



- * Cell → Unit of function and structure of the body
- * The smallest building unit of the body ⇒ cell
- * cell → ~~tiss~~ Tissue → Organ → System

Tissues are...

- Groups of similar cells and extracellular products that carry out a common function
 - providing protection ⇒ like Epithelial & Connective tissue
 - facilitating body movement ⇒ Like Muscle & Nervous tissue
- Study of tissues is histology
- 4 primary types of tissues in the body
 1. Epithelial tissue
 2. Connective tissue
 3. Muscle tissue
 4. Nervous tissue

Histology

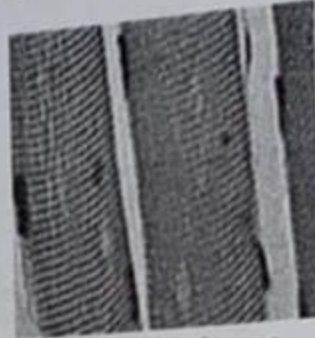
↓
tissue → science

Handwritten notes at the bottom of the page, including arrows and some illegible text.

④ Basic Types of Tissues



Connective tissue



Muscular tissue



Nervous tissue



Epithelial tissue

Epithelial Tissue

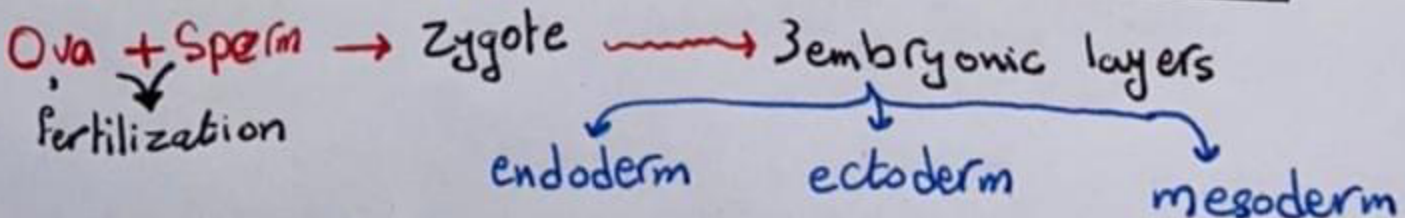
There are 2 type

Covers
secretion

- Epithelial tissue covers or lines every body surface and body cavity
- Epithelium is composed of one or more layers of closely packed cells between two compartments
 - Closely aggregated cells
 - Very little intercellular substances
 - Derived from 3 embryonic layers
 - endoderm
 - ectoderm
 - mesoderm
 - Regular shaped cells bind together by junction coesmplex
 - Resting on basal lamina (basement membrane)
 - Avascular (There are no blood vassels inside it)
 - Rich in nerve supply
 - High renewal rate

Minimal or

* The nutrition of epithelial tissue from underlying connective tissue.



Characteristics of Epithelial Tissue

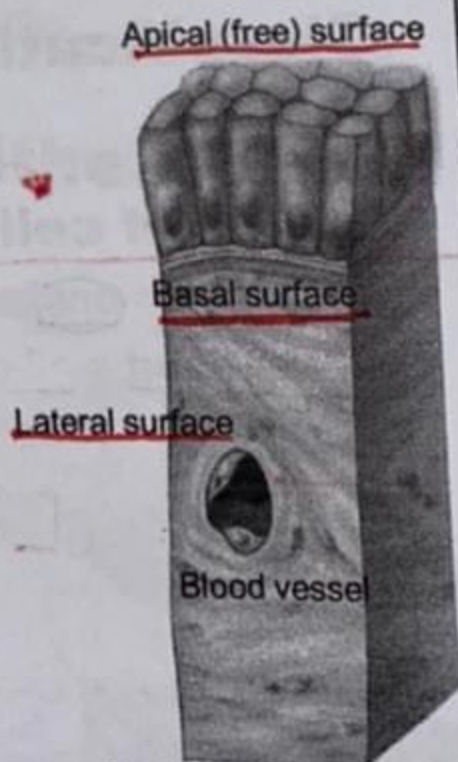
1. **Cellularity**: composed almost entirely of cells (with some extracellular matrix and sometimes other structures)
 - Closely aggregated cells with very little intercellular substances
2. **Polarity**: has specific top and bottom
 - **apical surface** exposed to external environment or internal body space, and
 - **basal surface** attached to underlying connective tissue, plus
 - **lateral surfaces** connected by intercellular junctions

4. **Attachment**: basal surface bound to basement membrane

5. **Avascularity**: no blood vessels: receive nutrients across apical surface or by diffusion

6. **Innervation**: lots of nerve endings

7. **High regeneration capacity**: epithelial cells are frequently damaged or lost to abrasion, so they are replaced quickly



Epithelium-connective tissue junction

Classification of epithelium

1

Covering and lining epithelium

covers body surface and body cavity

3

Special types

It has the characteristic features of the epithelium

2

Glandular (secretory) epithelium

Produce secretions

Classification of covering epithelium

Number of cell layers

- simple = one cell layer thick
- stratified = >2 cell layers thick
↳ more than one

• Simple



• Stratified

Cell shape

- squamous = flattened (flat nuclei)
- cuboidal = basically cube-shaped or roundish (rounded central nucleus)
- columnar = long and thin (like a column)
- Pseudostratified

looks like stratified but it's simple (one layer) resting on one basal lamina

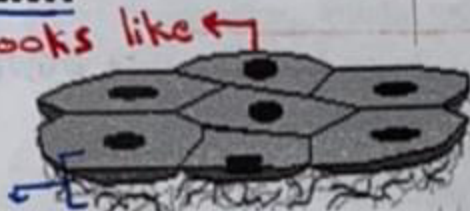
* Peseudo => False

1- Simple Squamous Epithelium

Flat cells \Rightarrow Very thin & smooth

LM:

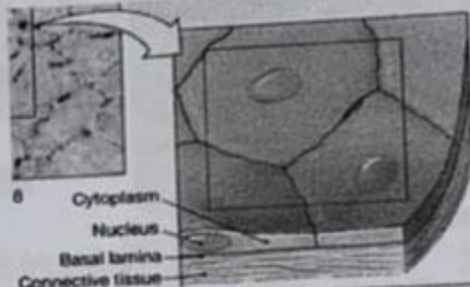
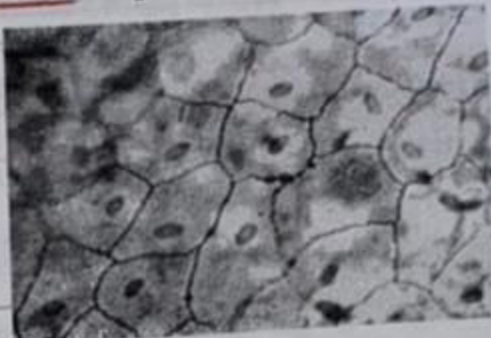
From above it looks like a polyhedral
 متعدد السطوح



From the side it looks flat and has a flat nucleus



Simple squamous



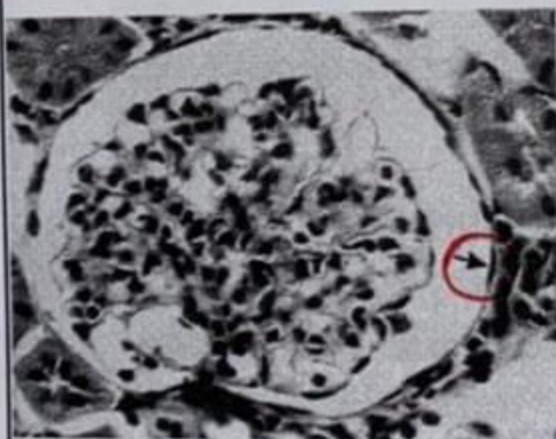
* Cell membrane not seen by LM " too thin 8.5 nm " \Rightarrow we see it in electron microscope.

* We see the Nucleus clearly through the LM \Rightarrow so, we depend on the shape of the nucleus to determine the type of Epithelium.

1- Simple Squamous Epithelium

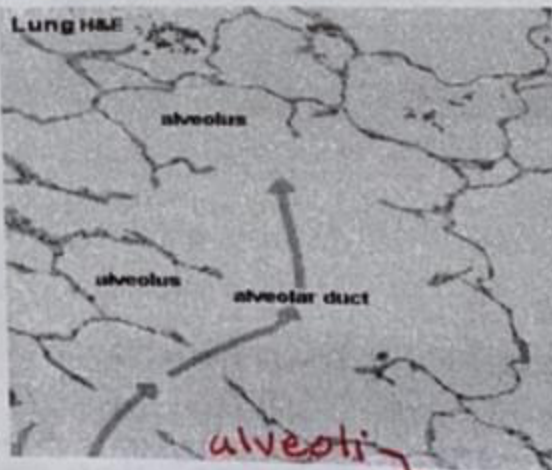
(Bowman's capsule- kidney)

(Lung alveoli)



Function: Filtration of blood

\rightarrow to give urine



Function: gas exchange

O_2 \rightarrow CO_2

\Rightarrow it must be very thin

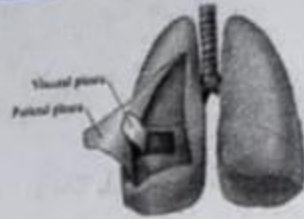
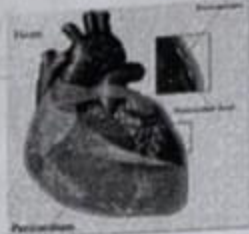
It has smooth surface Simple Squamous Epithelium

Endothelium:
of the blood vessel



Mesothelium:

Pericardium, pleura, peritoneum
Function: smooth surface => to prevent friction



why?
to prevent blood coagulation

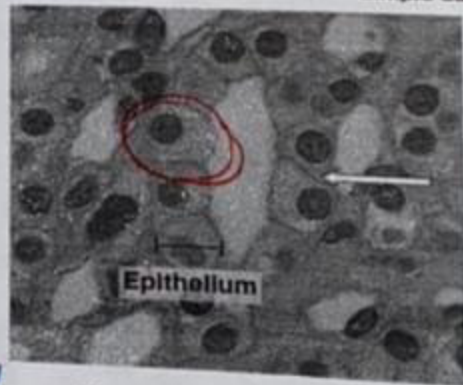
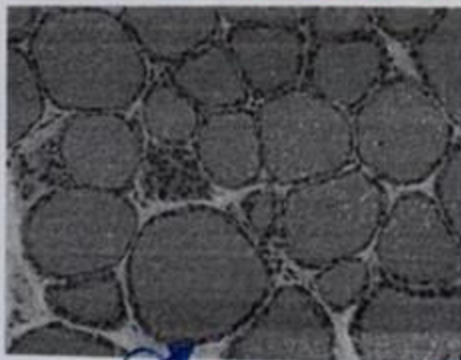
Endothelium

simple squamous epithelium of the blood vessels

- * pericardium -> It cover the heart
- * pleura -> It cover the Lungs
- * peritoneum -> It cover the intestine

2- Simple cuboidal Epithelium

cuboid in shape and has rounded nuclei



Site: Thyroid gland : secretion

② kidney tubules : ion exchange

Kidney

Tubules

cuboidal, columnar

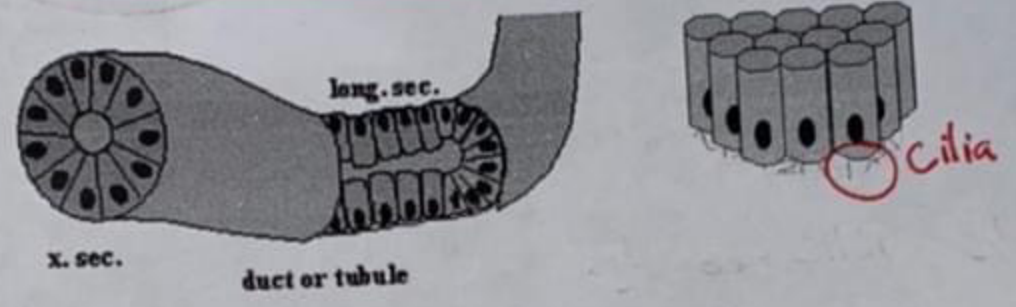
Bowman's capsule

Squamous

transbruda sro nli
 moterz podunigan srt ni

groups has cilia
 groups don't have cilia

3- Simple Columnar Epithelium



⇒ Polarity in apical surface

Types:

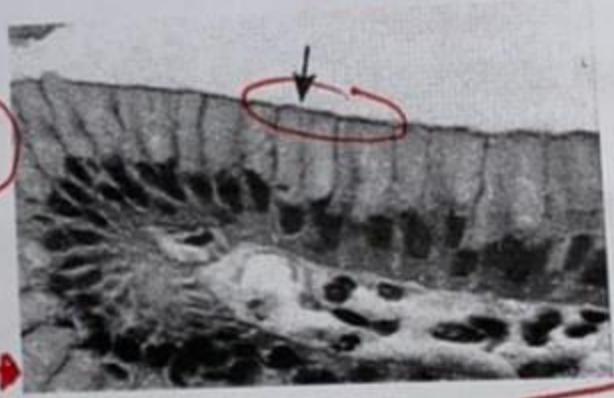
- a. Non ciliated
- b. Ciliated

⇒ Cilia Function: movement

a. Simple columnar epithelium (non ciliated)

cell → long nucleus is toward the base

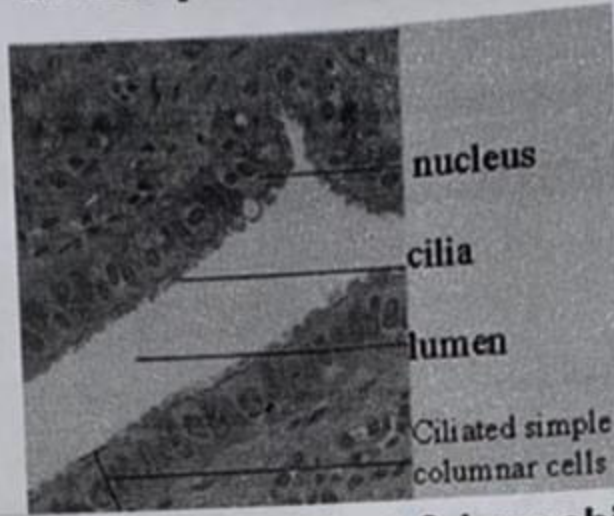
LM



Sites: ducts of glands: secretion
digestive tract: absorption

* Cilia are abundant in the respiratory system

b. Simple columnar epithelium ciliated



Sites: uterus, oviduct & bronchiole of the lung
(movement of luminal contents)*

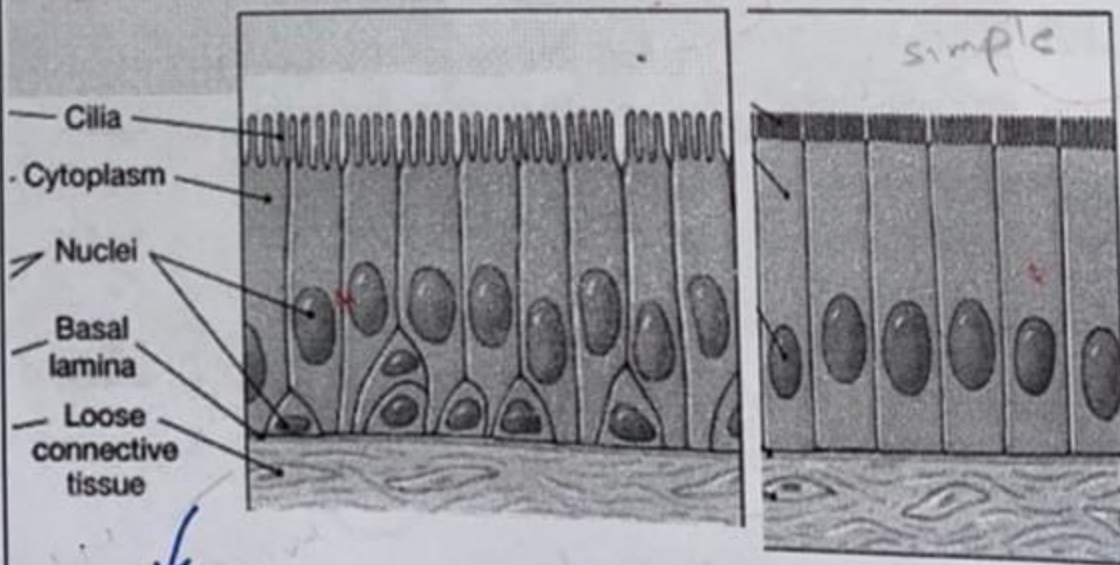
To move the ova from the ovary to the uterus

Function :- respiration air have Bacteria and dust clearing air by movement air (cilia)

Simple

4- Pseudostratified columnar epithelium

False

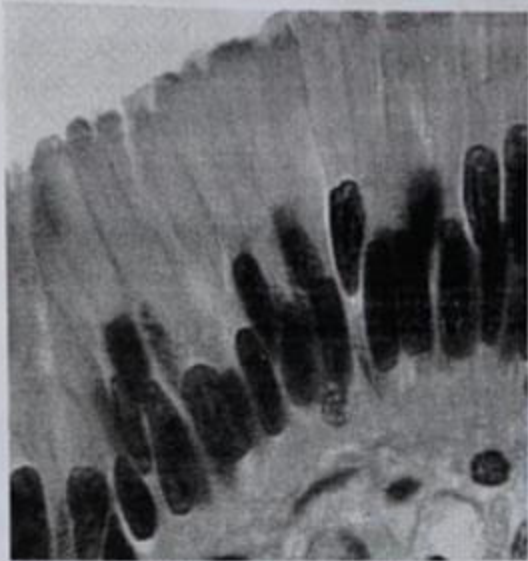


* all of the cells are on one basement membrane

* Nuclei not straight forward
ليست على استقامة

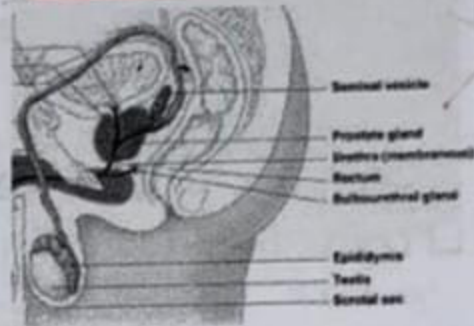
columnar → overcrowded → looks like stratified

a- Pseudostratified columnar epithelium
non ciliated



- Sites: Male genital tract - large ducts of glands: (secretion)

for nutrition of sperm

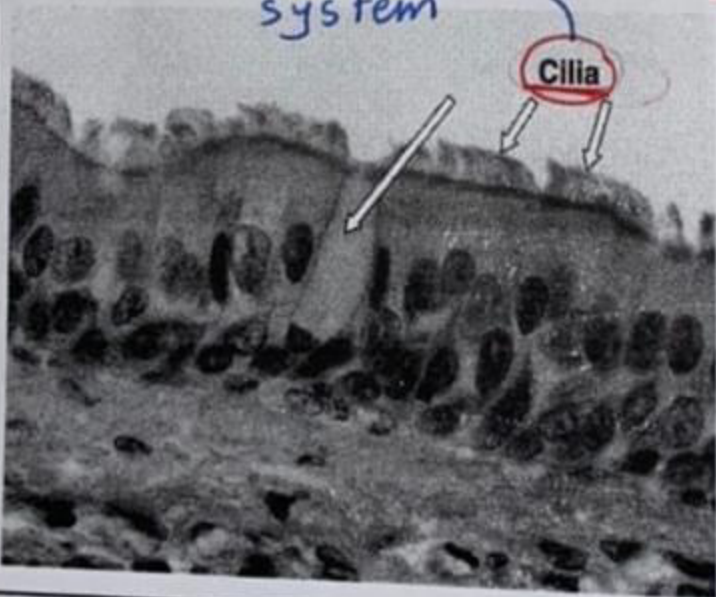


* It's only found in the respiratory system
 ⇒ Respiratory epithelium

b. Pseudostratified columnar epithelium
ciliated

respiratory system

- Sites: Nose- Trachea



Cilia



Epithelium

to movement of luminal contents to cleaning the respiratory system from

dust particles

looks like stratified ← but it's not ← stratified
more than one layer

Stratified Epithelium

What cell is on the top layer?

Classification according to shape of most superficial layer

- Stratified squamous epithelium
↳ flat nucleus
- Stratified cubeoidal epithelium
↳ rounded nucleus
- Stratified columnar epithelium
↳ column and have
- Transitional epithelium



of top layer
very rare type

It's only found in the respiratory system

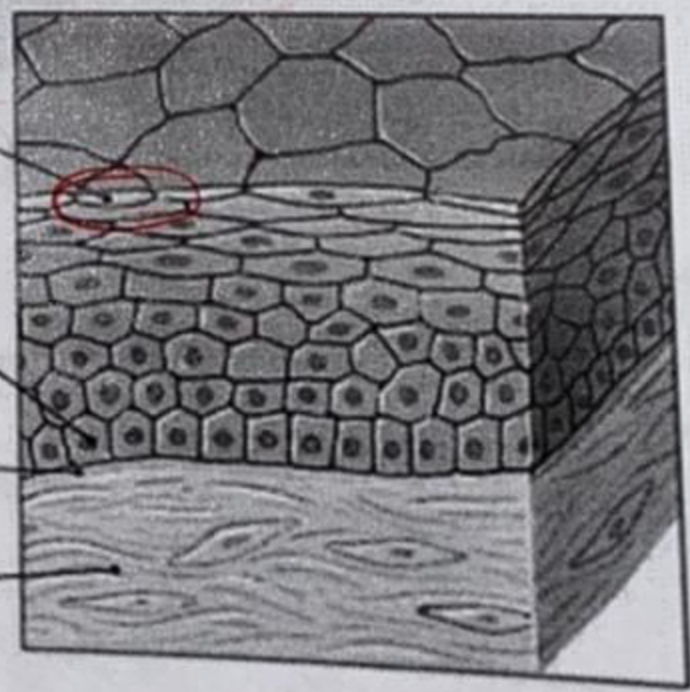
Stratified Squamous Epithelium

- Squamous superficial cells

- Stem cells

- Basal lamina

- Connective tissue

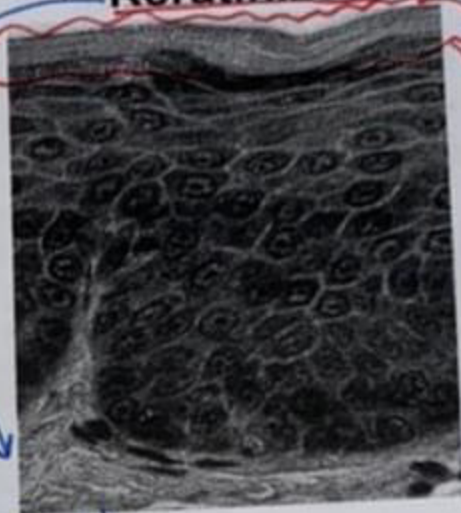
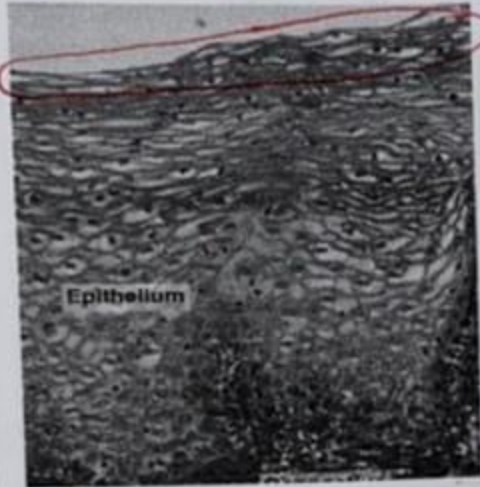


*keratine ⇒ Layer don't have nucleus like a fiber over the epithelial tissue (stratified)
Provides protection

Stratified squamous epithelium

Non Keratinized

Keratinized



keratine
no nucleus

Oesophagus- vagina

*cornea
mouth cavity
anal canal

(Physical protection)

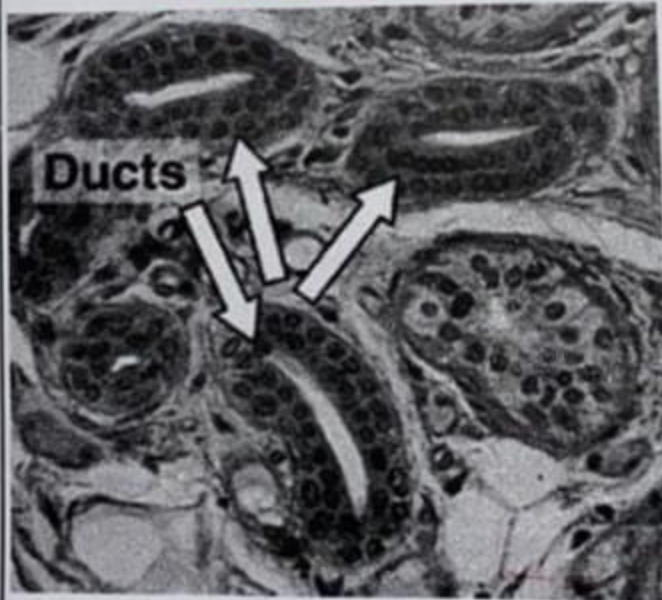
Just in skin

الجلد
بفتح الجيم
الجلد

mouth cavity, Nasal cavity

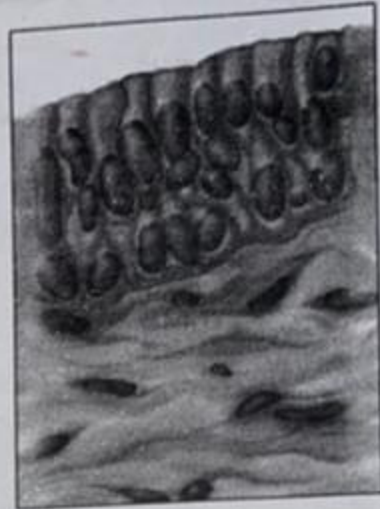
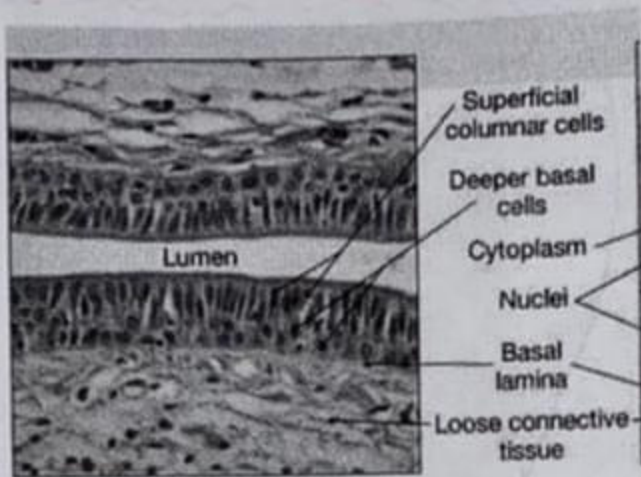
Stratified Cuboidal Epithelium

(Ducts of sweat glands: secretion) (Rare)



Handwritten notes in Arabic and English describing the structure and function of stratified cuboidal epithelium, mentioning its role in secretion and its rarity.

Stratified Columnar Epithelium (Rare)

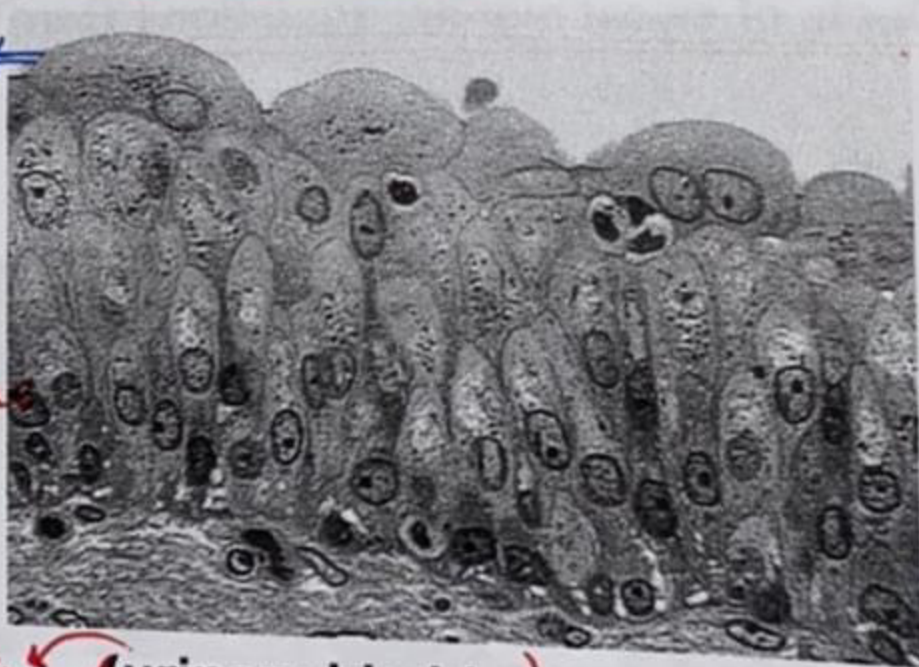


- ciliated: penile urethra
 - Non ciliated: conjunctival fornix
- (protection)

Transitional epithelium

☐ Stratified

☑ Its shape is variable



Top cell Large cuboidal cell
 • dome shaped cell

Thick cell membranes
 ⇒ protection

urinary system (urinary bladder) - empty

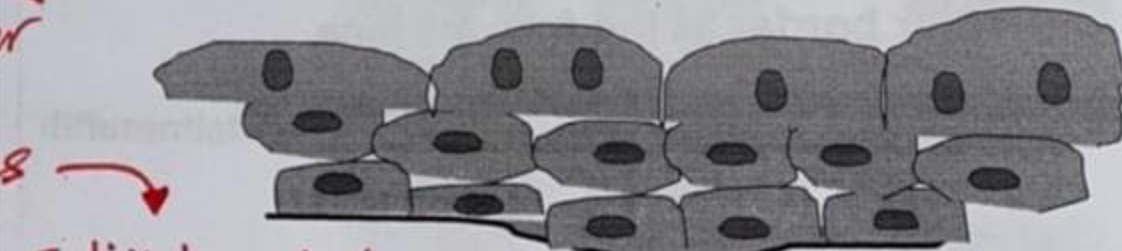
Transitional Epithelium



Transitional Epithelium

Full urinary bladder

The number of cells decreases



~~10 layers~~
10 layer empty → 3 Layer Full