

Stratified Epithelia

- Contain two or more layers of cells
- Regenerate from below
- Major role is protection
- Are named according to the shape of cells at apical layer

Stratified Squamous Epithelium

■ Description

- Many layers of cells – squamous in shape
- Deeper layers of cells appear cuboidal or columnar
- Thickest epithelial tissue – adapted for protection

Stratified Squamous Epithelium

■ Specific types

- Keratinized – contain the protective protein keratin
 - Surface cells are dead and full of keratin
- Non-keratinized – forms moist lining of body openings

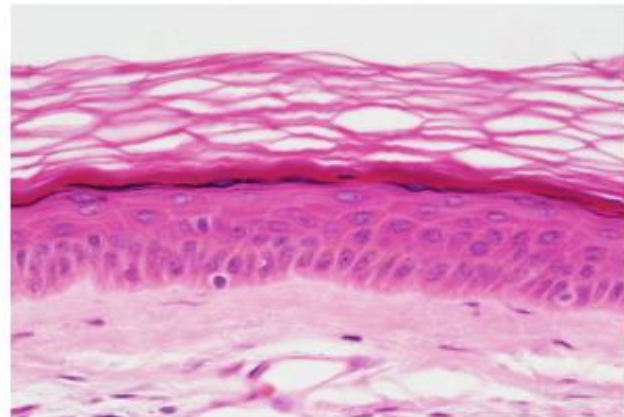
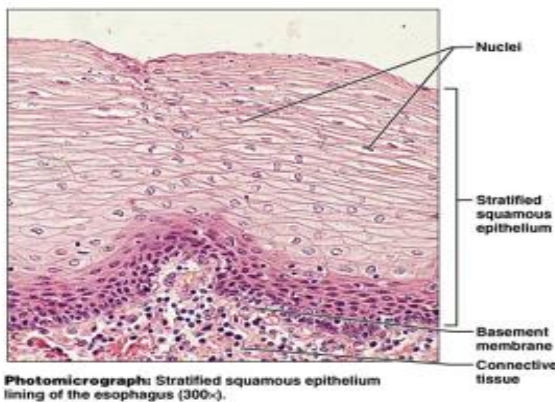
■ Function

- Protects underlying tissues in areas subject to abrasion

■ Location

- Keratinized – forms epidermis
- Non-keratinized – forms lining of esophagus, mouth, and vagina

Stratified Squamous Epithelium



Non-keratinized vs. Keratinized

Stratified columnar epithelium

- **Description**

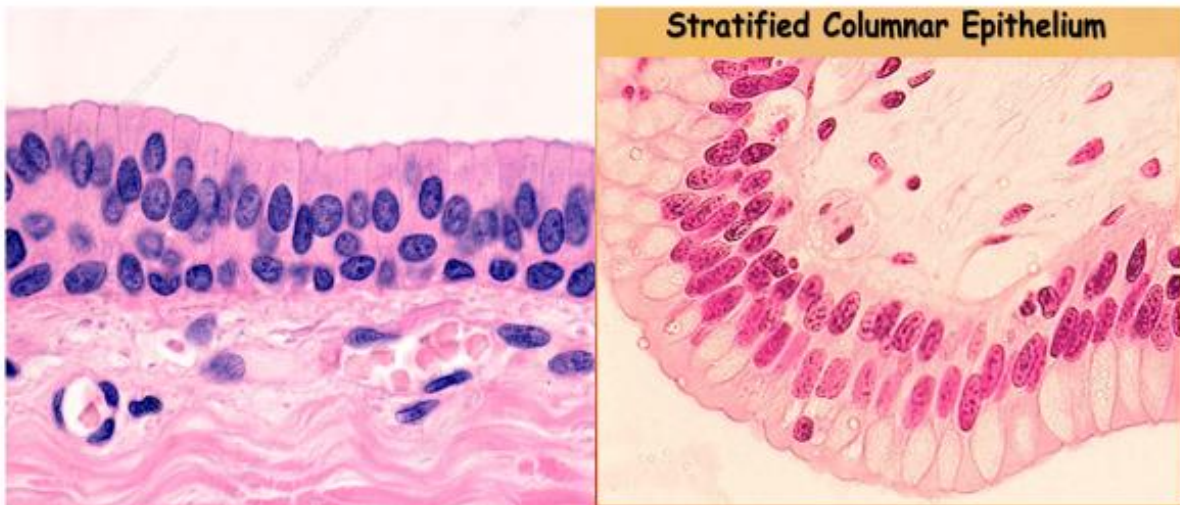
- It composed of column-shaped cells arranged in multiple layers.

- **Location**

- It is found in the conjunctiva, pharynx, anus, and male urethra.

- **Function**

- The cells function in secretion and protection.



Stratified cuboidal epithelium

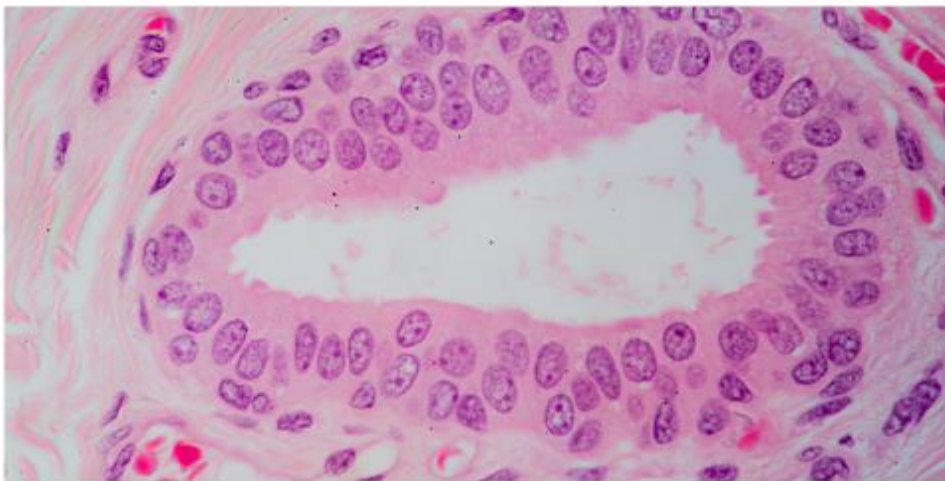
- **Description**

- Stratified cuboidal epithelium is a type of epithelial tissue composed of multiple layers of cube-shaped cells.

- Only the most superficial layer is made up of cuboidal cells, and the other layers can be cells of other types. found mainly in glands in glands

- **Function**

- stratified cuboidal epithelium serves two general purposes: secretion and protection.



Transitional Epithelium

■ Description

- Basal cells usually cuboidal or columnar
- Superficial cells dome-shaped or squamous

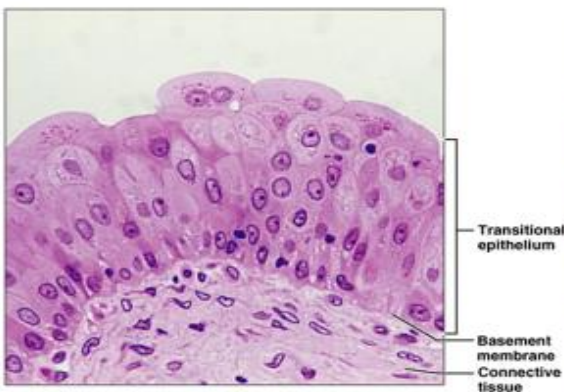
■ Function

- stretches and permits distension of urinary bladder

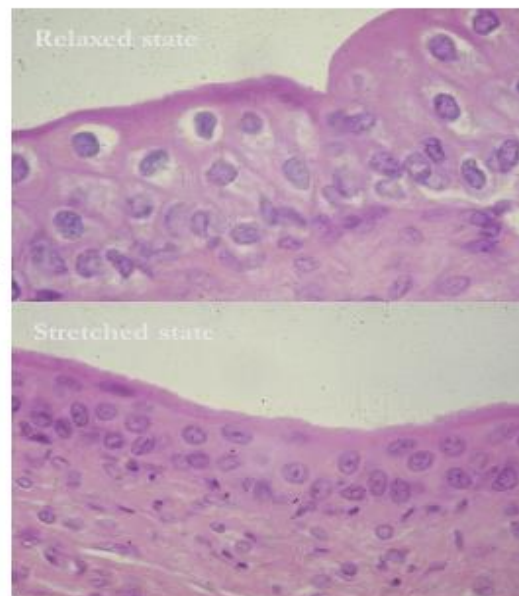
■ Location

- Lines ureters, urinary bladder and part of urethra

Transitional Epithelium



Photomicrograph: Transitional epithelium lining of the bladder, relaxed state (500x); note the bulbous, or rounded, appearance of the cells at the surface; these cells flatten and become elongated when the bladder is filled with urine.



Epithelial Surface Features

■ Apical surface features

■ Microvilli – finger-like extensions of plasma membrane

- Abundant in epithelia of small intestine and kidney
- Maximize surface area across which small molecules enter or leave
- Act as stiff knobs that resist abrasion

Epithelial Surface Features

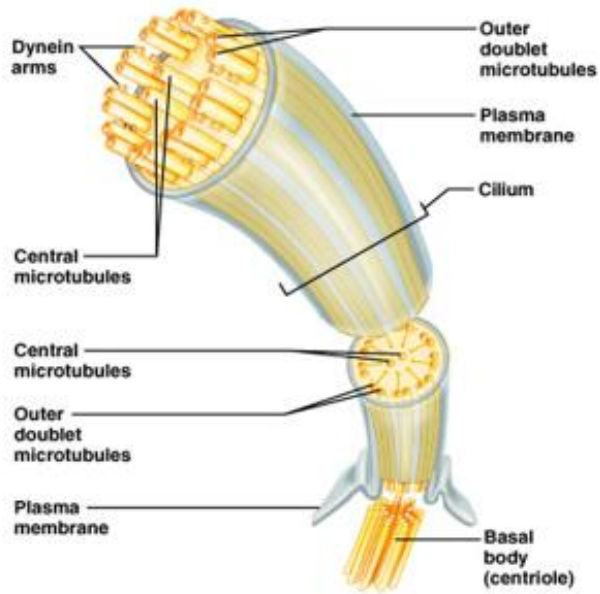
■ Apical surface features

■ Cilia – whip-like, highly motile extensions of apical surface membranes

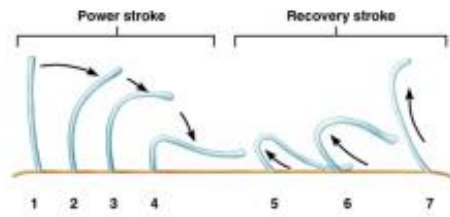
- Contains a core of nine pairs of microtubules encircling one middle pair
- Axoneme – a set of microtubules
- Each pair of microtubules – arranged in a doublet
- Microtubules in cilia – arranged similarly to cytoplasmic organelles called centrioles
- Movement of cilia – in coordinated waves



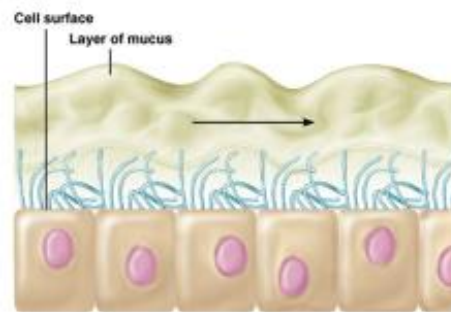
A Cilium



(a) Cilium



(b) Ciliary motion



(c) Movement of mucus across cell surfaces