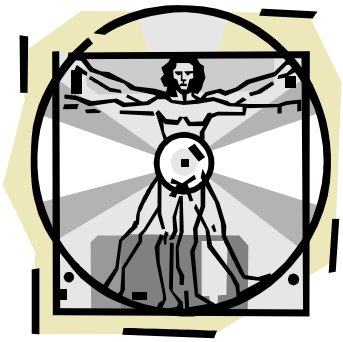
Bio & 241 A&P
Unit 1 / Lecture 3



Tissues

All body tissues arise from three fundamental embryonic tissues.

- ***Endoderm: forms epithelial tissues lining internal organs such as the GI tract***
- ***Mesoderm: connective tissue associated with dermis of skin, cartilage, bone***
- ***Ectoderm: forms nervous tissue and epidermis of skin.***

FOUR TYPES OF BODY TISSUE:

1. ***Epithelial***
2. ***Connective (most abundant tissue in the body)***
3. ***Muscle***
4. ***Nervous***

**** In this unit we will explore Epithelial and Connective tissues****

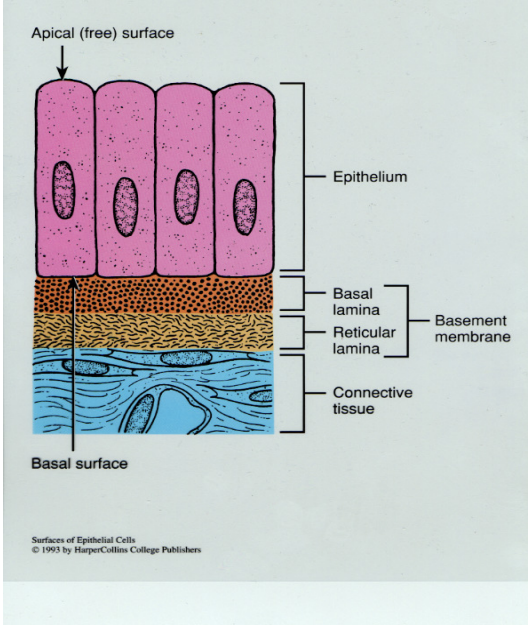
Epithelial Tissue -- General Features

- Closely packed cells with little extracellular material
  - Many cell junctions often provide secure attachment.
- Cells sit on basement membrane
  - Apical (upper) free surface
  - Basal surface against basement membrane
- Avascular---without blood vessels
  - nutrients and waste must move by diffusion
- Good nerve supply
- Rapid cell division (high mitotic rate)
- derived from ALL three primary germ layers:
  - ectoderm, endoderm, and mesoderm
- Functions
  - protection, filtration, lubrication, secretion, digestion, absorption, transportation, excretion, sensory reception, and reproduction.

Types of Epithelium

- Covering and lining epithelium
  - *epidermis of skin*
  - *lining of blood vessels and ducts*
  - *lining respiratory, reproductive, urinary & GI tract*
- Glandular epithelium
  - *secreting portion of glands*
  - *thyroid, adrenal, and sweat glands*

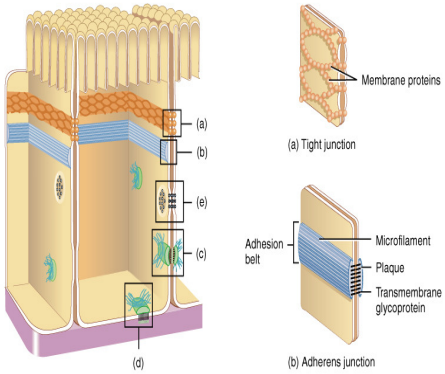
Typical Arrangement of Epithelial Tissue and its Basement Membrane



Typical Microscopic View of Epithelial Cells and its Basement Membrane

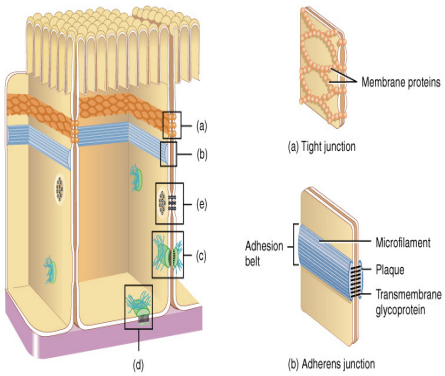
Cell Junctions

- **Tight Junctions: Prevent the movement of fluids between cells**
- **Adherens Junctions: (Belt desmosome) Help prevent cells from being separated at the apical surface**
- **Button Desmosomes: Attach cells to adjacent cells**

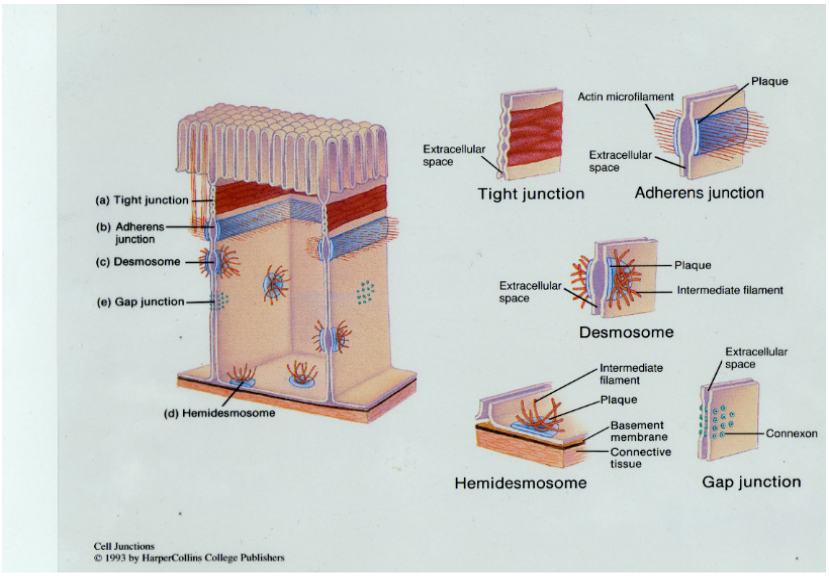


Cell Junctions

- **Hemidesmosomes: Attach cells to extracellular materials such as a basement membrane**



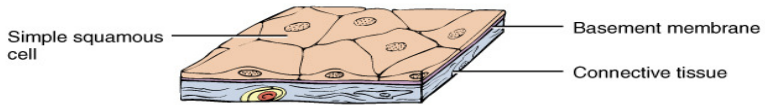
Types of Cell Junctions



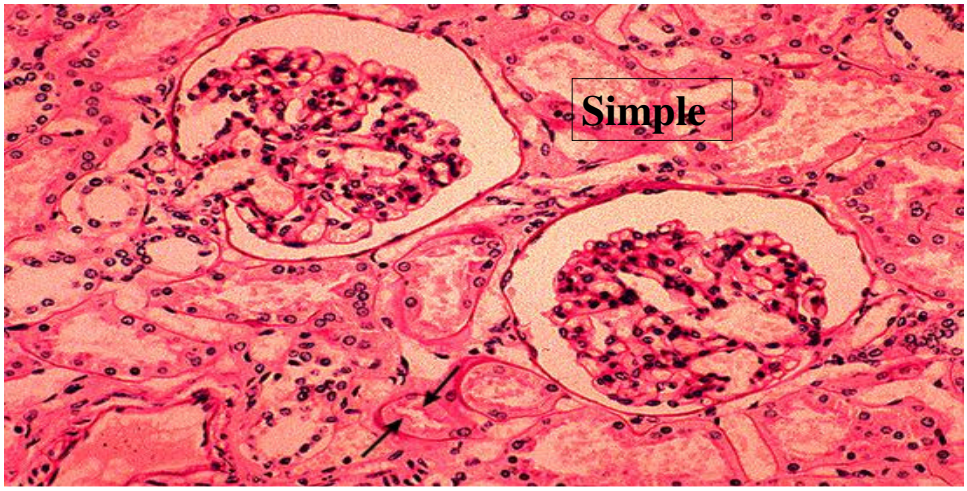
Epithelial Tissues

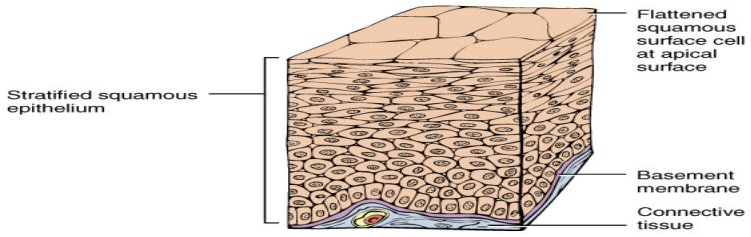
These tissues are classified according to the arrangement of cells and the shape of cells

1. **Arrangement:**
   - ***a. Simple***
   - ***b. Stratified***
   - ***c. Pseudostratified***

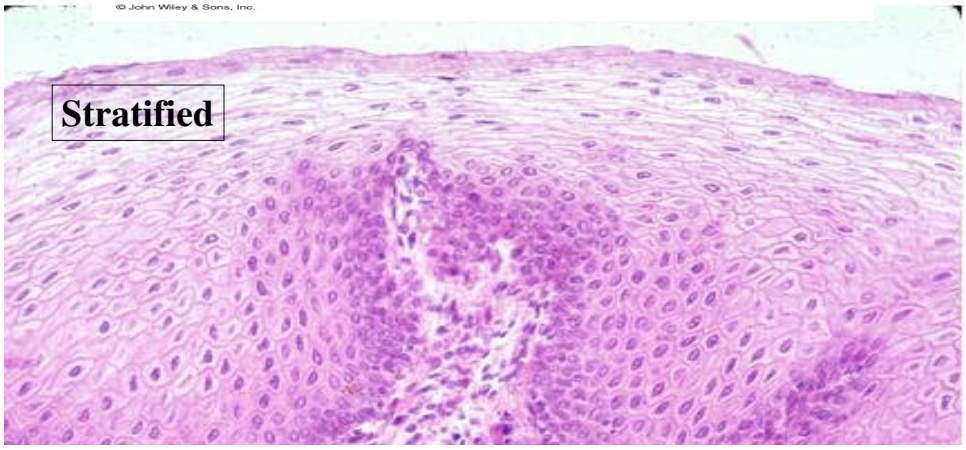


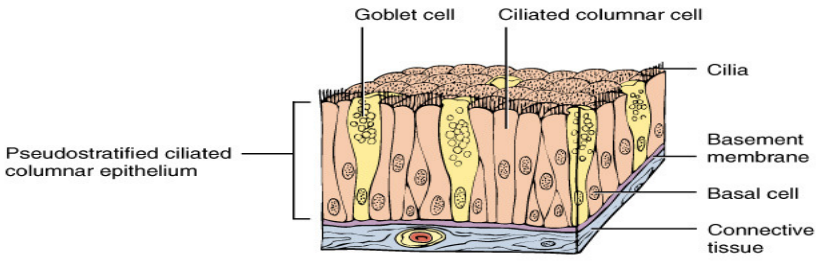
Simple squamous epithelium



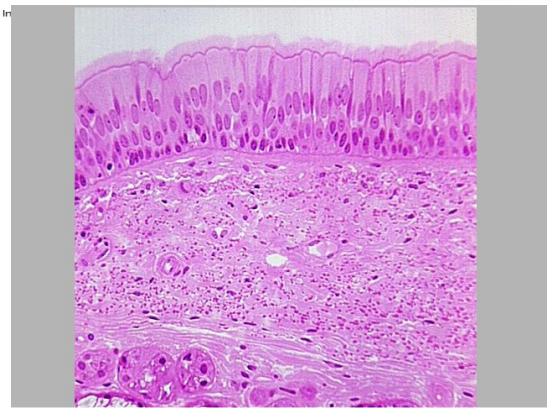


Stratified squamous epithelium





Pseudostratified columnar epithelium



Epithelial Tissues

2. Cell Shape

a. ***flat or squamous***

b. cube or cuboidal

c. cylindrical or columnar

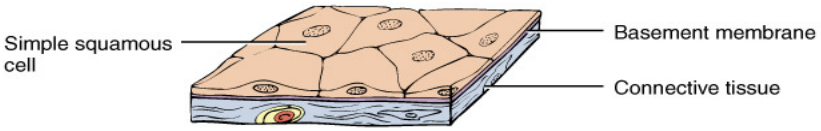
d. changing shape or transitional

Simple Epithelium

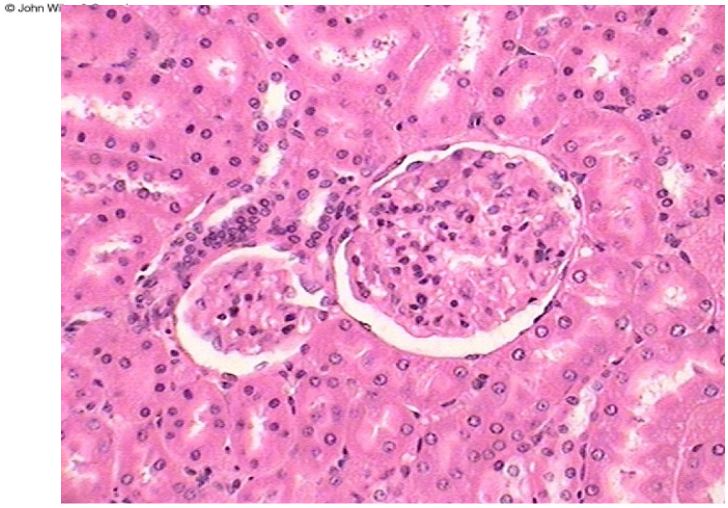
- *Simple squamous epithelium* consists of a single layer of flat, scale-like cells
  - adapted for diffusion and filtration (found in lungs and kidneys)
  - *Endothelium* lines the heart and blood vessels.
  - *Mesothelium* lines the thoracic and abdominopelvic cavities and covers the organs within them as part of Serous Membranes
- *Simple cuboidal epithelium* consists of a simple layer of cube-shaped cells
  - adapted for secretion and absorption (found in the kidneys and thyroid gland)

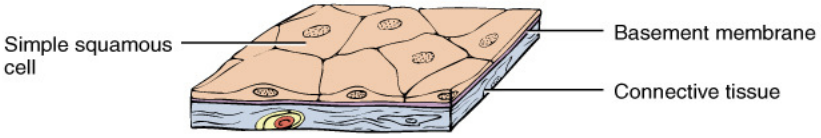
Simple Epithelium

- *Simple columnar epithelium* consists of a single layer of rectangular cells and can exist in two forms
  - *Nonciliated simple columnar epithelium* contains microvilli
    - increase surface are and the rate of absorption
    - goblet cells secrete mucus
    - Found lining the stomach, small intestines, and large intestines.

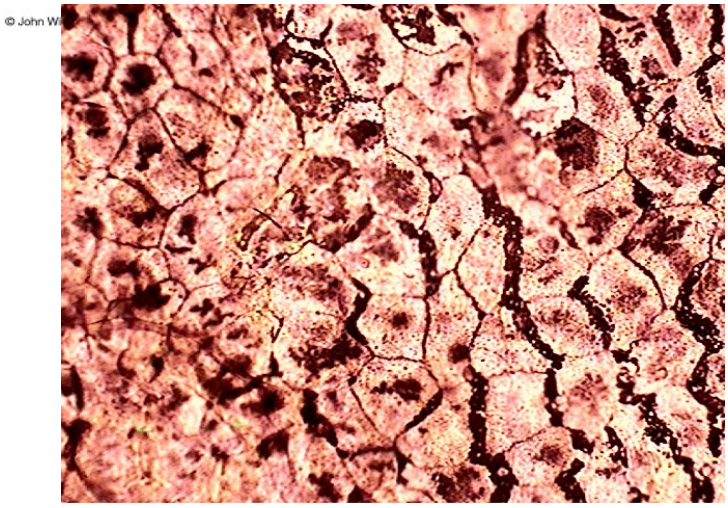


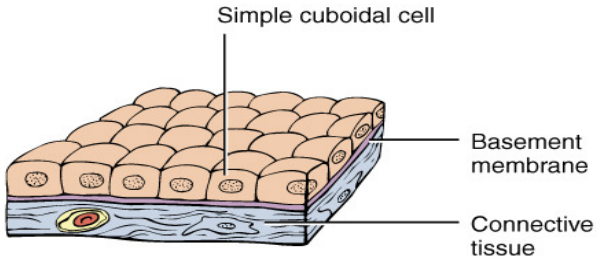
Simple squamous epithelium



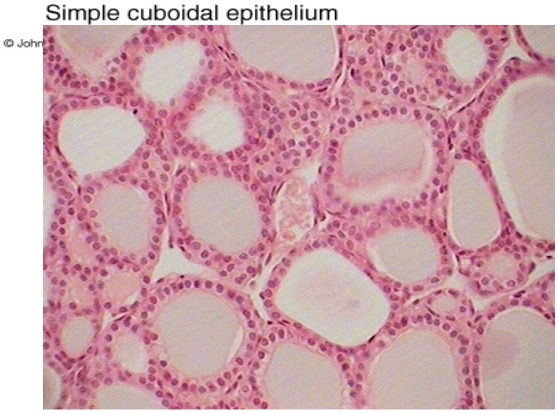


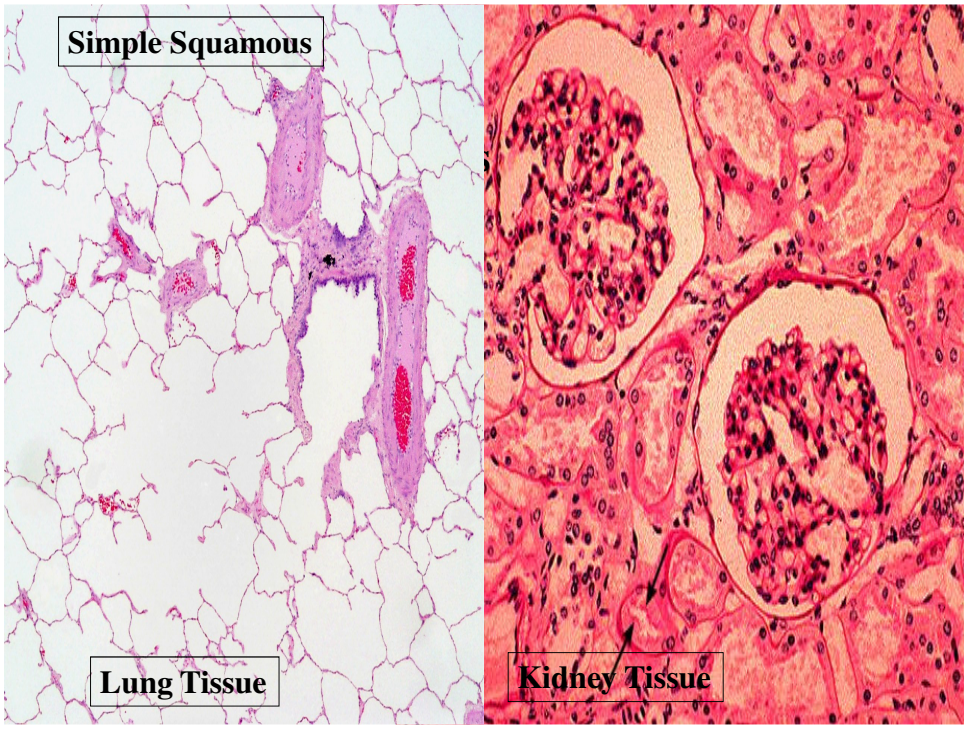
Simple squamous epithelium

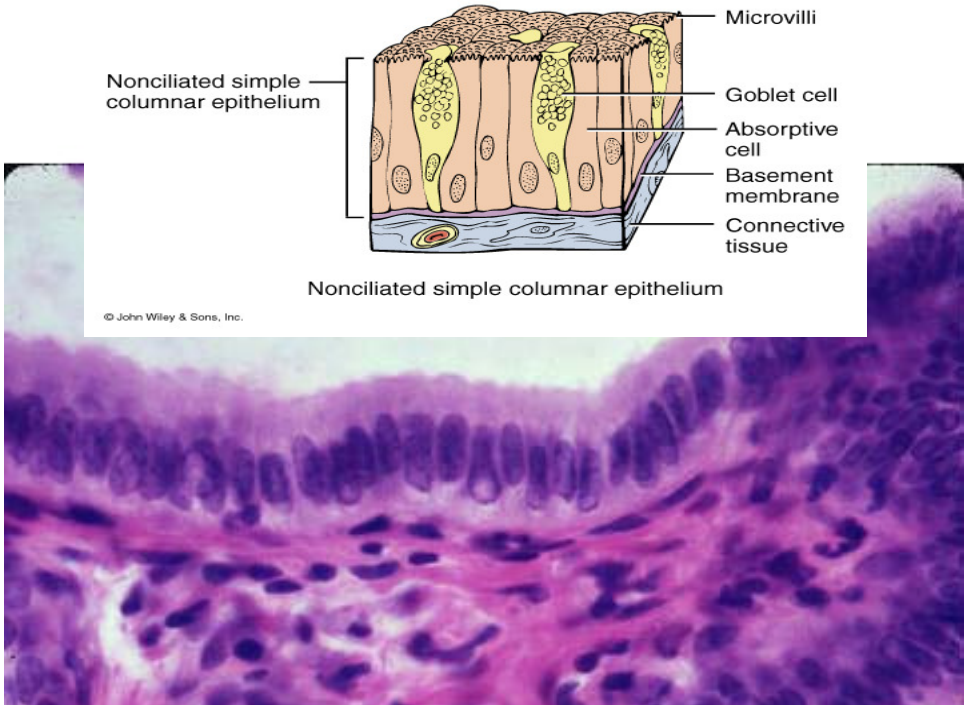




Simple cuboidal epithelium




Simple Squamous
Lung Tissue
Kidney Tissue


Microvilli
Nonciliated simple columnar epithelium
Goblet cell
Absorptive cell
Basement membrane
Connective tissue
Nonciliated simple columnar epithelium
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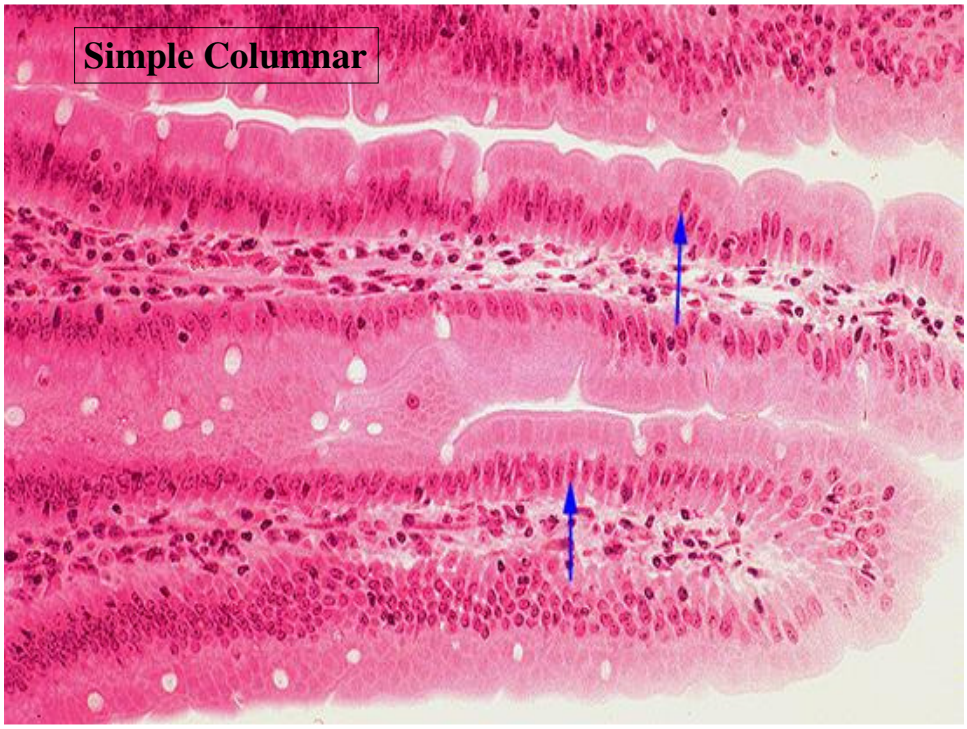
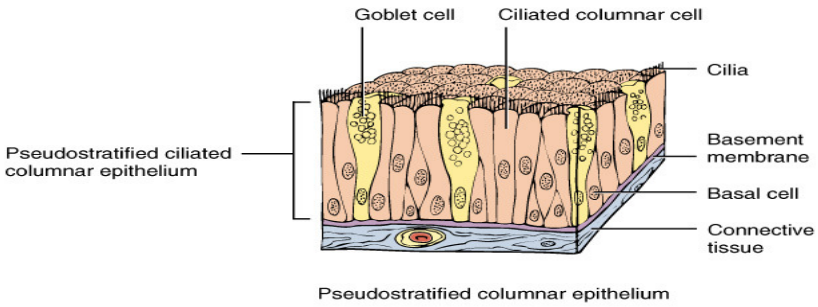
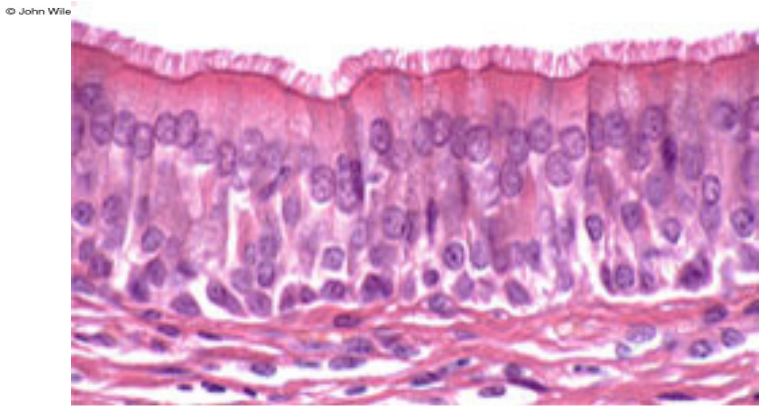


Pseudostratified Epithelium

- *Pseudostratified epithelium:* appears to have several layers because the nuclei are at various levels.
- All cells are attached to the basement membrane but some do not reach the apical surface.
- In *pseudostratified ciliated columnar epithelium*, the cells that reach the surface either secrete mucus (goblet cells) or bear cilia that sweep away mucus and trapped foreign particles.
- Found lining the respiratory system.

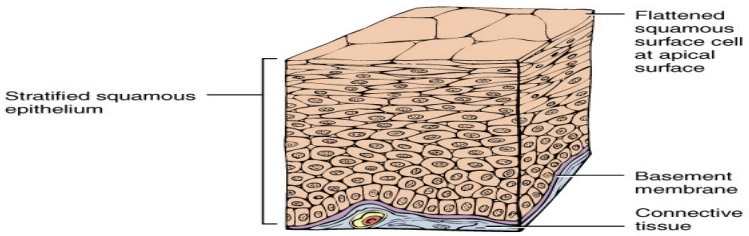


Pseudostratified columnar epithelium

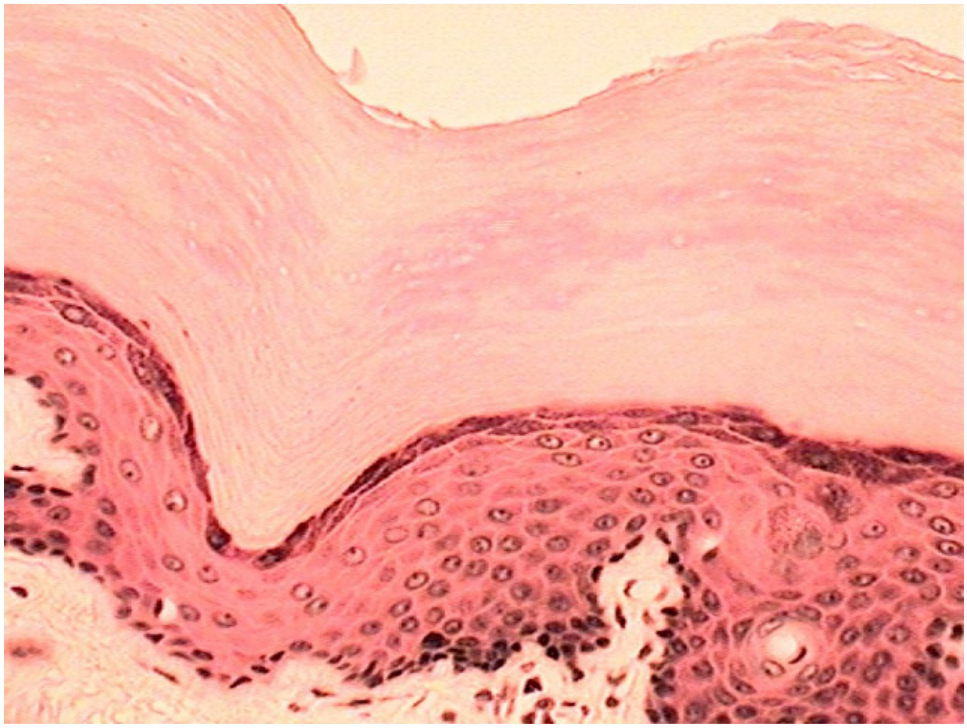


Stratified Epithelium

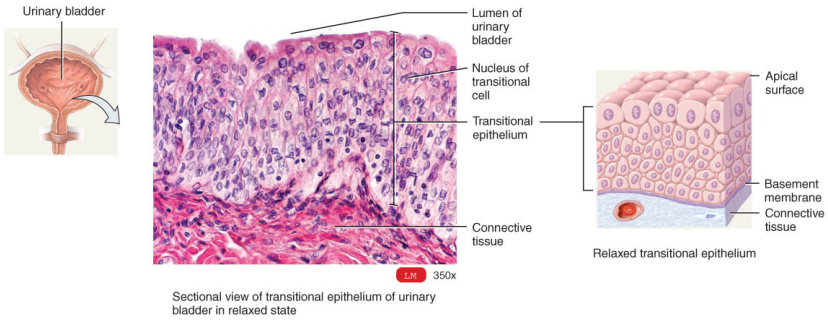
- Epithelia have at least two layers of cells.
  - more durable and protective
  - name depends on the shape of the **surface** (apical) cells
- *Stratified squamous epithelium* consists of several layers of
  - top layer of cells is flat
  - deeper layers of cells vary cuboidal to columnar.
  - basal cells replicate by mitosis
- *Keratinized stratified squamous epithelium*
  - a tough layer of keratin (a protein resistant to friction and repels bacteria) is deposited in the surface cells.
- Nonkeratinized epithelium remains moist.



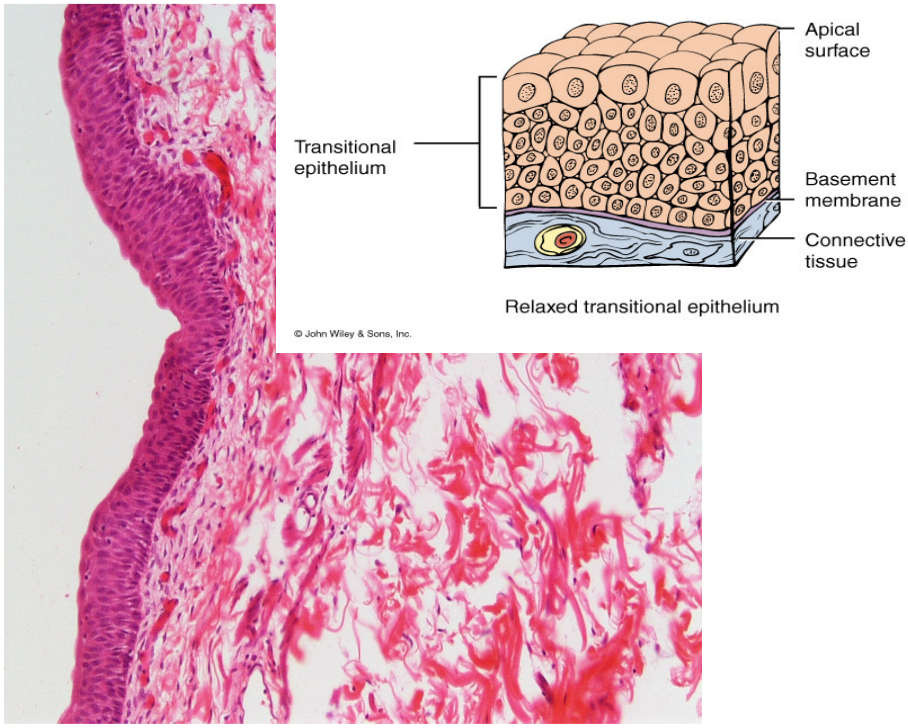
Stratified squamous epithelium



Transitional Epithelium

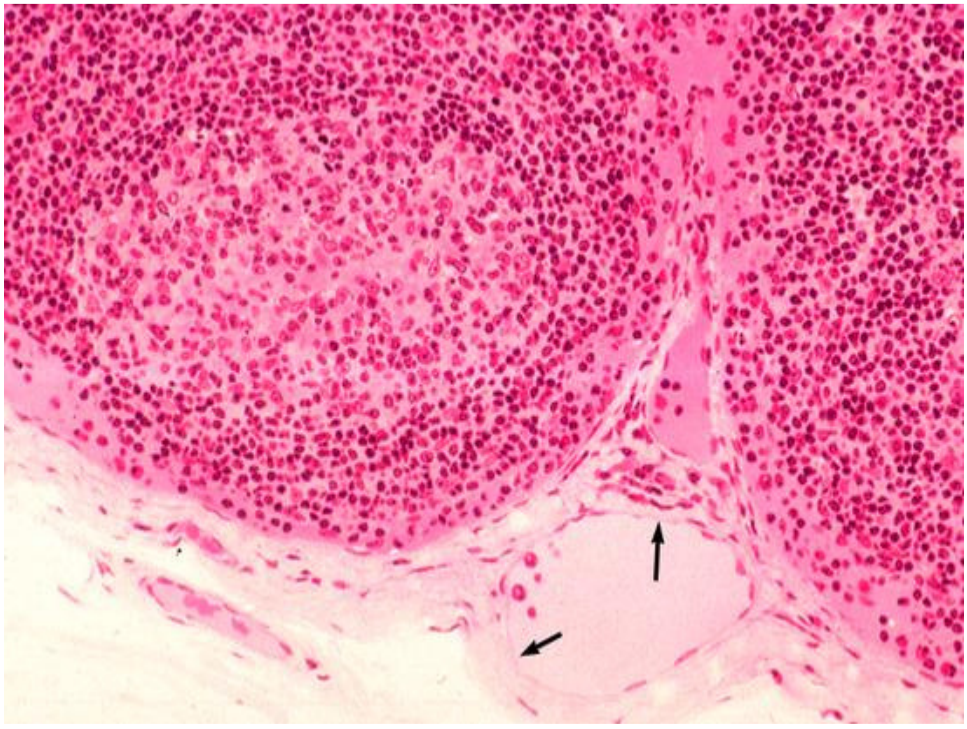


- Multilayered
  - surface cells varying in shape
    - round to flat (if stretched)
  - lines hollow organs that expand from within (urinary bladder)

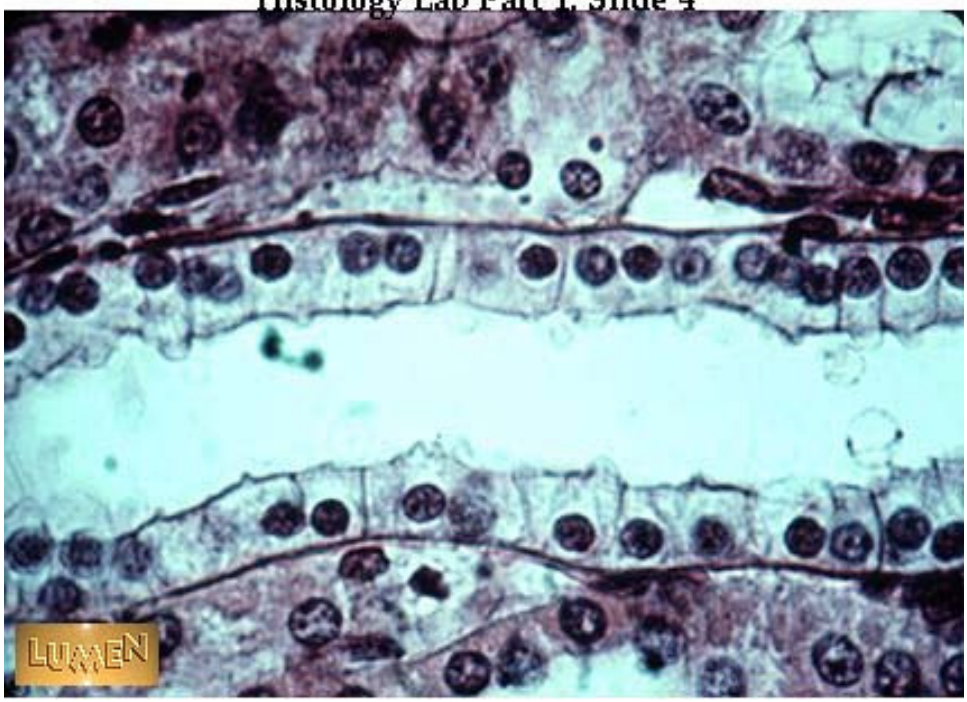


For each type of tissue you need to know

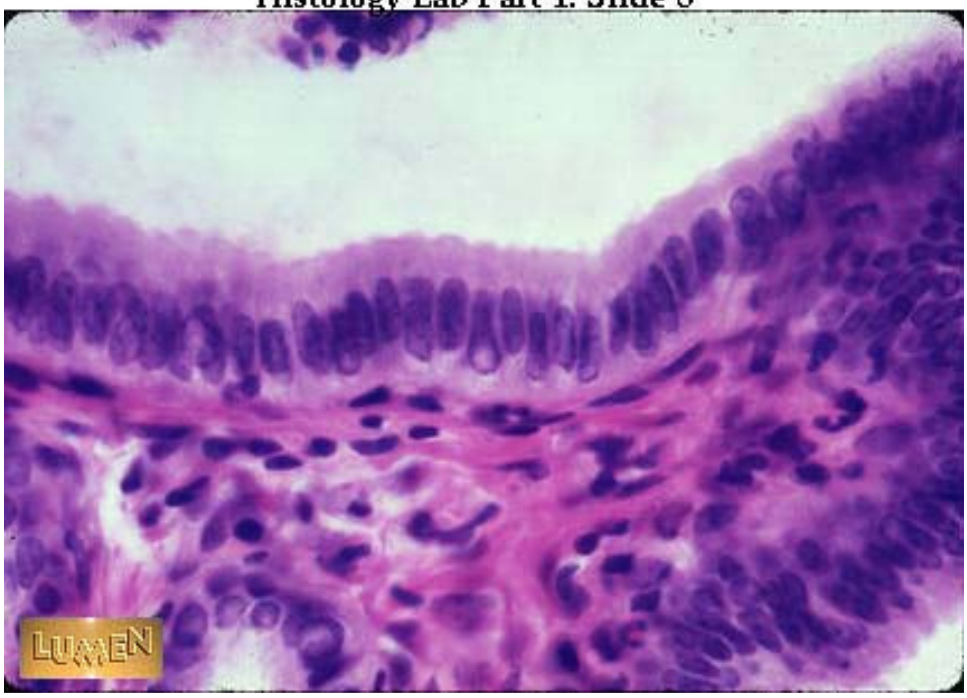
1. **Description**
2. **Example of location**
3. **Function**



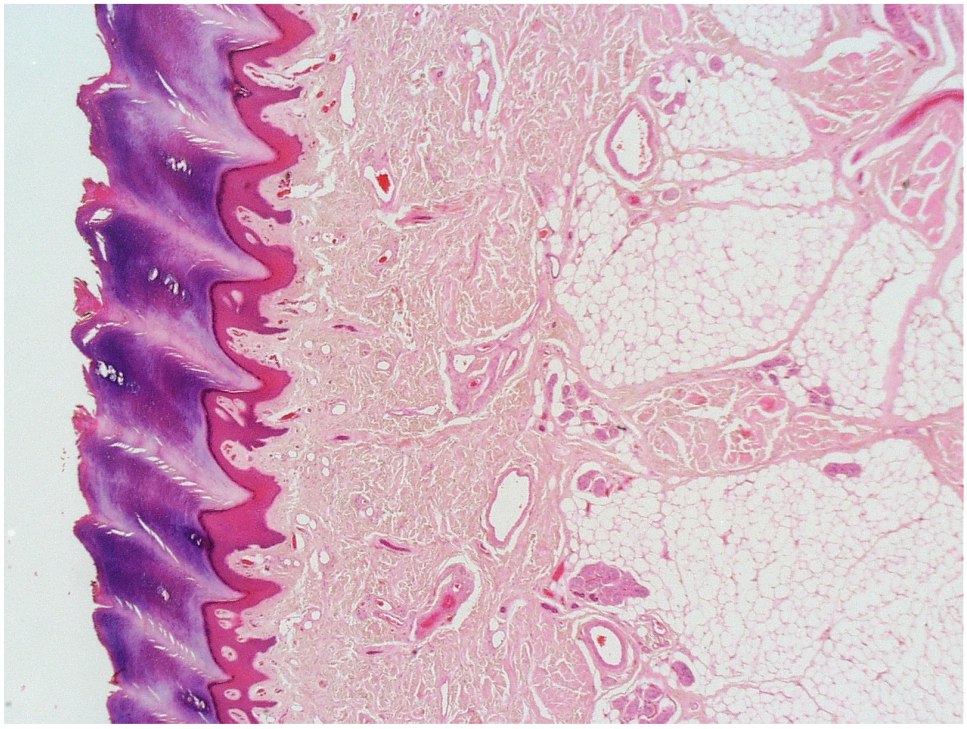
Histology Lab Part 1: Slide 4



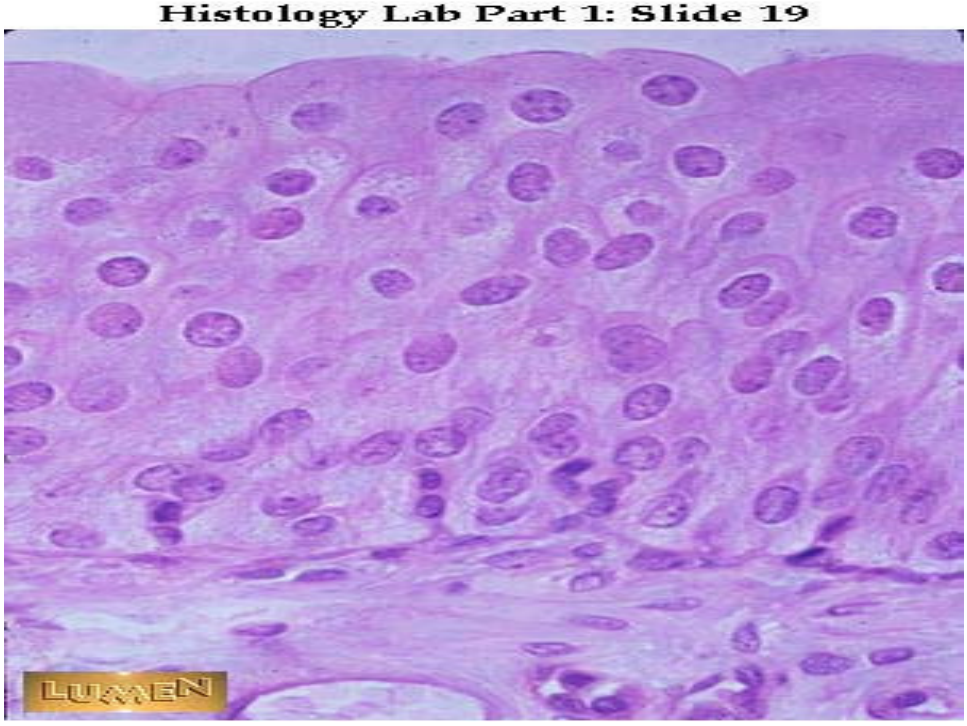
Histology Lab Part 1: Slide 8

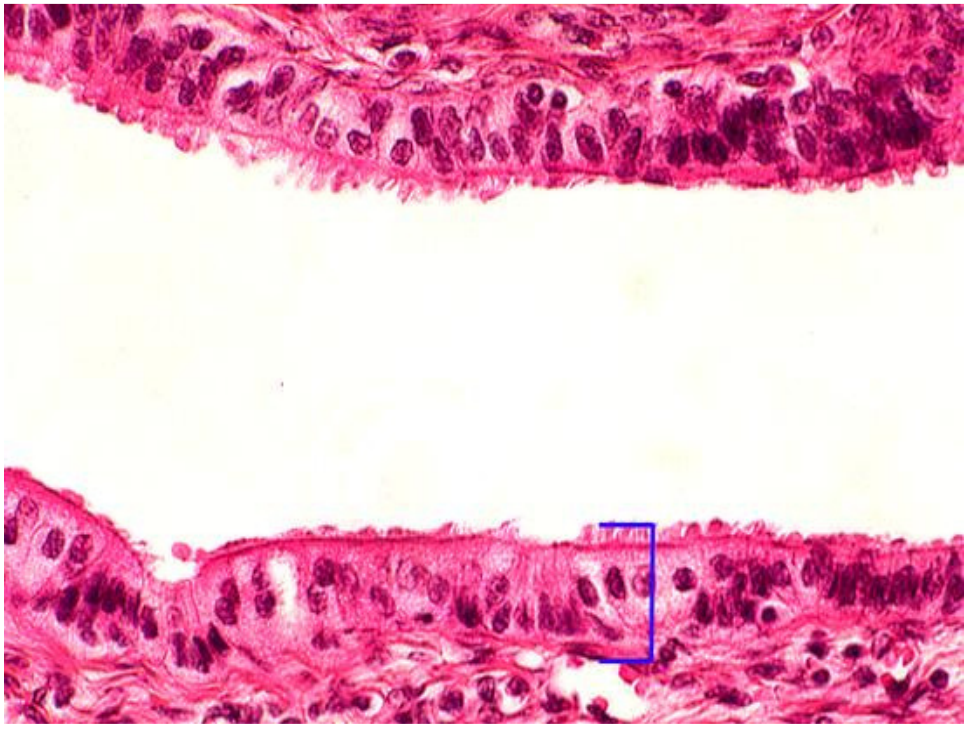


Histology Lab Part 1: Slide 15



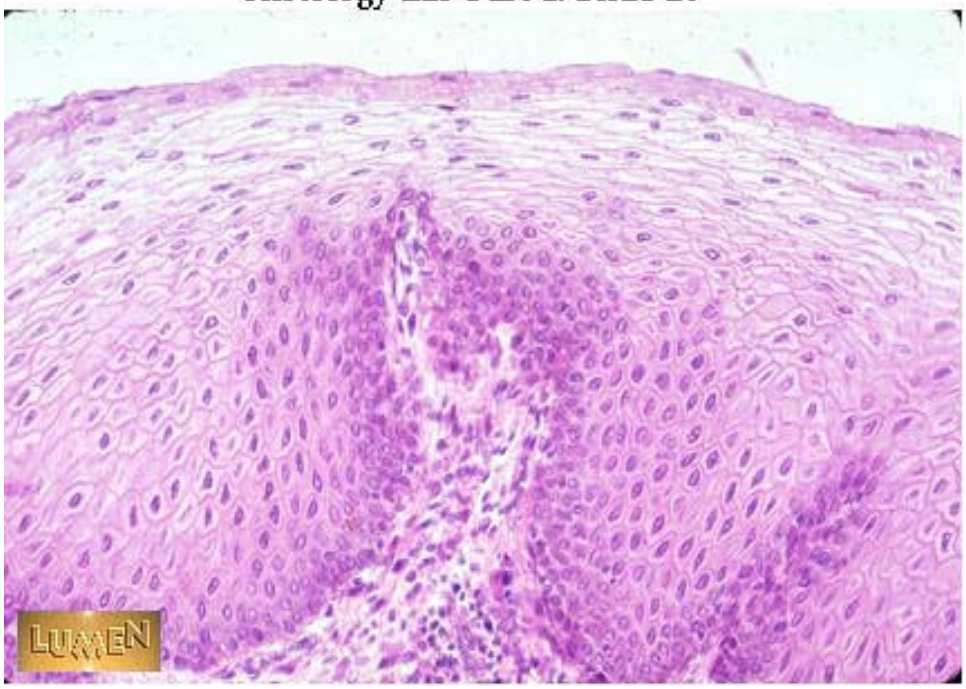
Histology Lab Part 1: Slide 19





Histology Lab Part 13: Slide 3

Histology Lab Part 1: Slide 20



Histology Lab Part 1: Slide 19