

the furrow lying over the tips of the spinous processes. The scapular line is drawn vertically downward from the inferior angle of the scapula. The spine of the scapula, running upward and outward to terminate in the acromion process, is easily felt. The inferior boundary of the thorax is formed by the costal cartilages of the lower ribs from the seventh to the tenth inclusive. These, with the ensiform cartilage, form the costal arch, which separates the anterior thoracic surface from the anterior surface of the abdomen.

The thorax has two openings, a superior and an inferior. The superior opening of the thorax is much the smaller, measuring in antero-posterior diameter about 2½ inches (5.7 cm.). It is bounded in front by the upper border of the manubrium and the first costal cartilage; laterally by the shaft of the first rib; behind, by the body of the first dorsal vertebra and the head of the first rib. Passing through it we have the following structures: sterno-hyoid, sterno-thyroid, and longus colli muscles; the innominate, left common carotid, left subclavian, superior intercostal, and internal mammary arteries; the right and left innominate veins; the right and left phrenic and pneumogastric nerves and the left recurrent laryngeal and the right and left gangliated cords of the sympathetic, and the cervical cardiac branches of the pneumogastric; the œsophagus, trachea, and thoracic duct, with the apices of the lungs invested in pleura.

The inferior opening is bounded in front by the ensiform cartilage and the common cartilage of the lower ribs; laterally, by the eleventh and twelfth ribs, and posteriorly by the body of the last dorsal vertebra. The opening is closed by the diaphragm, which separates the thoracic cavity above from the abdominal cavity below. It is pierced by a number of structures: through the aortic opening, between the two crura of the diaphragm, pass the aorta, thoracic duct, and vena azygos major; through the œsophageal opening, the œsophagus, right and left pneumogastric nerves, and the œsophageal branches of the thoracic aorta; on the right side, through an opening of its own, the inferior vena cava; while the greater, lesser, and least splanchnics and the continuation of the thoracic gangliated cord perforate the crus on each side, and on the right side alone the phrenic nerve pierces the right leaflet of the diaphragm anteriorly and a little externally to the opening for the inferior vena cava.

The walls of the thorax are formed anteriorly by the sternum and the costal cartilage, laterally by the shafts of the ribs, and posteriorly by the bodies of the twelve dorsal vertebrae and the heads and necks of the ribs. On transverse cross section, the thorax presents a reniform outline, the deep notch at the back being formed by the intrusion of the bodies of the dorsal vertebrae into the thoracic space. The various diameters of the chest at different levels are given by Holden as follows: In the average skeleton the antero-posterior diameter at the inlet is 2½ inches (5.7 cm.); at the outlet, 5¾ inches (14.25 cm.); while at the junction of the manubrium and gladiolus the antero-posterior diameter is 4½ inches (11.2 cm.). The inlet measures in transverse diameter 4¾ inches (11 cm.); it gradually increases as far as the ninth rib, where the transverse diameter measures 10¾ inches (26.6 cm.). From the ninth to the twelfth rib this diameter decreases. The female thorax has a smaller capacity than the male, the sternum is shorter, the ribs are more movable, and the difference between the upper and the lower openings is less. Abnormal forms are frequently found in which the relation between the different diameters that exist in the normal thorax is disturbed. A pigeon chest is one in which the sternum and costal cartilages project forward, the antero-posterior diameter being longer and the transverse diameter shorter than normal. It is usually found as one of the results of rickets. The barrel chest is one in which the antero-posterior and transverse diameters are nearly equal and the costal angle is an obtuse angle. It is frequently found in emphysema. The flat chest is one with a long transverse diameter and a short antero-posterior diameter. The costal angle in these cases is acute.

The spaces between the ribs are called the intercostal spaces and are closed by the external and internal intercostal muscles. The external intercostals are eleven in number on each side. They begin behind at the tubercles of the ribs and arise from the lower border of each rib as far forward as the ends of the ribs in front. Their fibres pass downward and forward and are inserted into the upper border of the rib below. The internal intercostals take their origin from the ridge on the inner surface of each rib, and the under border of the costal cartilages from the sternum as far back as the angles of the ribs. Their fibres pass downward and backward, at an acute angle to those of the external intercostal, and are inserted in the upper border of the rib below. By means of the ribs and the intercostal spaces many important structures in the thorax are located. The fourth interspace is identified in the male by the nipple. The lower border of the pectoralis major muscle marks the course of the fifth rib. The apex beat of the heart is found in the left fifth interspace one inch and a half below the nipple, and three-quarters of an inch toward the median line. The surface markings for the heart, as given by Deaver, are as follows: Take a point on the third right costal cartilage half an inch from the border of the sternum; from it draw a line to a point in the second interspace on the left side of the sternum, one inch from the left sternal margin. This line will indicate the base of the heart. From a point in the fifth interspace, one inch to the inner side of and two inches below the nipple, draw a line to a point half an inch to the right of the sternum in the fifth interspace. This line will locate the lower border of the heart. Connect the two extremities of the two lines as drawn and the included quadrangle will represent the heart area. A point just behind the sternal end of the third left intercostal space will indicate the position of the aortic valve; behind the third left chondrosternal articulation are the pulmonary valves. The tricuspid valve is found in the median line on the level of the fourth intercostal space; the mitral, at the left border of the sternum behind the fourth left costal cartilage.

**CONTENTS OF THE THORAX.—Pericardium.**—The pericardium is a fibroserous sac composed of two layers: an outer or fibrous, and an inner or serous. The outer or fibrous layer is continuous above with the fibrous sheath of the great vessels and ultimately blends with a layer of deep cervical fascia, which passes behind the sternocleido-mastoid muscle, forming a sheath in the neck for the carotid artery, internal jugular vein, and pneumogastric nerve. It is continuous below with the upper layer of the fibrous covering of the diaphragm. It is attached in front to the under surface of the sternum by the superior and inferior sterno-pericardiac ligaments. The serous portion of the pericardium, like all serous membranes, consists of two layers—a parietal and a visceral. The parietal layer lines the inner surface of the fibrous portion and forms the wall of the pericardial cavity. The visceral layer covers the heart muscle and lies in intimate contact with it. The two layers are continuous with each other at the roots of the great vessels and form a closed cavity, which contains a small amount of serous fluid, for the purpose of lubrication. When from an increase of pericardial fluid this sac becomes distended abnormally, the pericardial area can be outlined on the chest wall, and can be distinguished from the dulness due to cardiac hypertrophy by the fact that the area of pericardial dulness has its apex upward and to the right and its base downward, while an hypertrophied heart has its apex directed downward and to the left and its base upward and to the right.

If on the dissecting table, or at a post-mortem examination, the pericardium be incised in the median line and a transverse incision made at right angles to the first cut, the pericardium can be reflected in four V-shaped flaps, and the anterior surface of the heart inspected in its normal condition. The surface of the heart which presents itself will be almost entirely right ventricle, while the apex of the right auricle can be seen at the upper right

border of the heart. If now the apex of the heart be drawn upward and slightly to the left, the pericardial cavity can be seen and inspected. Running from the lower right-hand corner of the pericardial space upward to the heart is the large inferior vena cava. If this be cut and continued traction made upon the heart, the right and left inferior pulmonary veins will next be seen. Above these the pulmonary arteries and the right and left superior pulmonary veins are found. It is not the purpose of this article to go into a detailed description of the structure of the heart, which will be found in a separate article under an appropriate heading. (See *Heart*.)

**The Pleura.**—The pleura consists of two closed serous sacs which invest the lungs and line the thoracic cavity. Each pleura consists of two layers, a parietal, which lines the internal surface of the thoracic wall, and a visceral, which is closely adherent to the surface of the lungs. The pleura extends into the neck for a distance of an inch and a half to two inches above the upper border of the first rib, where it forms a closed sac which receives the apex of the lung. Inferiorly it covers the upper surface of the diaphragm and extends down in front to the costal cartilage of the seventh rib, on the left side to the lower border of the tenth rib, and on the right to the upper border of the tenth rib; behind, it passes to the upper border of the twelfth rib, or may pass as low as the lower border of the twelfth or the transverse process of the first lumbar vertebra. The two pleurae are not connected at any point, but touch, or may even overlap, on a level with the junction of the first and second pieces of the sternum, the left usually overlapping and lying anterior to the right. At the fourth costal cartilage the two sacs diverge, the right running almost straight downward to the ensiform cartilage, from which point it passes behind the seventh costal cartilage to the diaphragm. The left sac passes outward, downward, and to the left from the fourth costal cartilage to the left margin of the sternum, on a level with the fifth costal cartilage, from which point it passes downward and outward on the under surface of the seventh costal cartilage. The inferior lateral limits of the pleural sacs have been already described. On transverse section of the thorax the relations of the pleurae to each other, as well as the continuity between the parietal and visceral layers, can be demonstrated. Beginning at the median line in front, the anterior parietal pleura lies on the posterior surface of the sternum, passing thence to the posterior surface of the costal cartilages and intercostal muscles, follows the curve of the costal wall and becomes the lateral parietal pleura. Following the curves of the ribs it passes to the posterior wall of the thorax, and, as posterior parietal pleura, passes to the sides of the bodies of the dorsal vertebrae. On the left side it now passes over the abdominal aorta and the left thoracic gangliated cord, while on the right side it covers over, at different levels, the superior vena cava, the inferior vena cava, vena azygos major, and right thoracic gangliated cord. It next passes to the posterior surface of the root of the lung, and thence to the posterior surface of the lung itself, becoming the posterior visceral pleura, or, as it is sometimes called, the pleura pulmonalis. It now invests the lung, covering posterior, lateral, and anterior surfaces in order, as far as the anterior border of the lung, and passing as a septum into the fissures which separate the lobes of the lung. From the anterior border of the lung it passes on to the internal surface of the lung as far backward as the anterior surface of the root of the lung, which it next covers. From this point it passes on to the external surface of the pericardium and forward to the starting-point, becoming again the parietal pleura.

**The Lungs.**—The lungs are the organs of respiration, and are placed one on each side of the chest, separated by the mediastinum and its contents. Each lung is conical in shape and has an apex, a base, an internal and an external surface, and an anterior and a posterior border. The apex projects into the neck for about an inch and a half above the upper border of the clavicle, and lies in the

conical cavity formed by the apex of the pleura. The base is concave, to conform with the convex upper surface of the diaphragm. Its lower border is marked by a line drawn from the articulation of the sixth costal cartilage with the sixth rib to the spinous process of the tenth dorsal vertebra. Owing to the presence of the liver the right lung lies higher in the chest than the left, being on a level in front with the upper border of the fifth costal cartilage, while the lower border of the left passes down to the upper border of the sixth rib. The outer surface of the lung, or the thoracic surface, is smooth, convex, and conforms to the curve of the thoracic wall except in the portion which extends up into the neck. It is sometimes divided into an anterior, a lateral, and a posterior thoracic surface. The inner surface is deeply concave, owing to the position of the heart and pericardium. It is separated from the external surface, in front by the sharp anterior border, and behind from the posterior surface by the root of the lung. The anterior border is thin, sharp, and separates the external and internal surfaces. It overlaps the pericardium and follows closely the anterior internal border of the pleural sacs, as described above, except that the edges of the lungs do not overlap. The anterior border of the right lung reaches to the median line, while the left reaches to the left border of the sternum. The posterior border is round and broad, and lies in the concavity formed by the angle of the ribs on either side of the spinal column. It is much longer than the anterior border and becomes wide as it passes downward.

The roots of the lung are formed by the bronchi, the pulmonary arteries and veins, the bronchial arteries and veins, and the pulmonary nerves and lymphatics. These structures lie in the following order: from before backward, the pulmonary veins, pulmonary artery, and the bronchus; from above downward on the right side, the bronchus, the pulmonary artery, and the pulmonary veins; on the left side, the pulmonary artery, the bronchus, and the pulmonary veins, the bronchus lying above on the right side and in the middle on the left side.

**Lobes.**—Each lung is divided into an upper and a lower lobe. The division is about three inches below the apex. On the right side the upper lobe is again subdivided into two lobes by a horizontal fissure which passes forward from the middle of the first fissure to the anterior border of the lung. The right lung is also larger and heavier than the left, but its transverse diameter is greater than that of the left lung and its vertical diameter shorter. The left lung is longer than the right, but is much narrower.

**Mediastinum.**—The mediastinum is that portion of the thoracic cavity which is not contained within the pleural sacs. It is an irregularly shaped space bounded below by the diaphragm, in front by the sternum and costal cartilages, behind by the vertebral column, and extending above into the neck as far as the apices of the pleura. It is consequently limited above by the deep cervical fascia and the structures which pass through the superior opening of the thorax. It is divided, in a purely arbitrary manner, by a plane which passes through the junction of the manubrium and gladiolus in front, and the lower border of the body of the fourth dorsal vertebra behind. This plane corresponds with the upper border of the pericardium. The portion of the mediastinum above this plane is called the superior mediastinum. It is bounded in front by the posterior surface of the manubrium and the first and second costal cartilages, behind by the anterior surfaces of the bodies of the upper four dorsal vertebrae. Its lateral boundaries are the right and left pleural sacs. It contains the transverse portion of the arch of the aorta, the innominate artery, the left common carotid and subclavian arteries, and the superior intercostal artery; the right and left innominate veins, and the superior vena cava; the pneumogastric, the phrenic and cervical cardiac and left recurrent laryngeal nerves, and the upper portion of the thoracic gangliated cords on each side; the origins of the sterno-hyoid and sterno-thyroid muscles and a portion of the longus colli; the trachea, œsophagus, and thoracic duct. The inferior mediastinum is subdivided by the pericardium into

three portions—the anterior, which lies in front of the pericardium; the middle, which lies within the pericardium; and the posterior, which lies behind the pericardium. The anterior mediastinum is bounded in front by the posterior surface of the lower part of the sternum; behind, by the anterior surface of the fibrous layer of the pericardium; and below, by the attachment of the diaphragm to the ensiform and costal cartilages. It contains fat, areolar tissue, and a few lymphatic glands, which drain the inner and lower quadrant of the mammary gland. The middle mediastinum is bounded by the limits of the pericardium. It contains the heart and the roots of the great vessels. The posterior mediastinum comprises all the space bounded in front by the posterior layer of the pericardium, behind by the bodies of the lower eight dorsal vertebrae and the heads and necks of the ribs, above by the supposititious plane separating it from the superior mediastinum, and below by the upper surface of the diaphragm. It contains the following structures: the descending portion of the thoracic aorta and its branches, viz., the lower intercostal arteries, the œsophageal, bronchial, pericardiac, and posterior mediastinal branches, and the corresponding veins; the greater and lesser azygos veins, the pneumogastric and splanchnic nerves, the œsophagus, thoracic duct, and the posterior mediastinal lymphatics.

**The Aorta.**—The thoracic aorta is divided into three portions—the ascending portion, the transverse portion or arch, and the descending portion. The ascending aorta is about two inches long; commencing at the upper part of the left ventricle, it passes obliquely upward, forward, and to the right as far as the upper border of the second right costal cartilage, where it becomes the transverse aorta. At its commencement it is somewhat distended, and opposite the three cusps of the aortic valve presents three small dilatations, called the sinuses of Valsalva. These sinuses are placed one in front and two behind. From the anterior sinus is given off the right coronary artery, and from the left posterior sinus the left coronary artery.

The transverse aorta, beginning at the upper border of the second right costal cartilage, passes upward, backward, and to the left, lying on the anterior surface of the body of the fourth dorsal vertebra. It then curves downward and backward to the lower border of the fourth dorsal vertebra on the left side, where it becomes the descending aorta. The branches given off from the transverse portion of the aorta are the innominate and the left common carotid and subclavian. The innominate artery, or brachiocephalic, arises from the beginning of the arch of the aorta on a level with the upper border of the second right costal cartilage, and passing upward, forward, and to the right, divides behind the right sterno-clavicular articulation into the right common carotid and subclavian arteries. It varies in length from one to two inches. The innominate usually gives off no other branches, but occasionally the thyroidea ima, which ascends in front of the trachea and supplies the lower portion of the thyroid gland, is found arising from it. The left common carotid arises from the left portion of the arch of the aorta, between the innominate and the left subclavian. It passes upward, outward, and to the left, behind the left sterno-clavicular articulation, and, ascending into the neck, divides into the internal and external carotid arteries, on a level with the upper border of the thyroid cartilage.

The left subclavian artery arises from the arch of the aorta behind and to the left of the left common carotid, and passes nearly vertically upward to the inner border of the scalenus anticus muscle. It then curves outward, lying behind the scalenus anticus muscle, forming the second portion of the artery, and separated by the muscle from the subclavian vein which lies in front.

The descending aorta begins at the lower border of the fourth dorsal vertebra on the left side, and passes downward and slightly to the right, curving to conform to the spine on which it rests and whose curves it follows. It lies in the back portion of the posterior mediastinum and

gives off the following branches: pericardiac branches to the pericardium; bronchial branches to the substance of the lungs, usually a single one on the right side, and two on the left. The bronchial arteries pass along the posterior surface of each bronchus, and, following the course and division of the bronchial tubes, supply the bronchia, the substance of the lungs, and the retro-bronchial glands. The œsophageal arteries, varying in number from three to five, arise from the anterior surface of the aorta and pass downward on the œsophagus, which they supply, anastomosing with the branches of the inferior thyroid above and with the œsophageal branches of the gastric arteries from the cœliac axis of the abdominal aorta below. The posterior mediastinal arteries are a number of branches given off by the thoracic aorta, which supply the glands of the posterior mediastinum. The intercostal arteries arise in pairs from the posterior surface of the descending aorta. There are usually nine on each side. The two upper intercostal spaces receive their blood supply from the superior intercostal branch of the subclavian and from the anastomosis between this artery and the first aortic intercostal. The right intercostal arteries are longer than the left, as they have to pass across the spinal column to reach the right intercostal spaces. The arteries lie first between the pleura and the external intercostals; then, at the angles of the ribs, they pass between the external and internal intercostal muscles; in each intercostal space the artery passes upward to the lower border of the rib above, where it lies between the vein above and the nerve below, except in the upper intercostal spaces, where the nerve at first lies above the artery. Passing forward as far as the anterior axillary line it anastomoses with the terminal branches of the anterior intercostals from the internal mammary artery. This description applies to the upper six intercostal spaces. In the seventh, eighth, and ninth spaces the artery anastomoses with the intercostal branches of the musculo-phrenic artery, while the two lower intercostal arteries, running along the lower border of the eleventh and twelfth ribs, pass forward and downward to the muscles of the abdominal wall.

The pulmonary artery arises from the apex of the right ventricle in front of the aorta and passing upward divides into two branches, the right and left pulmonary arteries. The right pulmonary artery is longer than the left and passes outward and backward behind the ascending aorta and the superior vena cava to the root of the right lung, where it divides into branches; a large branch going to the upper lobe and a smaller branch to the lower lobe. The large upper branch gives off a branch to the middle lobe. The left pulmonary artery passes outward in front of the descending portion of the aorta to the root of the left lung where it divides into two branches, which are distributed to the upper and lower lobes. The relation of the structures in the root of the lung has already been noted.

The superior intercostal artery is a branch of the subclavian, arising from the upper and back portion of the artery, and passing downward and backward behind the pleura in front of the necks of the first two ribs. It supplies the first intercostal space and anastomoses with the first aortic intercostal to supply the second. The internal mammary artery arises from the subclavian from the under surface of the first portion of the artery. It passes directly downward behind the first costal cartilage to the inner surface of the anterior thoracic wall, lying on the costal cartilages about half an inch from the border of the sternum. In the sixth intercostal space it divides into its two terminal branches, the musculo-phrenic and superior epigastric. It gives off in its course a number of small branches which supply the anterior thoracic wall and mediastinal structures. The comes nervi phrenici or the superior phrenic artery joins the phrenic nerve and accompanies it to the diaphragm, where it anastomoses with the phrenic arteries from the internal mammary and abdominal aorta. The mediastinal arteries are small branches, six to eight in number, which are distributed to the lymphatic glands of the anterior media-

stinum. The pericardial branches supply the anterior surface of the pericardium. The sternal branches supply the triangularis sterni muscle and the posterior surface of the gladiolus. The anterior intercostal arteries pass outward in the intercostal spaces and anastomose with the terminal branches of the aortic intercostals. They lie first between the pleura and the internal intercostal muscles and then between the internal and external intercostals. The perforating or mammary branches arise from the internal mammary artery in the upper five intercostal spaces. Piercing the intercostal muscle they pass directly forward and outward and supply the pectoralis major muscle and the under surface of the inner half of the mammary gland. In the male these arteries are small and comparatively unimportant, but in the female, especially during pregnancy and lactation, they are of large size. The musculo-phrenic artery, a terminal branch of the internal mammary, passes downward and outward from the sixth intercostal space behind the costal cartilages and terminates opposite the last intercostal space. It gives off the lower anterior intercostal arteries and branches to the costal margin of the diaphragm and to the portion of the abdominal wall which lies immediately below the costal arch. The superior epigastric artery is the continuation in line of the internal mammary artery. It passes between the costal and sternal attachments of the diaphragm, and, penetrating behind the rectus abdominis muscle, supplies it; at the same time it anastomoses with the deep epigastric from the external iliac, forming a deep circle of anastomosis in the substance of the abdominal wall, between the subclavian artery above and the femoral artery below.

The internal mammary artery is sometimes wounded in stab or gunshot wounds. It can be reached and tied by an incision in the centre of any of the upper six intercostal spaces, parallel to the costal cartilages, and the artery ligated about half an inch external to the outer border of the sternum.

**VEINS.**—**Inferior Vena Cava.**—The inferior vena cava is formed at the lower border of the fourth lumbar vertebra by the junction of the right and left common iliac veins. It passes upward on the right side of the vertebral column, receiving tributaries from all of the pelvic and abdominal viscera except the organs of digestion. It perforates the central tendon of the diaphragm on the right of the median line, and, entering the pericardium, where it is covered by the serous layer, it terminates in the lower and posterior portion of the right auricle. The portion of the inferior vena cava lying in the thorax is short, and is best seen, after incision of the pericardium, by drawing the apex of the heart upward and to the left.

**Innominate Veins.**—The right and left innominate veins are formed by the junction of the subclavian and internal jugular veins on each side, just behind the sterno-clavicular articulation. The left is much longer than the right, being about two and a half inches in length, and passing from the left sterno-clavicular articulation downward and to the right to the junction of the first costal cartilage with the right border of the sternum, where it joins the right innominate vein to form the superior vena cava. The right is shorter and smaller and passes from the right sterno-clavicular articulation almost directly downward to its junction with the left. The tributaries of the right innominate vein are the right vertebral, internal mammary, inferior thyroid, and superior intercostal veins. Those of the left are the corresponding veins on the left side of the body with occasionally some veins from the thymus gland and the pericardium.

**Superior Vena Cava.**—The superior vena cava, formed by the junction of the right and left innominate, passes vertically downward and, piercing the pericardium, enters the upper part of the right auricle on a level with the upper border of the third right costal cartilage.

**Azygos SYSTEM.**—The azygos veins serve to connect the superior and inferior venæ cavæ. They are three in number. The right azygos vein, or vena azygos major, is formed in the abdomen by branches of the lumbar veins, enters the thorax through the aortic opening in

the diaphragm and passes up through the posterior mediastinum, lying on the right side of the vertebral column. At the upper border of the fourth dorsal vertebra it passes forward over the root of the right lung, receives the right bronchial vein, and empties into the superior vena cava at the point where the latter pierces the pericardium. It has as tributaries the right superior intercostal vein, the intercostal veins of the right side, the vena azygos minor, the right bronchial vein, and a portion of the veins from the œsophagus. The left, or vena azygos minor, is formed by a branch from one of the lumbar veins, or by a tributary from the left renal. Entering the thorax through the left crus of the diaphragm it passes up on the left side of the vertebral column as high as the ninth dorsal vertebra, where it curves to the right across the vertebral column behind the aorta and thoracic duct and empties into the right azygos vein. Its tributaries are the lower intercostal veins on the left side and the mediastinal and œsophageal branches. The left upper azygos vein, sometimes called the azygos tertia, or superior azygos, is not always present. When found it varies inversely in size with the left superior intercostal vein. It drains the upper left intercostal spaces and empties into the azygos major above its junction with the minor. When this vein is absent the space usually occupied by it is drained by the left superior intercostal vein. The internal mammary vein accompanies the artery and has tributaries corresponding to the branches given off by the artery. It is frequently found to be double, forming venæ comites lying on each side of the artery and connected at short intervals by cross branches. When the artery is tied care should be taken in passing the needle not to include the veins in the ligature. The two veins when present unite to form a single trunk, which empties into the innominate vein on either side.

**NERVES.**—The pneumogastric, or tenth cranial nerve, enters the thorax between the subclavian vein and artery, lying on the right side just behind the junction of the internal jugular and subclavian, and on the left side between the left carotid and subclavian arteries. Owing to the obliquity of the arch of the aorta the relations of the nerve on the two sides differ. On the right side it descends along the side of the trachea to the posterior portion of the root of the lung, where it gives off the posterior pulmonary branches which spread out to form a plexus, from which two cords descend on the œsophagus, breaking up into a network of branches, which, uniting with similar branches from the nerve on the opposite side, form the œsophageal plexus. Lower down on the œsophagus the fibres again unite to form a single cord which, running along the posterior surface of the œsophagus, passes with it through the œsophageal opening in the diaphragm and is distributed to the posterior surface and greater curvature of the stomach, communicating with the solar, splenic, and cœliac plexuses. The left pneumogastric nerve crosses in front of the arch of the aorta, giving off at this point the left recurrent laryngeal, which, winding around the arch of the aorta from before backward, passes upward in the groove between the œsophagus and trachea and enters the larynx, being distributed to all the muscles of the left side of the larynx except the crico-thyroid. As the recurrent laryngeal nerve on the right side comes off behind the sterno-clavicular articulation and winds around the first portion of the subclavian, and supplies the muscles of phonation on the right side of the larynx, an aneurism of the first portion of the right subclavian would cause pressure paralysis of the right vocal cord, while an aneurism situated in the arch of the aorta would cause a paralysis of the left vocal cord. The left pneumogastric nerve passes behind the root of the left lung, gives off the posterior pulmonary branches to the pulmonary plexus, as described, and the main portion of the nerve, descending along the anterior surface of the œsophagus, passes through the œsophageal opening in the diaphragm and is distributed to the anterior surface and lesser curvature of the stomach, joining branches from the hepatic plexus. The only other thoracic branch of the pneumogastric nerve