

The background of the slide features two microscopic images of epithelial tissues. On the left, there is a drawing of cuboidal epithelial cells with prominent red nuclei. On the right, there is a photograph of a histological section showing a layer of cells with dark, stained nuclei.

S.5 BIOLOGY

TOPIC: HISTOLOGY

SUB-TOPIC: EPITHELIAL TISSUES

By: Ssengaba Francis

Biology Teacher, Buddo s.s

Tel: 0772 567 417 / 0704 604 313

HISTOLOGY

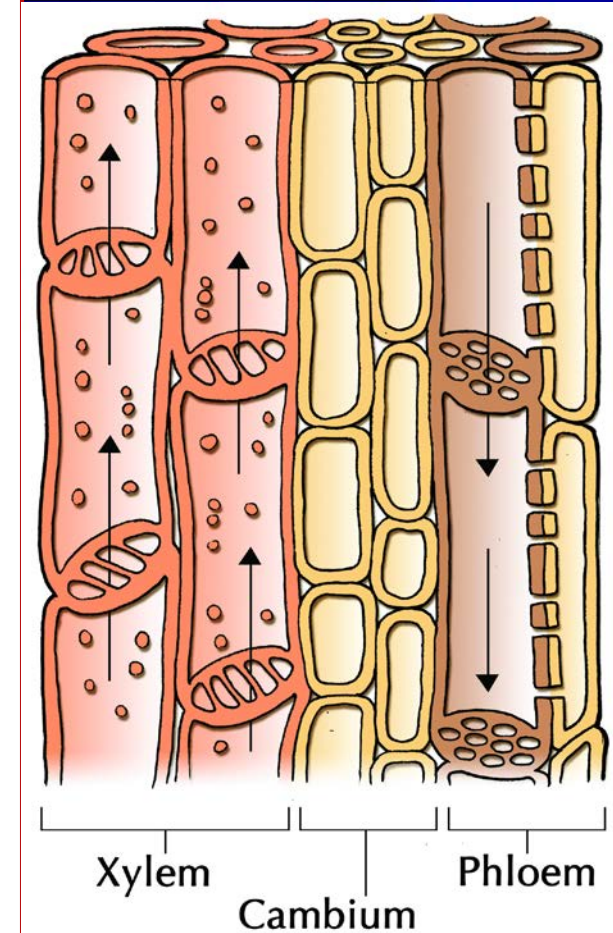
Histology is the study of tissues. In multicellular organisms, cells of similar structure and function are grouped to form tissues.

What is a tissue?

- A tissue is a group of cells with similar morphology and function.
- A tissue is a group of similar cells performing one or more functions.
- A tissue is a group of physically linked similar cells, and associated intercellular substance, that is specialized for a particular function.

Characteristics of tissues

- 1) Cells of a tissue are physically linked.
- 2) The cells of a tissue may be interspersed with intercellular substances.
- 3) A tissue may comprise one or more types of cells.
- 4) A tissue is specialized to perform a particular function(s).



ANIMAL TISSUES

Animal tissues are divided into 4 groups, namely:

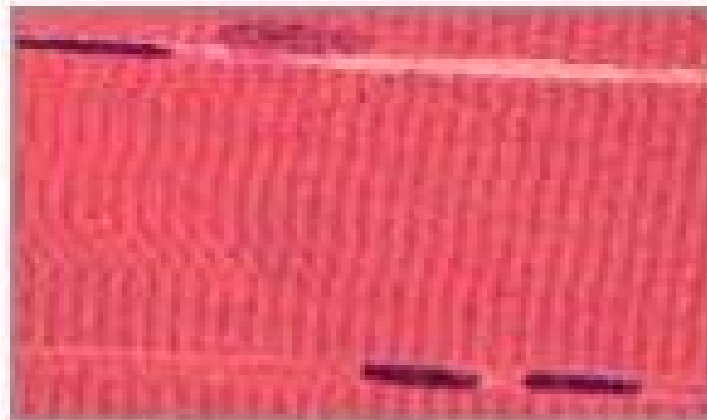
1. Epithelial tissues.
2. Connective tissue.
3. Muscle tissue.
4. Nervous tissue.



Connective tissue



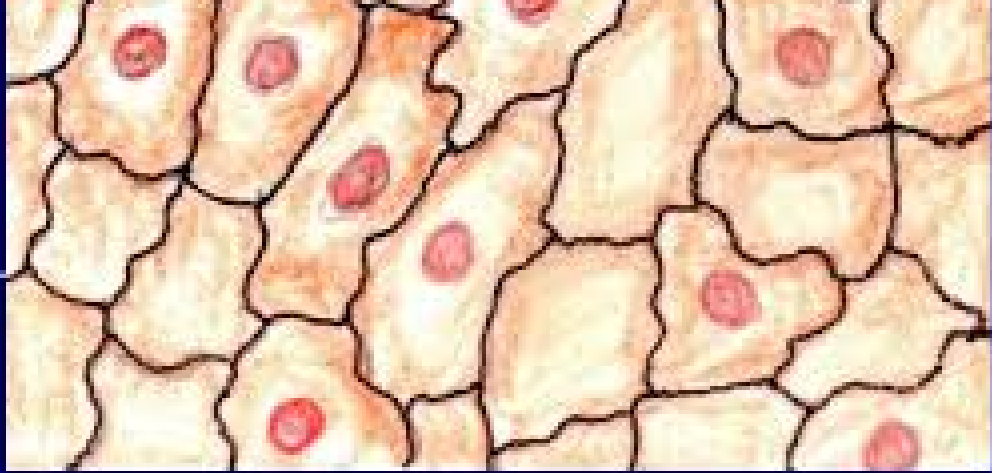
Epithelial tissue



Muscle tissue



Nervous tissue



Epithelial Tissues

- **Epithelium** is a collection of closely packed cells which covers the external and internal surfaces of the body of an animal.
- The surfaces include the lining of cavities or tubes and external surface of organs.
- Epithelium lining the inside of cavities and tubes is **endothelium** (plural – endothelia).
- The bottom layer of epithelia rests on a **basement membrane**, which is composed of collagen fibres in a matrix.



Functions of epithelial tissues

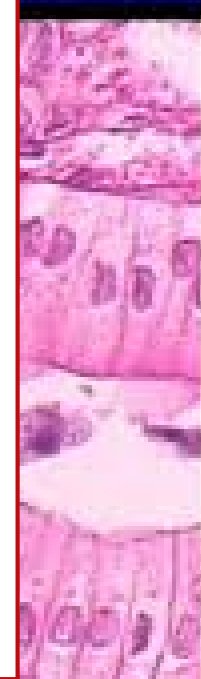
1. Protection of underlying structures from injury and infection.
2. Absorption / diffusion surface / gaseous exchange.
3. Secretion or excretion.
4. Movement/transport of materials.





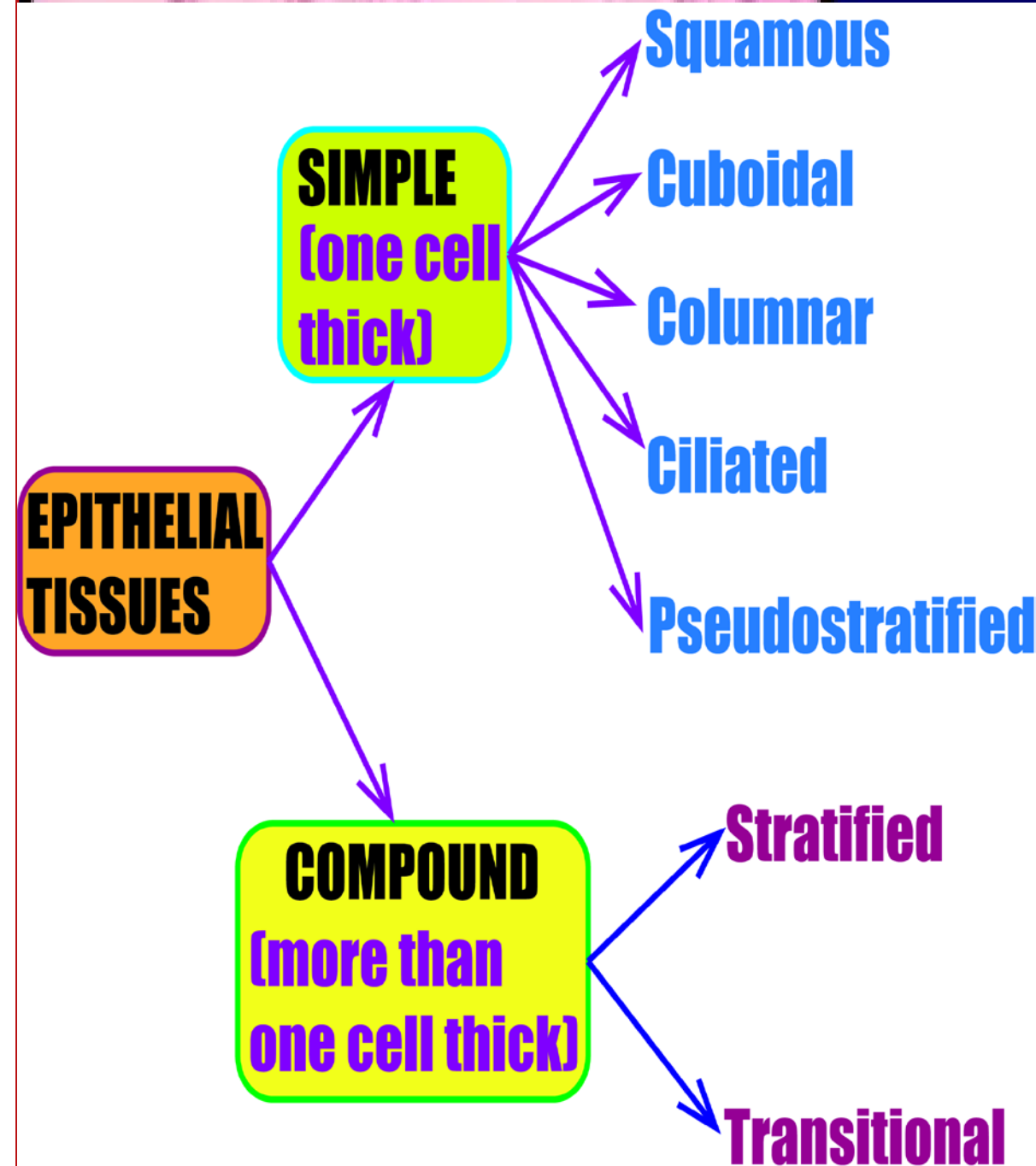
Characteristics of epithelial tissues

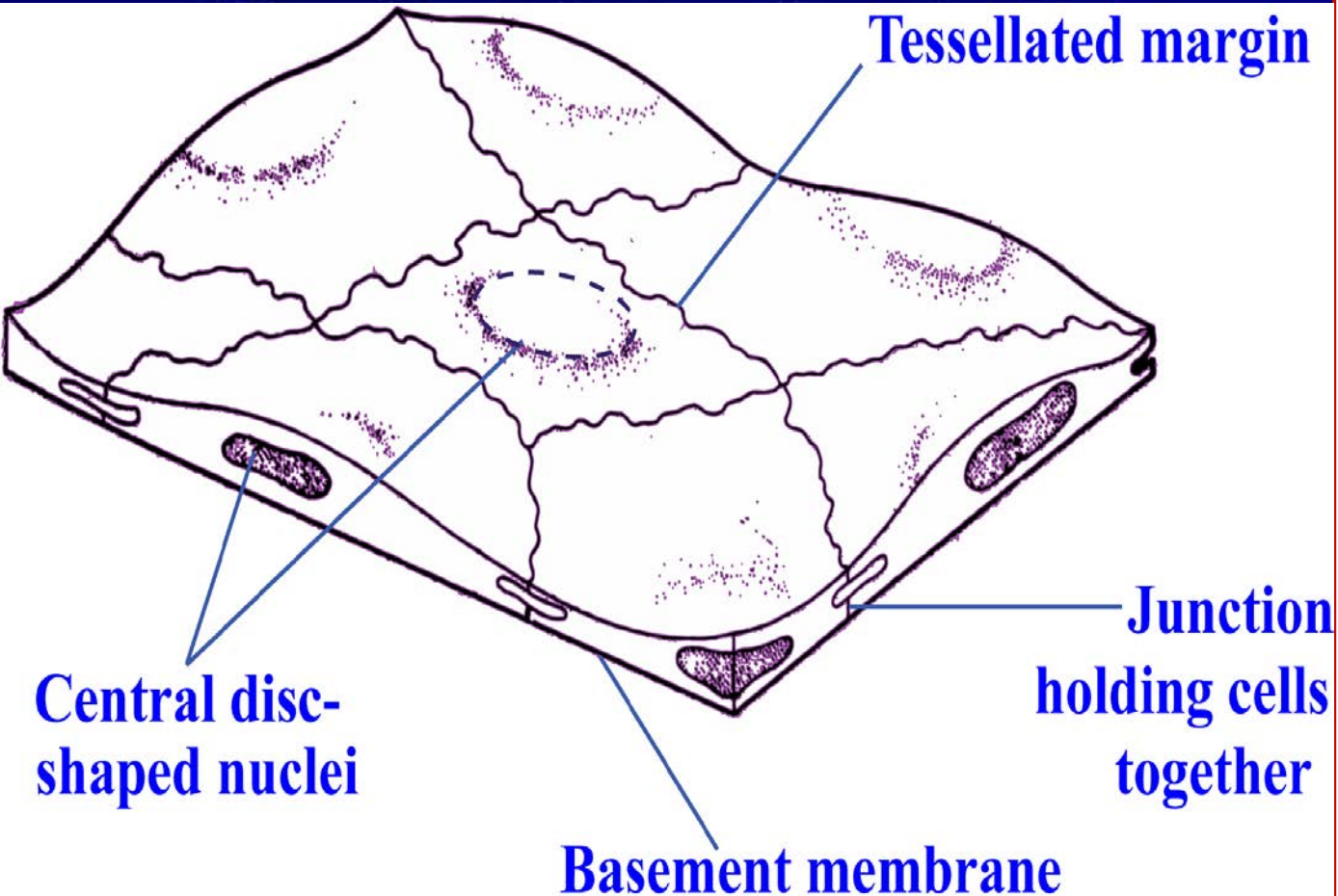
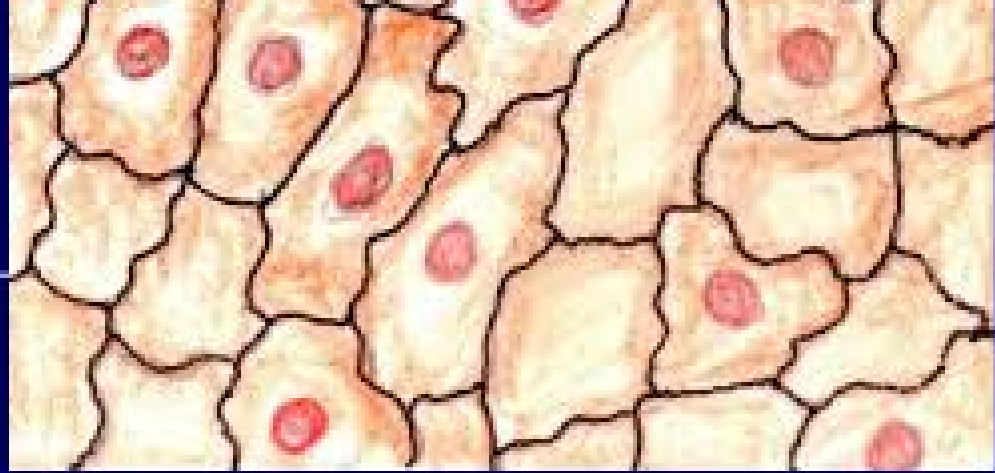
1. The cells are **closely packed** and firmly attached to each other with **little or no intercellular substances**.
2. The lower most layers of cells rests on a non-cellular **basement membrane** made of collagen fibres.
3. The cells are **held together by a cementing substance**, secreted by the underlying connective tissue.
4. The free surface may have cilia or micro-villi.
5. The cells may have glands or sensory/nerve endings.
6. Epithelial layers are **avascular (no blood supply)**, so they must receive nourishment via diffusion of substances from the underlying connective tissue.



Classification of epithelial tissues

- ❑ In general, tissues are classified by the morphology of their cells, and the number of layers they are composed of.
- ❑ Epithelial tissue with one layer of cells (only one cell thick) is called **simple epithelium**. Simple epithelia include:
 1. Simple Squamous epithelium.
 2. Simple cubical (cuboidal) epithelium.
 3. Simple ciliated epithelium.
 4. Simple columnar epithelium.
 5. Pseudo-stratified epithelium.
- ❑ Epithelial tissue with two or more layer of cells (two or more cells thick) is called **compound epithelium**. Compound epithelia include:
 1. Stratified epithelium.
 2. Transitional epithelium.



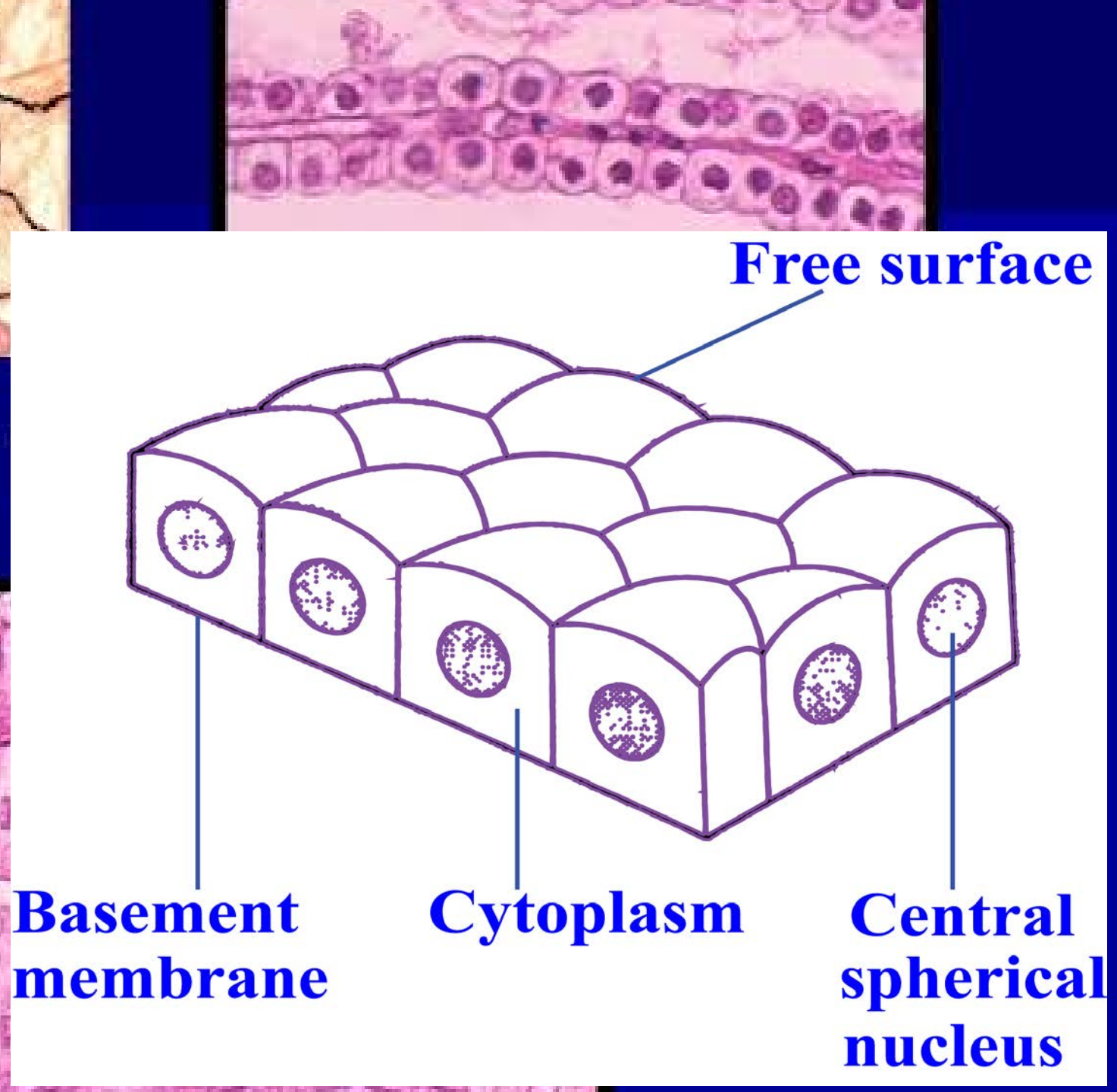


1. Squamous (Pavement) epithelium

- ❑ They have thin, flattened cells.
- ❑ Their edges are irregular.
- ❑ They have little intercellular substance between them.
- ❑ There are special junctions between cells to bind them together.
- ❑ They occur in areas where the protective covering needs to be permeable to molecules e.g. **alveoli of lungs, blood capillary walls, renal capsules of the kidney.**
- ❑ It also provides smooth lining to cavities and tubes, to allow friction free passage of fluids.

2. Cuboidal (cubical) epithelium

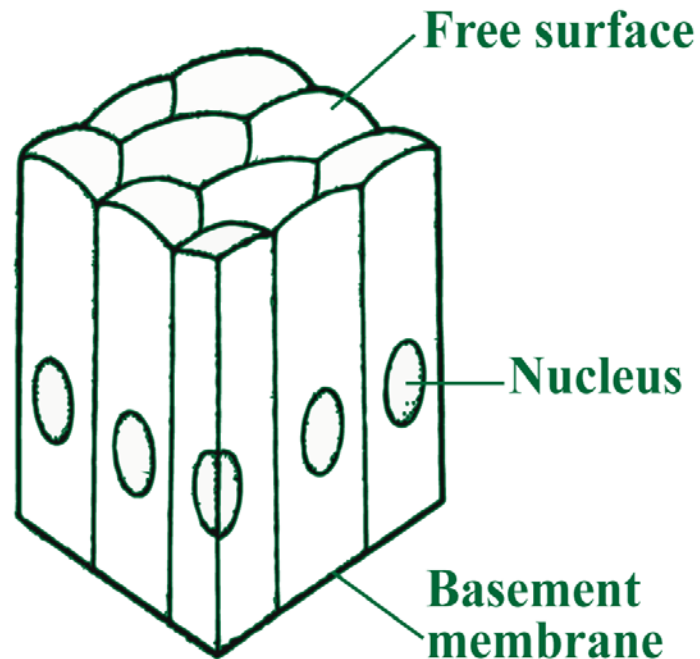
- ❑ Cells are cubical in shape, and when viewed from the surface are pentagonal or hexagonal in shape.
- ❑ They form the lining of many ducts, e.g. salivary and pancreatic ducts, tubules and ducts of the kidney.
- ❑ They are also found in glands, e.g. thyroid gland vesicles, sweat glands, pigmented layer of the retina.
- ❑ They may have secretory, absorptive or excretory functions.



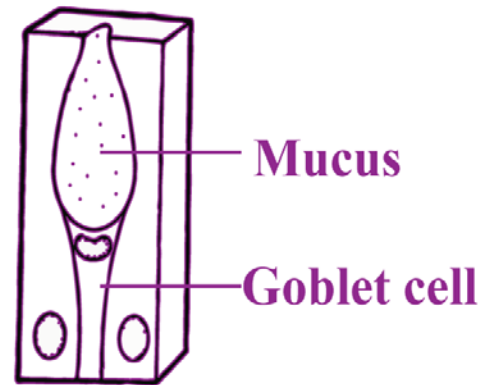
3. Columnar epithelium

- ❑ The cells are tall and narrow (provides more cytoplasm per unit area of epithelium).
- ❑ Nucleus is usually located at the base of the cell.
- ❑ Columnar epithelium often has **glandular cells (goblet cells)** which secrete mucus in which the tissue is bathed.
- ❑ There is a **striated border** at the free edge of the cells, or **brush border of microvilli**. This increases the surface area for absorption and secretion.
- ❑ Columnar epithelium lines the stomach, intestines, where the mucus gives protection from self digestion.
- ❑ It is also found in kidney ducts and the thyroid gland.

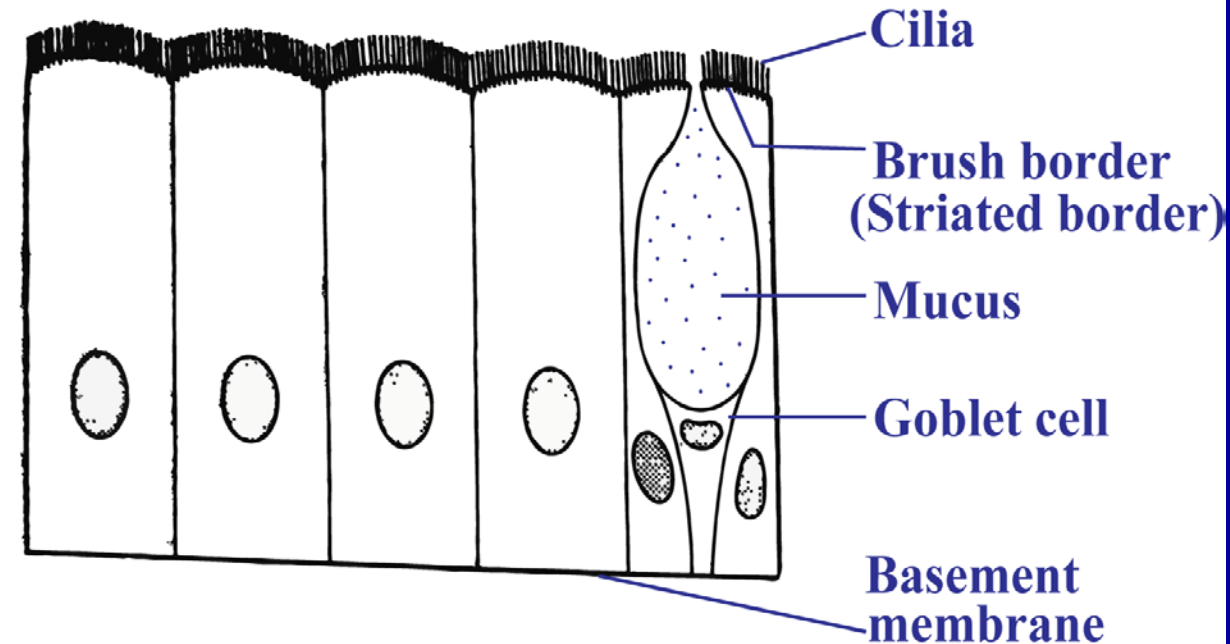
COLUMNAR EPITHELIUM



GOBLET CELL

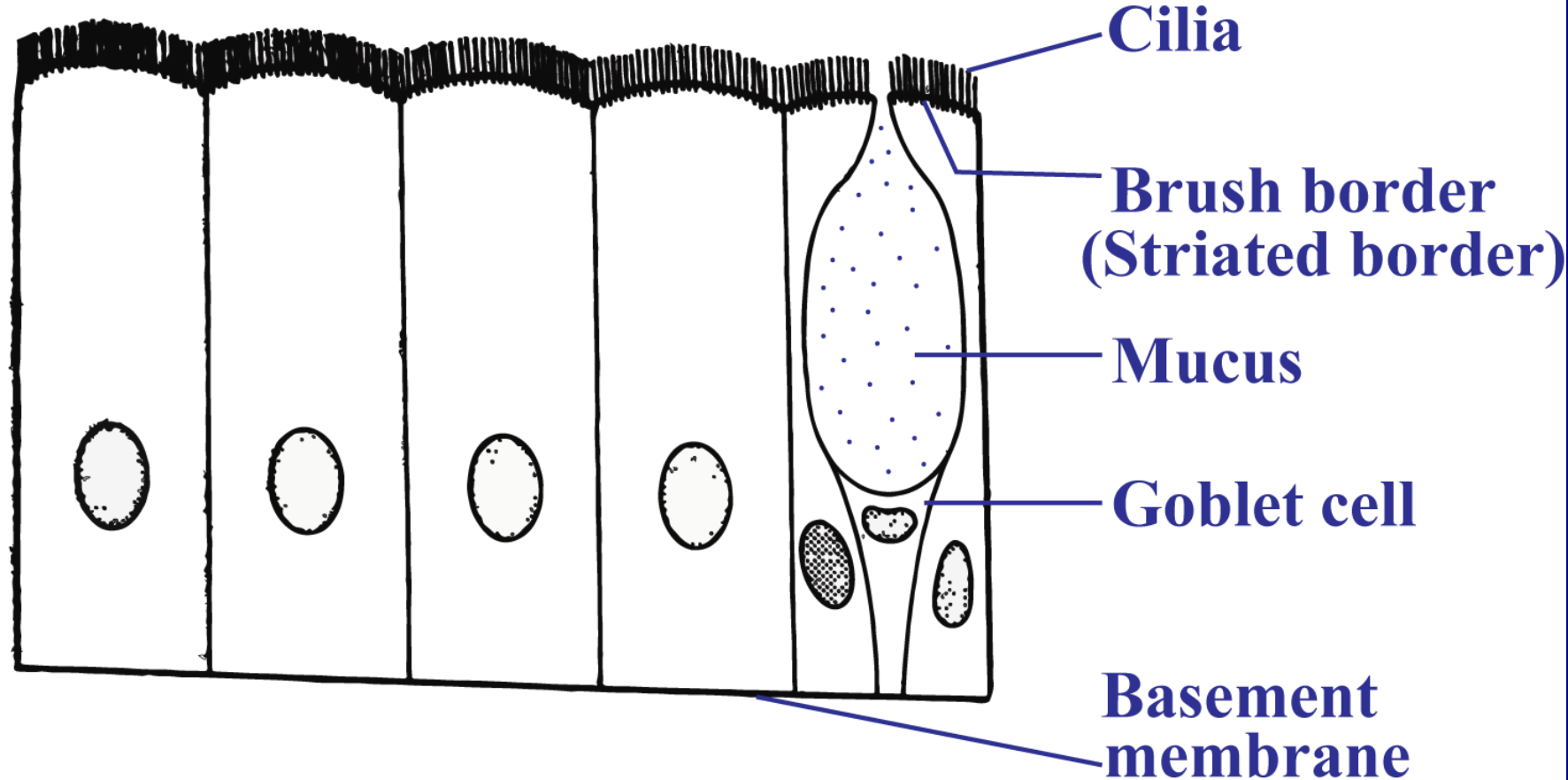


CILIATED COLUMNAR EPITHELIUM



4. Ciliated epithelium

- ❑ The cells are usually columnar in shape but have numerous cilia on the free surface, and mucus secreting cells between ciliated cells.
- ❑ The mucus produced protects and lubricates the epithelial lining to facilitate movement of solid materials along the tubes e.g. in the respiratory tract the cilia move mucus that has trapped dust and bacteria, preventing them from reaching the lungs.





End of the lesson!
For more information, contact

Ssengaba Francis



0704 604 313

0772 567 417

