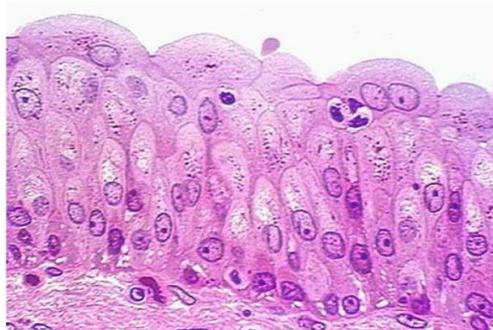
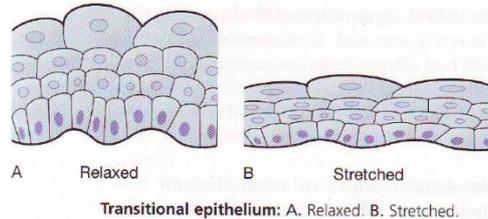


## Transitional epithelium **also called (Urothelium)**

This tissue is found mainly in the urinary system (bladder) and composed of three cells types, firstly the cells that is attached to basement membrane are **columnar cells** and in the middle are called **beer cells** and the last up cells are called **dome cells**.



(Urinary bladder) – empty



This type has more spaces between cells.

**Adaptation of Transitional epithelium to its function:**

- Thin corrugated basement membrane (protection of injury during filling the bladder with urine)
- Abundant mucoid intercellular substance to allow gliding of cells on each other.
- Cuticular border at the free surface. (For protection of urine toxicity)

## Glandular Epithelium:

It is the same structure of covering type, but the only difference is this type is getting down in the connective tissue and this part is called gland, there are 3 types:

- 1-Exocrine: this type has a duct pointing toward the blood stream directly.
- 2-Endocrine: this type has no ducts and secrets without ducts to blood stream
- 3-Mixocrine: this type is a mixture of endocrine and exocrine, for example:
  - Liver: Glucose and amino acid secretion are endocrine, while bile acids are exocrine
  - pancreas: digestive enzymes are exocrine, while insulin and glucagon are endocrine

## Types of glandular epithelium it is classified according to:

- 1- Number of cells
- 2- Presence or absence of a duct system
- 3- Mode of secretion (mechanism)
- 4- Nature of secretion
- 5- Shape of the secretory portion
- 6- Branching of duct

### Number of cells

**Unicellular** (goblet cell) almost the only one

**Multicellular** (Most of the glands e.g. Salivary glands)

### Mechanism (Mode) of Glandular secretions

This one is classified into 3 types, and you should have known that the large molecules enter the cells during endocytosis and leave it through exocytosis:

- Merocrine glands:

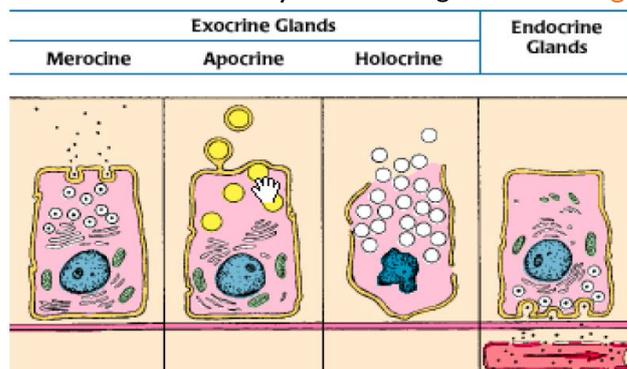
The secretion released through exocytosis e.g. **Pancreas**

- Apocrine glands

The secretion involves the loss of both product and apical cytoplasm e.g. **Mammary glands**

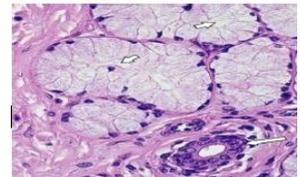
- Holocrine gland

The secretion destroys the cell e.g. **Sebaceous glands**

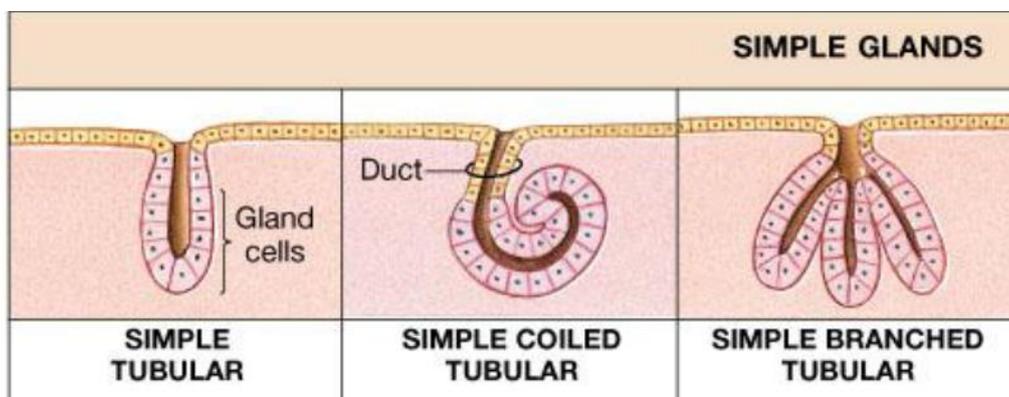
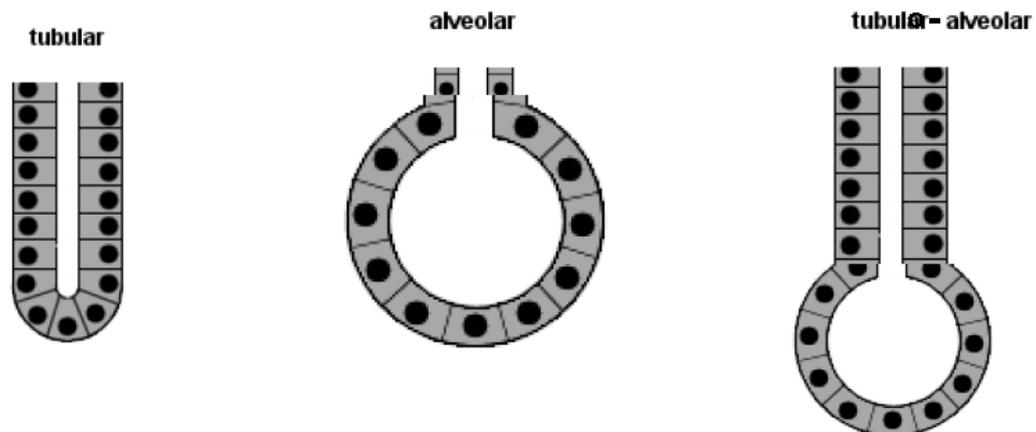


## Nature of Glandular secretions

- Serous glands e.g. **Parotid gland**
- Mucous glands e.g. **Sublingual gland**
- Mixed glands e.g. **submandibular gland**
- Glands with special secretion:
  - sebaceous gland (**oily secretion**) found **in hair and skin and is**
  - Broken down of the cell in order to work**
  - lacrimal gland **watery secretion**
  - Mammary gland **Milk secretion**
  - Glands in the ear **wax**
- **Lacrimal and serous glands have different secretions**



## Branching of ducts and shape of Secretory portion

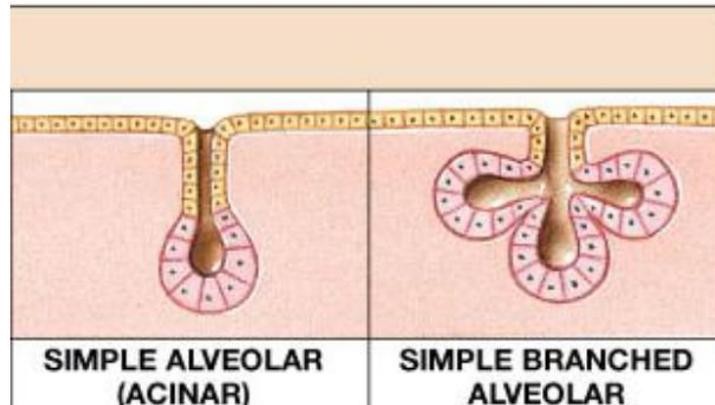


**Intestinal glands**

**Sweat glands**

**Fundic glands**

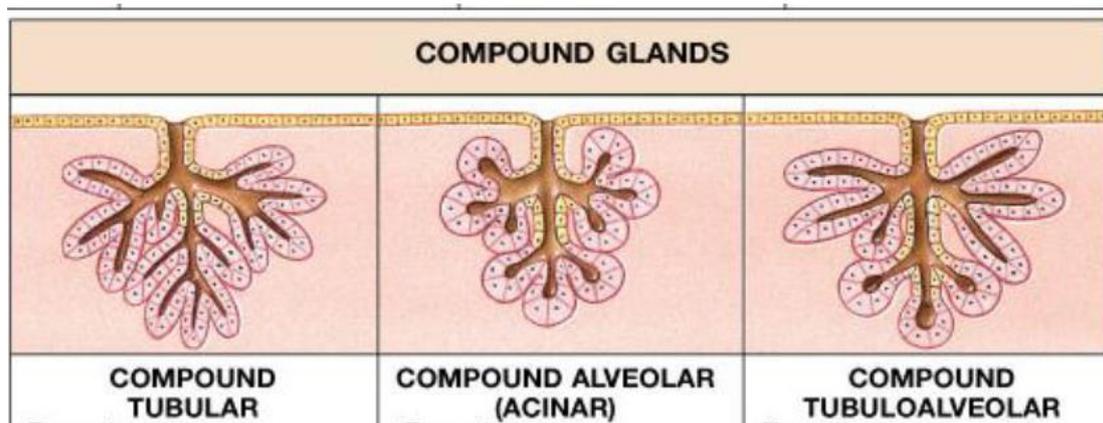
Simple means that duct has only 1 branch, while compound means that the duct has 2 or more branches.



**Sebaceous glands**

**Tarsal glands**

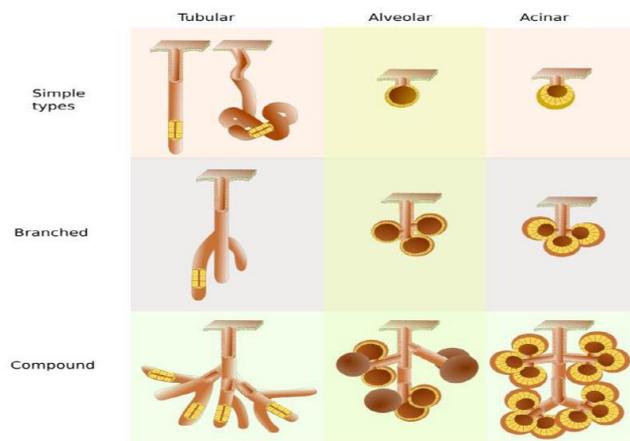
We can say that tarsal gland is a mediated sebaceous gland but no hair follicles behind the tarsal gland.



**Liver**

**mammary glands**

**salivary glands**

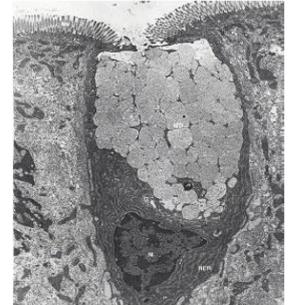
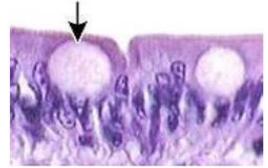


Alveolar is the same meaning of Acinar

## Now let's talk more specific

### Goblet cells

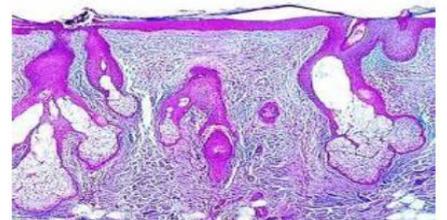
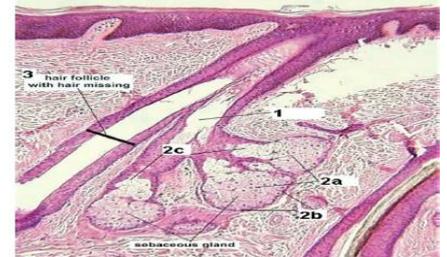
- Unicellular
- Exocrine
- Shape of the cell: flask shape with basal nuclei
- **Mode** of secretion: Merocrine
- **Nature** of secretion: Mucus
- **Site:** Respiratory system, GIT
  - This cell secretes mucous secretions in respiratory tract in order to get rid of foreign dusts that come during breathing.



- Also it secretes mucous in GIT tract for protection for GIT cells of any other secretion such like digestive enzymes.

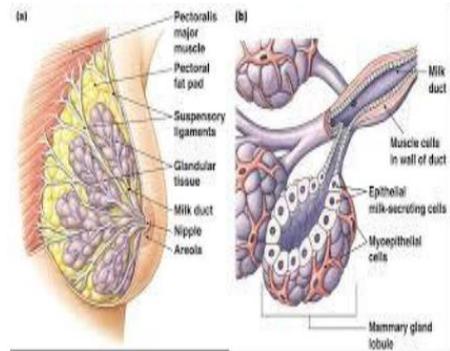
### Sebaceous gland

- Exocrine
- Mode: Holocrine
- **Nature:** (oily secretion)
- **Shape of secretory units:** Branched alveolar
- **Site:** Related to hair follicles
- **Activity of the gland increases at the age of puberty**
- **Obstruction of the duct by thick secretion & keratin causes Acne**
  - **Because it is not a straight duct (for sweat gland)**
  - We have two types of skin, thick and thin, almost whole body is thick skin, while only hand palm and foot is thin.
  - No hair follicle near to the thin skin and there are many hair follicles in the thick one.



## Mammary gland

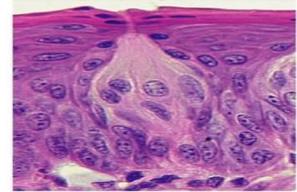
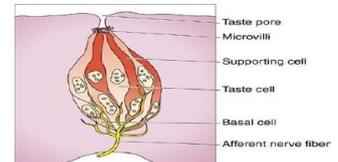
- Exocrine
- Mode: Apocrine
- Nature: (milk secretion)
- Shape of secretory units: Compound alveolar
- Site: Related to skin



## Special types of epithelium

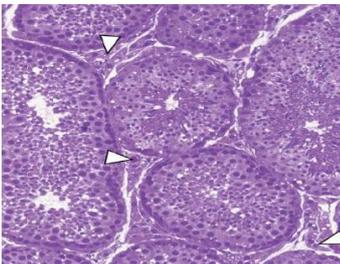
### Neuroepithelium

- E.g. Taste buds
- Site: dorsal surface of the tongue
- Function: sensation
- Specifically it is found in special sense organs (eye, nose, tongue, and ear)

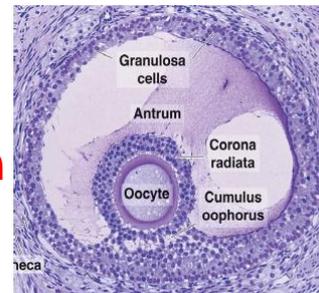


### Germinal epithelium

**Testis:** sperm



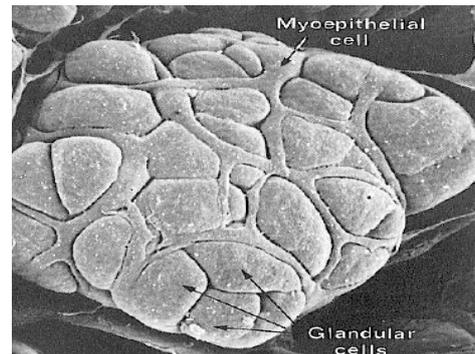
**Ovary:** ovum



**Function: Reproduction**

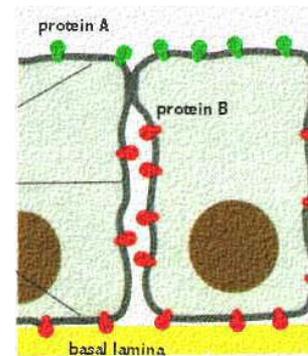
## Myoepithelium

- Shape:** Irregular with many processes
- Contain actin & myosin in the cytoplasm
- Site:** Acinus & ducts of the gland
- Function:**  
Contraction for squeezing the secretion



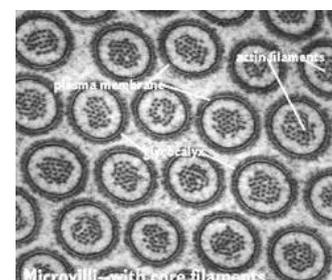
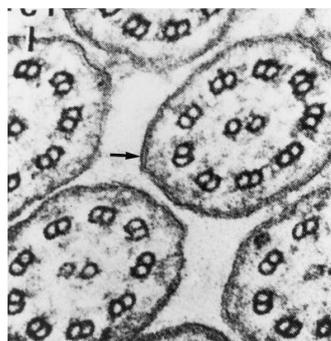
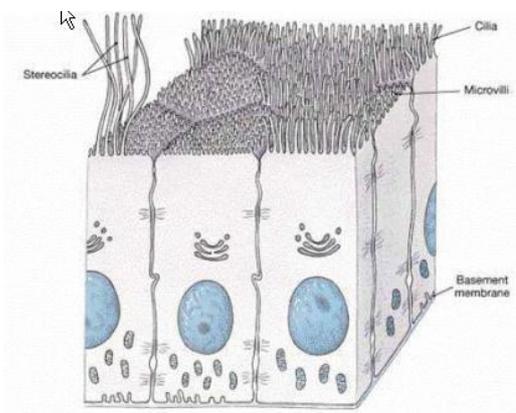
## Epithelial polarity

- Cells have a top, lateral side and a bottom
- So different activities take place at different places
- Apical modifications**
- Basal modifications**
- Lateral modifications**



## Apical modifications

- **Cilia:** found on the apical surface of the cell, long and not condensed (few), it is composed of microtubules (Double 9 + 2), and is important for movement.
- **Microvilli:** found also in the apical surface of the cell, short and cannot be used for movement, condensed and it has important role in absorption, composed of actine filaments.
- **Stereocilia:** also found on the apical surface, long and cannot be used for movement, made up of actine filaments.



	Microvilli	Stereocilia	Cilia (kinocilia)
1.	Superficial evaginations of cells	Superficial evaginations of cells	Cell surface prolongations which develop from inside the cell
2.	Glycocalyx present	Glycocalyx present	Glycocalyx inconspicuous
3.	Length 0.6-2.0 $\mu\text{m}$ ; thickness - 0.1 $\mu\text{m}$	Length - 2-15 $\mu\text{m}$ ; thickness-upto 0.25 $\mu\text{m}$	Length 2-150 $\mu\text{m}$ ; thickness - about 0.5 $\mu\text{m}$
4.	Cylindrical in outline	Elongated, wavy and tapering structures	Thread-like structures with tapering ends
5.	Supported internally by actin filaments	Supported internally by actin filaments	Supported internally by microtubules
6.	Basal granule absent	Basal granule absent	Basal granule present
7.	Interconnections absent	Adjacent stereocilia often develop interconnections	Interconnections rare
8.	Not vibratile	Not vibratile	Vibratile
9.	Take part in absorption of materials	Sensory transducers absorptive in function	Take part in material movement

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عزبالة

زميلكم مروان حرزالله... دعواتكم