# SCIENCE:

A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

TERMS:

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| PER YEAR, | - - - - - | FOUR DOLLARS | |
| 6 MONTHS, | - - - - - | TWO | " |
| 3 " | - - - - - | ONE | " |
| SINGLE COPIES, | - - - - - | TEN CENTS. | |

PUBLISHED AT

TRIBUNE BUILDING, NEW YORK.

P. O. BOX 3838.

LONDON, ENGLAND, - - - - 150 LEADENHALL ST.

SATURDAY, OCTOBER 22, 1881.


## TO OUR ENGLISH READERS.

We have received from Messrs. Deacon & Co., of 150 Leadenhall street, London, England, a standing order for a large supply of "SCIENCE," which will be forwarded weekly. We shall be obliged if our English readers will make this fact known to their friends.

## THE REVELATIONS OF THE AUTOPSY HELD ON THE BODY OF THE LATE PRESIDENT.

THE *Medical Record* of October 8th contains an account by Dr. Bliss, the late President's attending surgeon, of the life history of his illustrious patient, as well as the *post mortem* observations recorded at the time of the autopsy, and also at a later period, by those who examined the specimens preserved in the Army Medical Museum.

Inasmuch as the various diagnoses, made during Mr. Garfield's life, as to the location of the bullet, and the injury sustained by various organs, were all of them erroneous, and as the secular and medical journals have already discussed those topics *ad nauseam*, we shall limit ourselves to a relation of the leading features in the light of the anatomical findings.

For similar reasons, we shall give no space to a discussion of the views expressed by a physician, who, after incurring considerable ridicule at the hands of the medical profession, and much obloquy at the hands of the public, on account of his sensational experiments on dead bodies, and whose claimed results no doubt misled the eminent surgeons at the President's bed-side, publishes a *post mortem* diagnosis of the case in the same issue of the *Record*. In it he seeks to prove that if the bullet *was* found in an entirely different locality from the one his experiments induced him to surmise, it *would*, had it have gone a little further, infallibly have dropped into a similar situation on the *opposite* side! One of the leading medical journals has no other comment to make on this performance, and, as far as we can learn, that comment expresses the general opinion of the medical profession, than to announce that a leading circus company has engaged the services of Dr. Fanueil D. Weisse to repeat his celebrated experiments in the course of the programme.

We subjoin the essential portions of Dr. Bliss' report:—

The depressed cicatrix of the wound made by the pistol-bullet was recognized over the tenth intercostal space, three and one-half inches to the right of the vertebral spines. A deep linear incision (made in part by the operation of July 24, and extended by that of August 8) occupied a position closely corresponding to the upper border of the right twelfth rib. It commenced posteriorly about two inches from the vertebral spines, and extended forward a little more than three inches. At the anterior extremity of this incision there was a deep, nearly square abraded surface about an inch across.

On *inspection of the abdominal viscera in situ*, the transverse colon was observed to lie a little above the line of the umbilicus. It was firmly adherent to the anterior edge of the liver. The greater omentum covered the intestines pretty thoroughly from the transverse colon almost to the pubes. It was still quite fat, and was very much blackened by venous congestion. On both sides its lateral margins were adherent to the abdominal parietes opposite the eleventh and twelfth ribs. On the left side the adhesions were numerous, firm, well organized and probably old.

These adhesions, and the firm ones on the right side, as well as those of the spleen, possibly date back to an attack of chronic dysentery, from which the patient is said to have suffered during the civil war. On the right side there were a few similar adhesions, and a number of more delicate and probably recent ones.

A mass of black, coagulated blood covered and concealed the spleen and the left margin of the greater omentum. On raising the omentum it was found that this blood-mass extended through the left lumbar and iliac regions and dipped down into the pelvis, in which there was some clotted blood and rather more than a pint of bloody fluid. The blood-coagula having been turned out and collected, measured very nearly a pint. It was now evident that secondary hemorrhage had been the immediate cause of death, but the point from which the blood had escaped was not at once apparent.

The adhesions between the liver and the transverse colon proved to bound an *abcess-cavity* between the under-surface of the liver, the transverse colon, and the transverse mesocolon, which involved the gall-bladder, and extended to about the same distance on each side of it, measuring six inches transversely and four inches from before backward. This cavity was lined by a thick pyogenic membrane, which completely replaced the capsule of that part of the undersurface of the liver occupied by the abscess. It contained

about two ounces of greenish yellow fluid—a mixture of pus and biliary matter. This abscess did not involve any portion of the substance of the liver except the surface with which it was in contact, and no communication could be detected between it and any part of the wound.

Some recent peritoneal adhesions existed between the upper surface of the right lobe of the liver and the diaphragm. The *liver* was larger than normal, weighing eighty-four ounces; its substance was firm, but of a pale yellowish color on its surface and throughout the interior of the organ, from fatty degeneration. No evidence that it had been penetrated by the bullet could be found, nor were there any abscesses or infarctions in any part of its tissue.

The *spleen* was connected to the diaphragm by firm, probably old, peritoneal adhesions. There were several rather deep congenital fissures in its margins, giving it a lobulated appearance. It was abnormally large, weighing eighteen ounces; of a very dark lake-red color both on the surface and on section. Its parenchyma was soft and flabby, but contained no abscesses or infarctions.

There were some recent peritoneal adhesions between the posterior wall of the *stomach* and the posterior abdominal parietes. With this exception no abnormities were discovered in the stomach or *intestines*, nor were any other evidences of general or local peritonitis found besides those already specified.

The *right kidney* weighed six ounces, the *left kidney* seven. Just beneath the capsule of the left kidney, at about the middle of its convex border, there was a little abscess one-third of an inch in diameter, and there were three small serous cysts on the convex border of the right kidney, just beneath the capsule; in other respects the tissue of both kidneys was normal in appearance and texture.

The *urinary bladder* was empty.

Behind the right kidney, after the removal of that organ from the body, the dilated *track of the bullet* was dissected into. It was found that from the point at which it had fractured the right eleventh rib (three and one-half inches to the right of the vertebral spines) that missile had gone to the left, obliquely forward, passing through the body of the first lumbar vertebra and lodging in the adipose connective tissue immediately below the lower border of the pancreas, about two and one-half inches to the left of the spinal column, and behind the peritoneum. It had become completely encysted.

The track of the bullet between the point at which it had fractured the eleventh rib and that at which it entered the first lumbar vertebra was considerably dilated, and the pus had burrowed downward through the adipose tissue behind the right kidney, and thence had found its way between the peritoneum and the right iliac fascia, making a descending channel which extended almost to the groin. The adipose tissue behind the right kidney, and thence had found its way between the peritoneum and the right iliac fascia, making a descending channel which extended almost to the groin. The adipose tissue behind the kidney in the vicinity of this descending channel was much thickened and condensed by inflammation. In the channel, which was almost free from pus, lay the flexible catheter introduced into the wound at the commencement of the autopsy; its extremity was found doubled upon itself, immediately beneath the peritoneum, reposing upon the iliac fascia, where the channel was dilated into a pouch of considerable size. This long descending channel, now clearly seen to be caused by the burrowing of pus from the wound, was supposed, during life, to have been the track of the bullet.

The last dorsal, together with the first and second lumbar vertebra and the twelfth rib, were then removed from the body for more thorough examination.

When this examination was made, it was found that the bullet had penetrated the first lumbar vertebra in the upper part of the right side of its body. The aperture by which it entered involved the intervertebral cartilage next above, and was situated just below and anterior to the intervertebral foramen, from which its upper margin was about one-fourth of an inch distant. Passing obliquely to the left, and forward through the upper part of the body of the first lumbar vertebra, the bullet emerged by an aperture, the centre of which was about one-half inch to the left of the median line, and which also involved the intervertebral cartilage next above. The cancellated tissue of the body of the first lumbar vertebra was very much comminuted and the fragments somewhat displaced. Several deep fissures extended from the track of the bullet into the lower part of the body of the twelfth dorsal vertebra. Others extended through the first lumbar vertebra into the intervertebral cartilage between it and the second lumbar vertebra. Both this cartilage and that next above were partly destroyed by ulceration. A number of minute fragments from the fractured lumbar vertebra had been driven into the adjacent soft parts.

It was further found that the right twelfth rib also was fractured at a point one and one-fourth inch to the right of the traverse process of the twelfth dorsal vertebra; this injury had not been recognized during life.

On sawing through the vertebra, a little to the right of the median line, it was found that the spinal canal was not involved by the track of the ball. The spinal cord, and other contents of this portion of the spinal canal, presented no abnormal appearances. The rest of the spinal cord was not examined.

Beyond the first lumbar vertebra, the bullet continued to go to the left, passing behind the pancreas to the point where it was found. Here it was enveloped in a firm cyst of connective tissue, which contained, besides the ball, a minute quantity of inspissated, somewhat cheesy pus, which formed a thin layer over a portion of the surface of the lead. There was also a black shred adherent to a part of the cyst-wall, which proved, on microscopical examination, to be the remains of a blood-clot. For about an inch from this cyst the track of the ball behind the pancreas was completely obliterated by the healing process. Thence, as far backward as the body of the first lumber vertebra, the track was filled with coagulated blood, which extended on the left into an irregular space rent in the adjoining adipose tissue behind the peritoneum and above the pancreas. The blood had worked its way to the left, bursting finally through the peritoneum behind the spleen into the abdominal cavity. The rending of the tissues by the

extravasation of this blood was undoubtedly the cause of the paroxysms of pain which occurred a short time before death.

This mass of coagulated blood was of irregular form, and nearly as large as a man's fist. It could be distinctly seen from in front through the peritoneum, after its site behind the greater curvature of the stomach had been exposed by the dissection of the greater omentum from the stomach, and especially after some delicate adhesions between the stomach and the part of the peritoneum covering the blood-mass had been broken down by the fingers. From the relations of the mass as thus seen, it was believed that the hemorrhage had proceeded from one of the mesenteric arteries, but as it was clear that a minute dissection would be required to determine the particular branch involved, it was agreed that the infiltrated tissues and the adjoining soft parts should be preserved for subsequent study.

On the examination and dissection made in accordance with this agreement, it was found that the fatal hemorrhage proceeded from a rent, nearly four tenths of an inch long, in the main trunk of the splenic artery, two and one-half inches to the left of the cœliac axis. This rent must have occurred at least several days before death, since the everted edges in the slit in the vessel were united by firm adhesions to the surrounding connective tissue, thus forming an almost continuous wall bounding the adjoining portion of the blood-clot. Moreover, the peripheral portion of the clot in this vicinity was disposed in pretty firm concentric layers. It was further found that the cyst below the lower margin of the pancreas, in which the bullet was found, was situated three and one-half inches to the left of the cœliac axis.

Besides the mass of coagulated blood just described, another, about the size of a walnut, was found in the greater omentum, near the splenic extremity of the stomach. The communication, if any, between this and the larger hemorrhage mass could not be made out.

The examination of the *thoracic viscera* resulted as follows:

The *heart* weighed eleven ounces. All the cavities were entirely empty except the right ventricle, in which a few shreds of soft, reddish, coagulated blood adhered to the internal surface. On the surface of the mitral valve there were several spots of fatty degeneration; with this exception the cardiac valves were normal. The muscular tissue of the heart was soft, and tore easily. A few spots of fatty degeneration existed in the lining membrane of the aorta just above the semilunar valves, and a slender clot of fibrin was found in the aorta, where it was divided, about two inches from these valves, for the removal of the heart.

On the right side slight pleuritic adhesions existed between the convex surface of the lower lobe of the lung and the costal pleura, and firm adhesions between the anterior edge of the lower lobe, the pericardium, and the diaphragm. The *right lung* weighed thirty-two ounces. The posterior part of the fissure, between its upper and lower lobes, was congenitally incomplete. The lower lobe of the right lung was hypostatically congested, and considerable portions, especially toward its base, were the seat of broncho pneumonia. The bronchial tubes contained a considerable quantity of stringy muco-pus; their mucous surface was reddened by catarrhal bronchitis. The lung-tissue was œdematous, but contained no abcesses or infarctions.

On the left side the lower lobe of the lung was bound behind to the costal pleura, above to the upper lobe, and below to the diaphragm, by pretty firm pleuritic adhesions. The *left lung* weighed twenty-seven ounces. The condition of the bronchial tubes and of the lung-tissue was very nearly the same as on the right side, the chief difference being that the area of the broncho-pneumonia in the lower lobe was much less extensive in the left lung than in the right. In the lateral part of the lower lobe of the left lung, and about an inch from its pleural surface, there was a group of four minute areas of gray hepatization, each about one-eighth of an inch in diameter. There were no infractions and no abcesses in any part of the lung-tissue.

The surgeons assisting at the autopsy were unanimously of the opinion that, on reviewing the history of the case in connection with the autopsy, it is quite evident that the different suppurating surfaces, and especially the fractured spongy tissue of the vertebra furnish a sufficient explanation of the septic conditions which existed during life.

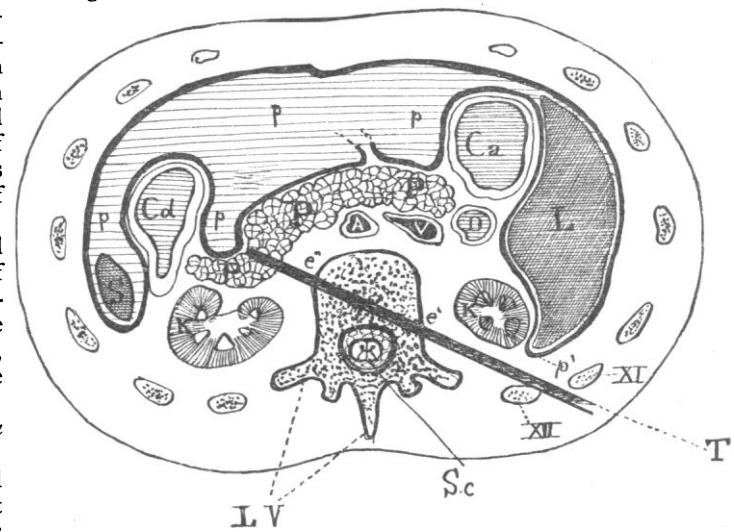



DIAGRAM OF A HORIZONTAL SECTION THROUGH A FROZEN HUMAN CADAVER AT THE LEVEL OF THE PANCREAS.

The accompanying diagrams (page 503) from the *Medical Record* illustrate the course of the bullet very aptly. Fig. 6 is, in our opinion, valueless as a diagram, and it is difficult to harmonize the statements about the track of the ball, and the figure reference, "injury to artery" in the latter illustration. The figure reference, "Point of impact of ball *and deflection*," may be also taken with some allowance.

We have added a schematic drawing taken from a plate representing a frozen section through the human

body, in the horizontal plane (supposing the body standing), and figured of the life size in Braune's magnificent "Atlas." Such a diagram more accurately represents the course of the bullet topographically, than the ones selected by Dr. Bliss seem to us to do.

It is a noteworthy fact, that on marking the topographical projection of the fracture of the 11th rib, that is the point of impact (XI), the fracture of the 12th rib (XII), the aperture of entry into the lumbar vertebra (c'), the aperture of exit (c"), and the terminus of the bullet track, where the bullet was found encysted, on this frozen section, and *connecting all these points by a line, that line is found to be perfectly straight!* It will be seen on examining the figures 4 and 5 furnished by the President's physician, that the bullet track was as straight as an arrow in its frontal projection, and as far as it involved the bony structures.

Now, a line which appears as a straight line in two projections of space, is a straight line in fact, and from this point of view, the case merits renewed discussion.

It must be recollected that our diagram represents a horizontal plane of the body, and the one where the bullet was found encysted. The point of impact lies much higher, the liver in that higher level occupies a greater area of the section, and the bullet in passing the peritoneum seems to have grazed the latter. It could hardly have done so without "nicking" the lower part of the pleural cavity, which descends to this level as a fine slit. The pleuritic adhesions found at the lower part of the right lung, sustain this view.

In the light of modern surgery, an examination of this wound could have presented no difficulties. It is illustrative of the unfortunate position in which the President's physicians find themselves placed, when attempting to defend their course, that the only examination of the wound, which they are able to refer to, is that made by the Surgeon General of the Navy, who was checked in his examination, and excluded from the President's bed-side by those later in charge of the patient. That the fracture of the ribs was not recognized by the attendants, until suppuration near the point of impact necessitated the removal of dead and decaying fragments of bone, is also a remarkable feature of the case. The course of the bullet from the point of impact, being a direct one to the lumbar vertebra, it is difficult to conceive how a thorough digital and instrumental examination could have failed to detect the irregularity produced on the vertebral body by the entrance of the bullet.

None of the procedures necessary to have determined the bullet track from the point of impact to the point of entry into the spinal column, would have been unwarrantable to the most conservative surgeon. *None of these procedures would have been more risky than the one later resorted to in the case, when the false bullet track was repeatedly probed to a distance of twelve inches.*

At this point criticism must necessarily pause, with reference to the question of the examination of the wound. The perforation of the lumbar vertebra having been detected, a bold surgeon might shrink from passing his probe further and following up the bullet-track into the regions beyond, through a perforated segment of the spinal column. What now, in the light of the *post mortem* seems perfectly feasable, during the President's life would have been considered as "heroic" a surgery, as can well be conceived. That a surgeon endowed with the necessary amount of daring, and that great essential the *tactus eruditus*, could have passed a probe through the vertebra and touched the bullet, *without injuring any important organ*, must be admitted by every impartial expert who bears in mind the directness of the bullet track.

This question, however, represents rather a side-issue, when it is recollected that it was not the location of the ball, or its presence in the body, that killed the President. It is only as an illustration of the extent to which the public was misled, and we fear intentionally misled, by some of the President's physicians, that it merits being referred to.

One of the consulting surgeons stated in an ironical way that the bullet could have been removed if its situation had been known, provided the surgeon had, as a preliminary, removed several lumbar vertebræ, and groped his way among the great nerves, the thoracic duct, the Aorta and the Vena Cava. This assertion is stated by no less a one than Dr. Hammond, to be an intentional deception of the people, as it was made through the columns of the daily papers. The reader will see in our diagram that the Aorta and Vena Cava have absolutely no relations to the bullet-track or to the seat of the bullet. Had the situation of the latter been appreciated during life, an incision on the left side of the spinal column would have been in order. This incision and the entire operation *would have been the strict counterparts of certain of the legitimate operations of modern surgery*, namely of *nephrotomy* and *lumbo-colotomy*. It is bad surgery which insists that in every bullet wound, the bullet has to be extracted through its own track. A bullet perforating the thigh to within an inch of the surface on the other side, is to be extracted from the point where it is nearest the surface.

The reader will find the left kidney indicated at K, this is operated on in the operation of nephrotomy, he will find the descending colon at (C. d.), this is opened into in the operation of lumbo-colotomy;

The same risks would have to be taken in the extraction of the bullet that are familiar to the surgeon who performs the latter operation.

Leaving aside all speculative issues, let us trace out the symptoms of the heroic and patient sufferer and their basis, as inferable from the autopsy.

When first struck by the bullet, the President suffered from Surgical Shock. The wound was so severe that his death might have taken place in a few hours; death so occurs to soldiers on the field of battle, who receive similar wounds. His treatment, which consisted in the administration of stimulants and opium, was eminently proper, and doubtless aided by the powerful constitution, overcame the tendency to a fatal collapse.

A tendency to such a collapse recurred at a later period, when Dr. Wales thought the President dying. The primary hemorrhage from the wound was insignificant, no important blood vessels were injured, and the hemorrhage seems to have been mainly external. At a later period an escape of dark venous blood from the wound seems to us to have indicated necrotic usure of the large veins running in the substance of the injured vertebral body.

The painful sensations experienced in the distribution of all the nerves, originating from the crural and particularly the sacral plexus, are attributable to the sudden shock acting on the vertebral column. There is no evidence that any hemorrhage occurred around the nerve roots, or any inflammatory disturbance of the cord or its membranes. The spontaneous disappearance of these nervous symptoms proves conclusively that they were due to the kind of shock, frequently occurring in the practice of military surgeons, and well described by Mitchell, Morehouse and Keene in their work on nerve-injuries. That the nerves on the right side suffered more than those of the left, is attributable to the greater nearness of the right vertebral bullet aperture to the inter-vertebral foramen, where the nerves concerned in the tegumentary supply of the most painful region in this case emerge.

The main injury done by the bullet in its further course, consisted in the irritation of important nerve filaments connected with the Solar Plexus of the Sympathetic System. Irritation of this Plexus, or its derivative branches, accounts for the obstinate and frequently recurring spells of nausea and vomiting, as well as for the great acceleration of the pulse rate, so marked a feature of the President's history. These same symptoms, through the same mechanism, occur with peritonitis, and some of our best physicians suspected the existence of this trouble, from these two symptoms alone. It cannot be said that the imperfect and ambiguous post-mortem record quoted, proves them to have been wrong in their surmise.

In view of the great irritability of the alimentary canal, it is to be considered highly unfortunate that the President's dietary was not properly attended to. At least two of his relapses were due to the undue massing of food in his stomach, at what were considered convalescent periods. Though it is denied that he was allowed improper articles, yet in view of the fact that much of what occurred in the sick-chambers, was rigidly ignored or suppressed by the medical staff, and that on their own confession he was fed on so injurious a combination as milk and lemon-juice for the first few days after the injury, we can not consider that assertion as an invention, until a more authoritative denial be made, than the one vouchsafed by Dr. Bliss.

Several days after the injury, when that examination of the wound was made, which should, in the opinion of ninety-nine out of a hundred surgeons, whom we have consulted or heard opinions from, been made in the first place, a canal was found extending downward to the pelvis. This is now known as the fistulous tract represented on the body-diagram. It was due to burrowing of the pus originating, be it borne in mind, not from the bullet, not from the perforated vertebra, but from the neglected fragments of the eleventh rib. The surgeons did all in their power for a long period to oppose Nature's attempt to close this passage. Thus the pus-absorbing surfaces were largely increased, and with it the dangers of pyæmia.

Without entering into the details of the management of the case, let us conclude with an examination as to the cause of death. The immediate cause of death is stated by the attending surgeon to have been hemorrhage from a dissecting aneurism of the splenic artery. The evidence offered as to the existence of such an aneurism is exceedingly feeble. It is founded on an examination of the specimen after it had lain in alcohol. Under such circumstances laminated layers, as well as membranous precipitates are very apt to form, and on the existence of these the diagnosis appears to rest. A far more natural explanation suggests itself. Every medical student knows that when the dead subject is injected for anatomical purposes masses of blood or of the injecting material are very apt to be found in the abdominal cavity, having escaped through rents in the arteries artificially produced. The pressure used by the embalmer when injecting the President's body was so great that in several places Dr. Bliss is constrained to speak of cavities, a large part of the fluid contained in which had probably transuded from the injecting material of the embalmer. The existence of other clots in the omentum, and elsewhere in the peritoneal cavity, shows that vessels altogether unconnected with the

wound were ruptured by the injecting pressure. The autopsy should have been made before the injection, and then we should have known whether a heart-clot as an accompanying factor of death from post-pyæmic exhaustion was present or not. A physician might well blush for a profession, a member of which could in the face of the criticism waiting to hang on every expression that fell from his lips, deliberately state that the President died of "Neuralgia of the Heart."

The primary cause of death was unquestionably pyæmia. The attending surgeons persist in speaking of septicæmia, and their apologist in the *Medical Record*, Dr. Shrady, ably shields their diagnosis by saying that strictly speaking there is no such thing as pyæmia. It should be known, he claims, as metastatic septicæmia. The attending surgeons knew and know what is meant by pyæmia, and deliberately denied, and still deny, that the condition passing under that name existed. The abscess of the parotid gland, the abscess in the kidneys, and the foci in the lungs are stubborn facts; but they do not appear to exist for those who seem interested in placing their critics in the wrong.

In the conclusion of the report it is stated:—

"The surgeons assisting at the autopsy were unanimously of the opinion that, on reviewing the history of the case in connection with the autopsy, it is quite evident that the different suppurating surfaces, and especially the fractured spongy tissue of the vertebra, furnish a sufficient explanation of the septic conditions which existed during life."

This is admitted to be a correct inference by all those competent to form an opinion. Probably many will cavil at the term "especially" as destined to make light of the responsibility involved in keeping up that largest suppurating area in the President's body, the fistulous tract.

The lessons to be drawn from this surgical case, and it must be borne in mind that just such a case is reported as recovered in Dr. Hamilton's text book, are the following:—

1st. Experiments with projectiles on the dead body do not constitute any guide applicable to given living cases of gun-shot wound."

2d. Surgeons will sin less by being bold in probing and examining wounds, even when near the great cavities of the body, than by being over-conservative and taking chances.

3d. With a constitution like that of Mr. Garfield, almost any operative procedure would be preferable to a conservatism which, through its efforts to keep up a false tract, increases the fatal chances of pyæmia.

Those interested in the mechanism of the impingement of projectiles, will scarcely credit the claim that the bullet was deflected at its impinging point on the eleventh rib. A bullet which crushes through two ribs, cuts clean through a vertebra, and penetrates altogether over eight inches of bony, muscular and fatty tissue in a straight line, and fired at so short a range, can scarcely have been deflected by the very rib it crushed to pieces. The simplest explanation of its course is, that the assassin fired at the President in a line directly continuous with the bullet track in the latter's body. That is, he fired while the plane of the President's back was oblique to the plane of the mouth of the revolver. With this the account given by the assassin himself, the coolest and most unmoved witness of the deed, is in accord throughout.

It should be recollected, what seems to have been overlooked by most or all of those who have criticized this case, that the relations of the parts into which the bullet was fired, were altogether different at the time of the assassination than when the autopsy was performed. At that time large, fatty and muscular masses had to be traversed by the ball, which, in the course of the wasting process ensuing, had nearly disappeared.

It is unfortunate that the brain was not examined. The continual delirious state of the sufferer suggests some metastatic affection of that organ. Probably the reason this organ was not examined was the desire to avoid disfigurement, but the brain can be removed in even a bald person without the latter.

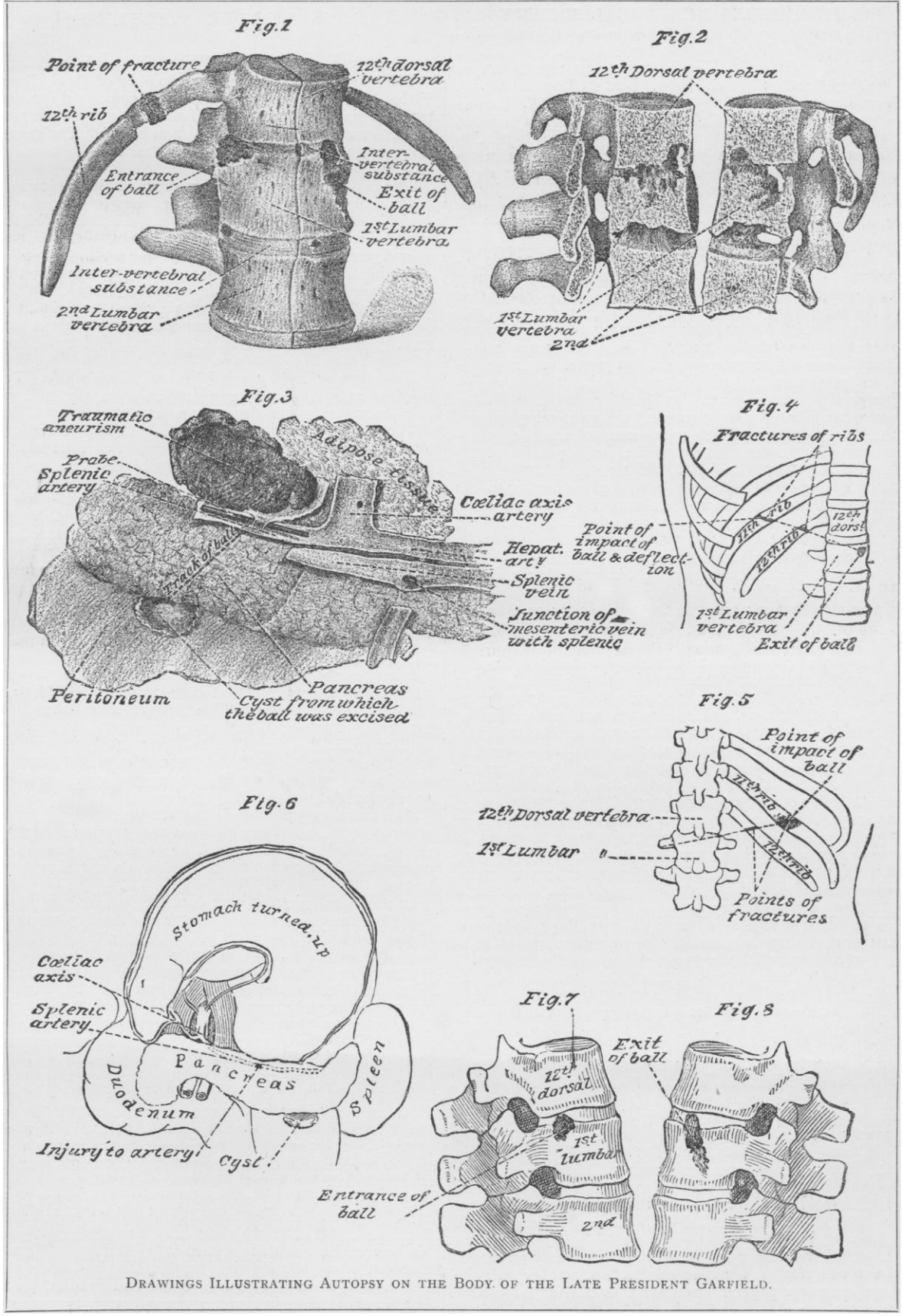
It may be here urged that the early performance of the autopsy should not have interfered with the subsequent embalming. The embalming procedure resorted to in the President's case was of the most routine and imperfect character, and not remotely comparable to the perfected processes employed by the German and Italian anatomists and embalmers.

REFERENCES TO OUR DIAGRAM. PAGE 499.

| | |
|---|---|
| *P.* | Pancreas. |
| *p. p. p.* | Peritoneal cavity, the contained intestines and omental masses omitted. |
| *e'* | Vertebral entry of bullet. |
| *e''* | " exit of " |
| *Ca.* | Ascending colon. |
| *Cd.* | Descending colon. |
| *D.* | Extraperitoneal part of Duodenum. |
| *H.* | Aorta. |
| *V.* | Vena Cava. |
| *K. K.* | Kidneys. |
| *Sc.* | Spinal Cord. |
| *S.* | Spleen. |

The thick straight line represents the bullet track.

PROTOPLASM STAINED WHILST LIVING.—Mr. L. F. Henneguy publishes the result of some experiments made on living infusoria, in which he confirms the observations of Brandt, made in 1879, that an aqueous solution of aniline brown, known in commerce as Bismarck brown, will give an intense brownish-yellow color to the protoplasm of the infusoria without in any way interfering with their enjoyment of life. The coloration first appears in the vacuoles of the protoplasm, then this latter is itself stained, the nucleus being most generally not at first colored, and so being made more conspicuous. Experiments made on vegetable protoplasm seemed to exhibit the same result.




DRAWINGS ILLUSTRATING AUTOPSY ON THE BODY OF THE LATE PRESIDENT GARFIELD.