

# Chapter 3

## Epithelial Tissue

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# General feature of epithelial tissue

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Organization : closely aggregated cells  
and little intercellular substance  
between cells

Polarity: free surface, basal surface  
and side surface

Avascularity

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Functions: protection, absorption and secretion

Classification: covering epithelium  
glandular epithelium  
sensory epithelium  
myoepithelium

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# I .Covering Epithelium

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1. The type and structure of covering epithelium

1.1 Simple epithelium

(1) Simple squamous epithelium

Endothelium: lining of Heart vesseles and lymphatic vascular sysytem

Mesothelium: pleura, peritoneum and pericardium

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(2) Simple cuboidal epithelium

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(3) Simple columnar epithelium:

(4) Pseudostratified ciliated columnar epithelium

1.2 Stratified epithelium

(1) Stratified squamous epithelium  
keratinized: epidermis

Nonkeratinized : oral cavity, esophagus

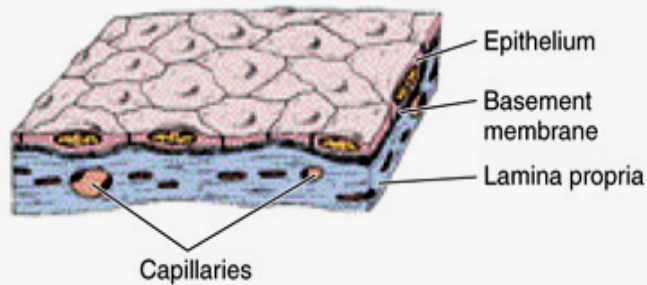
(2) Stratified columnar epithelium:

(3) Transitional epithelium:

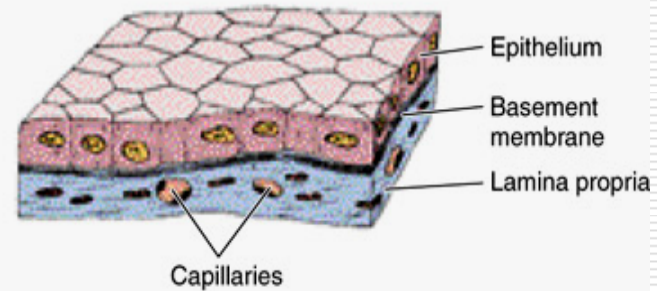
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# Simple Epithelium

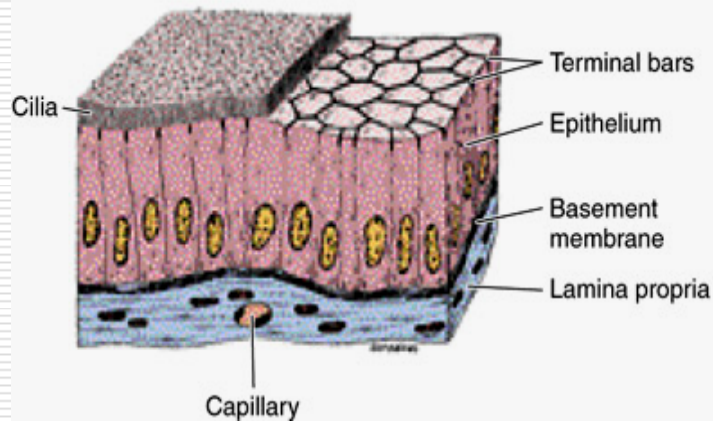
A Simple squamous epithelium



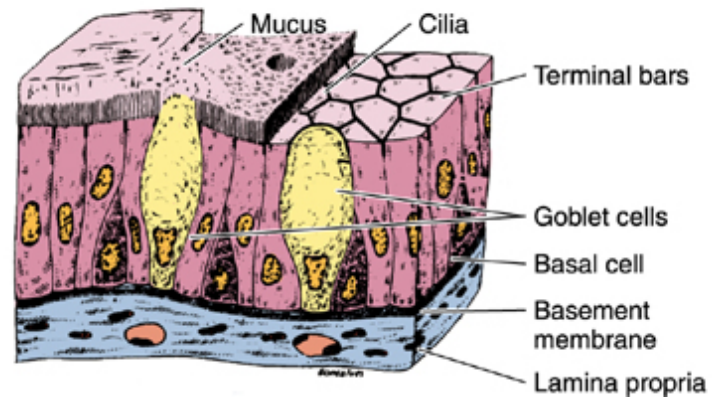
B Simple cuboidal epithelium



C Simple ciliated columnar epithelium



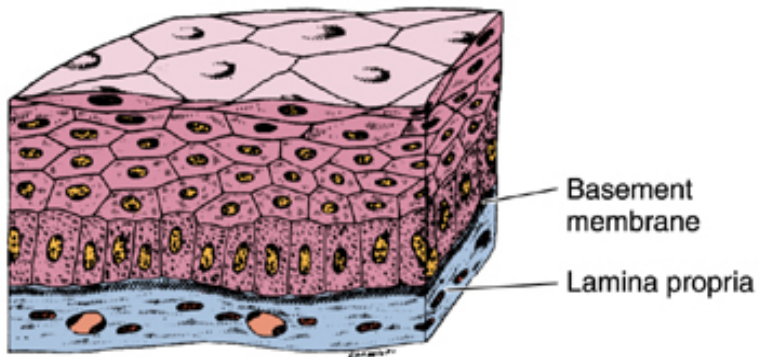
C Ciliated pseudostratified epithelium



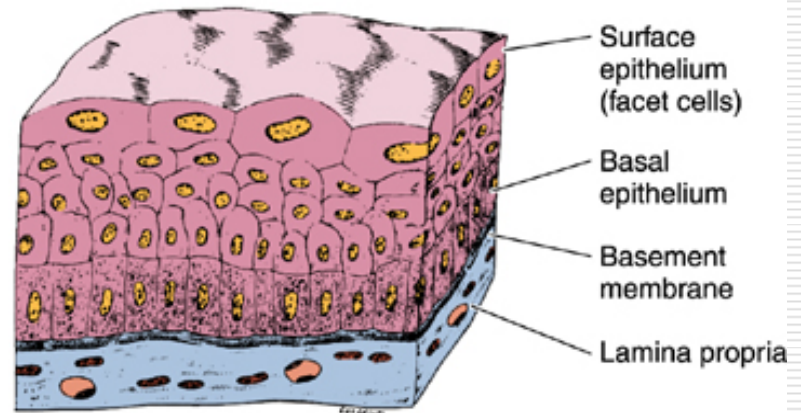
# Stratified Epithelium

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**A** Stratified squamous epithelium

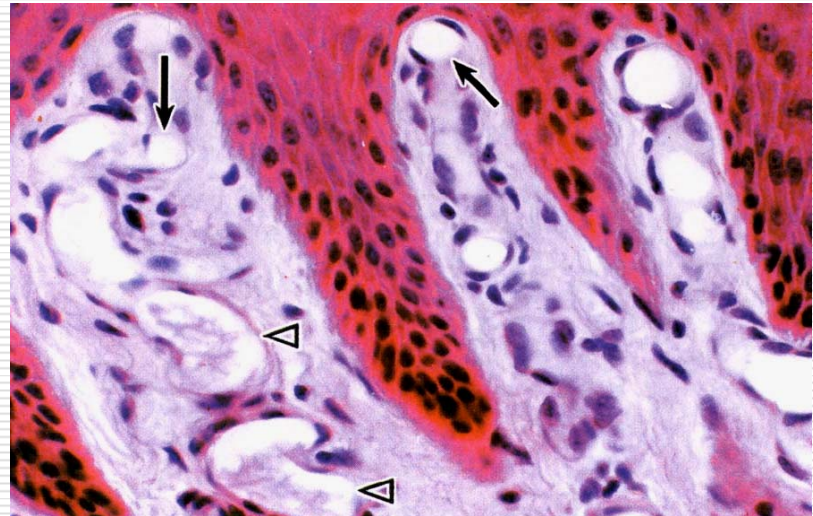
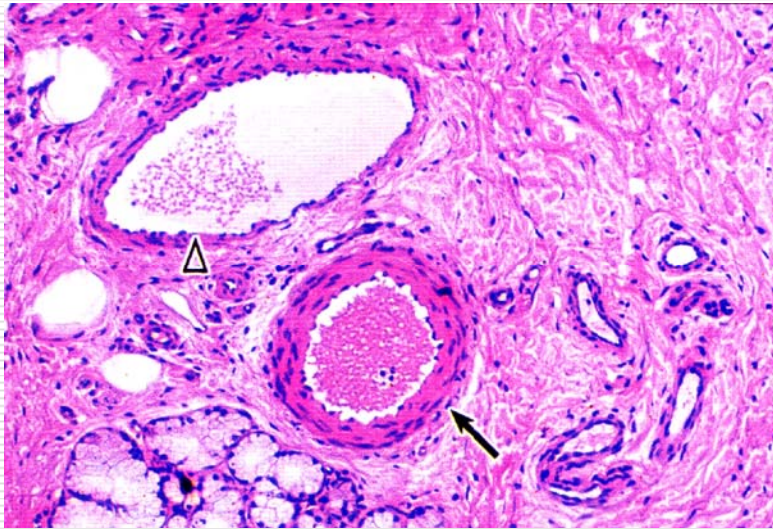


**B** Transitional epithelium



# Endothelium

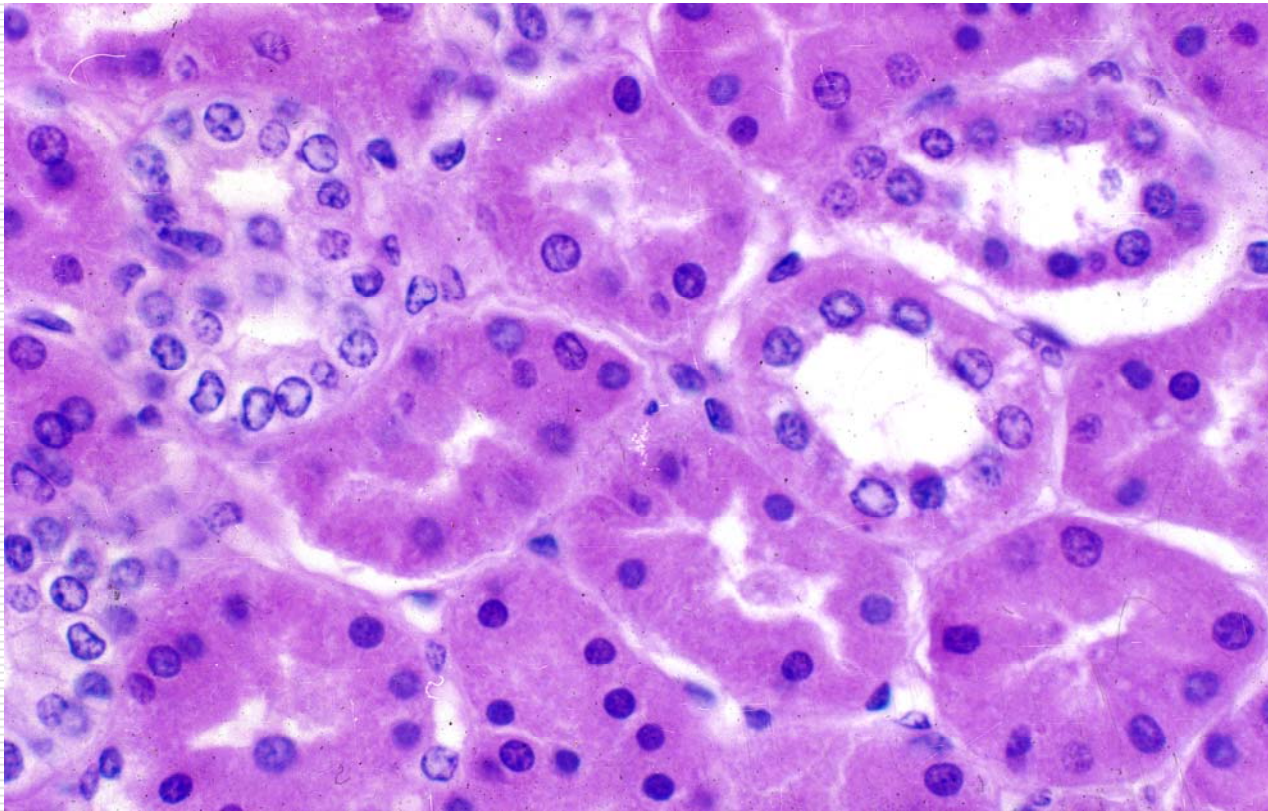
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# Simple Cuboidal Epithelium

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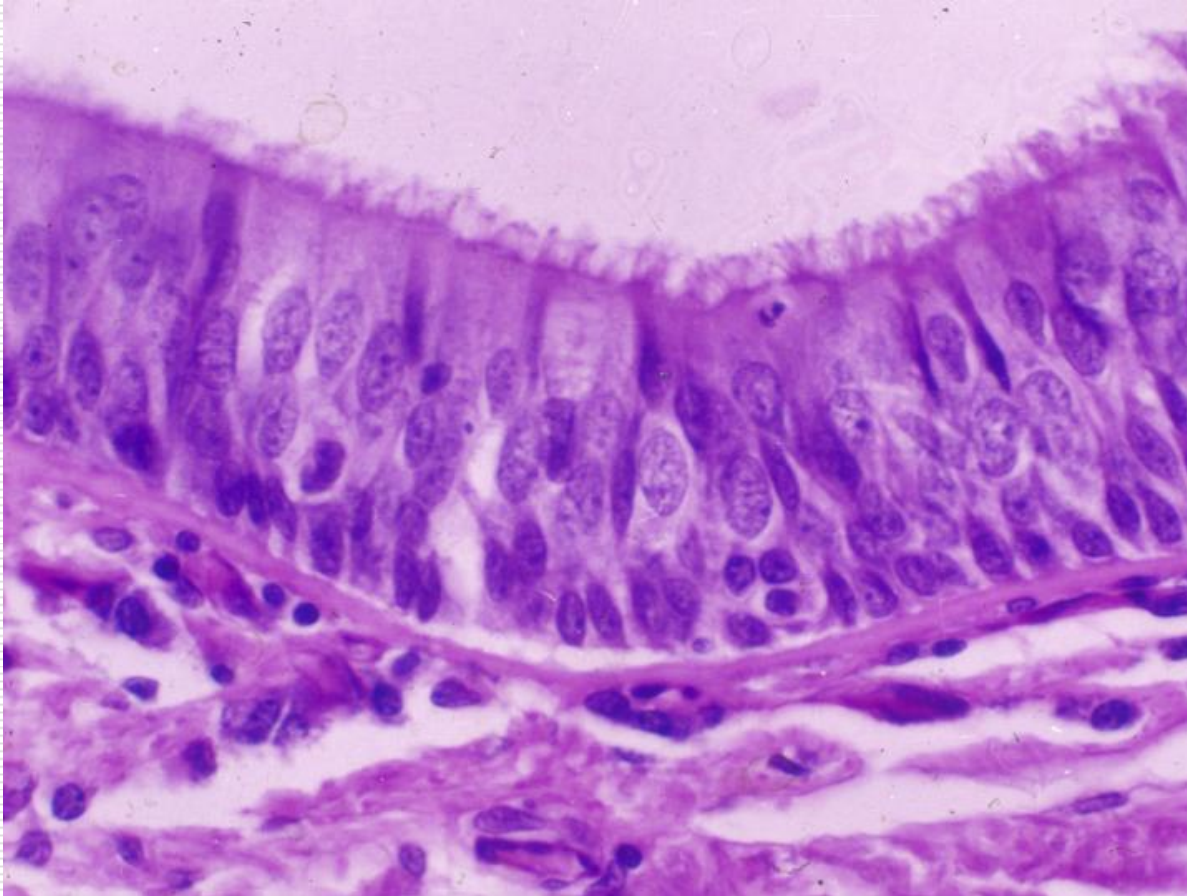
# Simple Columnar Epithelium

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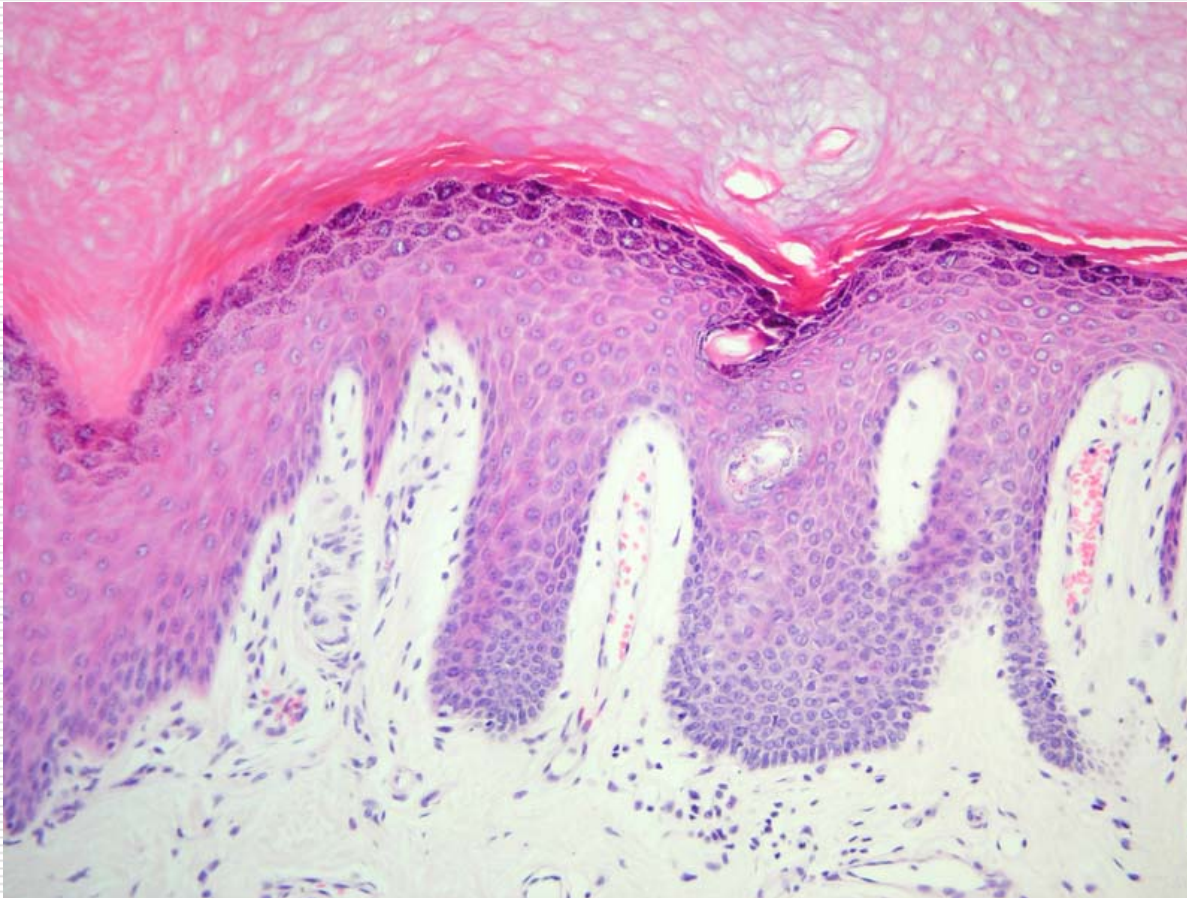
# Pseudostratified ciliated columnar epithelium

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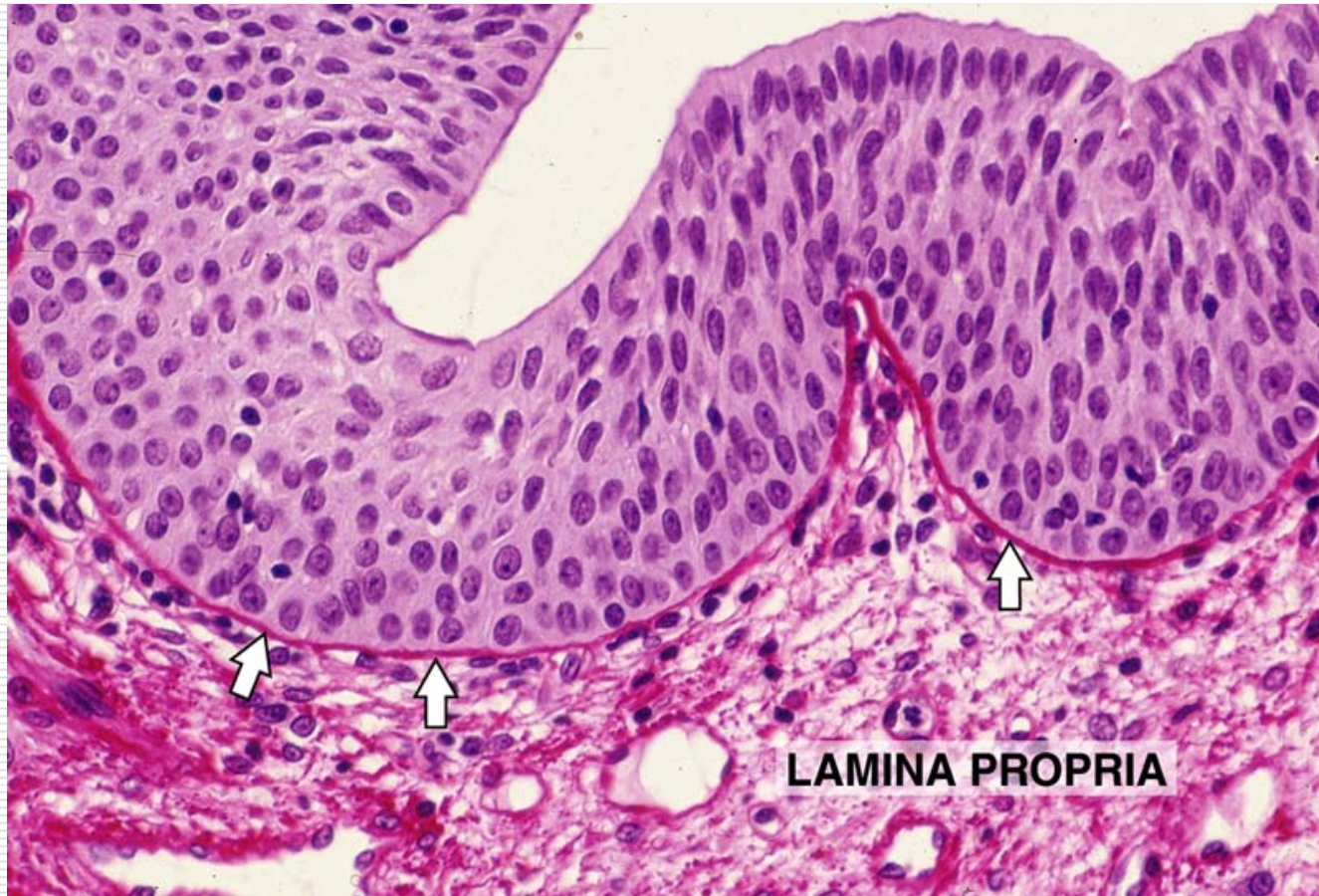


# Keratinized stratified squamous epithelium

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# Nonkeratinized stratified squamous epithelium



## 2. Specializations of the cell surface

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### 2.1 Apical surface

#### (1) Microvillus

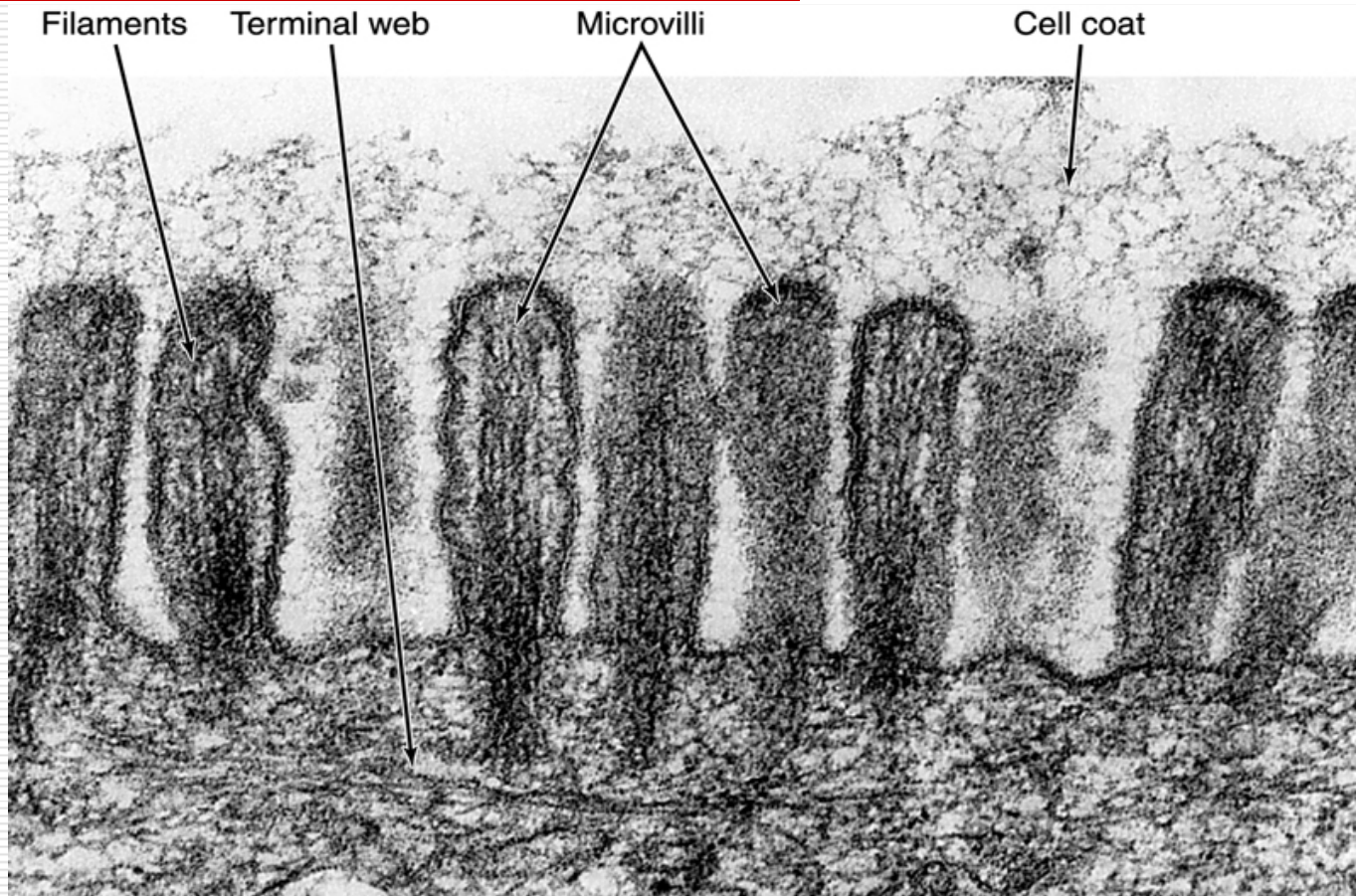
LM: striated border or brush border

EM: the vertical microfilaments contact with the terminal web

Function: to increase the surface of the cell

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# Cell coat and microvillus



## (2) Cilium

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LM: numerous elongated projections on the surface of epithelial cells

EM: a central pair of microtubules;  
9 pairs of peripheral doublet microtubules and basal body

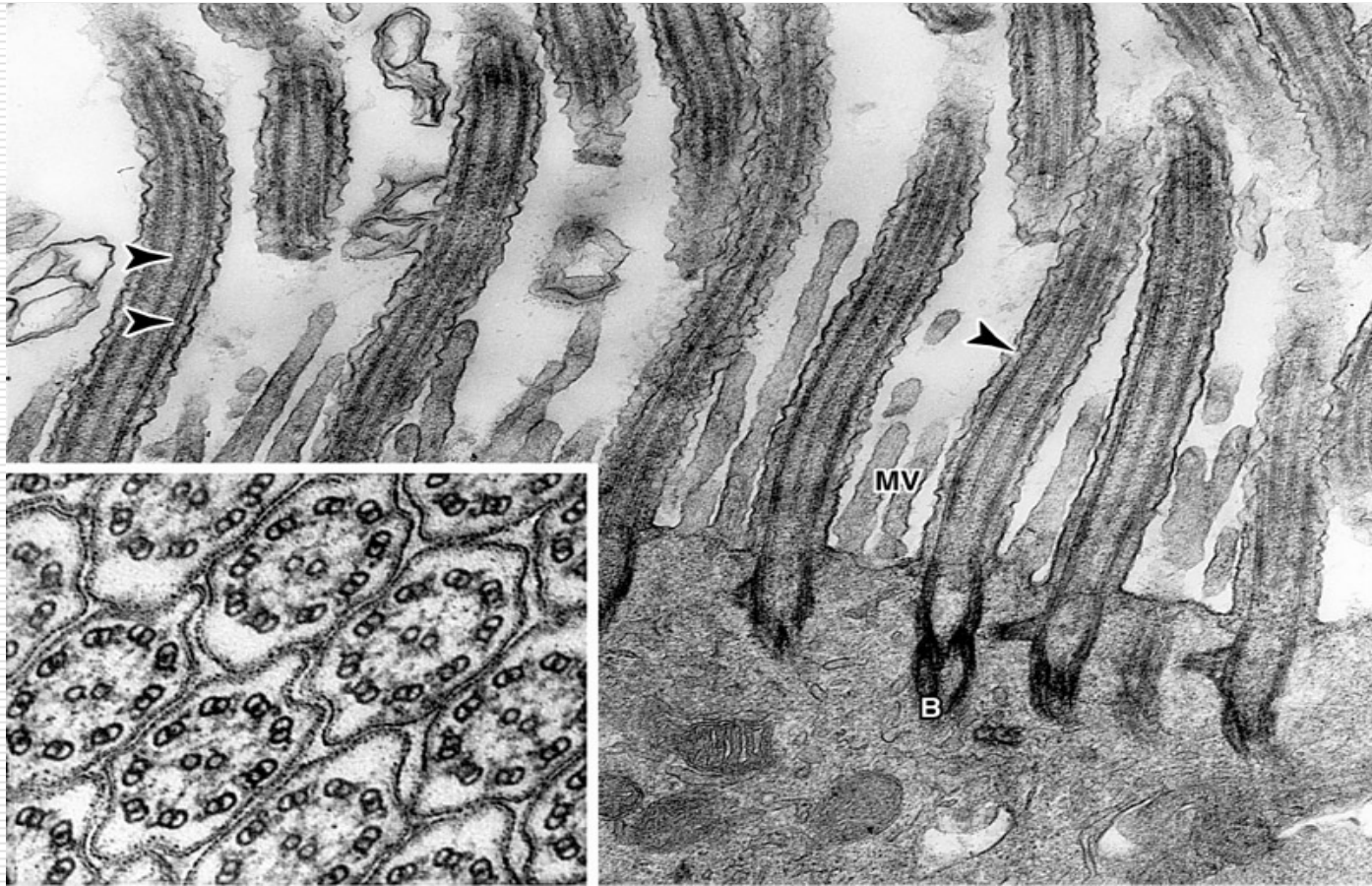
Function: In living organism, cilia have rapid back-and-forth movement.

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# Cilium

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## 2.2 Specializations of the lateral surface

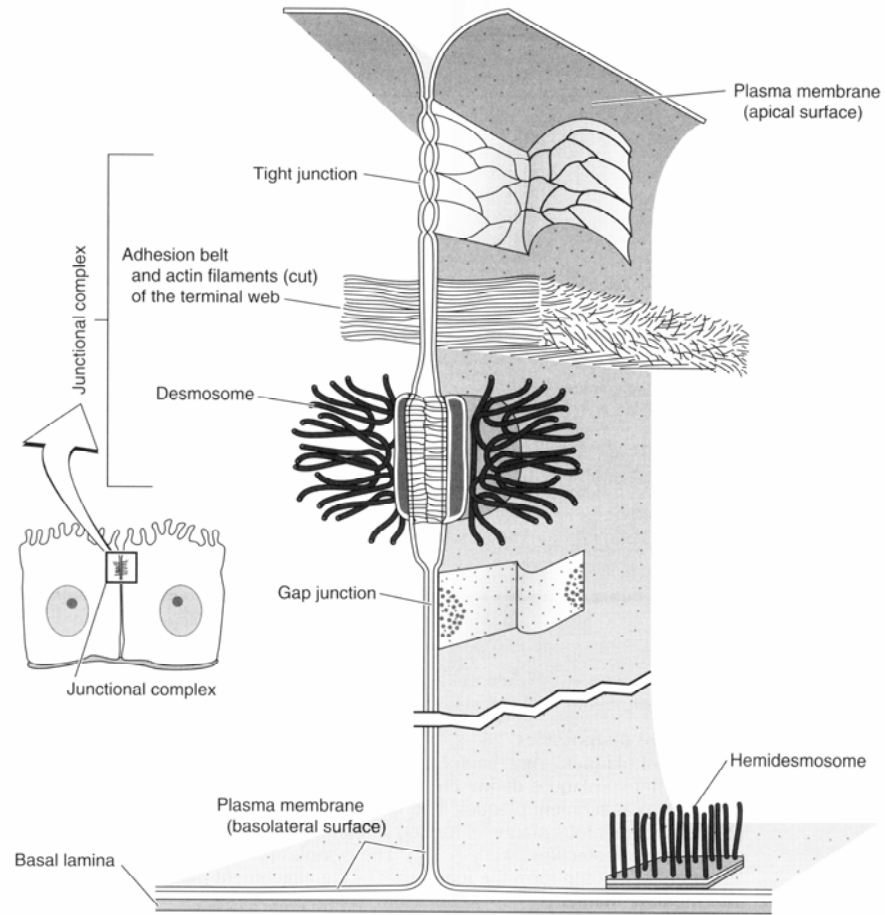
### ( 1 ) Tight junction

TEM:

Function: to form a barrier that prevents the passage of substances between the epithelial cells

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# Cell junction model



## (2) Intermediate junction:

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TEM:

Function: machinery junction

## (3) Desmosome

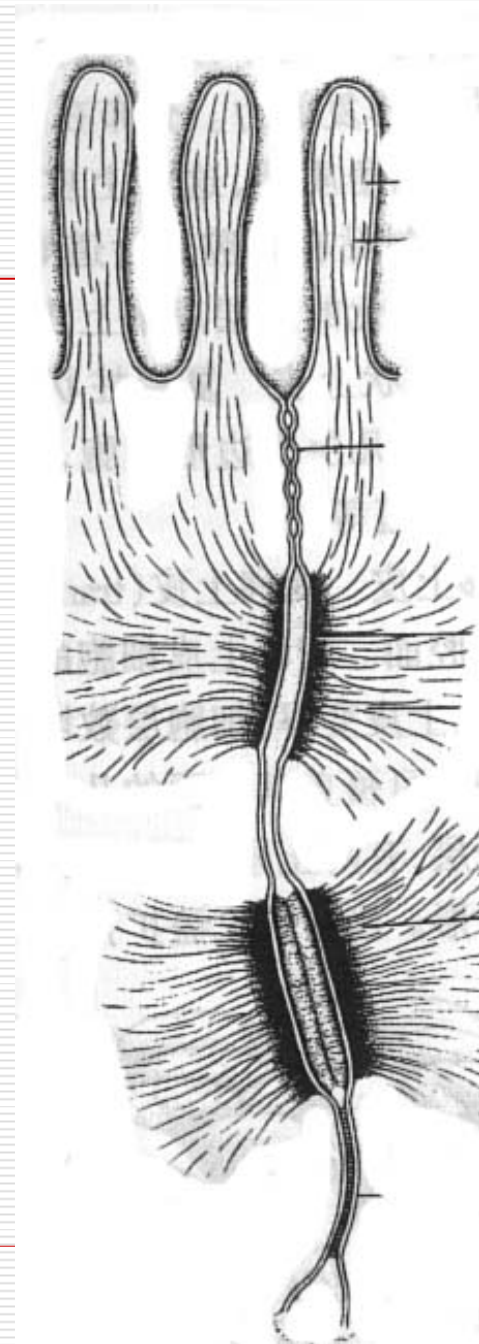
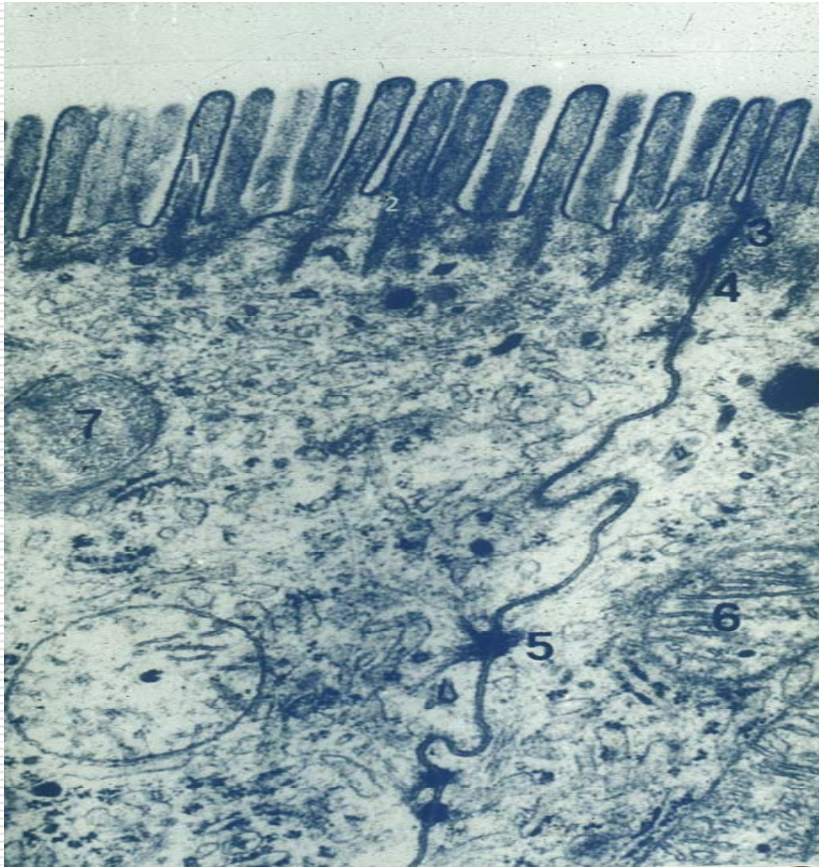
TEM: tonofilament

Function: machinery junction

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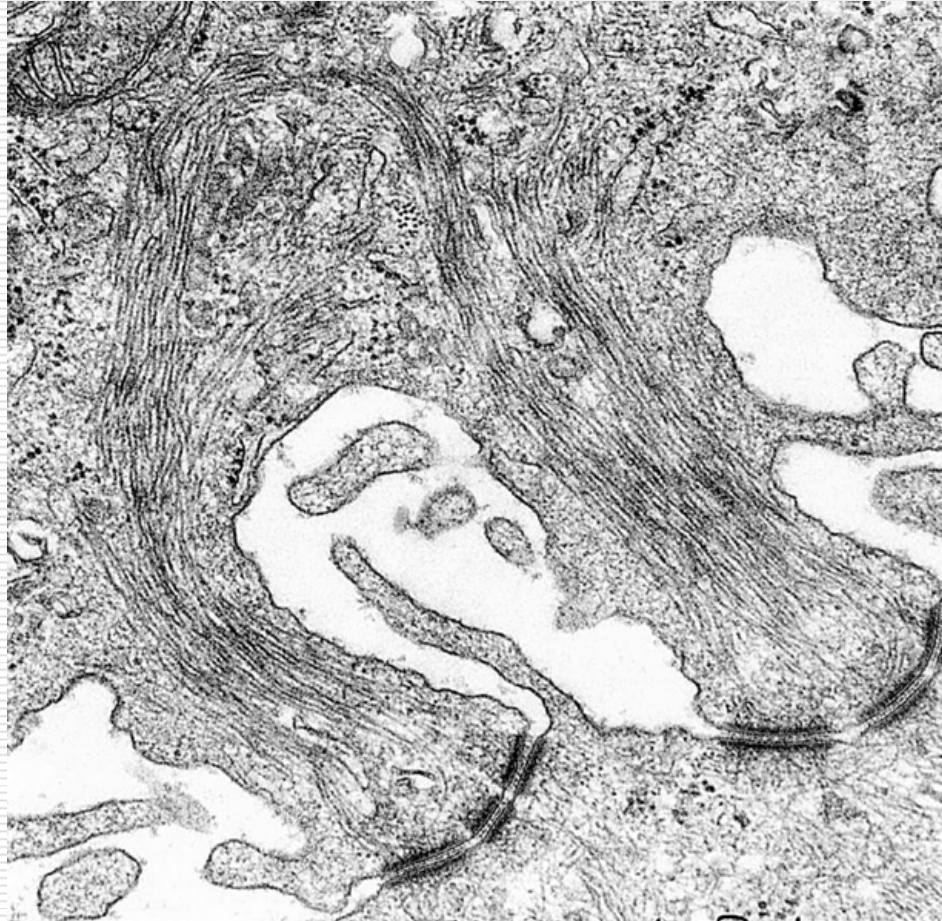
# Junction complex

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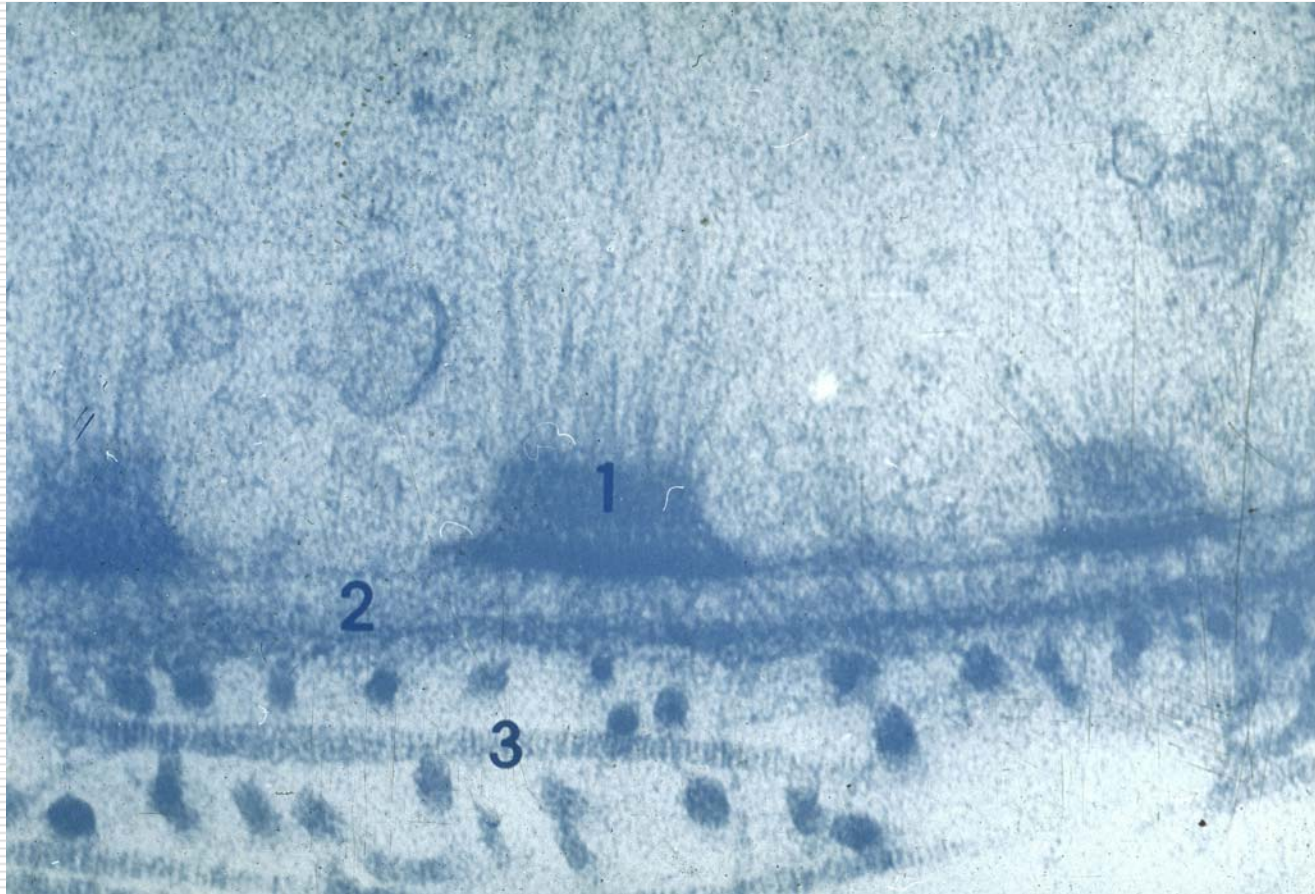
# Desmosome

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# Hemidesmosome and basement membrane

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## (4) Gap junction

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TEM: each “tube” is composed of 6 protein subunits.

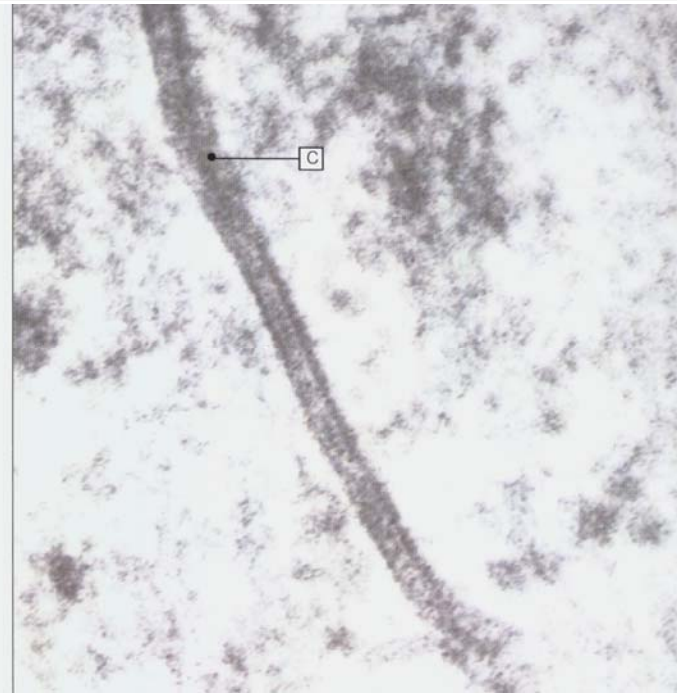
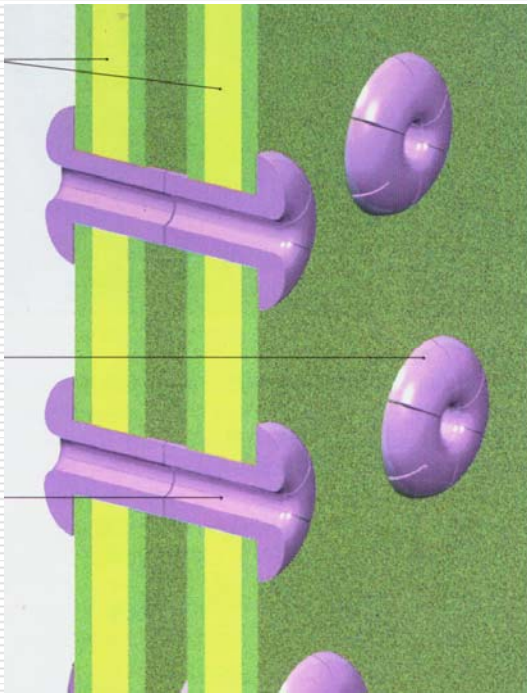
Function: allow selective diffusion of molecules between adjacent cells and facilitate communication between cells directly

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# Gap Junction

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# Junctional complex

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- 2 or more than 2 upper specialized types of attachment at least.

## 2.3 Specializations of the basal surface

### (1) basement membrane

LM: a layer of acidophilia membrane

EM: basal lamina and reticular lamina

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Basal lamina produced by the epithelial cells

Reticular lamina –ground substance and reticular fiber

to be produced by fibroblasts

Function: support      connection

— As a semi-permeable membrane —

## (2) Plasma membrane infolding

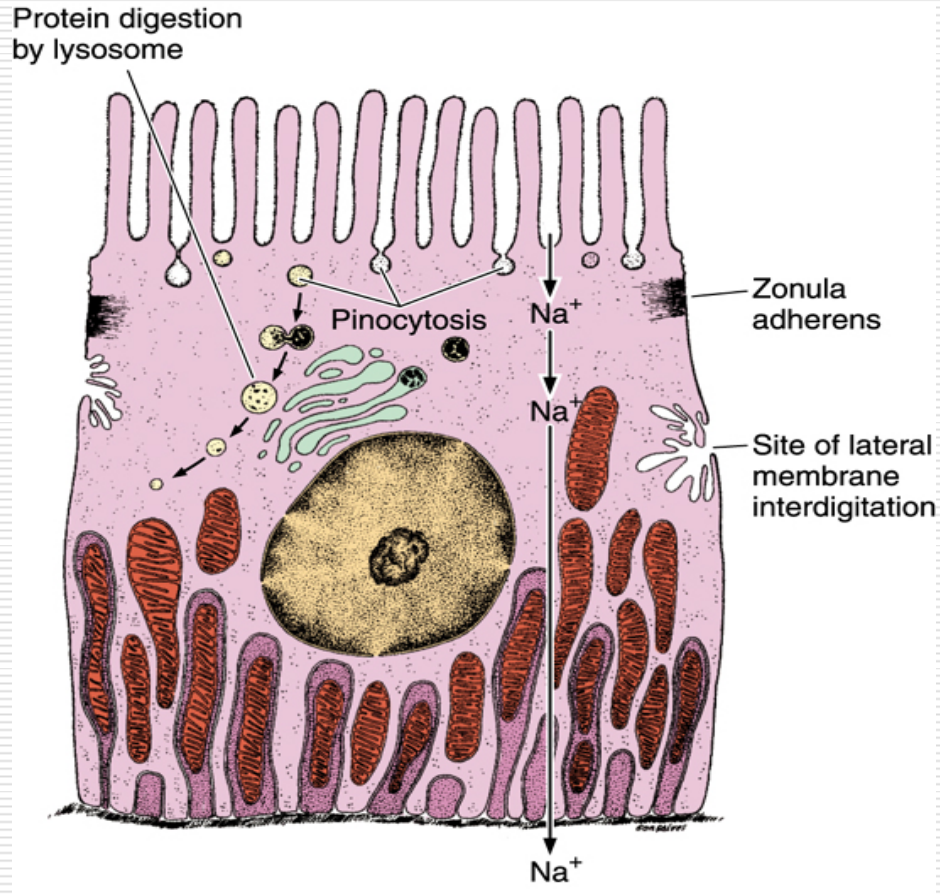
The structure:

Function: facilitate cell membrane transport of ion by increasing the basal surface area

## (3) Hemidesmosome

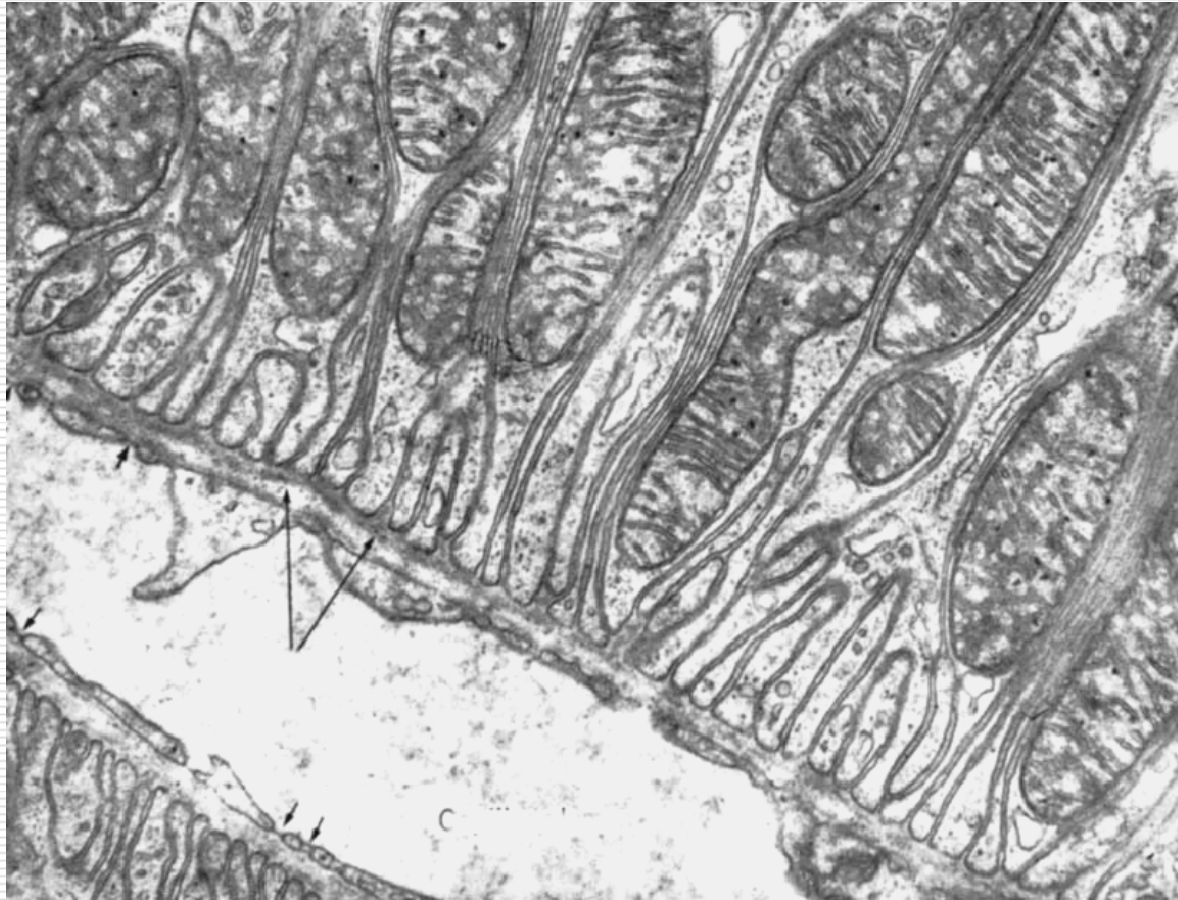
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# Plasma membrane infolding(model)



# Plasma membrane infolding

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## II .Glandular epithelium and gland

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Glandular epithelium:

the glandular epithelia are specialized for secretion.

Gland: the glands are organs composed mainly of glandular epithelia.

1. Development of gland

Exocrine gland

Endocrine gland

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## 2. The structure and type of exocrine gland

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Type of exocrine gland

(1) Secretory portion (acinus):

serous cells--- serous gland    zymogen granules

mucous cells--- mucous gland

mixed gland

(2) Duct

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### 3. The type of glandular cell

#### (1) Serous cell (protein-secreting cell)

LM:

EM: well developed RER, Golgi complex and secretory granules

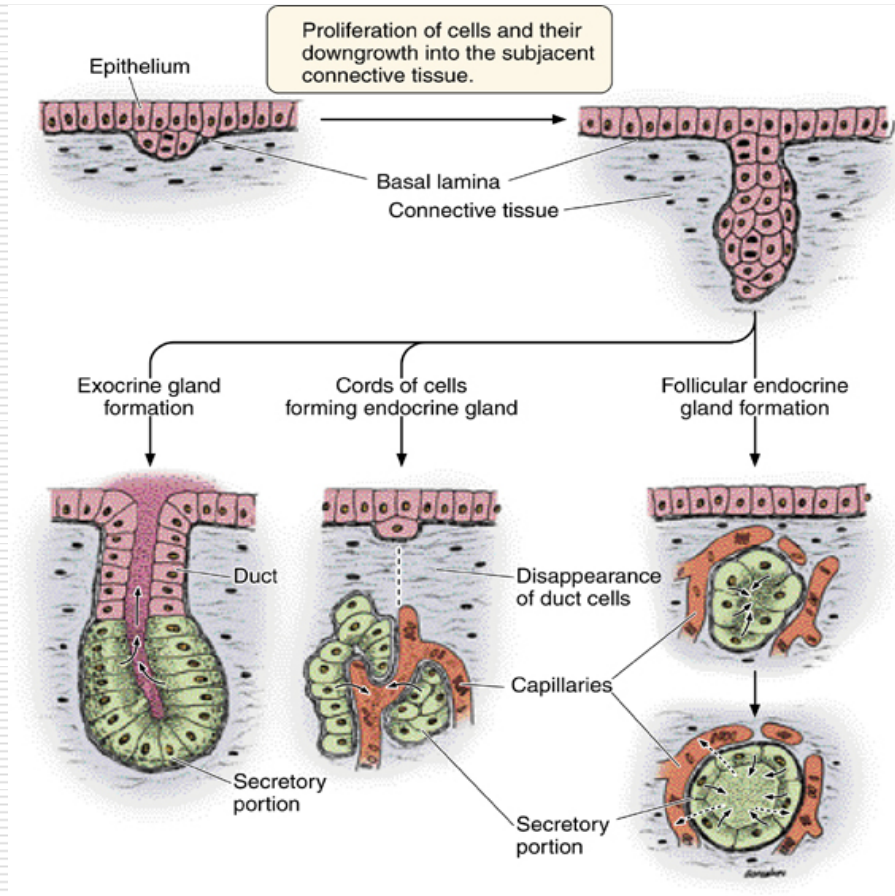
#### (2) Mucous cell

LM:

EM

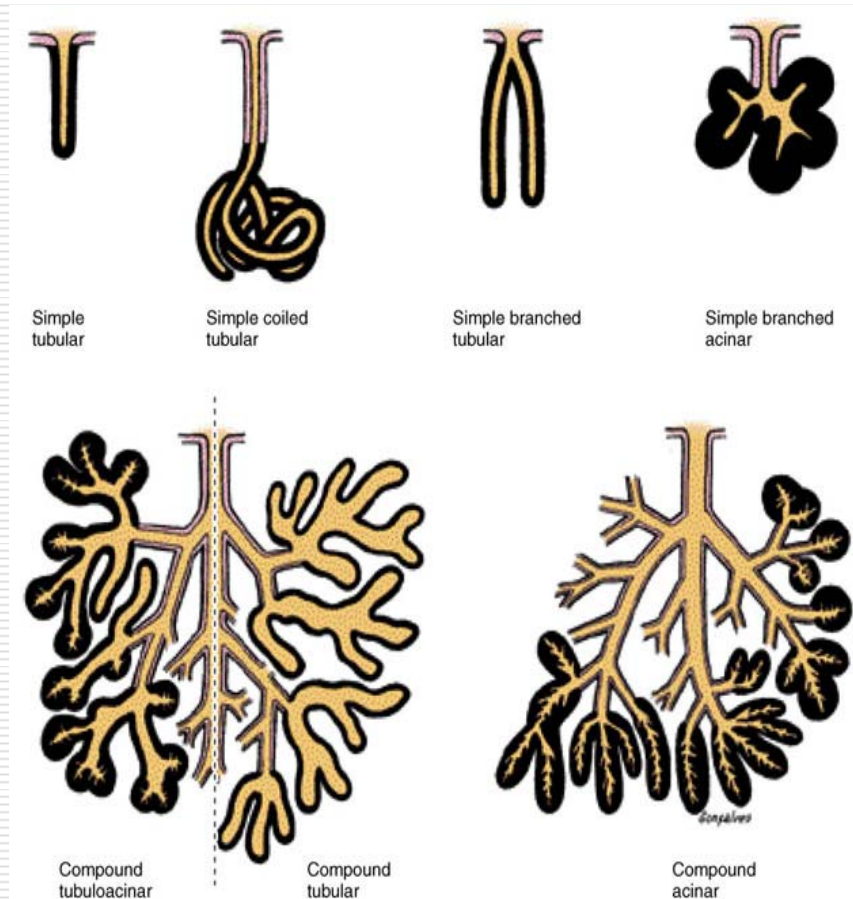
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# Development of endocrine and exocrine glands (model)



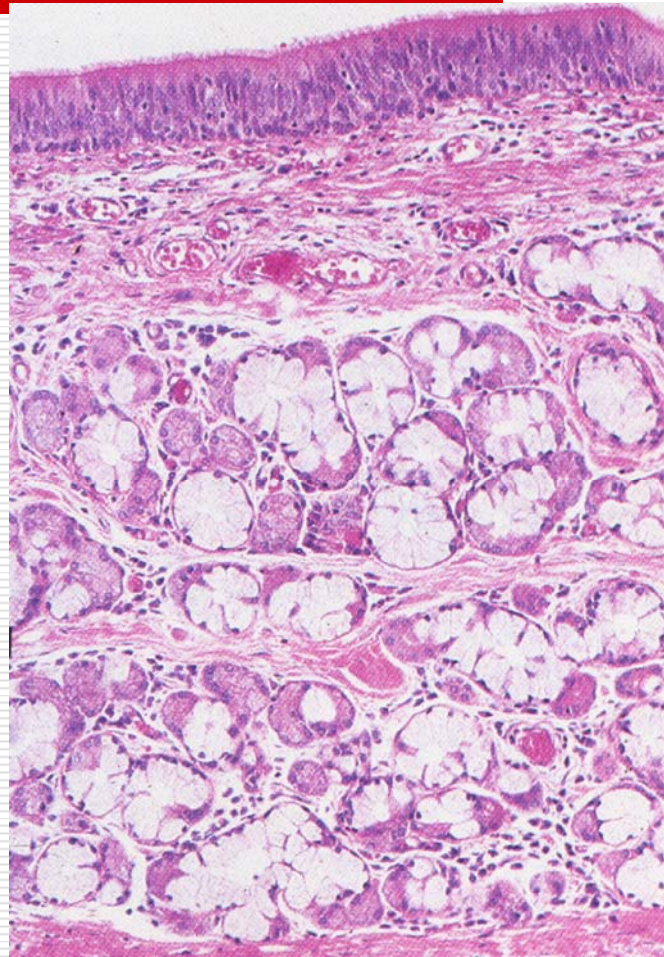
# Classification of exocrine gland

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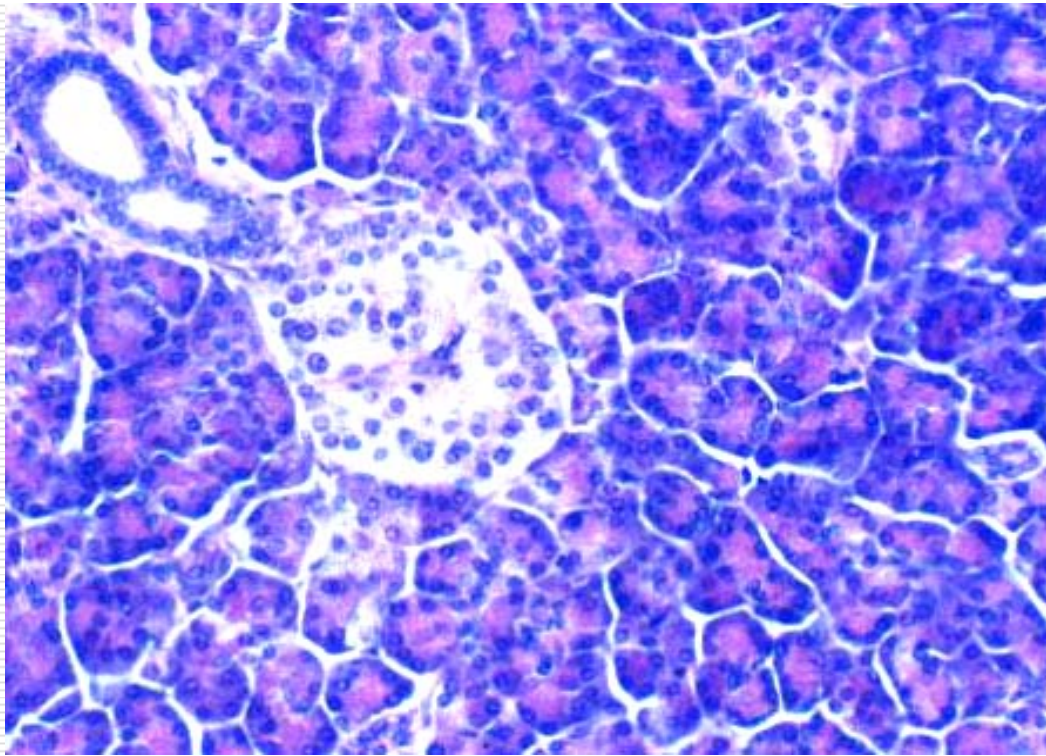
# Mucous and serous glands(LM)

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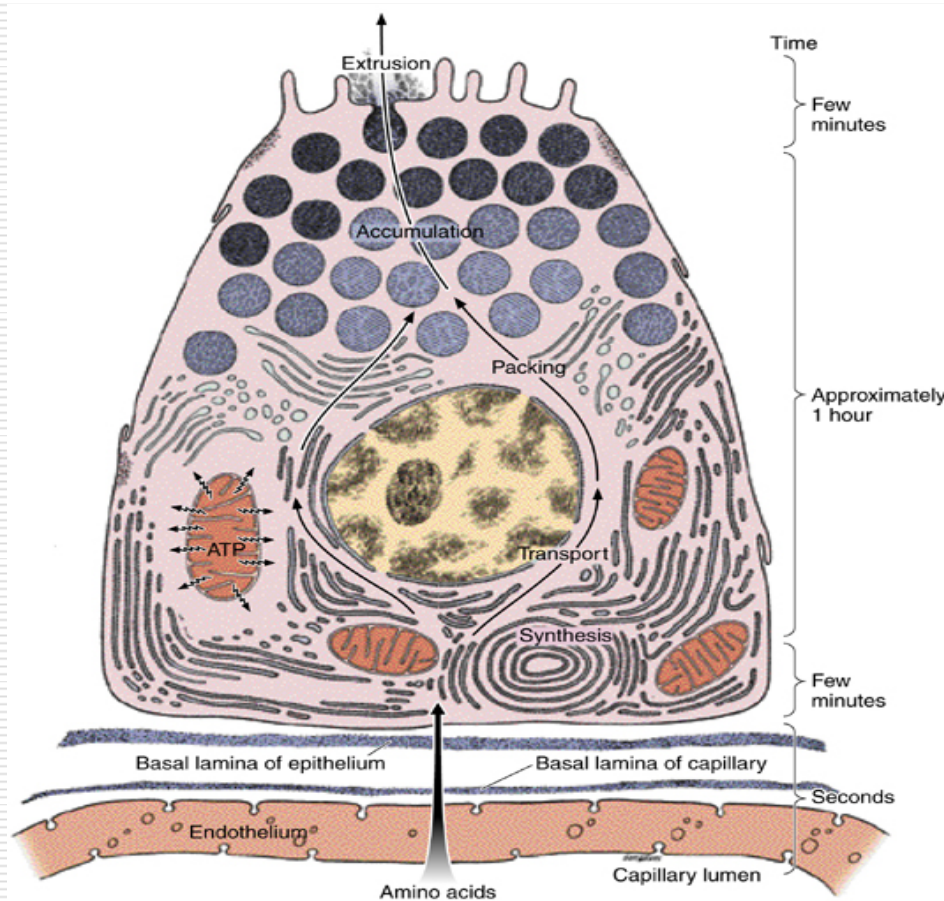


# Protein secreting cell (LM)

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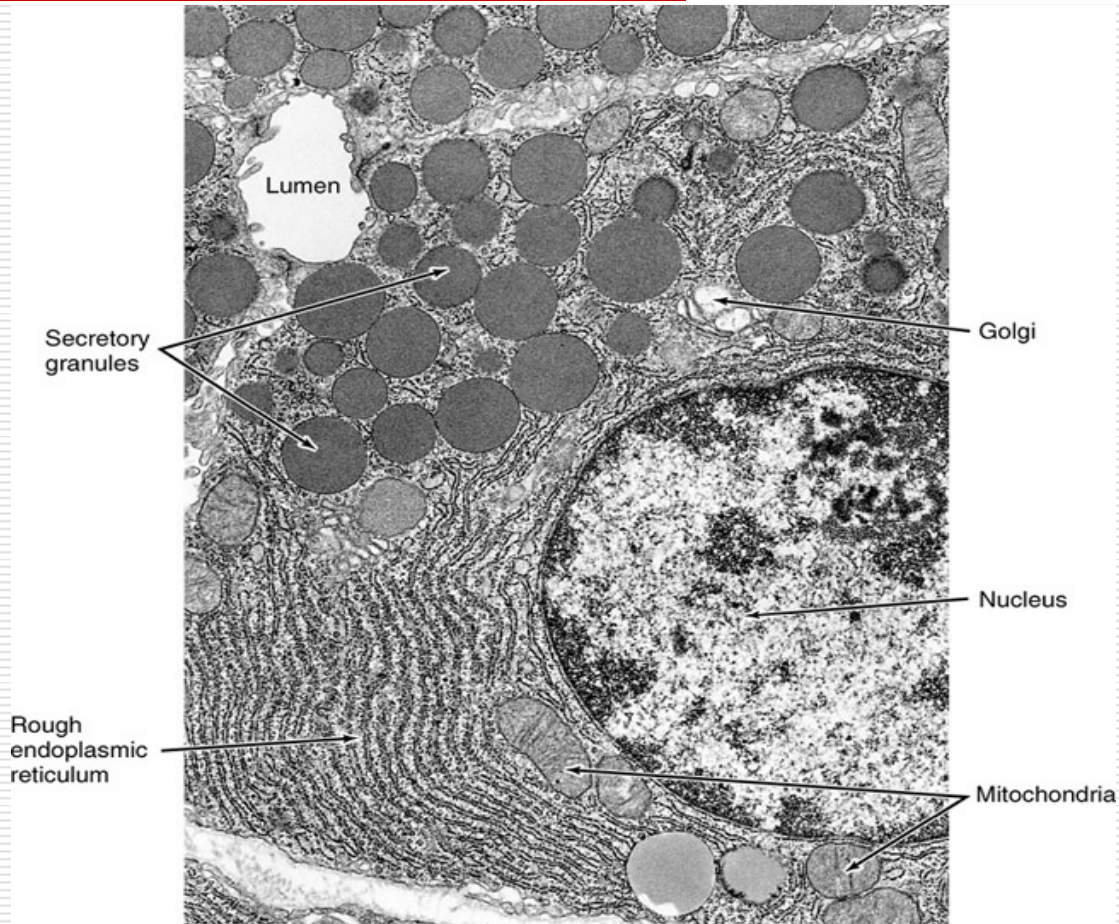


# Protein secreting cell (model)



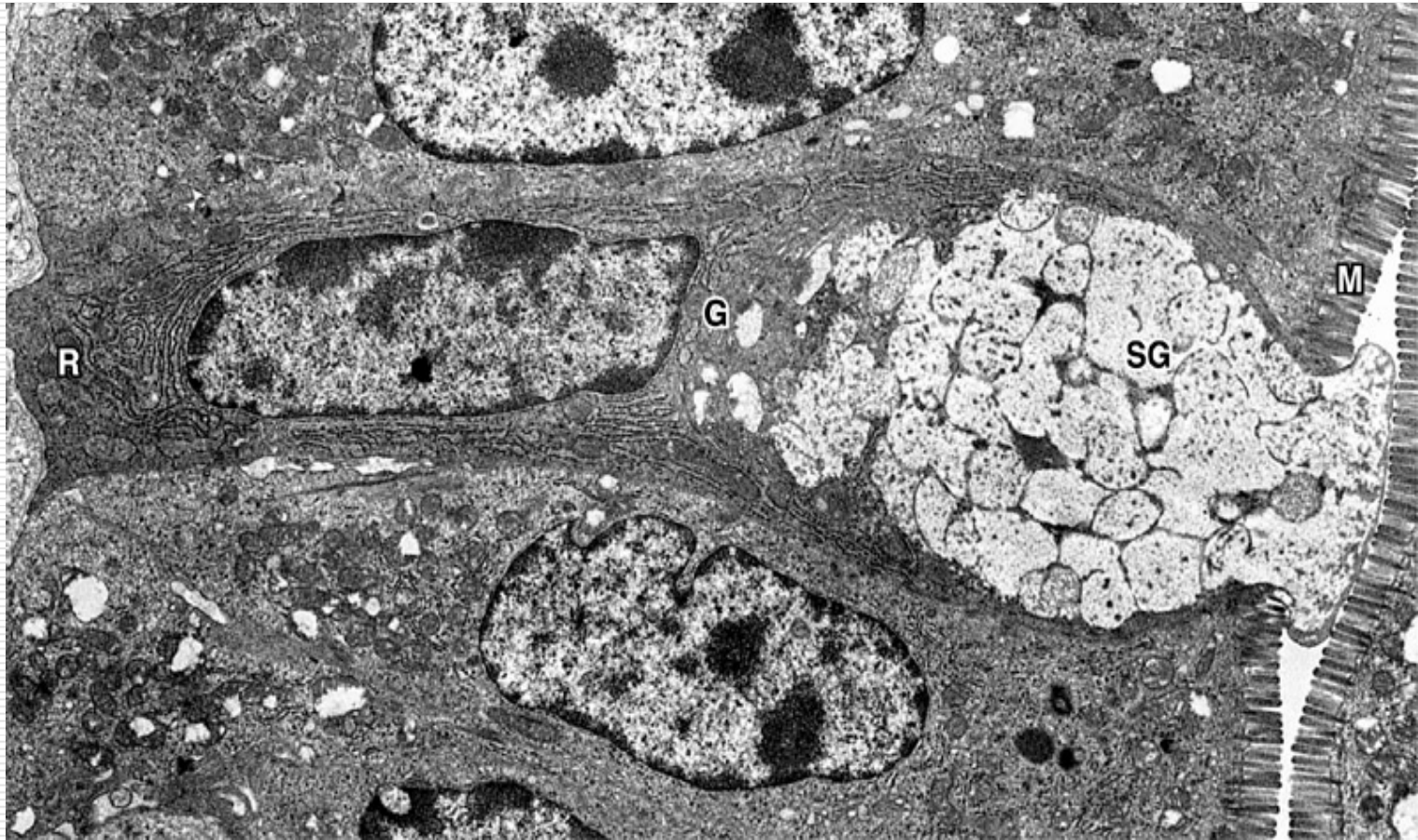
# Protein secreting cell (TEM)

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# Glycoprotein secreting cell (TEM)

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# Highlight of this chapter

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## Specializations of the cell surface

- Apical surface
  - Side face
  - Basal face
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