

Observations on injuries of the spine and of the thigh bone : in two lectures, delivered in the school of Great Windmill Street ... the first in vindication of the author's opinions against the remarks of Sir Astley Cooper, Bart. The second on the late Mr. John Bell's title to certain doctrines, now advanced by the same gentleman, etc. / by Charles Bell.

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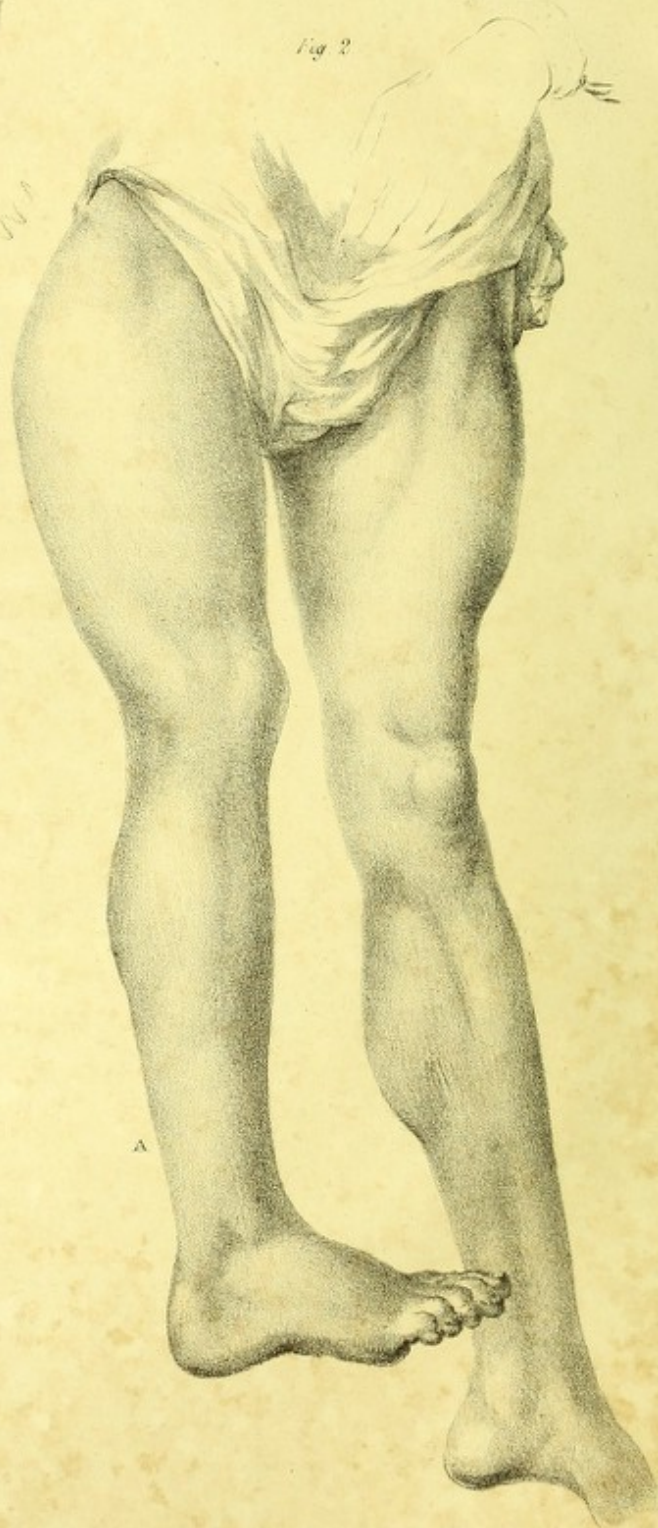
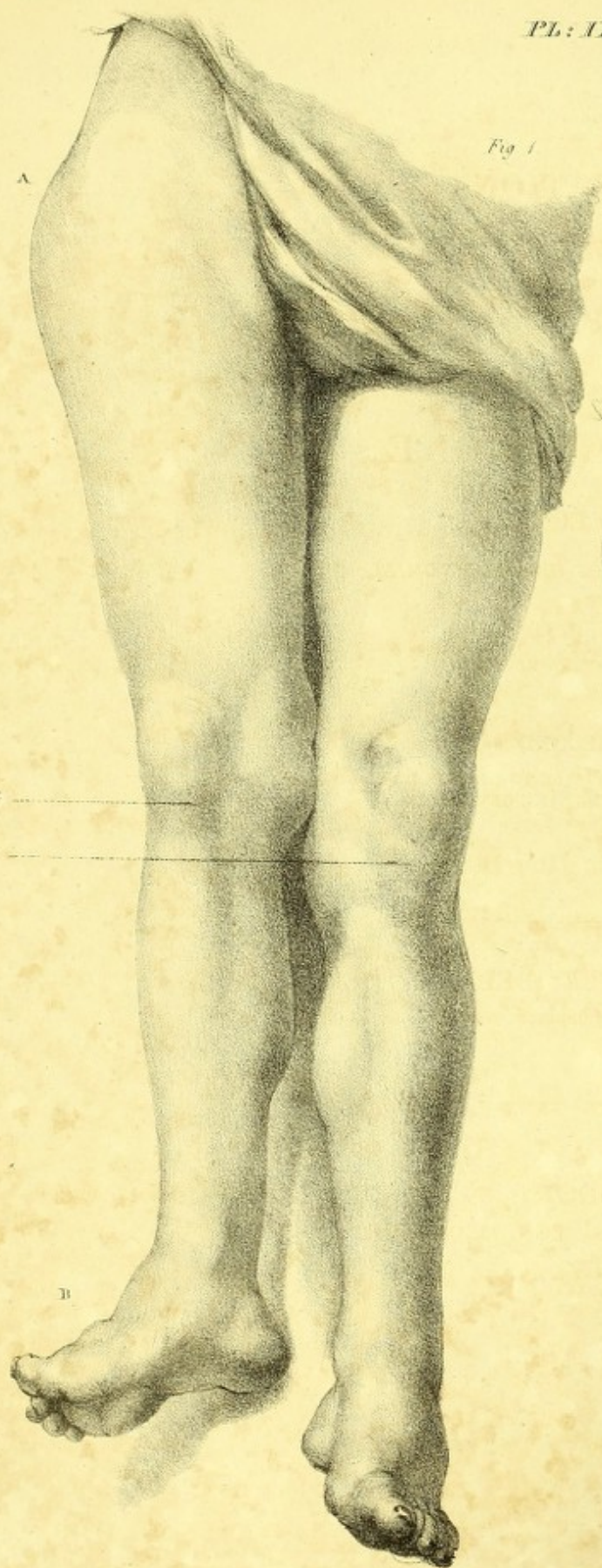
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OBSERVATIONS
ON
INJURIES OF THE SPINE
AND OF
THE THIGH BONE:

IN TWO LECTURES,
DELIVERED IN THE SCHOOL OF GREAT WINDMILL STREET.

THE FIRST
IN VINDICATION OF THE AUTHOR'S OPINIONS AGAINST THE REMARKS OF
SIR ASTLEY COOPER, BART.

THE SECOND
ON THE LATE MR. JOHN BELL'S TITLE TO CERTAIN DOCTRINES
NOW ADVANCED BY THE SAME GENTLEMAN.

Illustrated with Nine Plates.

BIBLIOTH.
COLL. REG.
MED. EDIN.

BY CHARLES BELL,
SURGEON TO THE MIDDLESEX HOSPITAL.

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P R E F A C E.

THESE two Lectures are in some measure controversial ; a manner of treating subjects of science, which, whether interesting or not to the profession, is never agreeable to the public, who cannot comprehend, and have no sympathy with professional feelings. But called upon to explain and illustrate certain opinions which I have long maintained, I have the comfort of thinking that in doing so I have brought forward a variety of important facts, which otherwise might have remained unarranged and neglected ; while in advancing the claims of my brother, I hold up an example to my young friends, of genius and industry employed in the improvement of surgery.

In considering these subjects, I have been sensible of two prevailing faults in the methods of teaching and of study. The first of these is the neglect or contempt with which many

modern teachers treat the works of past ages. They neglect the learning of our profession ; unjustly withholding praise from the benefactors of science who have preceded us, and present to their students a bad example, in despising the history of the art. We are disgusted with Paracelsus when he publicly burns the books of reference in his day ; and smile at Dessault when he affirms that his art began with him. But what shall we say of the recommendations daily given to students in our own times, who are taught to despise the study of books, and to neglect all authority but that of the person who is addressing them, and all practice or example but that of the hospital to which chance has led them? The history of surgery must indeed be humbling to those, who spoiled by success, conceive that they are themselves the great authorities in the profession : for in that history we learn that art improves slowly, and by degrees scarcely perceptible in an age ; and that what one man is able in his day to accomplish, is as nothing when compared with that accumulated knowledge which has descended from our predecessors. But it is not merely in diminishing the sources of professional skill that this disregard of study is to be deplored. The neglect of the literature of the profession deprives the student of all enthusiasm and love for it ; he is brought up deficient in liberal views, and is taught to over-rate the importance of the

person under whom he is educated, and to content himself with walking in the trammels of his particular practice. It may be the interest of teachers thus to keep the attention of their students directed to themselves. It gives them a sort of personal elevation ; while it saves them from the necessity of that continual exertion and perpetual renewal of study at every period of life, necessary to answer the demands of pupils who are daily becoming more learned in their profession. But it is a low ambition to grasp at the individual importance of the day that is passing, to the neglect of that permanent fame in the profession which true knowledge and science confer. We hear a great deal of the improvement of surgery in modern times ; but it appears to me that we lose, of what is old and good, fully as much, as we gain by our search after novelty ; and those who are ignorant of the history of the art, and not aware of the observations and discoveries of the great men who have preceded them, are in continual danger, in straining after new inventions, of only restoring what has been discovered, tried, and rejected before their time.

It has been truly said, that all general reflections are unjust in some particular ; and I ought to take this opportunity of adding, that at the present time there are private individuals, and more than one professor, able to point the way in the history and

literature of the profession. But it is notorious that this is not done ; that our students have no love of books, which, in their situation, should be so great a source of happiness, and that they, consequently, want deference for authority. Why should they not add learning to the many other advantages they possess? or why should the example of one man lead to so palpable a defect in our plan of study? Mr. Hunter required an apology for his imperfect education ; and he had the hardihood to assert that reading was folly. So it has happened, that whilst the philanthropist and philosopher find an example in him, the vulgar and the ignorant think they discern their own characters in his. Like most others who commenced study at the period of his high reputation, I have had to regret its influence. The opportunities which I possessed of gaining general knowledge were neglected, under the belief that in the study of practical anatomy I should attain every thing that was valuable in the profession. The consequence has been a severe struggle to do imperfectly in after years what I ought to have commenced with and continued. This influence, however, has not so far prevailed as to make me boast of defects, which is, nevertheless, done daily in our professional circles.

It is the interest of a teacher who can persuade himself that

he does his duty to his pupils, that those who attend his lectures should have the best works in their hands. The teacher has then some stimulus to exertion ; every thing that marks the advancement of knowledge is listened to with interest. But if his pupils do not read, they receive the most common-place views, as if they were reflections of the highest importance ; and in such a state of the schools, there can be no improvement.

The other fault to which I have alluded is not, perhaps, less hurtful to surgery ; namely, a neglect of the strict connexion which ought to be maintained between anatomy and surgery. The method pursued in many schools appears to oppose very formidable obstacles to improvement. Not only in teaching are the practical views and inferences separated from the demonstrations of anatomy ; but the parts of the body which ought naturally to be studied together are disjoined. The component parts of the same organ are demonstrated at separate periods of the course, and the student is still referred to some future explanation, which is necessary to complete the view of the subject. In this distracted way of viewing the subject, the data upon which one would rationally ground an opinion that is to be useful in practice, are scattered and lost sight of ; and the time is consumed in a circle of dry and unprofitable demonstrations

fit enough for the dissecting room, but altogether unsuited to those higher objects, those practical inferences, those useful and masterly combinations, which, in the theatre, ought to teach the student how to think as a physician, or a surgeon, reasoning on the principles with which anatomy supplies him. There are, at this time, in all the London schools, young men of great promise, who have entered on the important duties of teaching anatomy and surgery ; and a great deal will depend on the manner in which they view this subject, before they fall into habits of teaching which they will find it difficult to change.

The plan which I have pursued is this : At public lecture the demonstrations of the anatomy are repeated, and those parts with which the student is familiarised in the rooms below, are again placed before him—his knowledge of the subject is resumed and refreshed—but further views are opened upon him. He is now taught to consider the parts of the anatomy as in the performance of their functions as living parts; to observe their uses; their structure ; their natural functions, and their derangement : and never to lose sight of the result of those various views, as offering themselves in practice, and requiring the exercise of the surgeon's skill. The consequence of this manner of teaching must be a gradual

and progressive improvement of knowledge, even if the teacher have nothing but method to recommend him. Of the effect of it, in some respects, the profession may judge by what has been done relative to the nervous system. But there is no part of anatomy which has not, from the same method of teaching, received improvement. I purposely lay before the profession an example of this mode of prosecuting the science in one of the most common and least interesting subjects of demonstration, in order to show how much more accurate, and consequently how superior the conclusions are, which are drawn by a man who keeps steadily before him, in his reasonings, the anatomical demonstration, than those loose notions which are generally called facts, drawn from practice.

There are few demonstrations of the human body which would not better answer the object I have in view, in connecting the anatomy with practical inferences, than that which I have here selected. But at this moment, the public attention is so much drawn to the question of fractures of the thigh bone, as to afford a very striking illustration of the errors of the most ingenious men, when they neglect the aid of anatomy; or, when they pay no respect to the works of their predecessors, or

allow themselves to disregard what their contemporaries may have done.

I do not feel at liberty to quote the weekly journals of Sir Astley Cooper's lectures, as conveying his sentiments: But I think I am authorised to say, that on reading what is there delivered, it was a duty which he owed to the profession, and to all his friends, to disavow, in the most public manner, expressions and words ascribed to him in these publications. This should have been done, even if hand-bills had been necessary, at the door of every class-room in London. Now it has happened that my pupils are sitting before me with these pamphlets in their hands. They are extensively circulated, and the question comes to be, How are the sentiments and opinions expressed there to be contradicted? For that they require contradiction I shall have no difficulty in convincing the profession.

When my pupils first presented to me these printed journals of Sir Astley Cooper's lectures, and pointed out the passages which bore upon my opinions as delivered at lecture and in my works; I was induced to turn to his books, where, I must say, I found rules of practice laid down, as objectionable as those in

these anonymous works, and accompanied with expressions which betrayed the same tone of mind, although the words were less offensive.

These expressions stand connected with the censure of opinions which I have long maintained, and which I feel it now to be my duty not to vindicate, for they do not require that, but to enforce and illustrate.

I shall endeavour to forget the expressions, and shall limit myself to that part of the subject in which the public are interested, as well as my pupils; and if, in turning over Sir Astley Cooper's pages for this purpose, I meet with words revolting to good taste, and in consequence, should have given more point to my argument than was my intention when I set about this task, he, of all men, has the least reason to complain.

The difference in our opinions may be found to depend on the very dissimilar manner in which we have studied. I think that more numerous and more accurate observations have been made out of his circle than in it. He may continue to be of a different opinion, but I hope, when he again appears before the public, that he will consider that there are other schools, collec-

tions, and opinions, not unworthy the attention of him whose objects are truth and improvement.

The active professional life which Sir A. Cooper has led, may induce many to have confidence in what he has given to the public. With me it is an apology for his omissions, and for views limited to his own circle. He has not looked abroad as a liberal inquirer, neither to the present condition of the profession, nor to the authorities of the preceding age. The consequence has been, that the objects immediately before him have been unduly magnified; and hence, perhaps, it is, that his conclusions do not bear a just relation to the opinions of the profession; and do not furnish the safe rules of practice. I shall always hold valuable the unbiassed results of his experience: But when he brings forward, as facts, statements as fanciful as those of a professed theorist, and when he reasons incorrectly from his experience, every private motive for reserve must give way to duty. It is only when I feel the conviction of its necessity, that I can excuse to myself the mode in which I have examined the opinions of one who has attained so much eminence in the profession; but, in truth, things have taken such a course, that I am compelled to come forward in defence of my own opinions and of my brother's claims. It is not to be supposed that I have laboured

so long for young men, without inspiring some of them with a love for their profession and a partiality for me ; and were I not to enter this field, there are many to contend for me who might choose to imitate the worst parts of Sir A. Cooper's writings, and think themselves entitled to use that language of which he has set the example.

In short, I have been forced upon this task, and I hope that the manner in which I have performed it will satisfy those friends who felt its necessity ; and that the great number of facts and illustrations which I have supplied, will leave no cause for regret with those who are interested in the improvement of surgical pathology.

I may be blamed by superficial readers who take time only to see that I am engaged in opposing the opinions of an eminent person in my own profession ; but those who are able to enter into the depths of the questions debated in these papers, will perceive that there is something here more interesting to me than any personal consideration. My public duty forbids me to permit the extraordinary precepts which I have criticised to be conveyed to the students without contradiction ; and the simple expression

of my opinion is now no longer sufficient, to counteract the influence of these hasty notions of Sir Astley Cooper, delivered with an air of commanding superiority. I will carry conviction to the profession, by the statement of facts, and must not spare the labour necessary to put this subject fairly before them. I regret that on this occasion the pains which I have taken to set this matter right, form the only compliment to Sir Astley which I have it in my power to pay him.

It is by my influence with the younger men of the profession, grounded on demonstration and conviction, that I expect to make my life useful: And by those who understand or feel the importance and sacredness of this connexion, it will not be ascribed to personal irritation, or a desire to retaliate, when I am found rousing myself more thoroughly to prevent any diminution of my sphere of usefulness, than I could have ever been excited to do by any thing relating to the mere emoluments of the profession.

I think it due to myself to state that I have, in the Lectures which I now lay before the public, delivered myself in a very different tone from that in which I usually address my

pupils. I never have, on any other occasion, spoken of my cotemporaries, where I could not introduce their names with commendation : and when I felt myself compelled to alter that tone, I felt, at the same time, the necessity of delivering publicly, and to the profession at large, what I was thus forced to address to my pupils.

The Publisher having purchased the Copyright of Mr. John Bell's Work, entitled THE PRINCIPLES OF SURGERY, originally published in three vols. 4to., intends to re-publish the same, with commentaries, which shall embrace a critical inquiry into the present state of Surgery.

No. 73, Cheapside,

May 1, 1824.

LECTURE
ON
T H E S P I N E

IN WHICH

**THE ACCIDENTS IT IS LIABLE TO, ARE EXPLAINED FROM
OBSERVATION OF THE NATURAL FORMS AND
CONNEXIONS OF THE VERTEBRÆ.**

LECTURE ON THE SPINE.

I HAVE often had occasion to trace mistaken notions and modes of practice to a defective method of studying anatomy, and especially to that manner of demonstrating the structure of the animal frame, by which the several parts of the same organ are taken at different periods of the course of lectures. Young men lounge over the bones of the head until they have thoroughly acquired mechanical and false notions, and these they carry into practice. The demonstration of the brain comes some months later in the course, and along with it different subjects of contemplation; while the principles of surgery are lost sight of altogether. Men of sense soon correct these mistakes to which they are led in the class rooms. A man of observation, if he enjoys opportunities, soon discovers that in wounds of the head all lesser circumstances which had for a time engaged him are of little account, while it is on the condition of the brain and membranes that the question of life and death depends: and that the great question of practice turns on the means of avoiding or of subduing that inflammation to which the membranes of the brain are so peculiarly exposed. The mistaken and cruel practice,

which for many years prevailed, must be attributed to the structure and functions of the brain being less attended to than the anatomy, as it is called, of dry bones: and now by a false analogy, and a course of most unsatisfactory and inconsequent reasoning, we are about to run into the same course of error in respect to injuries of the spine. I have demonstrated the accurate anatomy of the vertebræ. I have built up the column, and shown you its relations to the skeleton, and the manner in which it forms the bond of connexion between the other bones of the skeleton. I noticed its importance as distinguishing the classes of animals. I then led you to contemplate it as a column, and to admire the adaptation of its forms and curves. I applied to it the plumb-line, and exhibited its changes from infancy to age, that we might be able to ascertain its diseases by their outward signs, and especially by the distortions to which it is subject.

But all this time, the important circumstances of its anatomy were not before us. I now show you the spine, with the soft parts attached; the spinal marrow with its sheath; the ligaments and intervertebral substance. It is now that you are to receive that impression which will carry you through practice, and which is to distinguish you from the mere mechanist or instrument maker. You see here the most vital organ enclosed within the tube of the spine, and surrounded with membranes the most prone to inflammation of any in the whole body. Here then is the consideration which should suspend your hand when you are about to put some ingenious mechanical notion into practice, which you expect to distinguish you in

your profession ; unless you have impressed on you a lasting conviction of the importance of these membranes, your ingenuity will prove a misfortune to some unhappy being—you may escape detection, but not your own lasting regret. We now attend to the subject of

FRACTURES OF THE SPINE.

When an intelligent surgeon is called to a patient who has fractured his spine, he forms the most gloomy presage, and his hopes dwell rather on the probability of mistake as to the nature of the injury, than of the powers of art, if the vertebræ be really fractured. He inquires anxiously into the nature of the injury : whether the man has been crushed down by a weight falling on the head and shoulders until the arched spine has broken ? whether he has fallen with his back bent, and the spines have been crushed against a projecting stone ? whether any body has been impelled against the bone ? and finally, whether he has been struck upon the spine ?

I hope that you perceive the drift and meaning of these questions. They go to this : how far may the symptoms be attributed to the shock or concussion given to the spinal marrow ? This is your first object of inquiry, because if the palsy of the extremities arise from this cause, your prognosis may be favourable : it is a state from which the patient will probably recover.

If the bone be broken, there is still hope that it may be the spinous processes only which are fractured and bruised ; but when it

is known that the body or arch of the vertebra is broken, then the case is almost desperate. Yet observe, that when I use this word, I do not authorise you to follow a line of practice which is to extinguish all hope.

The immediate causes of death from such a condition of the spine are, first, inflammation of the membranes of the spinal marrow: secondly, contusion or rupture of the spinal marrow.

And this reminds me, gentlemen, that I have an unpleasant task before me. There is a weekly pamphlet in your hands which professes to give the lectures of Sir Astley Cooper with great correctness. Some of you who have attended here, and know my opinions, have pointed out passages in this Journal which reflect on my published "Hospital Reports." This has led me to turn to Sir Astley Cooper's Essays and Treatise, where I find the same line of argument pursued, and with very little difference of expression. With the expressions you have nothing to do, nor is this the place in which it is fit to expose their inconsistency at once with good temper and with good taste. But so far you are materially concerned: I am your teacher, and must possess your confidence, else my lessons lose their value; and that confidence must rest on something better than the quips and repartees of controversy, namely, on demonstration of principles, with regard to which there can be no mistake. You have formed with me the relation of pupil and master, a connexion not to be dissolved; and I must do my utmost, that when you go into the world you shall not be ashamed of it.

In the "Treatise on Dislocations and on Fractures of the Joints," which I am about to examine, Sir Astley Cooper deprecates criticism upon his writings. He says, "He would prefer making use of a *pointed* expression to a *well turned* sentence, and would rather be seen in a good plain suit than in the finest embroidered dress." Well, then, I shall take him, as he requests us to do, in his plain suit, and put the subject plainly before him. He shall have no reason to make complaint of the severity of criticism, unless to bring forward numerous well-authenticated facts, close reasoning, and plain, practical, humane views of the subject, shall be so considered. In short, I meet him upon his own grounds, as an hospital surgeon and as a *practical* man.

When a teacher puts his finger through the circle of the vertebrae and asks you to consider it as the spinal marrow, it seems very like sense to say, if this bone be forced in upon the spinal marrow, it must be trepanned and raised. But experience informs us, that the great danger in injuries of the spine is from inflammation; notwithstanding which, we find nothing else in books than discussions upon the mechanical pressure on the spinal marrow, and the consequent paralysis. It is therefore my duty, in the first place, to distinguish the symptoms of inflammation of the membranes, from those of compression or concussion of the spinal marrow.

After perusing the large and splendid book of Sir Astley Cooper on the subject of dislocations and fractures, you remain quite ignorant of a very common case in practice. Instead of finding a man with fractured spine, lying with his lower extremities motionless and

insensible, we may chance to see him jump suddenly out of bed, or struggling under the hands of assistants, or, under the influence of delirium and priapism, talking gaily to the nurse. These are melancholy symptoms, boding the very worst; worse than paralysis—he will die before the fifth day. How is it, then, that the lectures, or the published work, of an hospital-surgeon, should make no mention of these cases? or what is worse, how does it happen, that, lost in the variety of little trifling circumstances, he should forget to impress a conviction of the dangers of inflammation? I fear that this is not neglect, but ignorance of the importance of this doctrine; for the practice which Sir Astley recommends throughout these papers, is such as no man could advise, if he were aware of the susceptibility of the membranes of the spinal marrow to inflame.

To fix this in your recollection, I will read a passage from my case-book.—“*Sept. 15th.* This young man’s condition is very threatening, his pulse is 136. He was delirious during the night, and threw himself out of bed. He is now in a state of extraordinary excitement, and although he has full motion of his limbs, yet the spine is undoubtedly broken or crushed, and he will, I fear, die with the symptoms of the last case, and from the same cause, suppuration within the tube of the spine.—*Evening.* He is delirious, and is like a man who is good tempered in his cups: he talks continually, and invites the nurse to bed to him with very gay discourse. His stools and urine still pass involuntarily; pulse 130, weak.—*17th Sept.* It has been necessary to tie him down in bed. He now appears dying: his breathing is very quick and laboured: his pulse hurried,

his countenance is sunk, and his tongue is covered with a brown fur."

In this case, both the body and ring of the eleventh dorsal vertebræ, were fractured.

From this volume of Sir Astley Cooper's, of which it is my unpleasant duty to take notice, you would never learn that there were such accidents to the spine as *diastasis*, or separation of the vertebræ by violence, where they resume their relations again. I shall supply this defect from my note book, which I do the more willingly, as it affords another instance of the symptoms which result from inflammation of the spinal marrow.—"For nearly a week the patient lay without symptoms of injury to the spinal marrow. He could throw his arms and legs about, and retained the urine and fæces. On the eighth day he was seized with convulsions over his whole body. He was relieved by bleeding, and continued sensible, but his jaw was locked. The convulsions returning with violence, he was again bled. A few minutes after this bleeding, his lower jaw moved with great rapidity, and continued moving in an extraordinary manner for nearly five minutes, when all at once he exclaimed he could speak. From this moment he appeared maniacal. His exertions proved that he was not paralytic, it required men to hold him; and he almost sprung out of bed. He passed fæces and flatus with singular force. In the course of an hour he was perfectly composed, and from the time of his first attack of convulsions to his being again sensible, a period of twelve hours elapsed. On the third day he com-

plained of difficulty of using his arm, and two days after he had total palsy of the lower extremities. He lived for a week, retaining much of the character of typhus fever; and the day before his death he recovered sensation in his legs. Dissection showed that the lowest cervical and upper dorsal vertebræ had been separated by violence: the intervertebral substance was destroyed, and pus was not only around the injured part of the spine, but had dropped down through the whole length of the spinal sheath." I place the specimen before you.—See Fig. 3, Plate III. Such are the effects of the violence done to the ligamentous connexions of the vertebræ, and such the singular and variable symptoms of inflammation of the spinal marrow.

There is, in this great work of Sir Astley Cooper, which, I repeat, I am unwillingly forced to criticise, another, and perhaps a more extraordinary omission, viz. the case of *subluxation* of the lumbar vertebræ. He has much to answer for, in sending young men into practice with their heads full of dangerous notions about digging out the bones of the spine, and ignorant of the most common occurrences, ignorant of the nature of an accident which so nearly resembles the fracture of the spine, that he himself has mistaken it, not in the hurry of practice, but after describing it at length. The accident happens to young people, and from the operation of a force which, in advanced years, would fracture the bodies of the vertebræ. A weight on the head and shoulders overpowering them, and bending them double, the articulating processes of the upper lumbar vertebræ are burst from their connexions; if they again fall into their places,

the case is diastasis ; but sometimes their edges meet, then it is *subluxation*, they are not restored to their natural position. The body is bent forward, as if the spine were distorted by disease, and the spinous processes of the vertebræ are felt to project, being at the same time deranged from the right line, and leaving an unusual space between them. The following case, from a gentleman of forty years' experience, is a curiosity.—“A boy was admitted into Guy's Hospital, who had been endeavouring to support a heavy wheel, by putting his head between the spokes, and receiving its weight upon his shoulders ; the wheel overbalanced him, and he fell bent double. When he was brought into Guy's Hospital, although he had been perfectly straight before, he had the appearance of one who had long suffered from distorted spine, yet the injury had not produced paralysis of the lower extremities. Three or four of the spinous processes had been broken off, and the muscles torn on one side, so as to give an obliquity to the situation of the fractured portions. This boy quickly recovered without any particular attention, and was discharged with the free use of his body and limbs, but he still remained deformed.”—*Sir Astley Cooper's Treatise on Dislocations and Fractures*, p. 551.

It may be observed that the force was applied to the boy's shoulders, and that he was bent down, and could not recover the upright position. How, then, could the processes of the vertebræ be broken, and what is there in the fracture of these processes, which should prevent the lad rising to the erect posture, or cause a permanent distortion of the spine? Fracture of the vertebræ is not

attended with such distortion; and I am happy to be enabled to inform you, that after such an accident, the edges of the articulating processes are absorbed, and in due time, the patient resumes the upright posture. I have seen such a case, where, in the first instance, it was supposed that the spinous processes were broken, but the space betwixt the vertebræ, the acute angle at which the patient was bent forward, the absence of all the usual symptoms of paralysis, and the gradual restoration to the perpendicular position after many months confinement, left no doubt of the nature of the case.

Let me not fail to remind you, that in all cases of violence done to the spine, and especially when the vertebræ are thus violently separated in subluxation or diastasis, the theca and membranes may be so injured, that a slow or chronic inflammation may be set up, and that a paralysis may thence arise, which, though it comes on slowly, is of the most formidable nature.

Another cause of death in the case of diastasis and subluxation of the vertebræ, is extravasation of blood. This is most apt to occur when the injury has been a consequence of falling from a height. In examining the spine of a man who had slipped from a haystack and came with his head to the ground, and who remained insensible, and soon after died, I found a separation of the third and fourth vertebræ, and on perforating the sheath the blood gushed from it. This sudden effusion of blood upon the base of the brain, and into the spinal canal, by rupture of the veins, you will distinguish from effusion of coagulable lymph, which is attended with pro-

tracted symptoms, and is altogether a distinct case. In the volume I have referred to so often (p. 545), we find a case narrated where symptoms of a year's continuance are attributed to the extravasation of blood, and that blood found liquid on dissection. When I first looked into this volume, I thought that this description of blood continuing liquid for twelve months must have been an accidental error of the printer, but farther perusal of the work proved that I was mistaken.

I now entreat your attention to the fracture of the tube of the spine, and its effects on the spinal marrow. When the injury of the spinal marrow has been such, as to deprive the nerves below of their connexion with the brain, all the body below the injury will have lost both sense and voluntary motion. But such privation is not the cause of death ; and the derangement that precedes the death should be the object of your study.

In the first place the bladder becomes distended, and if not relieved, this of itself will occasion death by inflammation. This is so obvious a consequence that the author to whom I have already referred has not overlooked it, although he has failed to dwell upon it in the manner which its importance demands. The next fertile source of mischief is distention of the intestinal canal ; and connected with this, we have to observe the remarkable flaccidity of the abdominal muscles : the derangement of the actions of respiration, and the heaving of the margins of the chest, as a necessary consequence of the defect of action in the abdominal muscles. On these

subjects, so interesting to the physiologist, but, which is more to the point, so important to the suffering patient, there is not one word in these works before me. Does the author know that the abdominal muscles and the muscles of the perinæum have any thing to do with the diaphragm? He has not for a moment entertained a thought that the viscera of the abdomen are compressed and supported during life by the diaphragm, abdominal muscles, and muscles of the perinæum. Consequently he has not thought of the flaccidity and relaxation of the abdominal muscles as connected with the distention of the viscera, nor does he hint at the means of giving relief!

In fractures of the cervical vertebræ, says he, below the origin of the phrenic nerve, "respiration is difficult, and performed wholly by the diaphragm, the power of the intercostal muscles being destroyed by the accident." Page 555. Here is another instance of the effect of a wrong mode of teaching. Being satisfied with giving the origins and insertions of the diaphragm, and calling it a muscle of respiration, young men may not see the absurdity of describing a man breathing by his diaphragm alone! But if the subject of muscular action, as it regards respiration, has been fairly put before them in a philosophical and rational manner, such a mistake as this could not be made. The youngest student would then perceive, that there must be two powers in operation before the respiration could proceed. He would be led to inquire what other nerves descend from the neck. But for a teacher to do this, would be to acknowledge certain discoveries made in these rooms, and would amount to a degree of liberality which I have not yet had the satisfaction of recording.

Speaking of the distention of the intestines, the author says, "This symptom arises from diminished nervous influence in the intestines; for although the peristaltic motion can proceed independently of the brain and spinal marrow, yet it is quite certain, that the involuntary functions of the intestines, like those of the heart, can be influenced by the brain and spinal marrow." It would be taking an improper advantage to compare the two members of the sentence, we must be satisfied with the meaning. You must all know, that the operations going on in the stomach and intestines are performed under a certain muscular pressure; and that if that pressure be removed, an extrication of gas in an unnatural quantity takes place from the contents of the canal (not their surfaces). It is from this source that in fracture of the spine, and consequent flaccidity of the abdominal muscles, a distention of the hollow viscera, such as the old authors would have called meteorismus, takes place.

How many occasions are there in practice where it is necessary to know that the relaxation of the abdominal muscles is attended with serious consequences, as in women after delivery: when the water of ascites is drawn off: even when there has been copious alvine discharge, as well as in the cases of paralysis from disease, and from fracture of the spine. If any of you had attended a case of diseased dorsal vertebræ combined with paralysis, you would have partaken of my surprise in reading this passage. Secretion of air indeed is a term which sounds like medical philosophy, and in this manner a reasoner, with his ideas somewhat abroad, seizes on a term of Mr. Hunter's as something on which he can securely rest, and like

a man in the water, snatches at whatever will keep him afloat. On the present occasion it is quite out of place and foreign to the purpose. It is the entire relaxation of the abdominal muscles to which your attention should be directed: the consequent deficiency in the compression of the stomach, intestines, and great veins, the derangement of those organs, and the disturbance of the act of respiration.

Before I proceed I am bound to remind you of a fault, which I must presume you have in common with other young men educated to surgery. You are anatomists and practised in dissection, and thence arises an intolerable itch to be doing, and a fondness for operation, and an admiration of what is called bold surgery. I say it is my duty as a teacher to restrain this disposition, not to add to it; but to substitute just and humane feelings. We are about to examine a new invention, a proposal to trepan the spine. This operation is proposed on an analogy with the trepanning of the skull.

You are taught to speak of compression of the brain, and familiarly to attribute the effects of injury of the head, to compression of the origin of the nerves, without being aware that this is the remnant of an untenable theory, by which it was taught as a matter incontrovertible, that the brain secretes the nervous fluids, and the nerves carry them out through tubes. It is no time to enter upon this inquiry, but I shall place the practical question before you. A portion of the skull is denuded, is dead; the patient falls into a state of oppression and insensibility; it is resolved to operate; the trephine is used, the dead portion of bone is taken away, half a tea-spoonful

of pus is removed from the dura mater, and in two or three hours after the operation, the patient opens his eyes with some intelligence: this is called a fine example of the effects of taking pressure off the brain! and yet it would be easy to prove, that the brain will suffer the pressure of six or eight ounces of blood without any such symptoms as these. No attempt is made to reconcile these facts of daily occurrence. Writers will pertinaciously retain the words of an obsolete theory, and speak only of compression of the brain, whereas they should be led to consider, that an irritation on the surface of the brain, by the presence of a small quantity of pus, or the pricking of a minute portion of bone, will totally oppress the faculties. Indeed when it must be so thoroughly well understood by practitioners, that an irritation on the remote extremities of the nervous system, even the irritation of a worm in the intestines, has the effect of laying the person as it were asleep, and making him insensible to all external impression, is it not extraordinary that teachers will continue to harp upon the old theory, and will not distinguish between epileptic and apoplectic insensibility?

Analogy is a very natural method of illustrating a medical subject; but it requires a delicate care, that the points of the resemblance be just. With respect to the treatment of fracture of the spine, says Sir Astley Cooper, nothing has hitherto been effectually done in surgery, and to fill up this hiatus, he proposes to trepan and raise up the depressed bone. I know not by what strange inconsequent process of reasoning, he conceives that he is successfully advocating this practice, when he asserts that a fractured spine may unite again:

we admit the fact; for here is a preparation before us, in which the fractured tube of the spine had been reunited*. But it is beyond my comprehension how it should ever occur to him, that because the spine may be reunited after fracture, he should therefore be at liberty to cut down through the integuments and muscles, and use the trephine, and take out the portion of bone, and expose the membrane of the spinal marrow.

Sir Astley Cooper has been accustomed, in the discussion of this and other subjects, to make use of language in allusion to me, which although it cannot betray me into a retort unbecoming my situation, at least sets me free from that delicacy and reserve, and those restraints, which I might otherwise have felt, and in your presence always have studied, in treating this gentleman's doctrines. It is language which is intended to find its way to your ears, and seeing from whom it comes might in some degree influence you, were I not patiently to refute the opinions with which it has been made to stand connected. In what he is represented to have said of the objections stated to this operation, which he so unadvisedly recommends, Sir Astley pretty obviously alludes to my Hospital Reports. Now let us lay aside all consideration of the language and tone of what he has said, and attend only to the principles on which the practice must rest.

“ If you could save one life in ten, aye, one in a hundred, by such an operation, it is your duty to attempt it, *notwithstanding any objections which some foolish persons may have urged against it.*” He

* See plate I. fig. 2.

continues in the following extraordinary strain: "Suppose any one now present were in this state himself, suppose him put to bed with paralysis of the lower extremities, and fully acquainted with the inevitable result if nothing were done, would he not be glad to have any attempt made to save him? would it not be foolish and unmanly to say he would rather die than have such an attempt made? The operation is not severe, it cannot add to his danger, and as to the pain, no man, who *is* a man, would regard it. In the two cases in which the attempt was made, the operation did not shorten life; on the contrary, there is reason to believe that it prolonged it. You will be justified therefore in making the attempt. Though I may not live long enough to see the operation frequently performed, I have no doubt that it will be occasionally performed with success. There is no reason why it should not, and he who says that it ought not to be attempted, is a blockhead (*a laugh*)."

I should almost be tempted to believe that some enemy had done this for Sir Astley Cooper, were it not consistent in its tone with that also published in his quarto volume, when speaking of the same subject. "Nothing is so easy as to condemn others; but be it remembered that the disposition to do so is a proof of a weak head and a bad heart; and that it is always to be discouraged in a profession where character is all in all." *Treatise on Dislocations, &c.* p. 560.

We must submit to hear many strange proposals for the improvement of our profession in the present day from young men ambitious of notice, but that a man of Sir Astley's years and station should talk

as he has done before students, and give them his authority for laying a patient upon his belly, and by incisions laying bare the bones of the spine, breaking up these bones, and exposing the spinal marrow itself, exceeds all belief. If it had been merely proposed to make such an incision of the skin, as would have allowed us with forceps to pull out a portion of the spine which had been driven in, I should only have said, "the operation will be fruitless:" I should not have thought that it deserved severity of criticism. But then there would in this simple practice have been no operation; nothing bold; nothing striking from its novelty. We might have almost considered it as a natural proceeding, though I am afraid not a successful one. But the bone must be trephined! Now let us examine why? Why is it that you apply the trephine to the skull? Is it not because you cannot raise the bone without it? You have nothing to lay hold of with the point of your elevator. And if you were even to raise the broken portion, you could not bring it away, because the depressed fragment is larger than the diameter of the hole. But if the ring of the vertebræ be broken down, where is the necessity for applying the trephine? You have the projecting spinous process; you have the inferior and superior edge of the bone on which to place your elevator, or to lay hold of with your forceps. I cannot for the life of me imagine any reason why that ring of bone should be trephined, and in two places.

Gentlemen, before you bow to this authority, consider the subject under two aspects: *first*, as you stand by the bed-side of your patient, pondering on his condition; and, in the *second* place, reflect whether

you are required to give your assent to the statement of a just analogy.—A man has received an injury on the spine; his lower extremities are motionless; you suspect that the bone is broken. Aware, in these circumstances, of the danger of bruising or pricking the spinal marrow, you only gently incline the body, and feel the part. It is painful and tumid, and beneath the swollen integuments you think you can feel the spinous process crushed. You know well that you ought not to press and move the part as you might a broken radius. What then, let me ask, are your reflections? 1. That this may be concussion only. 2. That the spinous process may be broken. 3. That extravasation may be in part the cause of the symptoms. 4. Anxious to inquire out the nature of the injury, if it appears that the column has been bent or twisted, you fear that it may be a fracture of the body of the vertebræ. Such are the questions you put to yourself; such the difficulties of the diagnosis. You cannot determine whether the man suffers from concussion, from extravasation, from fracture of the tube or of the body of the vertebræ; or whether the spinal marrow be compressed, or torn, or crushed wholly, or divided!

Now the question is, should this man be turned on his belly, and a portion of the tube of the vertebræ be dug out? Do not conceal the fact from yourselves. Try the operation on the dead body, and then judge of the degree of violence necessary to its accomplishment. One gentleman tells you, “the operation is not severe, it cannot add to the patient’s danger.” By this we may know what are his notions of a severe operation. This is the report of which he approves, and

which he offers as an example. "He made an incision upon the depressed bone as the patient was lying upon his breast, raised the muscles covering the spinal arch, applied a small trephine to the arch, and cut it through on each side, so as to remove the spinous process and the arch of bone which pressed upon the spinal marrow." *Treatise on Dislocations*, p. 559. The man must be already dead, whose condition is not made worse by such an operation as this! What sort of schooling must he have had, who does not believe that a man would be the worse for having the bone dug out from around the spinal marrow? If the theca were entire, it would be so far favourable; and yet we have seen the consequences of diastasis. If the sheath were perforated, it would be more quickly fatal; inflammation would presently commence, and the patient would be carried off, with symptoms such as I have described to be consequent on the inflammation of the spinal membranes.

There is an expression used which requires some comment. The same authority has it, that in two instances in which his pupils have operated, no harm resulted, but, on the contrary, good. It is not meant by this that the patients lived, but that the symptoms of paralysis were relieved. I have seen many deceived by the same occurrence after operations on the skull; and it is very proper that you should know the reason of a seeming amendment, when there is no reasonable hope.

When the brain is injured and the faculties oppressed, whether from concussion or compression, the rising of inflammation will pro-

duce symptoms which deceive the friends sometimes, and surgeons too, it would appear. The patient will sit up in bed, look about him, point his finger, and altogether exhibit symptoms of returning sense, but presently to sink into a deeper and a fatal insensibility. In the same way paralysis will be removed by rising inflammation; and in delirium, a patient will use those limbs with force, which previously had lain motionless and insensible. I have often seen the operation of trepan followed by this rising sensibility. The pain in the division of the integuments rouses the patient to exertion, he is held down, struggling under assistants, and in this condition, the bone being perforated, and the shattered pieces taken away, an inflammatory action is excited in the membrane of the brain, and accompanying this state of inflammation there is a gleam of returning sense. From men imperfectly educated to their profession, you may hear, on such occasions, congratulation expressive of their pleasure in having hit the case so well, and having so happily relieved the brain from pressure. So, I have no doubt, if the spinal marrow be not completely divided, the excitement from the sawing of the bones of the spine will produce similar results; and as the inflammation rises, the symptoms will be ameliorated, and there will be increase of power and motion ushering in delirium and death.

But still the analogy of the proposed operation on the spine, with the trepanning of the skull, may have its influence upon you. Let us examine this.—When a portion of the skull is pressed in upon the brain, and the patient lies in a state of insensibility, the surgeon performs the operation of trephine, raises the portion of bone from its

natural level, and takes it away altogether. According to the prevailing theory, the man ought to open his eyes and look about him with some little confusion at first, in being conscious of giving so much trouble; at all events he ought to rise and walk, for *pressure* is taken off from the brain, and the faculties should be entire. Unfortunately this does not occur once in a hundred times. But let us take it as a matter of fact, and examine the analogy of the condition of the brain and the skull on the one hand, with that of the spinal marrow and the vertebræ on the other. The portion of the brain injured by the intrusion of the skull does not amount to the fiftieth part of its whole mass, and therefore we should not be surprised that the faculties are restored after the operation; not so much so, certainly, as if the brain had been bruised from its circumference to its centre, or down to its base. If the spinal marrow should be crushed by such an intrusion of bone, to the effect of depriving the extremities of sense and motion, it is the entire thickness of that body that is crushed. It is clear to demonstration, that the nervous matter of the spinal canal bears so small a proportion to the extent of displacement of the vertebræ, compared with the mass of the brain, in its relation to the depressed portion of the skull, that the chance of relief from mechanical pressure is diminished to nothing in trepanning the fractured spine; on the other hand, great is the increase of danger from inflammation, by this mode of proceeding.

I ought here to state to you, that fracture or dislocation of the spine, with entire rupture of the spinal marrow, is not necessarily fatal. I have placed before you a specimen, showing violence to the joining of

the vertebræ without rupture of the sheath or apparent injury to the marrow, and this injury proved fatal by inflammation*. I now place in your hands a very remarkable specimen of dislocation of the bodies of the vertebræ. The child was knocked down by a stage coach, and the separation has taken place between the lowest dorsal and uppermost lumbar vertebræ. The dislocation, you perceive, is complete. It may be objected to this statement, that a very small portion of the bone has been broken off; but the circumstance of real importance is, the tearing asunder of the spinal marrow—it has been divided and separated. Notwithstanding this extraordinary violence, the child survived. It was taken away from the hospital, and, thirteen months after the accident, it died of croup†. But if by any ill-advised operation this had been converted into a compound dislocation, can any body believe that the child would have survived? Inflammation and suppuration would have followed, and the patient would have died of the first violence of the attack. This was a dislocation of the vertebræ at the lower part of the firm column. I give another specimen of imperfect dislocation or subluxation of the vertebræ at the upper part of the dorsal division‡. This injury was however attended with very different effects. The person fell from a barge in the Thames at low water, his head stuck in the mud, and he died instantly.

I place two more specimens in your hands, and let me recommend them to you as objects of interest, worthy to engage your most

* See plate III. fig. 2.

† See plate II. figs. 2 and 3.

‡ See plate III. fig. 3.

serious thoughts. You perceive that, in these instances, the pieces of bone which crush the spinal marrow are broken off from the bodies of the vertebræ: so, in these cases, if the surgeon had followed the advice alluded to—having laid bare the posterior part of the circle, and having divided it with the trephine, and taken away the posterior part of the circle—the spinal marrow would have lain between him and the portion of the bone that was producing the mischief; it could not have been replaced*.

I fear that I shall exhaust you in noticing the omissions of the author to whose writings it has become my duty to refer. He has omitted to observe, that fracture of the spine, like fractures of the other bones of the trunk, are most frequent in old labouring men. I show you the spines of old horses, where the vertebræ are joined by splints of new bone. I show you the same thing in the vertebræ of old men. You remember that I showed you, and I hope proved to your satisfaction, that the elasticity of the compages of the chest is the safeguard to the ribs and to the spine. I put into your hands a specimen of fractured spine, which proves to you†, that the splint of bone which consolidates the vertebræ, so far from being a protection, is the cause of their breaking; for you see, in this old man, the fracture runs across both the body of the vertebra and the additional splint of bone.

One subject more demands your attention, and then we have

* See plate I. figs. 1 and 2.

† See fig. 1, in plate II.

done. I have given you an example of a dislocation of the lower dorsal vertebræ from the vertebræ of the loins; and I had occasion to point out to you formerly, why disease of the spine takes place most frequently at this part. The vertebræ of the back, you remember, form a firmer bond than any of the other vertebræ of the spine; and the connexions of the ribs, as explained, form an additional security. Just at the base of this firmer column there must be unusual motion, and the freedom of motion here is the cause of disease.

The upper part of the cervical vertebræ has the greatest extent of motion, and we find that they are not without their necessary attendant fracture, dislocation, and disease. It is remarkable that Sir Astley Cooper has passed his professional life without having his attention directed to this subject. The solitary instance which he gives, is a narrative of what Mr. Else was wont to deliver in his lectures. The upper vertebræ of the spine are liable to fracture, but this occurs so seldom that the case is quite a curiosity, whereas it is most important for you not to remain ignorant of things almost of daily occurrence. The complication of ligaments, necessary for the security of the head and spine in the free motions they possess, renders them subject to disease. I present you with a specimen of luxation of the atlas, consequent upon disease*. A similar case occurred in the Middlesex Hospital, and in both instances, the patients died suddenly by the falling forward of the head upon the breast, and the compression of the spinal marrow. But there is a more

* See fig. 1, plate III.

common scrophulous disease in these vertebræ, which is attended with protracted suffering, and the obscurity of symptoms is perhaps the reason why I cannot direct you to any work which treats of the subject. I have met with it only in children; and the distress of the mother has been extreme, that, notwithstanding the tenderest care, every motion of the child was accompanied with screaming, and this you can well imagine to have proceeded from the motion of the head upon the vertebræ, since it partakes of motion in every variation of posture or exertion. If the disease be not terminated suddenly by consecutive dislocation, it will produce caries of these vertebræ, and, as I am lately informed, anchylosis, as in the other vertebræ.

Since I have spoken of what takes place in children, I may suggest a question from the preparation, or rather from the vertebra, I now hold in my hands. The ring, you see, is divided, and where the portions of bone have touched, a joint has formed*. The specimen was brought to me too late for accurate observation; but from the place of the separation, it appears to me that where the ring is divided by cartilage, it must have suffered violence of the nature of diastasis in childhood, and that the motion being continued, a joint has been formed instead of union by bone.

By the quotation from the work of Sir A. Cooper, you find it surmised, not only that I am deficient in judgment, but in feeling; that I had opposed the trephining the spine, not from the con-

* See figs. 5 and 6, in plate III.

viction of the necessity of doing so, but from some personal reason, which is not expressed, and which I cannot comprehend. Now these notions I received, in regard to the practice in cases of injuries of the spine, with my first lessons in anatomy; I once held them on authority, and now maintain and recommend them from experience, and on conviction of their correctness.

Will you believe this, or must I read from my master's book the lesson I received five-and-twenty years ago? "Notwithstanding the bloody operations described in books, of making incisions, finding the fractured or luxated bone, and drawing it out by the spines or splinters, there is nothing practicable; and those very ignorant directions, given upon the highest authorities, are dangerous to none but boys. The cutting into the fractured vertebra is a dream." *John Bell's Principles of Surgery*, vol. I. p. 626. So little did he anticipate the change which a few years would make upon the condition of the profession (of which he was himself in part the cause), for then surgeons were too timid, and were withheld from performing what was necessary; now we are all anatomists and operators, and for mere vacancy of ideas and lack of something better, operations are invented, and we have eclat for them in proportion as they are protracted, deep, and bloody. I have often wished that men of science could be enticed to study anatomy, and then all sorts of quackery would be put down and discountenanced; common sense and education would have their value, and no man would do an operation who could not give a reason for it; and that would be an incalculable benefit.

In conclusion, I have to say, that unbiassed by the circumstances in which I find myself, or the expressions which have been used, I have endeavoured to give you the correct rule of practice, and I have repeated the statement of my reasons, for the purpose I originally delivered them—to prevent my pupils from performing an operation of trepanning the vertebræ, which is not called for in any view of the case, and which can only lead to mortification and vain regrets.

I have now placed before you a suite of preparations, such as I believe no private collection can boast of; with one or two exceptions they occurred under my own observation; they make the subject complete, that is to say, they afford sufficient data from which to reason safely, and it is to me very gratifying, that to taunting words I can oppose facts and substantial vouchers, which require only to be contemplated and understood, in order to carry conviction. But I have no doubt that you have already made up your minds upon this subject; you perceive that when called to a person who has received an injury of the spine, there must be much difficulty in ascertaining the degree and kind of injury. He may be paralysed with fracture; he may have suffered fracture without paralysis; he may be paralysed independently of fracture. Concussion may be the cause of symptoms, extravasation may be the cause of symptoms. With strong suspicions of fracture you are not to turn the patient, and to press and examine, to satisfy your mind, if there is no plan of treatment to be directed by the result of that examination. You are in no case authorised to cut down upon the bone, and to trepan it, and to

expose the spinal marrow or its sheath. I have earnestly assigned the reasons against it, and in opposition to crude mechanical notions. Our whole attention must be directed to preserve the spine at rest, and to ward off the rising inflammation. Do this, and follow as bold practice as you choose.

LECTURE
ON
THE THIGH BONE,
SHOWING
THE APPLICATION OF THE ANATOMY TO PRACTICE.

LECTURE ON THE THIGH BONE.

GENTLEMEN,

YOU have already had the demonstration of this bone, and I trust are familiar with its form and processes, and with the insertions of the great muscles into it; but we must endeavour to put that knowledge to some use. I place the bone once more upright before you, that you may observe its relation, and the manner in which the weight bears upon it; and I shall take this opportunity of proving to you, that one of the most simple demonstrations of anatomy (which, given with even more than the minuteness of Dr. Alexander Munro, is quickly done) is yet a matter of the deepest interest, and that the knowledge of it must be carried with you into practice, unless you are to lay your account with a continual harassment of doubts arising in your own minds, and the commission of errors which may do infinite mischief to your patients, and ruin you in the opinion of others. When you have left a dislocation unreduced, or have mistaken a fracture for a dislocation, and when in consequence, your patient is irrecoverably lame, you will find that person beset you like an evil genius; he is ever hanging idle about the market-place,

or conspicuous in his gait as he makes his progress along the street : you have committed perhaps only one error, but it seems to be multiplied by his ubiquity, and the same story and the same discussion are every day excited by pity for that man's condition. Nothing but the diligent study of the anatomy will save you from the commission of these faults : forty years experience in an hospital, and extensive private practice, will not furnish you with such secure rules, as the reconsideration of the place and relation of the thigh-bone, the direction of the forces which act upon it, and the motions which it has to perform.

When the bone was demonstrated, you had a section of it presented to you, and in the description of the cavity, cancelli, and cortex, you might perhaps fail to notice their practical relations. Observe, then, these gunshot fractures : the ball, you see, has struck the bone in different parts (see plate IV.) ; here you see the ball sunk into the extremity, and lodged in the cancelli ; here again the ball has struck into the head of the thigh bone, broken it off at the neck, and the head of this bone, with the ball in the centre of it, were found within the abdomen. It had been forced through the acetabulum. But look here to the effect of a ball striking the centre of the diaphysis : the bone is burst, and the portions scattered in the flesh. Is it possible to give a demonstration which shall better satisfy you of the different structure of the centre and of the extremities of the bone ; or is it possible to assert, in a more emphatic manner, the necessity of carrying a knowledge of the structure with us, in laying down the rule in gunshot fractures ? You must at

once perceive, that the practice which is proper in the one instance of fracture, cannot be correct in the other.

Another instance, proving the importance of distinguishing the structure of the centre and of the extreme parts of the thigh bone, I must press upon your attention. I show you these preparations of the disease called necrosis. You see the shaft of the bone is dead, and a new bone is formed around it. But we have no example of this singular change being wrought upon the extremities of the bone, unless in very peculiar circumstances, while this, you see, is a common case. The cancellated structure of the extremity does not so easily admit of this form of the disease as the diaphysis does. It is the solidity of the diaphysis with the distinct cavity within, which makes the thigh bone subject to necrosis at its centre. I present you with three specimens of the necrosis of the thigh bone consequent upon amputation (see plate V.). The front of the stump falling into bad suppuration, the matter wrought its way into the medullium of the bone, and (as in our experiments when the medullium is destroyed) necrosis followed. Even in such a case then, if you found a bad stump and a projecting bone, and were to suppose that the whole bone was carious, and to conclude, that to amputate safely, you must take it off at the joint, you would commit one of those errors, for which it is a poor excuse to say, that you knew no better. If you were then forced to divulge all your feelings, you must express them thus: "All these various facts and accumulated instances afforded me by my teacher, and the principles drawn from the structure, I have quite neglected." If

you have to amputate, it is only to take off the diseased stump, cut across the bone, and withdraw the sequestra. But see what you may obtain by delay: the portion I now put into your hands was brought away from the face of a stump; you see it is the shaft of the bone wasted and carious, a true sequestra.

In the preparations on the table, and my drawings hung up behind me, you see, that a ball passing through the medullium of the bone causes necrosis; if free incisions be not made to give discharge to the matter which collects in the centre of the limb, the matter lodges in the medullium of the bone, and produces necrosis. It is now some years since I affirmed that practitioners did not know the advantages of free incisions in gunshot fractures; I am at least entitled to say, they did not practise them; and yet, gentlemen who had not at that time lifted the knife, will now complain of the attempt to anticipate their improvements. But I have the best testimonies around me: these specimens are not of yesterday; and the number and variety must prove to you, how anxious I have been to take a correct and practical view of this matter.

There is a rule, which I would wish even now to controvert, but which I fear will still be acted upon, from a disposition to do bold and novel operations, rather than to weigh the importance of principles. Here is a bone which has been fractured by musket-shot; the bone you see has united, but necrosis has been the remote consequence. Amputation was here very properly performed, since suppuration was wasting the patient; but was there a necessity for

operating at the hip joint? On such occasions the surgeon introduces his probe, feels the bone carious, and amputates at the hip joint. Yet, you see, there is no necrosis at the head and neck, or near the trochanters; and if he had amputated even at the very centre of the bone, he could have withdrawn the sequestra, and with it, all source of irritation from the stump.

The mania for amputation at the hip-joint, which has of late years prevailed, I have seen finely exhibited in an individual, who when the subject was mentioned, actually tore his hair, and exhibited the appearance of the deepest distress; one might have supposed that some of his dearest friends had fallen sacrifices to this operation; but no, the feeling was excited by his recollections being awakened, by the sight of a carious thigh-bone, of an opportunity of operating which he had lost*.

By hard study early in life, and by advantages which I believe no other person has enjoyed, I was enabled to come to conclusions upon some practical subjects, which are from time to time agitated up to the present day: and as the question comes round, my lectures

* A friend, on reading this, reminded me that he had been present at this singular exhibition of professional zeal; and states, what I had forgotten, that the enthusiast, in alluding to the particular instance in which he might have performed the operation, told us, "that as the child had previously lost the greater part of the limb by amputation for disease of the lower part of the thigh-bone, there would have been little danger from the shock of separating such a mass as a quarter of the body: I should have only," said he, "had to pick out part of the bone from the socket; and thus, I should probably not only have been the first of the few, whose patients have survived this operation, but have been even the first to have performed it."

seem applicable to the present new circumstances, although the expressions be the same which I have used for years. For example, speaking of the operation for lithotomy in the manner I have done for fifteen years, I am supposed to be making pointed objections to those gentlemen who have introduced the operation which is performed in Paris. When the army surgeons of the Peninsula returned home, they found me engaged delivering my old lecture, and imagined that it was addressed to them.

In 1809 I received a letter from an old pupil, telling me he was about to amputate at the hip-joint, giving me a description of the manner in which he meant to make his incisions, and asking my authority for it. I answered him, in an abrupt and emphatic manner, that he must not be guilty of this folly, but amputate in the common manner, and if necessary withdraw the sequestra. I show you the bone (see plate V.) which he amputated: you see that the sequestra has not run up so high as where the bone is divided with the saw. I saved the patient then from the effects of a very dangerous operation, but I prevented the young surgeon from anticipating many gentlemen of great merit in doing this bold operation. In succession, year after year, occurred cases of operation at the hip-joint by Mr. Emery, Mr. Brodie, Mr. Guthrie, Mr. Symes, and Sir Astley Cooper. My objections remain the same, substantially correct, but I seem, as the cases successively occur, to be criticising these gentlemen by a side-wind. Now a group of more respectable names cannot be placed together; and if to praise a man did not imply an assumed authority, I should say more of them; but at

present I shall say only this, that all these authorities have no influence at all with me against the principles on which I object to the operation: my opinion decidedly is, that they are all wrong in amputating at the hip-joint for disease of the bone: for if the head of the bone be diseased in the joint within the capsule, then is it a hip disease, and that alters the case altogether. If the head of the bone be shattered, then should the head of the bone be picked away. I shall not be so bold as to say, that there cannot arise a case for amputation at the hip-joint; but it is not fracture of the bone by musket-shot, nor necrosis of the bone, beginning in the centre of the diaphysis, that forms the case for hip-joint operation.

You have had, when these bones were first laid before you as subjects of anatomical demonstration, the epiphysis, apophysis, and diaphysis described to you. I have known in my day teachers acquire the reputation of minute anatomists, by tedious enumeration of the names of processes and heads of bones, whilst they seemed not to have the faculty of putting that knowledge to use. The advantage of taking anatomy as the ground-work of our observation is, that nothing is forgotten. Had this method been followed by Sir A. Cooper, writing professedly on the fracture and dislocation of the thigh-bone, he could not have neglected the subject of diastasis altogether; a point so important both in the questions of fracture and of dislocation. A child carried in arms, and throwing itself back in passion, whilst the maid holds it by the thighs, swings the whole weight of the body on the neck of the femur, and sometimes the head parts at the

cartilage. There is lameness, and pain, and inflammation; but the case is difficult to be understood, for there is not the crepitus attending fracture, nor the distortion which characterises dislocation. I have not met with an instance of this kind, but cases are on record. I hold in my hand, however, a specimen of diastasis of the lower head of the thigh-bone (see fig. 2, plate IV.). The lad, about thirteen years of age, had fallen through an open floor, and between the joists, so as to twist the leg, and the effect was supposed to be a fracture near the knee-joint. Suppuration took place in the joint, and by the delirious restlessness of the patient, and ulceration of the integuments, the bone was thrust through. A consultation was necessary, and on examination I found it was not a fracture, but that the spongy extremity of the diaphysis projected, whilst the epiphysis retained its connexion with the joint; the lad died. That such a case admits of reunion and cure, you may see by this other specimen, where the lower epiphysis is broken off, and reunited irregularly to the extremity of the shaft (fig. 3, plate IV.). This lad, when getting on the back of a gentleman's carriage, got his leg entangled in the spokes of the wheel, and the force was such as to twist off the epiphysis from the extremity of the diaphysis. His leg was amputated many years afterwards on account of an aneurism, occasioned by the projecting extremity of the shaft.

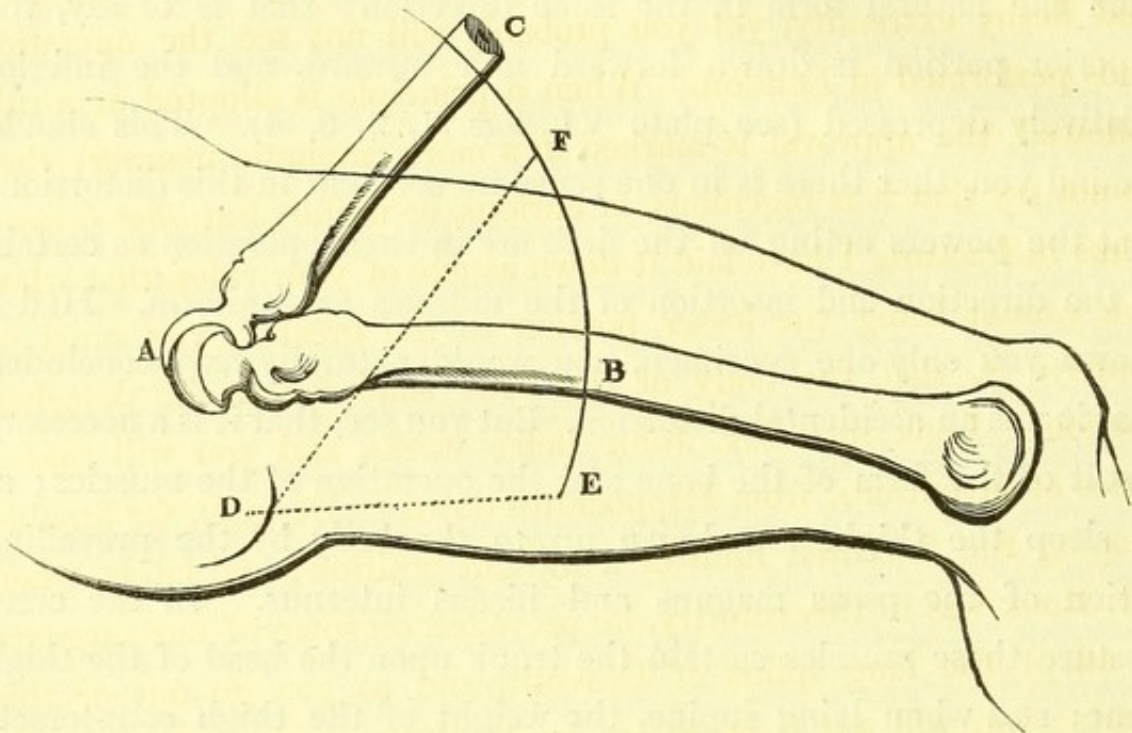
We shall now consider fracture of the shaft of the bone. The size of the femur, and the strength of these processes for the attachment of muscles, give sufficient proof of the difficulties which the

surgeon has to encounter in fractures of this bone, and of the powerful retraction and distortion which he must find the means of counteracting. I now place before you eighteen specimens of thigh bones fractured at the central portion: Of these, sixteen are distorted from the natural form in the same direction; that is to say, the superior portion is drawn forward and upward, and the inferior relatively depressed (see plate VI. figs. 1, 2, 3, 4). This should remind you, that there is in one sense no accident in this distortion: that the powers acting on the limb are in their operation as certain as the direction and insertion of the muscles are uniform. Had I shown you only one specimen, you would naturally have concluded that it was an accidental distortion. But you see, that it is a necessary result of the form of the bone and the operation of the muscles; as in sleep the thighs are drawn up to the belly by the prevailing action of the *psoas magnus* and *iliacus internus*. In the erect posture these muscles sustain the trunk upon the head of the thigh bone; and when lying supine, the weight of the thigh counteracts them, and they are in some measure stretched: but when the thigh bone is broken in the middle, or when it is cut through in amputation, the upper portion of the bone is immediately erected or drawn forward, and the surgeon's attention must be engaged not to depress the bone, for that produces excitement and spasm; but to counteract its influence in another manner.

I have, by the clearest demonstration, proved the necessity of raising the thigh during the sawing of the bone in amputation of the thigh; and I have shown that if this be not done, the bone will rise

the moment that it is divided, and project from the muscles *. (*See my Illustrations of the great Operations of Surgery, folio p. 60*). By

* The following sketch is taken from the *Illustrations of Surgery*.



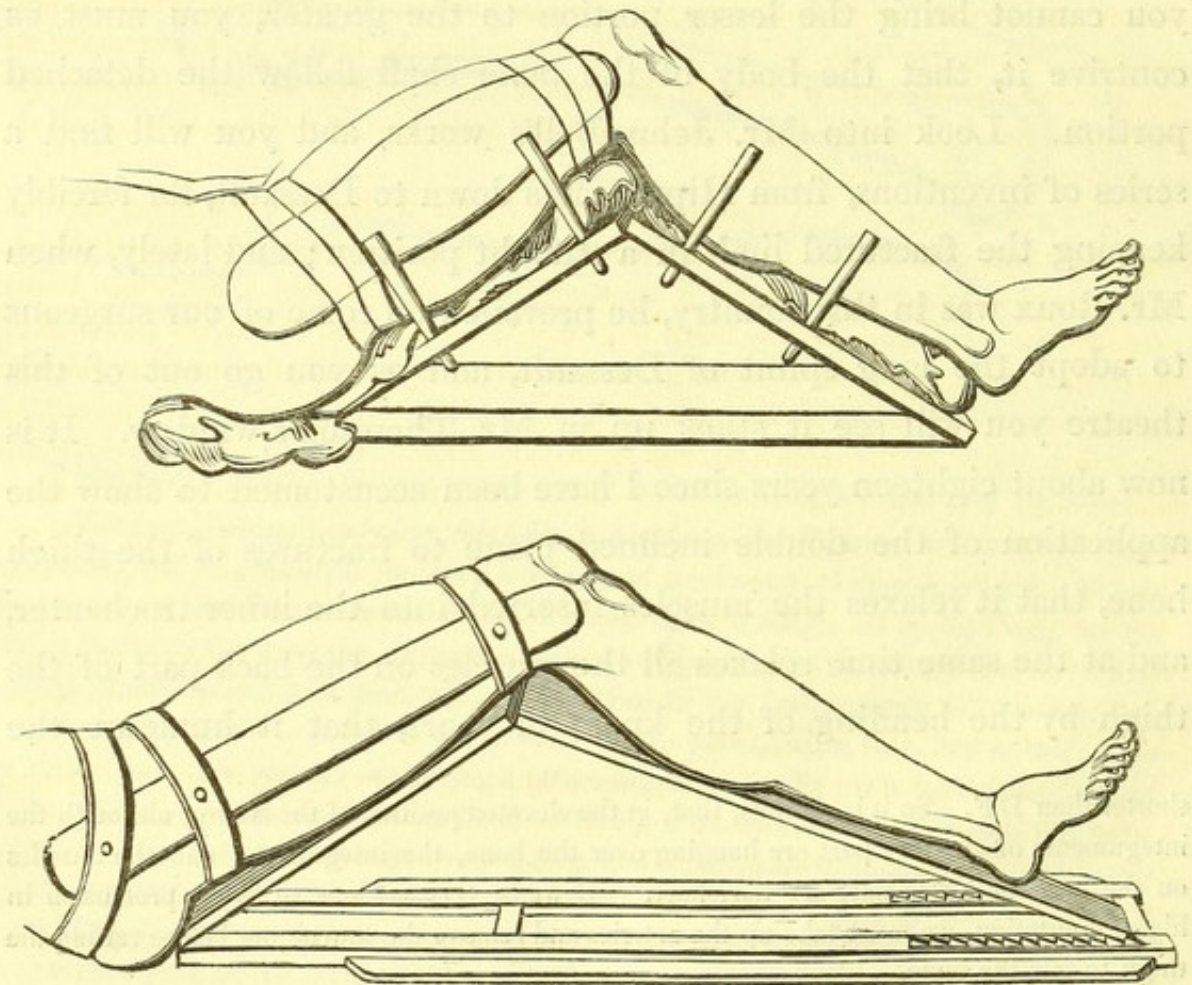
“ Question.—*What is the proper position of the limb during the sawing of the bone?*”

“ The pupil, sitting low before the table, holds down the thigh in a horizontal position. But should this be continued during the sawing of the bone? I apprehend not. When the muscles are divided and retracted and the bone sawn through, all appears well, for the bone is buried in the muscular substance; but when the limb is separated, and the stump is raised, which immediately takes place by an effort of the limb scarcely to be controlled, then the bone projects! Look to the position of the patient when he is laid in bed; does the stump lie in the position of the thigh before operation? No: it is with difficulty kept down; and if not restrained, would be directed upwards, making an angle with the body. In fact, it does stick up, and in proportion as it does so, the bone projects. The explanation is this: suppose that the thigh bone A B is cut across in amputation while the thigh is held down; that it is then raised, as it naturally will be, into the position A C, the muscles and integuments must shrink from it in proportion to its elevation; for D being the origin of the posterior muscles, they must be drawn from the bone in the proportion that the line D E is

some hospital surgeons in the country I have been thanked for this observation; but, although the practice which I have recommended gives great comfort to the patient during the cure, obviates the necessity of painfully restraining the stump, and provides for a full and fleshy extremity, yet you probably will not see the operation thus performed in London. When a principle is adopted or a rule followed, the approval is marked in a more emphatic manner; they do not say that it is ingenious, or curious, or useful; but, *that is mine*. Thus in fracture, I have laid it down as one of your rules, that when you cannot bring the lesser portion to the greater, you must so contrive it, that the body of the bone shall follow the detached portion. Look into Mr. John Bell's works, and you will find a series of inventions, from Hippocrates down to Dessault, for forcibly keeping the fractured limb in a straight position; and lately, when Mr. Roux was in this country, he prevailed on some of our surgeons to adopt the long splint of Dessault, and as you go out of this theatre you will see it stuck up in Mr. Thomson's window. It is now about eighteen years since I have been accustomed to show the application of the double inclined plane to fractures of the thigh bone, that it relaxes the muscles inserted into the inner trochanter, and at the same time relaxes all the muscles on the back part of the thigh by the bending of the knee; in short, that it humours the

shorter than DF. So it is obvious, that, in the elevated position of the stump, although the integuments on the fore part are hanging over the bone, the integuments and the muscles on the back or lower part are too short." If we be very anxious to avoid protrusion in high amputation, we must take up the arteries and remove the tourniquet before raising the thigh to saw the bone.

natural position of the limb; and that instead of having to restrain and bring down the upper portion, the lower part is raised to correspond with it. Had Sir A. Cooper adopted the reasoning, had he openly approved of it, or had he said that he acted upon it, long before the subject was explained by me, I should have quoted him as an additional authority to prove the correctness of these principles drawn from anatomy. But to show that he has laid the fractured thigh bone upon an inclined plane, he takes the trouble of having engraved the old machine for fractures of the tibia; a very excellent



thing for that purpose, but very ill adapted for fracture of the thigh bone. We find him committing two errors at once in vindication of this trifle; first, supposing that this is the instrument for the thigh bone, and of course not aware, that it is the very best for the tibia*. After asserting priority†, he proceeds, not to enforce

* These two outlines illustrate the manner in which the thigh is placed upon the inclined plane when the femur is broken. The first is taken from my Operative Surgery, and consists of two boards so united as to form a double inclined plane, and to allow the thigh to be raised, and the knee-joint to be bent, placing the limb so, that the Psoas and Iliacus, the Rectus, and the ham-string muscles are in a state of relaxation, whilst it raises the lower part of the bone, which we find almost uniformly depressed: in examining the specimens in the Museum of different fractures of the thigh bone, out of forty-one specimens, we have full proof of the disposition of the upper part of the bone to rise, and the lower part to be relatively depressed.

The second figure is the instrument drawn in Sir Astley Cooper's work, and one would be tempted to think, from the manner in which he has introduced it, and the observations he has made upon it; that it is intended to prove, that the method which I have proposed has been anticipated by him; but it appears to me, that he has laid the thigh on the fracture machine for the tibia, which has lain in Guy's, as in all other hospitals, without making any change in the general practice in cases of fractured thigh bone. Indeed, an apparatus nearly of the same form has been long known—it is called by Heister and Garengéot, Petit's box for fractures of the tibia. About thirty years ago an improvement was made on it by a splint maker in town. Here I may observe, that I am not surprised that the machine which is kept in the cutlers' shops, and called by them, "*Mr. Bell's inclined plane for fracture of the thigh*," should by many surgeons be deemed very ill calculated for the purpose, it being in fact the same machine that Sir Astley Cooper has given. The board for the thigh, even, as it is drawn here, is too short, but still it is much longer than the instrument it is copied from.

† "In the treatment of this injury, the length of the limb is preserved, by applying a roller around the foot of the injured leg, and by binding the foot and the ancles together, so as to prevent their retraction, and thus render the uninjured side the splint to that which is fractured, giving it a continued support. A broad leather strap should also be buckled around the pelvis, including the trochanter major, to press the fractured portions of the bone firmly together."

"The following plan I have also known to succeed; the thigh being placed," &c. (See

its application, but to show the manner of using the long splint. I believe the double inclined plane to be a most useful and necessary contrivance, whether it is his or mine, or some one's else; but I am quite sure the principle on which I used it is doubly interesting, and that it is applicable to various circumstances of disease, accident, and operation. Here let me remind you, that when you place the thigh in the position on the double inclined plane, you ought not to forget the common means of setting fractures. I have seen some of my own pupils lay the fractured limb upon the double inclined plane without splint or bandage. Now a splint ought to go down from the hip, along the outside of the thigh, to the knee. You see here the strength of the external trochanter, and therefore can justly estimate the power of the muscles inserted into it. These muscles, especially in a high fracture of the thigh, will draw the head of the bone outwards: a splint will in some degree restrain that; but if the line, in which the thigh lies, be a little inclined outwards, and the body of the patient raised, it will also serve to keep the extremities of the bone in due apposition.

But it is time we should be a little more particular in our attention to the trochanters of this bone. You observe that both stand oblique; they are neither outward nor inward, nor backward nor forward; but the inner trochanter is inward and backward; and

Treatise on Dislocations, p. 156). He then goes on to describe the double inclined plane, claiming priority; which, however, he has no sooner done, than he resigns it, and resumes the subject of treatment by the long splint, illustrating it with a case, and a drawing of the apparatus.

the greater is outward and forward. You remember, too, the lesson, that no muscle of the thigh bone has a simple operation ; that when the foot is raised to make the step forward, the thigh bone is rolled outward, and the toe pointed ; that when the body is carried forward, it is rolled upon the ball of the great toe ; and therefore it is obvious, that both classes of muscles tend to twist the thigh bone. So it happens, that in fracture of the neck of the femur, the check to the action of the muscles is removed, and the thigh is shortened, and the knee and toes turned out, as seen in the adjoined sketch (see Plate IX.) from your hospital Case-book, taken from a woman as she lay in bed, and whom some of you have attended.

I shall now draw your attention to the symptoms of injury or disease arising from the action of these muscles inserted into the trochanters. From the relation of the inner trochanter to the neck of the bone and the acetabulum, as I now place the femur in its natural position in the pelvis, you see that the tendons of the psoas magnus and iliacus internus muscles come close upon the joint, running over the weakest part of the capsule ; hence, in inflammation of the joint, you perceive what must be the position of ease ; that, to prevent the tendons of these muscles from pressing upon the joint, the patient's body is bent forwards, the knee raised, and the toe turned inward. You see, too, that when the bone is dislocated upwards, and the head of the bone lying on the dorsum of the ilium, the dislocation must be characterised by very nearly the same position, for the point of insertion of these muscles is drawn off, and the muscles stretched.

When engaged in the explanations which I now give you, in my first courses of lectures delivered in London, it was often said, "Why, he is treating of surgery!" Now, I tell you, gentlemen, that unless these things be received with your first lessons of the bones and muscles, you will forget their application altogether; you will have one class of ideas for the theatre and the dissecting-room; and another when you come to speak to your patient. Besides, your business here is not to learn the rudiments of anatomy only; but to learn to deduce principles and rules of practice from anatomical demonstrations: And you will be good and safe practitioners in proportion to the closeness with which you have followed me in these deductions from the anatomy. Many of you come from schools where a mere exercise of memory is enjoined, as if you were for ever to go in leading-strings, and depend upon the dicta of others: and once more I must tell you, what will prove your most difficult task in practice, that you are not to learn merely what it is right to do, in any given case, but to discover what the case before you truly is; and this requires examination and *thought*.

When the head and neck of the femur are shattered, and the great trochanter broken off, while the *psoas* and *iliacus internus* retain their hold on the lesser trochanter, and through it of the extremity of the shaft, the posterior and anterior muscles no longer balance each other. The extremity of the bone is drawn towards the groin, and has been mistaken for dislocation of the head of the thigh bone forwards. But the true nature of this accident may be ascertained by feeling the great trochanter in its place, and observing

the retraction and position of the limb. See the explanation of plate *VIII. fig. 4.*

If the neck of the bone be fractured, and the muscles retain their connexions with both trochanters, the limb will be shorter, and the foot turned out, as exhibited in fig. 1, plate IX.

We now come to the consideration of the neck of the bone: and I shall, in the first place, give you a sketch of what has been done on this subject by my brother, Mr. John Bell. Here let me observe, that his four large volumes of the Principles of Surgery are not suited for your reading until you are well initiated in your profession; and even then they require a commentator: But, on the other hand, it will be a book valuable in succeeding ages, and to all surgeons who are desirous of seeking the principles of their profession. Not only the ingenuity is to be admired which he displays upon this very subject, but also his felicity in illustrating the principles. Among other things, he explains how it happens, that the neck of the thigh bone is abruptly broken off within the capsule; or again, that the head of the bone is extensively fractured, and the portions thrust among the torn membranes and muscles: And he explains at great length, and with every possible variety of illustration, how it happens that the one is curable and the other incurable*. He proceeds thus, page 550: "When a bone is broken, the soft parts are thickened around it, there is a general soft swelling

* See p. 549, "Principles of Surgery," 4to. 1801, under the title of "Why is this fracture incurable?"

of the limb, accompanied with a particular tumour surrounding the part, which tumour is hard and firm, and feels as if there were formed round the bone a gland-like mass for the purpose of generating callus. When we break the leg of an animal and examine this thickening, we find the muscles, the cellular substance, and the periosteum thickened, and firmly adhering to the ends of the broken bone: the part is very vascular, and it would appear that this turgescence, swelling, and high action of the vessels, were determined to the generation of bone, which being generated, the action subsides, and the swelling and thickness dissolve." He continues at page 551: "But when the rotula or knee-pan is broken, we have to do with a bone which is in very different circumstances." And at page 553: "The neck of the thigh bone, which is completely insulated in its natural condition, can form, when broken, none of those conditions with the surrounding parts which should help to make up a mass capable of retaining the bones in close contact, and of assisting in the generation of callus. This is a reason why all our ingenuity is exhausted in vain, why each successive generation has condemned the inventions of the preceding age. All our hopes of succeeding in the cure of fracture in the neck of the thigh bone have been successively abandoned, and we are almost persuaded to subscribe to the bold, unlimited affirmation of Platner, '*Nunquam os eâ parte glutinari posse nec membram in antiquum statum reverti.*' The mechanism I have explained is, I fear, a true answer to the question of the celebrated Dessault: 'Why should not the neck heal as well as any other part of this bone?' But why is the neck of the thigh bone, when it does reunite, surrounded with so clumsy a mass of callus? This also must be explained: for it is a fact, and an interesting one, and must have

a place in the account which I am presently to give of the various conditions in which the fractured thigh bone is found after death."

We see by these excerpts the course of his reflections. What will you say, then, when you find that those ideas, so ingenious and so judicious, are extended and illustrated by narratives and cases and marginal sketches, forming a considerable portion of an elegant work dedicated to Sir Astley Cooper himself? That gentleman must have had great reliance upon the indolence of the part of the profession to which he addresses himself, when he could compose, I may say two large volumes, in which the fracture of the neck of the thigh bone forms the most prominent discussion, without a word of this matter. No doubt, in the very large class of students over which that gentleman presides, there are few who read, or read any thing but dictionaries; but there are some real students among them, and their opinion is worth the whole theatre besides. But there prevails a supineness in the senior members of the profession, else it would not have been permitted that the works of Mr. John Bell should have thus become the unacknowledged source of so many volumes and essays—on the Generation of Bone; the Tying of Arteries; the Pathology of Aneurism; the Wounds of Intestines, &c. I am confounded on seeing so many modern writers adopt his views and explanations, and usurp what belongs to one so warmly devoted to the best interests of his profession. Enjoying the opportunities I do, first in addressing you, which is a perpetual call upon me to exertion, then having the cases of an hospital to refer to, and the dissecting-room open to me for illustration, and so great a collection of facts

around me in the museum; I am often stung with the reflection to what noble use he would have put them: And when I consider how much he did with so poor opportunities, and how his exertions were opposed and his objects defeated by the jealousy of his profession while he lived, I look upon the life of our London hospital surgeons as a life of luxurious indolence.

If the reading part of the profession will continue to give praise to Sir Astley Cooper, and forget the merits of this work of Mr. John Bell, what reason have I to suppose that you will take a more generous interest in it? It is, however, my duty to state, that in his work he has explained that in fracture within the joint, the capsule is distended with fluid, and the bone does not unite; but that, on the contrary, union takes place when there is more extensive injury and bloody effusion. He knew the distinction between youth and age, in respect to fracture and dislocation of the thigh bone, and quotes a variety of authors to prove that the lameness of old women is from fracture of the thigh bone. He has introduced drawings, to prove how in disease, the neck of the bone is depressed. In one word, all the subjects of interest are there anticipated; but there is this difference between his manner of treating the subject and Sir Astley Cooper's: He seems ever most happy when he can support his reasoning by the authority of those who have preceded him, and feels that he has conferred a double benefit, when he can, at the same time, illustrate the truth and vindicate the character of some excellent old surgeon, and teach the youth of the present day to look back to the history of the profession for their most useful lessons. Sir Astley Cooper, on the other

hand, hates all authority which interferes with his popularity ; votes that volume to be an old musty one which is dedicated to himself ; omits all mention of his respectable contemporaries ; and only varies his terms of praise and eulogy on the young men whom he flatters, journalists and connexions in business, down to the cutler who makes his instruments.

I began my professional studies with my brother whilst he was engaged in these very subjects. I was employed in making dissections and drawings for him, and had often occasion to admire the ingenuity with which he brought out the authorities of writers, at that time seldom consulted, though now familiar to the well-informed practitioner, to supply the deficiencies in his own opportunities. I have brought up from the rooms a drawing which has sufficient marks of age ; I may say, of the infancy of art. It is one of the first class drawings made by me for my brother when he gave lectures. In it you see the drawings and plans illustrative of this subject of fractured thigh bone ; part of which was transferred to his work many years afterwards. We are apt to estimate time by the course of our own lives. It appears to me very long since all those questions relating to the neck of the thigh bone, were settled in the minds of the reading part of the profession ; and it cannot but appear extraordinary to me, to find a gentleman standing in the high situation of Sir Astley Cooper, going over the same ground again ; vindicating these observations as if they were the result of his own unaided conceptions ; claiming them as if they were his own natural offspring.

I must therefore tell you how it has come round that this subject has so highly interested the medical gentlemen of London. You see around me a number of preparations; so great, that it is a proof I have never lost sight of this subject; and when I have come to this part of the course, I have never failed to explain the application of these principles. When the ingenious Mr. Cross, of Norwich, went to Paris, having been my house-pupil, and familiar with these facts, he was struck with the neglect of them which prevailed there; and in his "Observations on the State of the Profession in Paris," you will not fail to recognise a pupil of this school. What would have been unpalatable coming directly from me, had a very different effect imported anew from Paris, with freshness and novelty about it. The readers of journals conceived they had got a new subject in hand, and Sir Astley Cooper finding it treated as a matter of novelty, comes forward, like an injured man, to claim priority. Gentlemen, sitting down here with a resolution to state these matters dispassionately, it is with some difficulty that I restrain the expression of my opinion of those, who would encourage any one to hope that he can now appropriate these observations to himself. But the truth is, as I stated in the beginning, that there is a most extraordinary neglect of the history of the profession, and consequently much injustice done to individuals; and what is worse, the excitement to the liberal pursuit of science is withdrawn. How entirely are the arguments I have used to induce you to labour for the improvement of the profession negatived, when, in the short space of time during which I have lectured, I have lived to see the observations of Mr. John Bell quite forgotten.

That they did not want importance is abundantly obvious from the reception they have met with, when stated with the boldness which we see in the publication under consideration.

In treating of the fractures of the neck of the thigh bone, our modern authorities have copied Mr. John Bell in illustrating the subject by the condition of the fractured patella: and here, too, as I shall show you, they have been negligent of facts, and very inaccurate in their mode of reasoning. They have too hastily concluded that the patella did not unite by bone. This very week a woman goes out of the Middlesex Hospital with the fractured patella united by bone, and you can feel the ridge of union*. Admitting that we may be deceived in this, there can be no deception in the preparation which I place in your hands: you have the patella shattered and reunited by bone†, and you perceive the fragments are united with perfect regularity. What are we to make of these facts when we also take into view the opinions of Sir Astley Cooper and his commentators? Shall we allow the medical profession, extended as it now is, and forming one body, not in London or England, but in Europe and America, to suppose that there is but one school and one opinion here, and that our opinions are unsettled on a common matter of observation and of daily occurrence? I must once more explain this.

* "Bolton came in with fractured patella 27th December, and was dismissed 10th March."

† See plate IV. fig. 1.

In the common case of fracture of the patella by the sudden action of the Quadriceps Extensor, the bone is broken, and the pieces drawn separate, without that degree of violence which is necessary to produce reunion by bone. But when the patella is broken by a blow upon it, as by the kick of a horse, there is not only less retraction, but the injury, bloody effusion, tumefaction, and rigidity of the parts, resemble that which attends the fracture of any other bone, and the fragments unite by bone.

I have here beside me eight specimens of fractured patella, reunited by ligament, and two by bone: were I to present to you those only which are united by ligament (and which are so common that we disregard them and cease to collect them), we should fall into the error of the day, and conclude that the knee-pan does not unite by bone, and that it is a provision of nature that it should not, lest the joint should become ankylosed or intercepted by the processes of new bone. But the ninth specimen decides the matter. You see that the fracture is not merely across, but that there has been a rent longitudinally; that the bone has been shattered, and therefore that it united by bone.

As to the head and neck of the thigh bone not having sufficiency of vessels to take upon them the ossific action, it is an idle theory. It is indeed amusing to see how the matter-of-fact man riots and luxuriates in a theory when he can. It has not been proved that absorption and wasting of the bone is an operation requiring less

activity of vessels than the secretion of bone. They have never inquired whether it is the loose head or the extremity of the bone that wastes, or whether they be equally wasted. They have not proved that the union by bone to the socket of the os innominatum, which sometimes takes place, requires less activity of vessels than its reunion to the extremity of the femur; and yet it has been thought conclusive to say, that "the third and principal reason which may be assigned for the want of union of this fracture, is the absence of ossific action in the head of the thigh bone when separated from its cervix." They have not leisure to observe the facts; they pretend to despise all authority but that of a London Hospital surgeon, and conclude that Latin is used to cloak a lie; and they do not reason correctly on what is passing before their eyes. The notes or heads of subjects on Sir Astley's margin might, with no loss to the reader, be transferred to the pages of Mr. John Bell. The opinions are the same, but the reasoning and the illustration, as might be expected, are somewhat different. Thus the want of union is attributed to the want of apposition. This is in part true, but this is not the question at issue. We do not need to be informed that bones far apart do not unite, but we do require to know why the bone which I place in your hands is not reunited*. The cervix of the femur, you see, is absorbed, the head of the bone has come into *close contact* with the extremity of the shaft, and yet there is no union by bone, but only a membrane between them. It is quite clear, that if the retraction of the bone were the cause of the want of union, the

* See fig. 3, plate VII. and fig. 1, plate VIII.

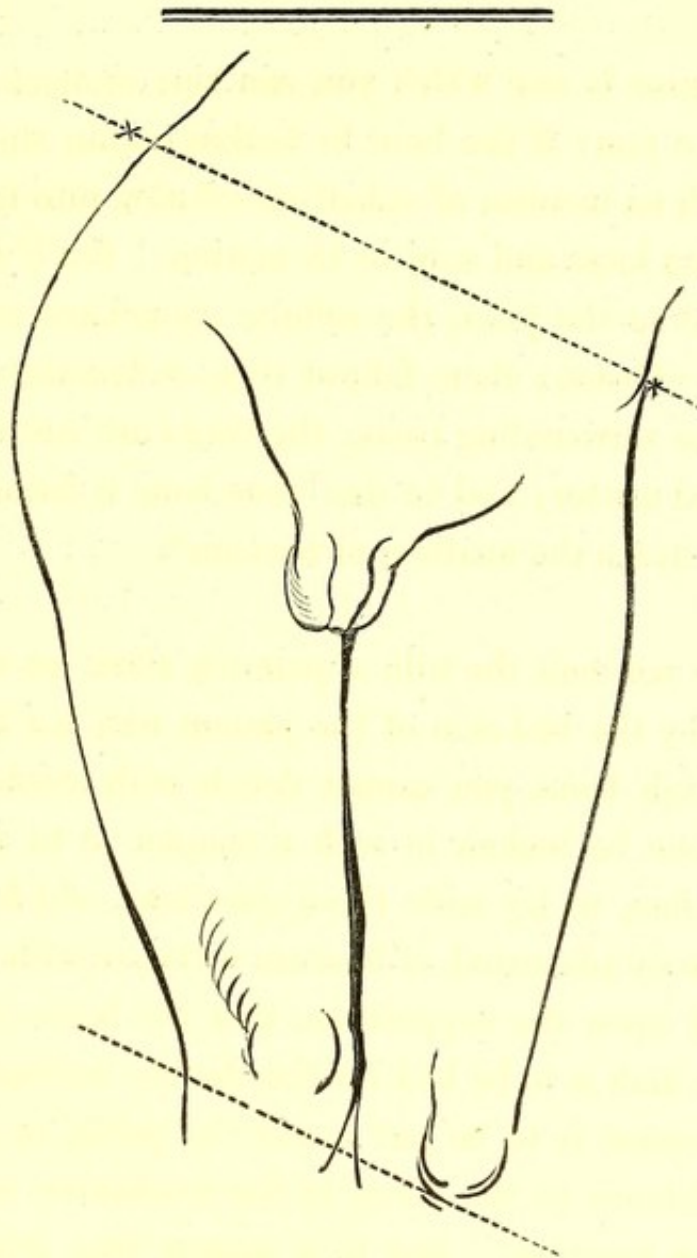
distinction of cases would not be marked by so precise a line, viz. whether the fracture is a quarter of an inch within or without the capsule of the joint.

The real cause is one which you can best understand who see the parts before you: if the bone be broken within this capsule, it is attended with an increase of colourless effusion into the joint, and the bones remain loose and subject to motion. But if the bone be broken external to the joint, the cellular connexions are torn, and there is bloody effusion; there follows this—inflammation and consolidation of the surrounding parts; the bones are sustained by this mass of inflamed matter; and in due time bone is formed in it, and that bone constitutes the medium of reunion*.

That I may not omit the rule of practice, allow me to state, that when you are by the bed-side of the patient who has fractured the neck of the thigh bone, you cannot decide with absolute certainty whether the bone be broken in such a manner as to unite or not. You are, therefore, to lay aside these questions, which are for the time so strenuously advocated, of fracture within or without the joint, and to proceed upon the supposition, that the bones may admit of reunion. The limb is to be laid on the double inclined plane, and a belt and compress is to be put round the pelvis, so as at once to offer some resistance to the rising of the trochanter, and press the broken surfaces together. But if it appear that after six weeks

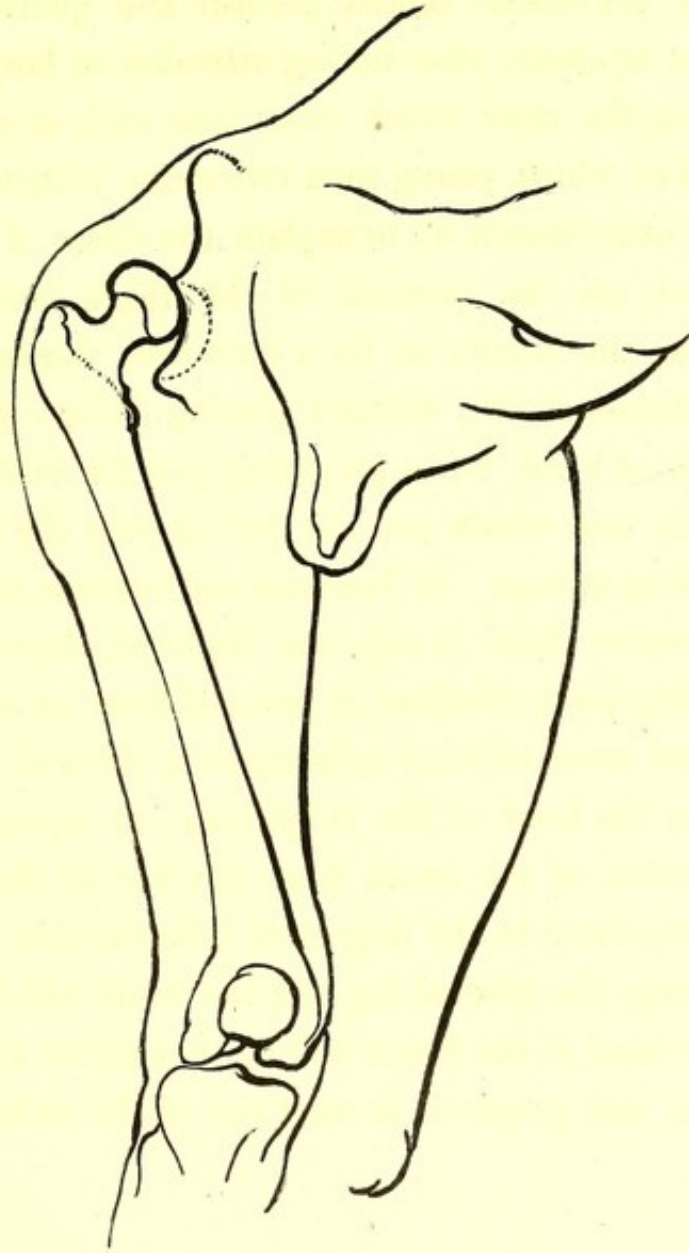
* See the illustration of this subject in the explanation of the plates.

there is no reunion, nor such stiffness and swelling as forebode it, we must let the patient rise and use a crutch, lest the parts fall out of use and waste.



We must now touch upon a subject of the greatest interest in the consideration of these points: and I must once more express my

wonder, that a gentleman should publish two quarto volumes of accidents of the hip-joint, after having attended an hospital for forty years, witnessing the cases which come into such an establishment, and the mistakes which young men entertain, without thinking it his duty, if he understands it, to explain the effect of inflammation of the hip-joint, on the position of the thigh bone. When a gentleman gives the results of his experience, during a long and successful professional life, without placing before you the most common source of error, he is preparing you for mistakes, digging as it were a pit, into which you are sure to step the first time you are out of leading-strings. It becomes my business to explain this subject. Whenever there is any, the slightest, degree of inflammation of the hip-joint, whether it proceed from an injury, or be a spontaneous and constitutional inflammation, there is an inclination of the pelvis on the head of the thigh bone, as represented above, and the inclination of the trunk from the line of the thigh bone, increases in proportion to the degree of inflammation. At last the disease continuing, the affected leg and the trunk will form an angle of 45° , and the head of the femur will be thus raised upon the lip of the acetabulum, and prepared to start out of the socket altogether.



Here, then, is the consecutive dislocation, a subject, strange to say, which this author never touches upon. Indeed I do not know that any author has explained it: Mr. John Bell did certainly not

understand it, and this perhaps is one reason why Sir Astley Cooper has not treated of it.

You know very well, gentlemen, that a ligament, to be firm, and white, and strong, must have only its natural degree of vascularity ; but if it be inflamed, with its increase of vascularity, it becomes of a gray colour, and softer, and loses its power of resistance. This condition of the ligaments of the hip-joint permits dislocation, but does not cause it. It is the inclination of the body and the leg which throws out the head of the bone from the socket ; and owing to the softening and yielding of the ligaments, there is no check or limit to the distortion, and thus dislocation is *consequent* upon injury.

From the first to the last degree of this inclination, it is of the highest importance for you to notice it*. In examining a limb which is supposed to be fractured or dislocated, you request the

* There is a sort of puzzle between the shortened and the lengthened limb, while in reality the limb is neither shorter nor longer. In Mr. Brodie's work on diseases of the joints, the lengthening of the limb by disease of the hip is very ingeniously accounted for. To balance the body without the necessity of resting on the lame hip, the patient projects the foot forward, and across the other foot. This enables him to preserve the body in equilibrium on the sound hip-joint. The consequence of this position is, that the pelvis on the diseased side dips lower than on the sound side. To this position of the pelvis the spine is in time accommodated ; and when the patient is laid on his back, the lame leg is longest, that is, it projects further in consequence of the curve of the spine, and inequality of the pelvis. See also plate A and plate II. in Mr. Shaw's Illustrations of Distortion of the Spine.

patient to lie upon his back, and putting the heels together, you find that one leg is shorter than the other. But before you allow yourself for a moment to think of dislocation or fracture, you look carefully to the position of the trunk; you take a piece of tape, you lay it across the pelvis, and fixing it with the thumbs upon the anterior and superior processes of the ossa ilii, you observe that the line made with the cord is oblique, as shown by the dotted line in the outline above, page 61; you now compare the height to which the process of the ilium on the injured side is raised above what it ought to be if the pelvis were truly poised, and comparing this with the elevation of the heel, you find that there is no shortening of the leg.

On turning to the 15th page of Sir Astley Cooper's book on Dislocations we find this passage: "Dislocations frequently occur from ulceration, by which the ligaments are detached, and the bones become destroyed. We frequently see this state of the parts in the hip-joint; the ligaments ulcerated, the edge of the acetabulum absorbed, and the head of the thigh-bone altered, both in its magnitude and figure, escaping from the acetabulum upon the ilium, and there forming for itself a new socket. We have, in the anatomical collection at St. Thomas's Hospital, a preparation of the knee dislocated by ulceration, whose tibia is thrown on the inner side of the external condyle of the "os femoris."

This is all that we find in our author upon this important subject; and indeed we have here enough to show, that whatever he may have seen, he has not drawn the right conclusions from the facts. I present

to you the condition of the bones forming the knee-joint, when they have been dislocated in *consequence* of inflammation: you see the tibia drawn back behind the femur. It is obvious, by the language of our author, that he has seen this; but he must have seen it with his outer organs only. Those among you who go round the hospital with me, must have seen me touching the hamstring tendons of patients with inflamed knee-joints, and on these occasions we have seen that they are tense as the strings of an instrument: and often I have remarked to you that the inflammation of the joint was increasing or diminishing, judging from the degree of tension or relaxation of these tendons. It is level to the observation of the most careless looker-on, that the distortion of the bones is not consequent upon the disease of the ligaments, but upon a prevailing action in the posterior muscles, which first bend the knee, and at last pull the bones of the leg behind the condyles; the rectus being relieved by the rising of the thigh, or the bending forward of the body.

Be you then, gentlemen, assured of this, that when you see an inclination of the body upon the head of the thigh bone, you have an inflammation deep in the hip-joint to encounter; and that when your patient, with an injury in the knee-joint, has a tense corded feeling in the hamstring tendons, a formidable inflammation within the joint has commenced; and that you must employ every means to avoid destructive inflammation in the apparatus of the joint. If, on the contrary, you see a young woman with swelling and pain of the knee-joint, and do not find this position of the limb and tension of the hamstring tendons, then is the inflammation exterior to the joint, and the case is probably only the "housemaid's knee."

But in regard to the hip-joint, I cannot let the matter pass without some further remarks. The most common cases require us to know that the pelvis changes its degree of obliquity in proportion to the tenderness of the hip-joint. Sir A. Cooper and his commentators have got involved in this question—What degree of shortening of the limb attends fracture of the neck of the thigh bone? After examining a preparation of a fracture of the neck of the thigh bone within the joint, he sends for the shoe which the man had worn, and finds, by measurement of the heel, that the bone must have been shortened four inches, since the additional heel to the shoe of the lame leg and the padding within amounted to this. Reflect a moment on the process of reasoning here : measure the length of the cervix, estimate its obliquity, and you will find that three-fourths of an inch in the distance betwixt the hip and the knee results from the neck of the thigh bone ; and notwithstanding the obvious conclusion from this, we are informed that the absorption of the neck of the bone shortens the limb four inches. What a precious thing it is to have to depend on a matter-of-fact man, who will be contented with nothing but actual admeasurement ! You must have seen an unfortunate cripple walking or hobbling with his stick, his hand pressed against the spine of the ilium, and the pelvis and the whole body inclined to the other side to ease the tender hip-joint. It is this inclination which appears to shorten the diseased limb to a degree much beyond the actual diminution of its length. I verily believe, that the gentleman who sent for the shoe to know how much the limb had been shortened by the accident to the hip-joint, had never thought whether the near or the off-wheel of his carriage bore the greater share of his weight ; and yet the one question involves the other ;

since he that does not know the principle on which the carriage-wheel is constructed, can know very little of the neck of the thigh bone; but there are some gentlemen who will know nothing unless it be practical.—I shall put a question to you: Suppose a boy were brought into the hospital, and that the wheel of a carriage had run over the tibia without breaking it, whether is it likely that the boy has been under the near or the off-wheel, the wheel that is depressed, or the wheel that is elevated?

From the same authority, if in courtesy I must continue so to speak, we learn that a fracture external to the joint is attended with a very slight degree of shortening of the limb; it is generally from half an inch to three quarters shorter. With this remark the reviewers are exceedingly perplexed: and no wonder! for if the principle, which is alone capable of explaining the difficulty, be obscured, their acumen will go for nothing. The *rationale* is this: the fracture *external* to the joint is not attended with *inflammation* and *pain in the joint*; consequently, the pelvis will not be raised on the injured side, and therefore the shortening of the limb will be no greater than the actual deficiency of bone occasions: there will be no apparent shortening beyond the actual defect in the reunion of the bones. These remarks are sufficient to show, that matters of fact, even when ascertained by measurement, are matters of prejudice and ignorance, unless inquired into, and put to the test of reason.

Once more I place the thigh bone before you: and now you are to observe, that when resting on the condyles it is not perpendicular,

but inclining; and that this inclination corresponds with the width of the pelvis. That is equal to saying that the obliquity of the bone is greater in the female.

Now, you perceive, that when a person drops upon his feet from a wall or window; or when, in walking, his foot falls suddenly into a hole; or when descending a stair he thinks he has come to the landing-place, but has still one or two steps to descend; although the force acts here on the neck of the bone, and is very apt to fracture it, especially in old people, yet you see another accident may here befall the lower extremity of the bone. For when I hang this plumb-line from the centre of the head of the femur, you see that it descends to the external condyle; and thus the external condyle receives a greater shock from the descent of the body than the internal. You perceive, too, that the deep notch in the trochlea of the bone divides the condyles and weakens the bone here; and thus it happens, that a fracture of the condyle, a fracture therefore penetrating to the joint, takes place.

I must once more mention the work of Sir Astley Cooper to take notice of an omission, and I should say a strange one, if it did not occur from the same cause with the others, the belief that practice will supply all deficiencies. He gives us instances of dislocation of the knee-joint in every possible direction; but there is no notice of an accident infinitely more important, in comparison, from its frequency; and ignorance of the nature of which will lead you into serious mistakes.

From the same cause, the obliquity of the thigh bone, there is another accident, very frequently taking place, in old women especially; and that is an injury of the internal lateral ligament, consequent upon a false step, by which the body is suddenly jolted upon the thigh bone. For, you see, the thigh bone inclining outwards, the inner condyle is apt to rise from the tibia, and in consequence to rupture the internal lateral ligament. I say nothing of that, because it is an obvious accident: but when the injury takes place in a lesser degree, so that the internal ligament of the knee-joint is stretched, sprained, and not lacerated, consequences arise which you can not understand unless your attention has been called to the effects which result from the obliquity of the thigh bone. This ligament, being injured, inflames, softens, and stretches: It allows the knee-joint to sink inwards: the obliquity of the thigh bone is thereby increased, and of course all the consequences resulting from that obliquity: every step now gives pain, and the ligament is thus continually injured, and being kept in a state of inflammation, softens and relaxes, and a permanent lameness and feebleness of the knee-joint is established.

When you listen to the old lady's story, you hear twenty fancies about it: but having made out, from much talk, that it is placing her foot on the step of the carriage in alighting, or in coming down stairs, that she suffers, you may say, "Now, madam, I shall touch the part affected:" and when you press on the insertion of the internal lateral ligament, she acknowledges that you have hit the cause. I leave your ingenuity to contrive the means of supporting the joint on the inside.

Having drawn your attention to the condyles of the femur, and the consequences of their inequality, I now wish you to observe the projecting edges of the trochlea of the femur. You perceive that it has elevated edges to keep the patella in its place during the play of that bone upon the knee-joint; but you also perceive, that if the patella be dislocated, the same ridge of bone will prevent its reduction. It is very remarkable, that in the work so often quoted, the author should not point out to his readers what is the obstruction to the reduction; or the mode of avoiding it, rather than of overcoming it. His rule would make you force the patella over this elevation; whereas the proper method is to press the patella towards the tibia before the attempt be made to bring it in front of the knee-joint. This is the last and least of those errors into which a confidence in experience, rather than a dependence on the knowledge of structure, has led Sir Astley Cooper, in reference to this single bone, of which I have now finished the surgical demonstration.

Thus, gentlemen, I have gone over the points of the anatomy of the thigh bone as I have done the other bones, and as I shall presently proceed with the tibia and fibula. But you see how I have been drawn to make animadversions upon a contemporary writer and teacher. I hope you believe me incapable of saying any thing to you, which I should wish to conceal from the seniors of the profession, or the public in general. What I have delivered to you I mean to publish; and if you shall find any difference in what you shall afterwards read, I trust it will only be in the greater distinctness and force of the language; since I feel restrained in delivering myself here, where those who may think themselves affected by my

sentiments cannot offer their vindication. In what I have been forced to deliver, I have had no personal or hostile feeling. Expressions which might give me a momentary feeling of irritation, or might naturally have excited a hasty word in return, could never influence me long enough to lead me into the detail into which I have gone to-day.

As to Sir Astley Cooper, I know that I shall not hurt him; neither diminish his opportunities of doing good, nor mortify his feelings. He is armed in double proof. Indeed he has said in the very book which I have referred to, on the occasion of a gentleman criticising him, "that it has led him to think better of his work than he had previously been disposed to do." This is some relief to me in concluding the observations which I have been called upon to make: and I most sincerely declare, that I shall be happy to correct the general impression on these matters, without giving Sir Astley Cooper one moment's uneasiness, or withdrawing him for the shortest time from his pursuits. But I wish to state decidedly to you, and to the profession generally, nay, I wish to do more, I wish to put it upon record, that all his contemporaries were not carried along with him; that those who shall succeed us in our hospitals and our lecture-rooms may know, that I entertained opinions very different from his on many important practical questions. I have gone thoroughly into one subject that I might be relieved from the necessity of speaking of others. The profession, or that small portion of it who value my opinion, shall know by this, my idea of his capacity for settling the rules on delicate questions of practice; but I shall not be easily drawn to say more than duty requires. I have

met him on his own ground ; I have not gone into vain criticism of language ; nor have I found fault needlessly : I have opposed him only as a practical hospital surgeon.

On very many occasions I have sacrificed my private interest to enable me to observe and accumulate vouchers of the correctness of my statements. For it must be acknowledged, that what are professionally called facts, are for the most part only those notions which a man insensibly adopts in the course of his practice, and which take a colour from his education and previous studies. It is this which makes the facts of one age differ from the facts of another age ; and the opinions of men differently educated to vary on what they are inconsistent enough to call matters of fact. The gentleman in the good plain suit, so often alluded to, has declared, that facts, and inevitable conclusions arising from those facts, compose his lectures ; and, like an obstinate man, he has said, that he is indifferent who may be made acquainted with them, for he is positive they cannot be refuted. This reliance on his own infallibility, so inconsistent with a perfect knowledge of the grounds on which medical reasoning is founded, as well as the singular inconclusiveness of his reasoning, have given me confidence to oppose him on so many occasions.

I hope the number of these preparations, by which I am surrounded, will prove to you that I am sincere in what I have delivered ; and that it has been the business of my life to search for the truth : And one who has been long finding what he seeks, treasures it with some enthusiasm.

By a very unexpected occurrence, I find myself opposed to one who has been long in the most extensive practice, and whose opportunities may, on that account, be supposed to be great. I can say, on the other hand, that on more than one occasion I have sacrificed practice for a wider field of observation. Educated by my brother, and having a portion of his love for our common profession, I should have been ashamed to be absent from scenes where, in one week, more was to be seen than in many years of London practice. When the wounded from Corunna were put ashore, I broke all my engagements in London that I might be among them to take cases and make observations; and when there was a report of 30,000 wounded at Waterloo, I was the first man out of England, and drawn purely by the same motives which now animate me in pursuing the subject before us: it is not likely that I should go 500 miles seeking opportunities of improvement, and yet be negligent of the daily occurrences of my own hospital.

Gentlemen—I know the danger of giving these observations to the public, and that I can reap no advantage but the consciousness of doing my duty to stop the progress of error. I had many reasons for avoiding the controversy, and only one for engaging in it: I made to you, in the beginning, a promise to sacrifice every thing to the duties I undertook as your master in anatomy. And I now conclude what has proved by much the most unpleasant part of my task in redeeming that pledge.

EXPLANATION OF THE PLATES.

Fig. 1.

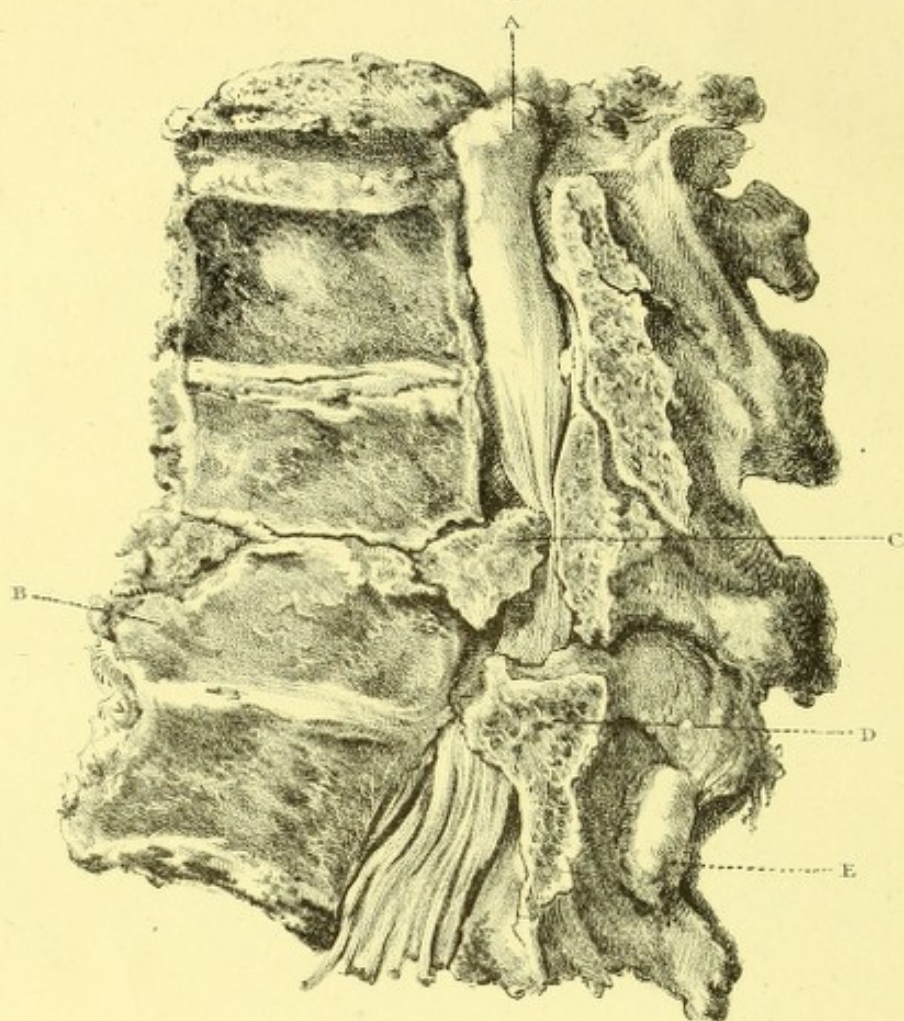
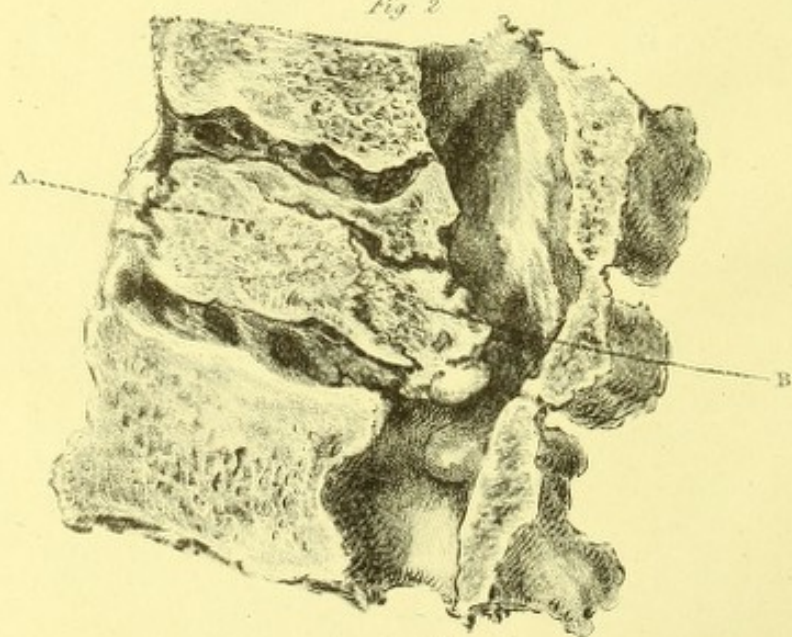


Fig. 2.



Printed by C. Hullmandel.

London: Pub'd by Thomas Tegg 75, Cheapside, April 1827.

EXPLANATION OF THE PLATES

OF

FRACTURED SPINE.



PLATE I.

Fig. 1. The spine fractured, and the spinal marrow crushed by the splinters.

A. The spinal marrow.

B. The body of one of the vertebræ fractured.

C. A fragment of the body of the vertebra forced in upon the spinal marrow.

D. A portion of the spinous process compressing the spinal marrow.

E. A broken spinous process.

I possess many specimens of fractured spine, and in all of them the bodies of the vertebræ are broken. This is a very important fact in reference to the proposed operation of trephining the spine; and it inclines me to believe what I have heard stated, that

in two instances of fractured spine where the trephine was used, the bodies of the vertebræ were found to be fractured.

Fig. 2. Represents a fractured spine, the broken portions being reunited by bone. Here, as in the other example, the body of the vertebra is broken.

A. The body of the vertebra from which a portion has been broken off and driven back.

B. The broken portion driven in upon the tube so as to crush the spinal marrow.

The accident was occasioned by a bank of earth falling upon the man's shoulders.

It will be readily understood, that these specimens prove an objection to the trepanning of the spine. If the operation had been performed in the case of fig. 1. the surgeon would have found the spinal marrow betwixt him and the displaced portion of bone: after opening the spinal canal, therefore, he could not have relieved the spinal marrow from compression. In the specimen fig. 2, we see, that notwithstanding the compression of the spinal marrow, the patient survived the immediate injury. But if the operation had been performed, the surgeon could not have reached the fragment; and the probability is, that inflammation and more immediate death would have followed.

Fig 1

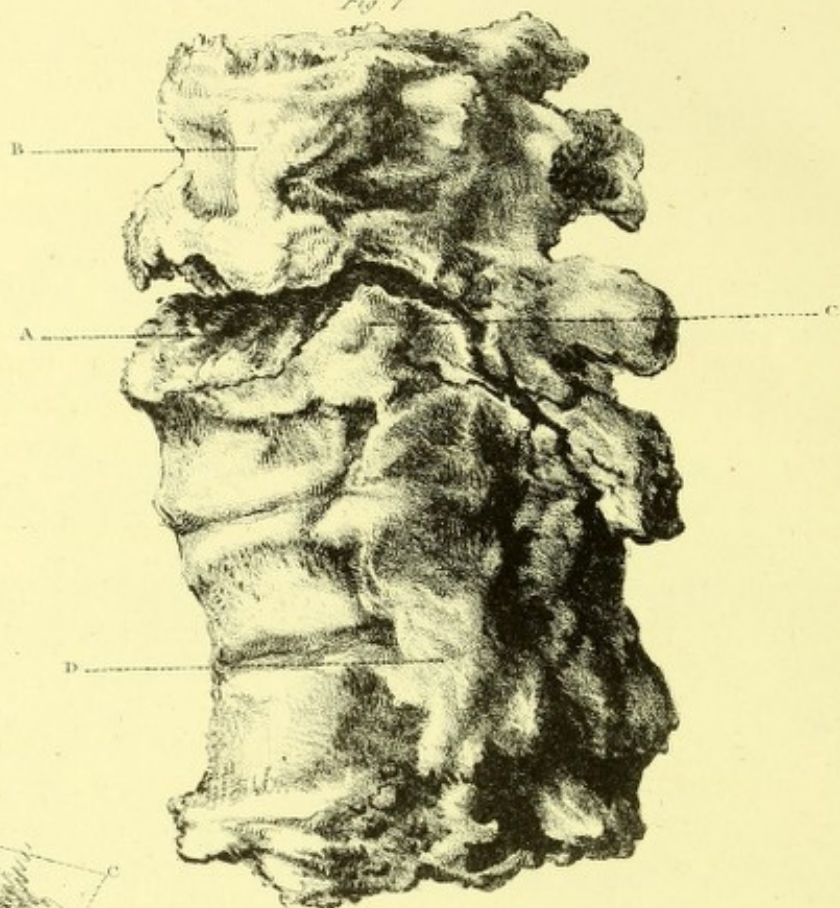


Fig 3

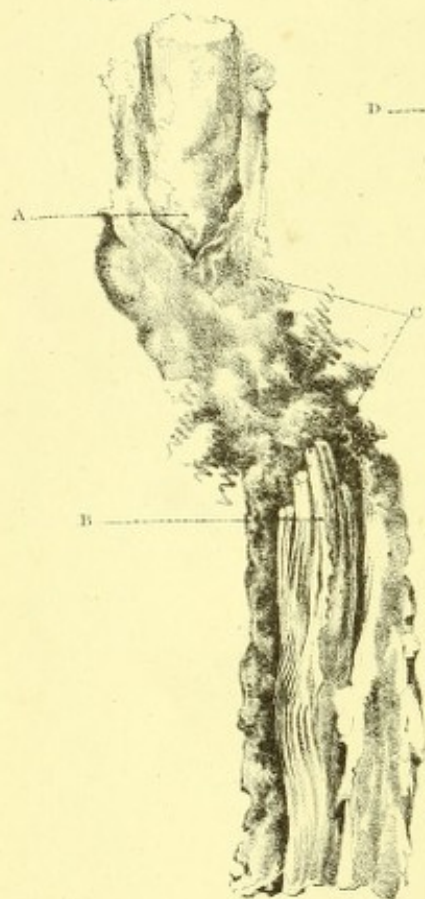
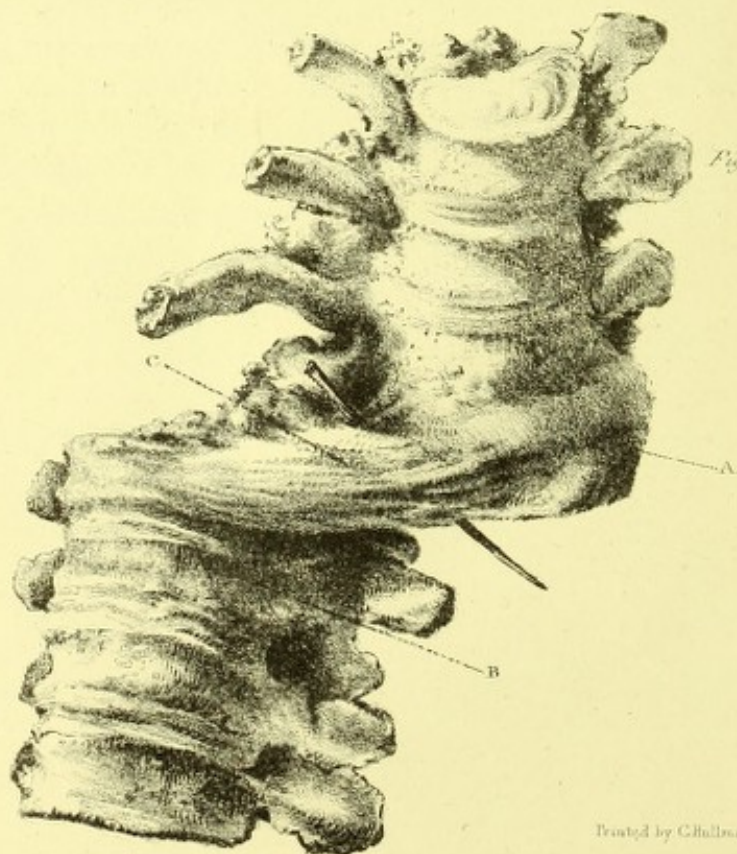


Fig 2



Printed by G. Hallenbeck.

PLATE II.

Fig. 1. Represents the formidable fracture of the vertebræ which takes place in old men. This happens in consequence of a preternatural splint of bone joining the vertebræ together, and destroying their elasticity; so that if a weight should fall on the shoulders, the spine, instead of bending, would break down like one of the long bones.

A. The fracture of the body of the vertebræ.

B. A large mass of osseous matter, which has produced ankylosis, or bony union of the vertebræ.

C. The point at which this mass of callus is fractured. The rent may be traced quite across it, from the body into the spinous process of the vertebra.

Fig. 2. A view of dislocated vertebræ: an unique specimen. The last dorsal and first lumbar vertebræ have suffered dislocation, and I state it thus, although a small portion of the lumbar vertebra is broken off.

A. The last dorsal vertebra.

B. The upper lumbar vertebra.

C. A strong ligament which now unites the displaced vertebræ in their new relation.

It is possible that the *ligamentum longum anticum* might have been torn from the bodies of the vertebræ when they were violently separated; but I rather imagine that this ligament is principally a new production. It exhibits a curious instance of accommodation to the condition of the bones.

Fig. 3. Is a sketch of the spinal marrow, as seen on turning round the preparation, fig. 2. It is entirely torn across.

A. Marks the point at which the spinal marrow is abruptly terminated above.

B. Points to the lower division of the spinal marrow, which presents an appearance of more distinct cords.

C. By dotted lines, measures the space betwixt the torn extremities of the spinal marrow.

The spine was dislocated by a heavy coach pushing down the child. It survived, and died, thirteen months after, of croup.

Here is another proof, that if the parts be not opened, and the membranes exposed, a person may survive the utmost violence done to the spinal marrow. Whether life is worth preserving in these circumstances, is a question which ought never to be agitated.

Fig 1.

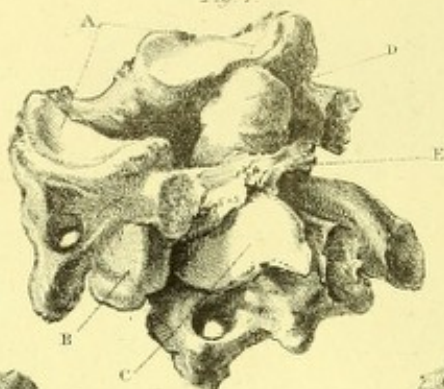


Fig 2.

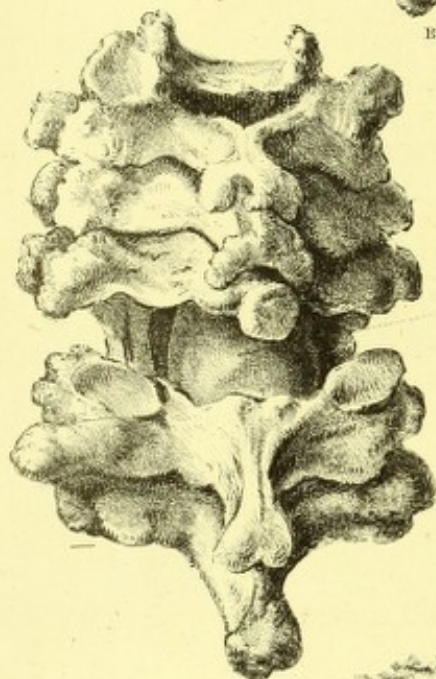


Fig 3.

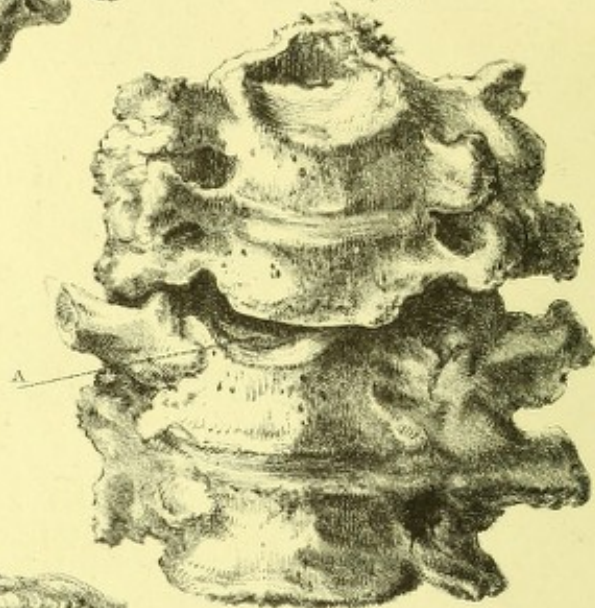


Fig 4.

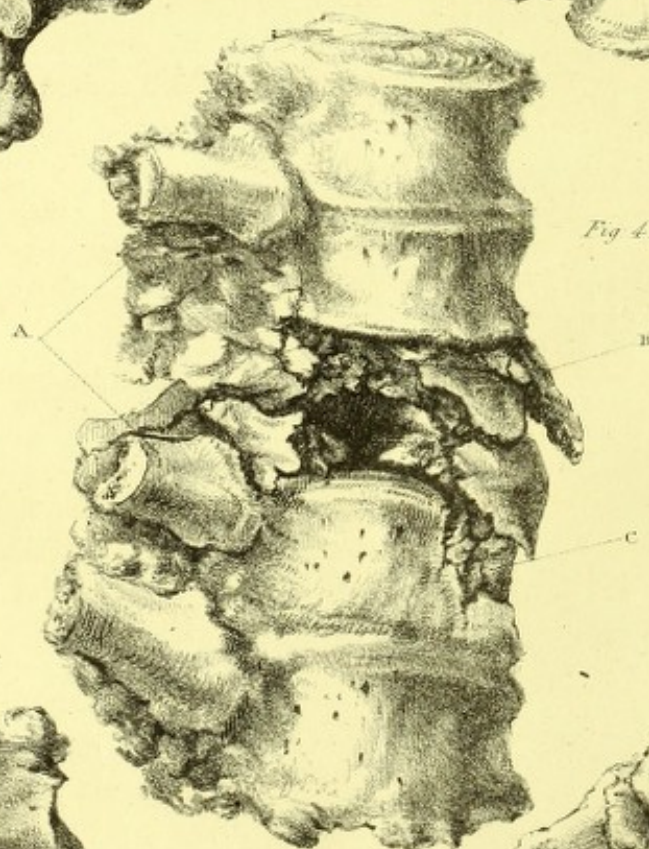


Fig 5.

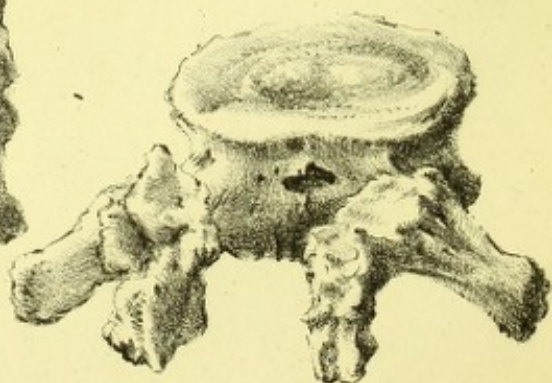


Fig 6.



PLATE III.

CONTAINS VIEWS OF SEVERAL SPECIMENS OF VERTEBRÆ INJURED
BY VIOLENCE.

Fig. 1. Represents luxation of the atlas.

A. The condyloid cavities of the atlas.

B. The lower articulating process of the atlas separated from the corresponding process of the dentata.

C. The surface of the vertebra dentata, which should correspond with the process B.

D. The odontoid process of the vertebra dentata, which has started in consequence of the diseased softening and rupture of the transverse ligament.

E. A rag of the ligament remaining, against which the process D rests.

In this case, the patient died in an instant, by the falling forward of the head. For the transverse ligament being weakened

by ulceration, gave way, and the atlas falling forward, carried the spinal marrow against the tooth-like process, and crushed it.

Fig. 2. Sketch of the vertebræ removed from the body of the patient, whose case is described at page 8. A separation, by direct violence, has taken place betwixt the uppermost vertebra of the back, and the lowest of the neck.

A. The sheath of the spinal marrow seen in consequence of the separation of the vertebræ, presenting now in the preparation, as it did on dissection.

Within the theca, and betwixt it and the spinal marrow, pus was found extending through the whole length of the tube.

The patient had suffered considerable pain in the lower part of the neck, during two or three days immediately succeeding the accident: but although the part was carefully examined, neither fracture nor hiatus between the vertebræ could be discovered. On dissection, a quantity of pus was found on the inferior cervical vertebræ. It came from betwixt the bones. On further examination, the ligaments which pass between the last cervical and first dorsal vertebræ were found to be dissolved. The abscess was bounded on the fore part by the œsophagus, and the intervertebral substance was so entirely destroyed, that when the vertebræ were removed from the body, they fell separate, so as to expose the sheath.

Fig. 3. Presents a specimen of subluxation of the bodies of the vertebræ.

A. A hiatus betwixt the first dorsal vertebra and last cervical vertebra. Why separation should take place here, is explained in the lecture. The man from whom this specimen was taken came to his death by falling headlong from a barge lying aground in the Thames; his head stuck in the mud, so that the whole weight of the trunk and limbs was thrown on the neck, and an obliquity in the direction of the force probably twisted the vertebræ.

Fig. 4. In this specimen the bodies of two of the vertebræ have been completely shattered.

A. The heads of the ribs. The intermediate one has been shattered.

B. The body of a dorsal vertebra shattered into many pieces.

C. The body of the vertebra immediately below, also fractured and shattered.

It is important to know, that a force acting on the shoulders, and bending down the body forward, is capable of completely bruising down and shattering the crust of the vertebræ. We have in this, another instance of the inutility of the proposed operation of the trephine.

Figs. 5 and 6. Two views of the specimen alluded to in the lecture. The spinous process is separated from the transverse process, so as to divide the ring which forms the canal of the

spine. The surfaces are rounded and smooth, showing that they were united by ligament, and permitted a certain motion.

A variety of other specimens of injured and diseased vertebrae may be seen in my Collection in Windmill Street.

Fig. 3.



Pl. : IV.

Fig. 2.



Fig. 1.

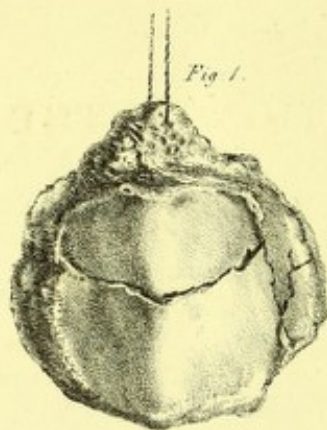


Fig. 4.

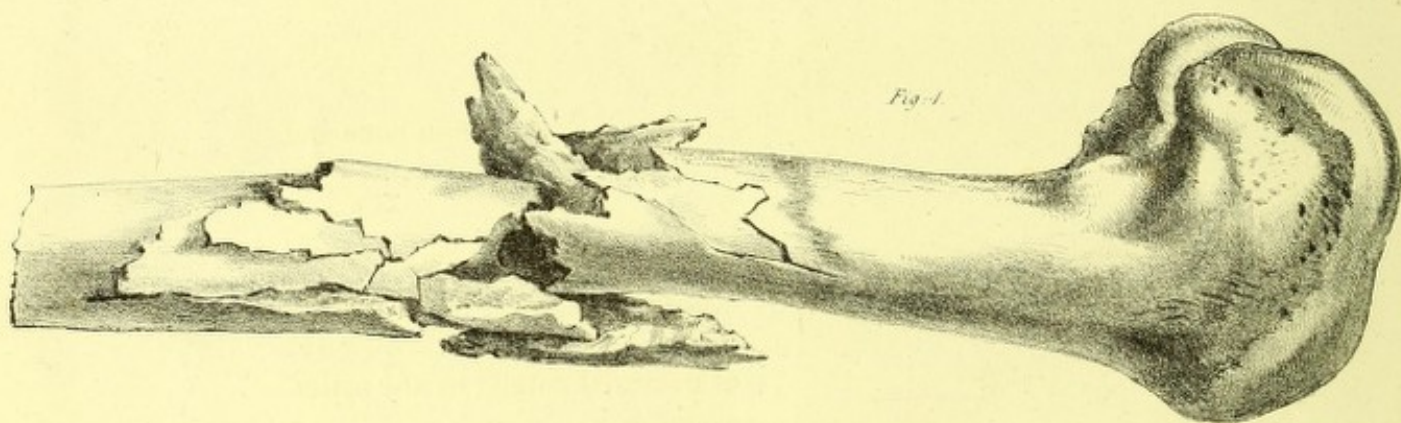
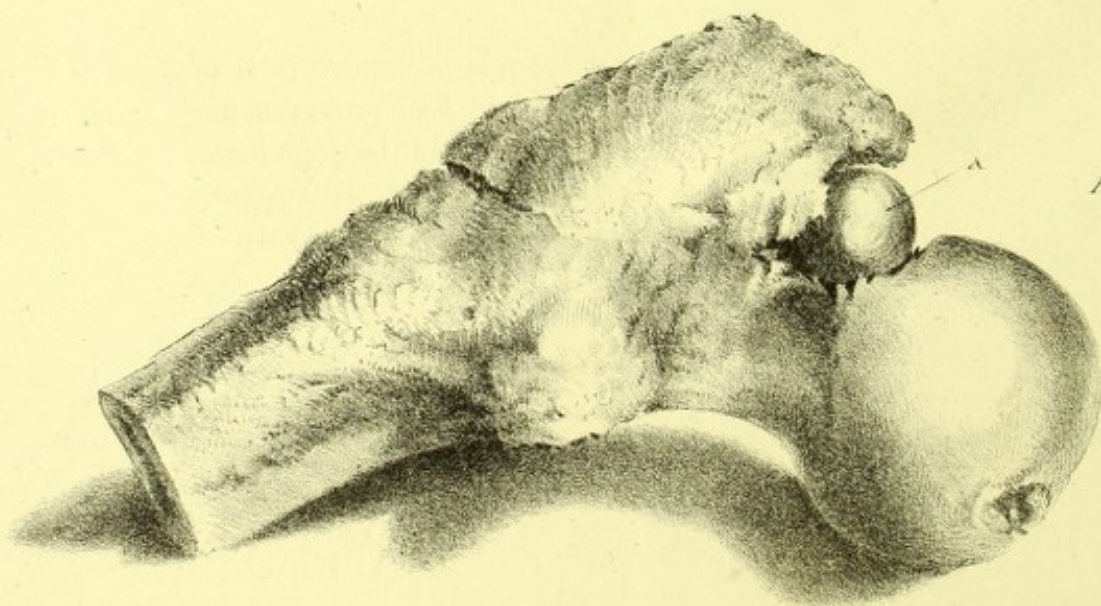


Fig. 5.



Engraved by C. Bellin.

EXPLANATION OF THE PLATES

OF

THE THIGH BONE,

ILLUSTRATIVE OF THE SUBJECT OF THE SECOND LECTURE.



PLATE IV.

This plate exhibits examples of fractures of the thigh bone and patella.

Fig. 1. Is a rare example of the patella fractured and reunited by bone. The principal fracture is transverse, but there is a fissure at right angles with this, or longitudinal to the bone, which proves that this was not a common case of fractured patella by the action of the muscles. It must have been struck.

It may be remarked, that although there is an elevated ridge of new bone on the outer surface of the bone, there is no projection nor inequality on the surface opposed to the trochlea of the thigh bone. Shall we say, that this is a provision of nature? or is it a consequence of the nature of the synovial membrane, and the want of

cellular membrane on the surface? However that may be, it disproves the common notion, that nature has ordained that the fractured patella shall not be united by bone, but only by ligament, that the motions of the joint may not be interrupted.

There is another case of fractured patella united by bone in my collection, but the demonstration is not so perfect.

See further, in the Lecture on the Thigh Bone.

Fig. 2. An example of the separation of the *epiphysis* of the femur from the *diaphysis*, or shaft. The case is noticed in the lecture under the term *diastasis*.

It is worthy of notice in this specimen, that the lad having lived some weeks, the extremity of the shaft of the bone is small compared with the epiphysis. This I attribute to the death of the latter portion, while the extremity continuing alive, and being surrounded with matter, it suffered absorption and consequent diminution. While this process of wasting in the extremity of the shaft was progressive, a cortex of new bone may be seen to have formed on its surface; and if the boy had lived, we should have had a specimen of necrosis.

Fig. 3. An example of *diastasis*. An accident of the same kind with the last had occurred here; but the separated epiphysis had reunited, though in a very irregular manner, so that the end of the shaft extended into the ham. About twenty years after the bone had been fractured, the patient, in jumping down from a chair, felt something snap, and very soon after, a pulsating tumor formed, which was discovered to be a popliteal aneurism. The further statement of the case does not belong to our present subject. It

was found that the artery had been torn on the rough extremity of the bone.

Fig. 4. A fracture of the *diaphysis* of the thigh bone by a musket ball. The effect here is to splinter and scatter a great many sharp and dense pieces of the bone abroad into the limb. There are several specimens showing this effect of gun-shot on the cylinder of the bone. It must be understood, that in these examples, the scattered portions of bone have been collected and replaced.

Fig. 5. A gun-shot fracture ; but the effects are different from what is seen in the last fig., owing to the part of the femur struck.

A. A musket ball lying on the neck of the thigh bone and within the joint, having passed through the trochanter.

There are several specimens exhibiting the effects of balls on the extremities of the long bones in my collection, and which better show the consequences of a ball striking the cancelli ; they sink without splintering the bone. In one case a musket-ball is seen to be lodged within the head or ball of the femur.

A Frenchman during the late war, in endeavouring to make his escape from a prison-ship, was fired at by the centinel. The ball passed in at the hip, and the patient in a few days died, with symptoms of peritonitis. On examination after death, the head of the thigh bone was found in the belly, and within the bone the leaden ball.

These examples are preserved to explain the importance of the anatomy ; and that the same case, as far as regards the weapon and

the force, will vary in most essential circumstances, according to the part of the bone struck. When the cylinder is perforated, and the medullium laid open, as in fig. 4, if very free incisions be not made, the matter lodges in the cavity, and, after much suffering, the bone at last falls into the condition exhibited fig. 1, plate V.

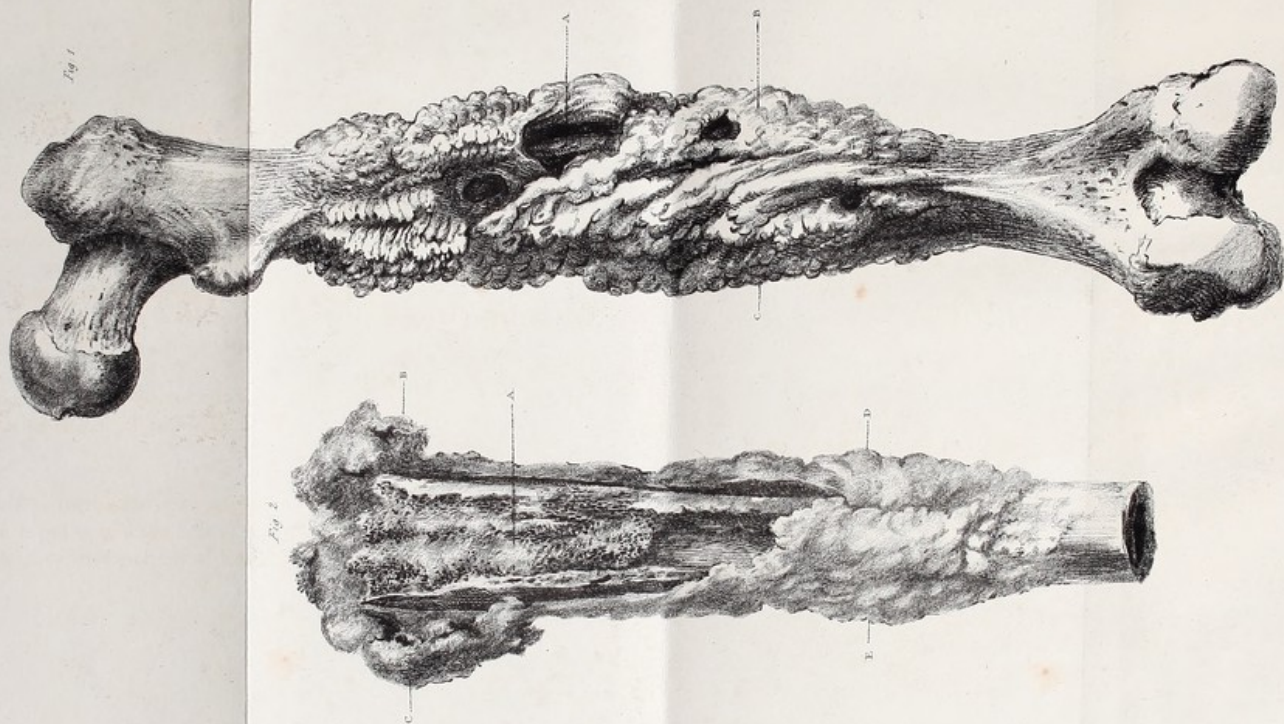


Fig. 2

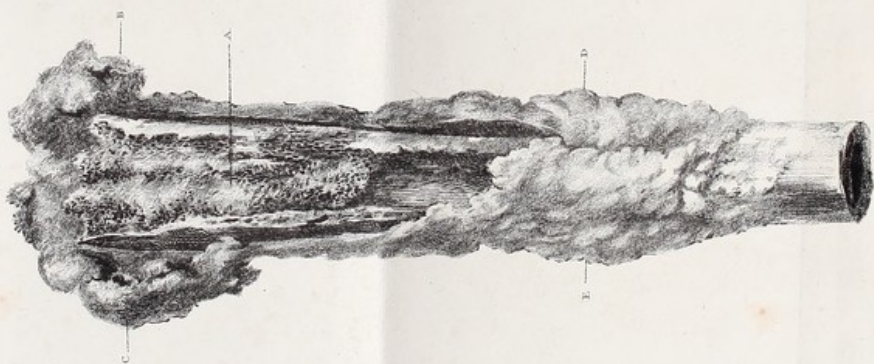


Fig. 3



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PLATE V.

This plate exhibits necrosis of the thigh bone.

Fig. 1. This figure shows the condition of the thigh bone consequent on gun-shot fracture, when the pus harbours in the cavity of the shaft. Necrosis has taken place.

A. The sequestra; that is, the old bone now reduced by absorption, and surrounded with a case of new bone.

B. C. Bone newly formed around the original thigh bone, soft and vascular, and having an irregular granular surface. The old shaft, A, is loose at the extremities, and wasted; but this new bone joins the epiphysis, and forms a substitute for the old bone.

It will be observed, that the necrosis has not extended into the extremities of the bone. I possess a great many examples of necrosis, but not one where the disease beginning in the centre has extended to the extremities.

Amputation was in this instance performed at the hip-joint. The patient died. The subject is discussed in the lecture on the thigh bone.

Fig. 2. This is a specimen of necrosis (represented of the natural size). The peculiarity here is, that the disease began in the knee-joint, and was communicated to the lower extremity of the femur.

A. Is the cancellated structure of the old and dead bone.

B. C. D. E. Mark the spongy new bone, which had surrounded and included the old bone.

In the specimen, fig. 2, plate IV. we have seen, that when the end of the thigh bone was separated and projected into a collection of pus, it became inflamed, and the process of necrosis was commencing. Here, disease of the knee-joint and suppuration had completed the process. In these circumstances the process of necrosis may take place in the extremities. But whether the disease begins in the lower extremity or in the centre, it will not be communicated to the upper extremity and to the hip-joint.

This bone was taken from the amputated limb of the patient alluded to in the preceding pages. The surgeon wished to remove the limb at the hip-joint, because it was necrosis, and the shaft thoroughly diseased; but I explained that the disease would not be found to have reached the upper extremity, and advised the common high amputation by double circular incision. The patient is alive.

Fig. 3. Is a sequestra drawn from the necrosed thigh bone, of the natural size. It is of importance to observe how the disease was produced in this case: the man had lost his leg by amputation above the knee; a very bad condition of the stump succeeded, and the end of the bone stuck out in the centre of the suppurating integuments. The matter finding access to the cavity of the diaphysis, it became the seat of abscess, and the consequence was such as we find in experiments on animals when we destroy the marrow: necrosis took place. The carious bone long projected

from the stump: this bone at length became loose, and was withdrawn, and proved to be a true specimen of sequestra. Such are not unfrequently the results of amputation in the West Indies.

The coming out of the sequestra of the old bone, leaving the new bone and the head of the old bone in a healthy condition, should teach us what to do in these cases. And if a second amputation should be necessary, let us recollect, that unless some very peculiar appearances should present, we have no authority to amputate at the hip-joint.

PLATE VI.

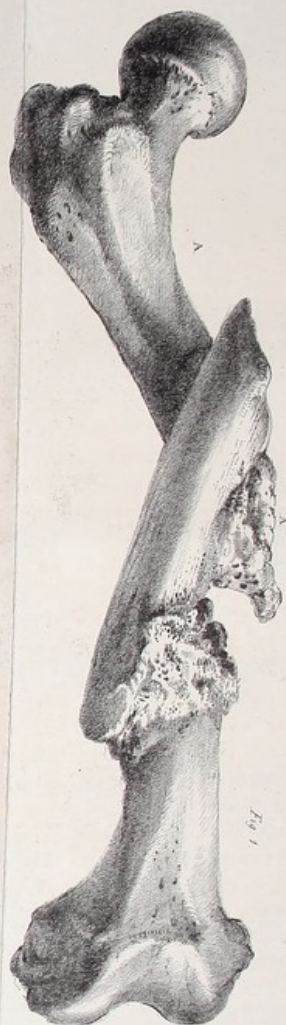
Out of forty-three specimens of fractured thigh bones contained in my Collection, twenty are united by bone, and of these eighteen are distorted in the same direction.

Fig. 1. Is the thigh bone of a madman, who, after throwing himself out of the window, would permit no means to be used to restrain the limb. We have all heard of the madman who contrived to cheat his surgeon, and who hid the fractured leg in the feathers of the mattress—but in the present instance the consequences have not been so happy. We see here to what degree the limb may be retracted in consequence of fracture of the femur, if no means are taken to counteract the action of the muscles.

Figs. 2 and 3. Exhibit fractures in the middle of the thigh bone.

Fig. 4. Is the section of a fractured thigh bone.

In all these figures A. points to the superior portion of the bone, and in all, it is seen that this superior portion is elevated. This is not a relative elevation—not a mere consequence of the falling of the lower portion of the fractured bone—it is a necessary and uniform result of the action of the muscles in fracture of the thigh bone. It arises from the same cause that elevates the stump after amputation above the knee; and this it is important to notice, else the distortion would be still ascribed to the weight of the leg.



The result of this demonstration, is the *rule* to raise the thigh on the inclined plane, and not to attempt the forcible depression of the superior portion by splints and bandages.

Another circumstance exhibited in these figures, is the ready disposition to throw out new bone after the fracture of the shaft; yet as the shaft of the bone is by much the densest part of the whole, and is therefore the least vascular, and much less vascular than the cervix and head of the femur, whence arises the ready reunion of the former; and wherefore do the latter not unite? The reason will not be discovered in the peculiarity of the bone, but rather in that of the surrounding substance. Bloody effusion, swelling, and condensation of the parts, are the necessary forerunners of the formation of new bone. This readily takes place after fracture of the cylinder of the bone, but cannot take place when the fracture is within the joint.

PLATE VII.

This plate contains specimens of fracture of the neck of the thigh bone.

Fig. 1. The thigh bone of a coachman, who had the bone broken by falling from the box. He was in the act of pulling up his horses, when the foot-board broke, and he was precipitated with his weight falling in the line of the thigh bone. The urethra was burst. He lived a month and ten days.

A. The sharp splinter of the upper part of the shaft of the bone.

B. The trochanter major split off.

C. D. New bone profusely furnished, and beginning to unite the three portions of the thigh bone. The man had survived the accident from September 5th to October 15th, six weeks. It offers a remarkable instance of displacement of the neck of the thigh bone, and retraction of the limb; and also of the luxuriant formation of new bone, and in places removed from actual contact with the original bone.

Fig. 2. A section of the head of the thigh bone, presenting a specimen of fracture external to the capsule of the joint.

Fig. 1

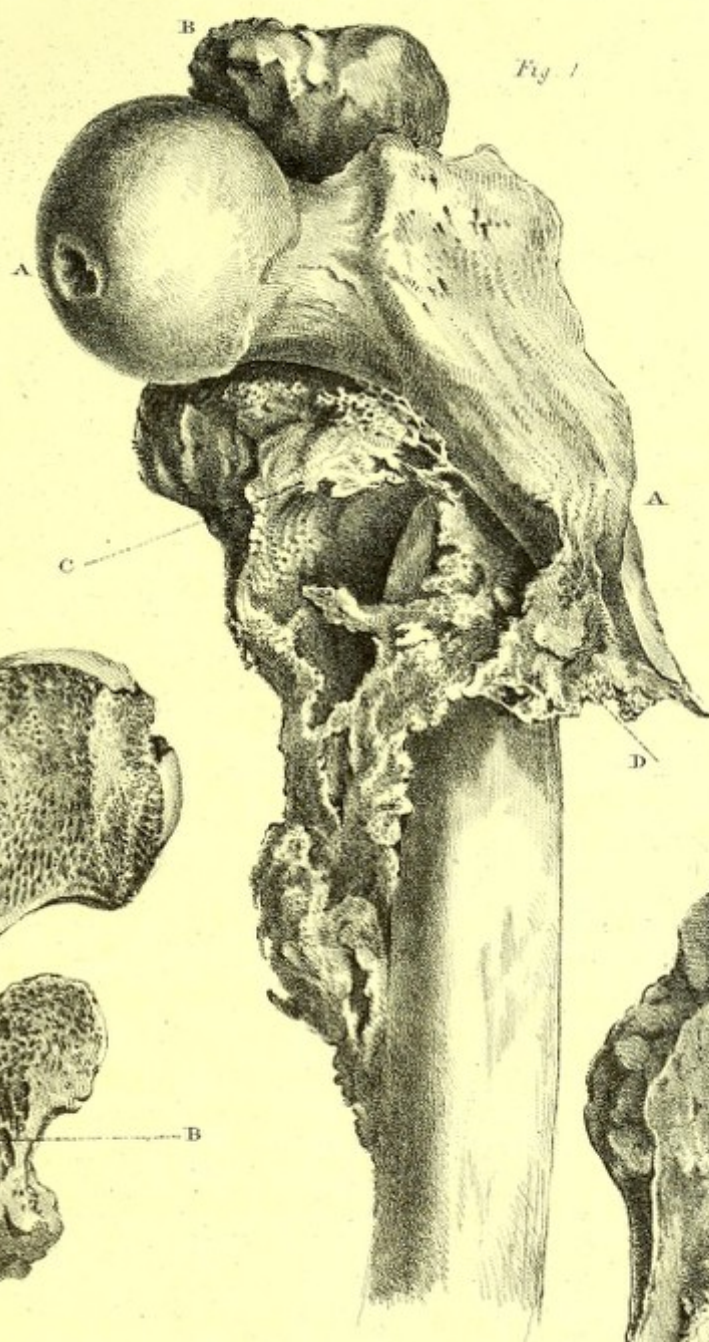
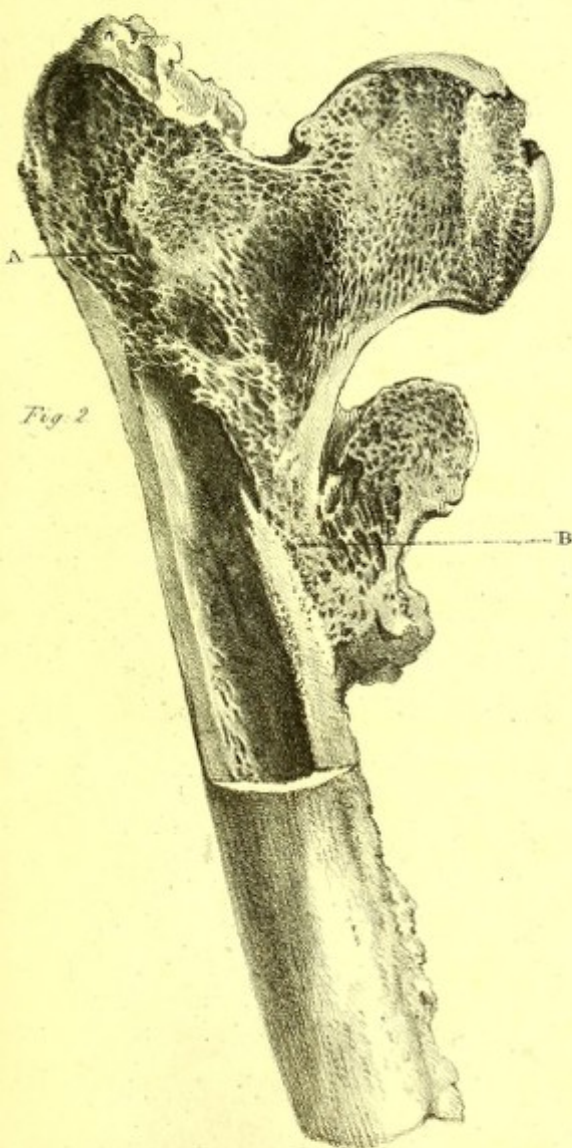
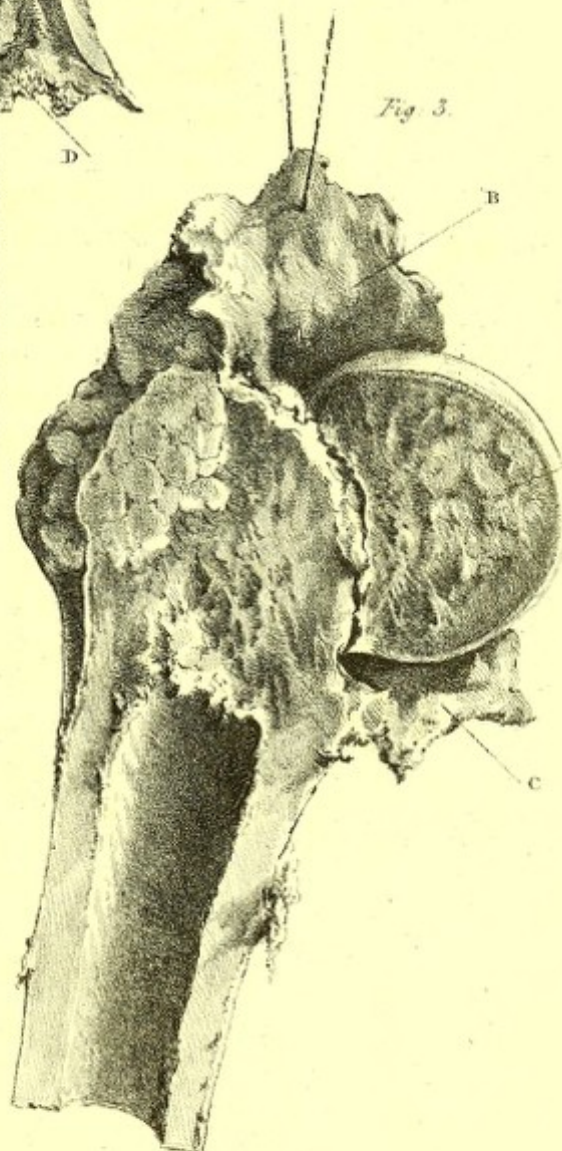


Fig. 3.



Printed by C. Ballman del.

London: Pub. by Thomas Tegg, 73, Cheapside. April 20th 1824.

A. B. The line of reunion indistinctly seen among the cancelli.

The head of the bone is depressed below the extremity, and the lesser trochanter stands out, so as to interfere with the motion of the limb.

On the outer surface of this bone is a ridge corresponding to the line of reunion A. B.

When the bone is broken in this manner at the root of the cervix, and external to the joint, there is a ready and perfect reunion by bone.

Fig. 3. An instance of the common case of fracture of the neck of the thigh bone within the capsule.

A. The head of the femur.

B. C. The capsule of the hip-joint much thickened.

This specimen very much resembles the others, where the neck of the bone has been fractured within the joint. The head and body of the femur are not united by bone, but only by a ligamentous mass. The cervix, which should intervene betwixt the head and body of the bone, is absorbed and quite gone in the space of eight weeks.

This specimen being preserved in spirits, the surface presents a different appearance from that of fig. 2, and the marrow has exuded from the cancelli. The gentleman who was sent to remove this bone from the body, cut down upon the hip of the sound limb. If he had very carefully compared the limbs, no doubt he might have discovered which had been fractured; and yet the

circumstance tends to prove, that much of the apparent shortening of the limb which had given occasion for dispute, depends on the manner in which the patient twists the pelvis to relieve the tender joint.

On the whole, there cannot be offered a finer contrast than betwixt the specimens fig. 2 and fig. 3.

Fig 2



Fig 1

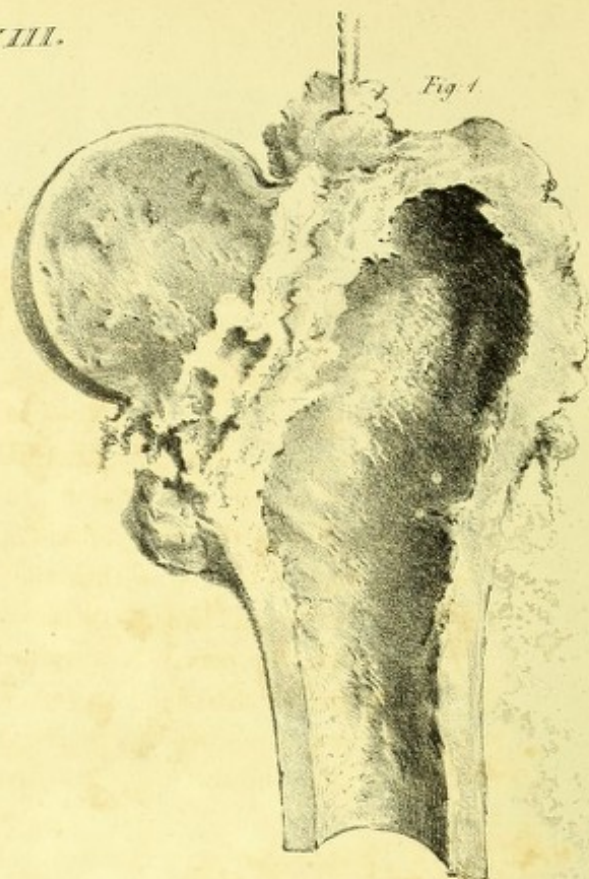


Fig 4

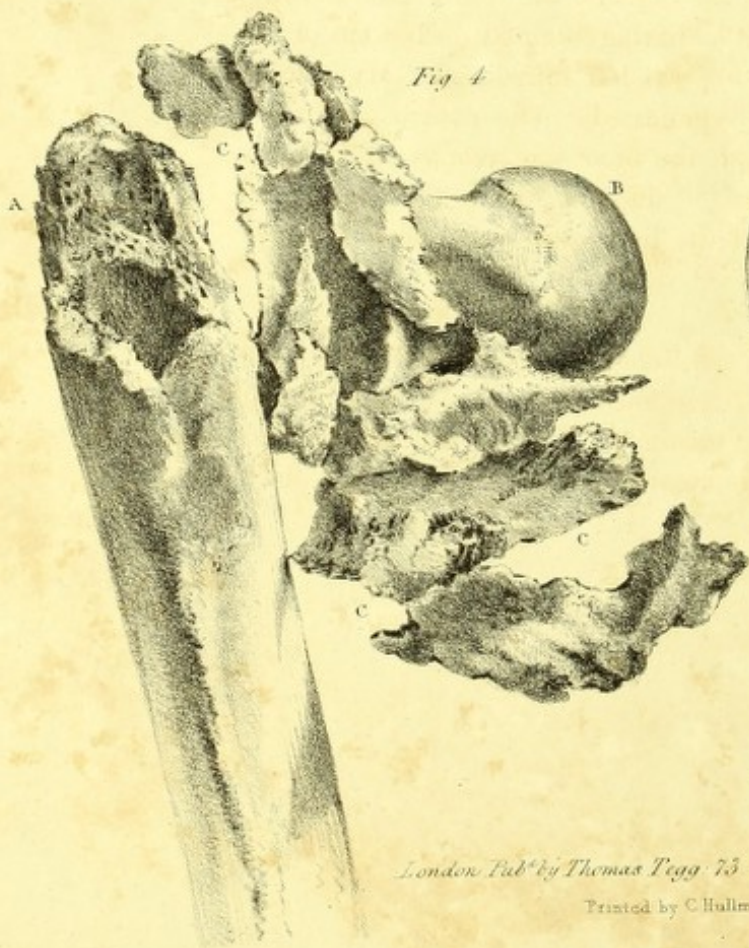


Fig 3

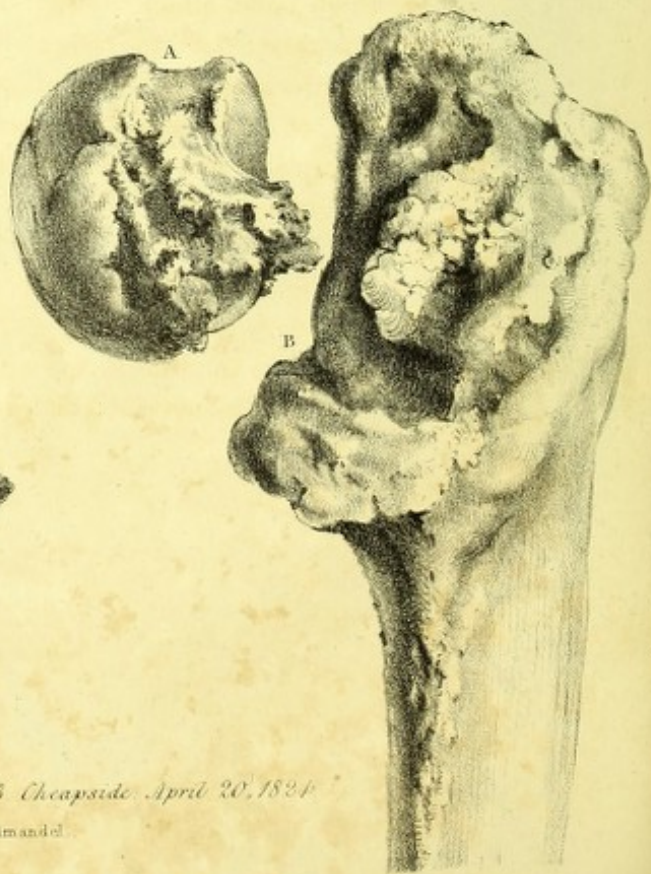


PLATE VIII.

Fig. 1. Is the view of a wet preparation of the neck of the thigh bone fractured within the joint. The patient was an old man, and lived two years after the accident. As in fig. 3, plate VII. the cervix is absorbed, the head of the bone has approached the shaft, and the trochanters touch the pelvis. There is no bony union here: a ligamentous matter attaches the head of the bone to the shaft.

This case affords an example of the difficulty of ascertaining the state of the joint after accidents. The patient was an inmate of a work-house. Some gentlemen, not well disposed towards the surgeon of the establishment, brought forward this man, and in a printed paper described him as having suffered dislocation of the thigh bone, and that the bone was left unreduced. My opinion was taken, and the surgeon vindicated. The patient died some months after this inquiry, and the proof was complete, that it was one of those common cases of fracture within the joint, with absorption and shortening of the limb—not consequent, but concomitant.

Fig. 2. This represents the head and cervix of the thigh bone altered by inflammation, and it is introduced to show how nearly, in certain conditions, the appearances resemble reunited fracture. The neck is shortened and depressed; a ridge runs round it, which

seems to point to the place of fracture and reunion. The head of the bone is flattened, and drops low, as if it had been broken down. Notwithstanding all this, those who are familiar with the objects in a large collection, will recognise only the inflamed head of the thigh bone, such as we see after hip-joint disease.

The frequent occurrence of this ridge, and the accurate resemblance of the necks of both femora, prove it to be a natural appearance, and not the effect of fracture.

Fig. 3. A dry specimen of ununited fracture of the cervix femoris.

A. The head of the bone loose, and moulded by friction and absorption.

B. The extremity of the shaft of the bone disfigured by the same process of absorption. There are deep hollows corresponding with the projections of the head of the bone; and while the cervix is quite gone, new processes of bone are formed, and especially we perceive, a shoulder shot out near B. from the lesser trochanter. This is in all the specimens, and serves to support the weight of the body, for against this the head of the bone rests.

This specimen exhibits the shortening of the bone by the absorption of the neck, and the check to the motion of the limb, by the projection of the shoulders of new bone. It also shows, that although there be no disposition to reunion, there is really no want of vascular activity in the bone.

Fig. 4. The extremity of the femur shattered to pieces.

- A. The extremity of the shaft.
- B. The head of the thigh bone.
- C. C. Nine smaller pieces of bone.

We should have imagined gun-shot only could have done this! and yet such is the effect of an old woman falling on her haunch, from tripping on the carpet, as I have witnessed very lately, in a lady of eighty-six.

These pieces of bone were taken from the body of an old woman, who was knocked down by a coach. She died before ossific union could have begun. The extremity of the bone A. projected towards the groin, and was felt during the patient's lifetime, and was mistaken for the head of the bone.

A question very lately arose in similar circumstances. A man fell from a scaffold which was raised about twelve feet from the ground. The parts about the hip were much injured. After he had been for some months under the care of a surgeon, he was still unable to walk, and the leg was shortened. Other surgeons examined, and they declared it a dislocation unreduced. But the circumstance of the trochanter major being in its place, and nearly in its natural state, with the shortening of the limb, and the projection in the groin moving with the motion of the thigh, justified the opinion, that there was no blame on the part of the surgeon—that it was not dislocation but fracture; and that the shaft of the femur had been drawn forward by the *psoas* and *iliacus internus* muscles remaining attached to the lesser trochanter.

PLATE IX.

Fig. 1. A sketch of the thigh of an old woman, who had fractured the neck of the thigh bone.

Fig. 2. A sketch of the limb of a young man, who had dislocated the thigh bone at the hip.

These sketches were taken as the patients lay in bed: they are not imaginary, but were drawn in the case-book of the hospital as we went round. I have somewhere seen a long-legged family engraved, to which these, I hope, bear but a faint resemblance.

In the sketch from the old woman, we see the heel of the injured side lying opposite to the ankle bone of the other leg. We see the leg turned out. We next perceive a fulness and elevation of the hip; and on attending strictly to the position, we are convinced that the limb is shorter, and turned out, and moveable, though not without pain.

On turning to the second figure, we see more stiffness and rigidity of the limb. It is shorter, but the toes and patella are turned in. The hip is full and the muscles rigid, and the bone appears locked in comparison with that of fig. 1. You can elongate the limb of fig. 1; you cannot stretch the limb of fig. 2, without more force. You can twist the former, but in rotating the latter you feel the head of the bone strike upon the dorsum of the ilium.

CONCLUSION.

I have made this selection from the specimens of injuries of the spine, in order to illustrate the subject of the first lecture. When to these are added the specimens of distorted spine, published this season by Mr. Shaw; and when the other specimens, which are arranged under the head of diseases of the vertebræ, are also taken into account, it will perhaps be acknowledged that no private collection equals mine, for the number of instances and vouchers in support of opinion. Every question connected with the surgery of the thigh bone can be illustrated without going out of my museum, where there are thirty-seven examples of fracture of the body of the femur, independent of those of the neck; all these have been collected under the impulse given by my brother's impressive lessons on the importance of facts. I hope what I have delivered will convey to my hearers the same sentiments, and have with them a similar effect: teaching them to mistrust every thing but anatomical proof.

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