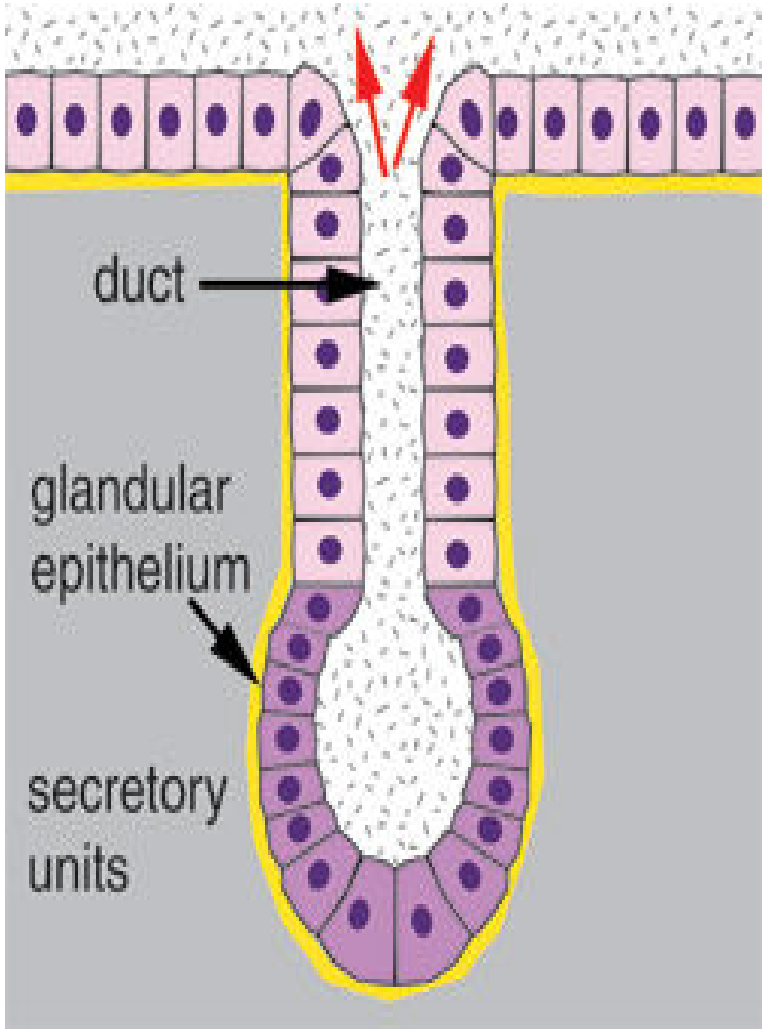
Glandular Epithelium

Most glands are formed during development by proliferation of epithelial cells so that they **project** into the underlying connective tissue. Some glands retain their continuity with the surface via a duct and are known as EXOCRINE GLANDS. Other glands lose this direct continuity with the surface when their ducts degenerate during development. These glands are known as ENDOCRINE glands.



III. GLANDULAR EPITHELIUM

1- **Presence or absence of ducts**:

   a. **Exocrine**: salivary glands.

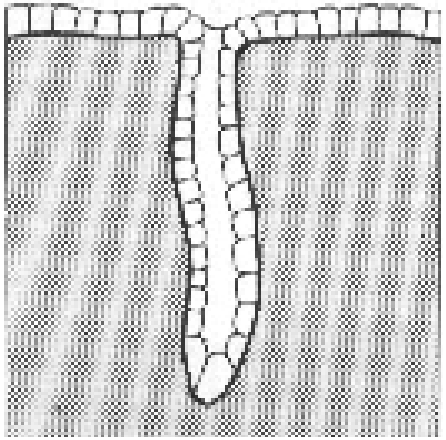
   b. **Endocrine**: thyroid.

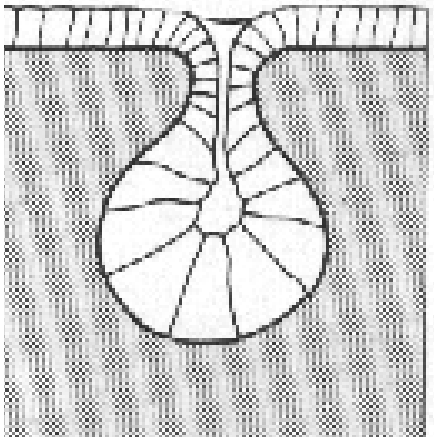
   c. **Mixed**: pancreas.

- 1- according to nunber of cell forming the gland:
- A) unicellular
- B) multicellular
- 2- according to nature of secretion:
- A)watery: sweat glands
- B) serous: parotid , pancreas
- C) mucous: goblet
- D)mucoserous: sublingual and submandibular

- 3- according to mode of secretion
- -merocrine: salivary glands
- -apocrine: mammary glands
- -holocrine:seabaseous glands
- 4- according to function
- Secretory
- Excretory of waste products

- 5- according to branching of the duct
- **Simple:** single non-branching duct
- **Simple branched**: single non-branching duct with branched secretory portion
- **Compound**: branching duct system (tree)
- 6- according to shape of secretory portion
- **Tubular**
- **Alveolar**
- **tubuloalveolar**





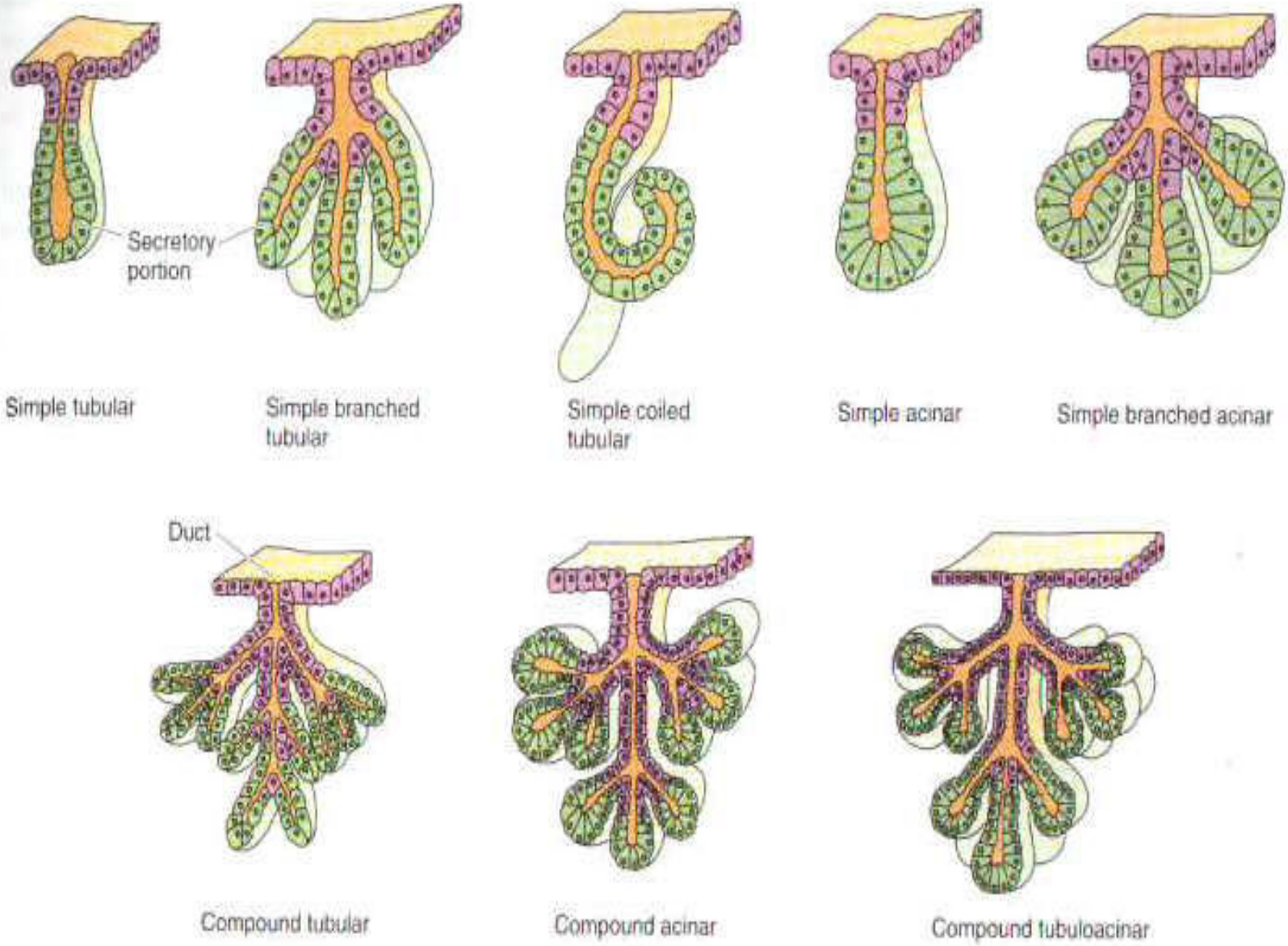
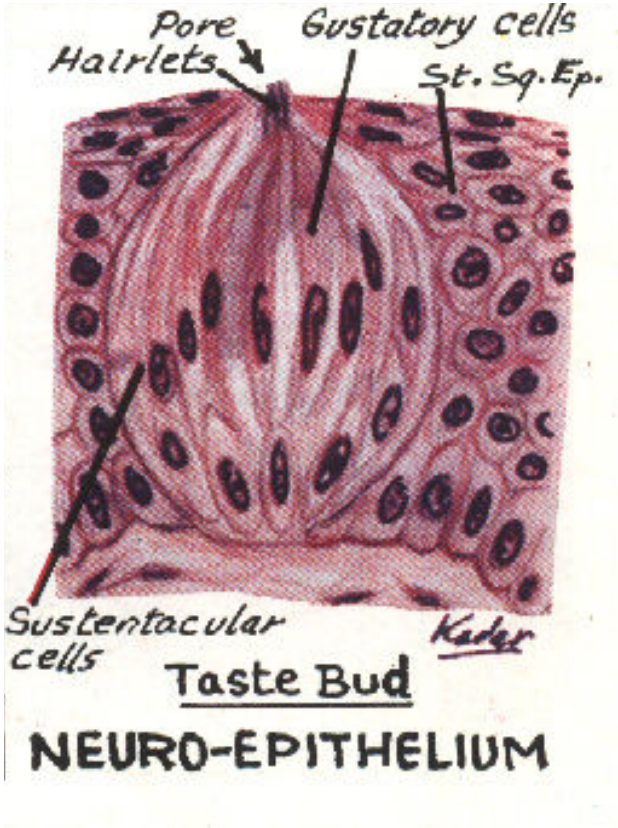


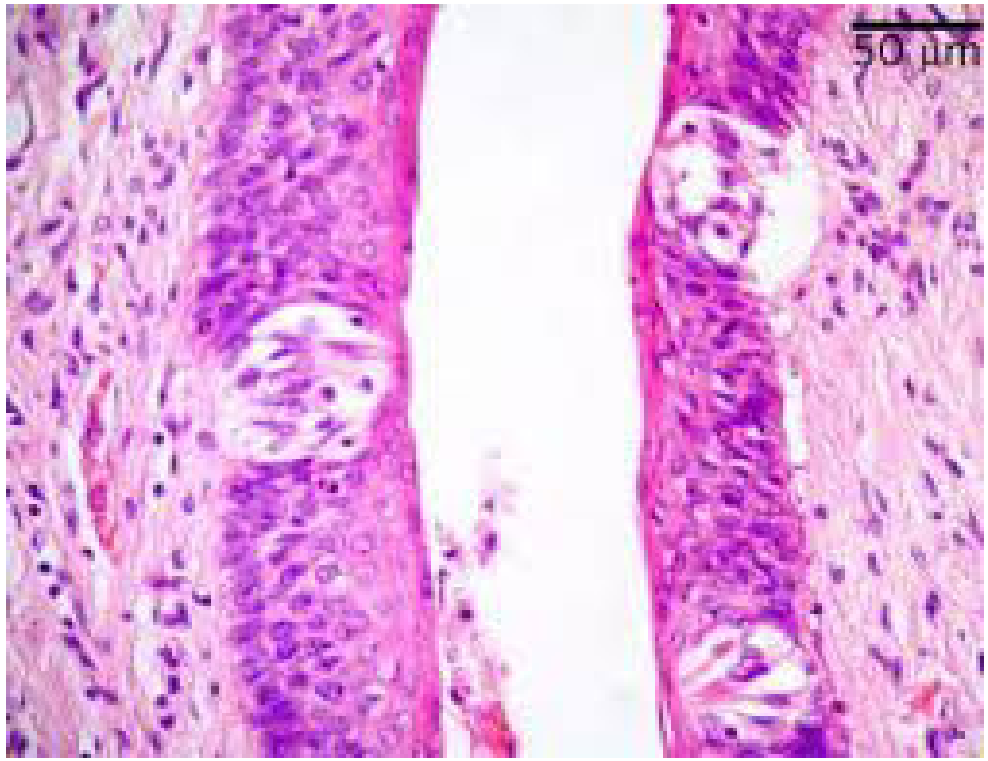
Figure 5–22. Schematic diagram of the classification of multicellular exocrine glands. Green represents secretory portion, lavender represents duct portion of gland.

Neuro Epithelium

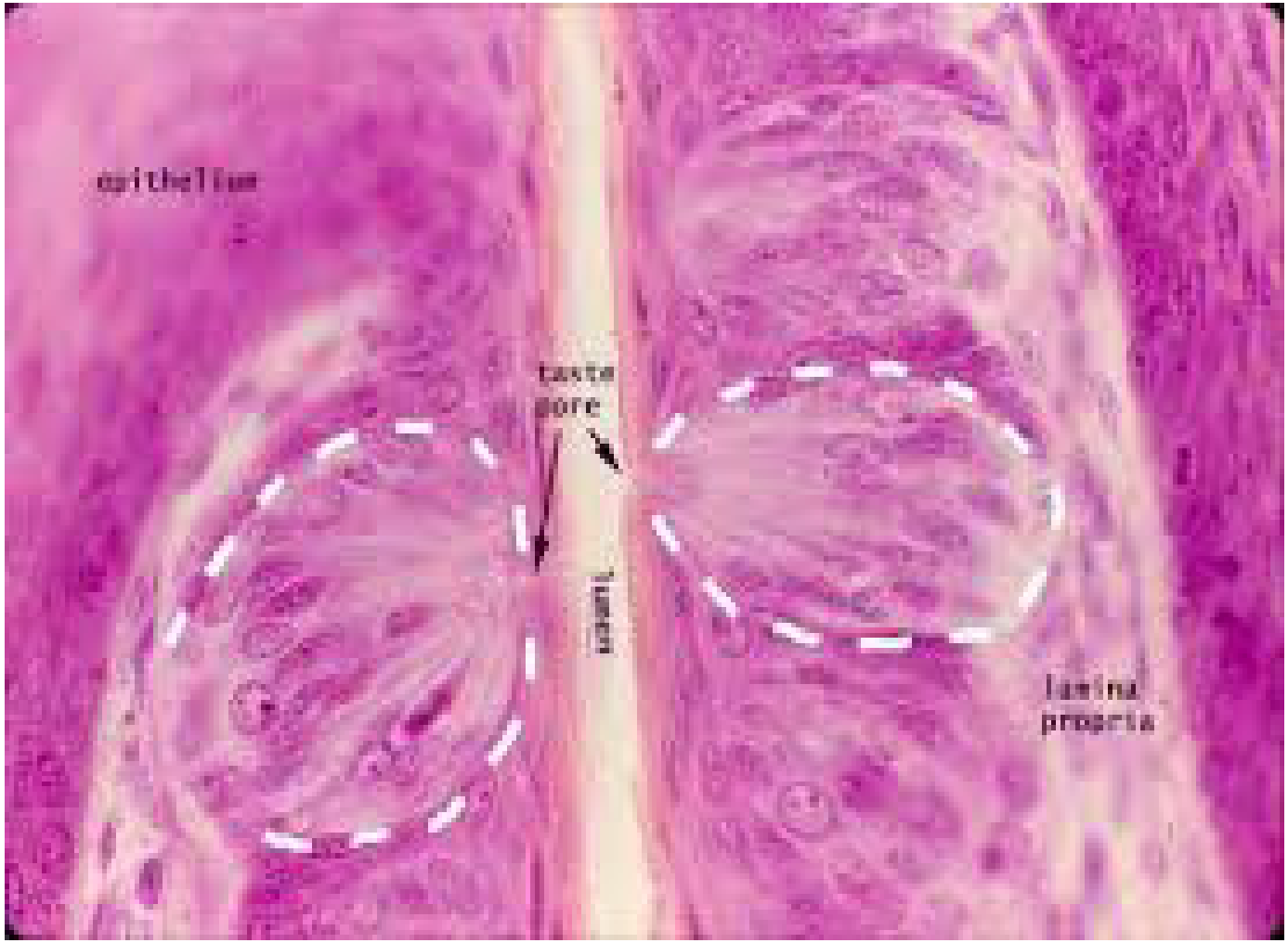
IV. NEURO-EPITHELIUM

- Epithelial tissue modified to receive external stimuli.
- Consists of supporting & sensory cells
- Found in:
  - **Tongue:** Taste buds (taste).
  - **Nose:** (smell).
  - **Internal ear:** (hearing).
  - **Retina:** (vision).





(Taste buds)Epithelium


epithelium
taste pore
lamina propria

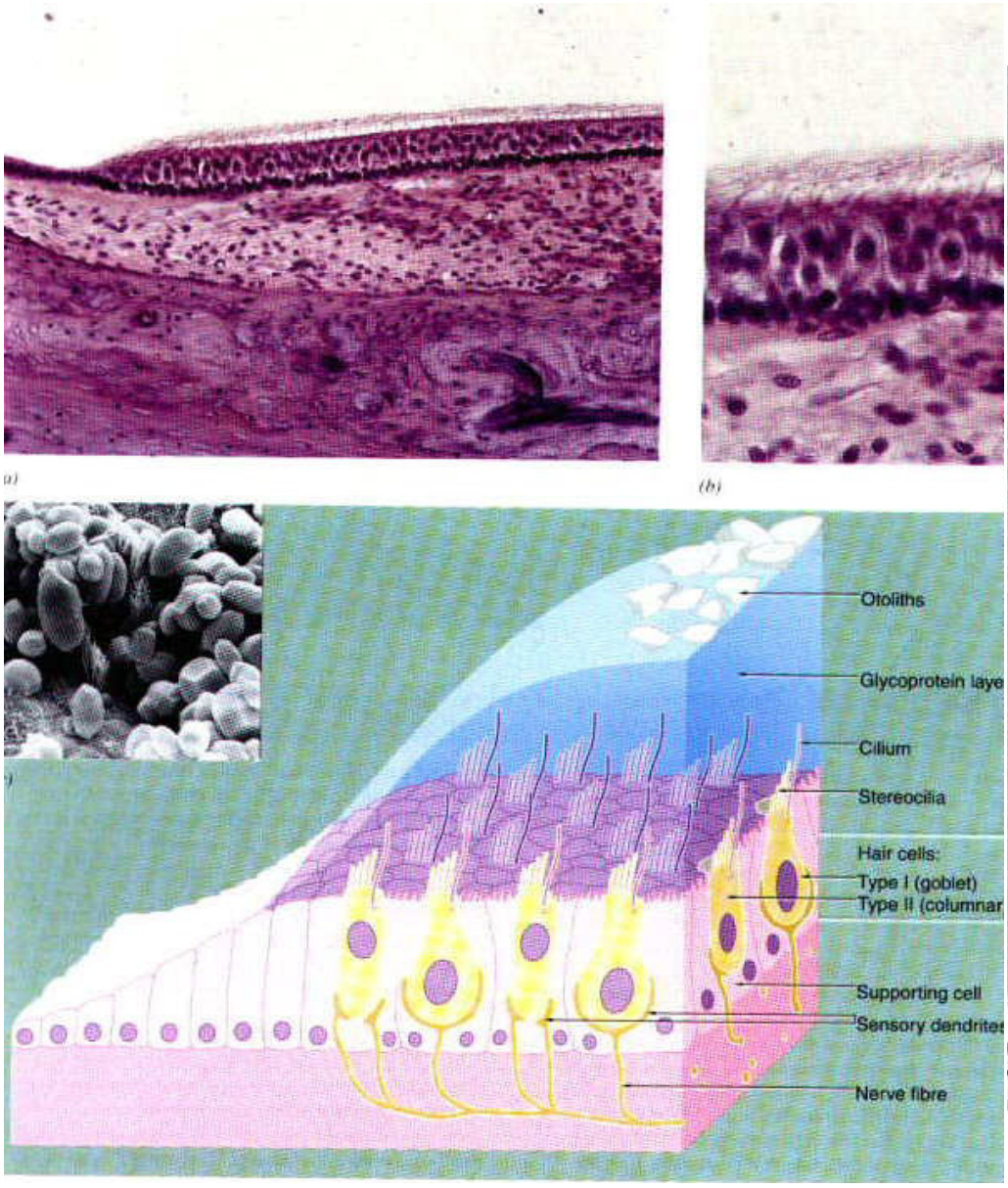
INNER EAR RECEPTORS

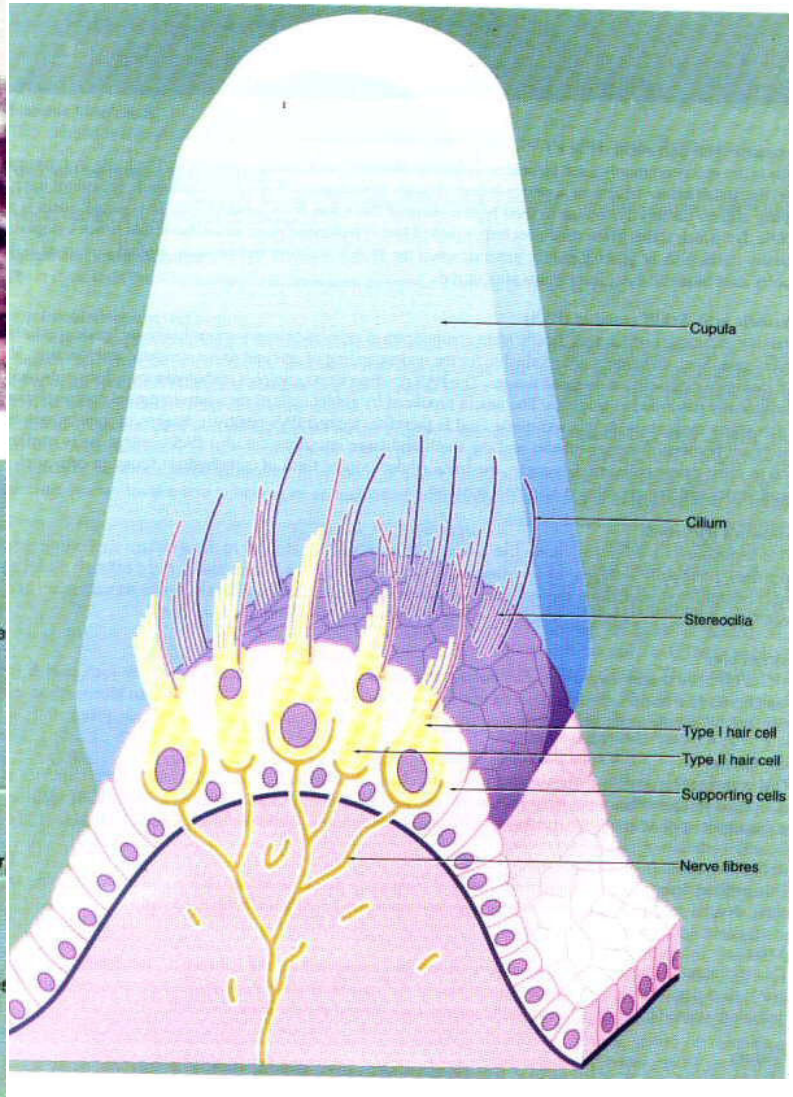
- **HEARING RECEPTOR :**
- **ORGAN OF CORTI**
- **VESTIBULAR RECEPTORS:**

1- MACULA UTRICULI

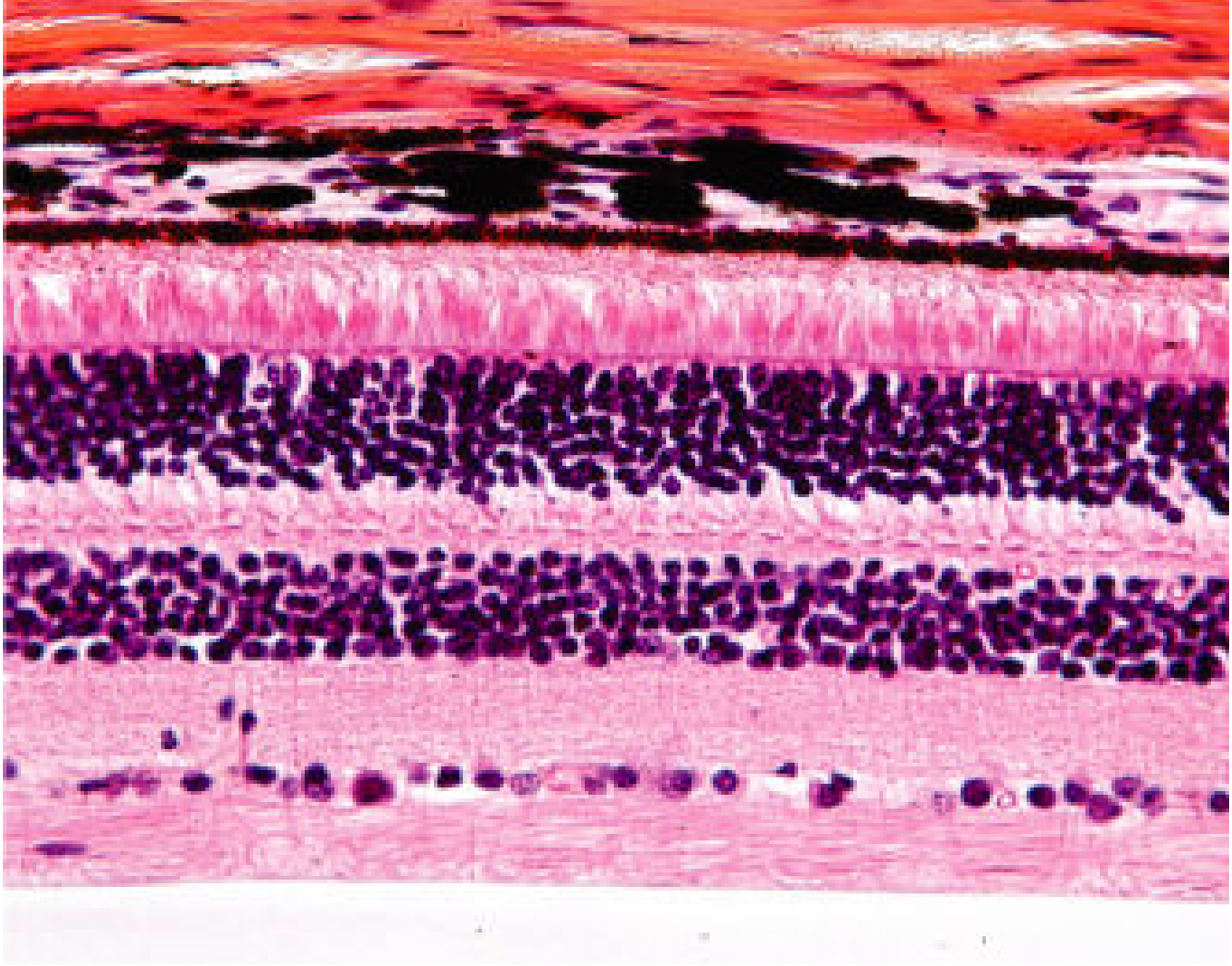
2- MACULA SACCULI

3- CRISTAE AMPULLARIS

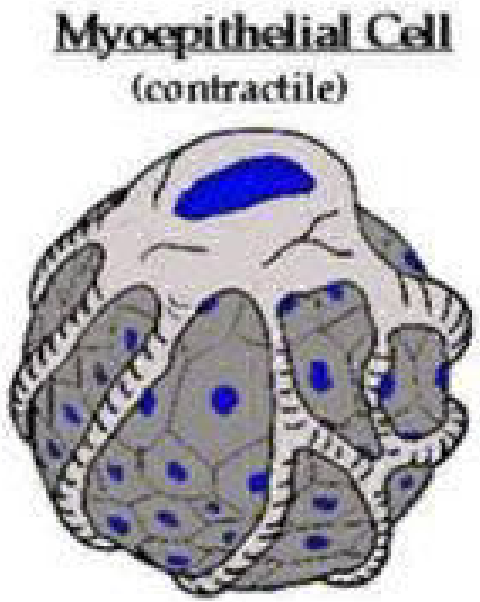


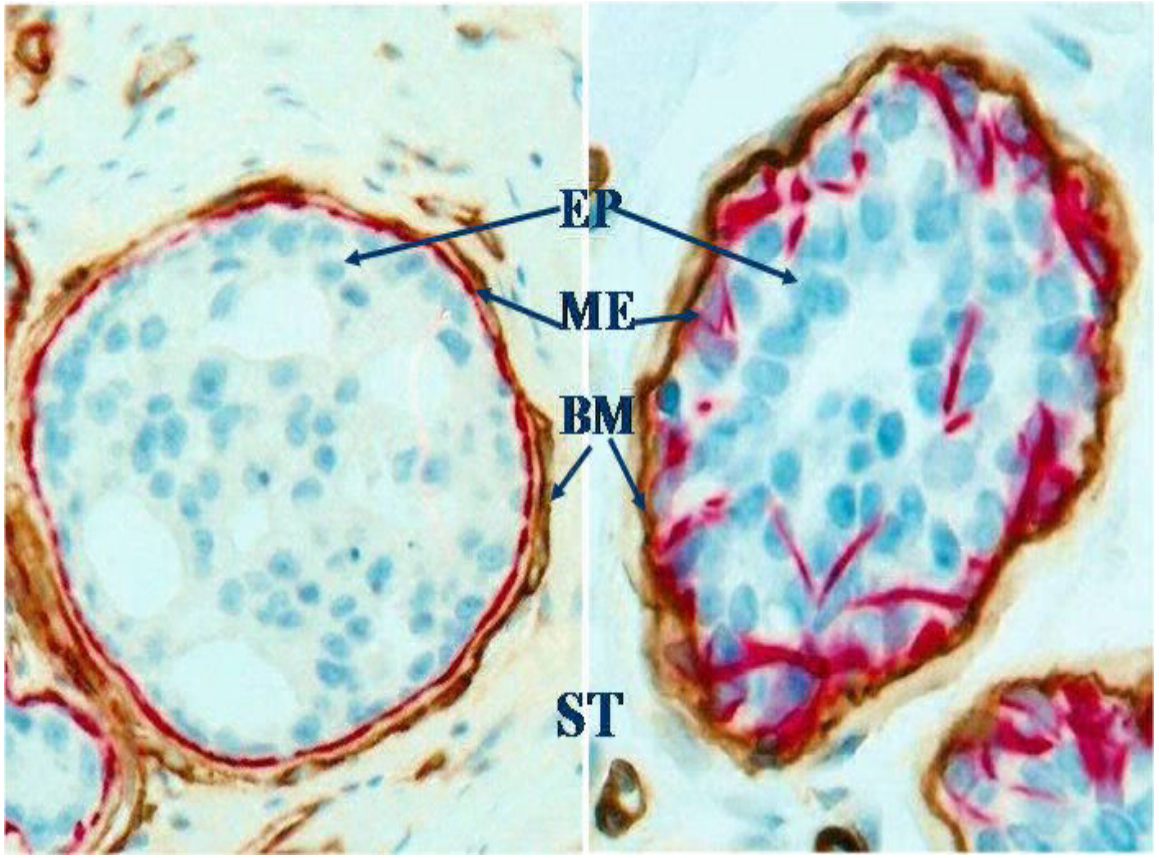


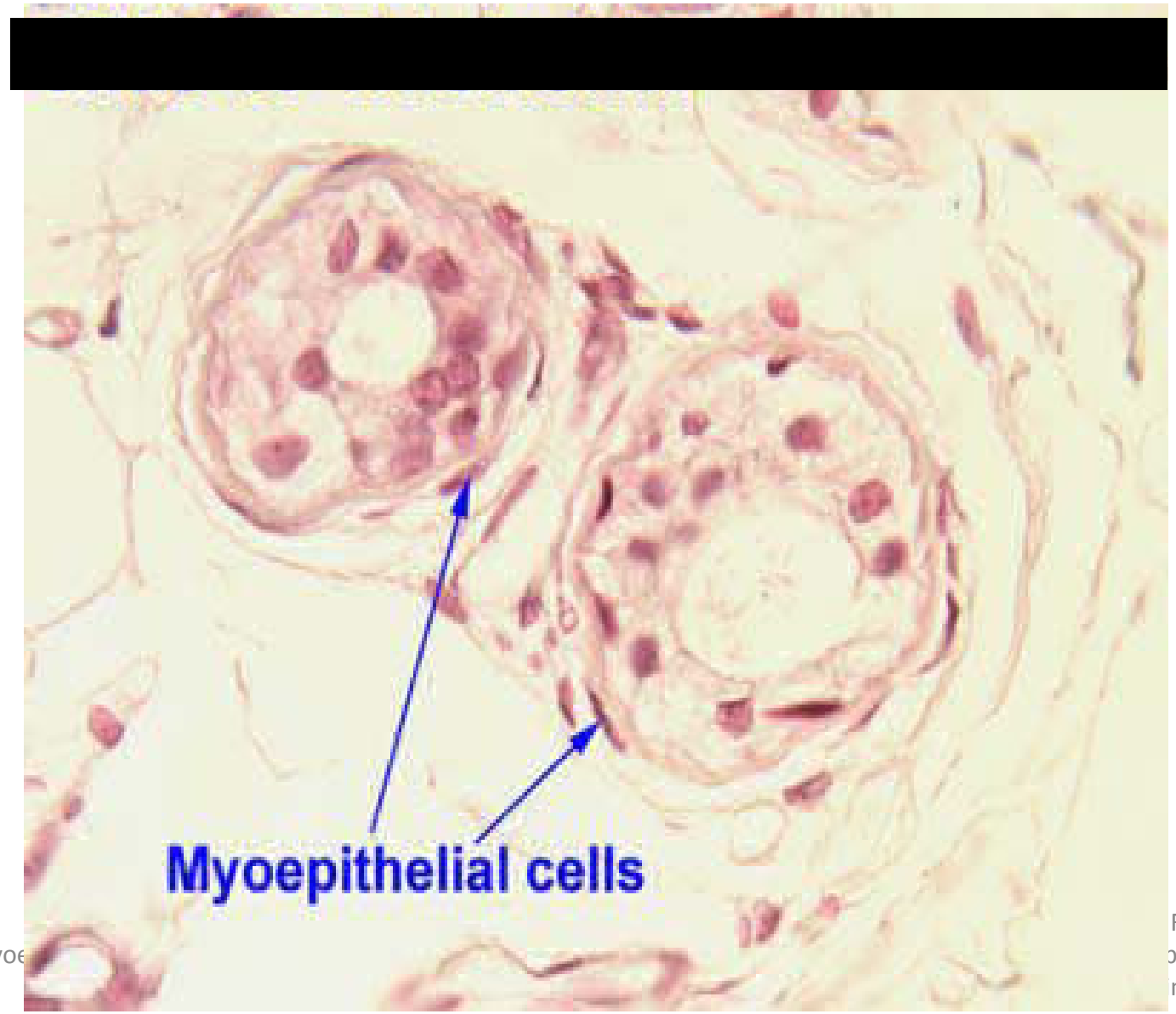
(Vestibular receptors)
Epithelium



Myoepithelium


Myoepithelial Cell
(contractile)


EP
ME
BM
ST



(Myoe

Epithelial Polarity

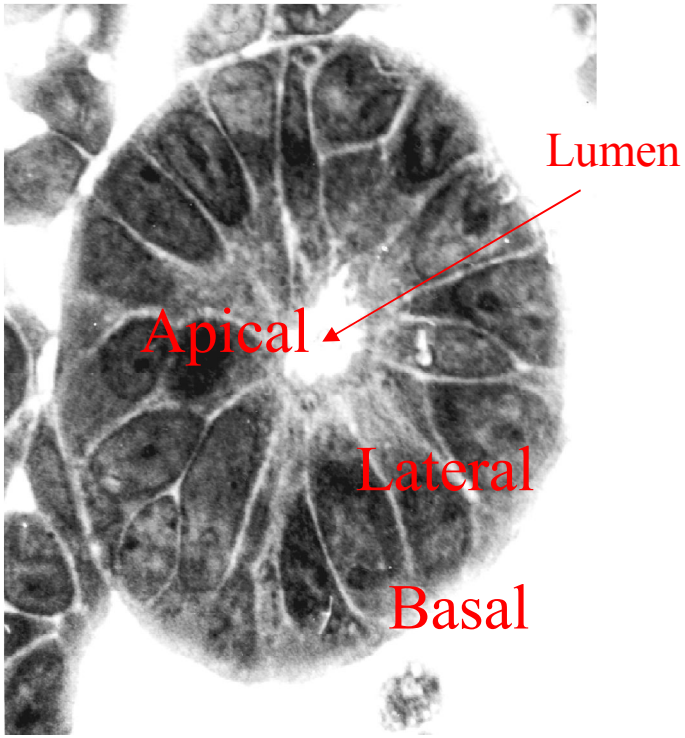
Polarized Cells

Apical:

- faces the lumen or outside world
- separated from the basolateral side by tight junctions

Basolateral:

- Lateral:
  - side that faces neighboring cell
  - forms functional continuum with basal side
- Basal:
  - adheres to extracellular connective tissue – basement membrane



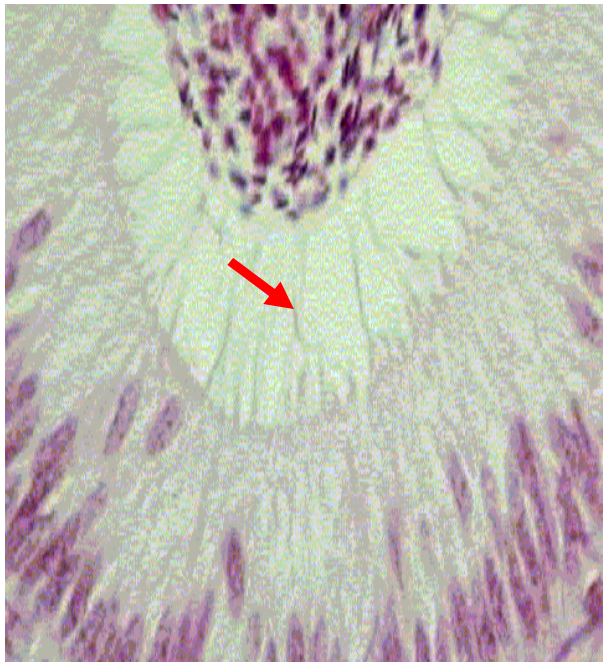
The Apical Region

Epithelial Specializations:

Microvilli

small intestines

Stereocilia



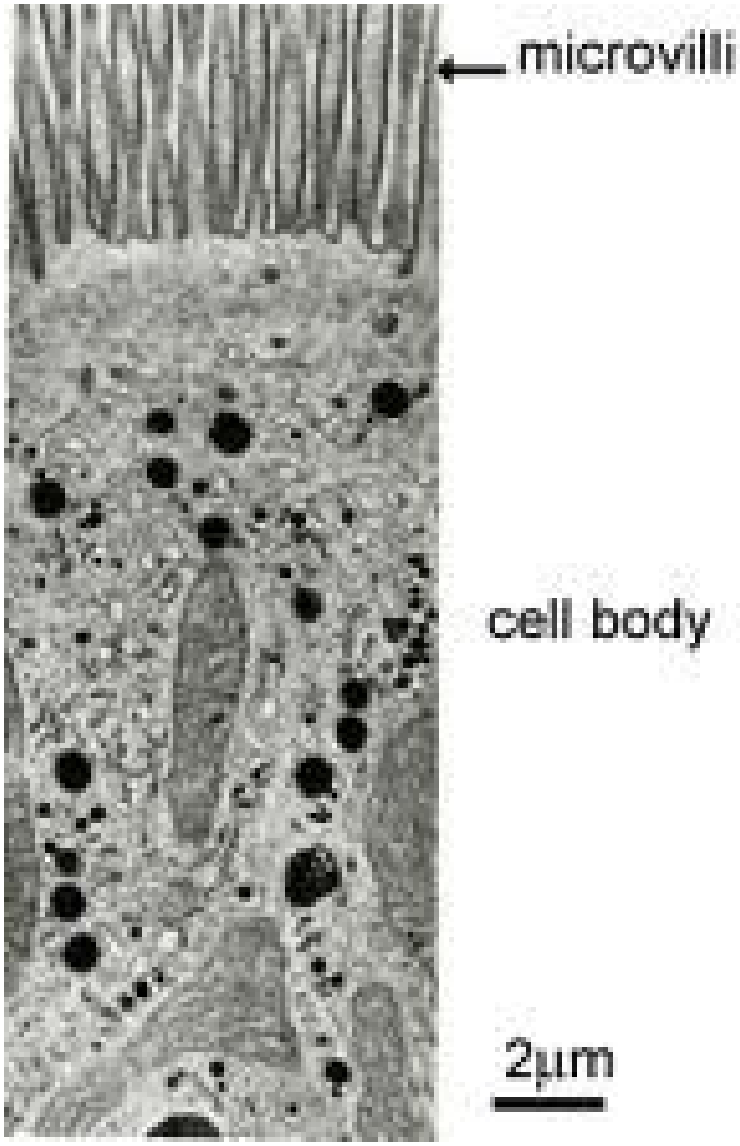
epididymis

Cilia

fallopian tube

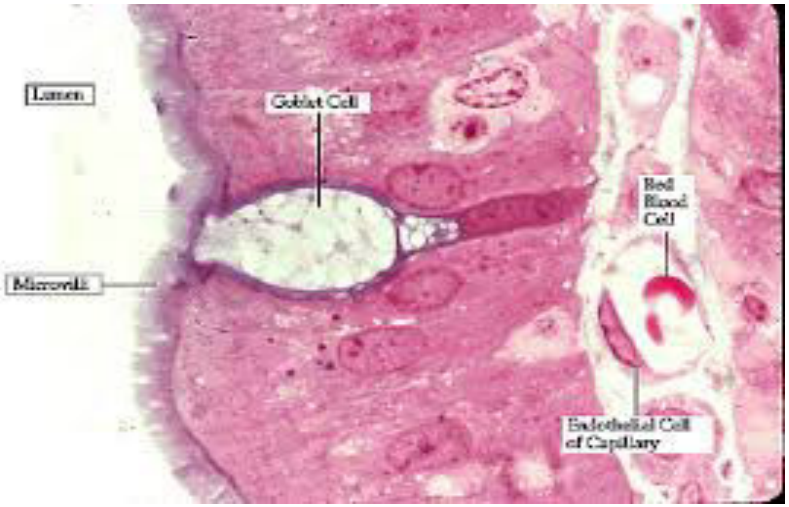
Microvilli

- Cytoplasmic processes that extend from cell surfaces
- L.M: (brush border)
- E.M:(actin)
- Made of actin skeleton above intermediate filaments
- Increase area for absorption as in small intestine
- Insert into terminal web



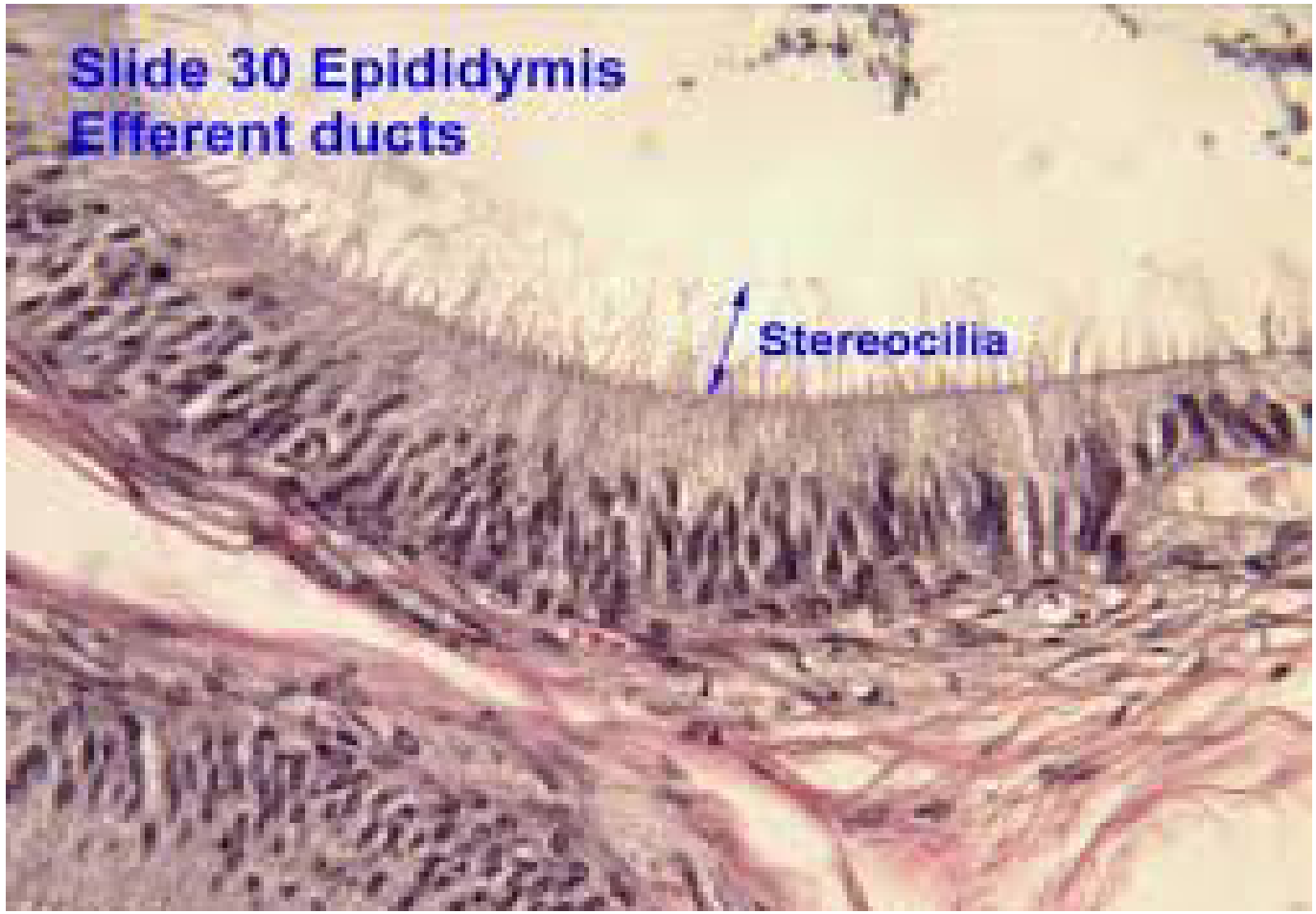
microvillus border

ter



Stereocilia

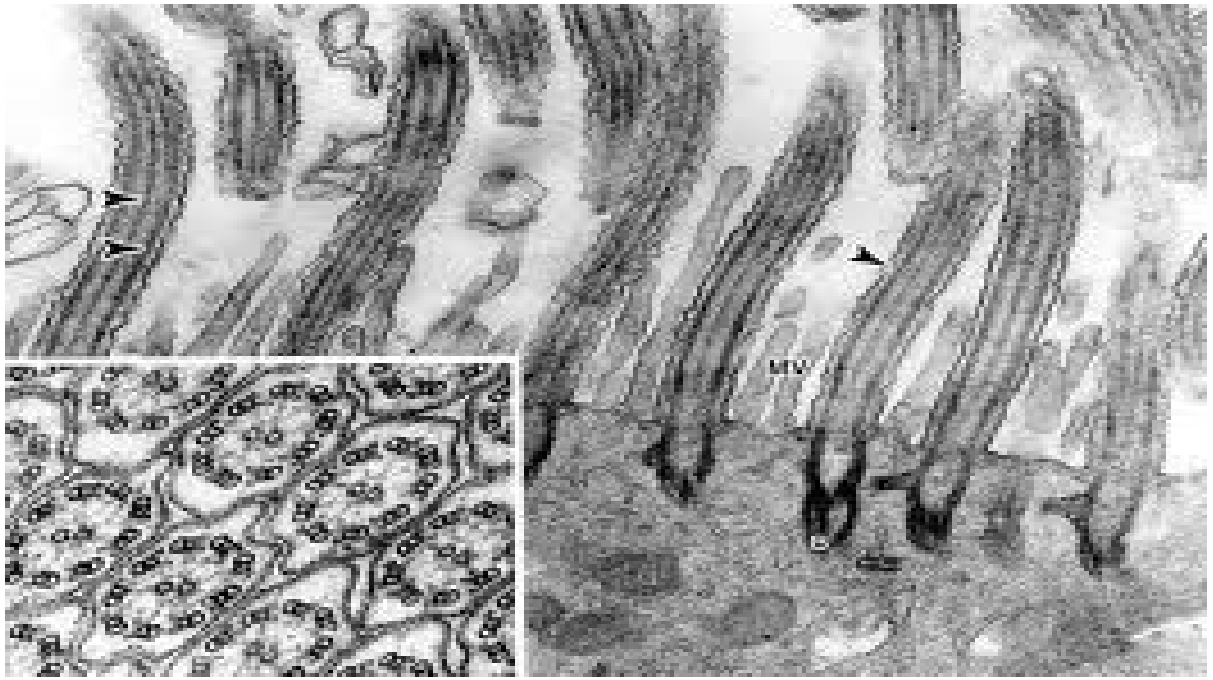
- Long microvilli (NOT CILIA!)
- L.M: (hair like prosesses) E.M:(actin core)
- Non-motile
- Absorption of remaining testicular fluid.



Cilia

- Motile processes of microtubules that move synchronously
- Insert into basal bodies (1 cilium per 1 body)
- 9+2 microtubule arrangement
- LM: hair like processes
- EM: 20 microtubules

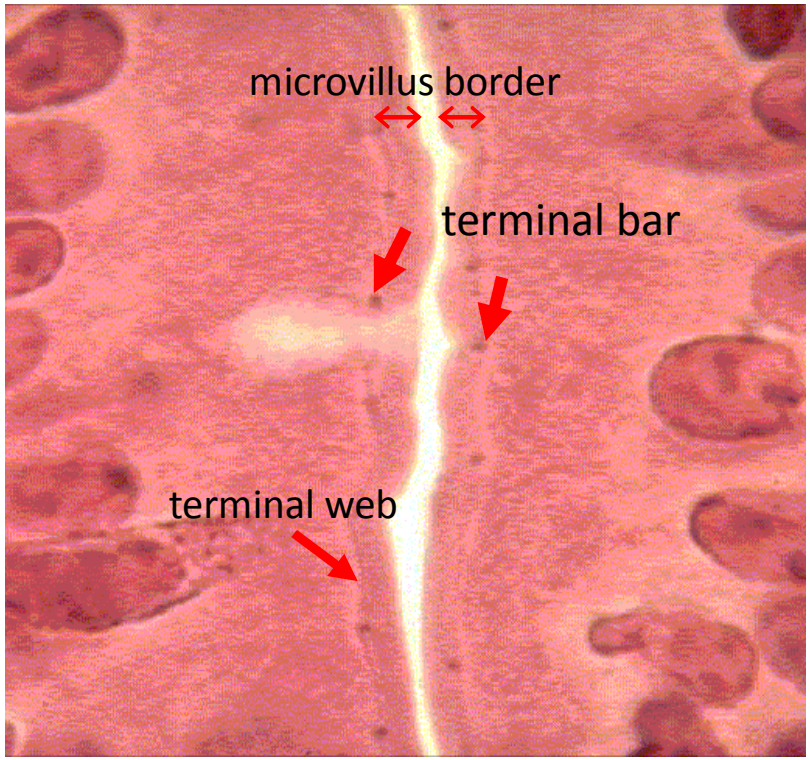
cilia

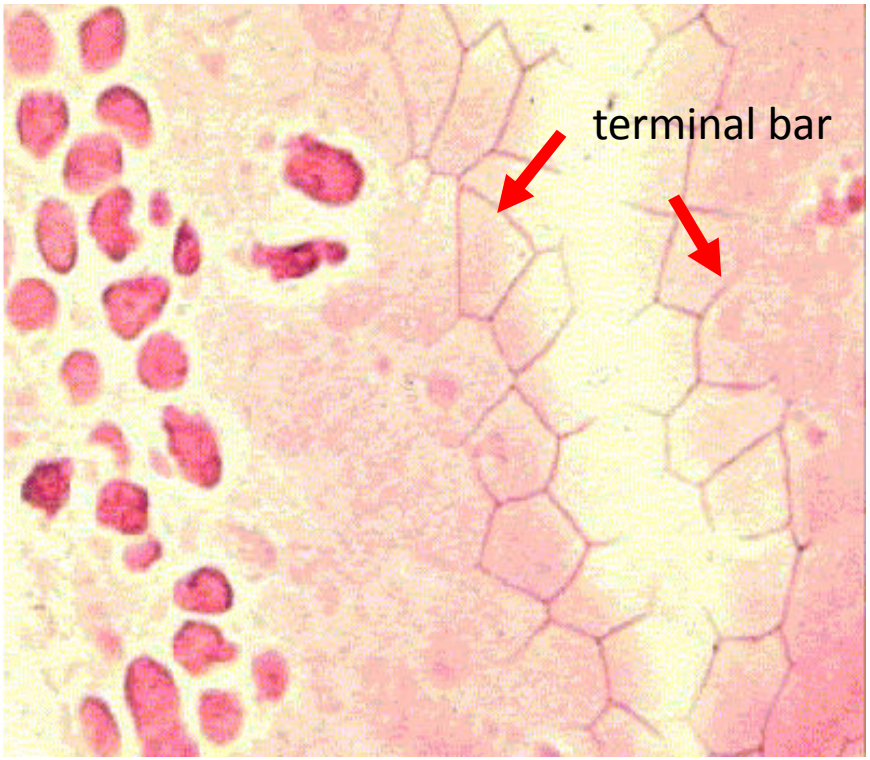


The Lateral Region

Junctional Complex (aka Terminal Bar)

: site of specialized attachment of adjoining epithelial cells





Bodian silver stain

The Junctional Complex

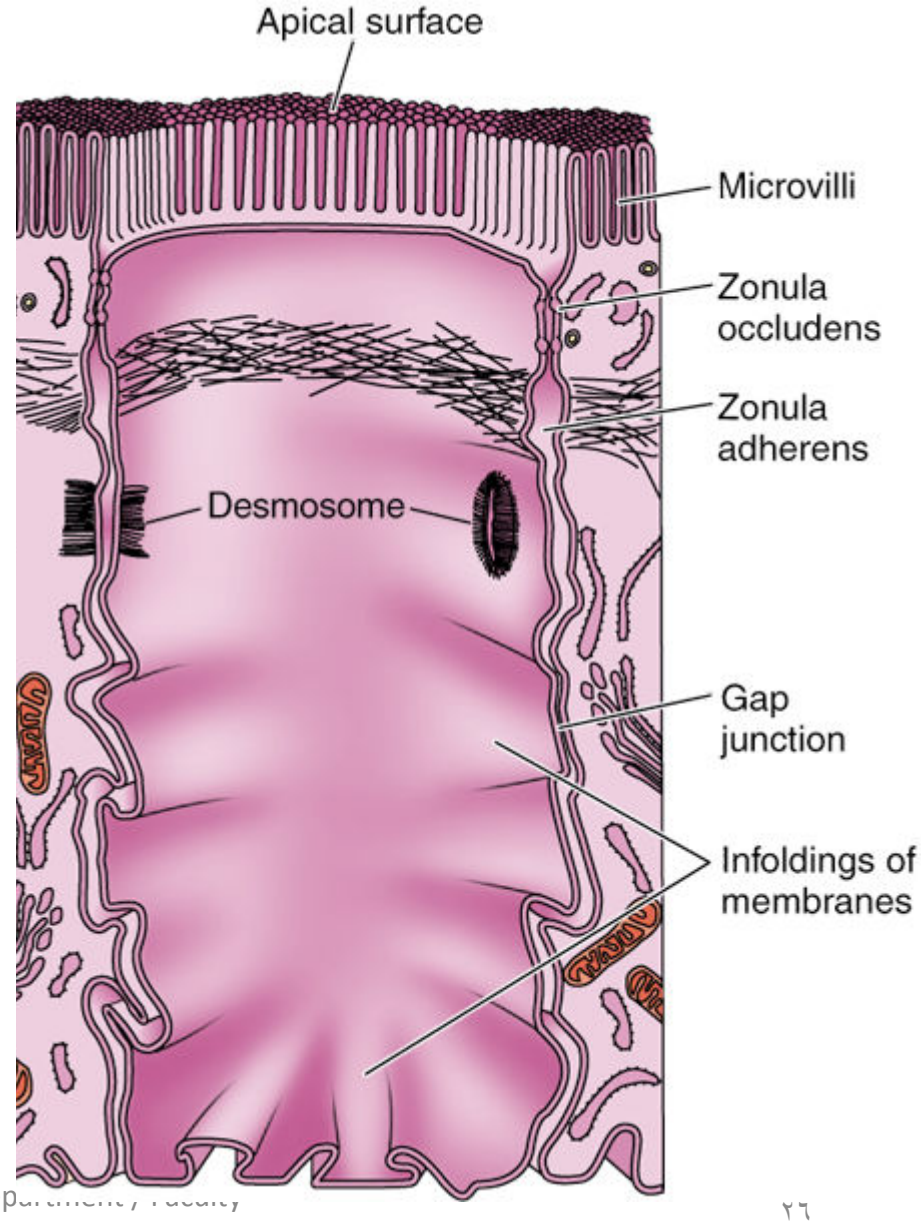
3 Components (apical -> basal):

1. Zonula Occludens=Tight Junction
- most apical (fuses completely)(0)
- located around entire perimeter (belt)
- diffusion barrier (prevent passage of substances between the cells)
- Fascia occludens (patchy fusion)

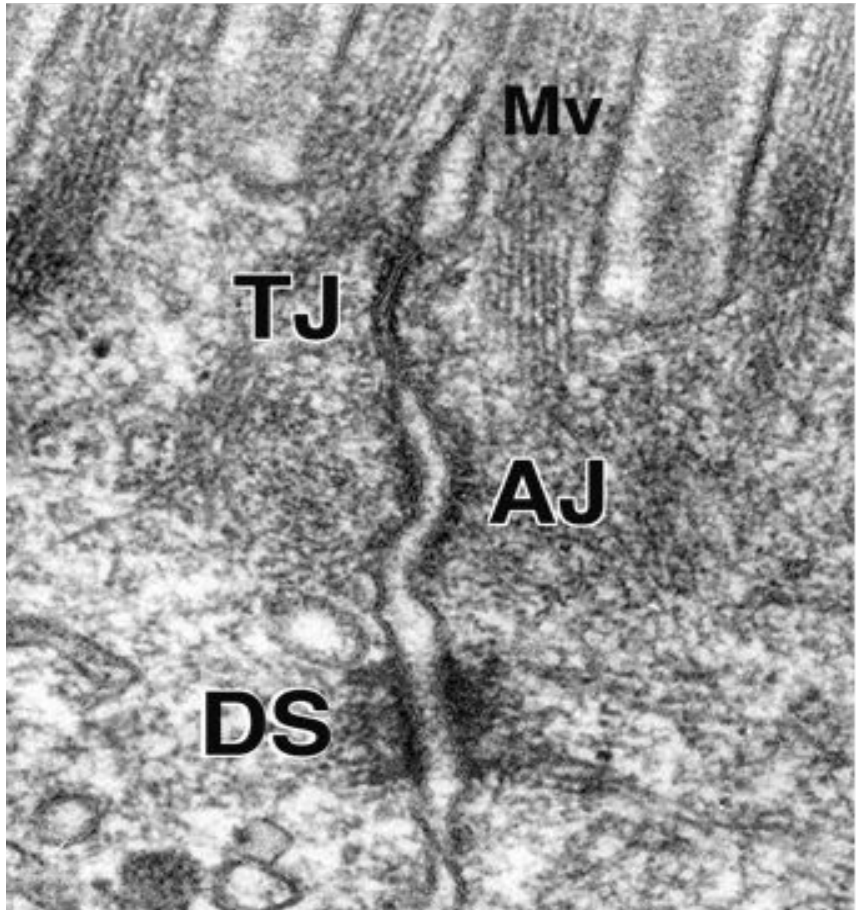
2. Zonula Adherens
- around entire perimeter
- Wide space (20 nm)
- Fix adjacent cells and prevent their separation

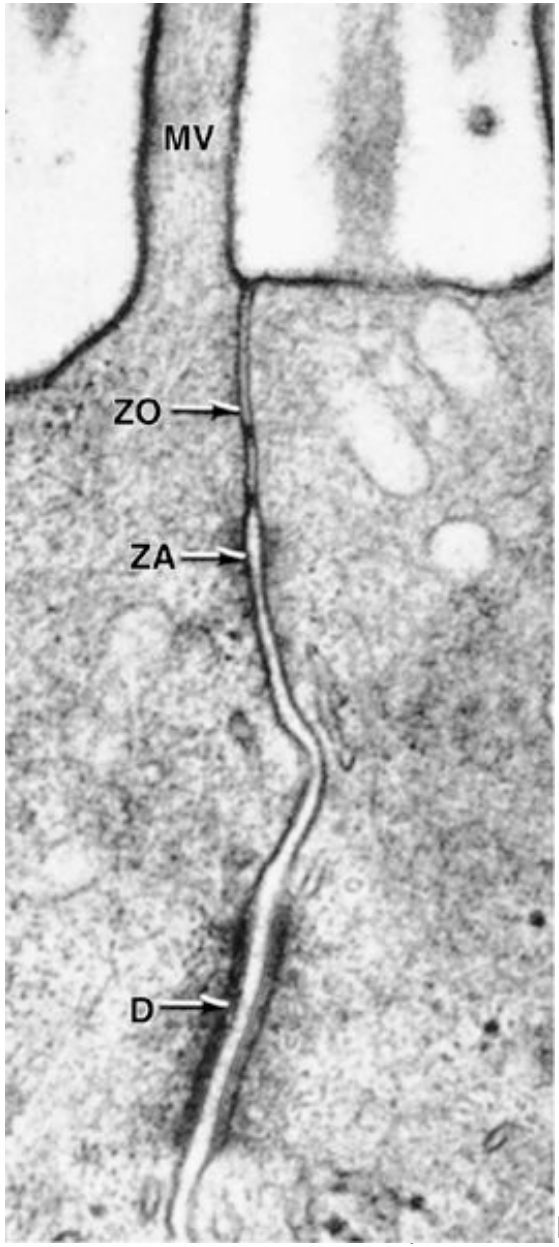
3. Macula Adherens=Desmosome
- occur at small discrete sites

Gap junctions
- at small discrete sites
- metabolic and electrical coupling



Electron micrographs of the junctional complex





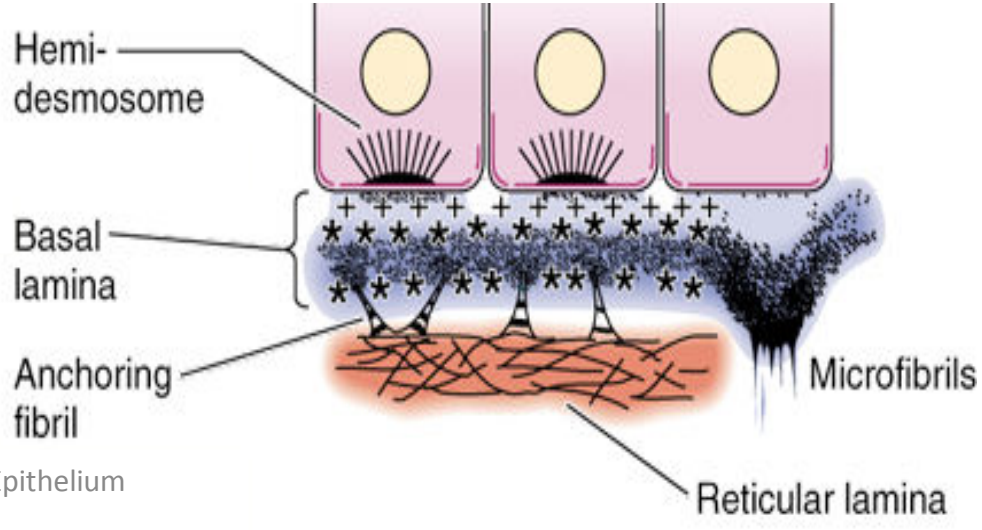
The Basal Region

Basement membrane

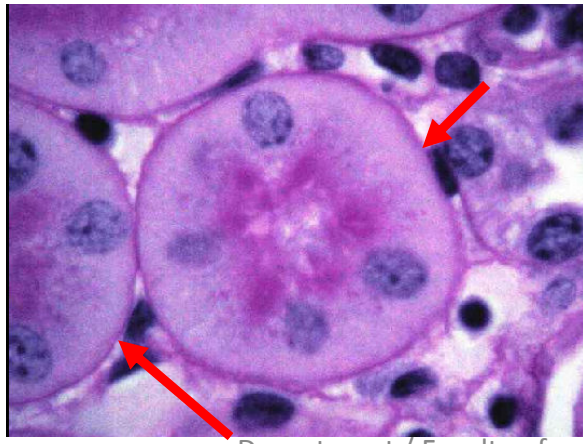
1. **Basal Lamina**
   - **Secreted by epithelial cells**
   - **Barrier between epithelium and connective tissue**
   - **Collagen type IV, proteogylcans & glycoproteins (PAS +)**
2. **Reticular Lamina**
   - **Connective tissue below epithelium**
   - **Collagen type III**

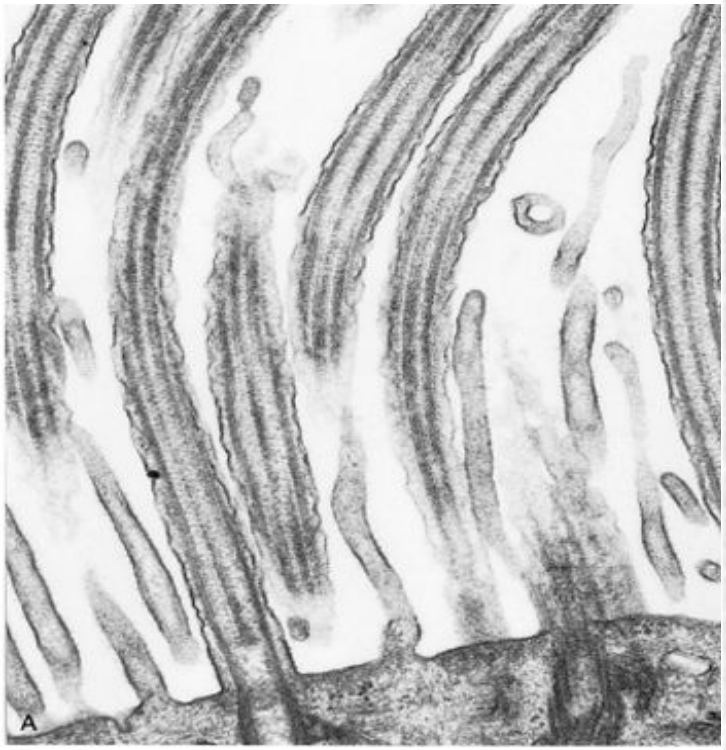
Hemidesmosomes

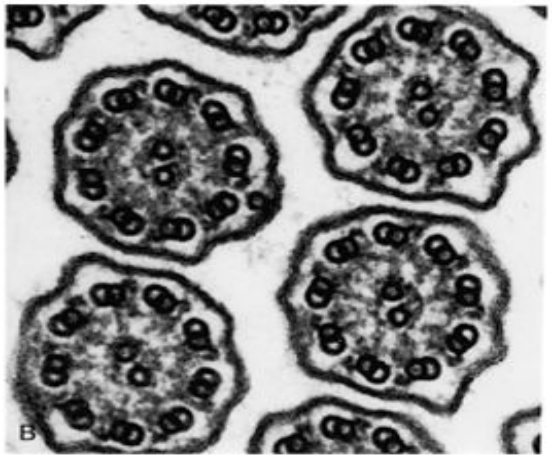
Junctions that anchors epithelial cells to basal lamina

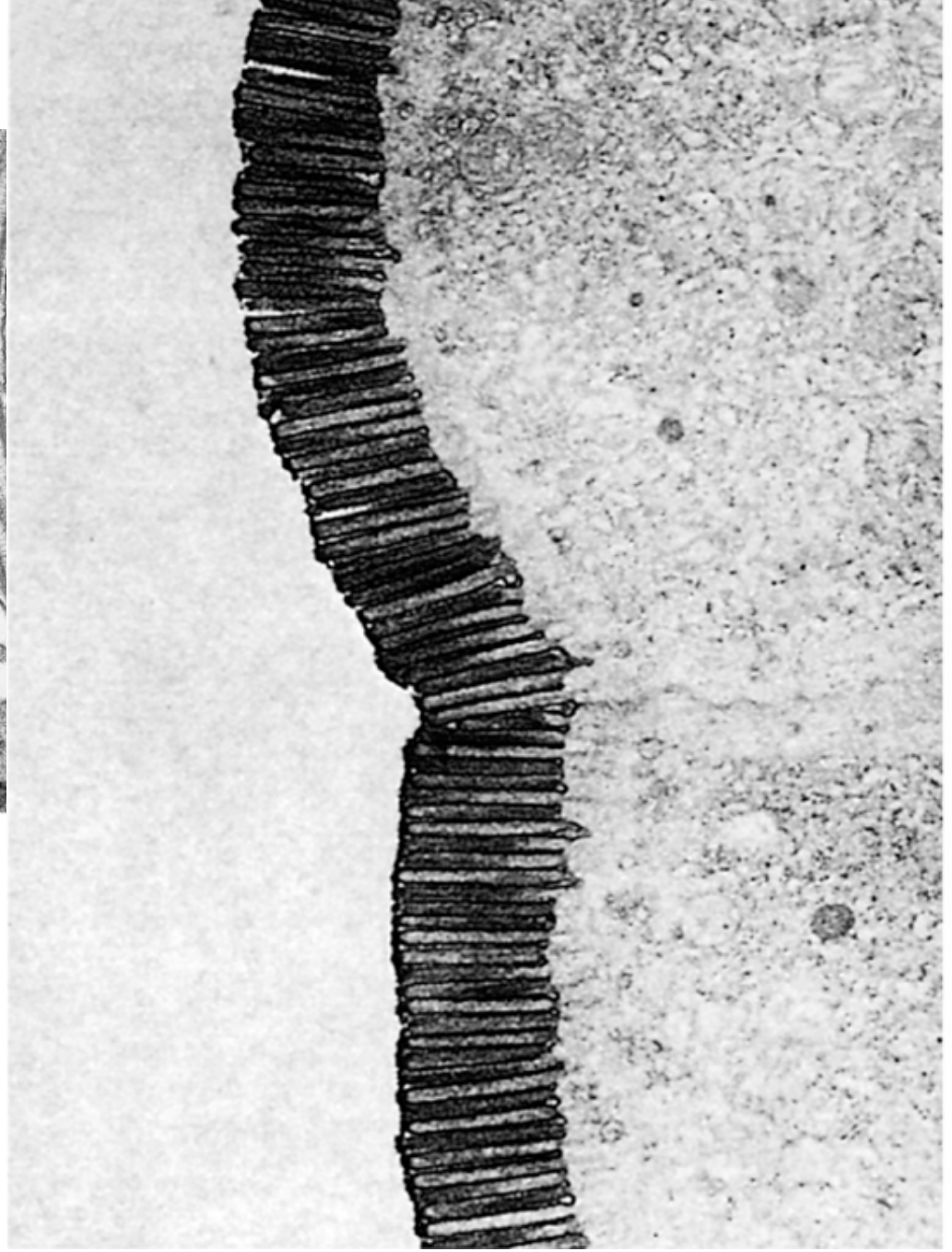


PAS stain









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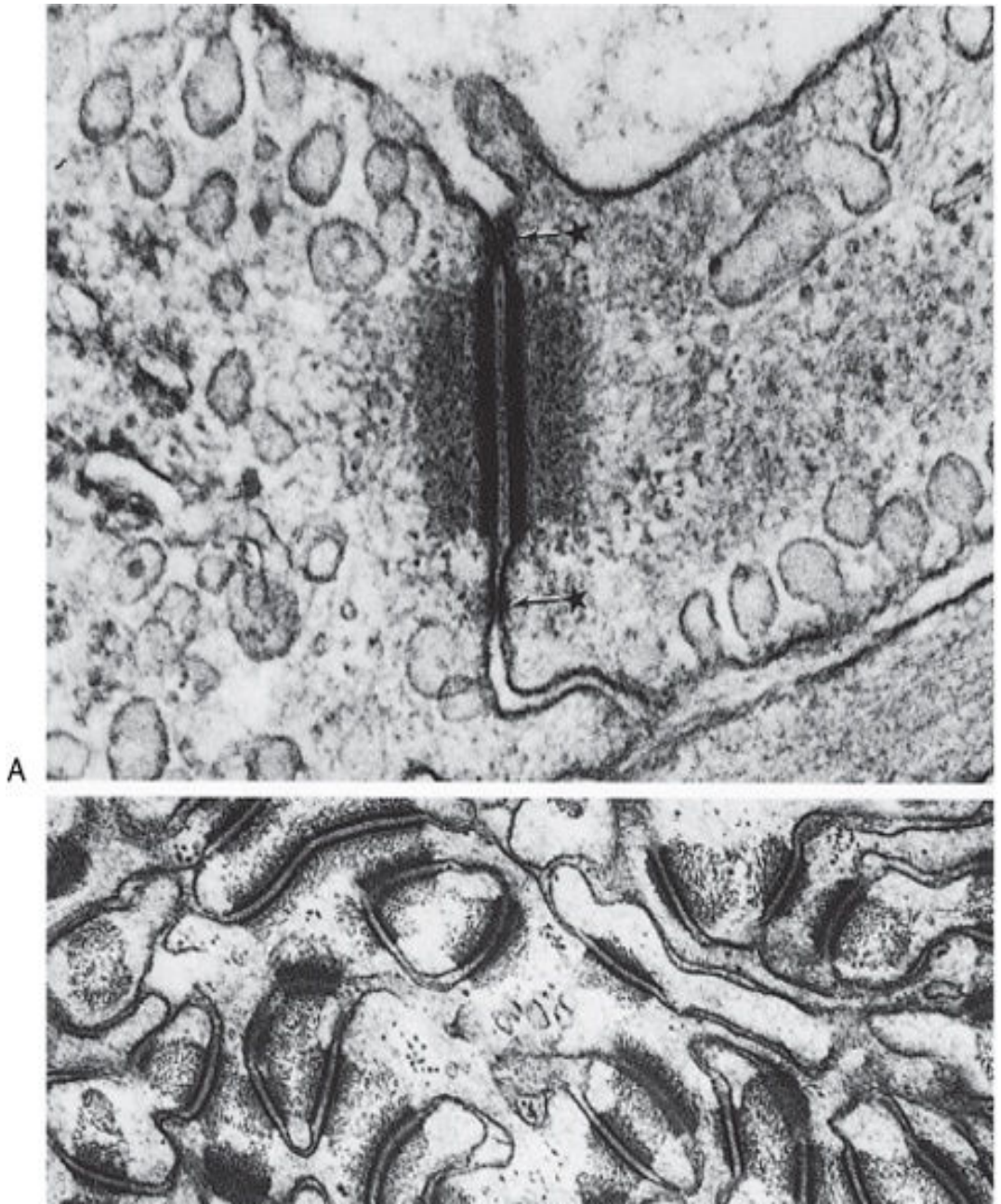
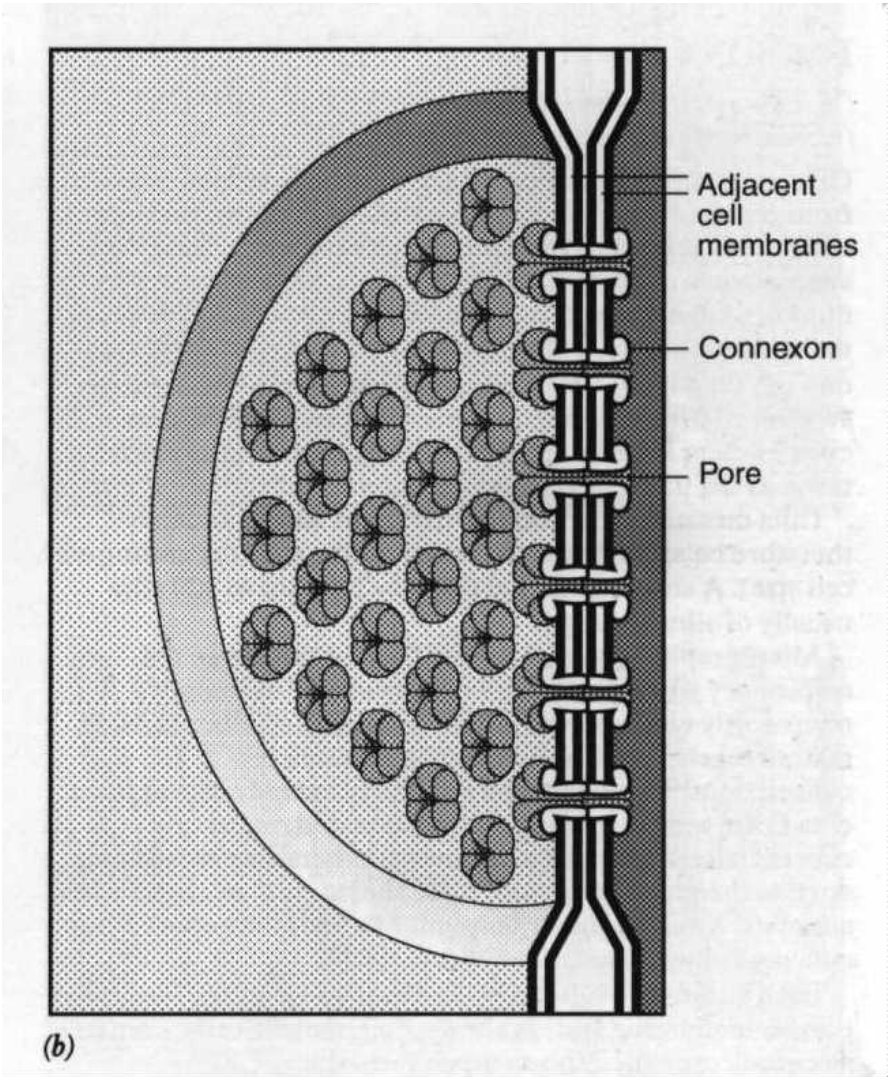
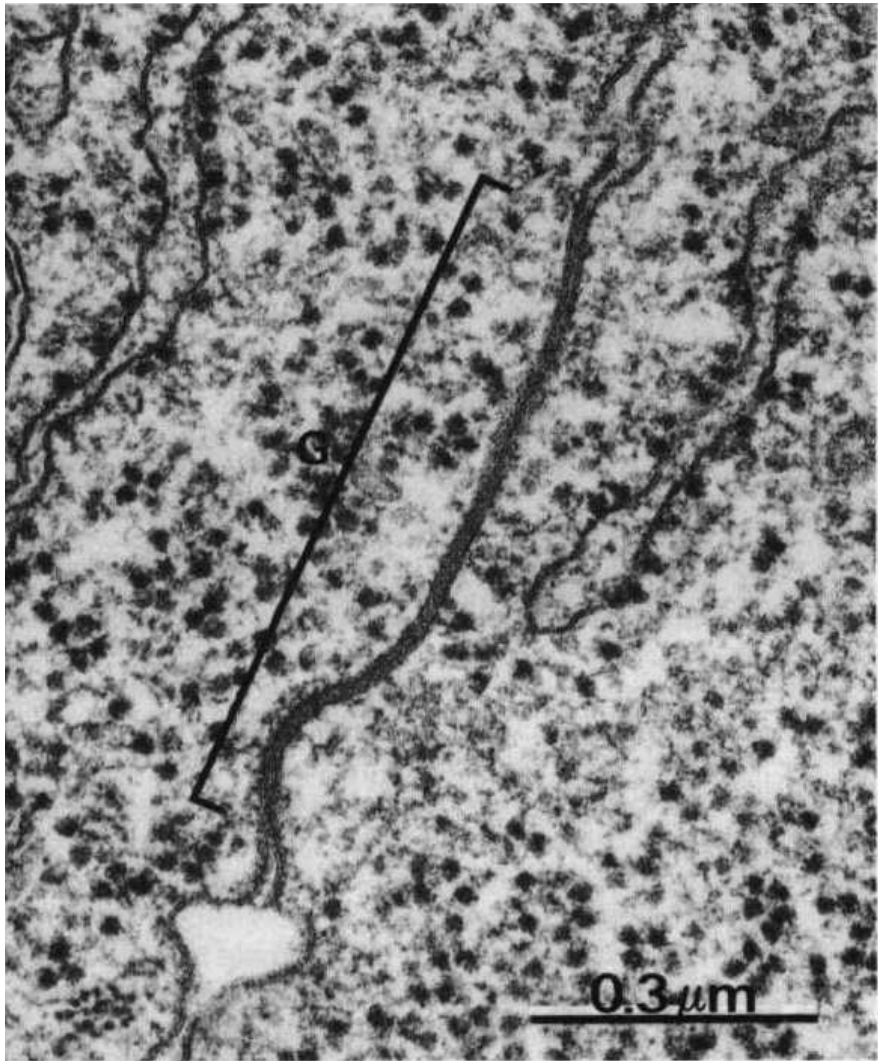
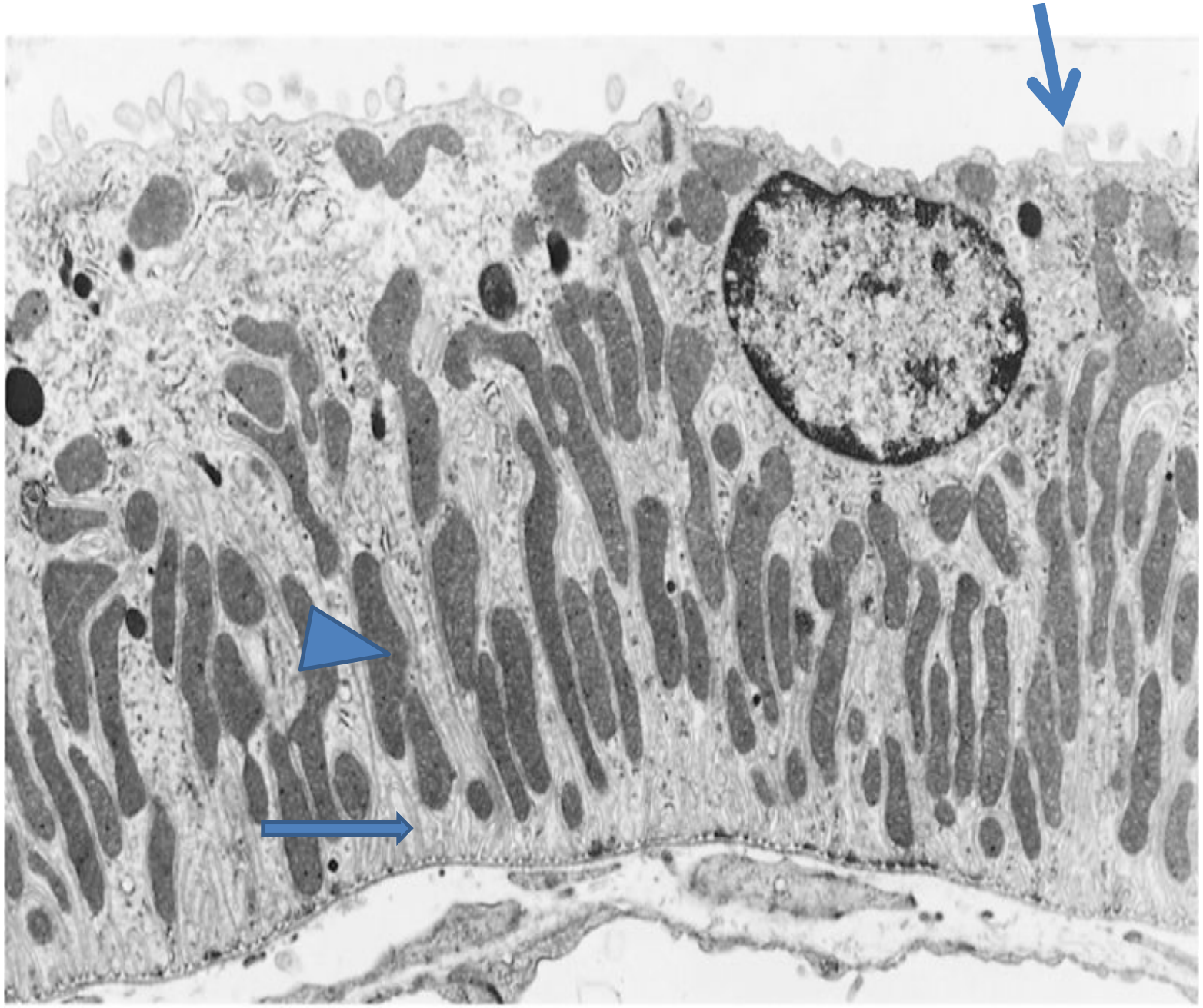
Desmosomes (macula adherens)

-very wide space(30nm)
-Scattered circular spots
-The cytoplasmic side is thickened
-tonofilaments are inserted (hair pins)
- Transmembrane proteins (linkers)
-strongest type




Adjacent cell membranes
Connexon
Pore
(b)


C
0.3 μm



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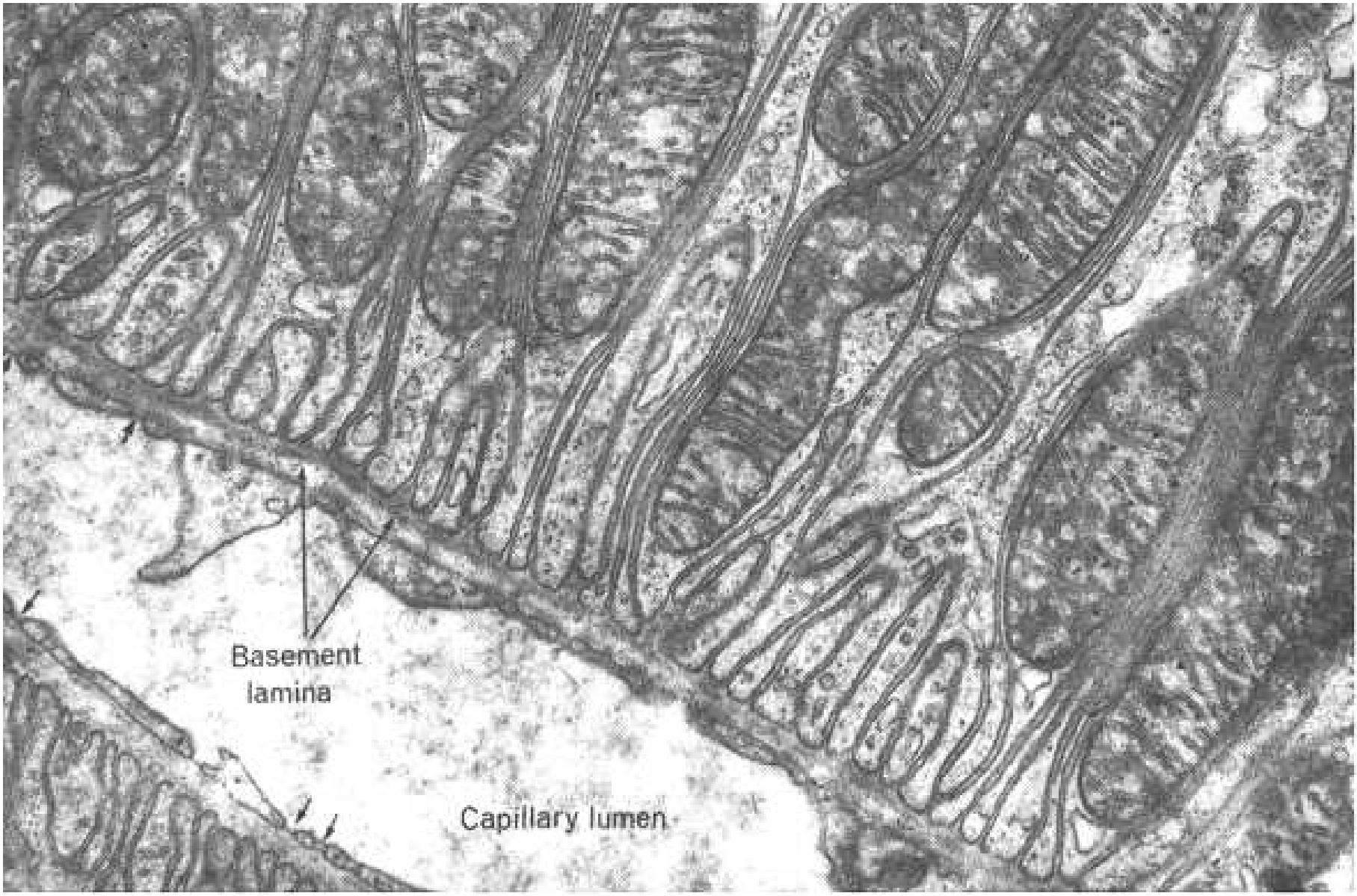
Basement
lamina
Capillary lumen