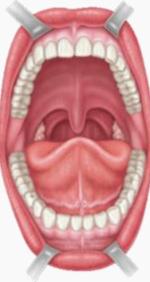
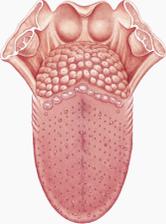
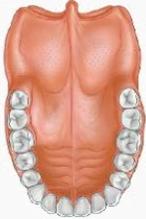


# GASTROINTESTINAL SYSTEM

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="123 448 203 517">Oral Cavity</p> 	<ul style="list-style-type: none"> <li>× The oral cavity has two openings:               <ul style="list-style-type: none"> <li>○ An anterior opening space between the upper and the lower lips).</li> <li>○ A posterior opening called oropharyngeal isthmus (opens into the pharynx).</li> </ul> </li> <li>× The vestibule is the cavity outside the closed teeth. It communicates with the mouth proper behind the third (last) molar tooth on each side when the jaws are closed.</li> <li>× The mouth proper is the cavity found inside the closed teeth.</li> </ul>	<ul style="list-style-type: none"> <li>× <b>Keratinized</b> stratified squamous epithelium: skin, the gingiva (gum).</li> <li>× <b>Non-keratinized</b>: soft palate, cheeks, floor of the mouth, mucosa.</li> <li>× <b>A modified squamous epithelium</b>: the transitional zone (vermilion zone; reddish part of the lips).</li> <li>× Lamina propria has many papillae and contains small salivary glands.</li> <li>× <b>Para-keratinized</b>: hard palate</li> </ul>	<ul style="list-style-type: none"> <li>× The mouth has 2 sources of development:               <ol style="list-style-type: none"> <li>1. depression in the <b>stomodeum</b> (lined with <b>ectoderm</b>)</li> <li>2. <b>cephalic</b> end of the <b>foregut</b> (lined with <b>endoderm</b>)</li> </ol> </li> <li>× These two points are separated by the <b>buccopharyngeal membrane</b>. During the 3rd week of development, the membrane disappears.</li> <li>× If the membrane persists it will extend to: Body of sphenoid, Soft palate, inner surface of the mandible, inferior to the incisor teeth</li> <li>× Structures that are <b>anterior</b> to this plane are <b>ectodermic</b> in origin(epithelium) like: Hard palate, Sides of the mouth, Lips, Enamel of the teeth</li> <li>× Structures situated <b>posterior</b> to this plane are derived from <b>endoderm</b>: Tongue, Soft palate, Palatoglossus and palatopharyngeal folds, Floor of the mouth</li> </ul>
<p data-bbox="114 1107 212 1139">Tongue</p> 	<ul style="list-style-type: none"> <li>× Posterior 1/3 of the dorsal surface is separated from anterior 2/3 by a V-shaped sulcus, the sulcus terminalis.</li> <li>× The apex of the sulcus: foramen cecum → upper end of the thyroglossal duct.</li> <li>× Behind the sulcus (Posterior 1/3) → lingual tonsils, no taste buds.</li> </ul>	<ul style="list-style-type: none"> <li>× A mass of striated muscle covered by mucous membrane (strongly adherent).</li> <li>× The dorsum surface → stratified squamous <b>para-keratinized</b></li> <li>× Ventral surface → smooth mucous membrane</li> <li>× Dorsal surface → irregular, covered by papillae</li> <li>× Filiform papillae: <b>keratinized</b>, no taste buds</li> <li>× Fungiform, foliate (poorly developed), circumvallate papillae (contains von Ebner's glands): contain taste buds.</li> </ul>	<ul style="list-style-type: none"> <li>× Appears in embryos of 4 weeks in the form of two lateral lingual swellings and one medial swelling, the tuberculum impar</li> <li>× These three swellings originate from <b>the first pharyngeal arch</b>.</li> <li>× A second median swelling, the copula, or hypobranchial eminence, is formed by <b>mesoderm</b> of the <b>second, third, and part of the fourth arch</b>.</li> <li>× Finally, a third median swelling, formed by <b>the posterior part of the fourth arch</b>, marks development of the <b>epiglottis</b>. Immediately behind this swelling is the laryngeal orifice.</li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
			<ul style="list-style-type: none"> <li>× As the lateral lingual swellings increase in size, they overgrow the tuberculum impar and merge, forming the anterior two-thirds, or body, of the tongue</li> <li>× The posterior part originates from the second, third, and part of the fourth pharyngeal arch.</li> <li>× the muscles probably differentiate in situ, but most are derived from myoblasts</li> </ul>
<p style="text-align: center;"><b>Palate</b></p> 	<ul style="list-style-type: none"> <li>× In the midline of hard palate: incisive foramen (passage of incisive vessels and nerves to nasal cavity)</li> <li>× Near the last molar teeth: the greater and lesser palatine foramina (passage of blood vessels and nerves)</li> </ul>	<ul style="list-style-type: none"> <li>× Hard palate: <b>Para-keratinized</b> stratified squamous epithelium, tough mucosa.</li> <li>× Soft palate: <ul style="list-style-type: none"> <li>-Upper surface: <b>ciliated pseudo-stratified columnar</b> epithelium (<i>follow respiratory system</i>)</li> <li>-Lower surface: <b>non-keratinized stratified squamous</b> epithelium (<i>follows GIS</i>)</li> </ul> </li> <li>× submucosa of soft palate consists of skeletal muscle (core), mucous glands and lymphoid nodules.</li> </ul>	<ul style="list-style-type: none"> <li>× The palate originates from the right and left maxillary processes and they meet each other at the midline.</li> <li>× If fusion doesn't occur → palate or upper lip cleft.</li> </ul>
<p style="text-align: center;"><b>Parotid Gland</b></p>	<ul style="list-style-type: none"> <li>× Location: below the external auditory meatus, behind the ramus of the mandible and in front of the sternocleidomastoid muscle.</li> <li>× The gland is surrounded by two capsules (an exception): regular capsule and outer capsule (part of deep fascia of the neck)</li> <li>× Contents: facial nerve and its branches, retromandibular vein, external carotid artery, auriculotemporal nerve, parotid lymph nodes.</li> <li>× The parotid gland lies in the parotid bed that is formed by: <ul style="list-style-type: none"> <li>-<b>Posteriorly:</b> the sternocleidomastoid muscle and the post. belly of digastric. <b>Anteriorly:</b> ramus of mandible. <b>Superiorly:</b> base of the trench is formed by the external acoustic meatus and the posterior aspect of the zygomatic arch. <b>Medially:</b> the carotid sheath and its contents (Vagus nerve, CCA, IJV).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× <b>Serous</b> secretions; a <b>branched acinar</b> gland</li> <li>× Secretions have high amylase activity</li> <li>× Intercalated and striated ducts are easily observed</li> <li>× Plasma cells secrete IgA (resistant to enzymatic digestion) forms a complex with the secretory components of the cells</li> <li>× <b>No presence of demilunes</b></li> </ul>	<ul style="list-style-type: none"> <li>× <b>Development of salivary glands:</b> during the 7th week it arises as a solid outgrowth of cells <b>from the walls of the developing mouth</b></li> <li>× These cells will grow into the underlying <b>mesenchyme</b></li> <li>× The epithelial buds will go through repeated branching to form solid ducts. The ends of these ducts will form the secretory acini, and they will both go through canalization</li> <li>× The surrounding <b>mesenchyme</b> will condense to form: the capsule of the gland &amp; Septa that divide the gland into different lobes and lobules</li> <li>× The ducts and acini of the <b>parotid</b> gland are both derived from the <b>ectoderm</b></li> </ul>

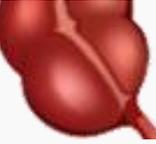
PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="69 199 253 268"><b>Submandibular Gland</b></p> 	<ul style="list-style-type: none"> <li>× <b>Location:</b> it lies beneath the lower border of the body of the mandible (between anterior and posterior belly of digastric)</li> <li>× Divided into superficial and deep parts by the mylohyoid muscle; superficial part is outside the boundaries of the oral cavity</li> <li>× Lingual nerve has triple relations with the submandibular duct: lateral → below → anteromedially (deep)</li> </ul>	<ul style="list-style-type: none"> <li>× Mixed (<b>seromucous</b>) mainly <b>serous</b></li> <li>× <b>Branched tubuloacinar</b> gland</li> <li>× Serous cells (main): rounded nuclei and <b>basophilic</b> cytoplasm</li> <li>× Has serous acini, mucous tubules and serous demilunes</li> <li>× Demilunes' cells: secrete lysozyme</li> <li>× Some cells secrete lactoferrin</li> <li>× Striated ducts are easily observed, but intercalated ducts are very short.</li> </ul>	<ul style="list-style-type: none"> <li>× <b>Submandibular</b> and <b>sublingual</b> glands are derived from the <b>endoderm</b></li> </ul>
<p data-bbox="91 624 230 692"><b>Sublingual Gland</b></p>	<ul style="list-style-type: none"> <li>× <b>Location:</b> The sublingual gland lies beneath the mucous membrane (sublingual fold) of the floor of the mouth, close to the frenulum of the tongue</li> </ul>	<ul style="list-style-type: none"> <li>× Secretion: mixed (<b>seromucous</b>) mainly <b>mucous</b></li> <li>× <b>Branched tubuloacinar</b> gland</li> <li>× Mucous cells predominate in this gland; serous cells are present on demilunes of mucous tubules</li> <li>× Intralobular ducts are not as developed as other glands</li> </ul>	
<p data-bbox="107 978 219 1011"><b>Pharynx</b></p> 	<ul style="list-style-type: none"> <li>× Situated behind the nasal cavities, the mouth, and the larynx and is divided into: nasal, oral, and laryngeal parts.</li> <li>× Palatine tonsils on the lateral wall of the oropharynx</li> <li>× At the sides and posteriorly: musculo-membranous wall</li> <li>× Anteriorly its open and is replaced by: <ul style="list-style-type: none"> <li>-The posterior openings of the nose (choanae) into the nasopharynx</li> <li>-The opening of the mouth into the oropharynx (Oropharyngeal isthmus)</li> <li>- The inlet of the larynx into the laryngopharynx (hypopharynx)</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>× Develops in the neck from the <b>endoderm</b> of the <b>foregut</b></li> <li>× The endoderm is separate from the surface ectoderm by mesenchyme. The mesenchyme in each side splits up to 5-6 arches</li> <li>× Each arch forms a swelling on the surface of the walls of the foregut</li> <li>× As a result of these swellings a series of clefts are seen between the arches (<b>pharyngeal clefts</b>)</li> <li>× Similar grooves are found on the lateral walls of the foregut (<b>pharyngeal pouches</b>)</li> <li>× The respiratory primordium maintains its communication with the pharynx through <b>the laryngeal orifice</b></li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="91 719 232 751">Esophagus</p> 	<ul style="list-style-type: none"> <li>× It passes through the diaphragm at the level of the 10th thoracic vertebra to join the stomach</li> <li>× In the neck, the esophagus lies: Anterior to the vertebral column, posterior to trachea and recurrent laryngeal nerve, lateral to lobes of the thyroid gland.</li> <li>× In the thorax, it passes downward and to the left through the superior and then the posterior mediastinum</li> <li>× At the level of the sternal angle, the aortic arch pushes the esophagus over to the midline</li> <li>× Relations of thoracic part of esophagus : <ul style="list-style-type: none"> <li>-<b>Anteriorly:</b> The trachea and the left recurrent laryngeal nerve; the left principal bronchus, which constricts it; and the pericardium, which separates the esophagus from the left atrium</li> <li>-<b>Posteriorly:</b> The bodies of the thoracic vertebrae; the thoracic duct; the azygos veins; the right posterior intercostal arteries; and, at its lower end, the descending thoracic aorta</li> <li>-<b>Right side:</b> The mediastinal pleura and the terminal part of the azygos vein</li> <li>- <b>Left side:</b> The left subclavian artery, the aortic arch, the thoracic duct, and the mediastinal pleura</li> </ul> </li> <li>× The left vagus lies anterior and the right vagus lies posterior</li> <li>× At the opening in the diaphragm, the esophagus is accompanied by the two vagi, branches of the left gastric blood vessels, and lymphatic vessels</li> <li>× Fibers from the right crus of the diaphragm pass around the esophagus in the form of a sling</li> <li>× It is related to the left lobe of the liver anteriorly and to the left crus of the diaphragm posteriorly.</li> </ul>	<ul style="list-style-type: none"> <li>× The esophagus is covered by <b>nonkeratinized stratified squamous epithelium</b></li> <li>× Submucosa contains esophageal glands</li> <li>× Lamina propria contains esophageal cardiac glands</li> <li>× Distal end: lower esophageal sphincter which consists of only smooth muscle</li> <li>× In the mid portion, a mixture of striated and smooth muscle cells; and at the proximal end, only striated muscle cells.</li> <li>× The rest is covered by a layer of connective tissue, the adventitia, that blends into the surrounding tissue.</li> </ul>	<ul style="list-style-type: none"> <li>× Epithelium of the internal lining of <b>the larynx, trachea, esophagus and bronchi</b>, as well as that of the lungs, <b>is entirely of endodermal origin.</b></li> <li>× Initially the lung bud is in open communication with the foregut</li> <li>× When the diverticulum expands caudally, however, two longitudinal ridges, the tracheoesophageal ridges, separate it from the foregut</li> <li>× Subsequently, when these ridges fuse to form the tracheoesophageal septum, the <b>foregut</b> is divided into a <b>dorsal portion</b>, the <b>esophagus</b>, and a <b>ventral portion</b>, the <b>trachea</b> and <b>lung buds</b></li> <li>× At first the esophagus is short but with descent of the heart and lungs it lengthens rapidly</li> <li>× Note! The cartilaginous, muscular, and connective tissue components of the trachea and lungs are derived from <b>splanchnic mesoderm surrounding the foregut</b></li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="107 555 219 584">Stomach</p> 	<ul style="list-style-type: none"> <li>× Location: in the upper part of the abdomen extending from beneath the left costal margin region into the epigastric and umbilical regions (it occupies the left upper quadrant mainly in the epigastric region)</li> <li>× Intraperitoneal organ</li> <li>× 4 regions: cardia, fundus, body and the pylorus</li> <li>× 2 curvatures: <b>Lesser curvature &amp; Greater curvature</b></li> <li>× 2 orifices: <ul style="list-style-type: none"> <li>-<b>Cardiac orifice</b>: communicates with the esophagus, located at 7<sup>th</sup> left costal cartilage 1 inch left to midline (no anatomical sphincter)</li> <li>-<b>Pyloric orifice</b>: junction between duodenum and stomach, located on the level of L1, 1 inch to right of midline (circular muscle is much thicker: has anatomical sphincter)</li> </ul> </li> <li>× <b>Relations</b>: <ul style="list-style-type: none"> <li>-<b>Anteriorly</b>: the anterior abdominal wall, the left costal margins, the left pleura, the lung, the diaphragm, the left lobe of the liver.</li> <li>-<b>Posteriorly</b>: lesser sac, left crus of diaphragm, spleen, left suprarenal gland, upper part of left kidney, splenic artery, body of pancreas, transverse colon and its mesocolon.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× <b>Simple columnar epithelium without goblet cells</b>. Covered by alkaline layer.</li> <li>× Mucosa is thick, vascular and has a wrinkled aspect, consisting of ridges called <b>gastric folds, or rugae</b>.</li> <li>× A gastric canal is formed between the gastric folds.</li> <li>× The epithelial layer contains numerous invaginations, called <b>gastric pits</b>, that extend deeper into structures called <b>gastric glands</b>.</li> <li>× Various cell types: mucous neck cells, parietal cells, chief cells and neuroendocrine cells.</li> <li>× Muscularis externa: inner oblique, middle circular (role in forming the pyloric sphincter), and external longitudinal (run along the curvatures).</li> <li>× Cardia: mucosa contains <b>simple/branched tubular cardiac glands</b></li> <li>× The lamina propria of the fundus and body is filled with branched, tubular gastric (fundic) gland. The <b>isthmus</b> of the glands contains stem cells and oxyntic parietal cells. The <b>neck</b> contains stem, mucous neck and parietal cells. The <b>base</b> contains parietal and chief cells. Enteroendocrine cells are also found in the neck and base of the gland.</li> </ul>	<ul style="list-style-type: none"> <li>× The stomach appears as a fusiform dilation of the foregut in the fourth week of development</li> <li>× The stomach rotates 90° clockwise around its longitudinal axis, causing its <b>left</b> side to face <b>anteriorly</b> and its <b>right</b> side to face <b>posteriorly</b>. Hence the <b>left</b> vagus nerve, initially innervating the left side of the stomach, now innervates the <b>anterior</b> wall. Similarly, the <b>right</b> vagus nerve innervates the <b>posterior</b> wall</li> <li>× During this rotation the original posterior wall of the stomach grows faster than the anterior portion, <b>forming the greater and lesser curvatures</b></li> <li>× The cephalic and caudal ends of the stomach originally lie in the midline, but during further growth the stomach rotates around an anteroposterior axis → the caudal part moves to right and upward and the cephalic moves to the left and slightly downward. The stomach thus assumes its final position, its axis running from above left to below right.</li> <li>× Rotation about the longitudinal axis pulls the dorsal mesogastrium to the left, creating a space behind the stomach called the omental bursa (<b>lesser peritoneal sac</b>). This rotation also pulls the ventral mesogastrium to the right.</li> </ul>
<p data-bbox="89 1257 237 1286">Duodenum</p> 	<ul style="list-style-type: none"> <li>× Most of the duodenum is retroperitoneal except the 1st inch &amp; last inch (intraperitoneal)</li> <li>× Situated in the epigastric and umbilical regions.</li> <li>× Begins at the pyloric sphincter (stomach) and ends at the ligament of Treitz which continues as the jejunum.</li> <li>× It has four parts, the 1st is 2 inches, the 2nd is 3 inches, the 3rd is 4 inches and the 4th is 1 inch</li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar epithelium with goblet cells</b></li> <li>× <b>Submucosa</b> contains <b>Brunner's glands</b> (produce alkaline secretions)</li> <li>× The lining of the small intestine shows a series of permanent folds, <b>plicae circulares (Kerkring's valves)</b>, <b>not very significant in duodenum</b></li> </ul>	<ul style="list-style-type: none"> <li>× The <b>terminal part of the foregut</b> and the <b>cephalic part of the midgut</b> form the Duodenum</li> <li>× The junction of the two parts is directly distal to the origin of the liver bud</li> <li>× As the stomach rotates, the duodenum takes on the form of a C-shaped loop and rotates to the right</li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
	<ul style="list-style-type: none"> <li>× 2<sup>nd</sup> part receives common bile and pancreatic ducts (open into ampulla of Vater, around it is a smooth muscle called sphincter of Oddi). We call this opening from the inside the major duodenal papilla.</li> <li>× <b>1<sup>st</sup> part:</b> runs upward and backward at the level of the 1<sup>st</sup> lumbar vertebra 1 inch to the right, <b>Relations:</b>  <b>-Anteriorly:</b> quadratus lobe of liver, the gall bladder, <b>Superiorly:</b> the epiploic foramen (free edge of lesser omentum contains common pyloric duct, hepatic artery and portal vein), <b>Posteriorly:</b> lesser sac, bile duct, portal vein, inferior vena cava, gastroduodenal artery, <b>Inferiorly:</b> head of pancreas.</li> <li>× <b>2<sup>nd</sup> part:</b> runs downward vertically on the right side in front of the right kidney and right ureter and ends next to 3<sup>rd</sup> and 4<sup>th</sup> lumbar vertebrae, <b>Relations:</b>  <b>-Anteriorly:</b> fundus of gallbladder, right lobe of liver, transverse colon, coils of small intestine, <b>Posteriorly:</b> Hilum of right kidney, right ureter, <b>Laterally:</b> right colic flexure, ascending colon, right lobe of liver, <b>Medially:</b> head of pancreas, bile and pancreatic duct</li> <li>× <b>3<sup>rd</sup> part:</b> Runs horizontally to the left, in front of the vertebral column, <b>Relations:</b>  <b>-Anteriorly:</b> root of mesentery of small intestine, superior mesenteric vessels within mesentery of jejunum, <b>Posteriorly:</b> right ureter, right psoas muscle, inferior vena cava, aorta. <b>Superiorly:</b> head of pancreas. <b>Inferiorly:</b> coils of jejunum.</li> <li>× <b>4<sup>th</sup> part:</b> upward to the left, ends in the duodenojejunal junction at level of 2<sup>nd</sup> lumbar vertebrae. <b>Relations:</b>  <b>-Anteriorly:</b> beginning of root of mesentery, coils of jejunum, <b>Posteriorly:</b> left psoas muscle, sympathetic chain on left margin of aorta, <b>Superiorly:</b> uncinate process of pancreas</li> </ul>	<ul style="list-style-type: none"> <li>× <b>Intestinal villi</b> in duodenum are leaf shaped, gradually assuming fingerlike shapes as they reach the ileum</li> <li>× Lamina propria contains glands called <b>crypts of Lieberküh</b> (between villi)</li> </ul>	<ul style="list-style-type: none"> <li>× This rotation, together with rapid growth of the head of the pancreas, swings the duodenum from <b>its initial midline position to the left side of the abdominal cavity</b></li> <li>× The duodenum and head of the pancreas press against the dorsal body wall, and the right surface of the dorsal mesoduodenum fuses with the adjacent peritoneum.</li> <li>× Both layers subsequently disappear, and the duodenum and head of the pancreas become fixed in a <b>retroperitoneal position</b></li> <li>× The dorsal mesoduodenum disappears entirely except in the region of the pylorus of the stomach, where a small portion of the duodenum (duodenal cap) retains its mesentery and remains intraperitoneal</li> <li>× During the second month, the lumen of the duodenum is <b>obliterated</b> by proliferation of cells in its walls. However, the lumen is <b>recanalized</b> shortly thereafter</li> <li>× Since the foregut is supplied by the celiac artery and the midgut is supplied by the superior mesenteric artery, the duodenum is supplied by <b>branches of both arteries</b></li> </ul>

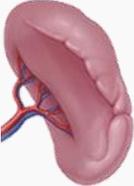
PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="107 320 219 347"><b>Jejunum</b></p> 	<ul style="list-style-type: none"> <li>× Intraperitoneal organs (have a mesentery that extends downward and to the right from the left side of the second lumbar vertebra to the region of the right sacroiliac joint)</li> <li>× The upper 2/5 is the jejunum &amp; the lower 3/5 is the ileum</li> <li>× Located in the umbilical region, surrounded by large intestine</li> <li>× Jejunum: upper part of the peritoneal cavity below the left side of the transverse mesocolon</li> <li>× Ileum: in the lower part of the cavity and in the pelvis</li> <li>× Jejunum is thicker, redder, their arcades are simple and has long vasa recta. Less fat (appear window). Wider diameter and numerous villi. The plicae circularis are larger, more numerous and closely set. There are no or few lymphatic follicles.</li> <li>× Ileum is thinner and less redder. The arcades are numerous and has short vasa recta. Big amount of fat (no window appear). Smaller diameter and less numerous villi. Plicae circularis is smaller, more separated and absent in the lower part. There are aggregation of lymphoid tissue called Peyer's patches.</li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar epithelium with goblet cells</b></li> <li>× The lining of the small intestine shows a series of permanent folds, <b>plicae circulares (Kerckring's valves), they are most developed in jejunum</b></li> <li>× Contain intestinal villi, lamina propria contains glands called <b>crypts of Lieberküh (between villi)</b></li> <li>× The intestinal glands contain stem cells, some absorptive cells, goblet cells and enteroendocrine cells. At the base of the gland there are bactericidal cells called <b>paneth cells.</b></li> <li>× Absorptive cells or enterocytes are tall columnar cells, each with an oval nucleus in the basal half of the cell. At the apex of each cell is a homogeneous layer called the striated (brush) border. When viewed with the electron microscope, the striated border is seen to be a layer of <b>densely packed microvilli</b></li> <li>× The lamina propria and the submucosa of the small intestine (mainly ileum) contain aggregates of lymphoid nodules known as Peyer's patches, an important component of the GALT. Each Peyer's patch appears as a dome-shaped area devoid of villi. Instead of absorptive cells, its covering epithelium consists of Microfold cells</li> <li>× The muscularis is well developed in the intestines, composed of an internal circular layer and an external longitudinal layer</li> </ul>	<ul style="list-style-type: none"> <li>× The midgut is suspended from the dorsal abdominal wall by a short mesentery and communicates with the yolk sac by way of the vitelline duct or yolk stalk</li> <li>× Over its entire length the midgut is supplied by the superior mesenteric artery</li> <li>× Development of the midgut is characterized by rapid elongation of the gut and its mesentery, resulting in formation of the primary intestinal loop</li> <li>× At its apex, the loop remains in open connection with the yolk sac by way of the narrow vitelline duct</li> <li>× In the adult the midgut begins immediately distal to the entrance of the bile duct into the duodenum</li> <li>× It terminates at the junction of the proximal two-thirds of the transverse colon with the distal third.</li> <li>× The cephalic limb of the loop develops into the distal part of the duodenum, the jejunum, and part of the ileum.</li> <li>× The caudal limb becomes the lower portion of the ileum, the cecum, the appendix, the ascending colon, and the proximal two-thirds of the transverse colon.</li> </ul>
<p data-bbox="125 1038 201 1066"><b>Ileum</b></p> 			

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p><b>Cecum</b></p> 	<ul style="list-style-type: none"> <li>× 2.5-3 inches</li> <li>× Intraperitoneal organ</li> <li>× Location: right iliac fossa, above the lateral half of inguinal ligament (lies on iliacus and psoas major muscles)</li> <li>× Has teania coli (3 separate longitudinal ribbons of smooth muscle) which causes sacculatation (haustra)</li> <li>× Doesn't have appendices epiplolca (adipose structures)</li> <li>× <b>Relations:</b> <ul style="list-style-type: none"> <li>-<b>Anteriorly:</b> coils of small intestine (ileum), greater omentum, the anterior abdominal wall in the right iliac region</li> <li>-<b>Posteriorly:</b> the psoas and the iliacus muscles, femoral nerve and the lateral cutaneous nerve of the thigh .</li> <li>- <b>Postero- medially:</b> appendix is commonly found in retrocecal recess.</li> <li>-<b>Medially:</b> Small intestine( ileum)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar with goblet cells</b> (numerous); <b>thicker</b> than small intestine</li> <li>× <b>No villi, straight surface (no folds)</b></li> <li>× Crypts of liberkün lack paneth cells, they contain lymphatic nodules. Crypts are <b>longer</b> than in small intestine.</li> <li>× The intestinal glands are long and characterized by <b>a great abundance of goblet</b> and absorptive cells and a small number of enteroendocrine cells</li> <li>× The absorptive cells are columnar and have short, irregular microvilli</li> <li>× The lamina propria is reduced and is rich in lymphoid cells and in nodules that frequently extend into the submucosa</li> <li>× The muscularis comprises longitudinal and circular strands (<b>well developed</b>)</li> </ul>	
<p><b>Appendix</b></p> 	<ul style="list-style-type: none"> <li>× 3-5 inches</li> <li>× Intraperitoneal ( mesoappendix)</li> <li>× Location: in the right iliac fossa in relation to anterior abdominal wall</li> <li>× Most common site: retrocecal recess (behind cecum)</li> <li>× No teania coli, haustrations nor appendices epiplolca</li> <li>× For incision: Mcburney's point (to reach the appendix during <b>operation</b> follow the taenia coli which converge toward the base of appendix)</li> </ul>	<ul style="list-style-type: none"> <li>× Characterized by a relatively small, narrow, and irregular lumen caused by the presence of abundant lymphoid follicles in its wall that form a circular layer in the mucosa and may infiltrate the submucosa.</li> <li>× Although its general structure is similar to that of the large intestine (same epithelium), it contains <b>fewer and shorter intestinal glands and has no teniae coli.</b></li> </ul>	
<p><b>Ascending Colon</b></p> 	<ul style="list-style-type: none"> <li>× 5 inches</li> <li>× Location: in the right lower quadrant</li> <li>× Retroperitoneal organ</li> <li>× Extends from cecum to right colic flexure</li> <li>× Has teania coli (3 separate longitudinal ribbons of smooth muscle) which causes sacculatation (haustra)</li> <li>× Has appendices epiplolca (adipose structures)</li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar with goblet cells</b> (numerous); <b>thicker</b> than small intestine</li> <li>× <b>No villi, straight surface (no folds)</b></li> <li>× Crypts of liberkün lack paneth cells, they contain lymphatic nodules. Crypts are <b>longer</b> than in small intestine.</li> </ul>	

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
	<ul style="list-style-type: none"> <li>× <b>Relations:</b> <ul style="list-style-type: none"> <li>-<b>Anteriorly:</b> Coils of small intestine, the greater omentum, the anterior abdominal wall</li> <li>-<b>Posteriorly:</b> The iliacus, The iliac crest, The quadratus lumborum, The origin of the transversus abdominis muscle, The lower pole of the right kidney, The iliohypogastric nerve, the ilioinguinal nerve cross behind it.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× The intestinal glands are long and characterized by <b>a great abundance of goblet</b> and absorptive cells and a small number of enteroendocrine cells</li> <li>× The absorptive cells are columnar and have short, irregular microvilli</li> <li>× The lamina propria is reduced and is rich in lymphoid cells and in nodules that frequently extend into the submucosa</li> <li>× The muscularis comprises longitudinal and circular strands (<b>well developed</b>)</li> </ul>	
<p data-bbox="91 946 232 1011"><b>Transverse Colon</b></p> 	<ul style="list-style-type: none"> <li>× 15 inches</li> <li>× Extends across the abdomen occupying the umbilical region (begins at right colic flexure below hepatic right lobe, hangs downward, ascends to left colic flexure below spleen -suspended from diaphragm by phrenicocolic ligament-)</li> <li>× Intraperitoneal organ</li> <li>× <b>Transverse mesocolon:</b> suspends the transverse colon from the anterior border of the pancreas, it is attached to the superior border of the transverse colon, the posterior layers of the greater omentum are attached to the inferior border</li> <li>× Has teania coli (3 separate longitudinal ribbons of smooth muscle) which causes saculation (haustra)</li> <li>× Has appendices epiploica (adipose structures)</li> <li>× <b>Relations:</b> <ul style="list-style-type: none"> <li>-<b>Anteriorly:</b> the greater omentum and the anterior abdominal wall (umbilical and hypogastric regions)</li> <li>-<b>Posteriorly:</b> second part of the Duodenum, head of the pancreas, coils of the jejunum and ileum</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar with goblet cells</b> (numerous); <b>thicker</b> than small intestine</li> <li>× <b>No villi, straight surface (no folds)</b></li> <li>× Crypts of lieberkün lack paneth cells, they contain lymphatic nodules. Crypts are <b>longer</b> than in small intestine.</li> <li>× The intestinal glands are long and characterized by <b>a great abundance of goblet</b> and absorptive cells and a small number of enteroendocrine cells</li> <li>× The absorptive cells are columnar and have short, irregular microvilli</li> <li>× The lamina propria is reduced and is rich in lymphoid cells and in nodules that frequently extend into the submucosa</li> <li>× The muscularis comprises longitudinal and circular strands (<b>well developed</b>)</li> </ul>	<ul style="list-style-type: none"> <li>× The proximal 2/3 originate from caudal limb of midgut.</li> <li>× The distal third originates from the hindgut.</li> </ul>

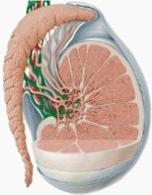
PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
<p data-bbox="85 325 237 392"><b>Descending Colon</b></p> 	<ul style="list-style-type: none"> <li>× 10 inches</li> <li>× Retroperitoneal organ</li> <li>× Extends from left colic flexure to pelvic brim and continuous as sigmoid colon</li> <li>× Has tenia coli (3 separate longitudinal ribbons of smooth muscle) which causes sacculations (hastra)</li> <li>× Has appendices epiploica (adipose structures)</li> <li>× <b>Relations:</b> <ul style="list-style-type: none"> <li>- <b>Anteriorly:</b> coils of small intestine, the greater omentum, the anterior abdominal wall</li> <li>- <b>Posteriorly:</b> lateral border of the left kidney, the origin of the transversus abdominis muscle, the quadratus lumborum, the iliac crest, the iliacus, the left psoas, the iliohypogastric and the ilioinguinal nerves, the lateral cutaneous nerve of the thigh, the femoral nerve.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: <b>simple columnar with goblet cells</b> (numerous); <b>thicker</b> than small intestine</li> <li>× <b>No villi, straight surface (no folds)</b></li> <li>× Crypts of Lieberkühn lack Paneth cells, they contain lymphatic nodules. Crypts are <b>longer</b> than in small intestine.</li> <li>× The intestinal glands are long and characterized by <b>a great abundance of goblet</b> and absorptive cells and a small number of enteroendocrine cells</li> <li>× The absorptive cells are columnar and have short, irregular microvilli</li> <li>× The lamina propria is reduced and is rich in lymphoid cells and in nodules that frequently extend into the submucosa</li> <li>× The muscularis comprises longitudinal and circular strands (<b>well developed</b>)</li> </ul>	<ul style="list-style-type: none"> <li>× Originates from hindgut</li> </ul>
<p data-bbox="129 1072 197 1101"><b>Liver</b></p> 	<ul style="list-style-type: none"> <li>× Location: occupies hypochondrium + epigastrium &amp; extends to left hypochondrium</li> <li>× Intrahepatic organ (covered with peritoneum except bare area)</li> <li>× Has 5 surfaces: anterior, posterior, right, superior (diaphragmatic), postero-inferior (visceral)</li> <li>× <b>Relations of visceral surface</b> (posterior relations): IVC, esophagus, stomach, duodenum, right colic flexure, right kidney, right suprarenal gland, gallbladder, porta hepatis (GB, H. Artery, portal vein), fissure for lig. Venosum &amp; lesser omentum, tubular omentum, lig. Teres</li> <li>× <b>Relations of superior surface:</b> diaphragm, pleura &amp; lung, pericardium &amp; heart</li> <li>× <b>Anterior relations:</b> diaphragm, right and left pleura and lung, costal cartilage, xiphoid process, ant. Abdominal wall.</li> <li>× Right and left lobe separated by 3 ligaments (falciform, venosum, teres)</li> </ul>	<ul style="list-style-type: none"> <li>× Glands are covered by CT capsule called <b>Glisson capsule</b> (thicker at hilum) which sends septa dividing the liver into lobes and <b>hexagonal lobules</b></li> <li>× Hexagonal lobules are composed of: central vein and hepatocytes, at each angle there's <b>a portal triad</b> (bile duct, hepatic arteriole, portal venule and lymphatics)</li> <li>× The venule contains blood coming from the superior and inferior mesenteric and splenic veins, and it's the largest structure.</li> <li>× The arteriole contains oxygen-rich blood coming from the celiac trunk of the abdominal aorta.</li> <li>× The duct is lined by <b>cuboidal epithelium</b></li> <li>× Vessels form sinuses between hepatocytes</li> <li>× <b>Liver sinusoid contains endothelial and Kupffer cells</b></li> </ul>	<ul style="list-style-type: none"> <li>× The liver primordium appears in the middle of the third week as an outgrowth of the <b>endodermal epithelium at the distal end of the foregut</b></li> <li>× This outgrowth, the hepatic diverticulum, or liver bud, consists of rapidly proliferating cells that penetrate the septum transversum, that is, the mesodermal plate between the pericardial cavity and the stalk of the yolk sac</li> <li>× While hepatic cells continue to penetrate the septum, the connection between the hepatic diverticulum and the foregut (duodenum) narrows, <b>forming the bile duct</b></li> <li>× A small ventral outgrowth is formed by the bile duct, and this outgrowth gives rise to the gallbladder and the cystic duct</li> <li>× During further development, epithelial liver cords intermingle with the vitelline and umbilical veins, which form hepatic sinusoids</li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
	<ul style="list-style-type: none"> <li>× <b>Relations of caudate lobe: inferiorly:</b> porta hepatis, <b>right:</b> IVC, left: lig. Venosum</li> <li>× <b>Relations of quadrate lobe: Anteriorly:</b> anterior margin of liver, <b>superiorly:</b> porta hepatis, <b>right:</b> GB, <b>left:</b> lig. Teres</li> </ul>	<ul style="list-style-type: none"> <li>× A subendothelial space known as the <b>space of Disse</b> separates the endothelial cells from the hepatocytes</li> <li>× The basolateral side of the hepatocyte, contains many <b>microvilli</b> and demonstrates <b>endocytic and pinocytic activity</b></li> <li>× In the space of Disse (perisinusoidal), there are fat-storing cells (<b>stellate or Ito's cells</b>)</li> <li>× Hepatocytes; <b>eosinophilic cytoplasm, large n. Of mitochondria and sER</b> (detoxification), some nuclei are polyploid, rER forms aggregates called basophilic bodies. Hepatocytes communicate by gap junctions</li> <li>× The bile canaliculus: a tubular space between hepatocytes</li> </ul>	<ul style="list-style-type: none"> <li>× Liver <b>CORDS</b> differentiate into the <b>parenchyma</b> (liver cells) and form the lining of the biliary ducts.</li> <li>× Hematopoietic cells, Kupffer cells, and connective tissue cells are derived from <b>mesoderm of the septum transversum</b>.</li> </ul>
<p style="text-align: center;"><b>Gallbladder</b></p> 	<ul style="list-style-type: none"> <li>× Location: epigastric-right hypochondrium, at tip of 9<sup>th</sup> Rt. C.C</li> <li>× Intraperitoneal (has a short mesentery)</li> <li>× <b>Relations of fundus: anteriorly;</b> ant. Abdominal wall, <b>posteroinferiorly:</b> transverse colon</li> <li>× <b>Relations of body: superiorly:</b> liver, <b>posteroinferiorly:</b> transverse colon, end of 1st part and beginning of 2<sup>nd</sup> part of duodenum</li> <li>× Neck forms the cystic duct (joins common hepatic to form common bile duct)</li> <li>× Hartmans pouch: between body and neck</li> </ul>	<ul style="list-style-type: none"> <li>× Mucosa: simple columnar without goblet cells. Has abundant foldings (<b>honeycomb appearance</b>)</li> <li>× <b>No muscularis mucosa or submucosa</b></li> <li>× Muscularis: externa irregular (oblique)</li> <li>× Has villi and microvilli</li> <li>× Epithelial cells are rich in mitochondria</li> <li>× No peristaltic movements</li> </ul>	<ul style="list-style-type: none"> <li>× A small <b>ventral outgrowth of bile duct</b> gives rise to the gallbladder and the cystic duct</li> </ul>
<p style="text-align: center;"><b>Pancreas</b></p> 	<ul style="list-style-type: none"> <li>× Location: epigastric-left upper hypochondrium region</li> <li>× Retroperitoneal organ</li> <li>× <b>Common anterior relations:</b> transverse colon and mesocolon, lesser sac, stomach</li> <li>× <b>Common posterior relations:</b> bile duct, portal vein, splenic vein (runs on posterior surface), IVC, aorta, origin of superior mesenteric artery, left psoas muscle, left suprarenal gland, left kidney, hilum of spleen (ends there)</li> </ul>	<ul style="list-style-type: none"> <li>× Mixed gland: <b>exocrine and endocrine</b></li> <li>× <b>Endocrine:</b> islets of Langerhans (<math>\alpha</math>- cells &amp; <math>\beta</math>- cells)</li> <li>× <math>\alpha</math>-cells: at the periphery, large, secrete glucagon</li> <li>× <math>\beta</math>-cells: at the center, small, secrete insulin</li> <li>× <b>Exocrine: pancreatic acini</b> (single acinus like the parotid; acinar cells have <b>polarity</b>) secrete pancreatic enzymes that help digest fat (lipases)</li> </ul>	<ul style="list-style-type: none"> <li>× Formed by two buds originating from the <b>endodermal lining of the duodenum</b></li> <li>× The dorsal pancreatic bud is in the dorsal mesentery, the ventral bud is close to the bile duct</li> <li>× When the duodenum rotates to the right and becomes C-shaped, the ventral pancreatic bud moves dorsally in a manner similar to the shifting of the entrance of the bile duct</li> </ul>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
	<ul style="list-style-type: none"> <li>× Splenic artery runs on posterior surfaces</li> <li>× <b>Relations of uncinete process:</b> anteriorly: superior mesenteric artery, posteriorly: abdominal aorta</li> <li>× Portal vein is formed behind the neck of pancreas (splenic + superior mesenteric)</li> <li>× Tail passes in splenicorenal lig.</li> <li>× <b>Relations of body:</b> <ul style="list-style-type: none"> <li>-<b>Anterior surface:</b> tubercle omental (where ant. Surface joins the neck), covered by peritoneum of lesser sac</li> <li>-<b>Posterior surface:</b> aorta, splenic vein, left kidney and its vessels, left suprarenal gland, origin of sup. mesenteric, crura of diaphragm.</li> <li>-<b>Inferior surface:</b> covered by peritoneum of greater omentum, some coils of jejunum, its left extremity rests of left colic flexure</li> <li>-<b>Superior border:</b> celiac artery, hepatic artery, splenic artery</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>× Difference between pancreas and parotid gland: in pancreas there is <b>absence</b> of striated ducts and <b>presence</b> of islets of Langerhans and the initial portion of intercalated ducts penetrate the lumen of acini</li> <li>× Nuclei, surrounded by a pale cytoplasm, belong to <b>centroacinar</b> cells that constitute the intraacinar portion of the intercalated duct</li> </ul>	<ul style="list-style-type: none"> <li>× Finally, the ventral bud comes to lie immediately below and behind the dorsal bud. Later the parenchyma and the duct systems of the dorsal and ventral pancreatic buds fuse</li> <li>× The <b>ventral</b> bud forms the <b>uncinate</b> process and <b>inferior</b> part of the <b>head</b> of the pancreas</li> <li>× <b>The remaining part of the gland is derived from the dorsal bud.</b></li> <li>× The <b>main pancreatic duct</b> (of Wirsung) is formed by the <b>distal part of the dorsal pancreatic duct and the entire ventral pancreatic duct</b></li> <li>× The proximal part of the dorsal pancreatic duct either is obliterated or persists as a small channel, the accessory pancreatic duct (of Santorini).</li> <li>× In the third month of fetal life, pancreatic <b>islets (of Langerhans)</b> develop from the <b>parenchymatous pancreatic tissue</b> and scatter throughout the pancreas</li> <li>× Insulin secretion begins at 5<sup>th</sup> month</li> <li>× Glucagon and somatostatin secreting cells also develop from parenchymal cells</li> <li>× Splanchnic mesoderm forms CT</li> </ul>
<p style="text-align: center;"><b>Spleen</b></p> 	<ul style="list-style-type: none"> <li>× Location: left hypochondrium (beneath left half of diaphragm under 9<sup>th</sup>–11<sup>th</sup> ribs.</li> <li>× Long axis is parallel to 10<sup>th</sup> rib.</li> <li>× Intraabdominal organ</li> <li>× 1 inch thick, 3 inch broad, 5 inch long</li> <li>× Weighs 7 once</li> <li>× 2 ends, 2 borders, 2 surfaces</li> <li>× Medial end is 4cm away from midline and lateral end is in left mid axillary line</li> <li>× Diaphragmatic surface (convex smooth) separates it from pleura and lung and 9<sup>th</sup>-11<sup>th</sup> ribs</li> <li>× Visceral surface is divided into gastric and renal surfaces</li> </ul>		<ul style="list-style-type: none"> <li>× Continuation of development of stomach: As this process continues in the fifth week of development, <b>the spleen primordium</b> appears as a <b>mesodermal proliferation</b> between the two leaves of the dorsal mesogastrium</li> <li>× With continued rotation of the stomach, the dorsal mesogastrium lengthens, and the portion between the spleen and dorsal midline swings to the left and fuses with the peritoneum of the posterior abdominal wall</li> <li>× The posterior leaf of the dorsal mesogastrium and the peritoneum along this line of fusion degenerate</li> </ul>

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	<ul style="list-style-type: none"> <li>× Lower extremity (colic surface): Rests upon the left flexure of the colon and the phrenicocolic ligament, and is generally in contact with the tail of the pancreas (pancreatic surface)</li> <li>× Hilum of spleen: Splenic artery (ant.), splenic vein (post.), tail of pancreas.</li> <li>× Superior border is notched</li> </ul>		<ul style="list-style-type: none"> <li>× <b>The spleen</b>, which remains <b>intraperitoneal</b>, is then connected to the body wall in the region of the left kidney by the lienorenal ligament and to the stomach by the gastrosplenic ligament</li> </ul>
<p style="text-align: center;"><b>Sigmoid Colon</b></p> 	<ul style="list-style-type: none"> <li>× Location: in the pelvic cavity</li> <li>× Usually occupies the rectovesical pouch in males and the rectouterine pouch in females)</li> <li>× Intraperitoneal organ</li> <li>× Has four parts: the <b>root</b> (mesocolon), the <b>lateral limb</b> (contains lower left colic artery), <b>medial limb</b> (contains superior rectal artery), <b>free edge</b> (curved to right of midline)</li> <li>× <b>Relations:</b> <ul style="list-style-type: none"> <li>- <b>Left:</b> left external iliac vessels, lateral wall of pelvis, and vas deference in males or ovary in females.</li> <li>- <b>Right:</b> small intestine</li> <li>- <b>Superior:</b> coils of small intestine</li> <li>- <b>Inferior:</b> urinary bladder in males, uterus in females</li> <li>- <b>Posterior:</b> rectum, sacrum, lower coils of terminal part of ileum, sacral plexus, left piriformis muscle and we have another muscle, left iliac vessels, left ureter, and left common iliac artery.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>× Originates from <b>hindgut</b></li> </ul>
<p style="text-align: center;"><b>Rectum</b></p> 	<ul style="list-style-type: none"> <li>× 5 inches long</li> <li>× Begins at middle piece of sacrum and ends 1 inch beyond tip of coccyx</li> <li>× Lower part is dilated to form rectal ampulla</li> <li>× Has two concavity on left and one on right</li> <li>× At both sides of the rectum and anal canal is the ischioanal fossa (wedge-shaped) which is filled with fat, a site of perianal abscess</li> <li>× <b>Relations:</b></li> </ul>	<ul style="list-style-type: none"> <li>× Upper half: epithelium is simple columnar epithelium with few goblet cells</li> <li>× Lower half is almost different in everything; stratified squamous epithelium non-keratinized</li> <li>× It forms columns transverse and columns longitudinal</li> <li>× Has crypts of Lieberkühn.</li> </ul>	<ul style="list-style-type: none"> <li>× Originates from <b>hindgut</b></li> </ul>

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	<p>-<b>Posterior:</b> in contact with the sacrum and coccyx - the piriformis muscle - Coccygeus muscle - levatores ani muscle - the sacral plexus - the sympathetic trunks and anococcygeal body</p> <p>-<b>Anterior in males:</b> the upper two thirds of the rectum are covered by peritoneum and related to the sigmoid colon and coils of ileum that occupy the rectovesical pouch.. The lower third of the rectum is devoid of peritoneum , and is related to the posterior surface of the bladder, termination of the vas deferens, seminal vesicles on each side, prostate and to the perineal body.</p> <p>-<b>Anterior in females:</b> The upper two thirds of the rectum are covered by peritoneum, related to sigmoig colon and coils of ileum that occupy the rectouterine pouch (pouch of Douglas).The lower third of the rectum is devoid of peritoneum, related to the posterior surface of the vagina and perineal body.</p>	<p>× Muscularis externa, outer longitudinal and inner circular lacks tenia coli and appendices epiplolca</p>	
<p><b>Anal Canal</b></p> 	<p>× The terminal part of the large intestine, 4 cm long, extends from the anorectal junction to the anus, situated below the level of the pelvic diaphragm and lies in the anal triangle of the perineum.</p> <p>× <b>Relations</b> to the anal canal:</p> <p>-<b>Anteriorly:</b></p> <p>- In males: Perineal body, membranous urethra, bulb of penis</p> <p>-In females: Lower end of the vagina and perineal body</p> <p>-<b>Posteriorly:</b></p> <p>-Anococcygeal ligament and tip of the coccyx.</p> <p>-<b>Laterally:</b></p> <p>-ischiorectal fossae.</p>	<p>× <b>Upper part:</b> simple columnar epithelium. The mucous membrane shows 6 to 10 vertical folds, these folds are called the anal columns of Morgagni</p> <p>-The lower ends of the anal columns are united to Each other by short semilunar folds of mucous membrane, these folds are called the anal valves.</p> <p>-Above each valve there is a depression in the mucosa, which is called the anal sinus, the anal valves together form a transverse line that runs all-round the anal canal, called pectenate line (which seperates the upper half from the lower half of the anal canal )</p> <p>× <b>Middle part:</b> non-keratinized stratified squamous epithelium. Termed as transitional zone or pecten, it is also lined by mucous membrane.</p>	<p>× <b>Upper 2cm originates from endoderm (from hindgut)</b></p> <p>× <b>Lower 2cm originates from ectoderm</b></p> <p>× The endoderm of the hindgut also forms the internal lining of the bladder and urethra</p> <p>× The terminal portion of the hindgut enters into the posterior region of the cloaca, the primitive anorectal canal; the allantois enters into the anterior portion, the primitive urogenital sinus</p> <p>× The cloaca itself is an endoderm- lined cavity covered at its ventral boundary by surface ectoderm.</p> <p>× This boundary between the endoderm and the ectoderm forms the cloacal membrane</p> <p>× A layer of mesoderm, the urorectal septum, separates the region between the allantois and hindgut. This septum is derived from the</p>

PART	ANATOMY	HISTOLOGY	EMBRYOLOGY
		<p>-The mucosa has a bluish appearance because of a dense venous plexus that lies beneath.</p> <p>-The lower limit of the pecten often has a whitish appearance (white line/hilton's line: transition from nonkeratinized to keratinized)</p> <p>× <b>Lower part:</b> a cutaneous part, about 8mm long and is lined by true skin (keratinized squamous) containing sweat and sebaceous glands.</p>	<p>merging of mesoderm covering the yolk sac and surrounding the allantois.</p> <p>× At the end of the seventh week, the cloacal membrane ruptures, creating the anal opening for the hindgut and a ventral opening for the urogenital sinus.</p> <p>× Between the two, the tip of the urorectal septum forms the perineal body</p> <p>× Proliferation of ectoderm closes the caudalmost region of the anal canal.</p>
<p><b>Testes</b></p> 	<ul style="list-style-type: none"> <li>× They are a firm, mobile organ, within the scrotum</li> <li>× Left testis usually lies at a lower level than the right</li> <li>× Upper end of the gland is tilted forward</li> <li>× Surrounded by a tough fibrous capsule, the tunica albuginea</li> <li>× A series of fibrous septa divide the interior of the organ into lobules</li> <li>× Structures inside: seminiferous tubules, interstitial cells, epididymis, vas deferens.</li> </ul>	<ul style="list-style-type: none"> <li>× Testis is divided into lobules</li> </ul>	<ul style="list-style-type: none"> <li>× Toward the end of the second month, the urogenital mesentery attaches the testis and mesonephros to the posterior abdominal wall</li> <li>× Prior to descent of the testis, this band of mesenchyme terminates in the inguinal region between the differentiating internal and external abdominal oblique muscles.</li> <li>× Later, as the testis begins to descend toward the inguinal ring, an extra-abdominal portion of the gubernaculum forms and grows from the inguinal region toward the scrotal swellings. When the testis passes through the inguinal canal, this extra-abdominal portion contacts the scrotal floor.</li> <li>× Normally, the testes reach inguinal region by 12weeks gestation, migrate through inguinal canal by 28 weeks, and reach scrotum by 33 weeks</li> <li>× The peritoneum of the abdominal cavity forms an evagination (processus vaginalis) → follows the course of the gubernaculum testis into the scrotal swellings → processus vaginalis evaginates into the scrotal swelling, forming the inguinal canal</li> </ul>