Alimentary Canal (I)

Esophagus and Stomach (Objectives)

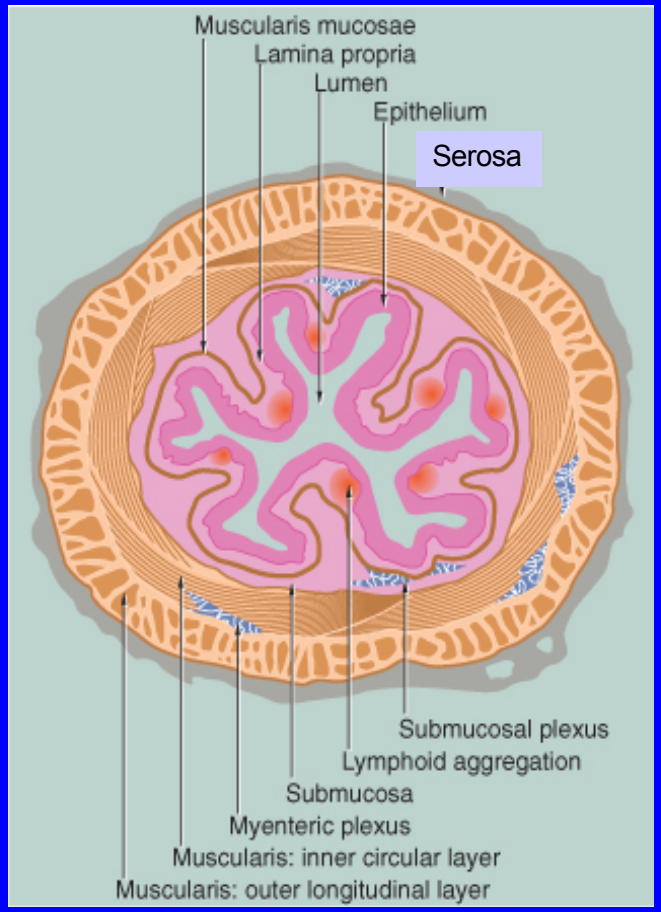
- By the end of this lecture, the student should be able to discuss the microscopic structure in correlation with the function of the following organs:
  1. Esophagus.
  2. Stomach.

Alimentary Canal

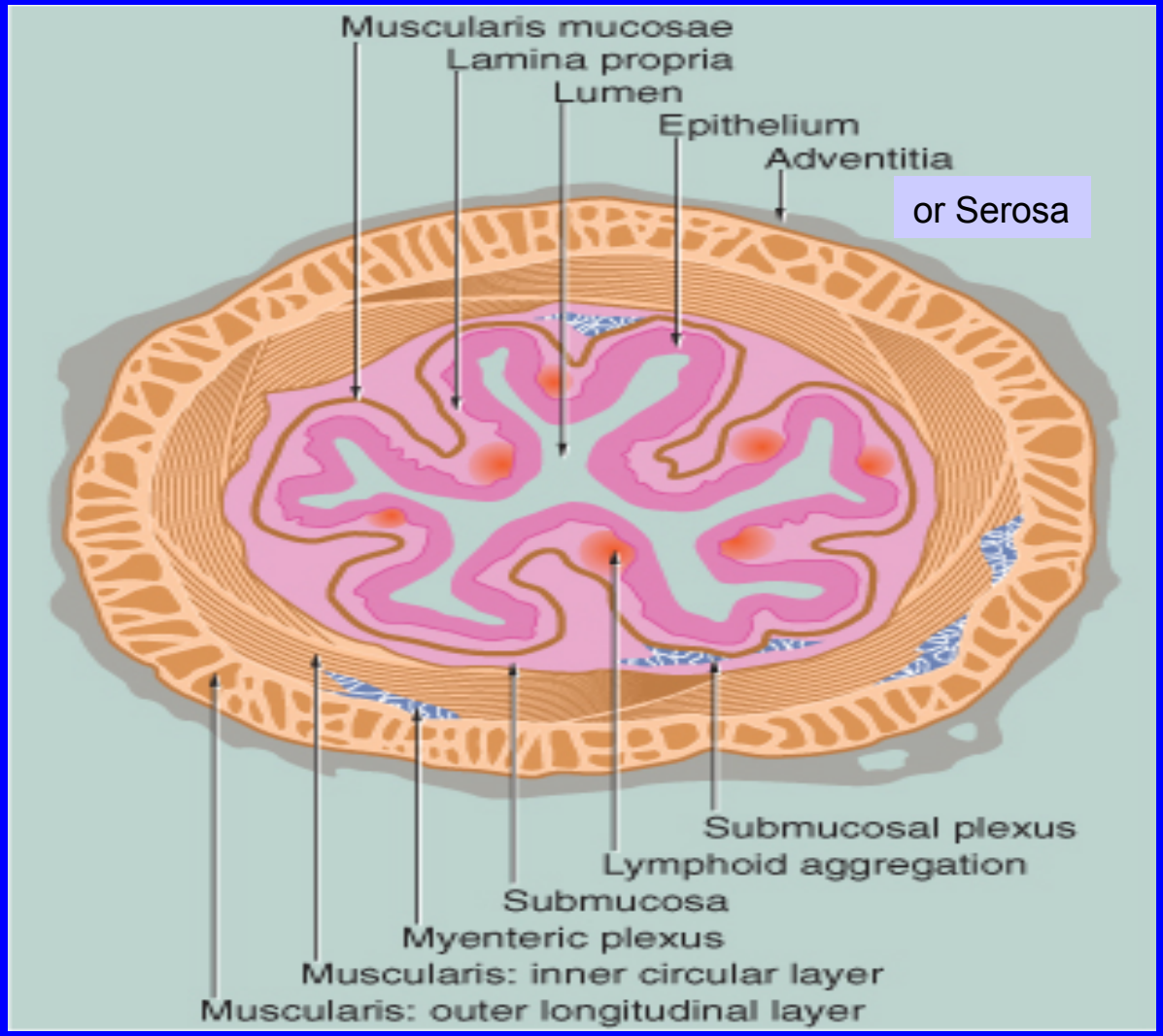
- Is the tubular portion of digestive system.
- Is subdivided into: esophagus, stomach, small intestine (duodenum, jejunum and ileum), and large intestine (cecum, colon, rectum, anal canal, and appendix).

General Architecture of L/M Structure of Alimentary Canal

1- Mucosa.
2- Submucosa.
3- Muscularis externa.
4- Adventitia OR serosa.



General Architecture of L/M Structure of Alimentary Canal



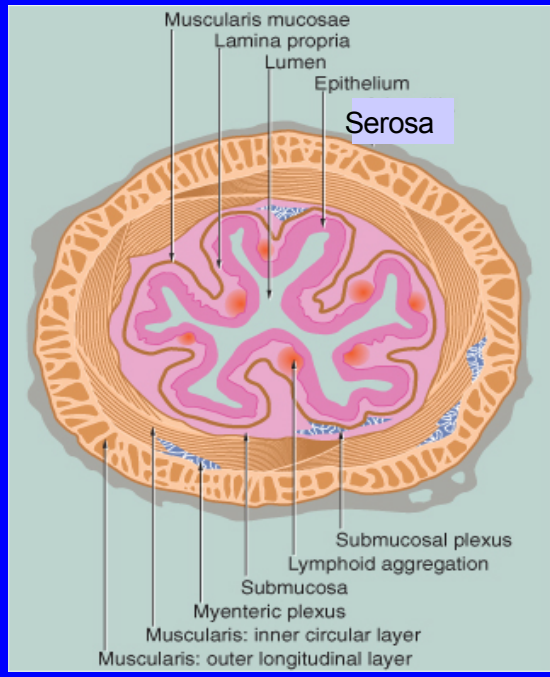
ESOPHAGUS

Esophagus

Four concentric layers:

1. Mucosa:

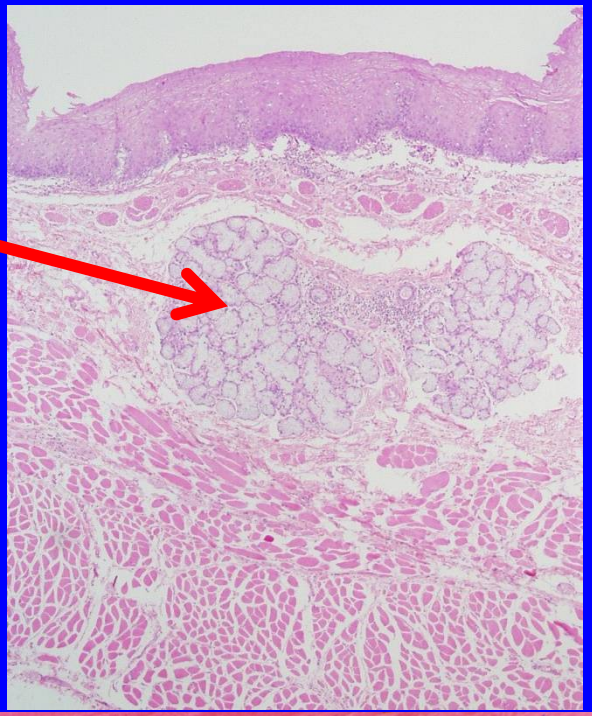
- **Epithelial Lining:**
  Non-Keratinized Stratified Squamous Epithelium.
- **Lamina propria:**
  Loose areolar C.T. with mucosal esophageal glands (secretion of mucus) in the upper and lower ends.
- **Muscularis mucosae:**
  Few layers of smooth muscle fibers.

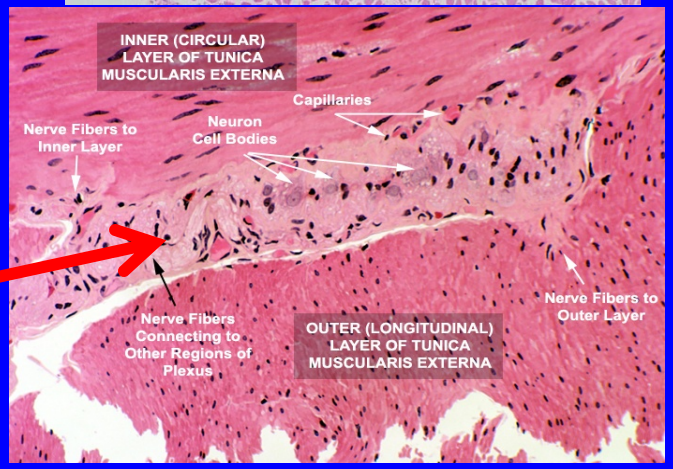


Esophagus

2. **Submucosa:**
   - Loose areolar C.T. containing blood vessels, nerves, **submucosal esophageal glands** (secretion of mucus) &
   - **Meissner's plexus** of nerve fibers and nerve cells.
3. **Muscularis Externa:**

   Two muscle layers:
   - Inner circular layer.
   - Outer longitudinal layer.
   - Upper 1/3: both layers are skeletal M.
   - Middle 1/3: inner layer is smooth muscle
     outer layer is skeletal M.
   - Lower 1/3: both layers are smooth M.
   - **Auerbach's (myenteric) plexus** in between the 2 layers

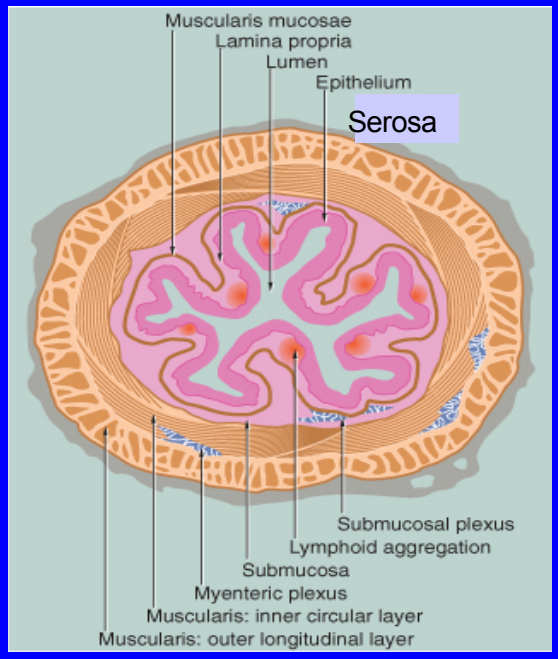


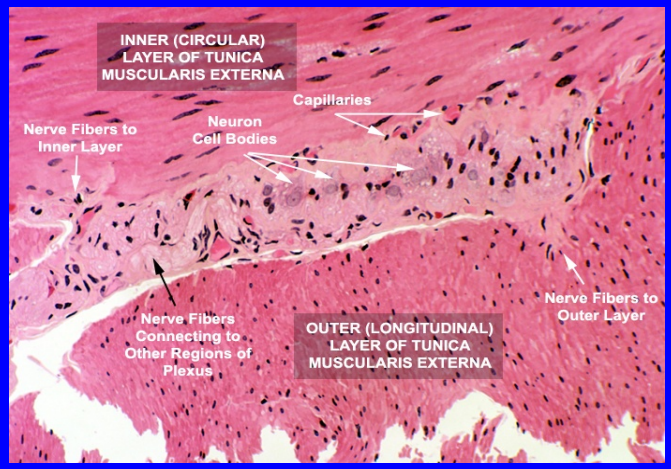


Esophagus

4. Serosa or Adventitia:

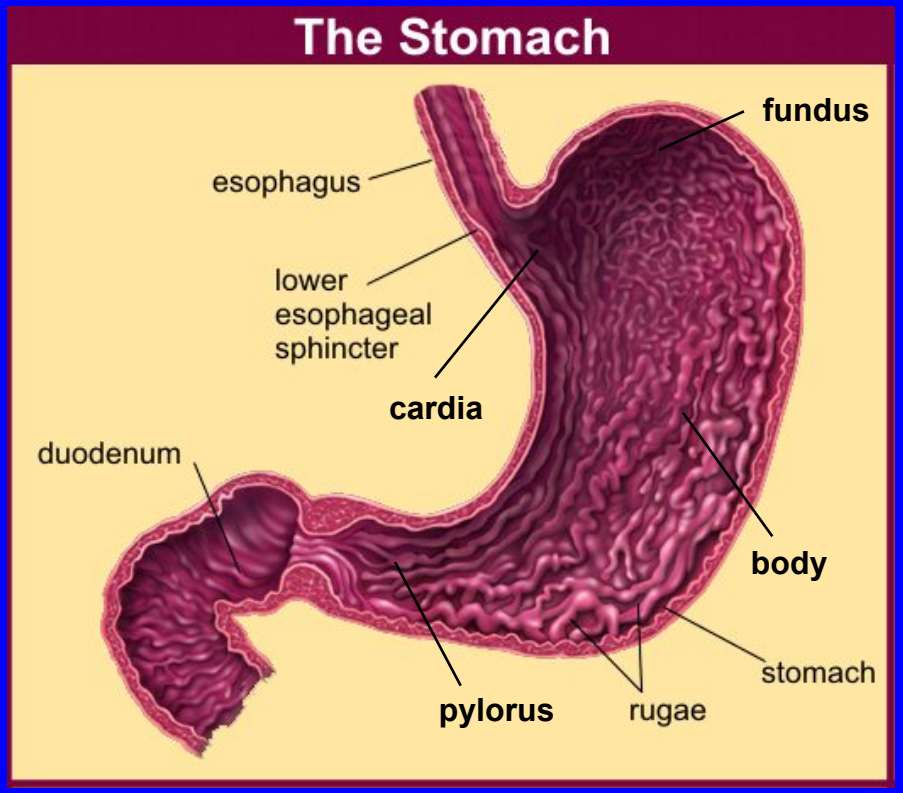
- Adventitia: is loose areolar C.T. not covered by mesothelium.
- Serosa: is loose areolar C.T. covered by mesothelium (simple squamous epithelium) in the abdominal part of the esophagus.



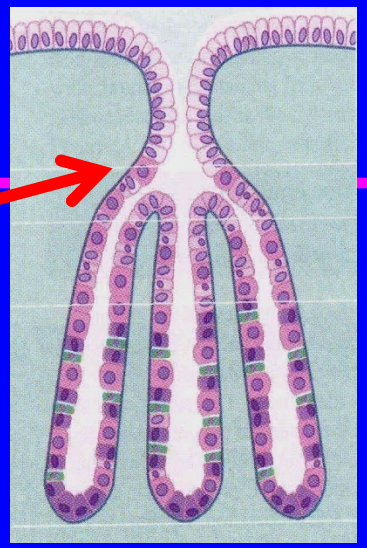


STOMACH

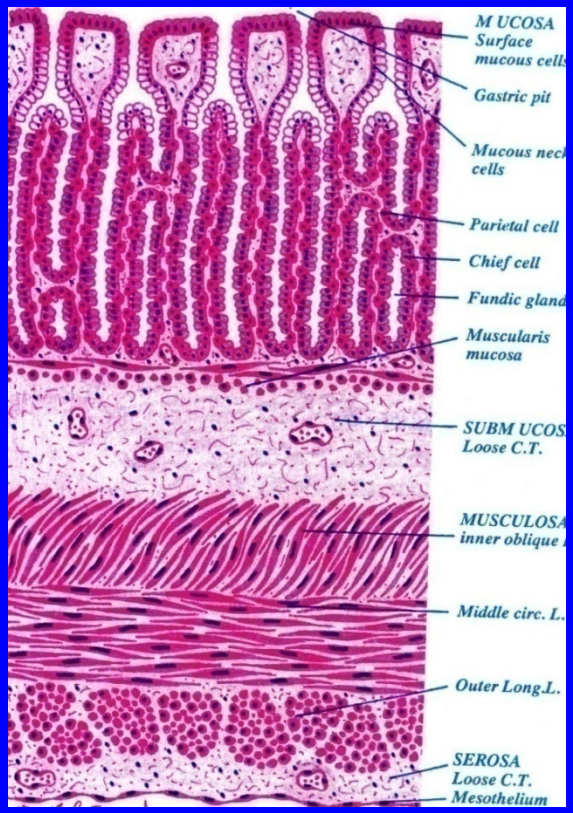
- It has 4 regions: **cardia**, **fundus**, **body** and **pylorus**.
- Mucosa has folds, known as **rugae** that disappear in the distended stomach.



Fundus (and Body) of Stomach



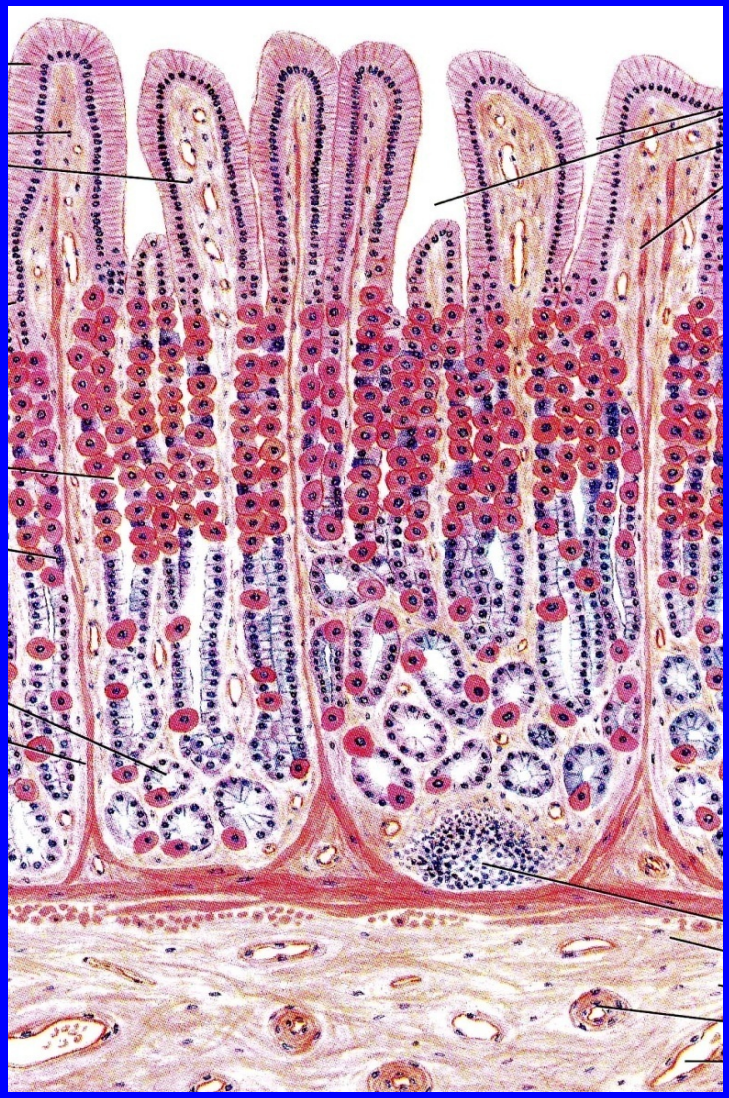
- **Mucosa:** is invaded by **fundic glands**. The surface epithelium of the mucosa is simple columnar mucus-secreting cells.
- **Submucosa:**
  - Connective tissue containing blood vessels, nerves, and Meissner's plexus.
  - **NO glands**.
- **Muscularis Externa:**
  - Three smooth muscle layers:
    - Inner oblique.
    - Middle circular.
    - Outer longitudinal.
  - Auerbach's (myenteric) plexus.
- **Serosa:**
  - C.T. covered by mesothelium.



Mucosa of Fundus of Stomach

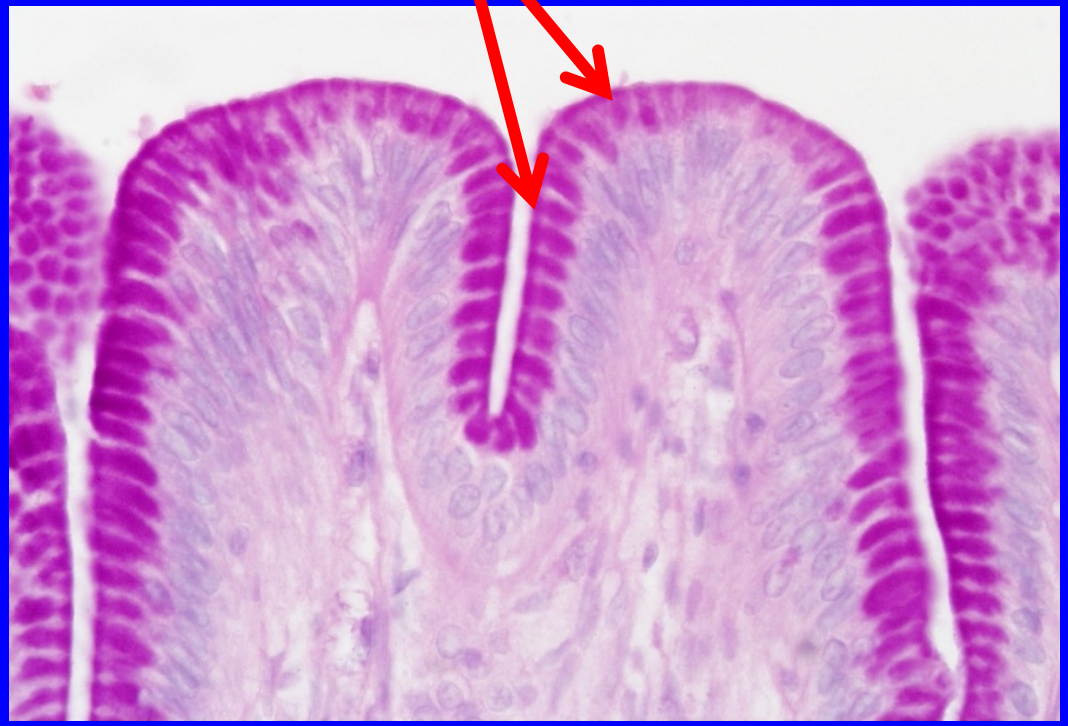
- **It is composed of:**
  1. Surface Columnar Epithelium:

     Simple columnar epithelium: secretes mucus.
  2. Lamina propria: C.T. invaded by numerous fundic glands with lymphoid elements.
  3. Muscularis mucosae: 2 layers of smooth muscle fibers.



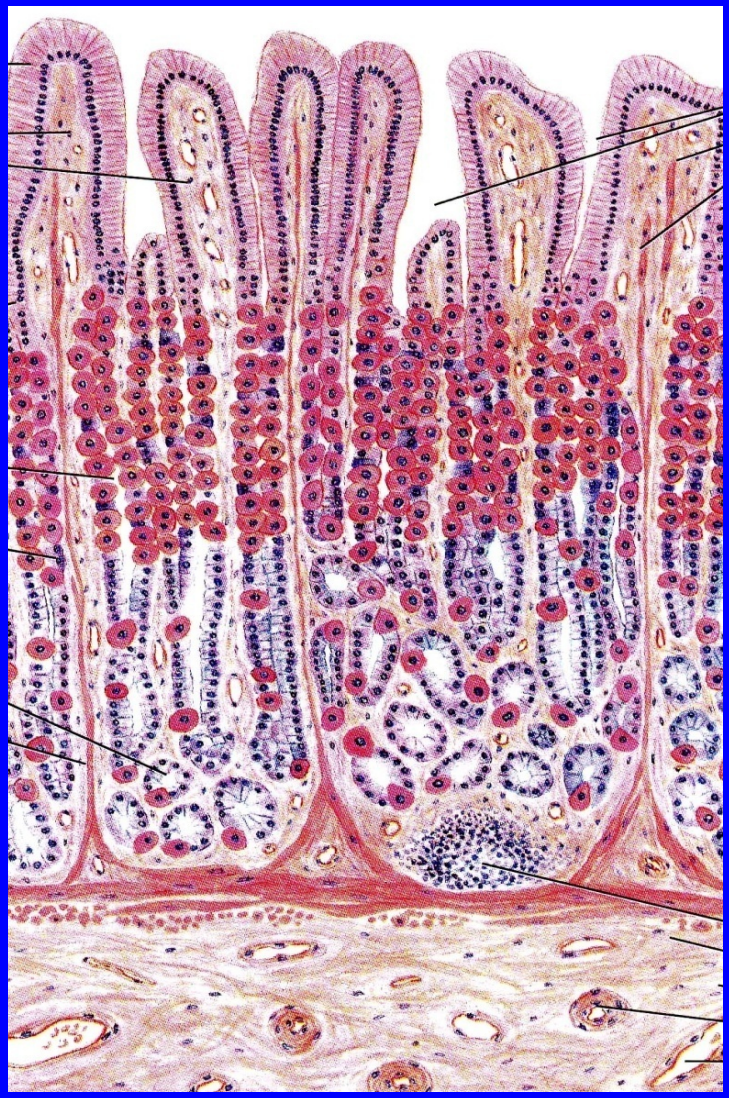
Mucosa of Fundus of Stomach

Surface Columnar Epithelium



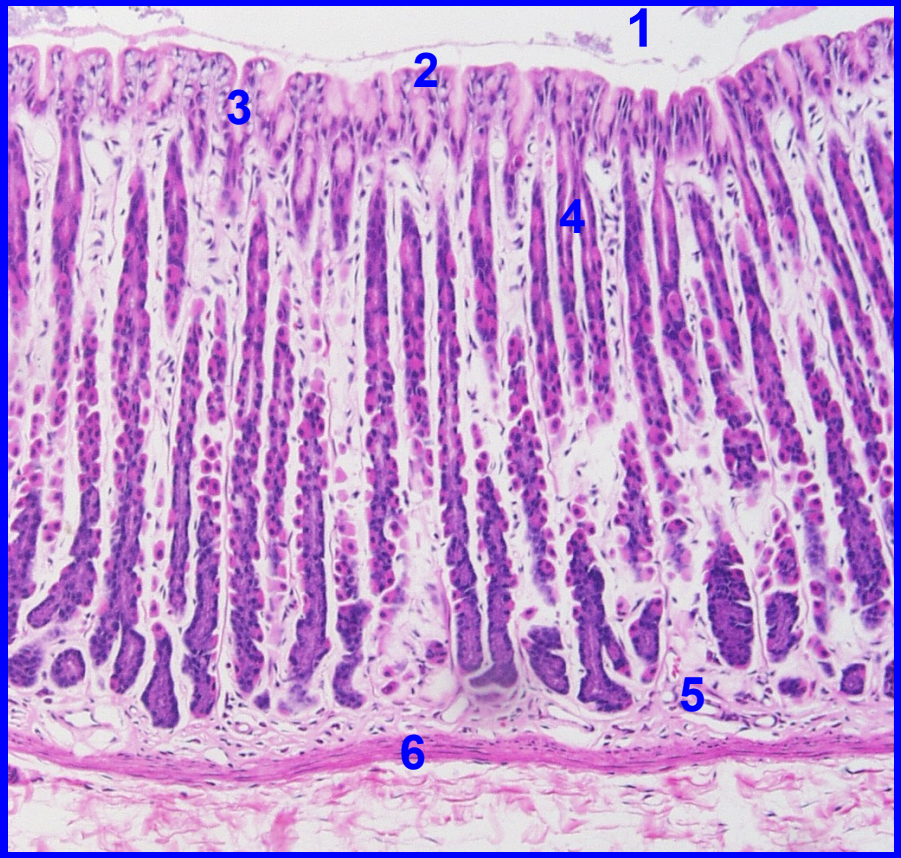
Fundic Glands

- **Fundic glands have:**
- Short pits: one fourth of mucosa.
- Simple branched tubular glands.
- Are rich in parietal & chief cells.



Mucosa of Fundus of Stomach

1. Lumen.
2. Surface columnar epithelium.
3. Pits of fundic glands.
4. Fundic glands.
5. Lamina propria.
6. Muscularis mucosae.



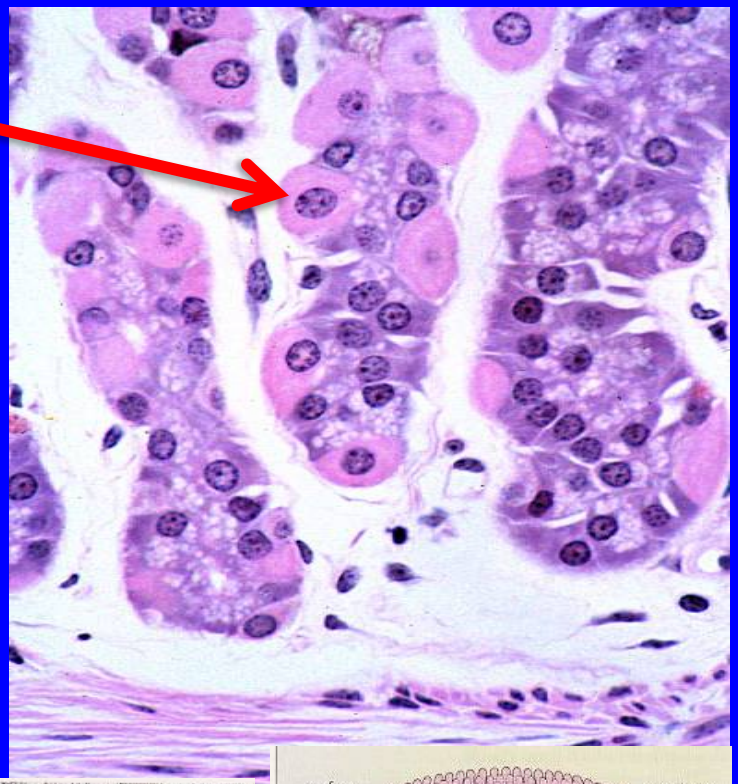
Fundic Glands

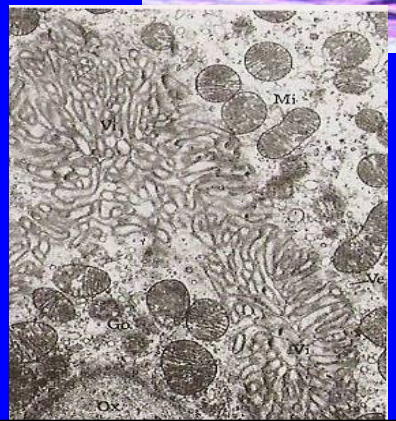
Composed of 5 cell types:

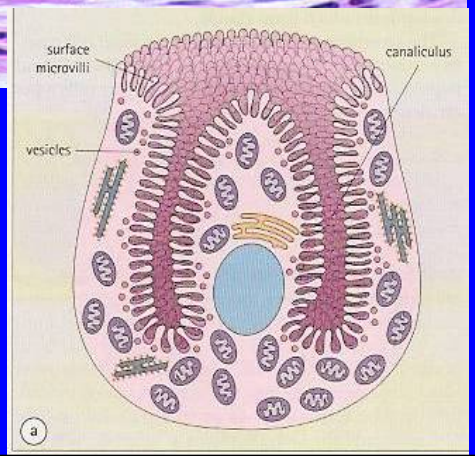
1. **Parietal (oxyntic) cells.**
2. **Peptic (chief) cells.**
3. **Mucous neck cells.**
4. **Enteroendocrine (EE, DNES) cells.**
5. **Stem cells.**

Fundic Glands

1. **Parietal (oxyntic) cells:**
   - **Shape:** pyramidal or polygonal.
   - **Nucleus:** central, round.
   - **Cytoplasm:**
     - deeply **acidophilic**, rich in SER and mitochondria (40% of the cell volume).
     - C-shaped intracellular canaliculus.
   - Secrete **HCl** and **gastric intrinsic factor** that helps absorption of vitamin B_{12}.
   - Parietal - why?
   - Oxyntic - why?



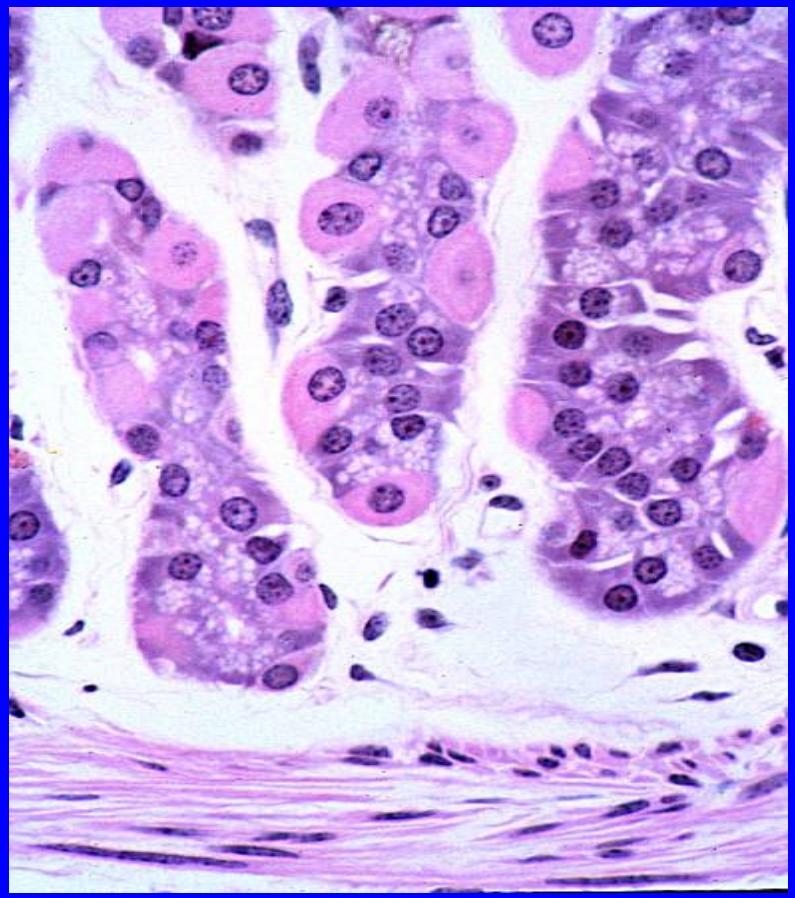


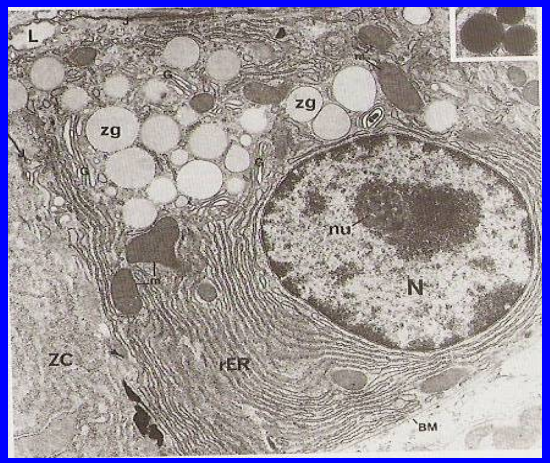


Fundic Glands

2. Peptic (chief) cells:

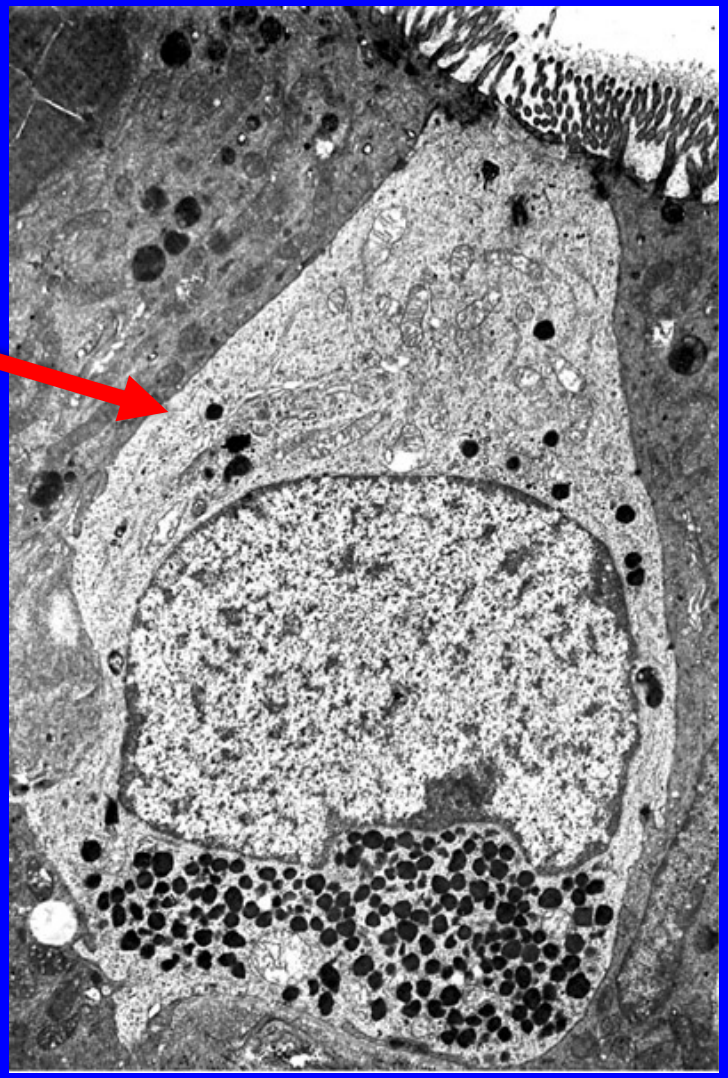
- The predominant cell type.
- Columnar cells.
- **Nucleus:** basal, round.
- **Cytoplasm:**
  - basophilic with apical secretory granules.
  - secrete **pepsinogen**.





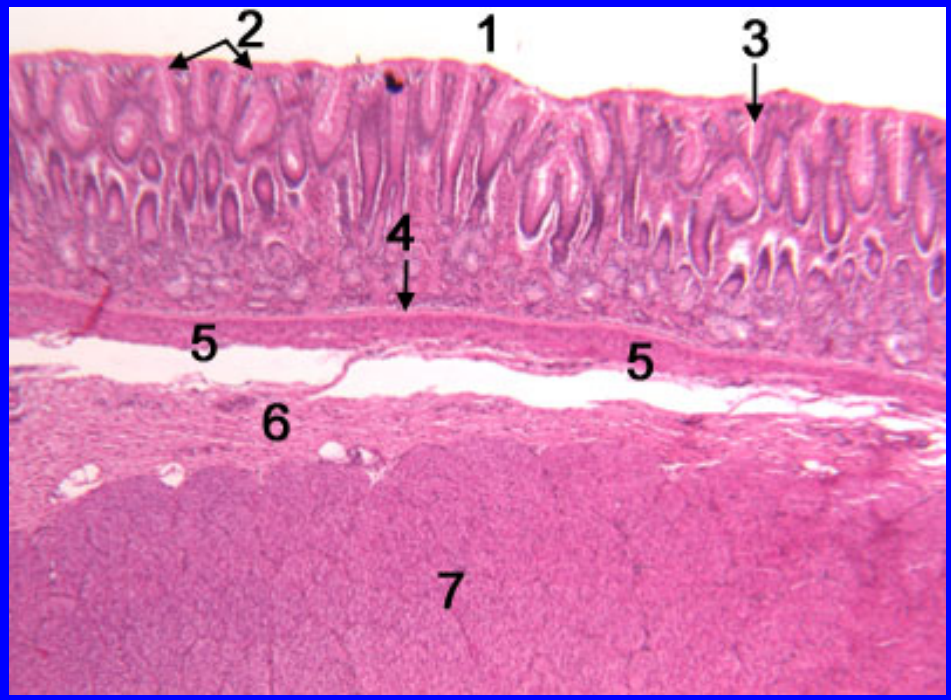
Fundic Glands

3. **Mucous neck cells:** secrete **mucus**.
4. **Enteroendocrine (EE) (DNES) cells:**
   Enterochromaffin (EC) cells: secrete **hormones** (e.g. serotonin, endorphin).
5. **Stem cells: regenerative** cells.



Pylorus of Stomach

- **Mucosa:** is invaded by **pyloric glands**. The surface epithelium is simple columnar mucus-secreting cells.
- **Submucosa:**
  - Connective tissue containing blood vessels, nerves, and Meissner's plexus.
  - **NO glands**.
- **Muscularis Externa:**
  - Two smooth muscle layers:
    - Inner circular.
    - Outer longitudinal.
  - Auerbach's plexus.
- **Serosa:**
  - C.T. covered by mesothelium



1. Lumen
2. Surface epithelium
3. Pits of pyloric glands
4. Lamina propria
5. Muscularis mucosae
6. Submucosa
7. Muscularis externa

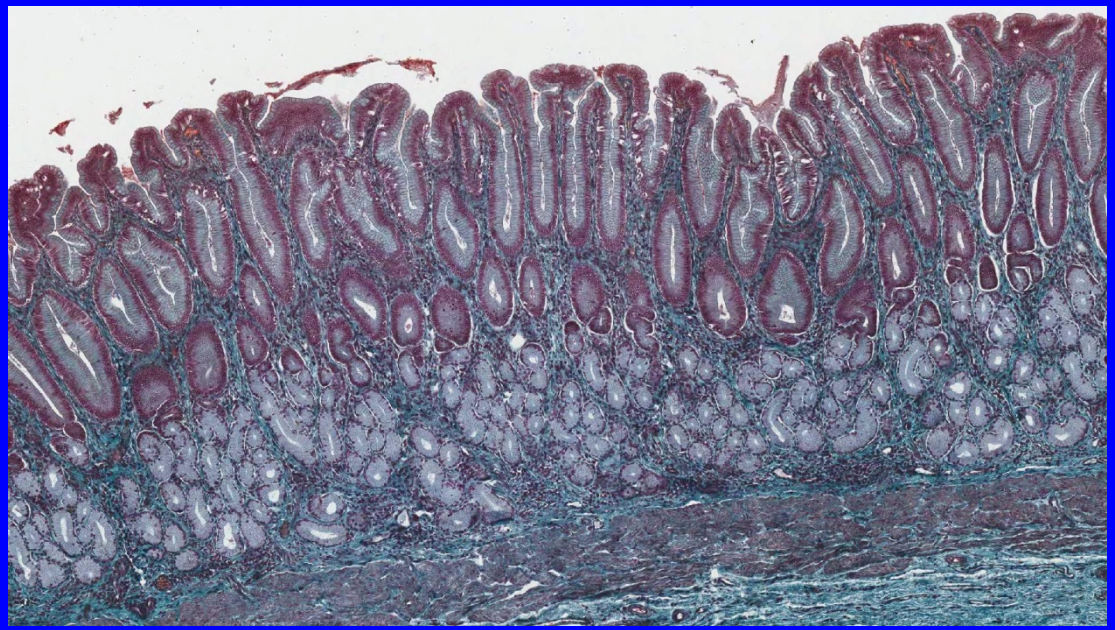
Pyloric glands

- Their pits are deep --- about half the length of mucosa.
- They are branched and convoluted --- many cross sections.

Pyloric glands

Cells of pyloric glands:

1. **Mucous neck cells (Mucus secreting cells):**
   - The predominant cells.
   - Secrete mucus.
2. **EE cells:**
   - EC cells
   - G cells
   - D cells
   - A **cells**
3. **Stem cells.**
4. **Parietal cells:** few.
5. **No peptic cells.**



THANK YOU