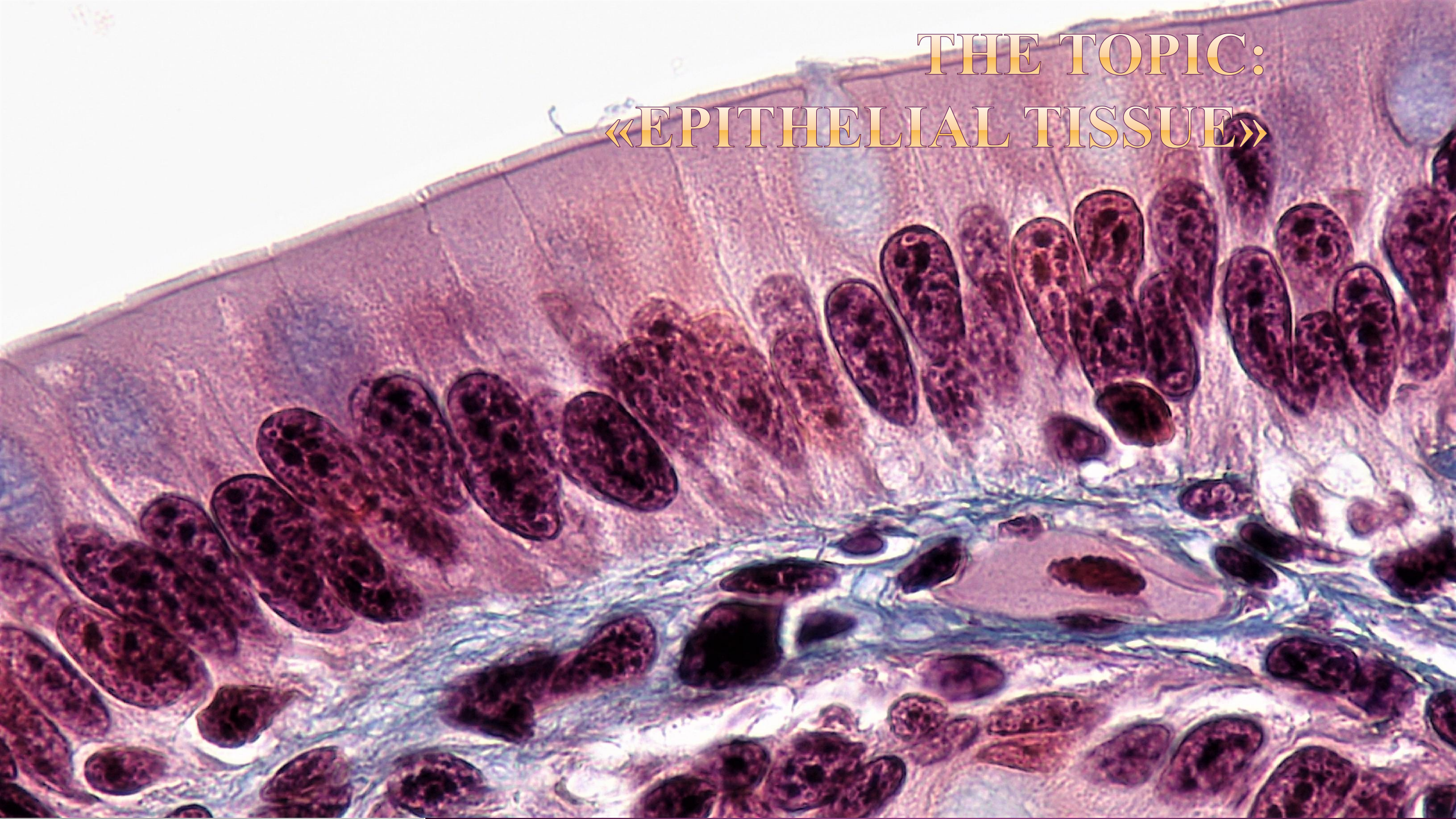


THE TOPIC:
«EPITHELIAL TISSUE»



- ❖ **Epithelial tissue** makes covering for body surface, lines body, cavities and constitute glands.

Types of epithelium:

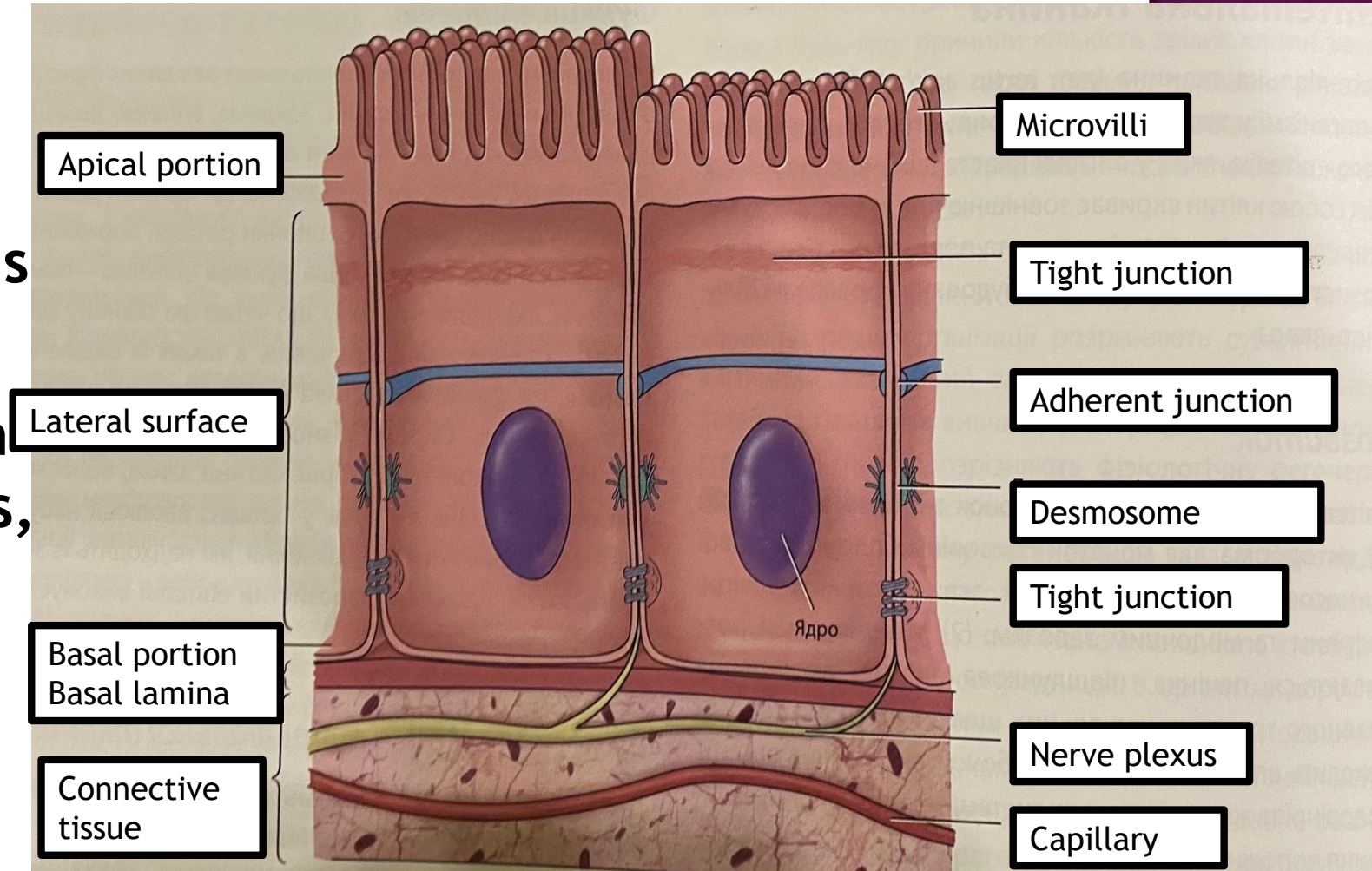
- ⊙ *Covering*
- ⊙ *Glandular* (forming glands).

Functions of epithelium:

- ⊙ Delimiting – barrier between internal environment and external environment;
- ⊙ Protective – prevent internal environment from mechanical, physical, and chemical factors;
- ⊙ Metabolic – reabsorption and excretion of chemical substances;
- ⊙ Secretory – prone to glandular epithelial cells;
- ⊙ Sensory – react on external signals (mechanical, chemical) that come from external environment (F.e. organ of sense).

General features of epithelium:

- Devoid of extracellular matrix
- Forms cell-to-cell junctions
- Lies on a basal lamina
- Cell polarity (basal portion has organelles and nucleus, apical portion- microvilli, brush border, cilia or flagella)
- No blood vessels
- High capacity to regeneration



❖ Basal lamina has:

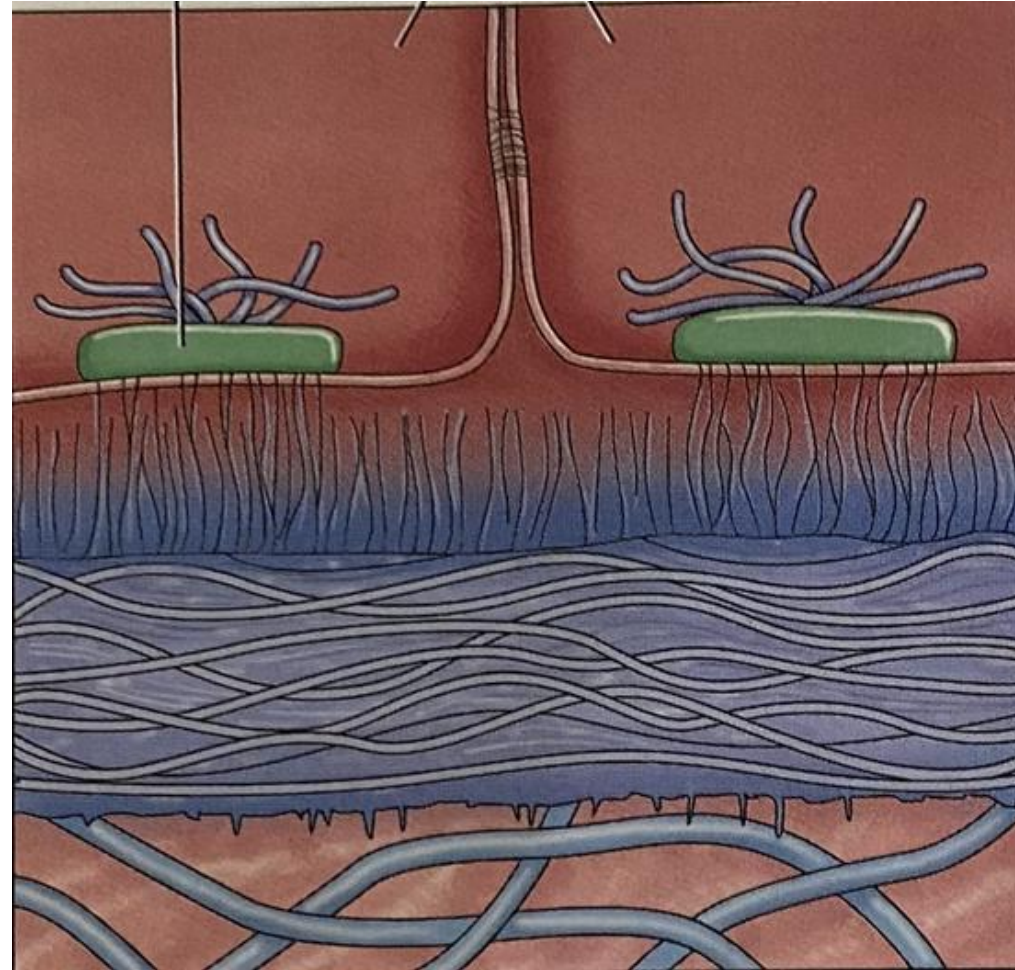
A) *Light lamina*- border on basal portion of the cell, containing glycoproteins-laminin, proteoglycans.

B) *Dark lamina* – is under the light lamina and contains collagen IV, glycoproteins- ectactin and fibronectin.

C) *Fibroreticular*

Functions:

- ⦿ Mechanical;
- ⦿ Trophic;
- ⦿ Barrier;
- ⦿ Prevent growth of epithelium into the underlying connective tissue.



MORPHOFUNCTIONAL CLASSIFICATION OF EPITHELIAL TISSUE

I Covering:

II Glandular

1. Simple

- ❖ **Squamos**
- ❖ **Cuboidal**
- ❖ **Columnar (with brush border, ciliated, glandular)**
- ❖ **Pseudostratified**

2. Stratified

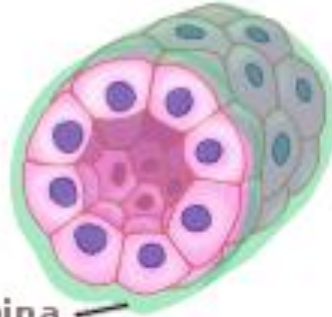
- ❖ **Keratinized**
- ❖ **Non-keratinized**
- ❖ **Transitional**

SIMPLE

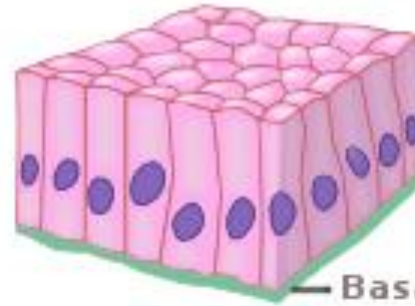
Simple squamous



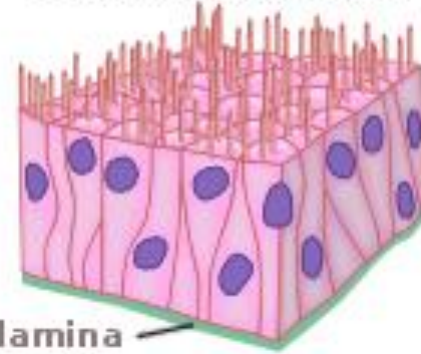
Simple cuboidal



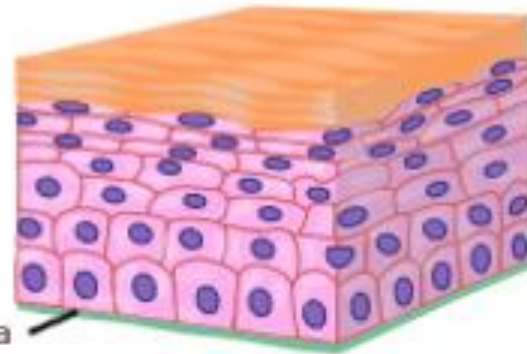
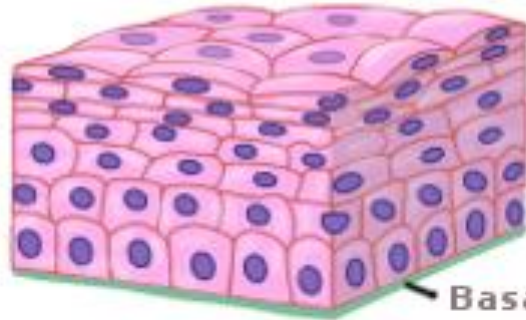
Simple columnar



Pseudostratified



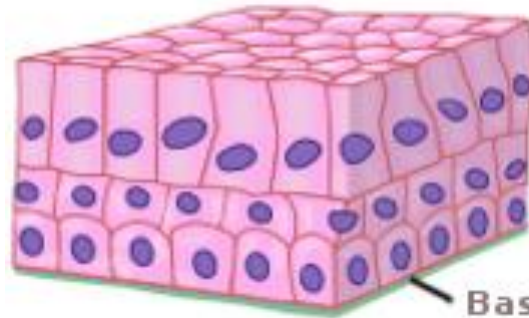
Stratified squamous



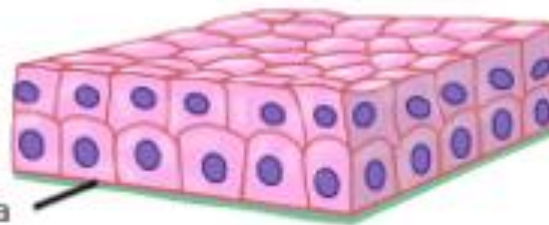
Keratinized stratified squamous

STRATIFIED

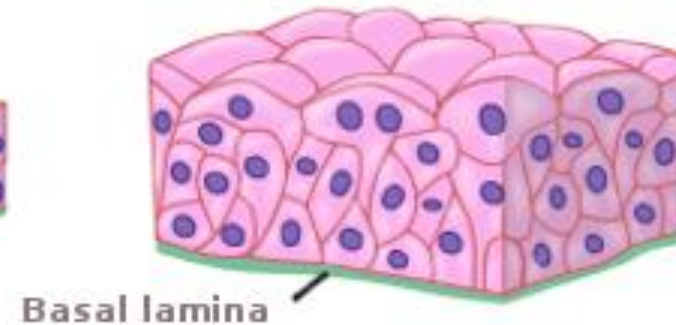
Stratified columnar



Stratified cuboidal



Transitional



PHYLOGENETIC CLASSIFICATION:

1. Skin epithelium (Epidermal):

- *sources* – ectoderm;
- *structure* – stratified or pseudostratified;
- *localization* – skin, oral cavity, esophagus, cornea, vagina;
- *function* – protective.

2. Intestinal (enterodermal):

- *sources* – entoderm;
- *structure* – simple columnar epithelium;
- *localization* – stomach, small and large intestine;
- *function* – reabsorption.

3. Kidney (nephrodermal)

- *sources* - mesoderm;
- *structure* – simple cuboidal;
- *localization*- kidney tubules;
- *function*- reabsorption of substances from primary urine into the blood.

4. Coelomic (mesothelium):

- *sources* – splanchnotomes of mesoderm;
- *structure* – simple squamous epithelium;
- *localization* – serosa;
- *function* – secretion of serous fluid.

5. Ependymogial:

- *sources* – neural tube;
- *structure* – simple;
- *localization* – brain cavities.

6. Angiodrrmal (endothelium):

- *sources* – mesenchyme;
- *structure* – simple squamos;
- *localization* – lines blood and lymphatic vessels, heart;
- *function*– *protection, absorption.*

STRUCTURE OF EPITHELIAL TISSUE

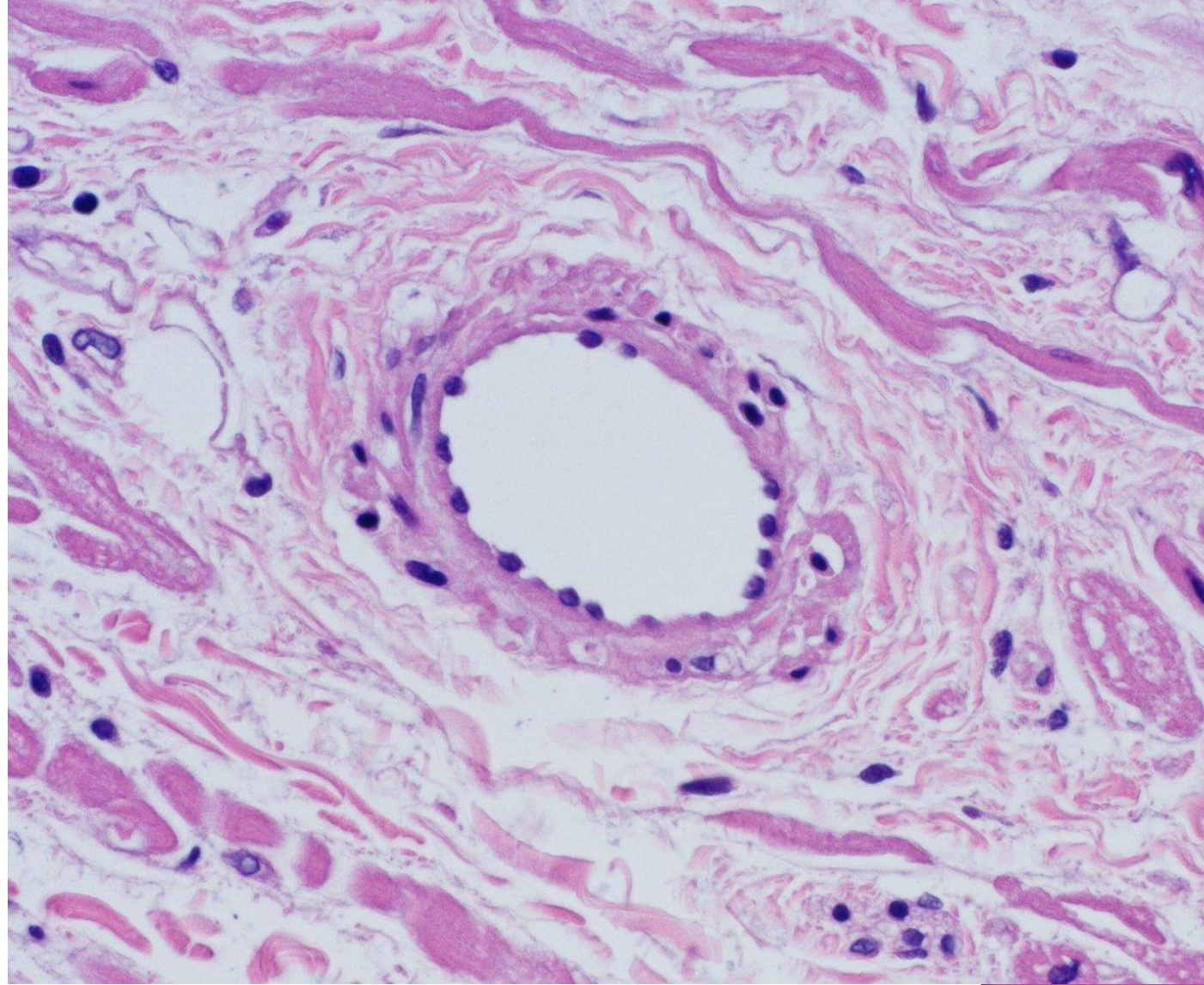
Simple squamous epithelium

❖ Endothelium

Structure: polygonal shape with irregular borders, may have 2-3 nuclei

Localization: blood and lymphatic vessels, heart

Function: transport of oxygen, carbon dioxide, participate in the regulation of blood flow



❖ Mesothelium

Structure: flattened, polygonal cells with irregular borders, possessing 2-3 nuclei

Localization: serosa

Function: secretion and absorption of serous fluid , prevents the friction of inner organs

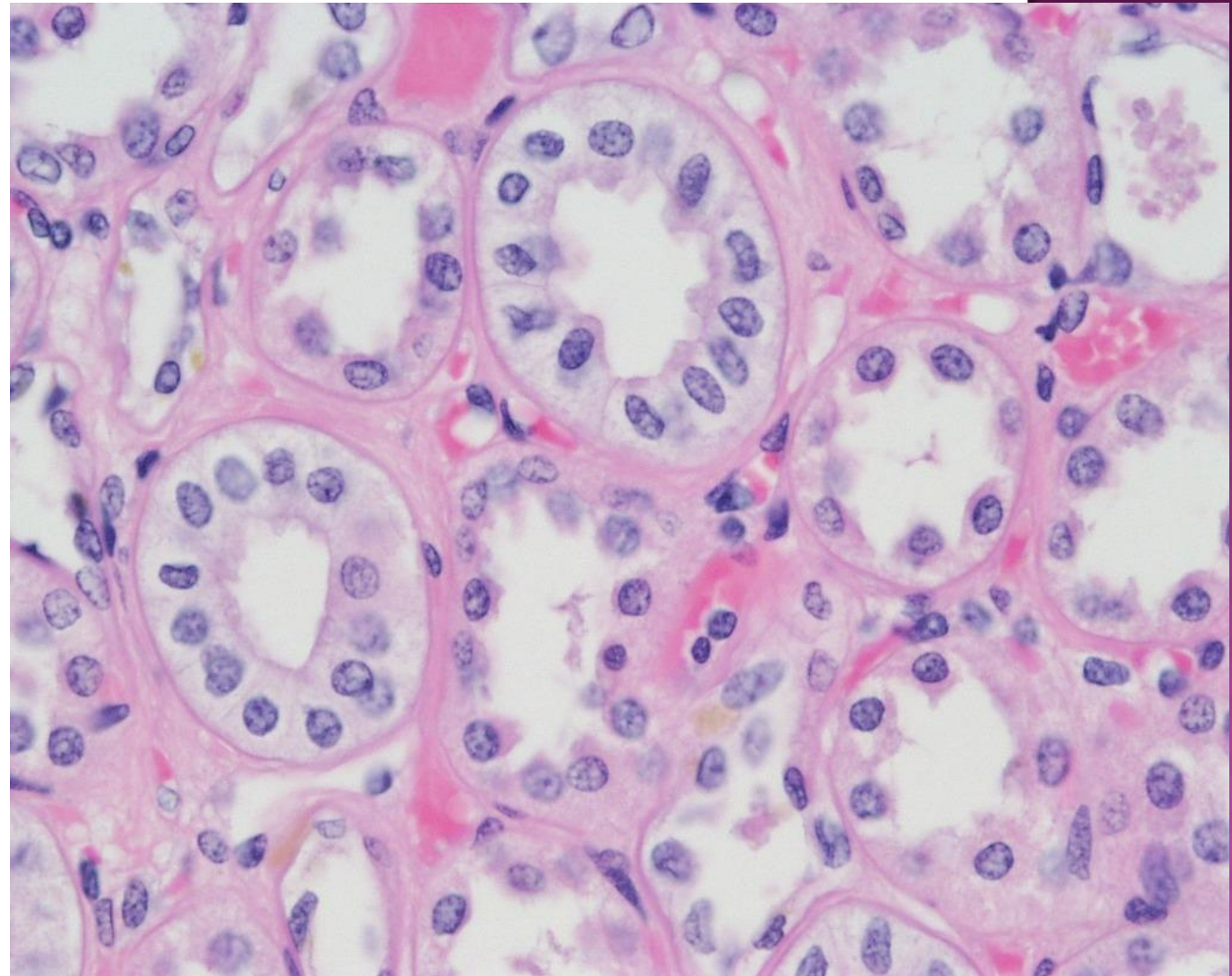


Simple cuboidal epithelium

Structure: the cell has equal height and width. The nucleus is round in the center

Localization: renal tubules

Function: reabsorption of substances from primary urine into the blood



Simple columnar epithelium:

Simple columnar ciliated epithelium

Structure: epithelial cell has cilia on the apical portion

Localization: oviducts

Function: moves ovary toward the uterus



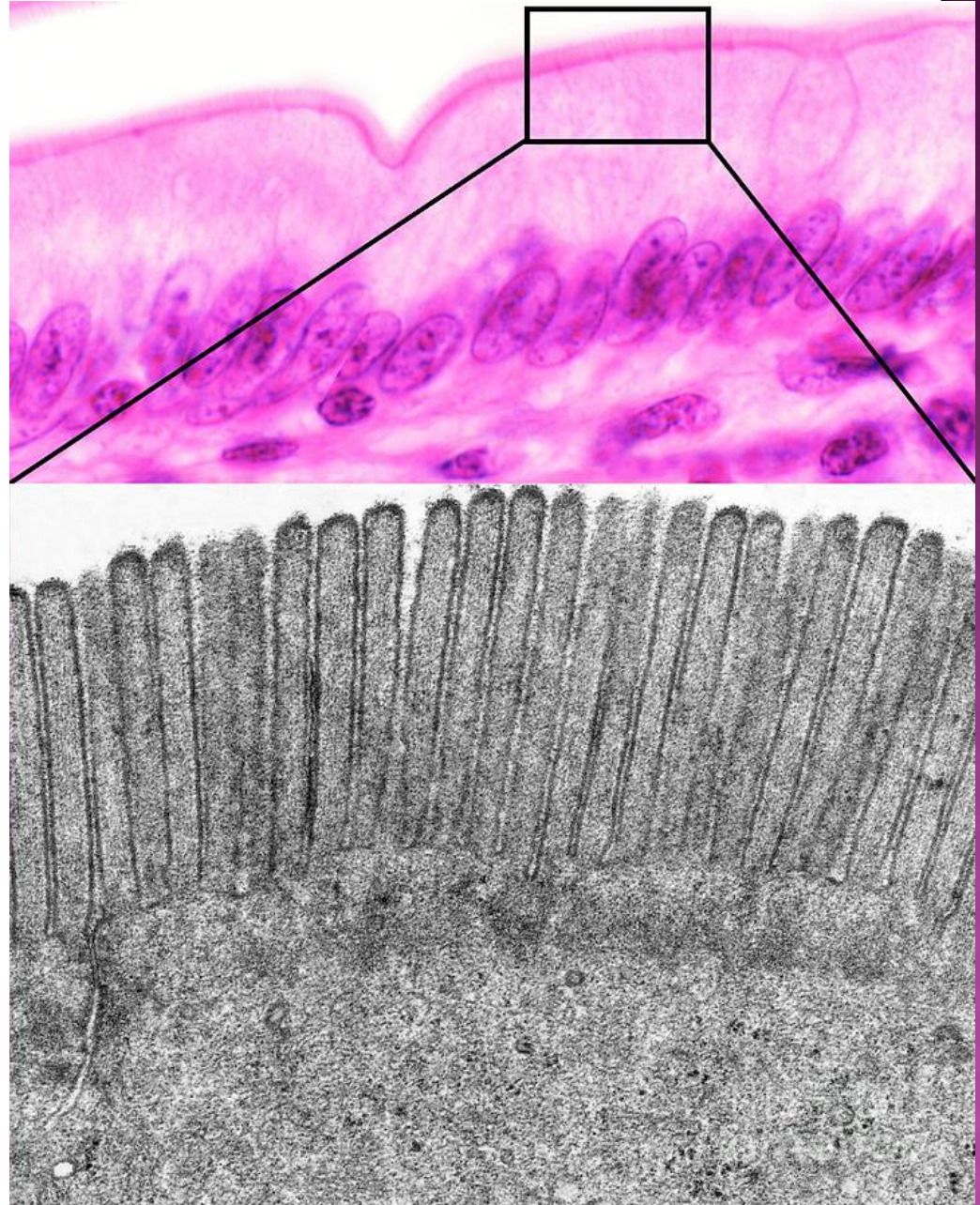
Simple columnar epithelium:

2. Simple columnar epithelium with brush border

Structure: has striation on the apical portion of the cell

Localization: intestine, gallbladder

Function: increase the reabsorption area



Simple columnar epithelium:

3. Simple columnar glandular epithelium

Structure: cells are capable to produce mucous secretion and work together with endocrine cells

Localization: stomach

Function: provide the exocrine function and the endocrine regulation

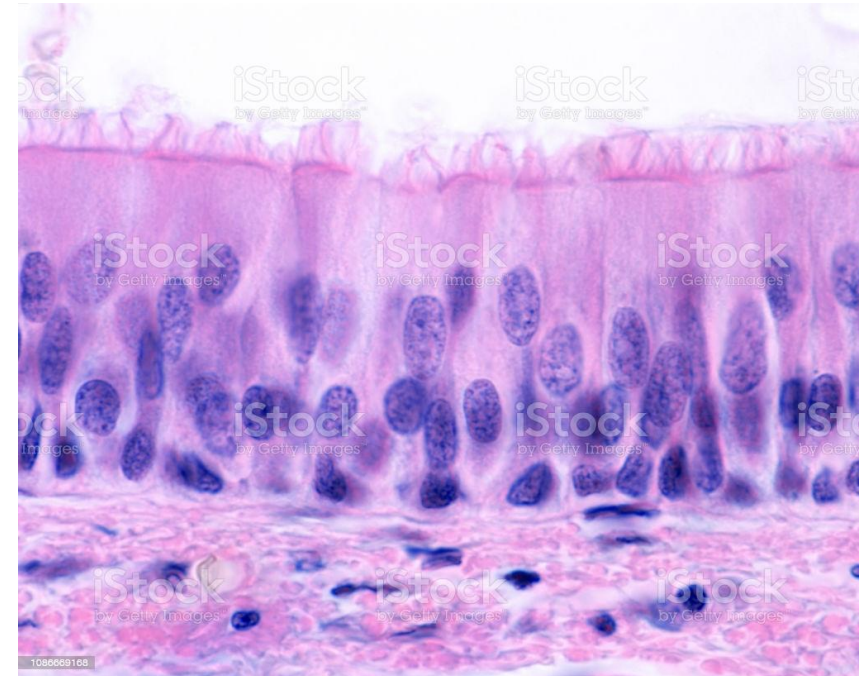
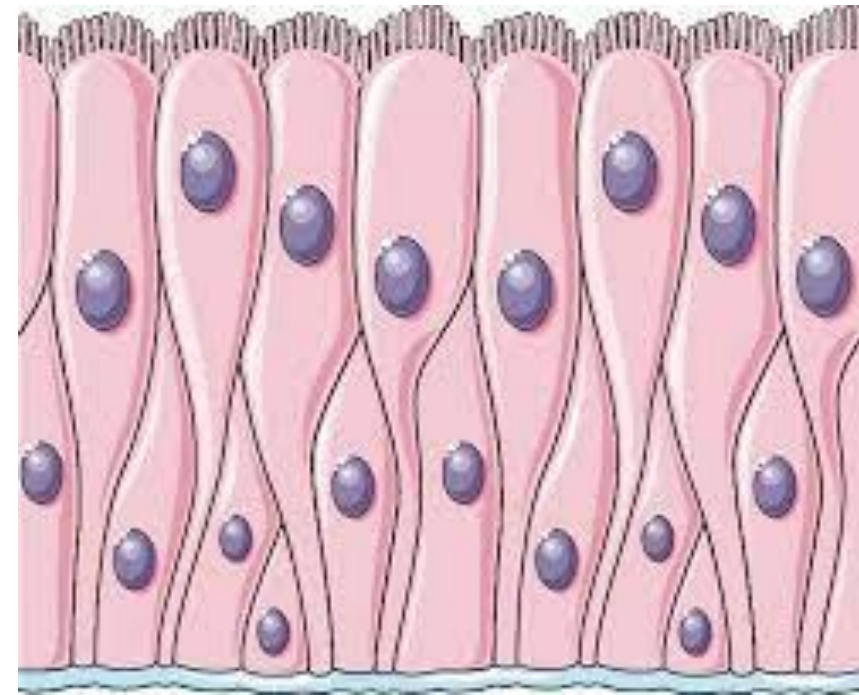


Pseudostratified (simple columnar ciliated epithelium)- type of simple epithelium and all cells are attached to the basal lamina . Due to different shapes of cell, the nuclei are located at a different level which makes epithelium appears as stratified

Structure: Types of cells

- ciliated
- goblet
- endocrine
- basal

Localization: respiratory tracts and some parts of reproductive system

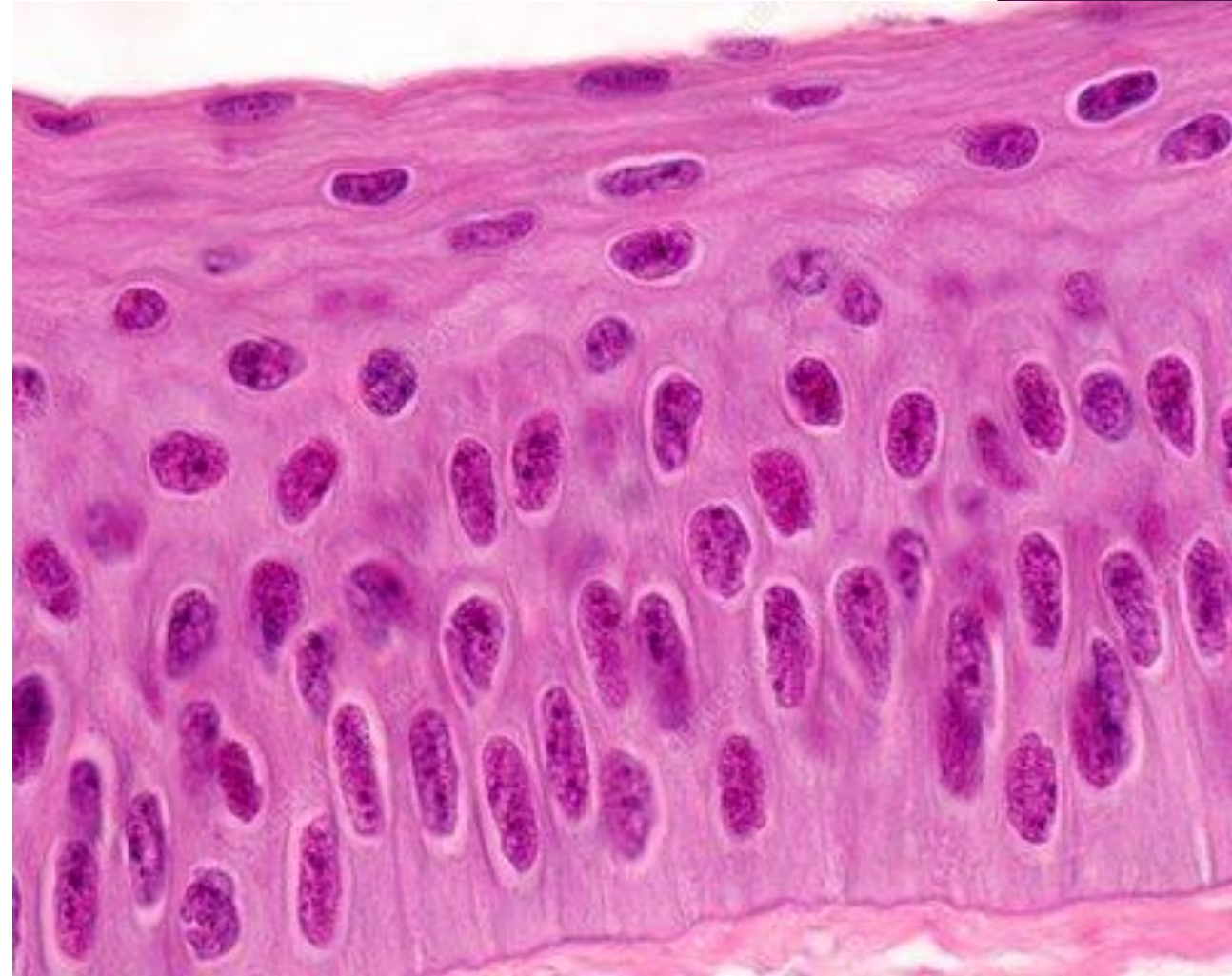


Stratified squamous non-keratinized epithelium

Structure: Consists of 3 layers:

1. Stratum basale - composed of columnar epithelial cells that are cambial with oval nuclei
2. Stratum spinosum - polygonal epithelial cells with round nuclei
3. Stratum superficial- outermost flatenned cells

Localization: cornea, oral cavity, esophagus, vagina, rectum



Stratified squamous keratinized epithelium

Structure: Consists of 5 layers:

Stratum basale - composed of stem cells, keratinocytes (intermediate filaments), melanocytes, Merkel's cells, Langerhans' cells

Stratum spinosum - 5-10 layers of polygonal keratinocytes containing tonofibrils

Stratum granulosum- 3-4 layers of keratinocytes containing keratohyaline

Stratum lucidum- 3-4 layers of squamous cells with retractile mass inside (fusion of keratohyaline)

Stratum corneum- anucleated squamous cells with keratin inside. The mechanism of desquamation is controlled by keratinosomes(lysosomes) which dissolve desmosomes and provide separation of flattened cell from the surface

Localization: skin



Transitional epithelium

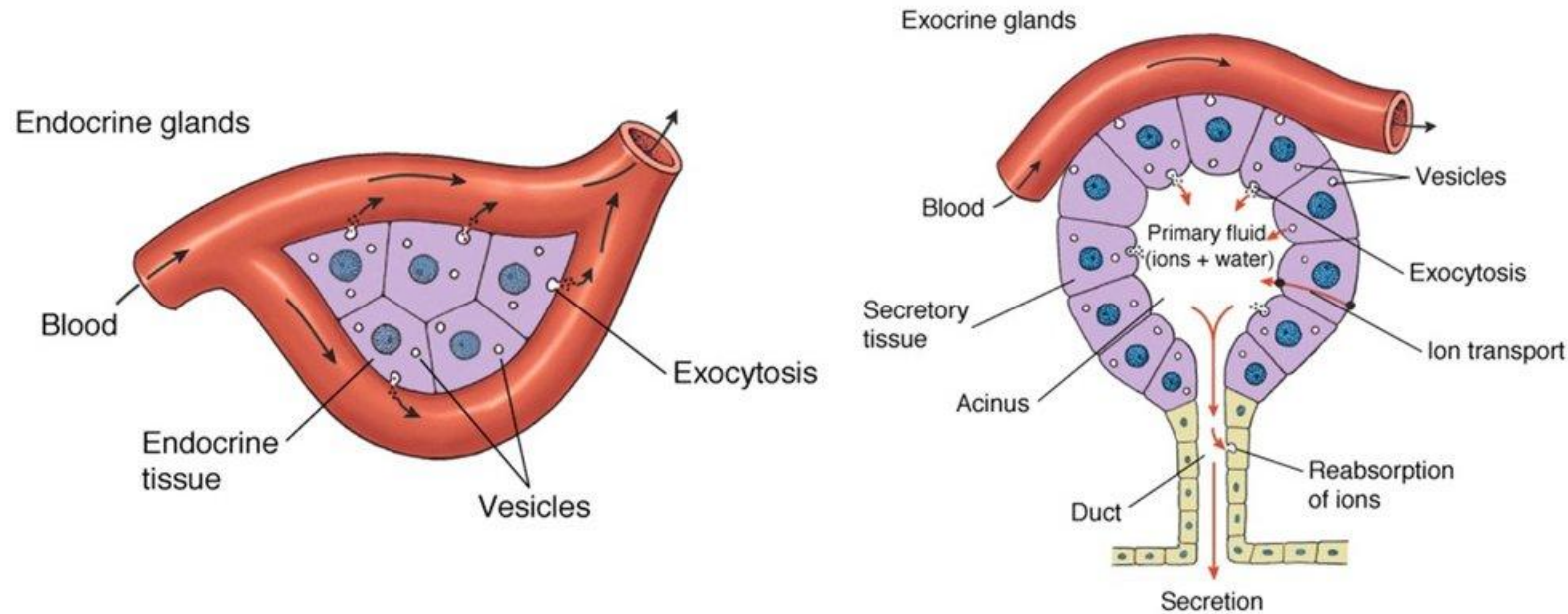
Structure: 3 layers

1. Basal layer-composed of round epithelial cells that are cambial with round nuclei
2. Transitional layer composed of polygonal cells with round nuclei
3. Superficial layer composed of dome-shaped cells with round nuclei

Localization: renal pelvis, urether, urinary bladder, urethra



GLANDULAR EPITHELIUM



❖ **Glands**- group of cells (or organ) that are synthesised chemical substances crucial for physiological functionality of the body.

On the basis of the way of secretion:

- *Exocrine*- release their secretion on the surface of the epithelium
- *Endocrine* don't possess excretory ducts and release the chemical substances into the blood or lymph

CLASSIFICATION OF EXOCRINE GLANDS

Number of excretory ducts

Simple

Number of secretory portion

Branched

Non-branched

Compound

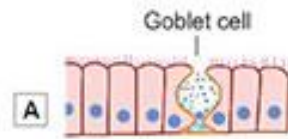
always branched

On the basis of shape of secretory portion

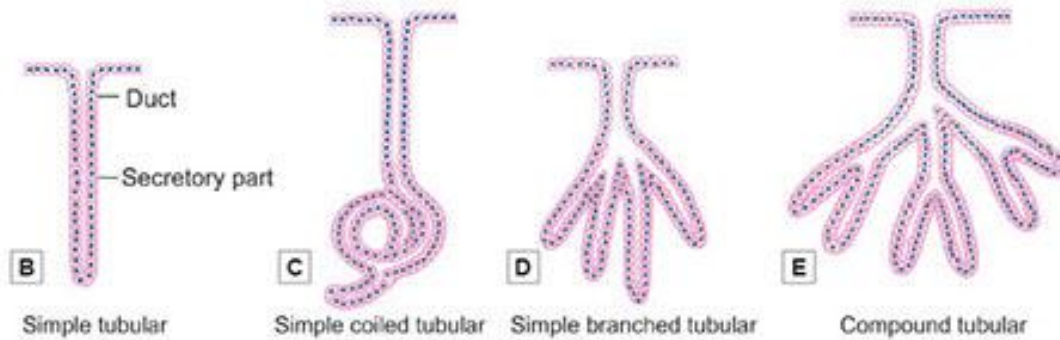
Tubular

Alveolar

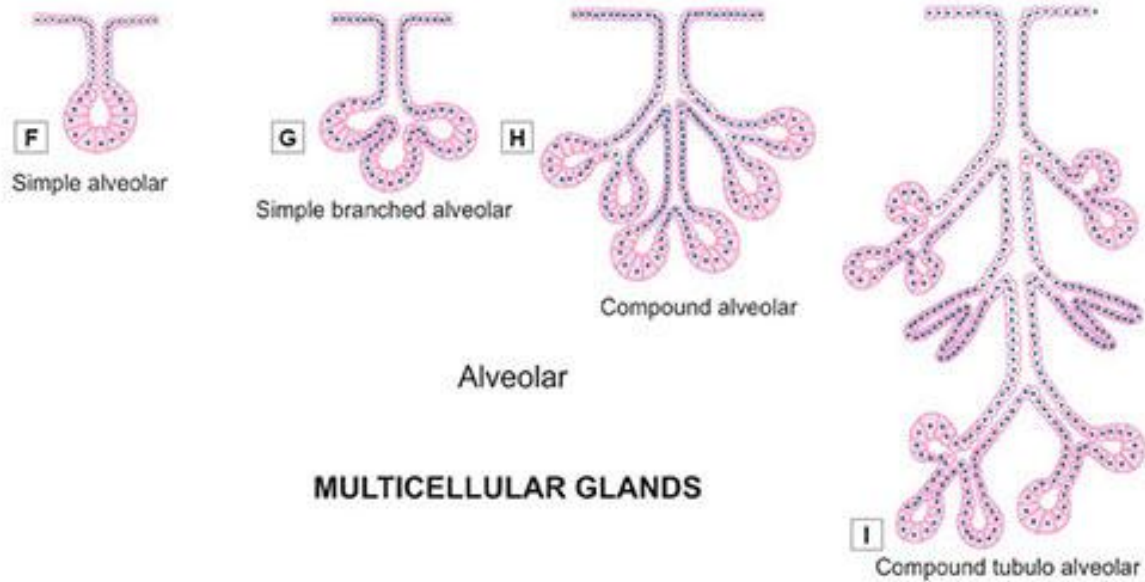
Tubulo-alveolar



UNICELLULAR GLAND



Tubular

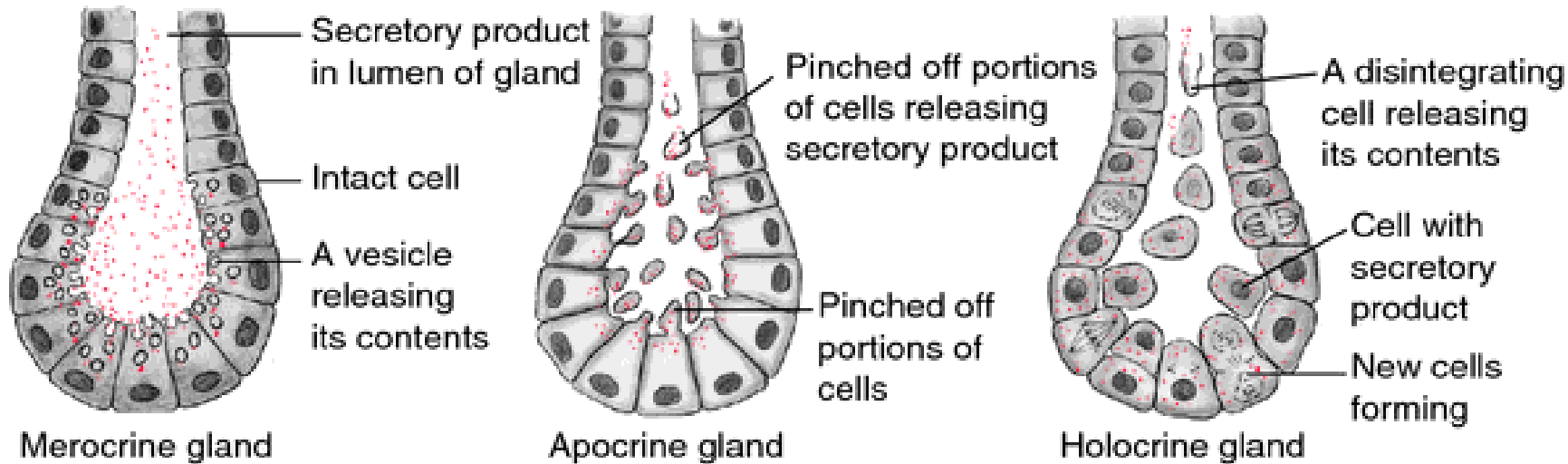


Alveolar

MULTICELLULAR GLANDS

MODE OF SECRETION

Merocrine-the cell release its secretion by exocytosis without destruction (sweat gland)



Apocrine- the apical portion of the cell is pinched off and lost during the secretory portion (mammary gland)

Holocrine- the secretory portion totally destroyed and excreted with a secretory product (sebaceous gland)

PHASES OF SECRETION

- ❖ **Secretion** – the process of production and releasing of chemical substances. Includes four phases:
 1. Absorption of chemical substances from the blood and lymph
 2. Synthesis and storage.
 3. Releasing from glandulocytes
 4. Resumption. The secretory cell come back to the initial condition