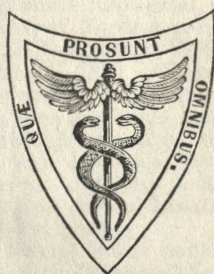


THE
AMERICAN JOURNAL
OF THE
MEDICAL SCIENCES.

EDITED BY
ISAAC HAYS, M.D.,
SURGEON TO WILLS HOSPITAL,
FELLOW OF THE PHILADELPHIA COLLEGE OF PHYSICIANS; MEMBER OF THE
AMERICAN MEDICAL ASSOCIATION; OF THE AMERICAN PHILOSOPHICAL SOCIETY; OF THE
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA,
&c. &c. &c.

NEW SERIES.

VOL. XX.



PHILADELPHIA:
LEA & BLANCHARD.
LONDON:
JOHN WILEY, AND JOHN MILLER.
.....
1850.

CONTENTS

OF THE

AMERICAN JOURNAL

OF THE

MEDICAL SCIENCES.

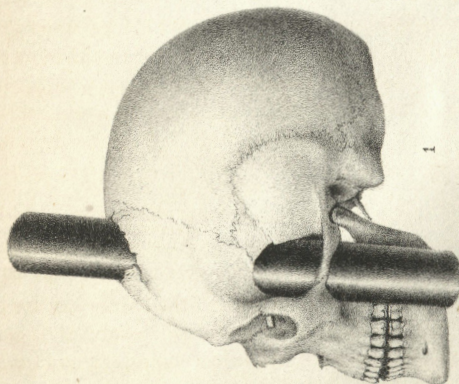
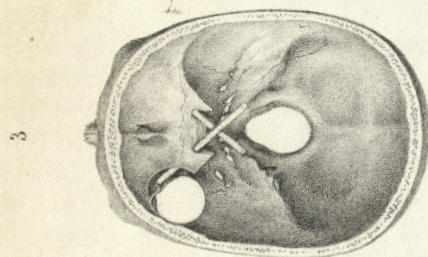
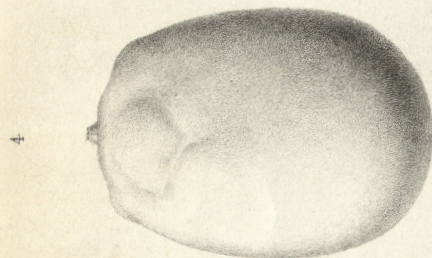
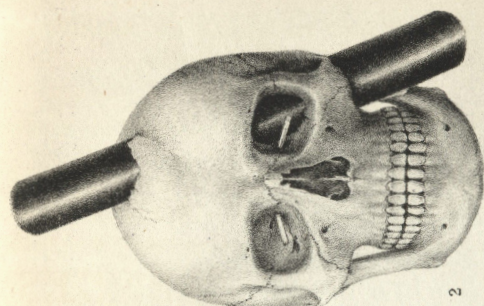
NO. XXXIX. NEW SERIES.

JULY, 1850.

ORIGINAL COMMUNICATIONS.

MEMOIRS AND CASES.

ART.	PAGE
I. Dr. Harlow's Case of Recovery from the passage of an Iron Bar through the Head. By Henry J. Bigelow, M. D., Professor of Surgery in Harvard University: [With a plate.] - - -	13
II. Remarks on the Relation of the Dumb-Bell Crystals to Uric Acid. By Charles Frick, M. D., of Baltimore, Maryland. [With a wood-cut.] -	23
III. Extracts from the Records of the Boston Society for Medical Improvement. By Wm. W. Morland, Secretary. [With a wood-cut.] -	26
IV. Annual Report of the Committee on Medical Chemistry. By Jno. C. Dalton, Jr., M. D. (Read before the Boston Society for Medical Observation, June 4th, 1849.) - - -	41
V. Case of Extra-Uterine Fœtation. By Wm. Denny, M. D., of Ellicott's Mills, Howard District, Anne Arundel county, Md. - - -	49
VI. Remarks on Obstetrical Forceps, with an attempt at their improvement. By Henry Bond, M. D. [With three wood-cuts.] -	62
VII. Histological Researches on the Development, Nature, and Function of Epithelial Structures. By W. J. Burnett, M. D. (Read before the Boston Society for Natural History, Aug. 1, 1849.) - - -	70
VIII. On Cholera Asphyxia. By James F. Gayley, M. D., of Philadelphia. - - -	83
IX. Notice of certain Peculiar Bodies observed in the Human Subject. By Joseph Leidy, M. D. [With five wood-cuts.] - - -	89
X. Ligature of Internal Iliac Artery for Aneurism. By Gilman Kimball, M. D., of Lowell, Massachusetts. - - -	92
XI. Abstract of a Case of Constitutional Irritation following Vaccination. By Charles E. Buckingham, M. D., Physician to the Boston House of Industry. - - -	96
XII. A Case of Wound of the left Ventricle of the Heart.—Patient survived five days;—with remarks. By John W. H. Trugien, M. D., of Portsmouth, Va. - - -	99
XIII. Poisoning by the Seeds of <i>Jatropha Curcas</i> . By R. J. Farquharson, M. D., Assistant Surgeon U. S. N. Communicated by T. Harris, M. D., Chief of the Bureau of Medicine and Surgery, U. S. N. -	102



O. VALLIN del. et lith. BOSTON.

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES

FOR JULY 1850.

ART. I.—*Dr. Harlow's Case of Recovery from the passage of an Iron Bar through the Head.* By HENRY J. BIGELOW, M. D., Professor of Surgery in Harvard University. (With a plate.)

THE following case, perhaps unparalleled in the annals of surgery, and of which some interesting details have already been published, occurred in the practice of Dr. J. M. Harlow, of Cavendish, Vermont. Having received a verbal account of the accident, a few days after its occurrence, from a medical gentleman who had examined the patient, I thus became incidentally interested in it; and having since had an opportunity, through the politeness of Dr. Harlow, of observing the patient, who remained in Boston a number of weeks under my charge, I have been able to satisfy myself as well of the occurrence and extent of the injury as of the manner of its infliction. I am also indebted to the same gentleman for procuring at my request the testimony of a number of persons who were cognizant of the accident or its sequel.

Those who are skeptical in admitting the co-existence of a lesion so grave, with an inconsiderable disturbance of function, will be interested in further details connected with the case; while it is due to science that a more complete record should be made of the history of so remarkable an injury.

The accident occurred upon the line of the Rutland and Burlington Railroad, on the 13th of September, 1848. The subject of it, Phineas P. Gage, is of middle stature, twenty-five years of age, shrewd and intelligent. According to his own statement, he was charging with powder a hole drilled in a rock, for the purpose of blasting. It appears that it is customary in filling the hole to cover the powder with sand. In this case, the charge having been adjusted, Mr. Gage directed his assistant to pour in the sand; and at the interval of a few seconds, his head being averted, and supposing the sand to have been properly placed, he dropped the head of the iron as usual upon the

charge, to consolidate or "*tamp it in.*" The assistant had failed to obey the order, and the iron striking fire upon the rock, the uncovered powder was ignited and the explosion took place. Mr. Gage was at this time standing above the hole, leaning forward, with his face slightly averted; and the bar of iron was projected directly upwards in a line of its axis, passing completely through his head and high into the air. The wound thus received, and which is more fully described in the sequel, was oblique, traversing the cranium in a straight line from the angle of the lower jaw on one side to the centre of the frontal bone above, near the sagittal suture, where the missile emerged; and the iron thus forcibly thrown into the air was picked up at a distance of some rods from the patient, smeared with brains and blood.

From this extraordinary lesion, the patient has quite recovered in his faculties of body and mind, with the loss only of the sight of the injured eye.

The iron which thus traversed the skull weighs thirteen and a quarter pounds. It is three feet seven inches in length, and one and a quarter inches in diameter. The end which entered first is pointed; the taper being seven inches long, and the diameter of the point one quarter of an inch; circumstances to which the patient perhaps owes his life. The iron is unlike any other, and was made by a neighbouring blacksmith to please the fancy of the owner.

Dr. Harlow, in the graphic account above alluded to, states that "immediately after the explosion the patient was thrown upon his back, and gave a few convulsive motions of the extremities, but spoke in a few minutes. His men (with whom he was a great favourite) took him in their arms and carried him to the road, only a few rods distant, and sat him into an ox cart, in which he rode, sitting erect, full three quarters of a mile, to the hotel of Mr. Joseph Adams, in this village. He got out of the cart himself, and with a little assistance walked up a long flight of stairs, into the hall, where he was dressed."

Mr. Joseph Adams, here spoken of, has furnished the following interesting statement:—

This is to certify that P. P. Gage had boarded in my house for several weeks previous to his being injured upon the railroad, and that I saw him and conversed with him soon after the accident, and am of opinion that he was perfectly conscious of what was passing around him. He rode to the house, three-quarters of a mile, sitting in a cart, and walked from the cart into the piazza, and thence up stairs, with but little assistance. I noticed the state of the left eye, and know, from experiment, that he could see with it for several days, though not distinctly. In regard to the elevated appearance of the wound, and the introduction of the finger into it, I can fully confirm the certificate of my nephew, Washington Adams, and others, and would add that I repeatedly saw him eject matter from the mouth similar in appearance to that discharged from the head. The morning subsequent to the accident I went in quest of the bar, and found it at a smith's shop, near the pit in which he was engaged.

The men in his pit asserted that "they found the iron, covered with blood

and brains," several rods behind where Mr. Gage stood, and that they washed it in the brook, and returned it with the other tools; which representation was fully corroborated by the greasy feel and look of the iron, and the fragments of brain which I saw upon the rock where it fell.

(Signed) JOSEPH ADAMS,
Justice of the Peace.

CAVENDISH, Dec. 14, 1849.

The Rev. Joseph Freeman, whose letter follows, informed himself of the circumstances soon after the accident.

CAVENDISH, Dec. 5, 1849.

DEAR SIR—I was at home on the day Mr. Gage was hurt; and seeing an Irishman ride rapidly up to your door, I stepped over to ascertain the cause, and then went immediately to meet those who I was informed were bringing him to our village.

I found him in a cart, sitting up without aid, with his back against the fore-board. When we reached his quarters, he rose to his feet without aid, and walked quick, though with an unsteady step, to the hind end of the cart, when two of his men came forward and aided him out, and walked with him, supporting him to the house.

I then asked his men how he came to be hurt? The reply was, "The blast went off when he was tamping it, and the tamping-iron passed through his head." I said, "That is impossible."

Soon after this, I went to the place where the accident happened. I found upon the rocks, where I supposed he had fallen, a small quantity of brains. There being no person at this place, I passed on to a blacksmith's shop a few rods beyond, in and about which a number of Irishmen were collected. As I came up to them, they pointed me to the iron, which has since attracted so much attention, standing outside the shop-door. They said they found it covered with brains and dirt, and had washed it in the brook. The appearance of the iron corresponded with this story. It had a greasy appearance, and was so to the touch.

After hearing their statement, as there was no assignable motive for misrepresentation, and finding the appearance of the iron to agree with it, I was compelled to believe, though the result of your examination of the wound was not then known to me.

I think of nothing further relating to this affair which cannot be more minutely stated by others.

Very respectfully, yours,
(Signed) JOSEPH FREEMAN.

DR. J. M. HARLOW.

Dr. WILLIAMS first saw the patient, and makes the following statement in relation to the circumstances:—

NORTHFIELD, Vermont, Dec. 4, 1849.

Dr. BIGELOW: Dear Sir—Dr. Harlow having requested me to transmit to you a description of the appearance of Mr. Gage at the time I first saw him after the accident, which happened to him in September, 1848, I now hasten to do so with pleasure.

Dr. Harlow being absent at the time of the accident, I was sent for, and was

the first physician who saw Mr. G., some twenty-five or thirty minutes after he received the injury; he at that time was sitting in a chair upon the piazza of Mr. Adams's hotel, in Cavendish. When I drove up, he said, "Doctor, here is business enough for you." I first noticed the wound upon the head before I alighted from my carriage, the pulsations of the brain being very distinct; there was also an appearance which, before I examined the head, I could not account for: the top of the head appeared somewhat like an inverted funnel; this was owing, I discovered, to the bone being fractured about the opening for a distance of about two inches in every direction. I ought to have mentioned above that the opening through the skull and integuments was not far from one and a half inch in diameter; the edges of this opening were everted, and the whole wound appeared as if some wedge-shaped body had passed from below upward. Mr. Gage, during the time I was examining this wound, was relating the manner in which he was injured to the bystanders; he talked so rationally and was so willing to answer questions, that I directed my inquiries to him in preference to the men who were with him at the time of the accident, and who were standing about at this time. Mr. G. then related to me some of the circumstances, as he has since done; and I can safely say that neither at that time nor on any subsequent occasion, save once, did I consider him to be other than perfectly rational. The one time to which I allude was about a fortnight after the accident, and then he persisted in calling me John Kirwin; yet he answered all my questions correctly.

I did not believe Mr. Gage's statement at that time, but thought he was deceived; I asked him where the bar entered, and he pointed to the wound on his cheek, which I had not before discovered; this was a slit running from the angle of the jaw forward about one and a half inch; it was very much stretched laterally, and was discoloured by powder and iron rust, or at least appeared so. Mr. Gage persisted in saying that the bar went through his head: an Irishman standing by said, "Sure it was so, sir, for the bar is lying in the road below, all blood and brains." The man also said he would have brought it up with him, but he thought there would be an inquest, and it would not do.

About this time, Mr. G. got up and vomited a large quantity of blood, together with some of his food; the effort of vomiting pressed out about half a teacupful of the brain, which fell upon the floor, together with the blood, which was forced out at the same time. The left eye appeared more dull and glassy than the right. Mr. G. said he could merely distinguish light with it.

Soon after Dr. Harlow arrived, Mr. Gage walked up stairs, with little or no assistance, and laid down upon a bed, when Dr. H. made a thorough examination of the wounds, passing the whole length of his forefinger into the superior opening without difficulty; and my impression is that he did the same with the inferior one, but of that I am not absolutely certain: after this we proceeded to dress the wounds in the manner described by Dr. H. in the Journal. During the time occupied in dressing, Mr. G. vomited two or three times fully as freely as before. All of this time Mr. G. was perfectly conscious, answering all questions, and calling his friends by name as they came into the room.

I did not see the bar that night, but saw it the next day after it was washed.

Hoping you will excuse this hasty sketch, I remain yours, &c.

(Signed) EDWARD H. WILLIAMS, M. D.

Dr. Harlow's account of his first visit to the patient, and of the subsequent symptoms, is here appended.

"Being absent, I did not arrive at the scene of the accident until near 6 o'clock, P. M. You will excuse me for remarking here that the picture presented was, to one unaccustomed to military surgery, truly terrific; but the patient bore his sufferings with the most heroic firmness. He recognized me at once, and said he hoped he was not much hurt. He seemed to be perfectly conscious, but was getting exhausted from the hemorrhage, which was very profuse both externally and internally, the blood finding its way into the stomach, which rejected it as often as every fifteen or twenty minutes. Pulse 60, and regular. His person and the bed on which he was laid were literally one gore of blood. Assisted by my friend, Dr. Williams, of Proctorsville, who was first called to the patient, we proceeded to dress the wounds. From their appearance, the fragments of bone being uplifted and the brain protruding, it was evident that the fracture was occasioned by some force acting from below upward. The scalp was shaven, the coagula removed, together with three small triangular pieces of the cranium, and in searching to ascertain if there were other foreign bodies there, I passed in the index finger its whole length, without the least resistance, in the direction of the wound in the cheek, which received the other finger in like manner. A portion of the anterior superior angle of each parietal bone, and a semicircular piece of the frontal bone, were fractured, leaving a circular opening of about three and a half inches in diameter. This examination, and the appearance of the iron which was found some rods distant, smeared with brain, together with the testimony of the workmen, and of the patient himself, who was still sufficiently conscious to say that 'the iron struck his head and passed through,' was considered at the time sufficiently conclusive to show not only the nature of the accident, but the manner in which it occurred.

"I have been asked why I did not pass a probe through the entire extent of the wound at the time. I think no surgeon of discretion would have upheld me in the trial of such a foolhardy experiment, in the risk of disturbing lacerated vessels, from which the hemorrhage was near being staunched, and thereby rupturing the attenuated thread, by which the sufferer still held to life. You will excuse me for being thus particular, inasmuch as I am aware that the nature of the injury has been seriously questioned by many medical men for whom I entertain a very high respect.

"The spiculæ of bone having been taken away, a portion of the brain which hung by a pedicle, was removed, the larger pieces of bone replaced, the lacerated scalp was brought together as nearly as possible, and retained by adhesive straps, excepting at the posterior angle, and over this a simple dressing—compress, nightcap and roller. The wound in the face was left patulous, covered only by a simple dressing. The hands and forearms were both deeply burned nearly to the elbows, which were dressed, and the patient was left with the head elevated, and the attendants requested to keep him in that position.

"10 P. M., same evening. The dressings are saturated with blood, but the hemorrhage appears to be abating. Has vomited twice only since being dressed. Sensorial powers remain as yet unimpaired. Says he does not wish to see his friends, as he shall be at work in a day or two. Tells where they live, their names, &c. Pulse 65; constant agitation of the lower extremities.

"14th, 7 A. M. Has slept some; appears to be in pain; speaks with difficulty; tumefaction of face considerable, and increasing; pulse 70; knows his friends, and is rational. Asks who is foreman in his pit. Hemorrhage internally continues slightly. Has not vomited since 12 P. M.

"15th, 9 A. M. Has slept well half the night. Sees objects indistinctly with the left eye, when the lids are separated. Hemorrhage has ceased. Pulse 75. 8 P. M., Restless and delirious; talks much, but disconnected and incoherent. Pulse 84, and full. Prescribed vin. colchicum, fʒss every six hours, until it purges him. Removed the night-cap.

"16th, 8 A. M. Patient appears more quiet. Pulse 70. Dressed the wounds, which in the head have a fetid sero-purulent discharge, with particles of brain intermingled. No discharge from bowels. Ordered sulph. magnesia, ʒj, repeated every four hours until it operates. Iced water to the head and eye. A fungus appears at the external canthus of the left eye. Says 'the left side of his head is banked up.'

"17th, 8 A. M. Pulse 84. Purged freely. Rational, and knows his friends. Discharge from the brain profuse, very fetid and sanious. Wounds in face healing.

"18th, 9 A. M. Slept well all night, and lies upon his right side. Pulse 72; tongue red and dry; breath fetid. Removed the dressings, and passed a probe to the base of the cranium, without giving pain. Ordered a cathartic, which operated freely. Cold to the head. Patient says he shall recover. He is delirious, with lucid intervals.

"19th, 8 P. M. Has been very restless during the day; skin hot and dry; tongue red; excessive thirst; delirious, talking incoherently with himself, and directing his men.

"20th and 21st. Has remained much the same.

"22d, 8 A. M. Patient has had a very restless night. Throws his hands and feet about, and tries to get out of bed. Head hot. Says 'he shall not live long so.' Ordered a cathartic of calomel and rhubarb, to be followed by castor oil, if it does not operate in six hours. 4 P. M. Purged freely twice, and inclines to sleep.

"23d. Rested well most of the night, and appears stronger and more rational. Pulse 80. Shaved the scalp a second time, and brought the edges of the wound in position, the previous edges having sloughed away. Discharge less in quantity and less fetid. Loss of vision of left eye.

"From this time until the 3d of October, he lay in a semi-comatose state, seldom speaking unless spoken to, and then answering only in monosyllables. During this period, fungi started from the brain, and increased rapidly from the orbit. To these was applied nitrate of silver cryst., and cold to the head generally. The dressings were renewed three times in every twenty-four hours; and in addition to this, laxatives, combined with an occasional dose of calomel, constituted the treatment. The pulse varied from 70 to 96—generally very soft. During this time an abscess formed under the frontalis muscle, which was opened on the 27th, and has been very difficult to heal. Discharged nearly ʒviii at the time it was punctured.

"Oct. 5th and 6th. Patient improving. Discharge from the wound and sinus, laudable pus. Calls for his pants, and wishes to get out of bed, though he is unable to raise his head from the pillow.

"7th. Has succeeded in raising himself up, and took one step to his chair, and sat about five minutes.

"11th. Pulse 72. Intellectual faculties brightening. When I asked him how long since he was injured, he replied, 'four weeks this afternoon, at half past four o'clock.' Relates the manner in which it occurred, and how he came to the house. He keeps the day of the week and time of day in his mind. Says he knows more than half of those who inquire after him. Does

not estimate size or money accurately, though he has memory as perfect as ever. He would not take one thousand dollars for a few pebbles which he took from an ancient river bed where he was at work. The fungus is giving way under the use of the cryst. nitrate of silver. During all of this time there has been a discharge of pus into the fauces, a part of which passed into the stomach, the remainder being ejected from the mouth.

"20th. Improving. Gets out and into bed with but little assistance. Sits up thirty minutes twice in twenty-four hours. Is very childish; wishes to go home to Lebanon, N. H. The wound in the scalp is healing rapidly.

"Nov. 8th. Improving in every particular, and sits up most of the time during the day. Appetite good, though he is still kept upon a low diet. Pulse 65. Sleeps well, and says he has no pain in the head. Food digests easily, bowels regular, and nutrition is going on well. The sinus under the frontalis muscle has nearly healed. He walks up and down stairs, and about the house, into the piazza, and I am informed this evening that he has been in the street to-day.—I leave him for a week, with strict injunctions to avoid excitement and exposure.

"15th. I learn, on inquiry, that Gage has been in the street every day except Sunday, during my absence. His desire to be out and to go home to Lebanon has been uncontrollable by his friends, and he has been making arrangements to that effect. Yesterday he walked half a mile, and purchased some small articles at the store. The atmosphere was cold and damp, the ground wet, and he went without an overcoat, and with thin boots. He got wet feet and a chill. I find him in bed, depressed and very irritable. Hot and dry skin; thirst, tongue coated; pulse 110: lancinating pain in left side of head and face; rigors, and bowels constipated. Ordered cold to the head and face, and a black dose to be repeated in six hours, if it does not operate. He has had spiculæ of bone pass into the fauces, which he expelled from the mouth within a few days.

"16th, A. M. No better. Cathartic has operated freely. Pulse 120; skin hot and dry; thirst and pain remain the same. Has been very restless during the night. Venesection fʒxvj. Ordered calomel, gr. x, and ipecac. gr. ij, followed in four hours by castor oil.

"8 P. M., same day. Purged freely; pulse less frequent; pain in head moderated; skin moist. R. Antim. et potassa tart., gr. iij; syr. simplex, fʒvj. Dose a dessertspoonful every four hours.

"17th. Improving. Expresses himself as 'feeling better in every respect;' has no pain in the head.

"18th. Is walking about the house again; says he feels no pain in the head, and appears to be in a way of recovering if he can be controlled."

Remarks.—The leading feature of this case is its improbability. A physician who holds in his hand a crowbar, three feet and a half long, and more than thirteen pounds in weight, will not readily believe that it has been driven with a crash through the brain of a man who is still able to walk off, talking with composure and equanimity of the hole in his head. This is the sort of accident that happens in the pantomime at the theatre, but not elsewhere. Yet there is every reason for supposing it in this case literally true. Being at first wholly skeptical, I have been personally convinced; and this has been the experience of many medical gentlemen who, having first heard of the circumstances, have had a subsequent opportunity to examine the evidence.

This evidence is comprised in the testimony of individuals, and in the anatomical and physiological character of the lesion itself.

The above accounts from different individuals, concur in assigning to the accident a common cause. They are selected as the most complete among about a dozen of similar documents forwarded to me by Dr. Harlow, who was kind enough to procure them at my request; and which bear the signature of many respectable persons in and about the town of Cavendish, and all corroborative of the circumstances as here detailed. The accident occurred in open day, in a quarry in which a considerable number of men were at work, many of whom were witnesses of it, and all of whom were attracted by it. Suffice it to say, that in a thickly populated country neighbourhood, to which all the facts were matter of daily discussion at the time of their occurrence, there is no difference of belief, nor has there been at any time doubt that the iron was actually driven through the brain. A considerable number of medical gentlemen also visited the case at various times to satisfy their incredulity.

Assuming the point that the wound was the result of a missile projected from below upwards, it may be asked whether the wound might not have been made by a stone, while the bar was at the same moment thrown into the air. It may be replied in answer, that the rock was not split, nor, as far as could be learned, disintegrated. Besides, an angular bit of stone would have been likely to have produced quite as much laceration as the bar of iron; and it is in fact possible that the tapering point of the latter divided and repelled the soft parts, especially the brain, in a way that enabled the smooth surface of the iron to glide through with less injury. And assuming the only possible hypothesis, that the round bar followed exactly the direction of its axis, the missile may be considered as a sphere of one and a quarter inches diameter, preceded by a conical and polished wedge.

The patient visited Boston in January, 1850, and remained some time under my observation, during which he was presented at a meeting of the Boston Society for Medical Improvement, and also to the medical class at the hospital. His head, now perfectly healed, exhibits the following appearances.

A linear cicatrix of an inch in length occupies the left ramus of the jaw near its angle. A little thickening of the soft tissues is discovered about the corresponding malar bone. The eyelid of this side is shut, and the patient unable to open it. The eye considerably more prominent than the other, offers a singular confirmation of the points illustrated by the prepared skull described below. It will be there seen that the parts of the orbit necessarily cut away are those occupied by the levator palpebræ superioris, the levator oculi, and the abducens muscles. In addition to a ptosis of the lid, the eye is found to be incapable of executing either the outward or upward motion; while the other muscles animated by the motor communis are unimpaired. Upon the head, and covered by hair, is a large unequal depression and elevation. A portrait of the cast of the shaved head is given in the plate; and it

will be there seen that a piece of cranium of about the size of the palm of the hand, its posterior border lying near the coronal suture, its anterior edge low upon the forehead, was raised upon the latter as a hinge to allow the egress of the bar; and that it still remains raised and prominent. Behind it is an irregular and deep sulcus several inches in length, beneath which the pulsations of the brain can be perceived.

In order to ascertain how far it might be possible for this bar of an inch and a quarter diameter to traverse the skull in the track assigned to it, I procured a common skull, in which the zygomatic arches are barely visible from above; and having entered a drill near the left angle of the lower jaw, passed it obliquely upwards to the median line of the cranium just in front of the junction of the sagittal and coronal sutures. This aperture was then enlarged until it allowed the passage of the bar in question, and the loss of substance strikingly corresponds with the lesion said to have been received by the patient. From the coronoid process of the lower jaw is removed a fragment measuring about three-quarters of an inch in length. This fragment in the patient's case might have been fractured and subsequently reunited.

The hole now enters obliquely beneath the zygomatic arch, encroaching equally upon all its walls. In fact, it entirely occupies this cavity; the posterior wall of the antrum being partially excavated at the front of the hole, the whole orbital portion of the sphenoid bone being removed behind, as also the anterior part of the squamous portion of the temporal bone, and the internal surface of the zygoma and malar bone laterally. In the orbit, the sphenoid bone, part of the superior maxillary below, and a large part of the frontal above, are cut away, and with these fragments much of the speno-maxillary fissure; leaving, however, the optic foramen intact about a quarter of an inch to the inside of the track of the bar.

The base of the skull upon the inside of the cranium presents a cylindrical hole of an inch and a quarter diameter, and such as may be described by a pair of compasses, one leg of which is placed upon the lesser wing of the sphenoid bone at an eighth of an inch from its extremity, cutting the frontal, temporal and sphenoid bones; the other, half an inch outside the internal optic foramen.

The calvaria is traversed by a hole, two-thirds of which is upon the left, and one-third upon the right of the median line, its posterior border being quite near the coronal suture. The iron freely traverses the oblique hole thus described.

It is obvious that a considerable portion of the brain must have been carried away; that while a portion of its lateral substance may have remained intact, the whole central part of the left anterior lobe, and the front of the sphenoidal or middle lobe must have been lacerated and destroyed. This loss of substance would also lay open the anterior extremity of the left lateral ventricle; and the iron, in emerging from above must have largely impinged upon the right cerebral lobe, lacerating the falx and the longitudinal sinus.

Yet the optic nerve remained unbroken in the narrow interval between the iron and the inner wall of the orbit. The eye, forcibly thrust forward at the moment of the passage, might have again receded into its socket, from which it was again somewhat protruded during the subsequent inflammation.

It is fair to suppose that the polished conical extremity of the iron which first entered the cavity of the cranium prepared the passage for the thick cylindrical bar which followed; and that the point, in reaching and largely breaking open the vault of the cranium, afforded an ample egress for the cerebral substance, thus preventing compression of the remainder.

Yet it is difficult to admit that the aperture could have been thus violently forced through without a certain comminution of the base of the cranium driven inwards upon the cerebral cavity.

Little need be said of the physiological possibility of this history. It is well known that a considerable portion of the brain has been in some cases abstracted without impairing its functions. Atrophy of an entire cerebral hemisphere has also been recorded.

But the remarkable features of the present case lie not only in the loss of cerebral substance, but also in the singular chance which exempted the brain from either concussion or compression; which guided the enormous missile exactly in the direction of its axis, and which averted the dangers of subsequent inflammation. An entire lung is often disabled by disease; but I believe there is no parallel to the case in the Hunterian collection of a lung and thorax violently transfixed by the shaft of a carriage.

Taking all the circumstances into consideration, it may be doubted whether the present is not the most remarkable history of injury to the brain which has been recorded.*

REFERENCE TO PLATE.

1. Lateral view of a prepared cranium, representing the iron bar in the act of traversing its cavity.
2. Front view of ditto.
3. Plan of the base seen from within. (In these three figures the optic foramina are seen to be intact, and occupied by small white rods. In the first two figures, no attempt has been made to represent the elevation of the large anterior fragment, which must have been more considerable than is here shown.)
4. Cast taken from the shaved head of the patient, and representing the present appearance of the fracture; the anterior fragment being considerably elevated in the profile view.
5. The iron bar of the length and diameter proportioned to the size of the other figures.

* The iron bar has been deposited in the museum of the Massachusetts Medical College, where it may be seen, together with a cast of the patient's head.