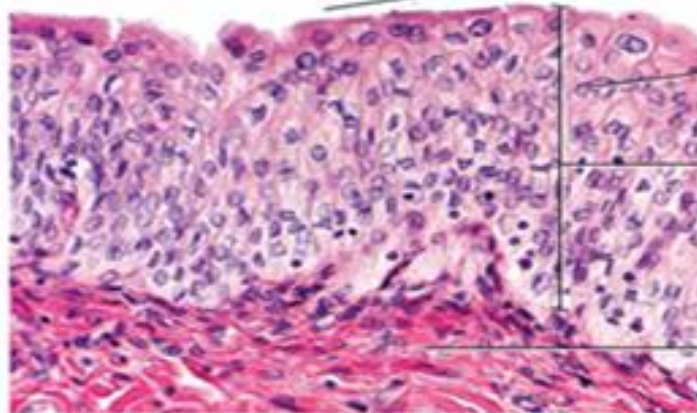
Cilia
Cytoplasm
Nuclei
Basal lamina
Loose connective tissue

(b) Trachea



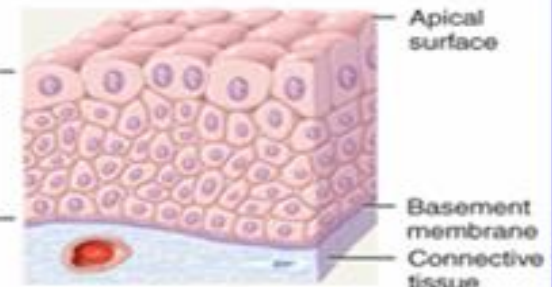
Transitional Epithelium

Urinary bladder



LM 350x

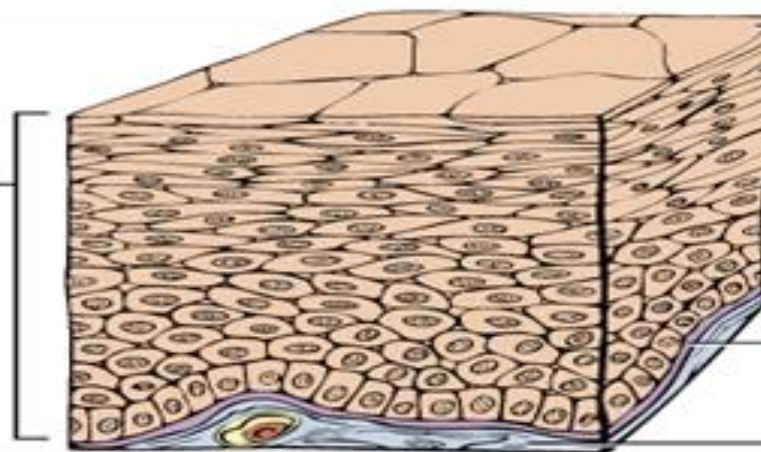
Lumen of urinary bladder
Nucleus of transitional cell
Transitional epithelium
Connective tissue



Relaxed transitional epithelium

Sectional view of transitional epithelium of urinary bladder in relaxed state

Stratified squamous
epithelium



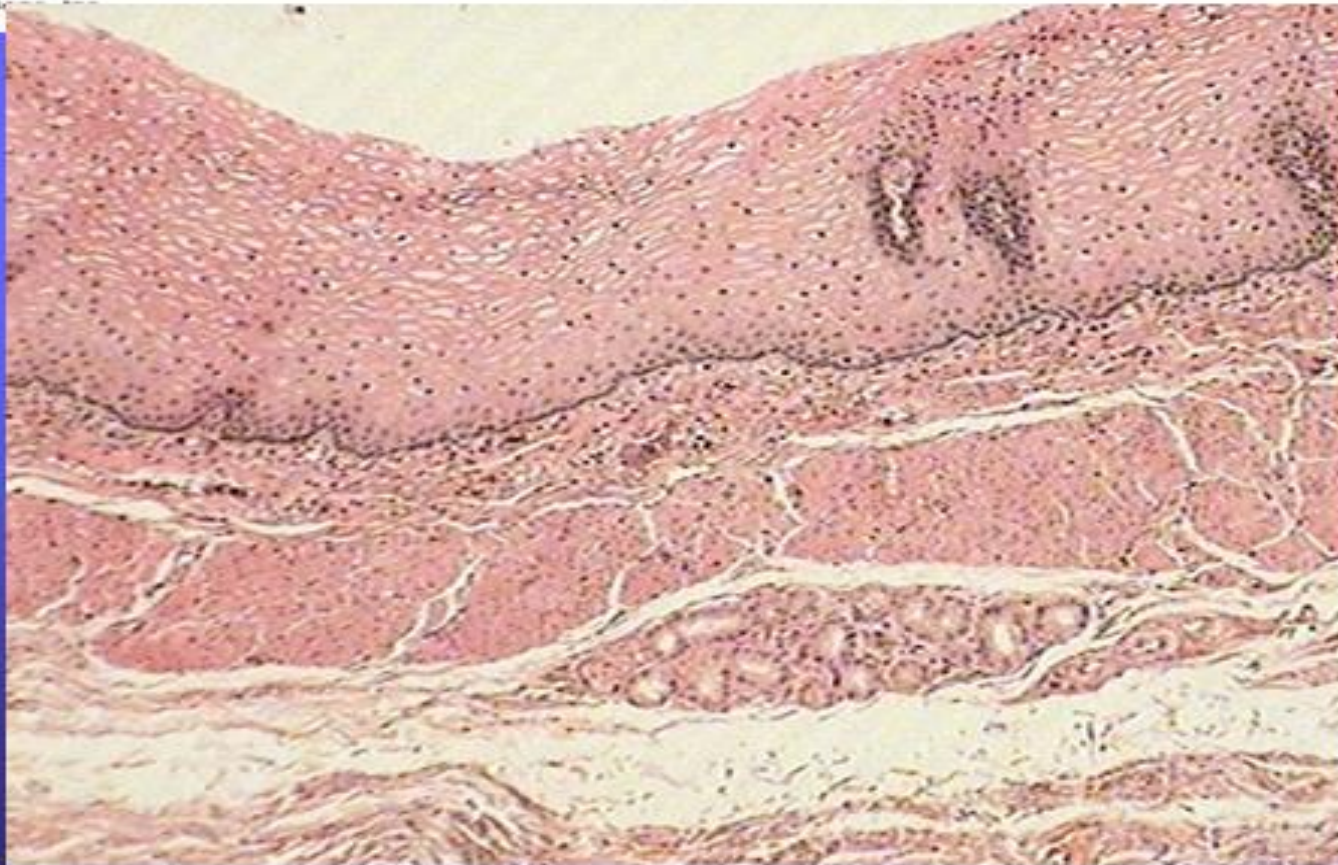
Flattened
squamous
surface cell
at apical
surface

Basement
membrane

Connective
tissue

Stratified squamous epithelium

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Thank You

Epithelial Tissue

In this module, you will learn about the different types of epithelial tissues and their functions.