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Zoology - 2

SIERRA INNOVATIONS

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Animal Tissues

Structural Organization in Animal "Animal Tissue"

* Life evolved on earth in front of single cell (Unicellular).
    - Like **Example**: - Amoeba, Paramecium
    - Can perform all necessary functional activity.
    - **"But not much efficient".** (Cannot perform all activity simultaneously.)

To attain efficiency → **Multi cellular** - Various kind of cell. → perform various function.

Tissue

* Group of similar cell along with intercellular substance having similar origin, specialized to perform specific function, is called tissue.
* It is termed as tissue by Xavier Bichat.
* **Study of tissue is Histology.** (Microscopic anatomy/Micro anatomy)

Types of tissue

A. Epithelial tissue: original - ecto, meso, and endo

B. Connective tissue: original - mesodermal

C. Muscular tissue: original - mesodermal

D. Nervous tissue: original - ectodermal

A. Epithelial Tissue

Epi = upon, Thelio = Grown,

* It is termed by Ruysch.
* Epithelial has free surface that face
    - A body fluid (Endothelial)
    - Outside environment (Epithelial)

Location

* That cover or lives on the External/internal surface of various body parts.

Function

* Giving help in
    - Nutrition
    - Excretion
    - Secretion
    - Protection

Type -

There are two types of epithelial tissues.

(i) Simple - composed of single layer of cells.

(ii) Compound - Composed of two or more layers of cell.

Characteristics

* Little or no inter cellular material between cells.
* Cell held together by **inter cellular junction.**
* Epithelium rest on **non-cellular basement.**
* Usually blood vessel absent.
* High power of regeneration.
* **Origin** = Epithelial originate from all three layers GL Ectoderm, Mesoderm and Endoderm.

Basement Membrane = Non cellular

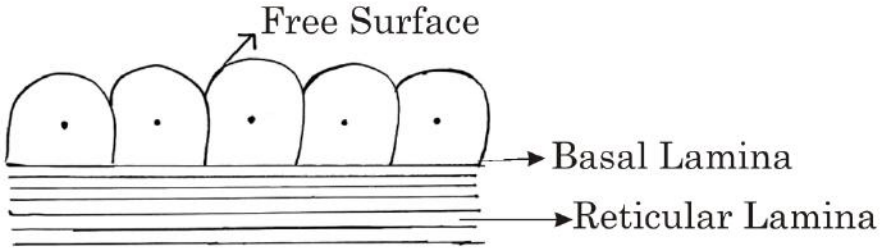
* Consist of two layers

(i) **Upper basal lamina**

* Separated by epithelium.
* Compose of Muco polysaccharide and Glycoprotein.

(ii) **Lower/Reticular Lamina**

* Composed of Collagen Fibre. (Inner thick fibrous layers)



Function

* Basement Membrane provide elastic support and also anchors positive epithelium tissue to the underlying Connective tissues for obtaining Nutrition.

Types of epithelium tissues

There are two types of epithelial tissues.

(i) Simple epithelium - composed of single layer of cells.

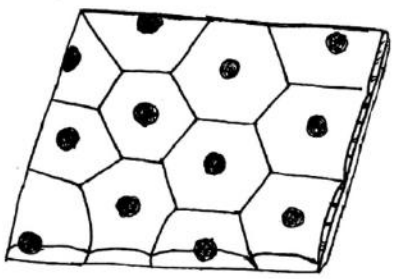
(ii) Compound epithelium - composed of two or more layer of cell.

(i) Simple epithelium

- Single layer of cells on Basement Membrane.
- **Function** Lining of body cavity, ducts & tubes.
- **Type** on basis of structure modification of cells.

1. **Simple Squamous**

* Large flat cells.
* Like "Tiles in a Floor" also called **"Pavement Epithelium"**.



Location

* Wall of blood vessels, lymph vessels, Alveoli.
* Wall of Woman's capsule.

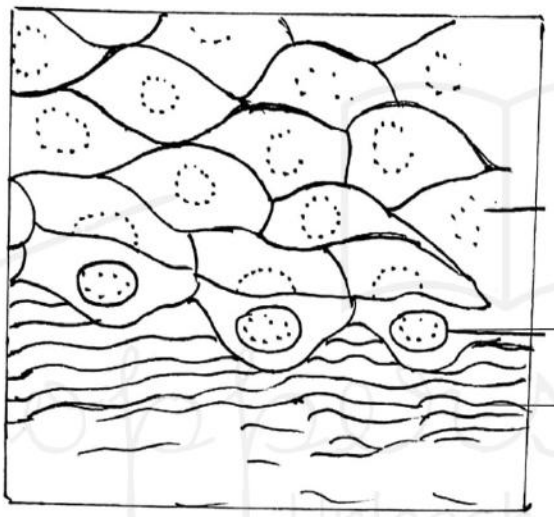
* Meso epithelium of coelom.

Function

* Filtration
* Exchange - Material & gases.

2. Simple cuboidal epithelium

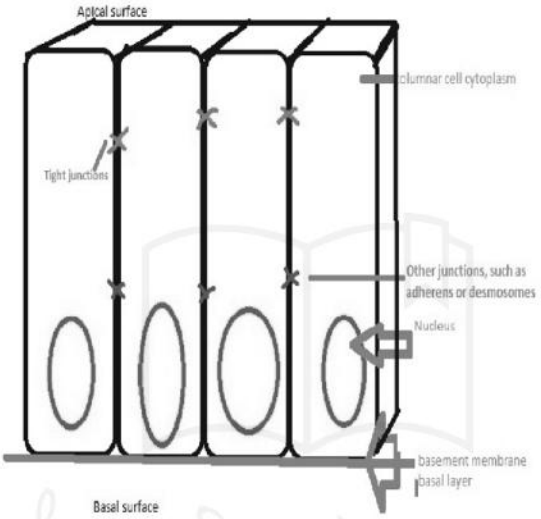
* Rest on Bone Marrow - Cube like cells



* **Function**
  - Secretion
  - Excretion
  - Absorption - brush boarder cuboidal epithelium.
* **Location**
  - PCT - Proximal convoluted tubule of Nephron.
  - Duct of Glands, Thyroid follicles.
  - Germinal epithelium
    - Ovaries
    - Testis

3. Simple columnar epithelium- Column like tube cell

* Tall cell elongated, **nuclei** at base of cells.
* Cells rest on Bone Marrow.
* Some cell stearic to produce Mucous Calories.
* **Free surface** - May be smooth / Micro cells.

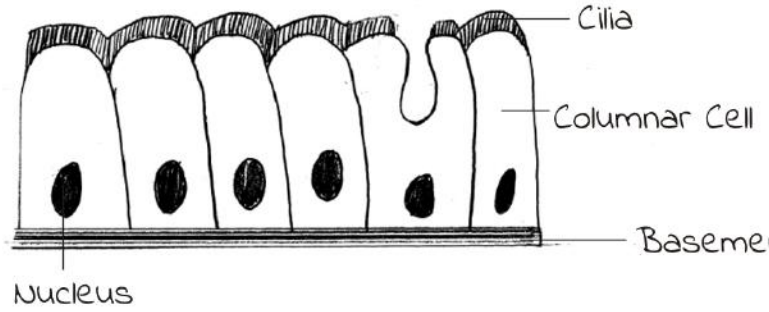


* **Location**
    - Stomach intestine
    - Gall bladder
    - Gastric & Intestinal glands
* **Function**
    - Secretion
    - Absorption

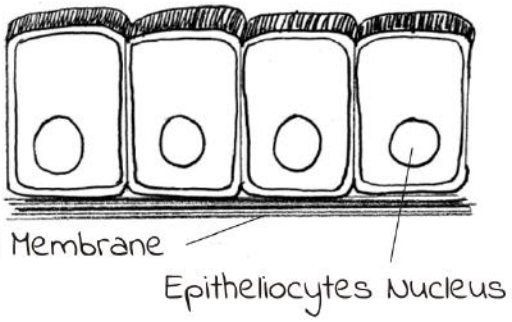
4. Ciliated epithelium

* Cilia on free surface
* function of Cilia- move particle in specific direction
* Cilia may be on columnar or cuboidal cells.

Ciliated Columnar Epithelium



Ciliated Cuboidal Epithelium



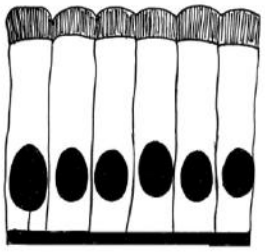
E.g., * In fallopian tube * Parts of uterus & cervix. * Efferent tubes of testis * Ventricle of brain & spinal cord * Auditory tube.	**E.g.,** * Part of nephron * Smaller bronchioles.

5. **Pseudo stratified columnar epithelium**

* Made up of a single layer of columnar cells.
* It appear two layered because having two type of cells.

One Large - Form free surfaces.

One small Layer - In between layer cells.



Pseudo stratified non Ciliated Columnar epithelium	Pseudo stratified Ciliated Columnar epithelium
e.g., * Larger duct of parotid salivary glands * Olfactory mucosa * Urethra of male * Larger duct of mammary gland	e.g., * Trachea upper respiratory * Large Bronchial

Glandular epithelium

* Epithelium specialized for secretion cells. Glandular Epithelium is cuboidal or columnar.

1. **Based on number**

* **Unicellular** - Consist of isolated single cells, e.g.,
    - Goblet gland
    - Paneth gland
* **Multicellular** - Cluster of cells, e.g.,
    - Salivary gland.
    - Sweat Gland
    - Gastric Gland
    - Sebaceous Gland

2. **Based on secretion**

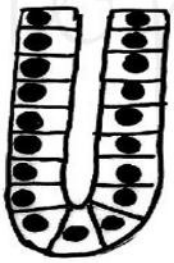
* **Exocrine**
    - Secretion through duct/tube.
    - e.g., Ear wax, mucous, oil saliva, milk, digestive enzymes.
* **Endocrine**
    - Duct less gland - e.g., pituitary parathyroid etc.
    - Secret product into fluid bathing glands.
* **Heterocrine**
    - Both nature mix type
    - e.g., Testis, ovary, pancreas

3. **Based on mode of secretion.**

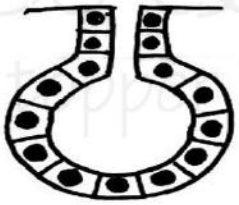
* **Merocrine** - (Mero = Part)
    - No contribution from cell.
    - By diffusion
    - e.g., salivary, pancreas, gastric, sweat.
* **Apocrine**
    - Apical part lost with secretion.
    - e.g., mammary gland
* **Holocrine**
    - **Whole** cell lost with secretion.
    - e.g., sebaceous gland.

4. **Based on structure /shape of secretary unit** (Multicellular glands)

* **Tubular** Tube like structure.
* **Alveolar** Alveoli like structure.



Here tube for secretin



Here Secular/Alves for secretin

Tubular	Alveolar
1. Simple tubular Tubes. e.g., Crypts of Lieberkuhn	1.Simple Alveolar e.g., Mucous gland of frog. Photism gland of toad
2. Simple coiled Tubes e.g., Sweat Glands	2. Simple Branch : Sebaceous

3. Simple Branched e.g., Gastric Gland	3. Compound Alveolar * Sublingual Glands * Submandibular Glands
4. Compound tubular, e.g., ◦ Mammary gland of promoters ◦ Inactive mammary gland of Eutheria	4. Compound – Tubular Alveolar, e.g., ◦ Active mammary gland of Eutheria ◦ Bartholin gland ◦ Cowper's gland ◦ Parotid gland

Compound epithelium

* Made up of more than one layer (Multi-layered).
* Epithelium having three layers
  - Upper – Superficial layer
  - Middle – Transitional layer
  - Lower – Basal layer
* Deepest layer on basement membranes.
* Limited Role in secretion & absorption.
* Main function is protection.

Types

(A) **Stratified compound epithelium**

* Non stretching multilayered epithelium.
* Developed from single **germinal layer**.
* Deepest Layer form by – Columnar
* Upper layer – may varies
  - Squamous
    - Keratinized
    - Non Keratinized

- Columnar
- Cuboidal
- Ciliated

(i) Keratinized stratified Squamous epithelium.

* **Superficial layer**- Squamous, dead, due, excess deposition of keratin. Its cell is called keratinocytes.
    - Lower - Stratum based, germinativum.
    - Middle - Middle transitional
    - Upper - Upper on superficial layer.
* Adjacent cell held by desmosomes.

Stratum Spinosum - Highly folded spiny.

Structure Granulosum

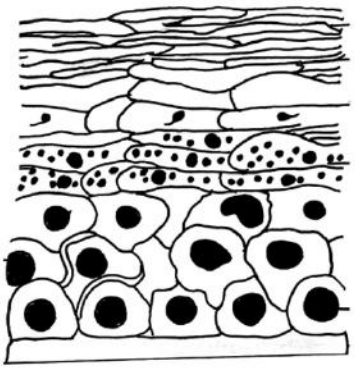
* Having keratohyalin granules
* Glycolic for adhesive cement (Water resistance)

Structure Lucidum

* Annotated

Structure Corneum -

* Full of keratin
* cells are called **Coenocyte cell**.



Location of Keratinized-

* Those surface which exposed Keratin

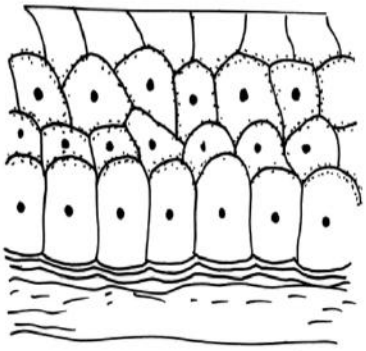
- Abrasion
- Mechanical stress
- Drying
    - Example - Epidermis of skin
- Part of nostrils
- Lips
- Lining of Anterior part of oral cavity
- Hard Plates
- Ant Dorsal surface of tongue
- Distal anal canal

Function:

* Inert hardened surface plate ideal cells protect underlying tirive front mechanicals injuries.
* Give protective Structure like
    - Nails
    - Claws
    - Horn
    - Hoot, Hairs
* Cementing layer check loss of water through evaporation.

(ii) Non Keratinized Stratified squamous epithelium

* Cells do not developed keratin, nor they become dead.
* Metabolically activities.
* **Outer cells** Retain nuclei oval in shape
* Cell inter linked by desmosomes.
* Adhesive lipids are not formed.



Occurrence:- Those surface which not exposed to drying but exposed to abrasion.

* Buccal Cavity.
* Tongue.
* Pharynx.
* Oesophagus, vocal cord.
* Part of anal canal, conjunctiva & cornea.
* Inner surface of eye lids.
* Vagina.
* Distill urethra.

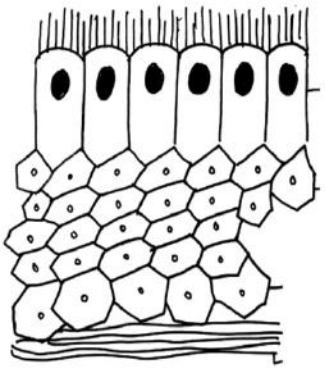
2. **Stratified cuboidal epithelium**

* Few layer thick
* **Superficial cell** cuboidal, metabolic active
* **Occurrence** -
    - Larger duct of **glands.**
    - **Parotid,** Pancreases.
* **Function** - protection, abilities to repair quickly.

3. **Stratified columnar epithelium**

* **Superficial** - Non ciliated columnar, metabolic active.
* **Occurrence**
    - Over epiglottis
    - Part of pharynx.
    - Cavernosum part of urethra.

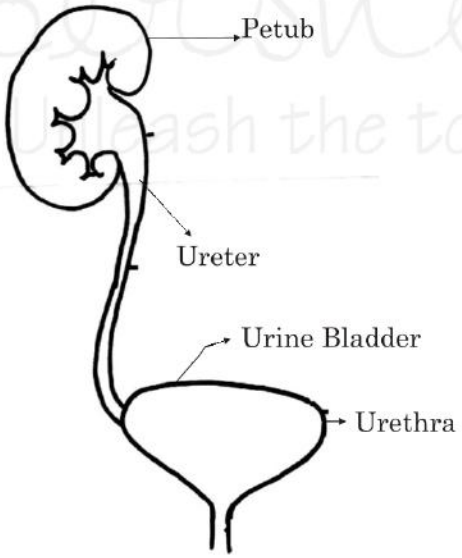
Stratified ciliated columnar epithelium



* Superficial cell are ciliated columnar
* **Example** : Nasal surface, part & larynx

⋕ Transitional epithelium (Urothelium)

* 4-6 Cells, Thick
* Stretchable
* Derived from 3 layers



- Ectoderm
- Mesoderm
- Endoderm

⋕ **Note** Only basal lamina that complete BM.

Structure There are 3 types of cell which are

* **Basal** - Columnar
* **Middle** - 2-3 Layers, Large polygonal, Pear shaped.
* **Superficial** - Large broad, oval, globular, umbrella shape.

Location	Function
* In renal calyces * Renal Pelvis * Ureter * Urinary Bladder	* Adhesion * Transport of material (Exchange) * To check leakage

 # Cell Junction

* These are present between adjacent cells, are the contact point between the part of adjective tissue cells.
* The cells are held together by specialized Inter cellular junction which sense as structural and functional link between them.
* To provide mechanical support for the plasma membrane of adjective epithelium cell modified to inter cellular junction.
* Purpose → Junction for → **Adhesions**
  → Transport of material **(Exchange)**
  → To check the leakage.

On the basis of function are following types.

(A) For adhesion (It adhere two cells)

* Zonular adherens (Inter mediate junction)
* Macular degeneration adherens (Desmosomes)
* Hemi desmosomes

(B) Adherence and exchange

* Inter digestion
* Inter cellular bridge.

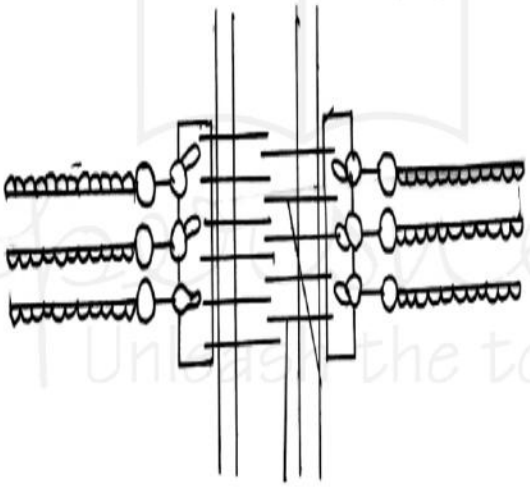
(C) **For transport of material** - Group junction.

(D) To check the leakage between two cells/ single junction (Zonula occludens)

Anchoring junction: - (It adhere two cells)

* They perform cementing function to keep neighbouring cells together.
* Anchoring junction are of three types.
    - **Zonula adherens** (Intermediate junction)
    - **Desmosomes (Macula adherens)**
    - **Hemi desmosomes**

1. Intermediate junction (Zonula adherens)



* There is dense plaque like structure on cytoplasmic side of each plasma membrane. From which micro-filaments of action (Portion) extend into the Cytoplasm.
* Transmembrane Glycoprotein is called Cadherins join the cells.
* **Function- serve anchoring.**

2. Desmosomes (Macula adherens)

* Like intermediate junction have plaque is called Transmembrane Glycoprotein (Cadherins) which extend into intercellular space between adjacent cells.
* Plaque is much thicker and stronger and disc like.