Lab 2 - Part 2

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.

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.
