It is not uncommon for a ball, after penetrating the thorax and passing through the lung, to be reflected from the pleural surface of the opposite costal wall, and to fall upon the diaphragm, and find its way into the posterior costo-diaphragmatic angle, as in the following case of hæmothorax:

CASE 4.—Private Erastus Roberts, Co. H, 12th Illinois Cavalry, aged 18 years, was wounded at Rappahannock Station, Virginia, October 12th, 1863, by a conoidal ball, which entered near fourth rib, between right scapula and spinal column, and penetrated the chest. He was admitted to Emory Hospital, Washington, on the next day. There was severe pain in the right lung and great dyspnœa; absence of respiratory murmur in right side. The treatment consisted of dressings, bandage around thorax, and opiates. He died October 15th, 1863. Autopsy showed rib fractured at place of wound; cavity of right chest full of blood; right lung collapsed but not wounded; the ball was found in the right thoracic cavity. *Spec.* No. 4496, Sect. I, A. M. M., is an elongated conoidal ball, notched at the apex and longitudinally grooved on one side of the body, and was contributed, with a history of the case, by Acting Assistant Surgeon A. M. Plant.

It is very common for the ball to posses sufficient momentum to carry it through the thorax and yet be detained by the elasticity of the skin, beneath the soft parts on the side of exit. In such cases the ball is usually cut out on the field; but is sometimes suffered to remain until the patient's arrival at a permanent hospital, as in the following cases:

CASE 5.—Private *Carlos E. Lawrence*, Co. E, 57th North Carolina Regiment, aged 34 years, was wounded at Rappahannock Station, November 7th, 1863, by a conoidal ball, which entered one inch to the right of the spinous process of the sixth dorsal vertebra, passed forward and lodged one inch inside of the right nipple. On the 9th, he was admitted to Armory Square Hospital. The patient, whose constitution was not naturally strong, was extremely debilitated and much enfeebled from the effects of the wound, which was much swollen and highly inflamed. On the 10th, the ball was excised by Acting Assistant Surgeon D. W. C. Van Slyck. The patient's system failed to respond to the most thorough and stimulating treatment, and he continued to sink, and died on November 16th, 1863, from asthenia. The missile, somewhat roughened near the apex, was forwarded to the Army Medical Museum, with a minute of the case, by Surgeon D. W. Bliss, U. S. V., and is represented in the wood-cut adjoining (FIG. 278).

FIG. 278.—Ball removed after traversing the chest. *Spec.* 563, Sect. I, A. M. M.

The next abstract illustrates not only this feature, but the rapid development of hydrothorax which sometimes follows penetration of the lung by a musket ball:

CASE 6.—Sergeant Thomas Clark, Co. I, 1st United States Cavalry, was struck by a carbine ball in the cavalry fight near Brandy Station, Virginia, August 1st, 1863. On the next day he was admitted to Douglas Hospital, Washington. When admitted, the bullet was discovered beneath the integument, below the inferior angle of the left scapula, whence it was removed by Acting Assistant Surgeon J. E. Smith. The wound of entrance was found anteriorly over the third rib, which had been fractured. This case was diagnosed as a penetrating wound of the left thoracic cavity, involving the upper lobe of the lung. There had been hæmoptysis and dyspnœa, and there was when admitted great prostration. The clinical history of the case is very imperfect. On the 7th, the patient was found almost *in articulo mortis*, and fully comprehended the situation; but after a consultation it was concluded that no operation at that period would be of avail. The effusion had almost filled the left side, and was causing dyspnœa and profound depression, and at 11 A. M. death took place. Previous to the autopsy, a trocar was introduced below the angle of the scapula, between the eleventh and twelfth ribs, and evacuated half a gallon of bloody serum. On examining the lungs, the track of the bullet was found lined with spiculæ of bone from the comminuted rib. There was local pneumonia of the upper lobe, with the usual evidence of pleuritis; copious effusion of serum, and extensive exudations of lymph. No other lesions were discovered, and death occurred from the traumatic pleuritis and its consequent effusion. The accompanying wood-cut (FIG. 279) gives some idea of the course of the ball. It was drawn from a wet preparation forwarded to the Museum by Assistant Surgeon W. Thomson, U. S. A., then in charge of Douglas Hospital.

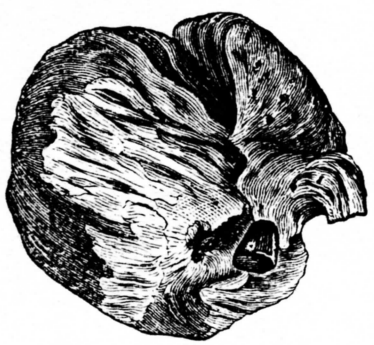

FIG. 279.—Preparation of portion of the upper lobe of the left lung, showing the track of a conoidal musket ball, which is attached. *Spec.* 1678, Sect. I, A. M. M.

In the next case the apparent direction of the ball would suggest that both pleural cavities were opened; but it is probable that its track on the right side lay without the thorax:

CASE 7.—Private Chauncey Pinney, Co. D, 154th New York Volunteers, aged 25 years, was wounded at Gettysburg, Pennsylvania, July 1st, 1863, by a conoidal ball, which entered the left side, fractured the seventh rib about its middle, traversed the cavity of the chest, and lodged in the right side, three inches external to the angle of the sixth rib. He was treated in the

field hospital until August 6th, when he was transferred to the hospital at Camp Letterman. The patient had suffered little from the effects of the injury. The ball was excised and the wound was dressed with simple cerate and tightly supported by adhesive plaster. Tonics were administered, with an opiate occasionally, and at night. From the wound of entrance there was a protrusion of about an inch in size, which was at first believed to be a hernia of the lung, but subsequently proved to be tissue which yielded to caustic. Suffered from dyspnœa and slight cough; right leg very sore and lame from rheumatism. August 13th, general health improving. September 1st, wound presented a healthy granulating surface, with slight suppuration. He continued to improve, and, on October 1st, was transferred to Broad Street Hospital, Philadelphia; on January 22d, 1864, to Mower Hospital, whence he was returned to duty February 10th, 1864. On November 1st, 1864, he entered Hospital No. 8, Nashville, and was again returned to duty January 1st, 1865. On April 29th, 1865, he was admitted to the hospital at Elmira, New York, and was finally discharged from service July 7th, 1865. Acting Assistant Surgeon A. B. Stonelake reports the case. Pension Examiner Ira Shedd reports, under date of May 2, 1867: "A conoidal ball entered the left side of the chest, between the tenth and eleventh ribs, and emerged on the opposite side about two inches anterior to the spinal column, fracturing in its passage one of the vertebræ, and injuring the left lobe of the lung and spinal cord or nerves. Has neuralgia of right leg; is permanently lame, often having severe pain; pain in back and loins, with dysury and partial retention of urine, the result of spinal irritation; strabismus, and loss of sight merging to amaurosis, evidently increasing in severity, resulting from the original spinal injury; fatigue, and often producing dyspnœa and great prostration. Disability total and permanent in present degree." He was still a pensioner in March, 1872.

The exact site of lodgement is almost always obscure, and sometimes is not in the cavity in which the indiscreet tyro would persist in groping for it with his probes, as in the case of Corporal William N——, related at page 451, in which the missile (FIG. 204) penetrating the chest above the right clavicle, passed downward, and, impinging on one of the dorsal vertebræ was deflected, and traversed the mediastinum and lower lobe of the *left* lung, and diaphragm, and lodged under the greater curvature of the stomach. The case of Captain Stolpe, related on page 515, and illustrated by PLATES XI and XII, and also the following case are in point. In the latter instances, the balls were voided at stool:

CASE 8.—Private Thomas B. Belt, Co. C, 155th Pennsylvania Volunteers, having been wounded at Petersburg on March 25th, was admitted to Armory Square Hospital, Washington, on April 24th, 1865. A bullet had entered through the cartilaginous portion of the seventh rib, passed into the region of the transverse colon, and lodged. On admission, the patient suffered from traumatic fever, severe pain in the region of the wound, extending over the abdomen, hiccough and vomiting—the vomited matter consisting of small particles of greenish matter. There was difficult respiration and anorexia; the surface was covered with a cold, clammy perspiration, and there was great difficulty in making water. The treatment in this case consisted of a demulcent and anodyne decoction, of which a wine-glassful was taken four or five times daily; the free use of cracked ice, and a very limited diet of beef-tea, not exceeding six ounces daily. On April 29th, the patient being seized with severe pain in the bowels, passed the ball while defecating. Immediate relief followed, and on May 1st, 1865, the patient was doing well. He was discharged the service on September 22d, 1865. The missile was contributed to the Army Medical Museum, with the foregoing account, by Acting Assistant Surgeon C. H. Bowen. It is shown in the adjoining wood-cut (FIG. 280). Belt is not a pensioner.

FIG. 280.—Conoidal ball, much disfigured and containing several bony spicula imbedded. *Spec.* 1569, Sect. I, A .M. M.

CASE 9.—Private William Welsh, Co. F, 51st Ohio Volunteers, received a gunshot wound of the thorax, at Murfreesboro', Tennessee, December 31st, 1862. He was taken to the hospital of the 3d division, Fourteenth Corps, and simple dressings applied to the wound. On January 10th, he was transferred to Hospital No. 19, Nashville, whence he was conveyed, on January 30th, per hospital boat Emerald, to Covington, Kentucky, entering Seminary Hospital. He died on February 14th, 1863. At the necropsy, a buckshot was found to have entered the right breast, between the fifth and sixth ribs, fracturing the sixth, passed through the parietes into the cavity in a direction downward and toward the spine, wounding the pleura, passed through the diaphragm, and diagonally through the right lobe of the liver, close upon the superior extremity of the right kidney, but doing no material damage to that organ, and lodged in the body of the first lumbar vertebra, about three lines from the spinal canal. In the cavity of the chest on the right side, between the pleura-costalis and pleura-pulmonalis, adhesions were strong throughout, and when separated there were appearances of pus on the surface of the lung. The lung itself exhibited signs of inflammation in its whole extent, and was collapsed to about half the size of the left lung. No evidence appeared that this lung had been wounded, although it is possible that it did not wholly escape injury. Heart and left lung normal. There was not much fluid in the pleural cavity, but the fold of the pleura passing over the diaphragm had a large coagulum intervening between it and the diaphragm. Abdominal viscera all healthy, except the liver, which was much congested, with signs of inflammation along the track of the ball. The case is reported by Surgeon J. T. Carpenter, U. S. V.

In the next case, fragments of clothing were expectorated four months after the reception of the wound:

CASE 10.—Lieutenant-Colonel John B. Collis, 7th Wisconsin Volunteers, aged 35 years, was wounded at Gettysburg, July 1st, 1863, by a ball, which entered the right side, immediately over the tenth rib, midway between the sternum and spinal