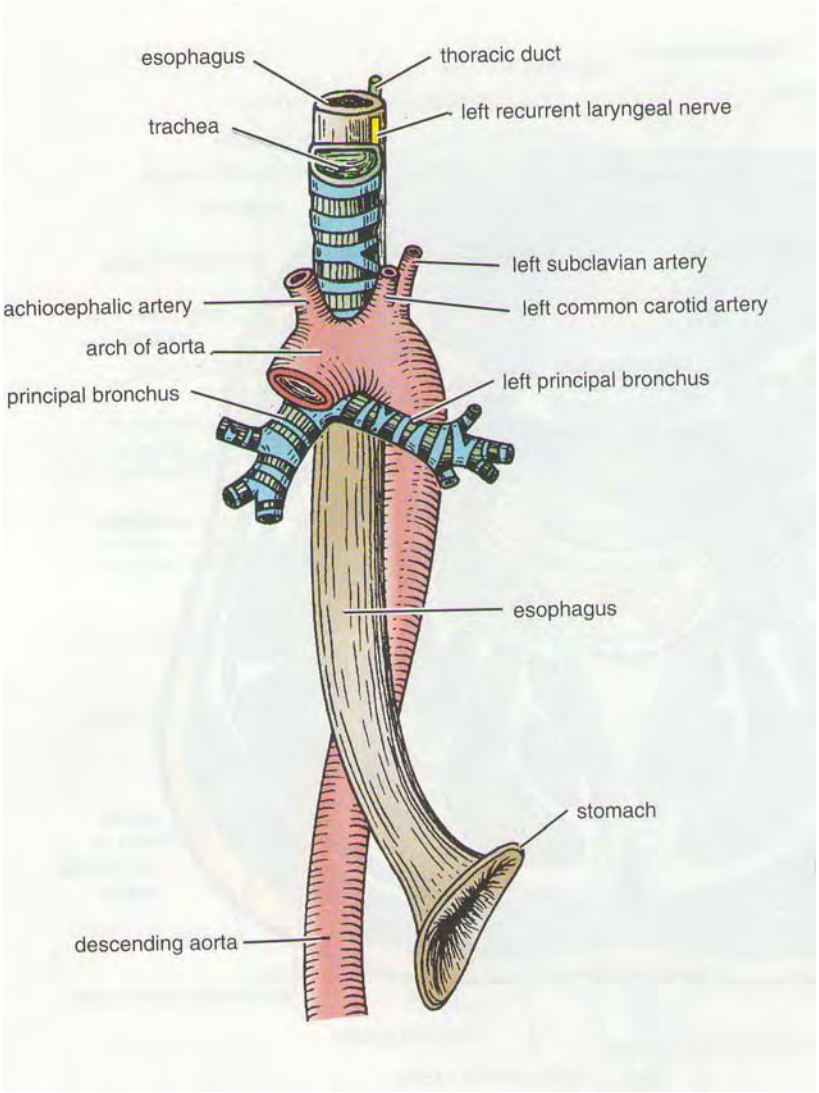
Lecture 2 in Anatomy of GIT

By

Dr. Mohammad Ahmad Abdulla

Esophagus

The esophagus is a muscular tube about 10 inches (25 cm) long, extending from the pharynx to the stomach. It begins at the level of the cricoid cartilage in the neck and descends in the midline behind the trachea. In the thorax, it passes downward through the mediastinum and enters the abdominal cavity by piercing the diaphragm at the level of the tenth thoracic vertebra. The esophagus has a short course of about $^{1}/2$ in. (1.25 cm) before it enters the right side of the stomach.



Esophagus in the Neck

Relations

Anteriorly: Trachea, recurrent laryngeal nerves.
Posteriorly: The prevertebral muscles and the vertebral column.
Laterally: The thyroid gland, carotid sheath (common carotid artery, internal jugular vein, and vagus nerve) and on the left side is the thoracic duct.

Blood Supply

Arteries: Inferior thyroid arteries.
Veins: Inferior thyroid veins.

Lymph Drainage

Deep cervical lymph nodes.

Nerve Supply

Recurrent laryngeal nerves and branches from the sympathetic trunks.

Esophagus in the Thorax

Relations

Anteriorly: Trachea, left recurrent laryngeal nerve, left bronchus, left atrium of the heart.
Posteriorly: Vertebral column, thoracic duct, azygos veins, right posterior intercostal arteries, descending thoracic aorta.
Laterally, right side: Mediastinal pleura, azygos vein.
Left side: Aortic arch, left subclavian artery, thoracic duct, mediastinal pleura.

Blood Supply

Arteries: Upper part from the descending thoracic aorta, lower third from the left gastric artery.
Veins: These drain into the azygos veins, and from the lower third, they drain into the left gastric vein, a tributary of the portal vein.

Lymph Drainage

Upper part into the superior and posterior mediastinal nodes and, from the lower third, into nodes along the left gastric blood vessels and the celiac nodes in the abdomen.

Nerve Supply

Vagal trunks (left vagus lies anterior and right vagus lies posterior), esophageal plexus, sympathetic trunks, greater splanchnic nerves.

Esophagus in the Abdomen

The esophagus enters the abdomen through an opening in the right crus of the diaphragm. After a course of about 0.5 in. (1.25 cm), it enters the stomach on its right side.

Relations

Anteriorly: The esophagus lies posterior to the left lobe of the liver and in front of the left crus of the diaphragm. The left and right vagi lie on its anterior and posterior surfaces, respectively.

Blood Supply

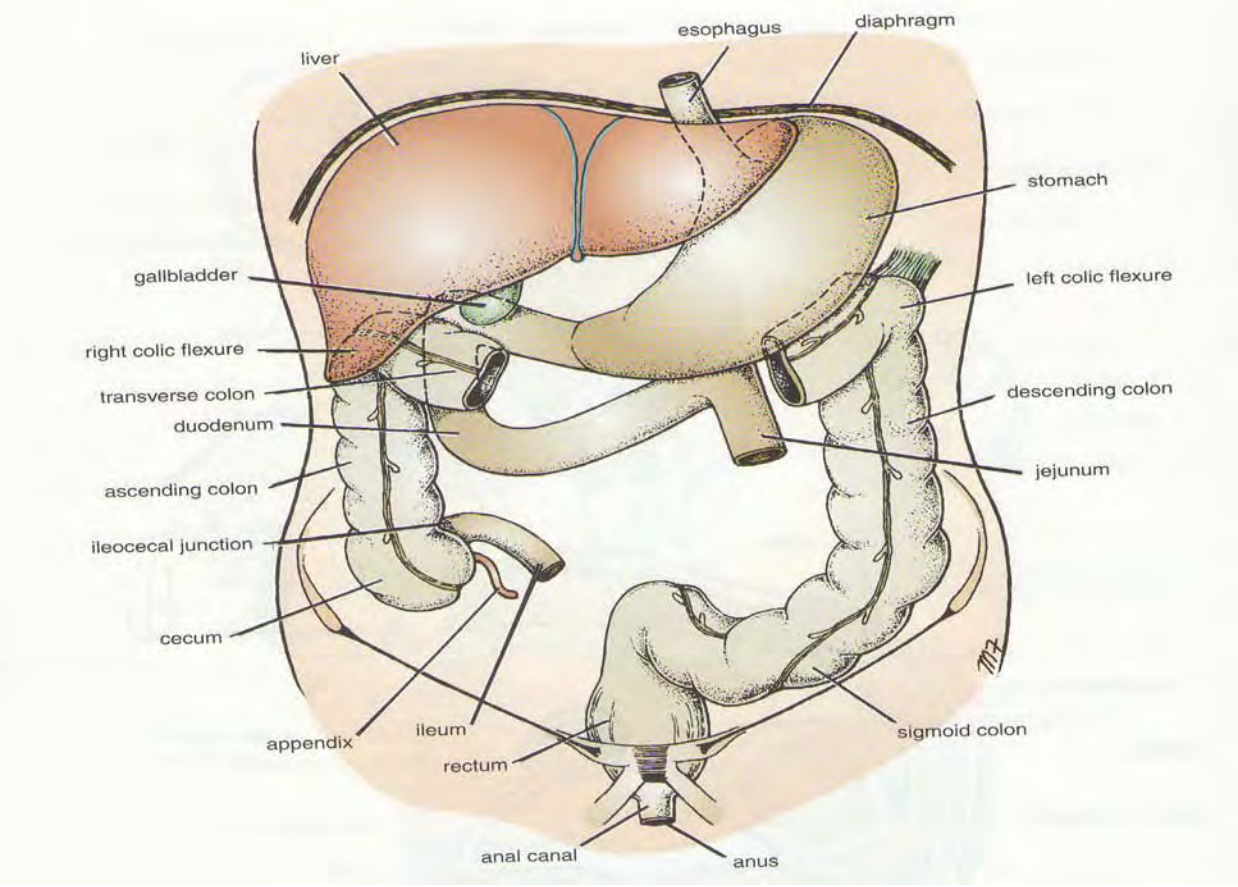
Arteries: Branches from the left gastric artery.
Veins: The left gastric vein, a tributary of the portal vein.

Lymph Drainage

The lymph vessels follow the arteries into the left gastric nodes.

Nerve Supply

Anterior and posterior gastric nerves (vagi) and sympathetic branches of the thoracic part of the sympathetic trunk.



Stomach

The stomach is a dilated portion of the alimentary canal situated in the upper part of the abdomen. It is roughly **J** shaped, and it has two openings (the **cardiac** and **pyloric orifices**), two curvatures (the **greater** and the **lesser curvatures**), and two surfaces (an **anterior** and a **posterior surface**).

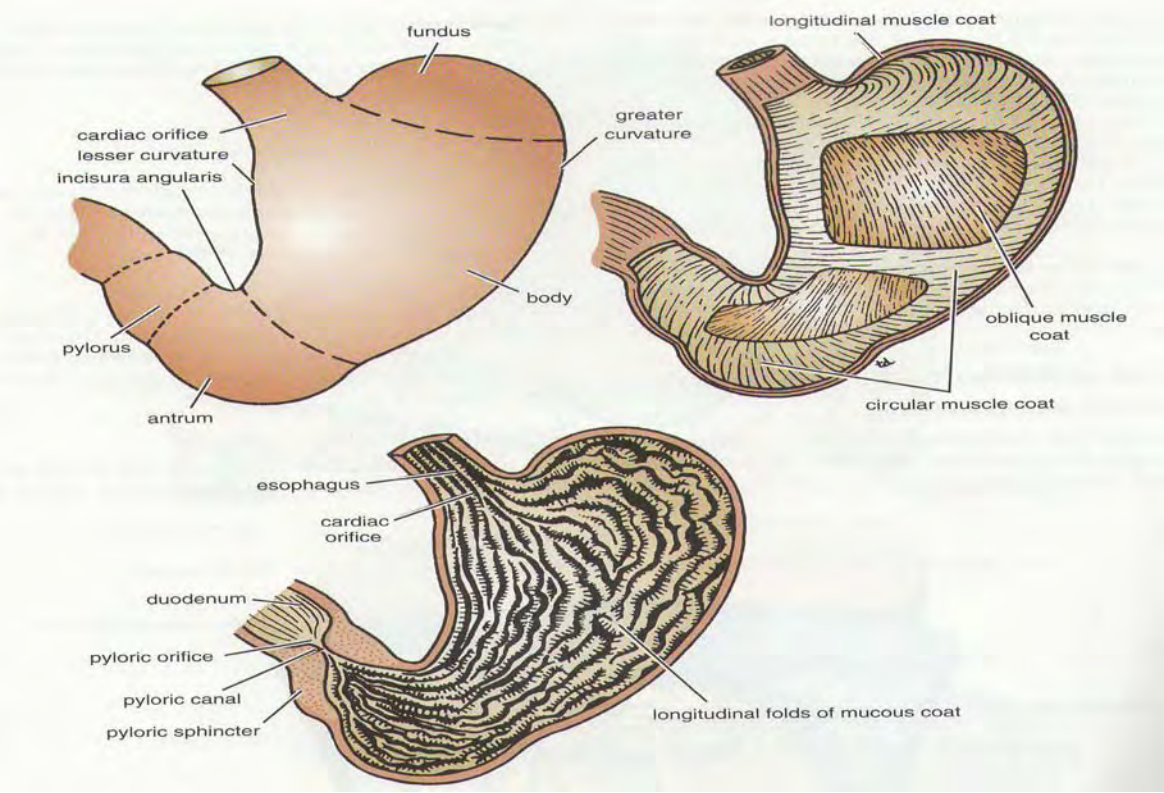
The stomach may be divided into the following parts:

Fundus: This is dome shaped and projects upward and to the left of the cardiac orifice. It is usually full of gas.

Body: This extends from the cardiac orifice to the **incisura angularis** (a constant notch in the lower part of the lesser curvature).

Pyloric antrum: This extends from the incisura angularis to the pylorus.

Pylorus: This is the most tubular part of the stomach. The thick, muscular wall is called **the pyloric sphincter** and the cavity of the pylorus is called the **pyloric canal**.



The **lesser curvature** forms the right border of the stomach and is connected to the liver by the lesser omentum. The **greater curvature** is much longer than the lesser curvature, and it extends from the left of the cardiac orifice over the dome of the fundus and along the left border of the stomach. The **gastrosplenic omentum (ligament)** extends from the upper part of the greater curvature to the spleen. The **greater omentum** extends from the lower part of the greater curvature to the transverse colon.

The esophagus enters the stomach at the **cardiac orifice**. No anatomic sphincter can be demonstrated here, but a physiologic mechanism prevents the regurgitation of stomach contents into the esophagus.

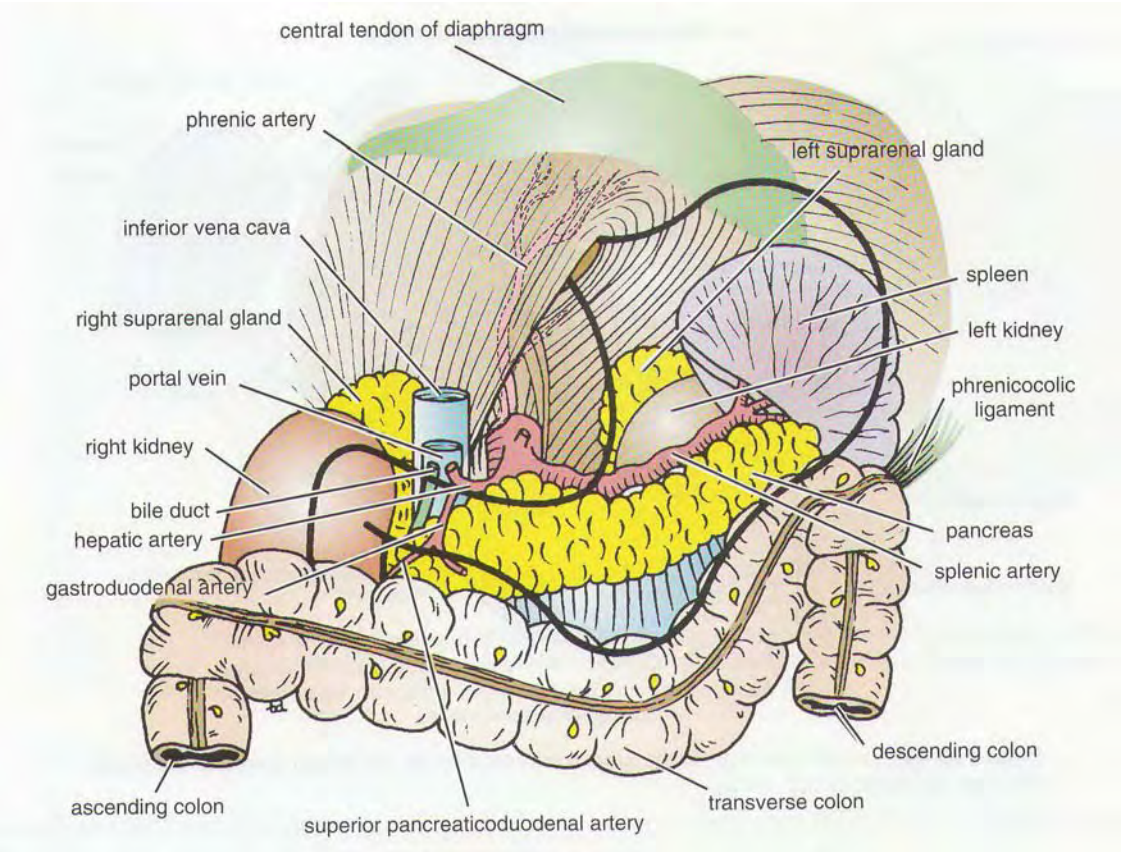
The **pyloric orifice** is formed by the pyloric canal. The circular muscle coat of the stomach is much thicker here and forms the anatomic and physiologic pyloric sphincter.

Relations of the Stomach

These vary with the degree of filling.

Anteriorly: Left costal margin, anterior abdominal wall, diaphragm, left pleura, base of the left lung, pericardium, quadrate and left lobes of liver.

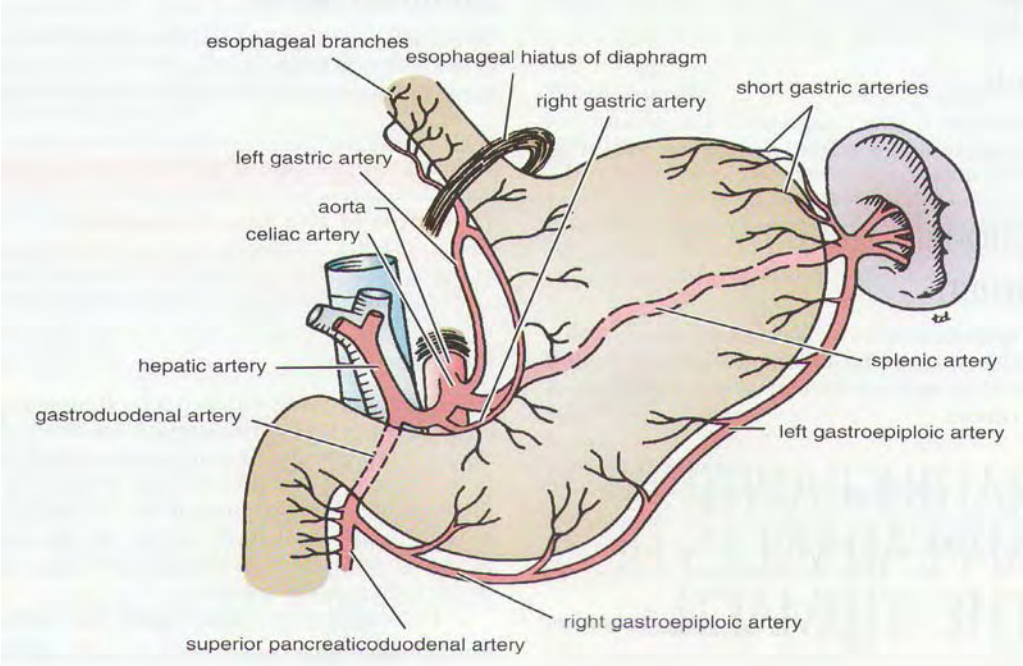
Posteriorly: Lesser sac, pancreas (body and tail), splenic artery, diaphragm, left suprarenal gland, and upper part of the left kidney, spleen, and transverse mesocolon.



Blood Supply

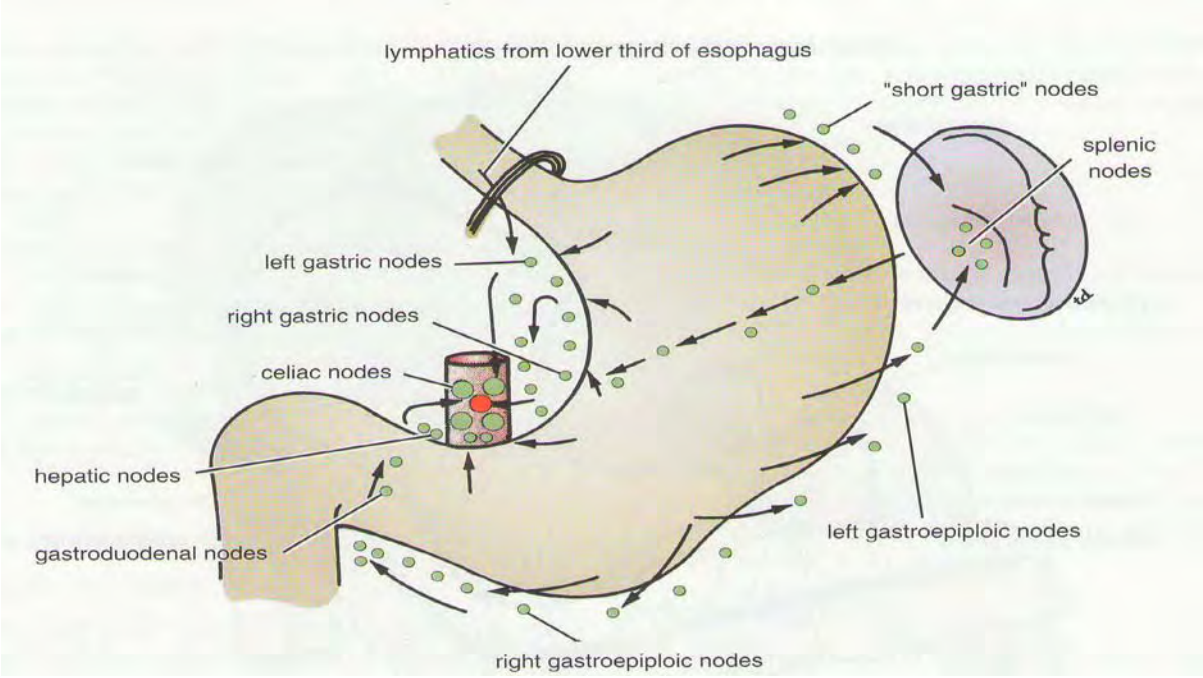
Arteries: The right and left gastric arteries supply the lesser curvature. The right and left gastroepiploic arteries supply the greater curvature. Short gastric arteries derived from the splenic artery supply the fundus.

Veins : The veins drain into the portal circulation. The right and left gastric veins drain into the portal vein. The short gastric and the left gastroepiploic veins drain into the splenic vein and the right gastroepiploic vein drains into the superior mesenteric vein.



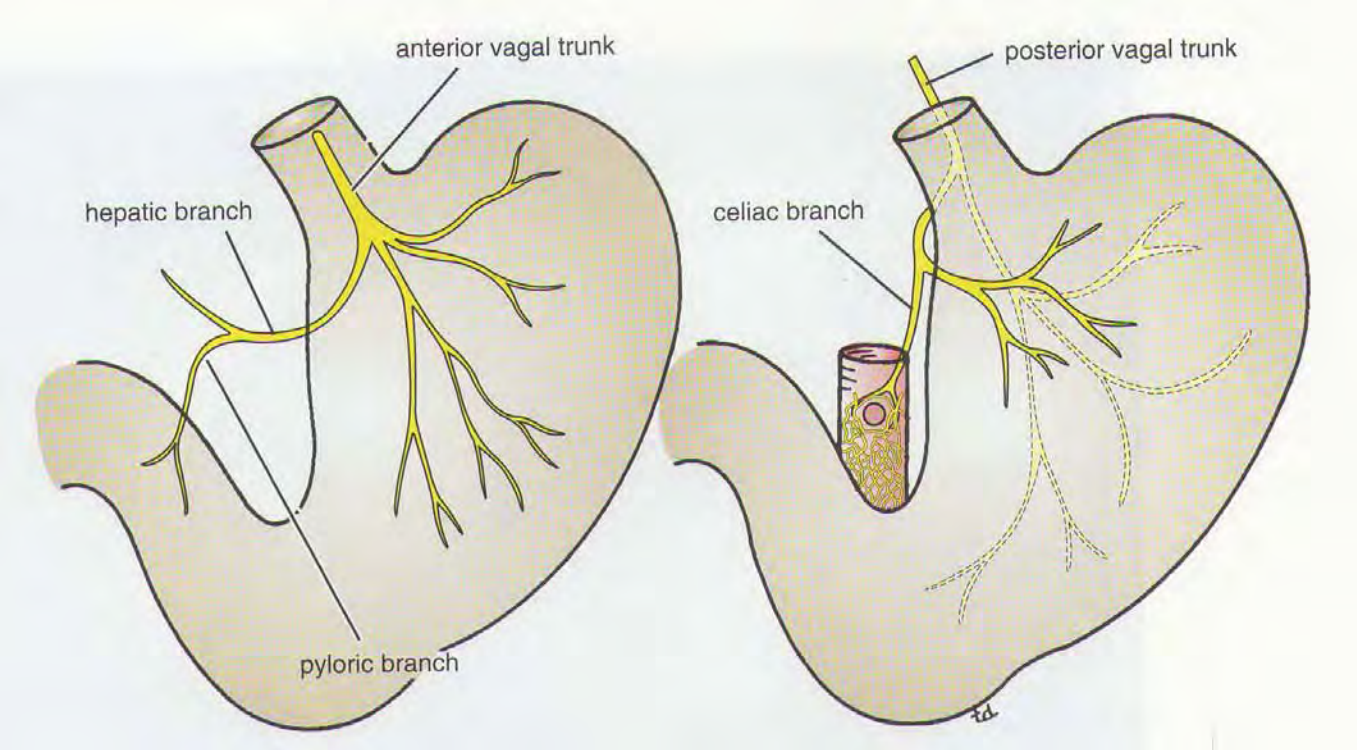
Lymph Drainage

The lymph vessels follow the arteries into the left and right gastric nodes, the left and right gastroepiploic nodes, and the short gastric nodes. All lymph from the stomach eventually passes to the celiac nodes.



Nerve Supply

The sympathetic nerve supply is from the celiac plexus, and parasympathetic nerve supply is from the vagus nerves.

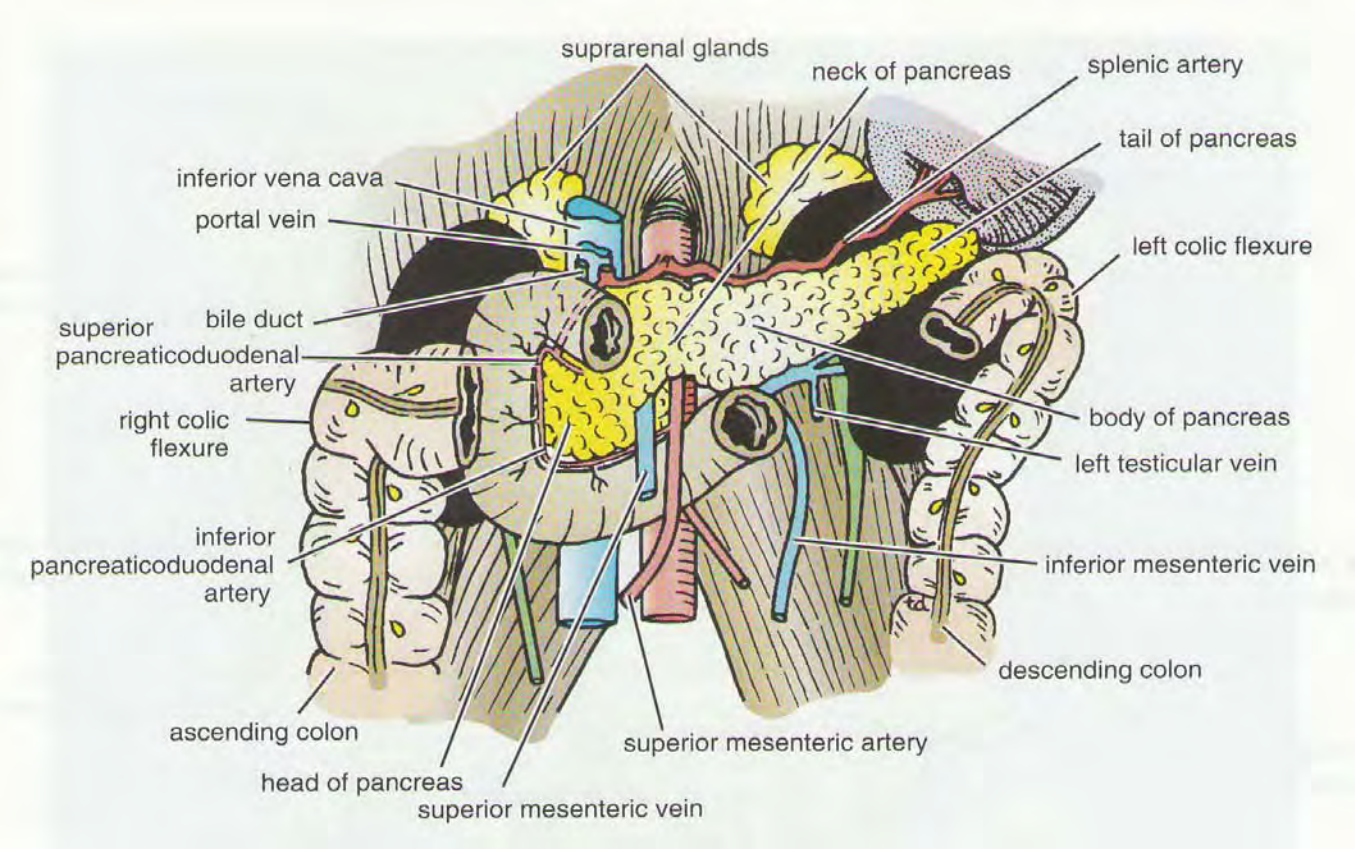


Small Intestine

The small intestine extends from the pylorus of the stomach to the ileocecal junction. It is divided into three parts: the duodenum, the jejunum, and the ileum.

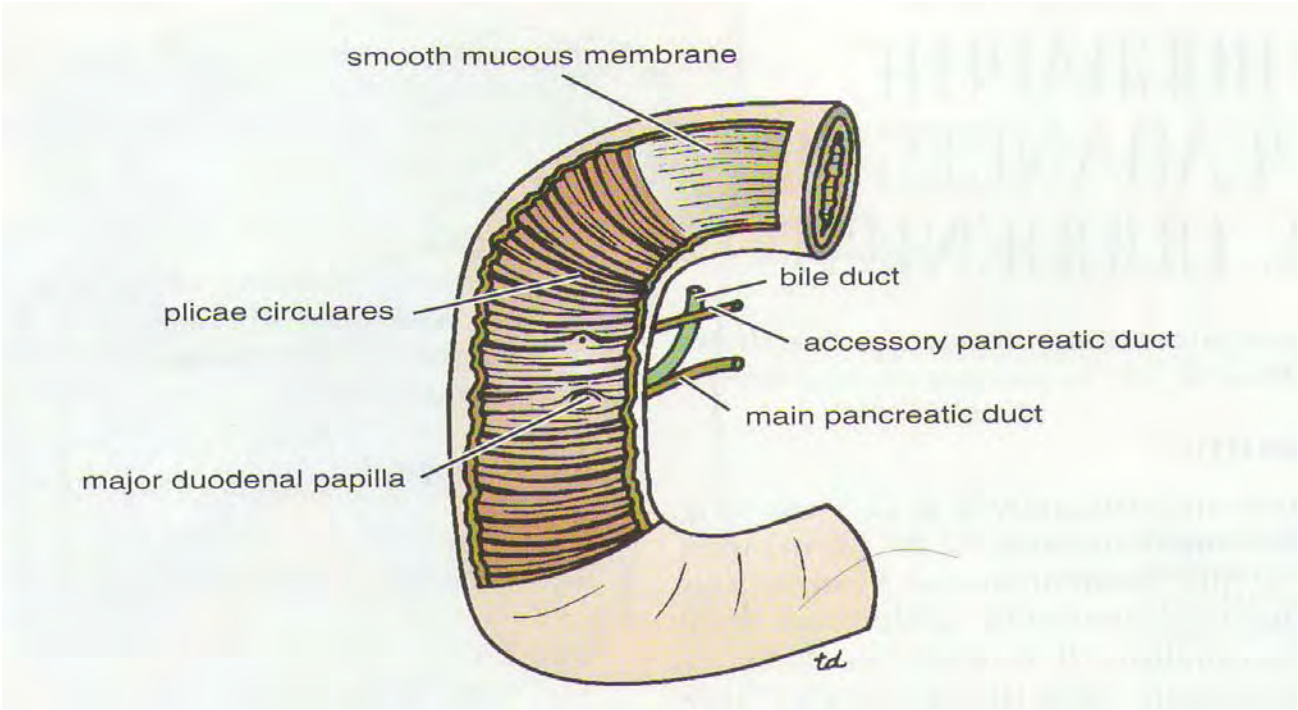
Duodenum

The duodenum is a C-shaped tube approximately 10 in. (25 cm) in length that curves around the head of the pancreas. The duodenum begins at the pyloric sphincter of the stomach, and it ends by becoming continuous with the jejunum. The **first inch** of the duodenum has the lesser omentum attached to its upper border and the greater omentum attached to its lower border. The remainder of the duodenum is retroperitoneal.

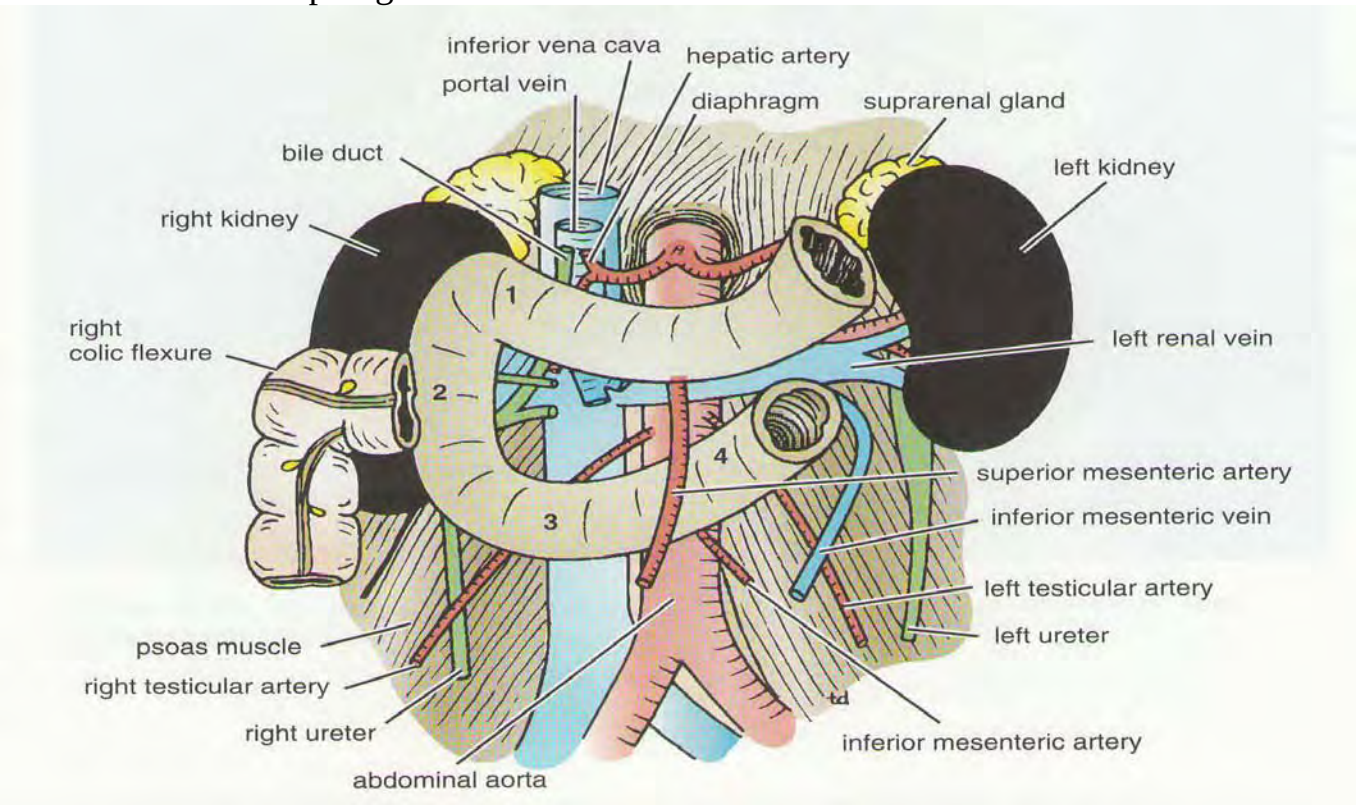


<u>The duodenum is divided into four parts:</u>

1. **<u>The first part</u>** runs upward and backwards on the transpyloric plane at the level of the first lumbar vertebra.
2. **<u>The second part</u>** runs vertically downward. The bile and main pancreatic ducts pierce the medial wall approximately halfway down, and they unite to form an **ampulla** that opens on the summit of a **major duodenal papilla**. The **accessory pancreatic duct** (if present) opens into the duodenum on a **minor duodenal papilla**, approximately 0.75 in. (1.9 cm) above the major duodenal papilla.



3. **<u>The third part</u>** passes horizontally in front of the vertebral column. The root of the mesentery of the small intestine and the superior mesenteric vessels cross this part anteriorly.
4. **<u>The fourth part</u>** runs upward and to the left to the duodenojejunal flexure. The flexure is held in position by the **ligament of Treitz**, which is attached to the right crus of the diaphragm.



Relations

1. **First part:** Anteriorly: Quadrate lobe of the liver, gallbladder. Posteriorly: lesser sac (first inch only), gastroduodenal artery, bile duct, portal vein, inferior vena cava.
2. **Second part:** Anteriorly: fundus of the gallbladder, right lobe of the liver, transverse colon, coils of the small intestine. Posteriorly: hilus of the right kidney. Medially: head of the pancreas, bile duct, and pancreatic ducts.
3. **Third part:** Anteriorly: root of the mesentery of the small intestine, superior mesenteric vessels, coils of the jejunum. Posteriorly: Right ureter, inferior vena cava, aorta. Superiorly: head of the pancreas.
4. **Fourth part:** Anteriorly: beginning of the root of the mesentery and coils of the jejunum. Posteriorly: left margin of the aorta.

Blood Supply

Arteries: The upper half of the duodenum is supplied by the superior pancreaticoduodenal artery, which is a branch of the gastroduodenal artery. The lower half is supplied by the inferior pancreaticoduodenal artery, which is a branch of the superior mesenteric artery.

Veins: The superior pancreaticoduodenal vein joins the portal vein. The inferior pancreaticoduodenal vein joins the superior mesenteric vein.

Lymph Drainage

The lymph vessels drain upward via the pancreaticoduodenal nodes to the gastroduodenal nodes and the celiac nodes. They drain downward via the pancreaticoduodenal nodes to the superior mesenteric nodes.

Nerve Supply

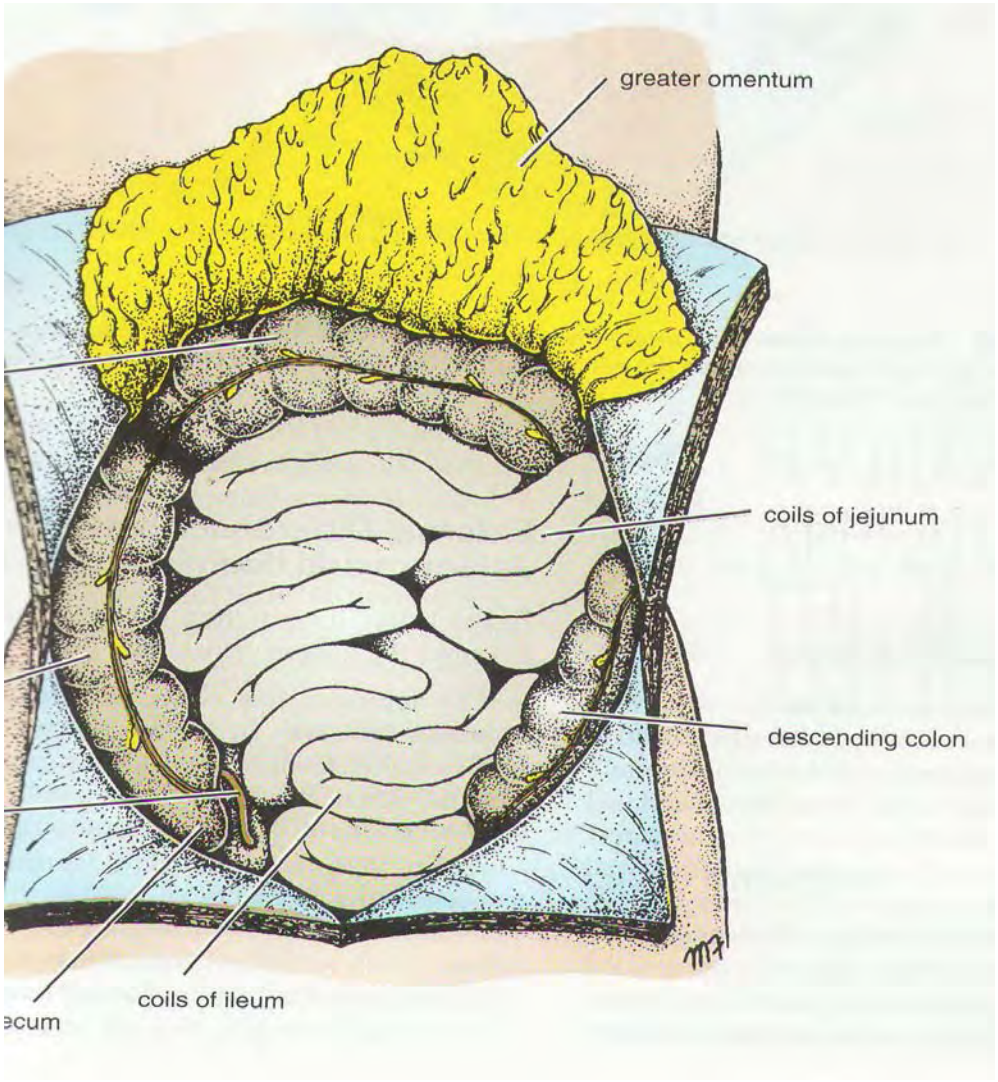
The duodenum is supplied by the sympathetic and vague nerves via the celiac and the superior mesenteric plexuses.

Jejunum and Ileum

The jejunum measures approximately 8 ft (2.5 m) long, and the ileum measures approximately 12 ft (3.6 m) long. The jejunum begins at the duodenojejunal flexure in the upper part of the abdominal cavity and to the left of the midline. It is wider in diameter, thicker walled, and redder in color (more vascular) than the ileum.

The coils of the ileum occupy the lower right part of the abdominal cavity and tend to hang down into the pelvis. The ileum ends at the ileocecal junction.

The coils of the jejunum and the ileum are suspended from the posterior abdominal wall by a fan-shaped fold of peritoneum called the mesentery of the small intestine.



Relations

Anteriorly: Anterior abdominal wall and greater omentum, which usually covers over the coils.
Posteriorly: Posterior abdominal wall and retroperitoneal structures.

Blood Supply

Arteries: Branches of the superior mesenteric artery.
Veins: The veins drain into the superior mesenteric vein.

Lymph Drainage

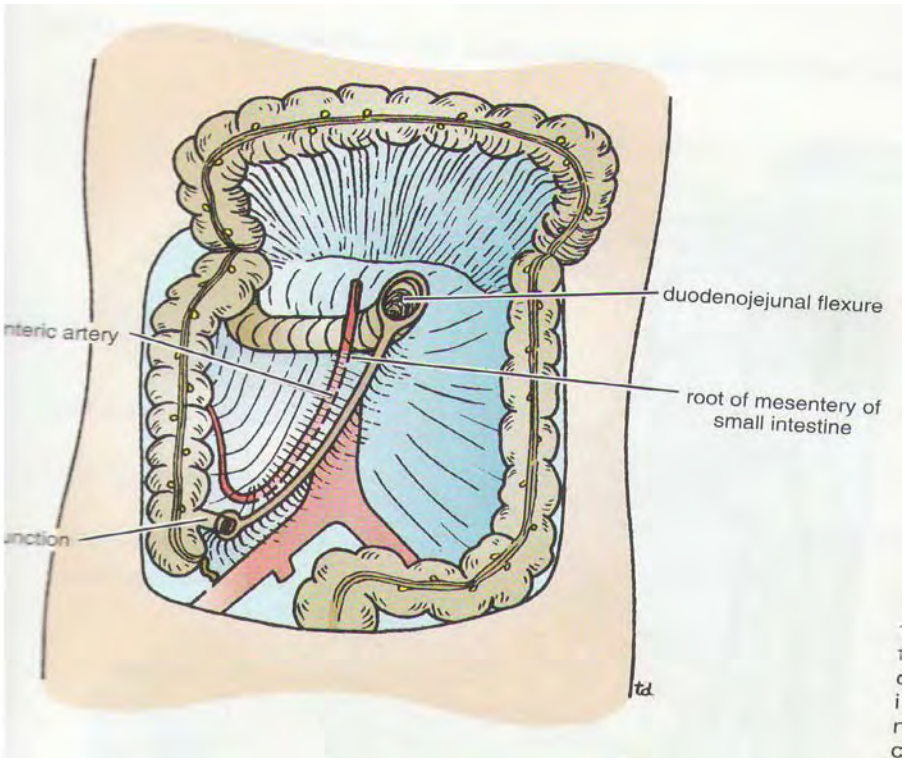
The lymph passes to the superior mesenteric nodes via intermediate nodes.

Nerve Supply

Sympathetic and vagus nerve fibers arise from the superior mesenteric plexus.

Mesentery of the Small Intestine

The coils of jejunum and ileum are freely mobile and are attached to the posterior abdominal wall by a fan-shaped fold of peritoneum known as the mesentery of the small intestine. The long free edge of the mesentery is attached to the mobile intestine. The short fixed root of the mesentery is attached to the peritoneum on the posterior abdominal wall along a line that extends downward and to the right from the left side of the second lumbar vertebra to the region of the right sacroiliac joint. The root of the mesentery permits the entrance and exit of the branches of the superior mesenteric artery and vein, lymph vessels, and nerves into the mesentery.



External Differences between the Jejunum and Ileum

In the living, the jejunum can be distinguished from the ileum by the following features:

1. The jejunum lies coiled in the upper part of the peritoneal cavity below the left side of the transverse mesocolon; the ileum is in the lower part of the cavity and in the pelvis.
2. The jejunum is wider bored, thicker walled, and redder than the ileum. The jejunal wall feels thicker because the permanent infoldings of the mucous membrane, the plicae circulares, are larger, more numerous and closely set in the jejunum; whereas in the upper part of the ileum, they are smaller and more widely separated and in the lower part, they are absent.

3. The jejunal mesentery is attached to the posterior abdominal wall above and to the left of the aorta, whereas the ileal mesentery is attached below and to the right of the aorta.
4. The jejunal mesenteric vessels form only one or two arcades, with long and infrequent branches passing to the intestinal wall. The ileum receives numerous short terminal vessels that arise from a series of three or four or even more arcades.
5. At the jejunal end of the mesentery, the fat is deposited near the root and is scanty near the intestinal wall. At the ileal end of the mesentery, the fat is deposited throughout so that it extends from the root to the intestinal wall.
6. Aggregations of lymphoid tissue (Peyer's patches) are present in the mucous membrane of the lower ileum along the antimesenteric border. In the living, these may be visible through the wall of the ileum from the outside.