The Diaphragm
The nerves from the *four upper* ganglia are quite small, and pass inward to join the cardiac and posterior pulmonary plexuses. The nerves from the *six lower* ganglia constitute the greater, the lesser, and the smaller splanchnic nerves. The *great splanchnic nerve* is composed of the most numerous filaments from the fifth, sixth, seventh, eighth, ninth, and tenth ganglia, which combine into a single trunk, and, passing through the crus of the diaphragm on the corresponding side, join the solar, renal, and supra-renal plexuses. The *lesser splanchnic nerve* arises by branches from the tenth and eleventh ganglia, and passes generally to the cœlïac plexus; and the *smallest splanchnic nerve* arises as a collateral branch from the twelfth ganglion, and terminates in the renal plexus. The chains of the sympathetic ganglia and their nerve-cords are covered by the reflection of the costal pleura upon each side, which holds them in place, and which must be removed before they can be examined and followed through the diaphragm. The association of the filaments of the splanchnic nerves with the solar plexus probably accounts for many of the obscure symptoms complained of in dyspepsia, which by reflex action manifest themselves in pain in the area of distribution of the cutaneous nerves of the upper part of the back.

**THE DIAPHRAGM.**

The diaphragm is the thin, movable, arching partition which separates the cavity of the thorax from the cavity of the abdomen. Its construction is very peculiar, as it consists of muscular and tendinous portions which arise by numerous digitations and, arching upward and inward, converge to be inserted into a common central tendon. To the upper surface of the central tendon are attached the fibrous pericardium and the dense lateral bands which are prolonged from the deep cervical fascia, already described (page 259). These serve to maintain the arch of the diaphragm and to keep the central tendon in position while the muscular portions are in constant motion during respiration (page 273). When looked at from below, the whole diaphragm resembles somewhat a large palm-leaf, while the central tendon appears almost a counterpart in form: hence the differ-
ent portions of each, in front and at the sides, are called the leaflets. Of these the right leaflet is the largest. In structure the central tendon consists of intersecting fibres which pass in all directions and then radiate among the muscular fasciculi, thus affording additional strength. It is of a glistening bluish-white color. The muscular portion of the diaphragm arises by fleshy digitations from the ensiform cartilage, from the inner surfaces of the six lower ribs on each side, interdigitating with the attachment of the transversales abdominis muscles, and from the tendinous arches over the quadratus lumborum and psoas muscles on each side, which consist of condensations of the extra-peritoneal fascia in this locality, and are known, from their ligamentous nature, respectively as the ligamentum arcuatum externum and the ligamentum arcuatum internum (Plate 63, Nos. 6 and 31, Vol. II.). The ligamentum arcuatum externum extends from the twelfth rib to the transverse process of the first lumbar vertebra, and the ligamentum arcuatum internum extends from the transverse process of the first lumbar vertebra to the body of the second. Lower down upon the lumbar vertebrae are two variably-developed and always unsymmetrical fleshy portions, called the crura of the diaphragm, because their component fibres in passing upward cross each other in such a way that they usually form a figure-of-eight arrangement around the openings for the aorta and the oesophagus (Plates 62 and 63, Vol. II.).

The aortic opening is in the middle line in front of the spine between the two crura, and gives passage to the descending aorta, with the thoracic duct and the vena azygos major on its right side. The oesophageal opening is in the muscular portion above and in front of the aortic opening, and transmits, besides the oesophagus, the right and left pneumogastric nerves (page 317). To the right of the latter, and in the highest part of the central tendon, is the opening for the inferior vena cava, which also gives passage upward to some of the hepatic lymphatic vessels, and occasionally to a branch of the right phrenic nerve. The wall of the inferior vena cava is adherent to the central tendon where it passes through it, so that it is not subjected to pressure in the action of the adjacent muscular leaflet. Besides these three great openings there are several smaller ones under the crura, which allow the splanchnic nerves to enter the abdomen from the
The diaphragm (page 320). On the left side the vena azygos minor gains entrance to the thorax (page 319). On each side of the ensiform cartilage there is a triangular space which gives passage to the epigastric branch of the internal mammary artery, and to the lymphatic vessels from the anterior wall of the abdomen into the anterior mediastinum (page 259). Occasionally this becomes distended by an abscess or by a diaphragmatic hernia.

The diaphragm receives branches from the lower intercostal and internal mammary arteries, but is mainly supplied with blood by the two phrenic arteries, which arise from the aorta just as it issues through its proper opening.

The nerves of the diaphragm are the phrenic (page 207) and some of the branches of the lower five or six intercostal nerves, which are reinforced by sympathetic fibres from the neighboring supra-renal plexuses. These fibres form the diaphragmatic plexuses, and on the right side there is a little ganglion (diaphragmaticum), from which filaments pass to the liver. The diaphragm, next to the heart, is the most extraordinary muscular arrangement in the body. Its upper surface arches into the thoracic cavity, on each side, at variable heights (Plate 40), reaching during expiration about the level of the fifth rib on the right side and of the sixth rib on the left (page 265), and during inspiration sinking about an inch, and thus pushing downward the abdominal viscera to a slight degree. It is through the alternate contraction and relaxation of its muscular portions that it enters largely into the mechanism of respiration, aiding, in this important process, the expulsion of the air from the lungs, by acting in harmony with the rest of the thoracic walls and thus accommodating the cavity of the thorax to the degree of expansion of these elastic organs. It is concerned in coughing, sneezing, and laughing, as is manifest by its rapid contractions during those acts. It also assists the abdominal muscles in compressing the viscera in vomiting and defecation, and in the efforts of parturition. The under surface of the diaphragm is covered by the peritoneum, as described with the region of the abdomen in Vol. II.