



**Faculty of Biological Science and Technology**  
**Zoology and Botanical Department**  
**Practical Histology**

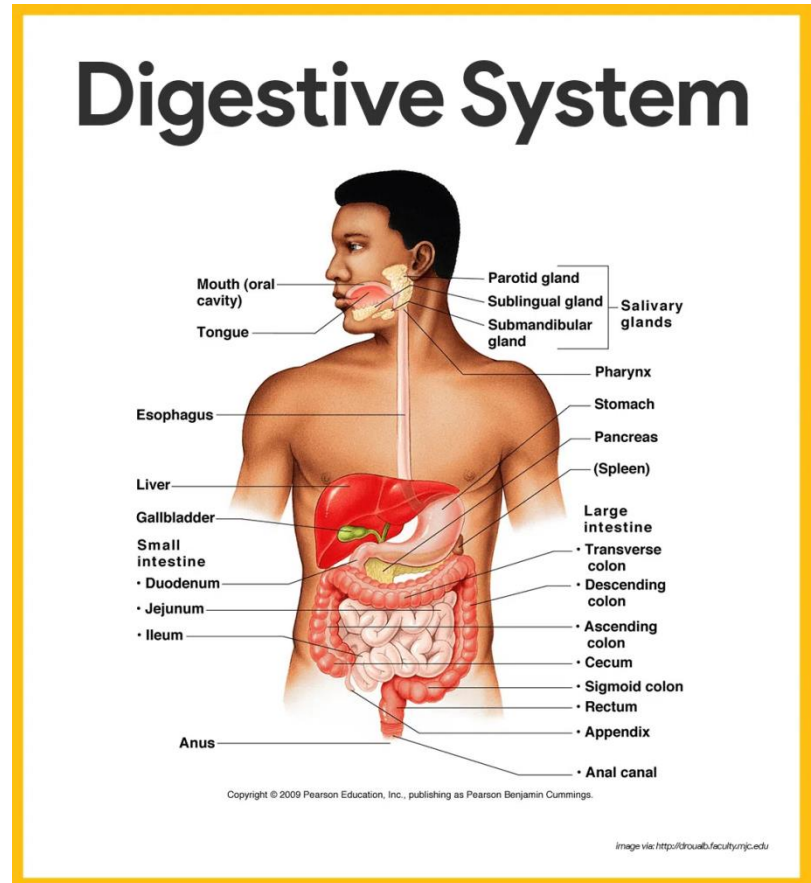
**Digestive System Histology**  
**Part 1**

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## Digestive system

- ▶ Digestive system consists of digestive tract (mouth (oral cavity), esophagus, stomach, small intestine, large intestine and anus) and associated glands known as accessory glands of digestive system (salivary glands, pancreas, liver and gall bladder)
- ▶ The wall of digestive tract also called as gastrointestinal (GI) tract is composed of four fundamental tissue layers including: mucosa, submucosa, external muscular layer and serosa/adventitia



From: <https://nurseslabs.com/digestive-system/>



## General structure of GI tract

### ▶ Mucosa

- ▶ epithelium
- ▶ lamina propria
- ▶ muscularis mucosae

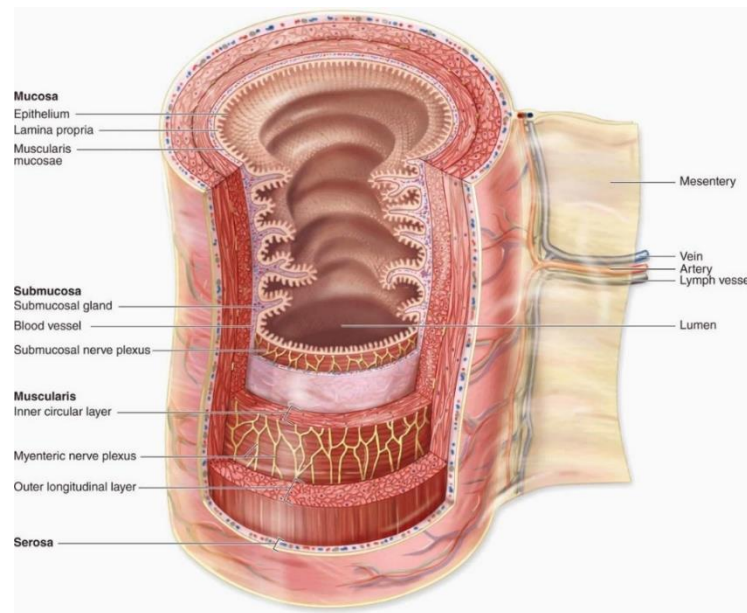
### ▶ Submucosa

- ▶ It makes up of connective tissue along with blood vessels, lymphatic vessels, and Meissner (submucosal) nerve plexus. It has glands in some region

### ▶ External muscularis layer

- ▶ Inner circular muscular layer
- ▶ Outer longitudinal muscular layer
- ▶ Myenteric (Auerbach) nerve plexus

### ▶ Serosa/ adventitia



From: <https://basicmedicalkey.com/digestive-tract-2/>

- ▶ Adventitia is the connective tissue surrounding an organ that merges with the connective tissue surrounding nearby organs
- ▶ Serosa (or serous membrane) is an outer membrane which lining the inner walls of body cavities and organs inside them. It is composed of two layers: parietal serosa which line the inner wall of body cavities and visceral serosa which attach to outer part of organs within body cavities. Serosa of abdominal and pelvic organs is also known parietal peritoneum and visceral peritoneum
- ▶ In histology, the attached visceral peritoneum is called serosa. Serosa made up of thin layer of epithelium known as mesothelium and a connective tissue layer underneath. Mesothelium is a simple squamous epithelium of mesodermal origin



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## Oral cavity

- ▶ Oral cavity is defined as the space extending from lips anteriorly to pharynx posteriorly. Cheeks surrounded oral cavity laterally. Palate placed in the superior and tongue and muscular floor placed in the inferior of oral cavity
- ▶ The epithelium of oral cavity is stratified squamous. This epithelium maybe keratinized, partial keratinized or non-keratinized depends on different location and function

## Tongue

- ▶ Histologically, the tongue mucosa is formed from a surface stratified squamous with numerous lingual papillae and taste buds. Beneath is underlying lamina propria
- ▶ Tongue is a muscular organ which composed of striated muscle tissue. Loose connective tissue extend from lamina propria between muscular fibers
- ▶ Mucous and serous glands also embedded within the musculature of the anterior part of tongue
- ▶ Lingual papillae are tiny projections of dorsal surface mucosa of tongue. These projection are found only on anterior 2/3<sup>rd</sup> of tongue
- ▶ Mammals have four kinds of lingual papillae called filiform, fungiform, foliate, and vallate (circumvallate). With the exception of the filiform papillae, all other lingual papillae contain taste buds



## Tongue

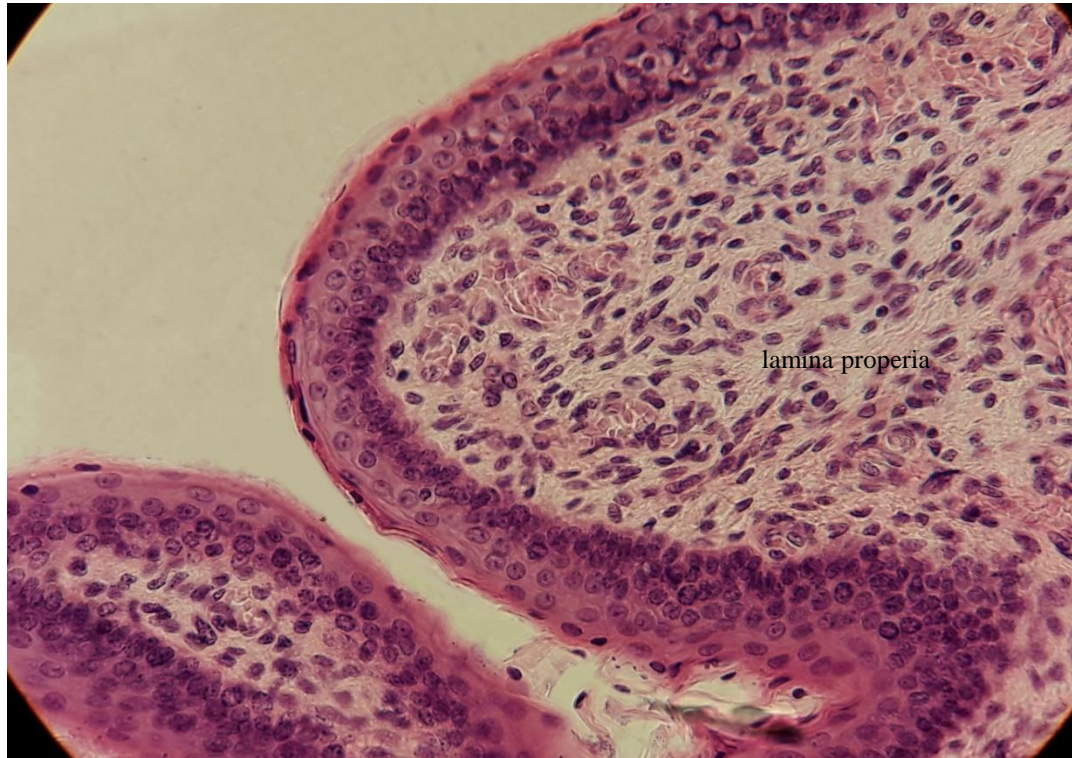


Dorsal surface of tongue which depicts fungiform papillae (black star) and filiform papillae (black arrow) , H&E, 18X. This picture is taken from histological slide in histology laboratory of Isfahan University





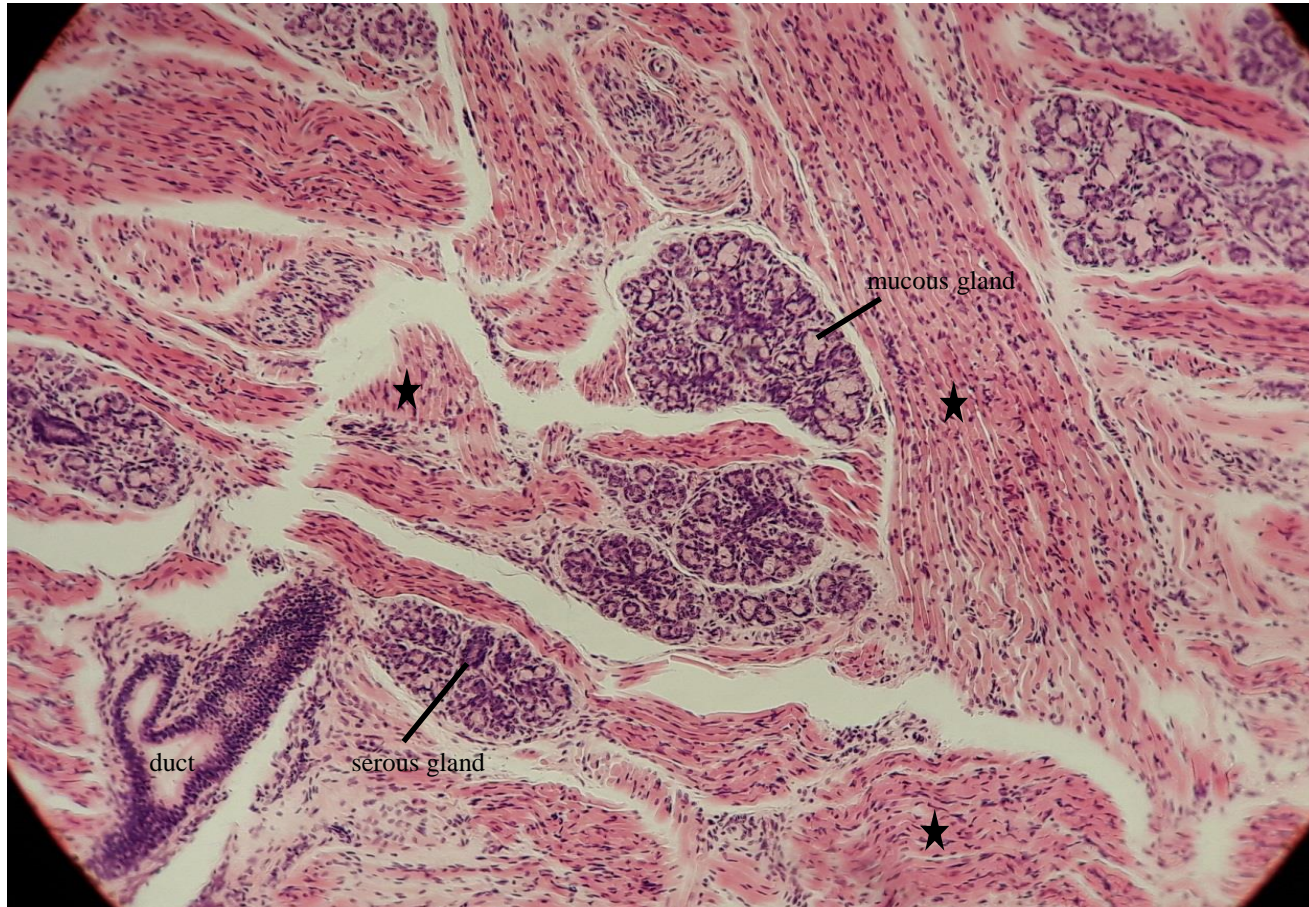
## Tongue



Dorsal surface of tongue which depicts non-keratinized stratified squamous epithelium. Lamina propria lies beneath epithelium; H&E, 720X. This picture is taken from histological slide in histology laboratory of Isfahan University



# Tongue

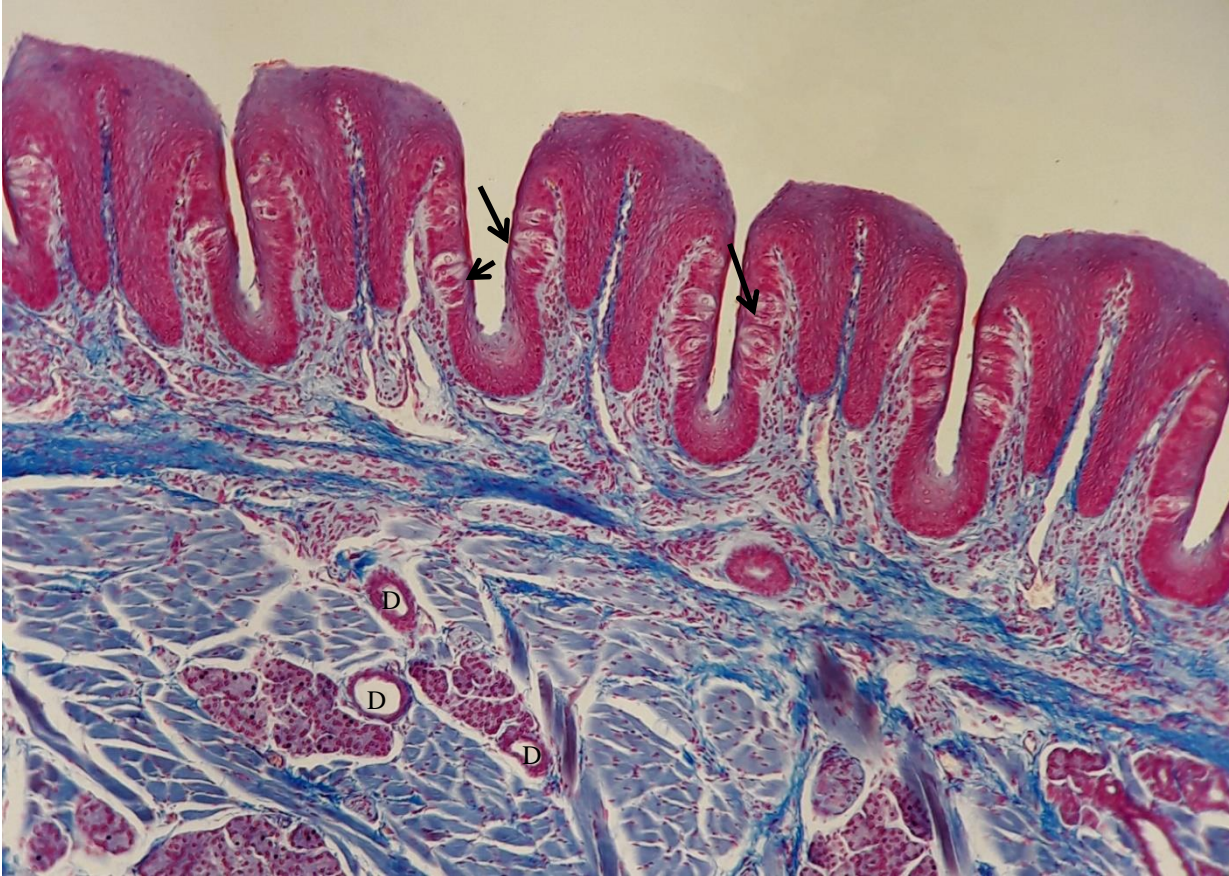


Tongue. Black stars depict striated muscle fibers. These fibers are pulled in all directions. ; H&E, 14X. This picture is taken from histological slide in histology laboratory of Isfahan University





## Tongue



Dorsal surface of tongue which depict foliate papillae with numerous taste buds. Striated muscle fibers, serous glands and ducts (D) lie below the mucosa. 14X. This picture is taken from histological slide in histology laboratory of Isfahan University





## Taste bud

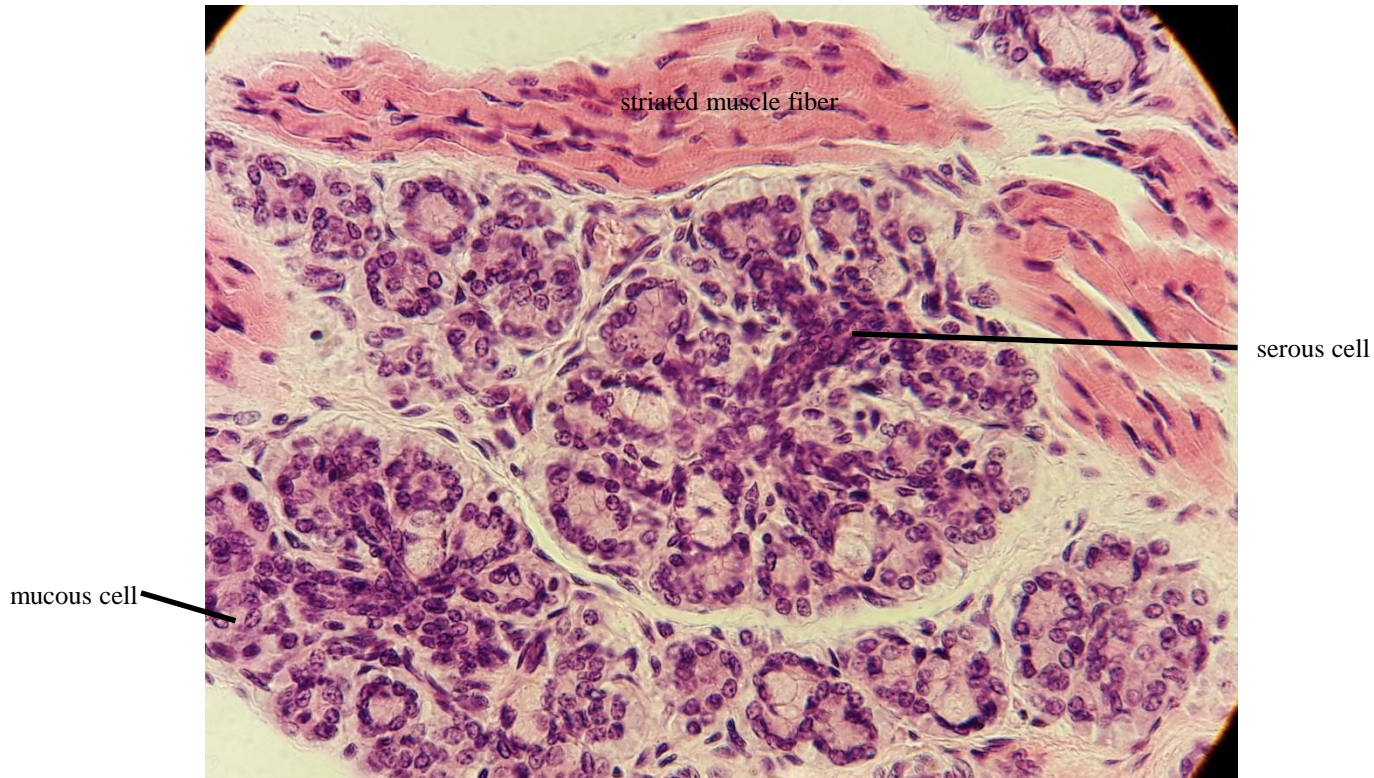
- ▶ Taste bud is shaped like an onion or an orange. It is embedded within epithelium of dorsal surface of lingual papillae, soft palate, pharynx and larynx
- ▶ Each taste bud contains 50-100 cells of distinct morphology and function, including:
- ▶ Gustatory (taste) cells: they are more frequent with dark cytoplasm and nucleus. They have some microvilli extended from taste pore
- ▶ Supportive cells: they are spindle shape cells that have pale nucleus and cytoplasm. These cells are scattered throughout taste buds
- ▶ Basal stem cells are precursor cells which can divide and differentiate into two others



Taste bud. Taste pore (black arrow), gustatory cell (black star), and supportive cells (black circle). Basal stem cell are found at the bottom of taste bud. 140X. This picture is taken from histological slide in histology laboratory of Isfahan University



## Serous and mucous glands in tongue



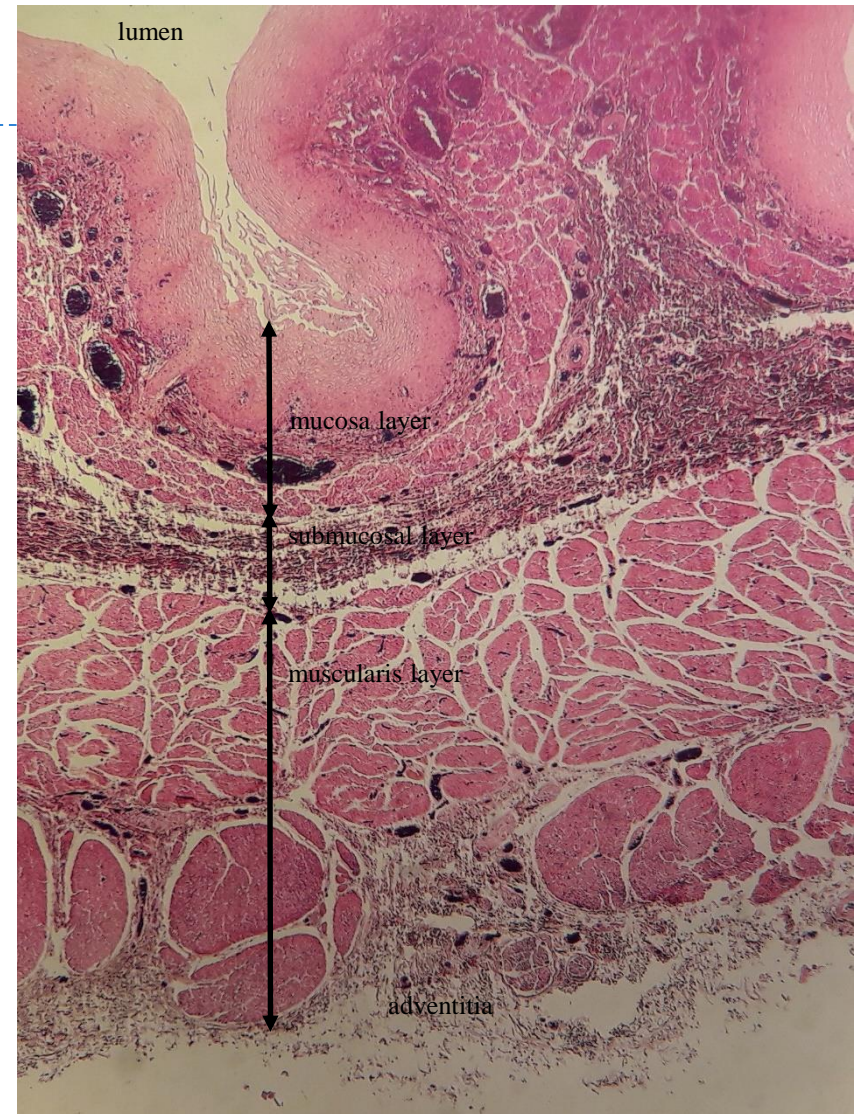
Glands in tongue. Mucous cells have pale cytoplasm with round nuclei located at the base of cells. Serous cells are polygonal with more basophilic cytoplasm and round nuclei H&E, 72X. This picture is taken from histological slide in histology laboratory of Isfahan University





# Esophagus

- ▶ The wall of esophagus contains of four layers:
- ▶ Mucosa layer
  - ▶ Non-keratinized squamous stratified epithelium
  - ▶ Lamina propria ( loose connective tissue)
  - ▶ Muscularis mucosae
- ▶ Submucosal layer (connective tissue)
- ▶ Muscularis layer (upper third, striated muscle; middle third, mixed of striated and smooth muscle; and lower third, smooth muscle)
- ▶ Adventitia
- ▶ Mucosal and submucosal glands are scattered throughout esophagus wall

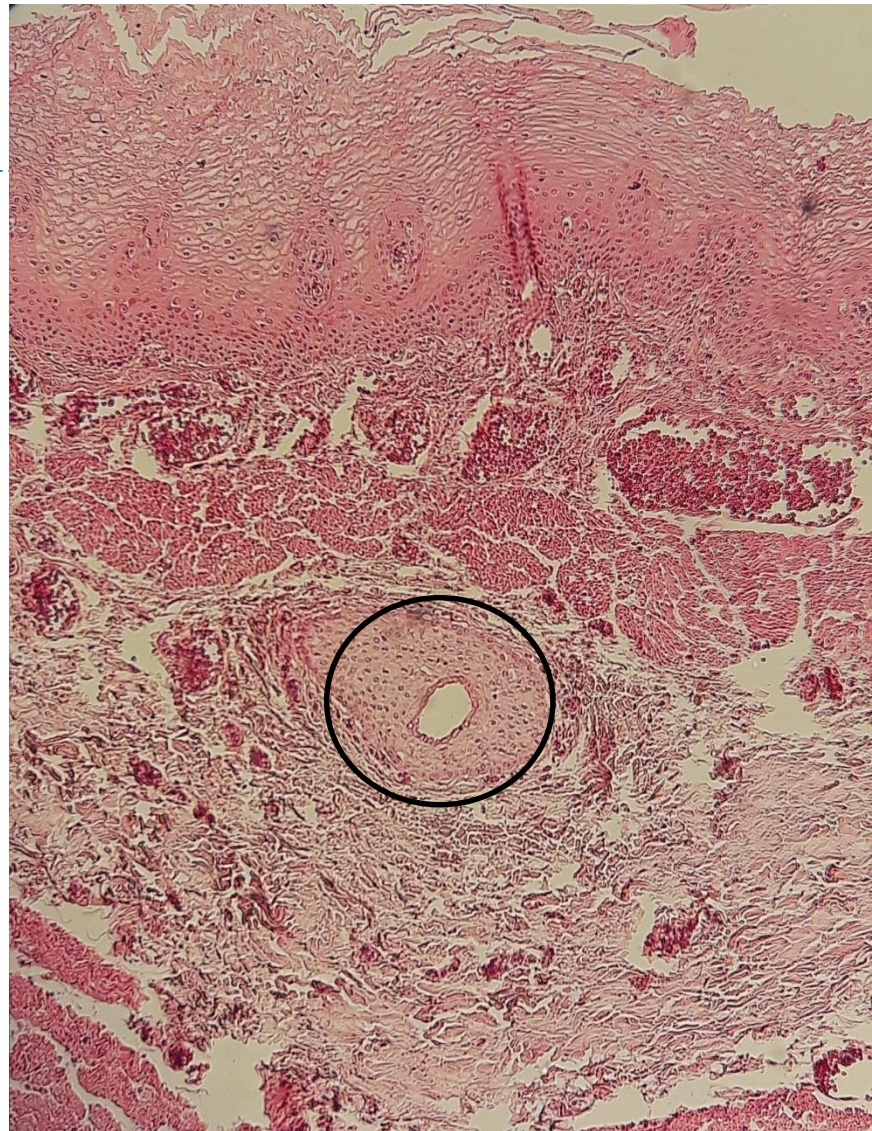


Cross section of esophagus wall. H&E, 14X. This picture is taken from histological slide in histology laboratory of Isfahan University





## Esophagus



non-keratinized squamous  
stratified epithelium

lamina propria

muscularis mucosae

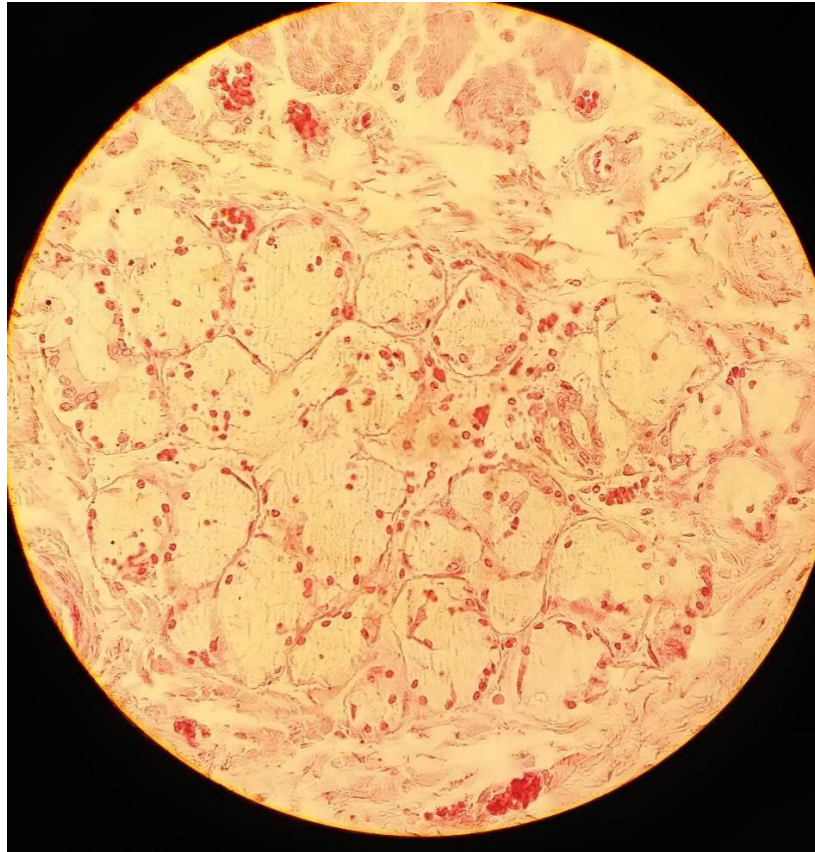
submucosal layer

Mucosa and submucosa in esophagus. Circle depicts a duct of esophagus gland. H&E, 14X. This picture is taken from histological slide in histology laboratory of Isfahan University



## Esophagus

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Esophageal gland in submucosal layer of esophagus. These are mucus gland which help lubricate mucosa layer and protect it. H&E, 40X. This picture is taken from histological slide in histology laboratory of Isfahan University





## Esophagus

- ▶ The external muscular layer of esophagus consists of inner layer of circular fibers and outer layer longitudinal fibers
- ▶ The circular muscular fibers run transverse at the cranial and caudal sections of the esophagus, but oblique in the body of esophagus



Cross section of esophagus. H&E, 10X. This picture is taken from histological slide in histology laboratory of Isfahan University