

Lab 3
Epithelial Histology

Slide 1-2-1 Simple Squamous Epithelium (1) and (2)*:

*Both of these slides are from the outer part (cortex) of the kidney showing nephrons (Bowman's Capsule) & Glomerulus.

- Simple Squamous Epithelium
 - Single layer of flattened cells.
 - Nuclei of cells are flat (disc-shaped).
 - Nuclei protrude (bulge) toward the lumen.
 - Cell membrane is usually impossible to see clearly.
 - Functions:
 - Diffusion
 - Filtration
 - Secrete serous fluid (for serosa layers)
 - Common Locations:
 - Bowman's Capsule
 - Capillaries
 - all 6 serosa layers
 - alveolar air sacs of the lungs

Slide 1-2-2 Simple Squamous Epithelium (1) and (2)*:

*Both of these slides are from the lungs showing the alveolar air sacs.

- Simple Squamous Epithelium
 - Same info as Slide 1-2-1.

Slide 1-2-4 Simple Cuboidal Epithelium (1)*:

*This slide is from the outer part (cortex) of the kidney showing nephrons.

- Simple Cuboidal Epithelium
 - Single layer of "cuboidal" / "cube-shaped" cells.
 - Nuclei of cells are large, spherical (or oval) & in cell's center.
 - Some have **microvilli** on the apical surface.
 - Functions:
 - Secretion (stuff moves from the cell to the lumen)
 - Absorption (stuff moves from the lumen to a capillary)
 - Common Locations:
 - Kidney tubules (most of the nephron)
 - small ducts of glands
 - surface of the ovary

Slide 1-2-5 Simple Columnar Epithelium (1) and (2)*:

*Both of these slides are from the Small Intestine. *Sometimes you will see this called "Goblet-Cell" epithelium.*

□ Simple Columnar Epithelium

- Single layer of "tall" / "rectangular-shaped" cells.
- Nuclei of cells are large, spherical (or oval) & tend to position close to the basement membrane or by the center of the cell.
- Some have **Microvilli** on the apical surface.
 - Microvilli are very short & packed close together.
 - Microvilli are non-motile & increase the surface area.
- Some have **Cilia** on the apical surface.
 - Cilia are very long & spaced apart from each other.
 - Cilia are motile & move stuff trapped in mucous.
- Functions:
 - Secretion (stuff moves from the cell to the lumen)
 - Absorption (stuff moves from the lumen to a capillary)
- Common Locations of the "Non-ciliated" Simple Columnar:
 - Stomach inner lining
 - Small Intestine inner lining
 - Large Intestine inner lining
 - Rectum inner lining
 - Excretory Ducts of some glands
- Common Locations of the "Ciliated" Simple Columnar:
 - Small Bronchi inner lining
 - Fallopian Tube (Uterine Tube) inner lining

□ Goblet Cells

- can be found in ciliated & non-ciliated locations of simple columnar epithelium.
- Goblet Cells secrete a protein called **Mucin** into the lumen where it mixes with **Water** to form **Mucous**.

Slide 1-2-6 Pseudostratified “Ciliated” Columnar Epithelium*:

*This slide is from the inner epithelial lining of the trachea.

□ Pseudostratified Columnar Epithelium

- Single layer of “triangular-shaped” cells that alternate in up and down. Some cells don’t reach the free surface, but all cells will touch the basement membrane.
- Nuclei vary in shape and can be seen alternating at different levels with the “roomiest part” of the cell. This can give the *illusion* the epithelium is stratified when it is not.
- Some have **Cilia** on the apical surface.
 - Cilia are very long & spaced apart from each other.
 - Cilia are motile & move stuff trapped in mucous.
- Functions:
 - Secretion (stuff moves from the cell to the lumen)
- Common Locations of the “Non-ciliated” Simple Columnar:
 - Ducts of some large glands.
- Common Locations of the “Ciliated” Simple Columnar:
 - Trachea inner lining
 - Left and Right Main Bronchus inner lining

□ Goblet Cells

- can be found in ciliated & non-ciliated locations of simple columnar epithelium.
- Goblet Cells secrete a protein called **Mucin** into the lumen where it mixes with **Water** to form **Mucous**.

Slide 1-3-1 Transitional Epithelium in Bladder*

*This slide is from the inner epithelial lining of the Urinary Bladder.

- Transitional Epithelium
 - Visually looks like stratified cuboidal epithelium, but in reality these cells are all connected (tethered) by a tiny strand of their cytoplasmic membrane to the basement membrane, like the strings of balloons in a clowns hand.
 - When the Urinary Bladder is **empty** the Transitional epithelial cells can bunch up very tall and get up to about **9 cells thick**.
 - When the Urinary Bladder is **full** the Transitional epithelial cells become compressed and spread out to about **3 cells thick**.
 - bulbous, rounded **Umbrella Cells** with 2 *nuclei* can usually be seen on the apical side (top row) next to the lumen.
 - Functions:
 - Stretches and Recoils to accommodate the filling and emptying of the Urinary Bladder and Ureters.
 - Common Locations:
 - Ureter inner lining
 - Urinary Bladder inner lining.
 - proximal end of the urethra's inner lining.

Slide 1-3-2 Transitional Epithelium in Ureter*

*This slide is from the inner epithelial lining of the Ureter.

- Transitional Epithelium
 - Same info as Slide 1-3-1.

No slides for the following two epithelial tissue types. They are listed here as you might **rarely** come across them, but they are not tested on in the lab. I do cover them in Lecture in Chapter 4 on Histology, so questions on a lecture exam are fair game.

- Stratified Cuboidal Epithelium
 - Usually 2 layers of cube-like cells.
 - Function:
 - Mostly protection of ducts from the friction of fluid flow.
 - Common Locations:
 - very large ducts of sweat glands.
 - very large ducts of mammary glands.
 - very large ducts of salivary glands.

 - Stratified Columnar Epithelium
 - Usually 2 layers of cells, with cube-shaped cells by the basement membrane and columnar ones on top of them.
 - Function:
 - Mostly protection of ducts from the friction of fluid flow.
 - Common Locations:
 - very, very large ducts of some glands.
 - some in the lining of the male urethra.
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Slide 1-3-3 Keratinized Stratified Squamous Epithelium*:

*This slide is from the skin.

- Keratinized Stratified Squamous Epithelium
 - many cell layers thick (all the cells are quite small)
 - cells are cuboidal and big near the basement membrane.
 - cells are flat and smaller near the apical surface.
 - “Keratinized” means the surface has dead cells fragments and it will a “flaky” appearance.
 - Functions:
 - Very good protection from abrasion forces.
 - Common Locations:
 - Epidermis of Thick and Thin Skin.
 - lining the surface of the rough areas of the hard palate.

Slide 1-3-4 Non-Keratinized Stratified Squamous Epithelium*:

*This slide is from the inner epithelial lining of the vagina.

- Non-Keratinized Stratified Squamous Epithelium
 - many cell layers thick (all the cells are quite small)
 - cells are cuboidal and big near the basement membrane.
 - cells are flat and smaller near the apical surface.
 - “Non-Keratinized” means the surface has living cells, so nuclei are usually visible all the way to the apical surface.
 - Functions:
 - good protection from abrasion forces.
 - Common Locations:
 - vagina inner lining
 - esophagus inner lining
 - lining the inner side of the cheeks of your mouth
 - lining the surface of the soft palate.