



SNS COLLEGE OF TECHNOLOGY

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Department of Biomedical Engineering

Vision Tit 2

Vision Title 3

Course Name: 19BMT201 Anatomy & Physiology

II Year : III Semester

Unit I- Cell and Tissue Structure

Topic : Epithelial Tissue and its function

19BMT201/HAP/Unit 1 /Mrs.J.Jareena /AP/BME



EPITHELIAL TISSUE or EPITHELIUM



- The basic tissue of the body.
- Cells are arranged as continuous sheets.
- Single or multiple layers.
- Cells are held tightly together by cell junctions.
- Free surface
- Basal surface adheres to basal lamina or basement membrane.
- Avascular but supplied by nerves.
- Has high capability to regenerate.



Embryological aspect

- Epithelia are derived from all the 3 germ layers:
- Ectoderm- Epithelium of skin
- Endoderm- Epithelium of gut
- Mesoderm- Epithelium of pericardial, peritoneal and pleural cavities



Functions

- Protection
- Absorption
- Barrier
- Excretion
- Secretory
- Function as sensory surfaces



Classification

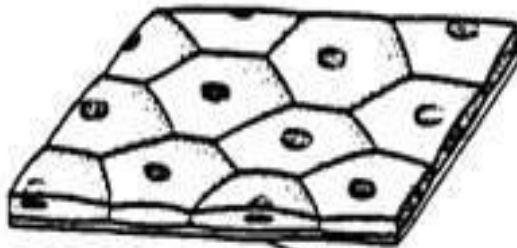
According to shape, arrangement and the specialization of their free surface:

- Simple
- Stratified
- Pseudostratified
- Transitional

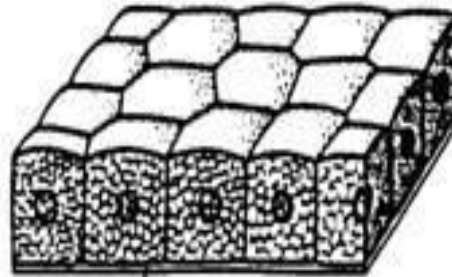


Simple epithelium

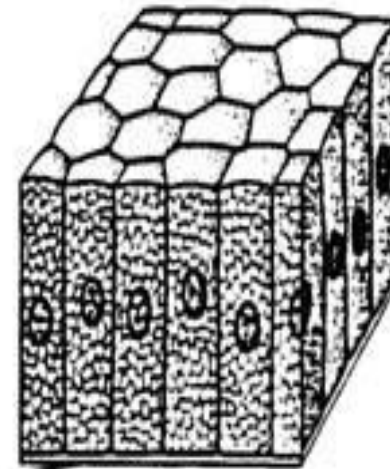
Simple squamous



Simple cuboidal



Simple columnar



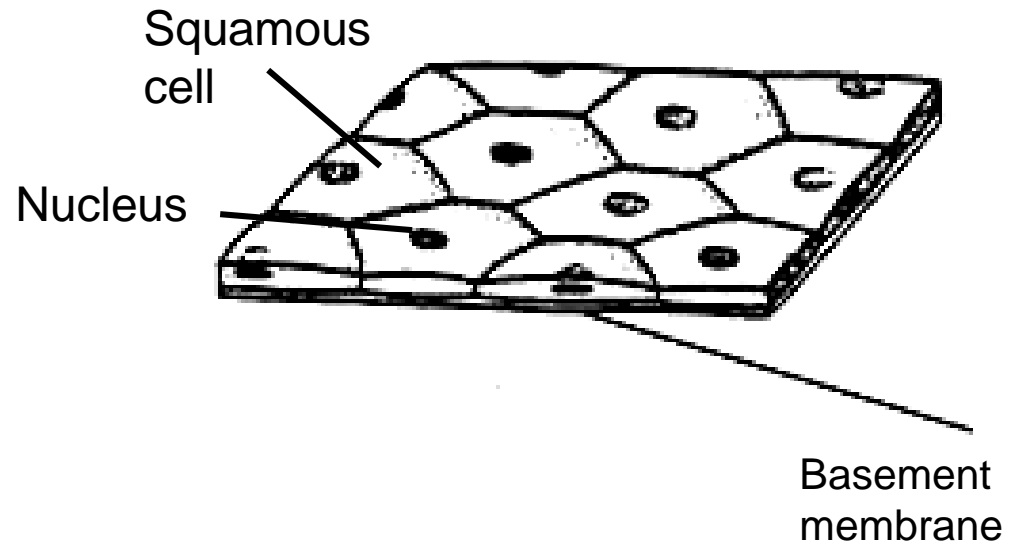
Basement membrane



Simple Squamous Epithelium

- Single layered
- Flat cells
- On surface view, like floor tiles
- Elevated nuclei
- Examples:
 - Lung alveoli
 - Parietal layer of Bowman's capsule of kidney
 - Inner aspect of tympanic membrane
 - Mesothelium
 - Endothelium

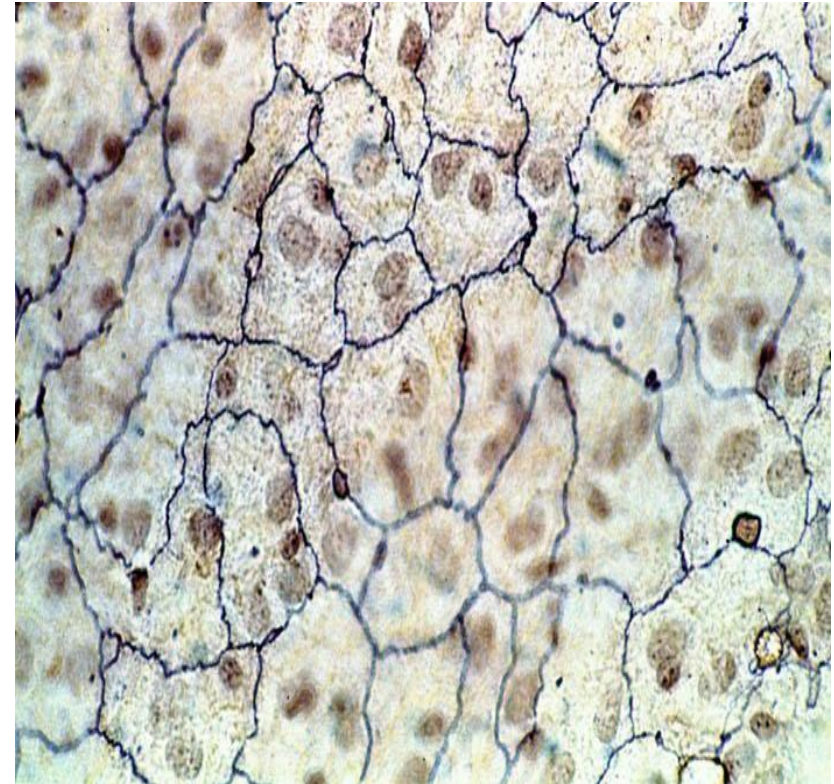
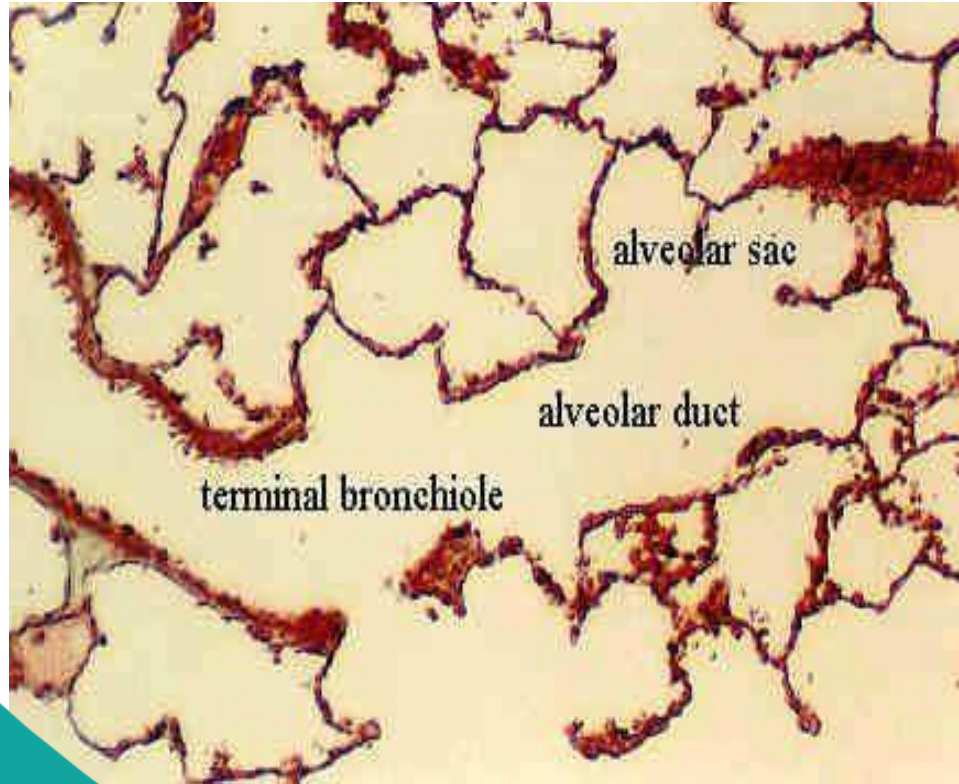
Simple squamous



Function: Rapid transport of substances, secretion of fluid, diffusion of gases and osmosis



Simple Squamous Epithel

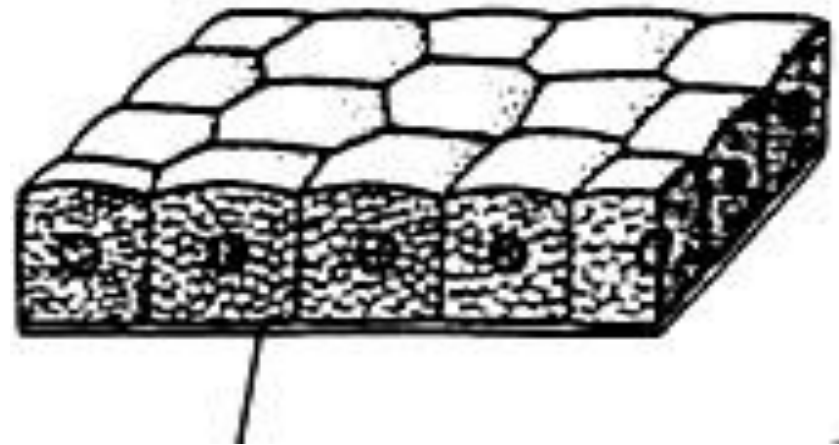




Simple Cuboidal Epithelium

- Single layer of cuboidal shaped cells
- On surface view, cells look like mosaic (hexagonal)
- Examples:
 - Thyroid follicles
 - Tubules of nephrons
 - Pigmented layer of retina
 - Germinal layer of ovary
 - Inner layer of lens
 - Choroid plexuses of brain

Simple cuboidal



Basement membrane

Function: Secretion and absorption



Simple Cuboidal Epithelium



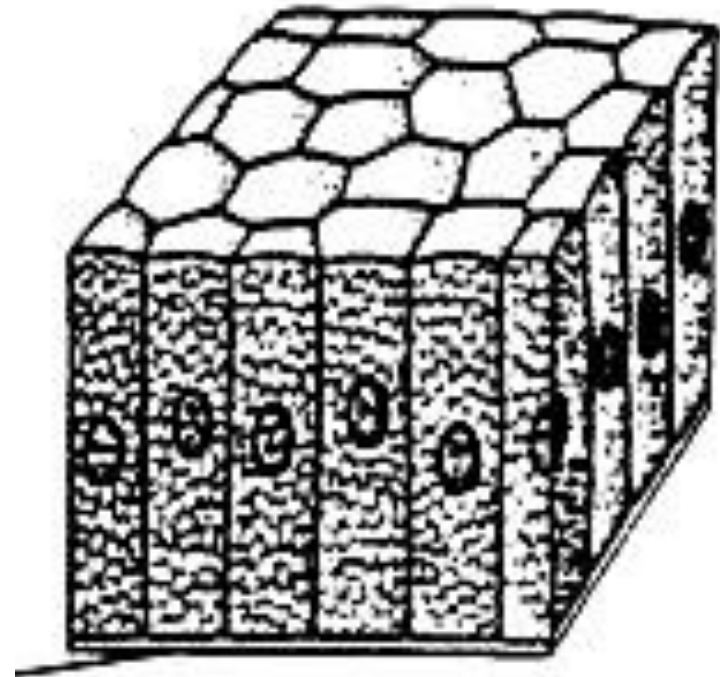


Simple Columnar Epithelium

- Cells having more height than width
- Nuclei are elongated, located in the lower half of cells
- Cells may show some surface modifications
- Examples:
 - GIT(stomach to anus)

& cavity
of spinal

Simple columnar

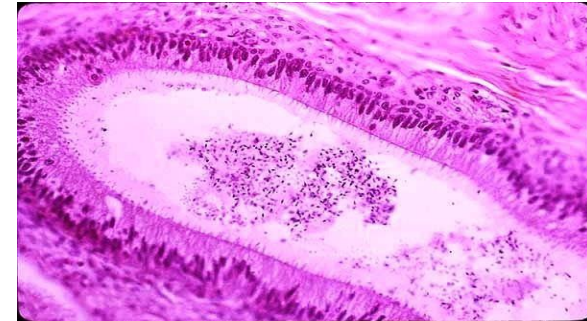
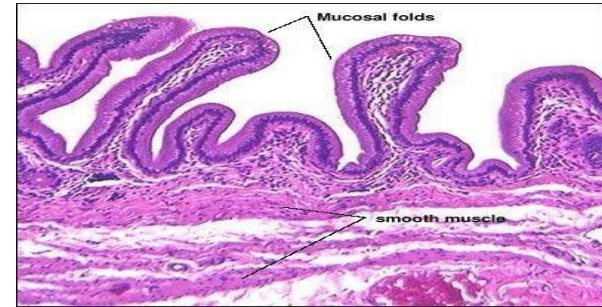


Function: Secretion and absorption;
Ciliary action

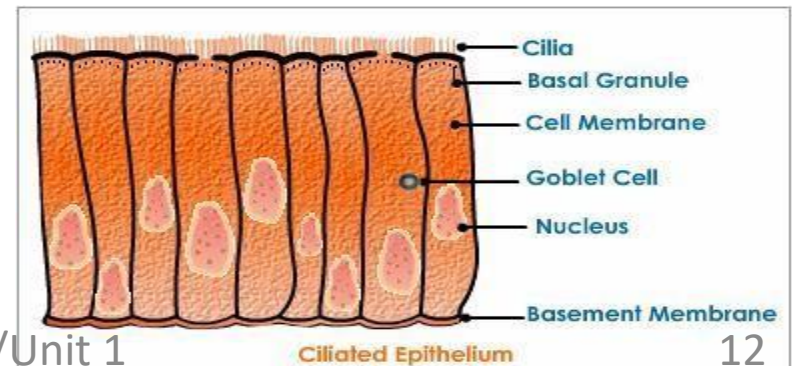


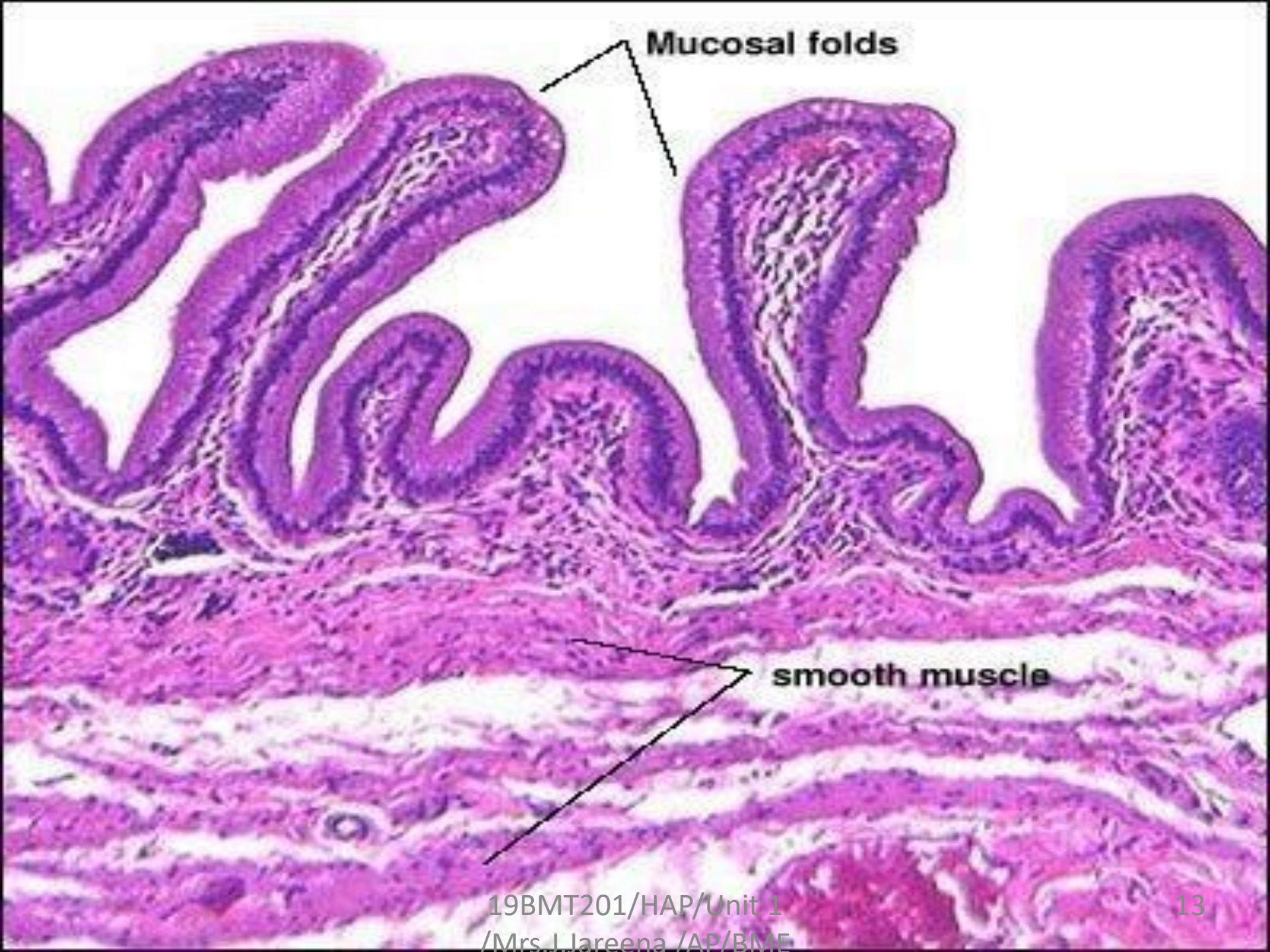
Surface modifications

- **Microvilli-**
 - **Striated border** (fine vertical striations)
eg; small intestine
 - **Brush border**—
branched projections
eg; PCT, gall bladder
- **Stereocilia-**
 - epididymus, internal ear
(kinocilia), olfactory cilia



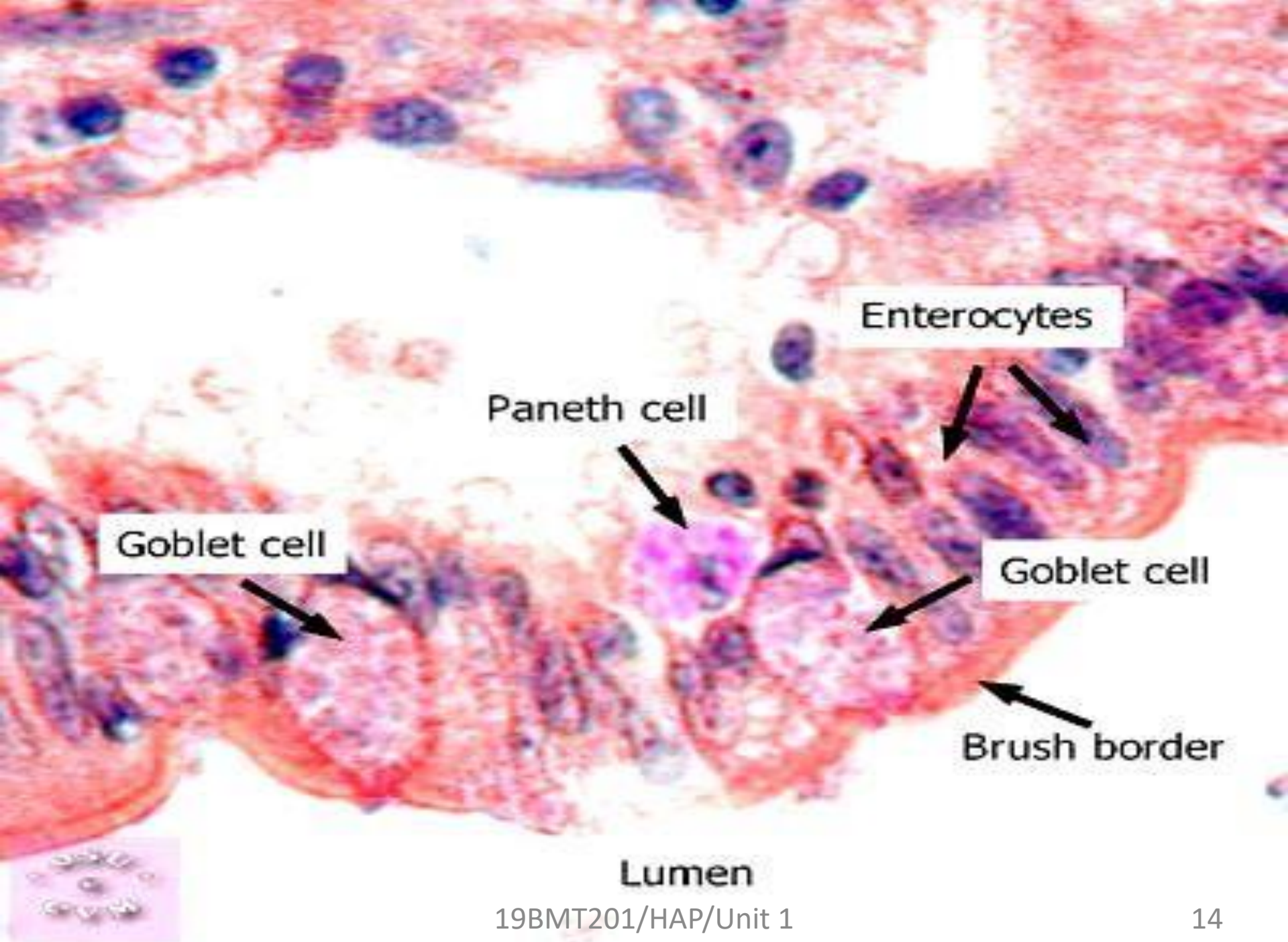
ent ductules
na, middle
e





Mucosal folds

smooth muscle



Enterocytes

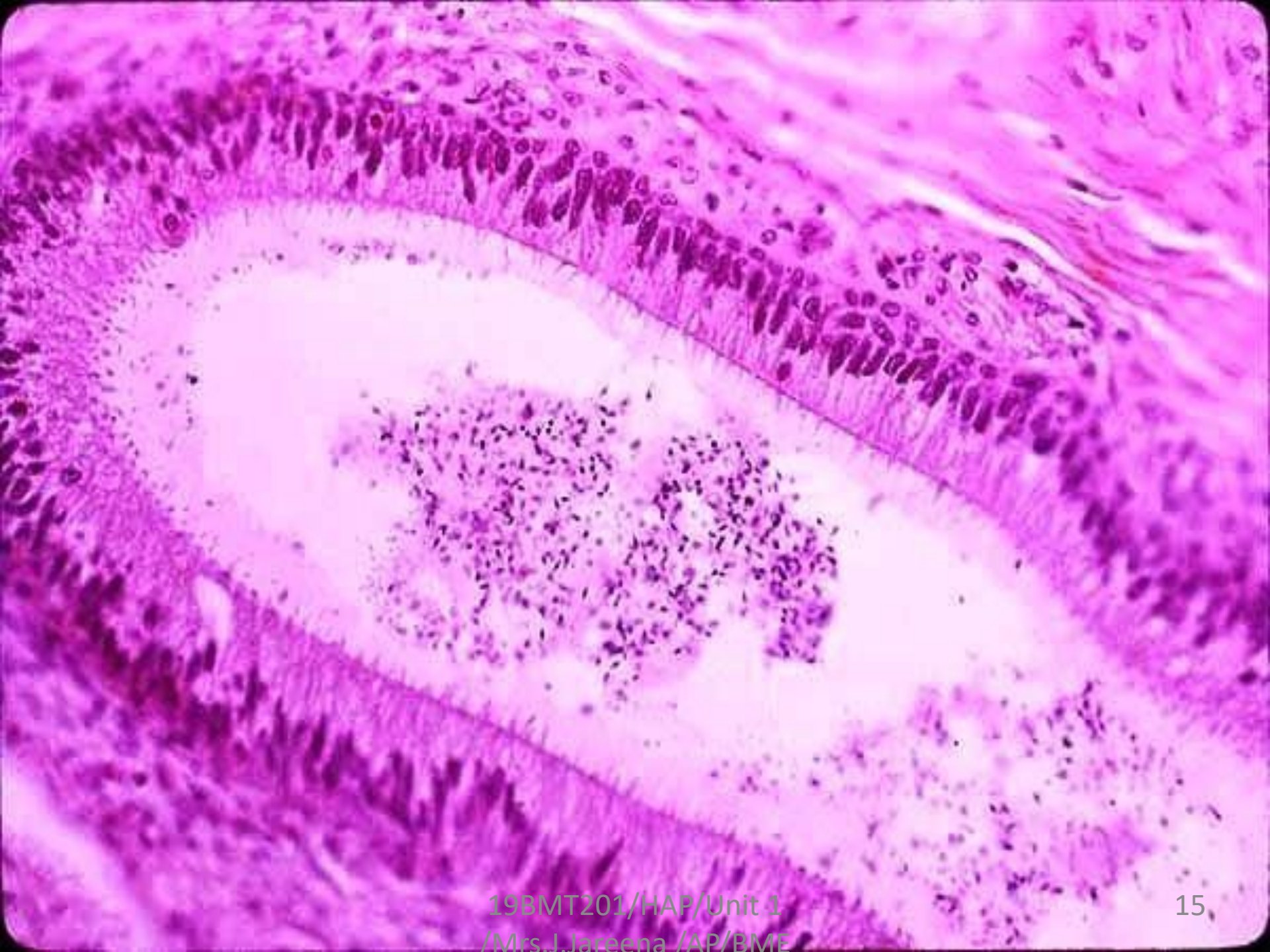
Paneth cell

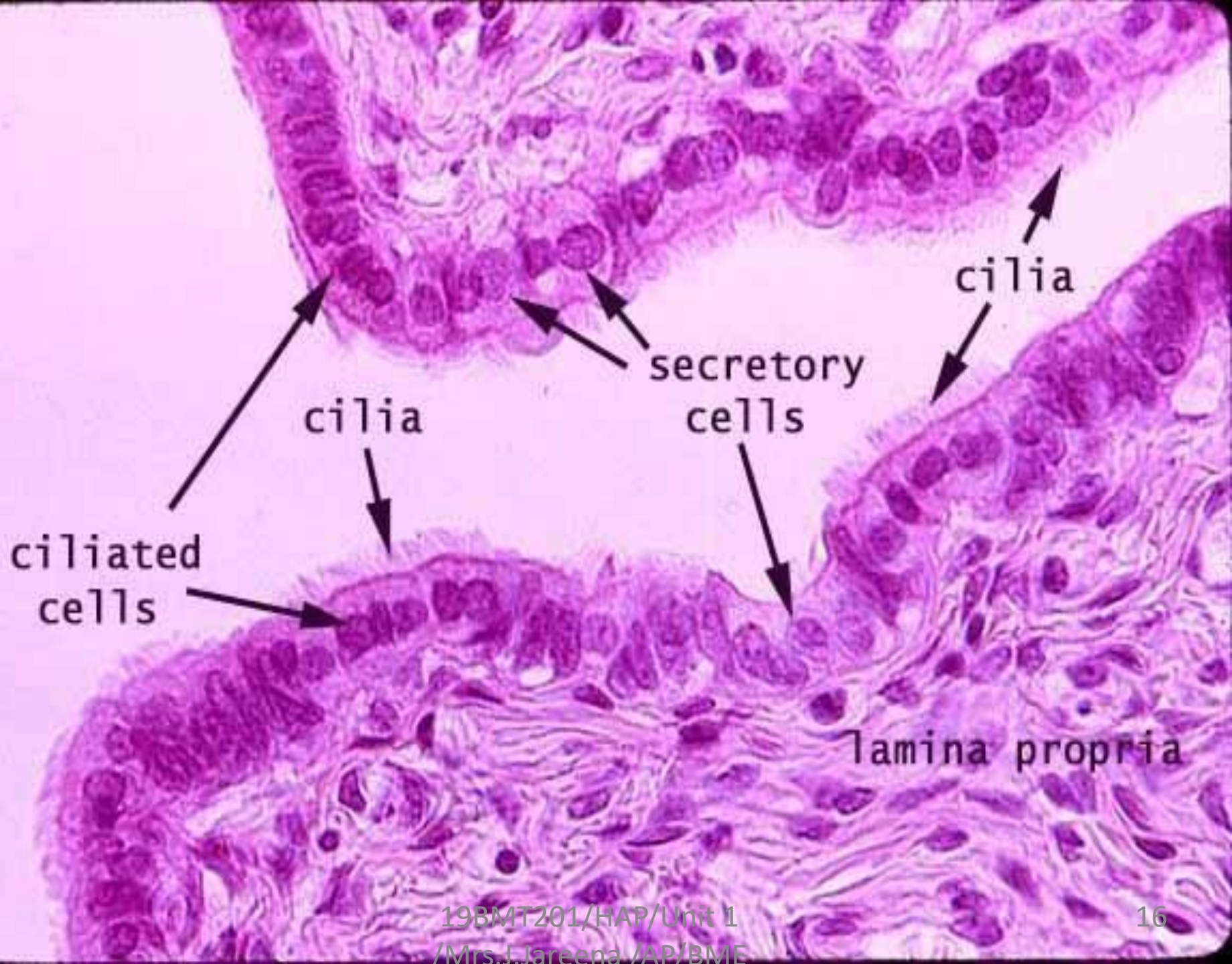
Goblet cell

Goblet cell

Brush border

Lumen





ciliated
cells

cilia

secretory
cells

cilia

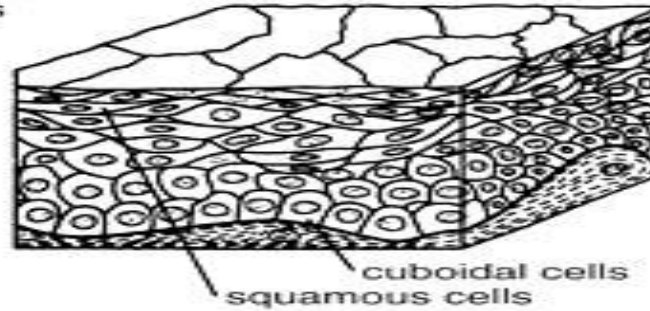
lamina propria



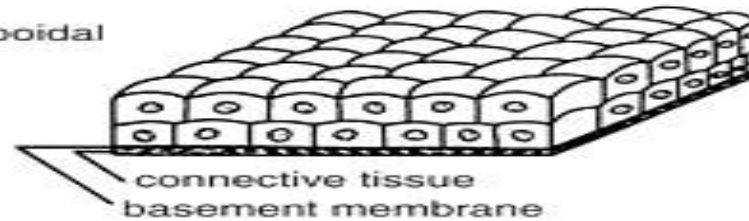
Stratified epithelium

stratified squamous

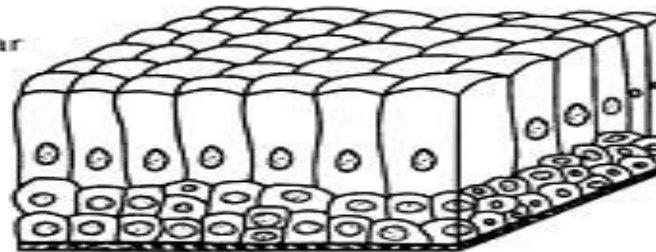
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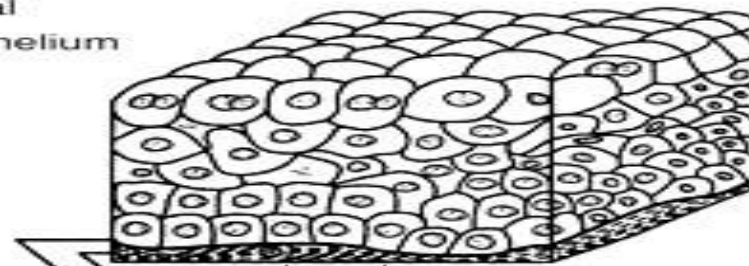
stratified cuboidal



stratified columnar



transitional
epithelium





Stratified Squamous Epith

- Multi layered squamous cells

- **Keratinized:**

Skin Tongue

- **Non keratinized:**

oral cavity

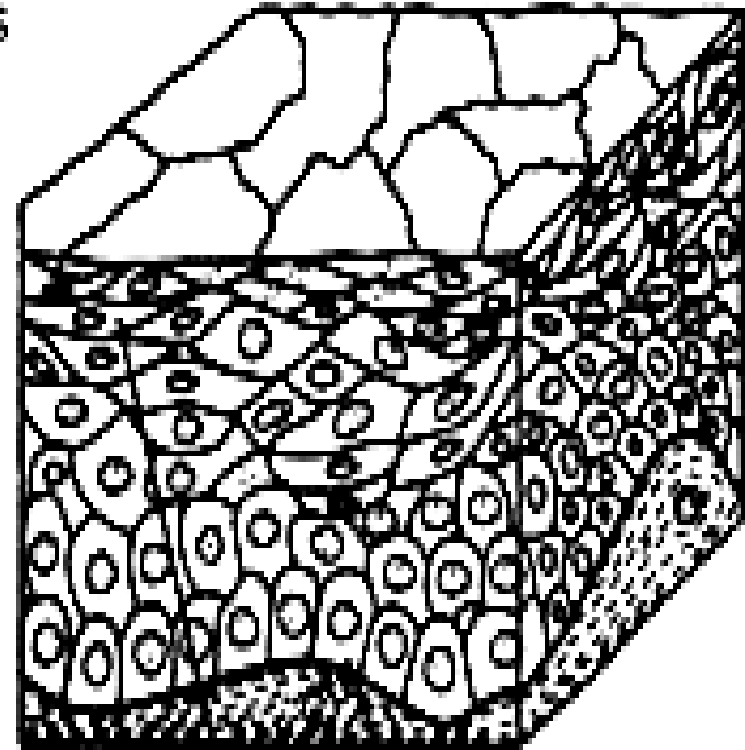
esophagus

vagina

cornea

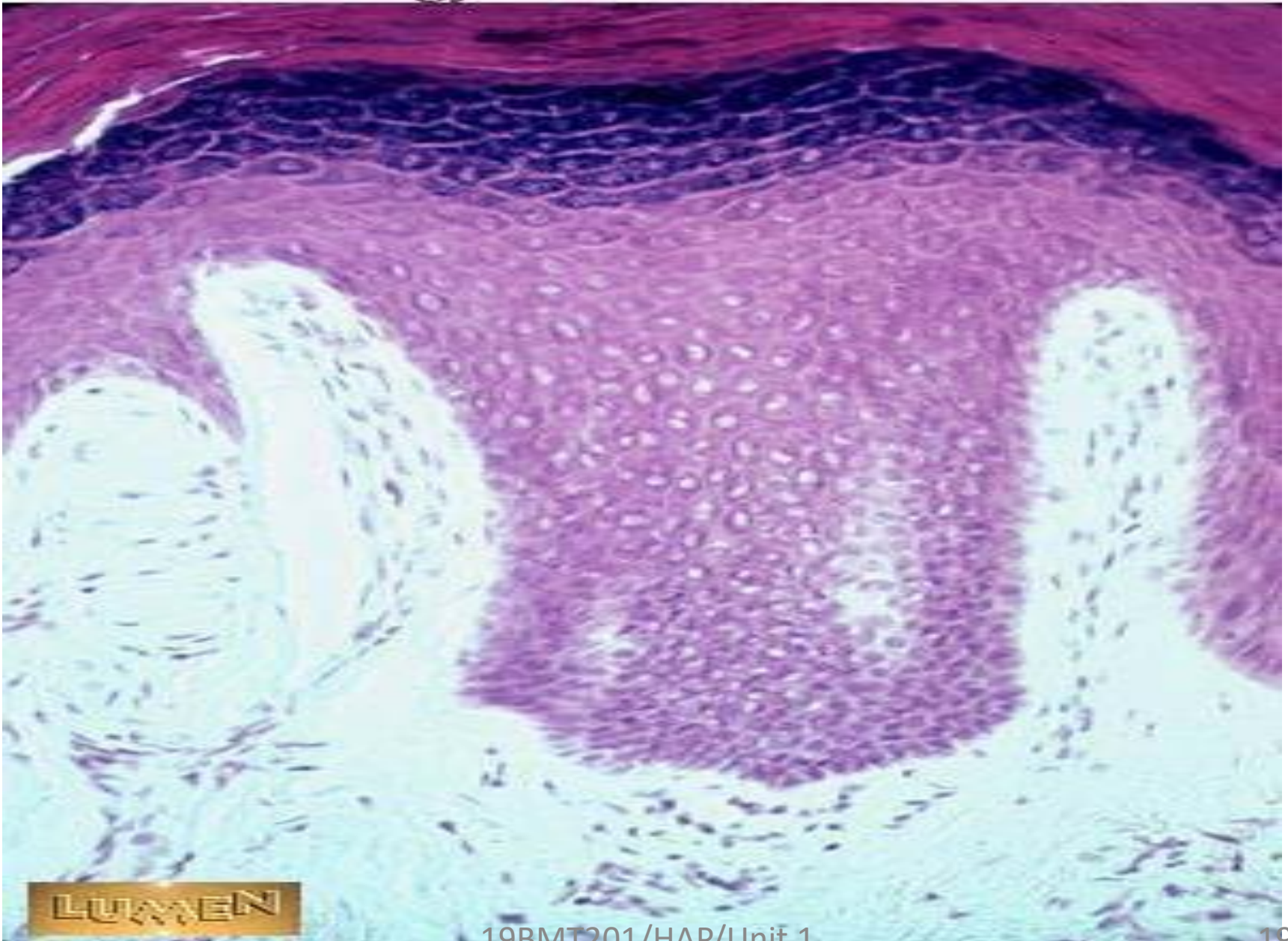
ction of
er tissue

US



cuboidal cells
squamous cells

Stratified squamous (keratinized)



Stratified squamous (non keratinized)





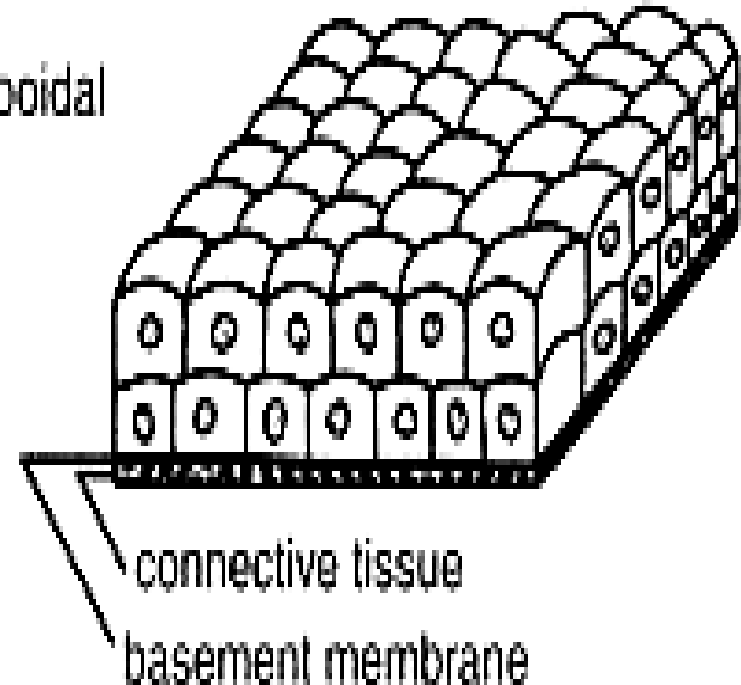
Stratified Cuboidal Epithelium

Cells: two layers

Nuclei: centrally located,
and spherical

Functions: absorption,
secretion

stratified cuboidal



Examples—

Ducts of sweat glands, ovarian follicle, seminiferous tubules

Functions: Passage to the secretion and acts as barrier

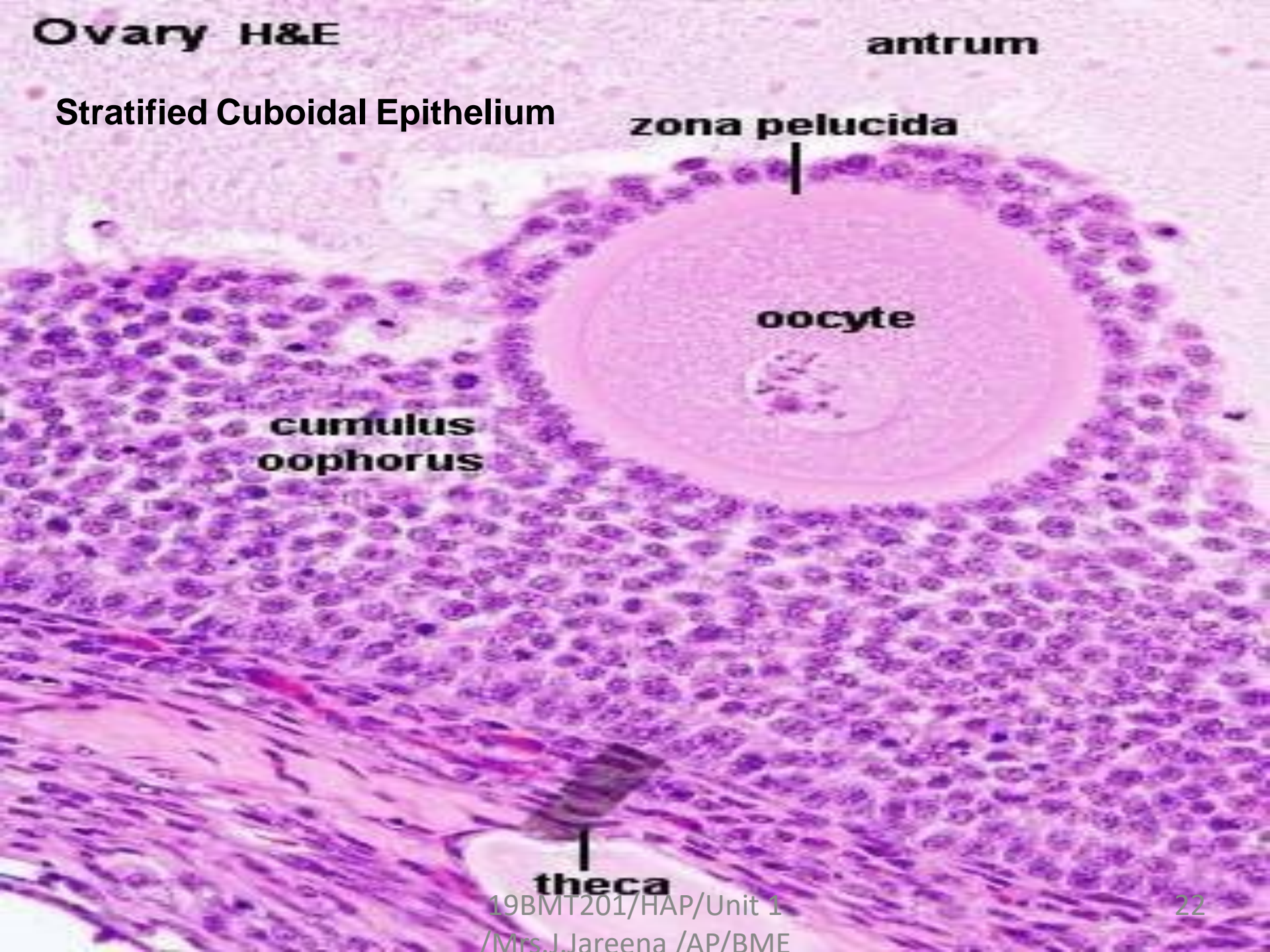
Stratified Cuboidal Epithelium

zona pelucida

oocyte

cumulus
oophorus

theca



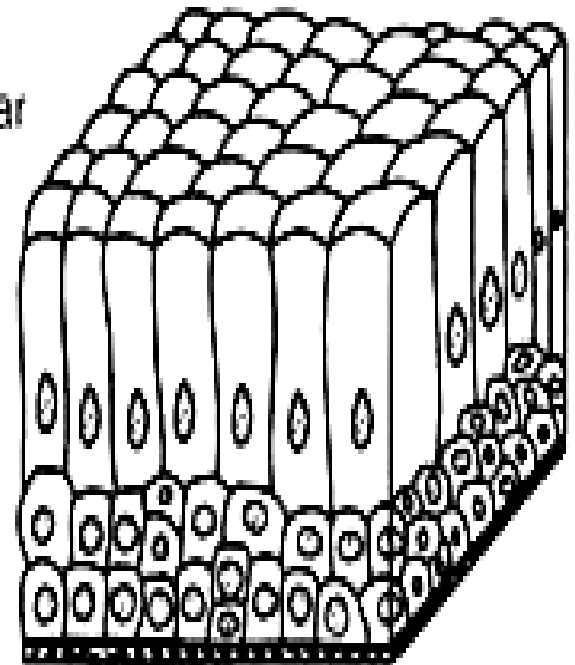


Stratified columnar

- Two or more layer of cells
- Superficial cells are columnar
- Examples – Conjunctiva
Cavernous urethra

Functions: Passage to the secretion and acts as barrier

stratified columnar



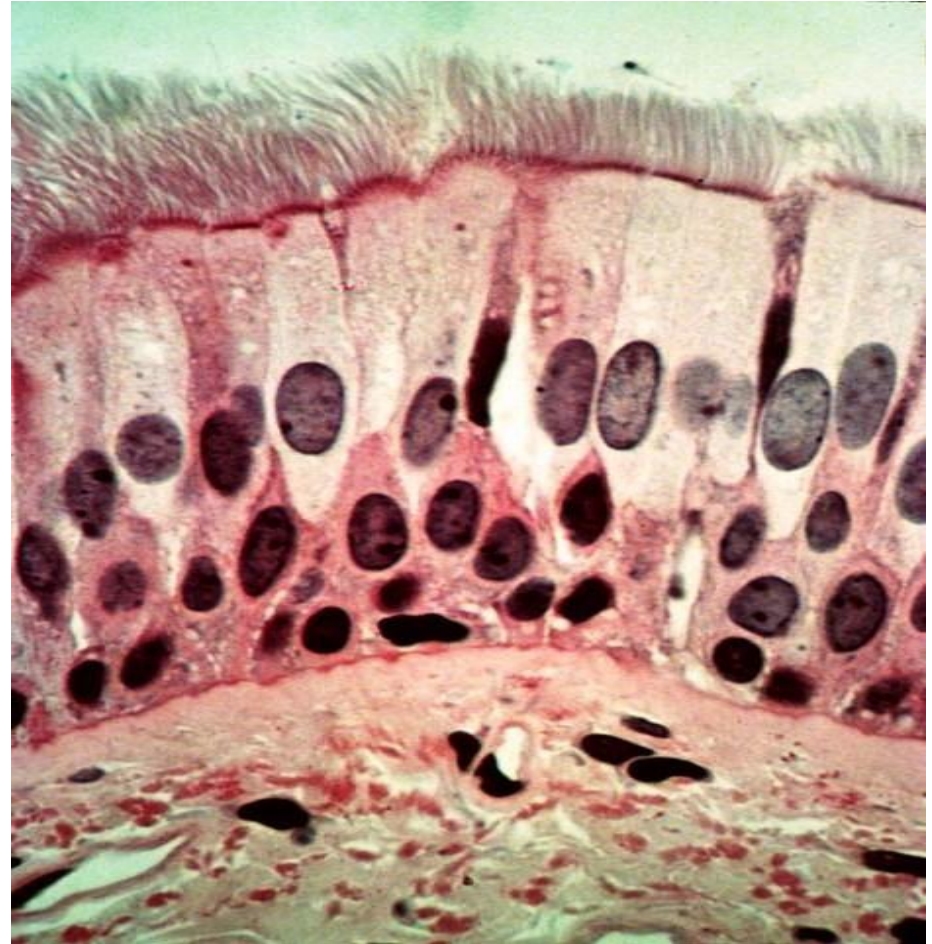


Pseudostratified Columnar epithelium

- Cell of unequal heights resting on same basement membrane.
- Ciliated/non-ciliated
- May contain goblet cells
- Examples-
Trachea, bronchi, auditory tube, ductus deferens, male urethra

Functions:

Protection, ciliary movements remove mucus, goblet cells secrete mucus





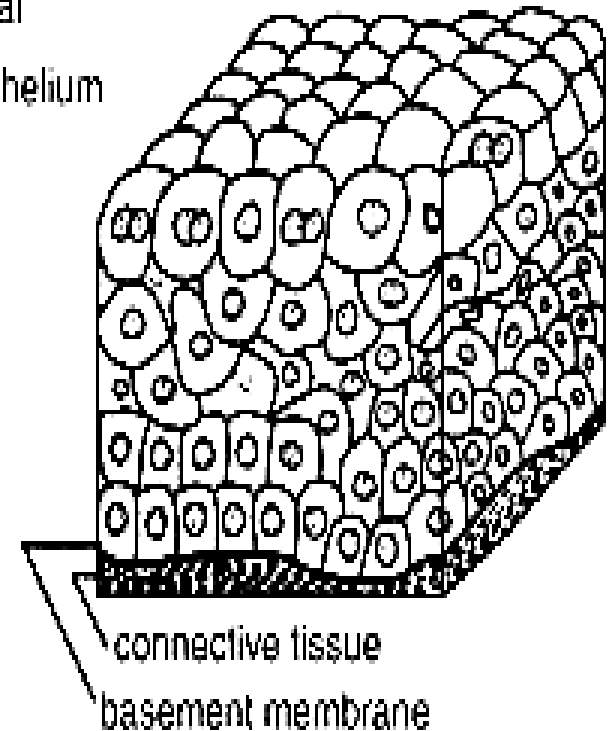
Transitional epithelium (urothelium)

Layers-

- Basal layer**- columnar or cuboidal
- Middle layer**- pear or polyhedral cells (interdigiting layer)
- Outer layer**- rounded or umbrella cells, often binucleate
- Eg; ureter, urinary bladder

Functions: Protection, distention

transitional
epithelium



Transitional Epithelium





References

1. diFiore's Atlas of Histology with functional Correlations, 12th Edition.
2. Essentials of Anatomy for Dentistry Students, 1st Edition.
3. Textbook of Histology, 3rd Edition.



MCQ

- Simple Squamous epithelium is seen in-
 1. Alveoli of lungs
 2. Stomach
 3. Urinary bladder
 4. Tongue



MCQ

- Transitional epithelium is found in-
 1. Uterus
 2. Ureter
 3. Gall bladder
 4. Vagina



MCQ

- Stomach is lined by-
 1. Simple columnar epithelium
 2. Straified squamous epithelium
 3. Simple cuboidal epithelium
 4. Pseudostratified columnar epithelium



MCQ

- Pseudostratified Columnar ciliated epithelium is a feature of-
 - 1.Ureter
 - 2.Skin
 - 3.Trachea
 - 4.Kidney



MCQ

- All are the functions of epithelium **except** -
 1. Protection
 2. Absorption
 3. Secretion
 4. Assimilation