

Tissues

- Cells work together in functionally related groups called tissues
 - How is this done?
 - Attachments
 - communication
- Types of tissues:
 1. Epithelial – lining and covering
 2. Connective – support
 3. Muscle – movement
 4. Nervous – control



Epithelial Tissue – General Characteristics & Functions

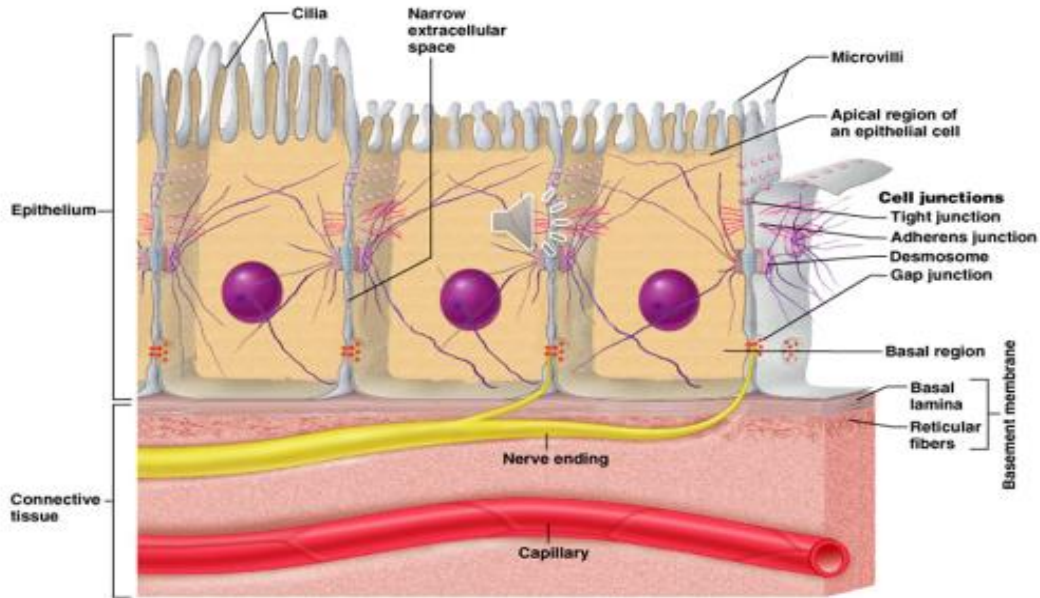
- Covers a body surface or lines a body cavity
- Forms most glands
- Functions of epithelium
 - Protection
 - Absorption, secretion, and diffusion
 - Filtration
 - Forms slippery surfaces (mucus secretion)

Special Characteristics of Epithelia

- Cellularity
 - cells are in close contact with each other with little or no intercellular space between them
- Specialized contacts
 - [may have junctions for both attachment and communication](#)
- Polarity
 - epithelial tissues always have an apical and basal surface
- Support by connective tissue
 - at the basal surface, both the epithelial tissue and the connective tissue contribute to the basement membrane
- Avascular
 - nutrients must diffuse from basal layer
- Innervated
- Regenerative
 - epithelial tissues are highly mitotic

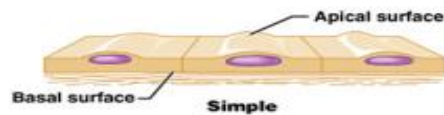


Special Characteristics of Epithelia

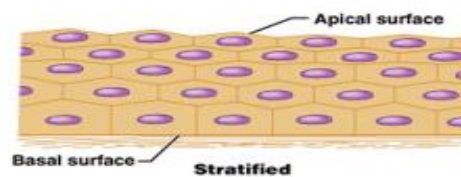


Classifications of Epithelia

- First name of tissue indicates number of layers
 - Simple – one layer of cells



- Stratified – more than one layer of cells





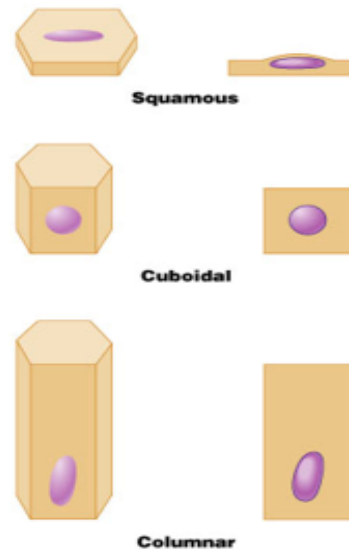
Classifications of Epithelia

■ Last name of tissue describes shape of cells

■ Squamous – cells wider than tall (plate or “scale” like)

■ Cuboidal – cells are as wide as tall, as in cubes

■ Columnar – cells are taller than they are wide, like columns



Naming Epithelia

■ Naming the epithelia includes both the layers (first) and the shape of the cells (second)

■ i.e. stratified cuboidal epithelium

■ The name may also include any accessory structures

■ Goblet cells

■ Cilia

■ Keratin

■ Special epithelial tissues (don't follow naming convention)

■ Pseudostratified

■ Transitional



Simple Squamous Epithelium

■ Description

- single layer of flat cells with disc-shaped nuclei

■ Special types

■ Endothelium (inner covering)

- slick lining of hollow organs

■ Mesothelium (middle covering)

- Lines peritoneal, pleural, and pericardial cavities
- Covers visceral organs of those cavities

Simple Squamous Epithelium

■ Function

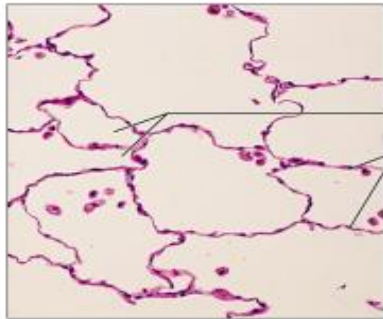
- Passage of materials by passive diffusion and filtration
- Secretes lubricating substances in serous membranes

■ Location

- Renal corpuscles (kidneys)
- Alveoli of lungs
- Lining of heart, blood and lymphatic vessels
- Lining of ventral body cavity (serosae/serous memb.)

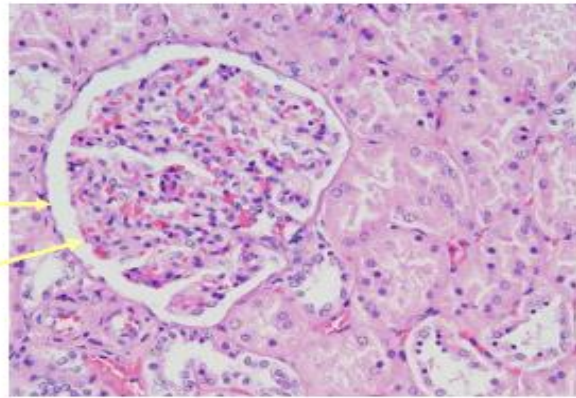
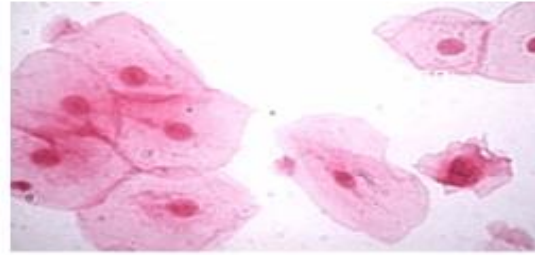


Simple Squamous Epithelium



Photomicrograph: Simple squamous epithelium forming part of the alveolar (air sac) walls (400x).

Air sacs of lung tissue
Nuclei of squamous epithelial cells



Simple squamous lining the walls of the capillary

Simple Cuboidal Epithelium

■ Description

- single layer of cube-like cells with large, spherical central nuclei

■ Function

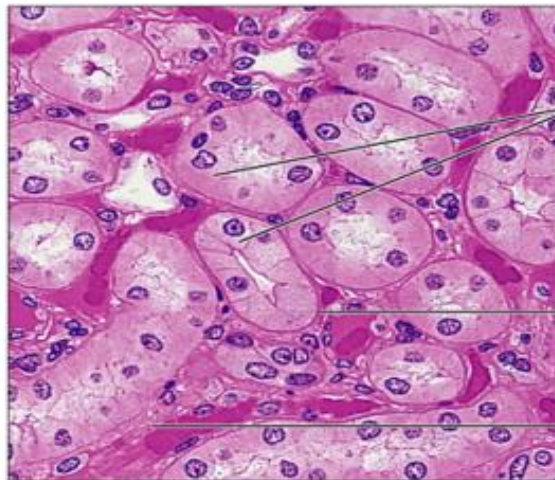
- secretion and absorption

■ Location

- kidney tubules, secretory portions of small glands, ovary surface



Simple Cuboidal Epithelium



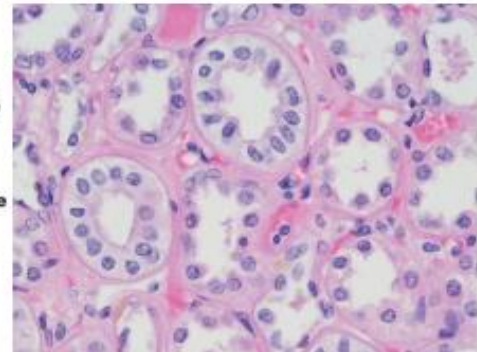
Photomicrograph: Simple cuboidal epithelium in kidney tubules (400 \times).



Simple cuboidal epithelial cells

Basement membrane

Connective tissue



Simple Columnar Epithelium

■ Description

- single layer of column-shaped (rectangular) cells with oval nuclei
 - Some bear cilia at their apical surface
 - May contain goblet cells

■ Function

- Absorption; secretion of mucus, enzymes, and other substances
- Ciliated type propels mucus or reproductive cells by ciliary action



Simple Columnar Epithelium

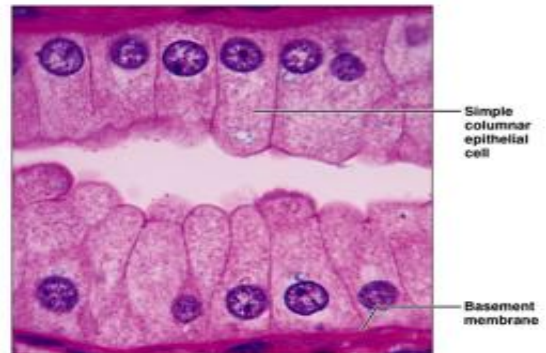
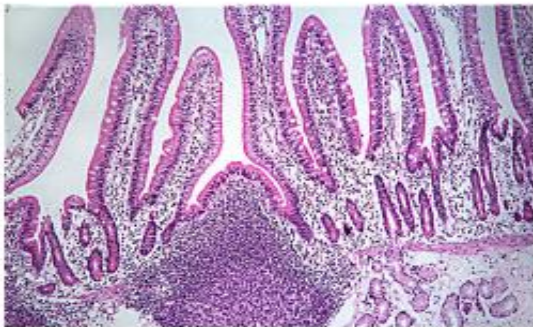
■ Location

■ Non-ciliated form

- Lines digestive tract, gallbladder, ducts of some glands

■ Ciliated form

- Lines small bronchi, uterine tubes, and uterus



Photomicrograph: Simple columnar epithelium of the stomach mucosa (1300x).

Pseudostratified Columnar Epithelium

■ Description

- All cells originate at basement membrane
- Only tall cells reach the apical surface
- May contain goblet cells and bear cilia
- Nuclei lie at varying heights within cells
 - Gives false impression of stratification

■ Function

- secretion of mucus; propulsion of mucus by cilia



Pseudostratified Columnar Epithelium

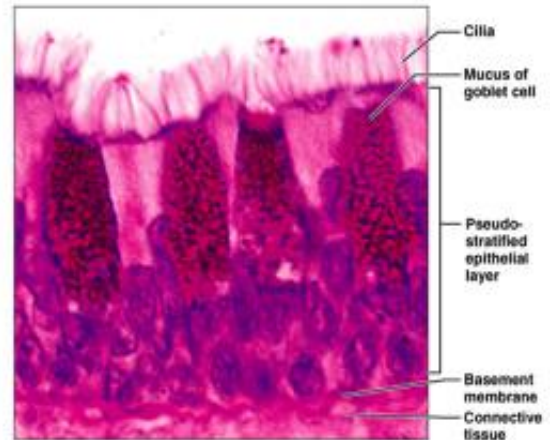
■ Locations

■ Non-ciliated type

- Ducts of male reproductive tubes
- Ducts of large glands

■ Ciliated variety

- Lines trachea and most of upper respiratory tract



Photomicrograph: Pseudostratified ciliated columnar epithelium lining the human trachea (400x).