Layers of the GI Tract
1. Mucosa (mucous membrane)
   epithelium
   lamina propria
   muscularis mucosa
   i. Lining Mucosa: lip, cheek, floor of mouth, soft palate, ventral surface of tongue
   ii. Masticatory Mucosa: gingiva, hard palate
      i) Epithelium - keratinized or parakeratinized
      ii) Submucosa - absent
   iii. Specialized Mucosa: dorsal surface of tongue
      i) Filiform Papillae – keratinized epithelium
      ii) Fungi form Papillae - non-keratinized epithelium
      iii) (Foliate Papillae) - rudimentary in human
      iv) Circumvallate Papillae – non-keratinized epithelium with associated taste buds and von Ebner’s salivary glands
2. Submucosa
3. Muscularis Externa
   inner-circular
   outer-longitudinal
   (3rd layer in stomach)
4. Serosa or adventitia
Glands
   - Glands within the GI Tract
   - Glands outside - Salivary glands, Liver, Pancreas
   Epithelium - non-keratinized
   Submucosa contains salivary glands

- Oral Mucosa
  o Lip
    ▪ Outer lip: skin, hair follicles, sebaceous glands, sweat glands
    ▪ Vermillion border
      □ Capillaries close to surface, dilated --> red
      □ No salivary glands
    ▪ Oral mucosa: squamous non-keratinized epithelium, labial salivary glands in submucosa
      □ Lamina propria under mucosa
      □ Labial salivary glands
  o Masticatory Mucosa
    ▪ Stratified keratinized squamous epithelium on roof of mouth and gums
    ▪ Respiratory epithelium above it (nasal cavity)
    ▪ Bone in hard palate
    ▪ Tooth
  o Specialized Mucosa
    ▪ Dorsal and lateral borders of tongue covered by mucous membrane
    ▪ Dorsal surface has papillae
    ▪ Bundles of skeletal muscle crossing at right angles
    ▪ Dense lamina propria
    ▪ Filiform papillae - conical, core of lamina propria, keratinized epithelium
    ▪ Fungiform papillae - expanded, smooth, round tops
    ▪ Circumvallate papillae - large circular, deep trench, non-keratinized epithelium
- Taste buds on lateral borders
- Non-myelinated nerves
- Serous glands of von Ebner in lamina propria drain into base of trench

**Gingiva and Teeth**
- Muco-gingival junction: parakeratinized (keratin w/ cells)
- Gingiva
  - Highly keratinized and underlying CT that surrounds the teeth
  - Interdigitation w/ lamina propria increases surface area for epithelial attachment to CT
- Tooth
  - Enamel is removed because it is decalcified, 95% mineral
  - Dentin: 65% mineral, appears as acellular fibers
  - Cementum: between dentin and periodontal ligament
  - Periodontal ligaments bind alveolar bone to tooth dentin, Sharpey's fibers, extensive vascular supply
  - Cemento-enamel junction
  - Acellular cementum toward root apex
  - Cellular cementum can be differentiated by presence of cementocytes w/in lacunae
  - Bone appears as longitudinally oriented in alveolar socket; appears like immature or woven bone w/ no Haversian systems
  - Dentinal tubules in dentin w/ odontoblasts lining pulp cavity
  - Ameloblasts in enamel
- Gingival attachment
  - Epithelial attachment to enamel can break down leading to infection
  - Results in loss of alveolar bone, periodontal ligament and eventually the tooth
- Pulp is inside of teeth

**Salivary Glands**
- General structure
  - Gland has lobules
  - Divided by stromal tissue where blood vessels, nerves and large, interlobular ducts are
    - Interlobular ducts have pseudostratified columnar epithelium
  - Secretory acinar cells and ducts w/in each lobule
- Parotid (23% of saliva production)
  - Abundance of fat
  - Acinar cells fairly uniform in appearance because secretions are serous
  - Intralobular ducts made of simple columnar epithelium
    - Striated ducts transport water and ions
    - Intercalated ducts connect secretory acini and striated ducts
- Submandibular (65%) and sublingual (4%)
  - Mix of serous and mucous secretory cells
  - Mucous secretory cells stain lightly, nuclei pushed against basal cell membrane
    - Serous demilune cells at cap of region are brightly stained; fixation artifact because serious and mucous cells adjacent
  - Intercalated ducts too short to be seen in section
  - Sublingual has more mucous acini and fewer intralobular ducts --> stains lighter overall