Surgical essays / by Astley Cooper and Benjamin Travers.

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SURGICAL ESSAYS.

BY

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It was intended that an Essay, which Mr. Travers had prepared for this Volume, should have succeeded Mr. Cooper's; but on account of the length of the Paper on Dislocations, and of that contributed by Mr. Travers, it has been judged better to reserve it for a Third Part, which will appear in the course of a few Months, and two short Essays of Mr. Cooper's have been substituted for that of Mr. Travers.

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CASES

OF

DISLOCATIONS

OF THE

THIGH-BONE.

By Mr. ASTLEY COOPER.

IT is a curious circumstance, and one of which I was informed by Mr. Cline, that Mr. Samuel Sharpe, who was Surgeon to Guy's Hospital, and had a large share of practice in this metropolis, did not believe that a dislocation of the thigh-bone ever occurred.

This want of knowledge in a very excellent surgeon, for the time at which he lived, can only be imputed to the few opportunities which then offered of pursuing morbid anatomy, for he must frequently have seen the accident in the living subject, but never having examined it in the dead, was led to believe that the appearances of dislocation had arisen from some other cause.

Since the publication of my former essay on Dislocations of the Thigh, the following cases of this accident have occurred within my know-

ledge, the circumstances of which I shall shortly detail from my notes, before I proceed to consider the other objects of this essay.

CASE I.

Dislocation of the left Femur on the Dorsum Ilii.

James Ivory, aged 71, of Pottensend, Herts, on the 7th of February, 1810, whilst working in a clay-pit about twenty-five feet below the surface of the earth, had a large quantity of clay fall in upon him, while he was in the act of stooping with his left knee bent rather behind the other, and he was in this situation buried under the earth. He was however soon removed from his perilous situation, and, being carried home, a surgeon was immediately sent for, who, aware of the accident being a dislocation, directly employed some men to extend the limb, whilst he attempted to push the head of the bone into the acetabulum; but all his efforts were unavailing, as unfortunately for the patient pullies were not employed. The appearances of the limb at present, and it is now nine years from the accident, are these; the limb is three inches and a half shorter than the other, and the patient is obliged to wear a shoe having an additional sole of three inches on that side, which lessens, though it does not prevent, his halt in walking; when he stands, the foot of the injured limb rests upon the other; the toes are turned inwards, and the knee, which is advanced upon the other, is also inverted, and rests upon the side of the patella of the sound limb

and upon the vastus internus ; it is also bent, and cannot be completely extended. The thigh, from the unemployed state of several of the muscles, is very much wasted; but the semitendinosus, semimembranosus and biceps, owing to the shortened state of the limb, form a considerable rounded projection on the back part of the thigh. The trochanter major is seven-eighths of an inch nearer to the spine of the ileum on the injured side than on the other. On viewing him behind, the trochanter is seen to project on the injured side much further than on the other; the situation of the head of the bone on the dorsum ilii is easily perceived, and when the limb is rotated inwards it is still more obvious. The spinous processes of the ilia are of an equal height. When sitting, the foot is turned very much inwards, and the knee is placed behind the other, whilst the toe only reaches the ground. When fatigued he experiences pain in the opposite hip, and in the thigh of the injured limb. This unfortunate man has an arduous task to gain his bread by his labour, as he cannot stoop but with the greatest difficulty, and is therefore obliged to seek those employments which least require that position. When he attempts to take any thing from the ground he bends the knee of the injured limb at right angles with the thigh, and throws it far back. He can now stand for a few seconds upon the dislocated limb, but it was twelve months before he could do so. When in bed it is painful to him to lie on the injured side. His hip is, without any apparent cause, much weaker at some times than at others. When sitting down to evacuate

his fæces, he is obliged to support himself by resting the injured knee against the tendo achillis of the other leg, placing his right hand on the ground. He now walks with two sticks; at first he employed crutches, and these he used for twelve months, when he was enabled to trust to one crutch and a stick, until his limb acquired greater strength. In getting over a stile, he raises the injured leg on two steps, and then turns over the sound limb; but this he cannot accomplish when the steps are far apart, and he is frequently obliged either to turn back or to take a circuitous route. When lying with his face downwards, the dislocated hip projects very much upwards. He sometimes falls in walking, and would very frequently do so, but that he takes excessive care, as the least push against him throws him down. The knee being bent, part of the shortening of the limb depends upon that circumstance. I give this case to shew the evil that results from a dislocation of the hip remaining unreduced; and it proves that dislocation of the thigh may occur in a strong healthy man after he has arrived at the age of sixty.

CASE II.

Dislocation of the Right Thigh in the Foramen Ovale.

A gentleman was thrown from his horse on the 4th of January, 1818. The accident was occasioned by the animal suddenly starting to the right side, and endeavouring to keep his

seat by the pressure of the right thigh against the saddle, he was thrown, and from the fall received a severe contusion upon his head, which produced alarming symptoms; on the following day it was observed that the right thigh was useless, and that the knee was raised and could not be brought into a straight line with the other, having at the same time a direction outwards, rendering it necessary to tie it to the other knee; the symptoms of injury to the head precluded, at this time, the possibility of an attempt at reduction. In fourteen days he was so far recovered as to enable him to sit up, and in a month he began to walk with crutches. On November 1st, 1818, I first saw him, and the appearances of the injured limb then were as follows. The thigh was longer than the other by the length of the patella; the knee was advanced, and when in the recumbent posture, the injured leg could not be drawn down to the same length with the other. The upper part of the thigh-bone was thrown downwards, so as to render the hollow of the groin on the injured side deeper than the other. The toes were rather everted, but were capable of resting on the ground when the body was erect, though the heel could not. The head of the bone could not be felt, and the trochanter was much less prominent than usual; when the upper part of the thigh-bone was pressed against the acetabulum, and moved, there was a sensation of cartilaginous rubbing, which, although not easily described, is readily distinguished from the crepitus occasioned by a fractured bone. When sitting, the injured leg was two inches longer than the other; and to that degree

the knee was projected beyond the sound one. In progression the knee was bent, and the body being thrown forwards, he rested chiefly upon his toe, and halted exceedingly in walking. The sartorius and gracilis muscles were very much put upon the stretch. At first he suffered much from pain in the dislocated hip and thigh, but is now free from pain unless he attempts to stand on that limb only; his toe at first was with difficulty brought to the ground, but he is now improved in walking, for when he first made trial with the assistance of a crutch and stick he could not exceed half a mile, but is now capable of walking two miles. In flexion his thigh admits of considerable motion, but he cannot extend it further than to bring the ham to the plane of the other patella. The knees cannot be brought together, but he advances one before the other in the attempt; he can sit without pain, but the jolting of a carriage hurts him exceedingly; and the attempt to sit on horseback produces excessive suffering. He cannot straighten his leg when his body is erect, nor can he stoop to tie his shoe on the injured side. Pain is produced by resting on that hip in bed. No attempt was made to reduce the limb; the injury to the head might have rendered it dangerous in the commencement; and at the time I saw him there was no chance of success.

CASE III.

Dislocation on the Dorsum Ilii.

Mary Bailey, aged seven years, was admitted into Guy's Hospital June 16, 1819, under the

care of Mr. Astley Cooper, for a dislocation of the os femoris upwards on the dorsum ilii. This accident was occasioned by the child swinging on the shaft of a cart, which being insecurely propt, suddenly gave way, and she fell to the ground upon her side. The nature of the accident was exceedingly evident; the limb on the dislocated side was at least two inches shorter than the other; the toe rested on the tarsus of the opposite foot, and was turned inwards; the knee was also inverted, and rested on the other. The child was admitted into the hospital at half past five in the afternoon, the accident having happened a little more than half an hour. Where so little resistance was expected the pullies appeared unnecessary, and towels were substituted, one being applied above the knee and the other between the pudendum and thigh, then bending the knee and bringing the thigh across the other just above the knee, gradual extension was made, and in about four minutes the head of the bone suddenly snapt into its socket. On the seventh day the child was walking in her ward, and suffered little inconvenience.

To Mr. Daniel, one of Mr. Lucas's dressers, I am obliged for the foregoing particulars; he having reduced the limb in the presence of many of the students.

CASE IV.

Dislocation of the Head of the Thigh-bone into the Ischiatic Notch.

John Cockburn, a strong muscular man, aged

33, was admitted into Guy's Hospital on the 31st of July, 1819. While carrying a bag of sand at Hastings on the 24th of June, he slipped and dislocated the left hip-joint, and the following is the account he gives of the accident; that the foot on the affected side was plunged suddenly into a hollow in the road, which turned his knee inwards, when his body fell with violence forwards. Two attempts were made to reduce the dislocation by pullies on the day of the accident, which did not succeed, and it was consequently repeated on the 27th of June, which was also unsuccessful, although it was continued each time nearly an hour. He was directed to Guy's Hospital by Mr. Stewart, surgeon at Hastings. It was found upon examination, after he had been admitted, that the thigh was dislocated backwards into the ischiatic notch, the limb was a little shortened, the knee and foot were turned inwards, and the toe rested on the ball of the great toe of the other foot; the head of the bone could not be felt, the trochanter major was opposite the acetabulum, the rim of which could be distinctly perceived. The body being fixed, the thigh could be sufficiently flexed nearly to touch the abdomen. The patient was carried into the operating theatre soon after his admission, and when two pounds of blood had been taken from him, and he had been nauseated by two grains of tartarized antimony, extension was made with the pullies in a right line with the body, and the upper part of the thigh was raised while the knee was depressed; the extension was continued at least for an hour and a half, during which time he took two grains more of tartarized antimony,

by which he was thoroughly nauseated; the attempts, however, at reduction, did not succeed. On the 3rd of August, the tenth day from the accident, Mr. Astley Cooper succeeded in reducing it in the following manner: He ordered so much blood to be taken from the arm as to produce a feeling of faintness. A table was placed in the centre between two staples, upon which the patient was laid on his right side; a girt was passed between the scrotum and the thigh, and carried over the pelvis to the staple behind him; and thus the pelvis was, as far as possible, fixed: a wetted roller was carried around the lower part of the thigh just above the knee, and a leather strap buckled on it, to which the pullies were fixed, and to a staple before the limb. The body was bent at right angles with the thigh, and it crossed the upper part of the other thigh: then the extension with the pullies was begun, and gradually increased until it became as great as the patient could bear. An assistant was then directed to get upon the table, and to carry a strong band under the upper part of the thigh, by which he lifted it from the pelvis so as to give an opportunity for the head of the bone to be turned into its socket. Mr. South, who held the leg, was directed to rotate the limb inwards, and the bone, in thirteen minutes, was heard to snap suddenly and violently into its socket.

JAMES CHAPMAN,

Dresser at Guy's Hospital, to whom I am indebted for the foregoing statement.

I believe, in this case, I should not have succeeded, but from attention to two circumstances; first, I observed that the pelvis advanced within the strap which was employed to confine it, so that the thigh did not remain at right angles; and I was obliged to bend the body forwards to preserve the right angle during extension; and secondly, the extension might have been continued for any length of time, yet the limb would never have been reduced but by the rotation of the head of the thigh-bone towards the acetabulum.

CASE V.

Dislocation of the Thigh Bone into the Ischiatic Notch.

DEAR SIR,

William Dawson, aged 34, on the 15th of August, 1818, while spending his harvest-home with several of his companions, became quarrelsome with one of them, who threw him down, and trod upon him. Upon extricating himself and endeavouring to rise, he found some serious injury to his right thigh rendering him incapable of standing; and in this state he was dragged by his associates, for many hundred yards, into a stable, where he lay till the next morning. I then saw him lying upon a mattress, with the hip and thigh, on the right side, prodigiously swollen and painful; and I was particularly struck with the appearances of the knee and foot on the same side, which were very much turned inwards, but the limb was scarcely short-

ened. I ordered him to be carefully conveyed home upon a shutter supported by six men, a distance of about half a mile. From the immense swelling and general enlargement of the whole of the thigh, and of the soft parts around the pelvis, it was impossible to ascertain exactly the state of the injury; but it was fully impressed upon my mind, that there was some unusual dislocation of the head of the thigh-bone. He was accordingly ordered immediately to lose blood both by general and topical means, with emollient poultices to the whole of the swollen parts; brisk purgatives were also administered, succeeded by saline medicines, and a quiet position enjoined for eleven days; by which time the swelling began somewhat to subside. Still the precise nature of the injury was not satisfactorily evident: but it was thought by Mr. Nunn of Colchester, and Mr. Travis of East Bergholt, who had kindly come over to witness it, that there was a luxation. The only difficulty we had to reconcile this to ourselves, was the belief, in our minds, that no author had noticed this accident to have taken place without an alteration in the length of the limb, except it might be Mr. Astley Cooper, in his new publication, which we neither of us had yet seen. We accordingly had recourse to a minute examination of the skeleton; when we immediately fancied we could account for this sort of luxation not being attended with the usual marked signs of displacement of the head of the bone, excepting the knee and foot being turned inwards; for we noticed, that if the head of the bone be luxated sideways into the ischiatic

notch, it would produce scarcely any difference in the length of the limb. Trusting that a little further delay might not be attended with any material disadvantage, but give a chance for the entire subsidence of all inflammation and swelling, we proposed meeting again as soon as we conveniently could, by which time we might consult Mr. Cooper's book. On Sunday the 30th of August we accordingly met, which was fifteen days after the accident, and from the complete removal of all swelling the whole of the femoral bone was satisfactorily traced to its rounded head, which was lodged in the ischiatic notch. Upon referring to the essays which we had now before us, we had the case delineated and described; and as it was exhibited in a plate, we had only to imitate, in order to accomplish the reduction of the bone. In the presence of two or three other medical gentlemen who had now joined us, we commenced the operation; and as it would be unnecessary to state every particular, after the manner in which the position of the patient, the fixing of the pullies and towels, are demonstrated by this publication; suffice it for me to remark, that, after ten or twelve minutes' gradual extension, the reduction of the bone was most readily and admirably accomplished.

Preparatory to commencing the operation, we took thirty ounces of blood from the arm *ad deliquium,* and afterwards, while fixing the pullies, &c. we gave four grains of tartarized antimony, at intervals, to produce nausea.—Immediately after the operation we gave one grain of opium, applied sedative lotions to the parts,

and proceeding carefully for about a fortnight, the patient was enabled to move about upon crutches, and was shortly after sent home perfectly well.

I am,

JOHN ROGERS.

Manningtree,
August 15th, 1818.

REMARK.

The relation of the foregoing case, from the kind manner in which Mr. Rogers has expressed himself, may savour a little of vanity; but I shall readily suffer this imputation, as my greatest gratification will ever be to find that my humble endeavours may in the slightest degree have conduced to the advantage of my professional brethren, or to the benefit of those who may be placed under their care.

The dislocation in the ischiatic notch has been, as far as I know, in every author who has written on the subject, incorrectly described: for it had been stated, that the limb was lengthened in this accident; and I need scarcely mention the mischiefs in practice from so mistaken an opinion; but one I here must give. A gentleman wrote to me from the country, in these words: "I have a case under my care of injury to the hip; and I should suppose it a dislocation into the ischiatic notch, but that the limb is shorter instead of being longer as authors state it to be:" this error must have arisen from their having examined a pelvis separated from the skeleton, and observed that the ischiatic notch

was below the level of the acetabulum when the pelvis was horizontal—although it is above the acetabulum in the natural oblique position of the pelvis, at least as regards the horizontal axis of the two cavities. It is to be remembered that there is no such accident as a dislocation of the hip downwards and backwards.

CASE VI.

Dislocation on the Dorsum Ilii.

MY DEAR SIR,

William Sharpe, an athletic young man, in wrestling received a fall, his antagonist falling with and upon him, their legs being so entangled that he cannot say how he came to the ground. He complained of great pain in the hip, and was incapable of rising. About twenty minutes after the accident I found him lying on his belly in the field where it had occurred, and the left limb in a trifling state of abduction, shortened, and the knee and foot turned inwards, the prominency of the trochanter gone, and the head of the bone obscurely felt on the dorsum ilii. He was conveyed home, and, in order to reduce the dislocation, for such I considered it, I placed the man on his right side diagonally across a four-post bedstead. The centre of a large sheet rolled up was placed at its extremities, passing in front and behind the body, and fastened to the upper bed-post, as low as possible. The centre of a napkin, rolled in like manner, was then applied upon the dorsum ilii, between its crista and the dislocated bone; and

each extremity being brought under the sheet (forwards and backwards) was reflected over it and tied in the centre, by which means I thought to keep the pelvis secure; the counter-extending force was applied above the ancle (it appearing to me to interfere less with the muscles upon the thigh:) first, rolling round a wetted towel, and then, placing upon this the end of a long or jack-towel: three men were now directed to pull gradually and steadily; and when I perceived the head of the femur was brought down to the edge of the acetabulum, I raised it a little with my clasped hands placed under the upper part of the thigh, and immediately the head of the bone entered the cotyloide cavity with a smart snapping noise. The man had considerable pain about the hip and knee for some time, but is now quite well.

I am, Dear Sir,

Yours, truly,

HENRY OLDNOW.

Nottingham,
August 8th, 1819.

CASE VII.

Dislocation of the Ischiatic Notch.

Mr. Wickham, jun. of Winchester, had the kindness to inform me of a case of this dislocation which had been admitted into the Winchester Hospital, under the care of Mr. Mayo, one of the surgeons of that institution, whose permission I have to state the following circumstances.

John Norgott, aged 40, was brought to the hospital on 27th December, 1817, from the neighbourhood of Alton; twelve days had elapsed since the accident happened, without his being aware of the nature of the injury. He reported that his horse had fallen with him and on him, so that one leg was under the horse, whilst his body was in a half-bent position, leaning against a bank; he was of middle stature, but very muscular; the leg was but very inconsiderably shorter than the other, and but little advancing over it; in fact, the immobility of the limb was the chief criterion of the dislocation; for the head of the bone was thrown into the ischiatic notch. The mode of reduction was simple: Mr. Mayo had the limb extended by the pullies, so as to bring the head of the bone to the edge of the acetabulum, and then tilted over it by a towel fastened round the patient's thigh, and neck of an assistant. The man remained three or four weeks before he was allowed to leave the house; but on the 4th of February he was discharged, cured.

Winchester,
August 10, 1819.

CASE VIII.

Mr. Mayo also mentions the case of William Hendy, who came into the hospital in August 1812: the dislocation had taken place seven weeks before, and was reduced the day after his admission; he was discharged, cured, on the 18th of November. This was a dislocation on the dorsum ilii.

CASE IX.

Of Dislocation on the Dorsum Ilii.

Happening to be in Chester in September, 1818, I walked through the wards of the neat, and apparently, to me, excellently conducted infirmary of that city. Mr. Bagnall, surgeon in Chester, mentioned to me a case of dislocation of the thigh upon the dorsum of the ilium, which I immediately proceeded to examine. The man's name was John Chesers, and he had been admitted under the care of Mr. Rowlands; the bone was dislocated upwards, the affected thigh was shorter than its fellow, the knee was inclined inwards and forwards, and the foot pointed inwards; every attempt to rotate the foot outwards was productive of considerable pain at the hip. When I had concluded my examination of this case, I was informed by Mr. Bagnall, that a man had been admitted two months before under the care of Mr. Bennett, one of the surgeons of the infirmary, with a dislocation of the thigh; and having requested of Mr. Bennett the particulars of this accident, he was so kind as to send me the following account.

CASE X.

Dislocation on the Dorsum Ilii.

John Forster, aged 22 years, was admitted into the Chester Infirmary July 10th, 1818, with a dislocation of the thigh on the dorsum ilii,

occasioned by a cart passing over the pelvis. Upon examination I found the leg shorter than the other, and the knee and foot turned inwards. The patient being firmly confined upon a table, I extended the limb by pullies for fifty minutes without success, and he was returned to bed for three hours; after which he was put in the warm bath for twenty minutes, and the extension was repeated for fifteen minutes unsuccessfully; I therefore took twenty-four ounces of blood from him, and gave him forty drops of tinct. opii, continuing the extension, but not succeeding in producing faintness, I gave small doses of a solution of tartrite of antimony, which in a quarter of an hour produced nausea; in ten minutes afterwards I succeeded in reducing the limb, and in less than a fortnight he left the infirmary quite well.—Unfortunately, he began to work hard immediately, and brought on an inflammation in the hip, of which he has not recovered.

S. R. BENNETT.

Chester.

CASE XI.

Dislocation on the Dorsum Ilii.

Mr. Tripe, surgeon at Plymouth, has sent to the Medico-Chirurgical Society, an account of a case of dislocation of the thigh-bone on the dorsum ilii, which had happened seven weeks and one day prior to his making an extension to reduce it, by which he was so fortunate as to succeed in restoring the bone to its natural situation.

It appears then, by these examples, that in eleven cases, seven were dislocated upon the dorsum ilii; three in the ischiatic notch; and one in the foramen ovale.

It is really highly gratifying to observe the difference of knowledge in the Profession at the present period when compared with that of fifty years ago. What should we think of a surgeon in the metropolis, in the present day, with all his opportunities of seeing disease in the large hospitals of this town, who doubted the existence of a dislocation of the thigh, when we find our provincial surgeons immediately detect the nature of these injuries, and directly succeed in their attempts to reduce them. Let them never forget, however, that it is to their knowledge of anatomy that they are indebted for this superiority, and, more especially, to morbid anatomy.

In my former essay I endeavoured to describe the different situations into which the thigh-bone is thrown in the dislocations of the hip-joint, and the various appearances which these luxations produce; at the same time pointing out what I have found to be the best means for their reduction. It was then my intention to have described the dislocations of the knee-joint, but, upon more consideration, I thought it better to continue the account of the injuries incident to the upper part of the thigh-bone, before I entered into a description of those of other joints, because it would give me an opportunity of directly contrasting the symptoms which such fractures produce, with the distin-

Contrasted with dislocation.

guishing marks of dislocation, and thus enable the young surgeon readily to discriminate the one accident from the other. It must be confessed that there is some difficulty in distinguishing the fractures of the hip-joint from its luxations, and that much difference of opinion subsists as to the process nature employs in the restoration of these fractures; for whilst one surgeon maintains that all attempts to cure them are unavailing, another asserts that they admit of union like fractures of other bones of the body. I shall therefore proceed to state what has occurred to me upon these points, both from my observation on persons suffering under this accident, and my examination of those after death, in whom this accident had happened, as well as the effects which are produced by breaking the upper part of the thigh-bone, in experiments on inferior animals.

Difference of opinion.

ON

FRACTURES OF THE NECK OF THE THIGH-BONE.

Such accidents are more frequent than dislocations of the os femoris, which is evinced by the comparative number we admit into our hospitals, being seldom without an example of the fractured neck of the thigh-bone, whilst the cases of dislocation upon the average do not exceed one in a year.

Comparative frequency of the two accidents.

The fracture of the neck of the thigh-bone is of two kinds: first, that in which the bone

Fracture of two kinds,

is broken transversely through the cervix within the capsular ligament; and secondly, when it is fractured externally to the ligament, either through the root of the cervix or through the trochanter major; the former of these may be called the internal, and the latter the external fracture, as regards the relative situation of the bone with respect to the capsular ligament.

internal and external.

Of the Fracture of the Neck of the Bone within the Capsular Ligament.

The appearances which are produced by this fracture are as follow: the leg becomes from one to two inches shorter than the other, for the junction of the trochanter major being destroyed by the fracture, the trochanter is drawn up by the muscles, and carries with it the neck of the bone as high as the ligament will permit, and consequently the trochanter rests upon the edge of the acetabulum and upon the ileum above it. This difference in the length of the limbs is best observed by desiring the patient to place himself in the recumbent posture on his back, when, by comparing the malleoli, it will be found that one leg is from one to two inches shorter than the other; but the retraction thus produced is easily removed, by drawing down the shortened limb, when it will appear of the same length with the other; but immediately this extension is removed, the action of the muscles quickly forces it into its former position; and this appearance may be

Diagnostic marks of fracture within the ligament.

Length.

repeatedly produced by extending the limb. This evidence of the nature of the accident continues until the muscles acquire a fixed contraction, which enables them to resist any extension which is not of the most powerful kind. Another circumstance which marks the nature of this injury, is the foot and knee being turned outwards; and this state depends upon the numerous and strong rotatory muscles of the hip-joint, which proceed from the pelvis to be inserted into the thigh-bone, and to which, very feeble antagonists are provided, a part of the glutæus medius and minimus, the obturatores, the pyriformis, the gemini and quadratus, the pectinalis and triceps all assist in rolling the thigh-bone outwards, whilst a part of the glutæus medius and minimus, and the tensor vagina femoris are the agents of the rotation inwards. It has been denied that the muscles are the cause by which this eversion is produced, and it has been attributed to the mere weight of the limb; but any one may satisfy himself that it is in part owing to the muscles, by feeling the resistance which is made to an attempt at rotation inwards of the neck of the bone. This difficulty is also in some measure attributable to the length of the cervix femoris, which remains attached to the trochanter major, because in proportion to its length, by resting against the ileum it is prevented turning inwards. Directly the bedclothes are removed, two circumstances strongly arrest the attention of the surgeon, namely, the diminished length of the injured limb, and the eversion of the foot and knee. In the dis-

Foot turned outwards.

location upwards, the head and neck of the bone prevents the trochanter from being drawn backwards, whilst the broken and shortened neck of the thigh-bone in the fracture of this part readily admits it, and hence the reason why the foot is inverted in the one case and everted in the other.

Three or four hours must elapse before this appearance is in its most decisive state, as the muscles require some time to retract, and this is the reason that the accident has been mistaken for dislocation. The surgeon having been called directly after the accident had happened, and before the muscles had acquired that fixed state of contraction they afterwards possess, he is led to mistake the nature of the injury; and from this cause patients, even in hospital practice, have been exposed to painful and useless extensions.

Degree of pain.

The patient, when perfectly at rest in the horizontal posture, suffers but little, but any attempt at rotation is painful, and more especially the rotation inwards, because the broken extremity of the bone then rubs against the lining of the capsular ligament, upon which it is drawn by the action of the muscles. The pain which is felt in this accident is in the upper and inner part of the thigh, opposite the insertion of the iliacus and psoas muscles, into the trochanter minor, or sometimes just below this point. The perfect extension of the limb may be easily effected, but flexion is more difficult and somewhat painful, and its degree depends upon the direction in which the bone is

Degree of motion.

bent, for if the flexion be outwards, it is accomplished with ease and but little suffering; but if it be attempted by directing the thigh towards the pubes, the act of bending the limb is with difficulty accomplished, and is attended with very severe suffering, but it is easier or more difficult in proportion as the neck of the bone be shorter or longer.

Subduction of the trochanter.

In this accident the trochanter major is drawn upwards towards the ileum, but the broken neck of the bone attached to the trochanter is placed nearer the spine of the ileum than the trochanter itself, and in this situation it afterwards remains; by which alteration of position the trochanter projects less on the injured side, because it is no longer supported by the neck of the bone as in its natural state, but rests in close apposition to the ileum.

Appearances in the erect position.

In order to form a still more decided judgment of this accident, after the patient has been examined in the recumbent posture, let him be directed to stand by his bed-side, supported by an assistant, so as to bear his weight upon the sound limb; immediately he does this, the surgeon observes most distinctly the shortened state of the injured leg, from the toes resting on the ground but the heel not reaching it, the everted foot and knee, and the diminished prominence of the hip; then ordering the patient to bear upon the injured limb, he finds himself incapable of doing it but with considerable pain, which seems to be produced by the psoas and iliacus muscles being put upon the stretch in the attempt, as well as by the pressure of

the broken neck of the bone against the capsular ligament*.

A crepitus, like that which accompanies other fractures, might be expected to occur in these accidents, but that is not the case when the patient is resting on his back with the limb shortened; but if the leg be drawn down, so as to bring the limbs to the same length, the crepitus is sometimes observed by the broken ends of the bone being thus brought into contact; but the rotation inwards most easily detects it. When the patient is standing upon the sound limb, with the injured unsupported, by rotating it inwards the crepitus will sometimes be perceived. Crepitus.

To the circumstances I have already mentioned, as strongly characterizing this accident, must be added the period of life at which it usually occurs, for the fracture of the neck of the thigh-bone within the capsular ligament seldom happens but at an advanced period of life. Old age, however, is a very indefinite term; for in some it is as strongly marked at sixty as in others at eighty. That regular decay of nature which is called old age, is attended with changes that are easily detected in the dead body; and one of the principal of these is found in the bones, for they become thin in their shell, and spongy in their texture. Age. Changes in age in the bones.

The process of absorption and deposition differ at different periods of life; in youth the arteries, which are the builders of the body,

* The greater or less projection of the trochanter, however, will depend upon the length of the fractured cervix femoris.

deposit more than the absorbents remove, and hence is derived the great source of the growth of the body. In the middle period of life the arteries and absorbents so nearly preserve an equilibrium of action, that with a due portion of exercise the body remains in a stationary state, while in old age the balance is destroyed by the arteries doing less than the absorbents, and hence the person becomes diminished in weight, more from a diminution of arterial action than from an increase of the absorbent.

This is well seen in the natural changes of the bones, their increase in youth, their bulk, weight, and little comparative change during the adult period, and the lightness and softness they acquire in the more advanced stages of life; this is so obvious, that the bones of old persons may be cut with a pen-knife, which is capable of making no impression on them at the adult period. Even the neck of the thigh-bone in old persons is sometimes undergoing an interstitial absorption, by which it becomes shortened, altered in its angle with the shaft of the bone, and so changed in its form as to give an idea, upon a superficial view, of its having been the subject of fracture; but it requires very little knowledge of anatomy to distinguish in the skeleton the bone of advanced age from that of the middle period of life.

Slight causes of this fracture.

This state of bone favours much the production of fractures, and the slightest causes will often produce them in old age. In London the most frequent source of this accident is from a person, when walking on the edge of the elevated footpath, slipping upon the carriage pave-

ment; and though a distance but of a few inches, from occurring so suddenly and unexpectedly, it produces a fracture of the neck of the thigh-bone. I was informed by a person who had sustained a fracture of this kind, that being at her counter, and suddenly turning to a drawer behind her, some projection in the floor caught her foot, and preventing its turning with the body, the neck of the thigh-bone was fractured. A frequent cause of this accident is, however, a fall upon the trochanter major; but I have dwelt particularly on the slight causes which produce it, that the young surgeon may be upon his guard respecting it, as he might otherwise believe that so important an injury could scarcely be the result of so slight an accident, and that excessive violence was necessary to break the neck of the thigh-bone: such an opinion is as liable to be injurious to his reputation, as that of confounding this accident with dislocation.

It very rarely occurs under fifty years of age; and dislocation seldom at a more advanced period, although there are exceptions to this rule: for I have myself once seen this fracture at thirty-eight years of age, and a dislocation of the thigh at sixty-two; but between fifty and eighty is the most common period: for, from the different state of the bone, the same violence which would produce dislocation in the adult occasions fracture in age. But when dislocation does occur between sixty and seventy years, it is in persons whose constitutions are particularly strong, and in whom age has not produced those changes in their bones which I have already endeavoured to point out.

Union of this fracture.

Much difference of opinion has existed upon the subject of the union of the fractured neck of the thigh-bone; it has been asserted, that these fractures unite like those of other parts of the body; but the dissections which I made in early life, and the opportunities I have since had of confirming these observations, have convinced me that the transverse fracture of the cervix femoris within the capsular ligament, does not unite by bone, a circumstance which I have always taught in my lectures; this is a most essential point, as the reputation of the surgeon hinges upon it. I was called to a case of this fracture, in which the medical attendant had been promising, week after week, an union of the fracture, and the restoration to the patient of a sound and useful limb. After many weeks the person became anxious for further advice; I did all in my power to lessen the nature of the mistake this gentleman had made, by telling the patient she would probably ultimately walk, although with some lameness; and taking the surgeon into another room, asked him upon what grounds he was led to suppose there would be union; to which he replied, he was not aware but the fracture of the neck of the thigh-bone would unite like those of other bones of the body; the case, however, proved unfortunate for his character, as this patient did not recover in the degree they usually do. Young medical men find it so much an easier task to speculate than to observe, that they are too apt to be pleased with some sweeping conjecture, which saves them the trouble of observing the processes of nature; and they have afterwards, when they embark in their professional practice, not

only still every thing to learn, but also to abandon those false impressions which hypothesis is ever sure to create, before they can be safely trusted.—Nothing is known in our profession by guess: and I do not believe, from the first dawn of medical science to the present moment, that a single correct idea has ever emanated from conjecture: it is right, therefore, that they who are studying their profession should be aware that there is no short road to knowledge; and that observations on the diseased living, examination of the dead, and experiments upon living animals, are the only sources of true knowledge; and that induction from these are the sole basis of legitimate theory.

In all the examinations which I have made of transverse fractures of the cervix femoris entirely within the capsular ligament, I have never met with a bony union, or of any which did not admit of motion of one bone upon the other. To deny its impossibility would be presumptuous, under all the varieties of direction, extent of fracture, and degree of violence by which it has been produced, for there is scarcely a general rule which does not admit of exception; but, all I wish to be understood to say is, that if it ever does happen, it is an extremely rare occurrence, and that I have not yet met with a single example of it*.

Having thus stated what is the common result of these cases, as regards their want of

Cause of the want of union.

* In Mr. Cross's account of his visit to the French Hospitals, some interesting matter upon this subject will be found.

union, I shall now proceed to give the reasons which may be assigned for the absence of ossific union in the transverse fracture of the neck of the thigh-bone within the capsular ligament.

Want of proper apposition.

The first reason which I should state is the want of proper apposition of the bones; for if the broken extremities be in any part of the body kept asunder, ossific union is prevented.

A boy, who had a compound fracture of the tibia, without the fibula being broken, and having the protruded end sawn off, the two extremities were prevented from coming in contact by the fibula, and union never occurred.—My friend, Mr. Smith, an excellent surgeon at Bristol, had a similar case under his care, in which a portion of the tibia had been sawn off, and the fibula remaining whole, prevented ossific union*.

* The particulars of the case were as follows:—The boy was admitted into the Bristol Infirmary for disease of the tibia; and the diseased portion not extending more than from two to three inches in length, that part of the bone was removed by the saw. In a month the limb had acquired so much firmness, that the boy was permitted to walk about the ward, which he was able to perform tolerably well, and in six weeks no doubt was entertained of ossification having taken place in the uniting substance; at this time he sickened with the small-pox, and died.—Upon examination, the edges of the extremities of the tibia were absorbed and rounded, and on the inferior portion a bony callus had formed, about three-quarters of an inch in extent; no earthy matter was discoverable in the greater part of the space originally occupied by the diseased bone, but a tough though thin ligamentous band extended from the superior to the inferior portion of the tibia. See *Medical Records and Researches.*

This fact is easily seen by experiment on other animals; I sawed seven-eighths of an inch of the radius from a rabbit, and the ends of the bones were not united to each other, but only to the ulna. In another rabbit I took out one-ninth of an inch of the radius with the same result; I also sawed off the extremity of the os calcis, and suffered it to be drawn up by the action of the gastrocnemius muscle, and it united only by ligament. See Plate.

The neck of the thigh-bone, when broken, is under similar circumstances; for, by the contraction of the muscles it is no longer in apposition with the head of the bone, and is therefore prevented uniting; but if this were the only obstacle, it would be argued that the retraction of the thigh-bone might be prevented by bandaging and extension: and the truth of this cannot be denied, although it is extremely difficult to preserve the limb in this position, as the patient in evacuating his fæces and urine, or by the slightest change of position, produces instant contraction of the limb, by calling into action those powerful muscles which pass from the pelvis to the thigh-bone.

Absence of continued pressure.

The second reason which prevents a bony union in these fractures, is the want of pressure of one bone upon the other, even where the length of the limb is preserved; and this I consider as the principal cause, and which will operate in preventing an ossific union in all cases where the capsular ligament is not torn; and in those I have had an opportunity of examining it has not been lacerated. The circumstance to which I allude, is the secretion of

a quantity of fluid into the joint; from the increased determination of blood to the capsular ligament and synovial membrane, a superabundance of serous synovia, that is, synovia much less mucilaginous than usual, distends the ligament, and entirely prevents the contact of the bones, by pushing the upper end of the body of the thigh-bone from the acetabulum. After a time, this fluid becomes absorbed, but not until the inflammatory process has ceased, and ligamentous matter has been effused into the joint, from the interior of the synovial membrane. That pressure between the broken extremities of bones is necessary to their union is further shewn by the following circumstances. If two broken bones overlap each other, on that side on which they are pressed together, there is an abundant ossific deposit; but on the opposite side where there is no pressure, scarcely any change is observed. So also we find if the ends of the bone be drawn from each other by the action of muscles, as sometimes happens in the fractures of the Os Femoris, Tibia, Os Humeri, Radius et Ulna, that union is not effected until the surgeon, by a strong leather bandage tightly buckled around the limb, compels the bones to press upon each other, and thus support the necessary inflammation for the production of ossific union. When a fracture occurs amidst muscles, those which are inserted into the fractured part of the bone have generally a tendency to keep the extremities of the bones together, with some few exceptions; but when a fracture occurs in the neck of the thigh-bone, the muscles have only an influence upon one portion of

the fractured bone; and this influence serves to draw one part from the other.

Little action in the head of the bone.

The third reason which may be assigned for the want of union of this fracture, is the little action proceeding in the head of the thigh-bone when separated from its cervix, its life being solely supported by the ligamentum teres which has some few vessels ramifying from it to the head of the bone. Little effusion of cartilage takes place, and but little bone is thrown out to fill the cancelli; yet it is certain that when the patient begins to employ the limb, the one portion of bone is occasionally applied against the other, and it would therefore be expected that a greater change in the head of the bone should take place; but on account of its slight vital power, this is not found to be the fact. I must observe, however, from the same circumstances happening in fracture of the patella, that want of apposition and pressure are the principal causes of the absence of union in the fracture of the neck of the thigh-bone. But still it must be allowed that the changes which are taking place in the head of the bone, after this fracture, are less than those which occur in any other fracture in the body, excepting in that of the patella, and that they seem even to differ in kind, because, instead of the common cartilaginous effusion which always precedes the formation of bone, a large quantity of ligamentous matter is thrown out from the surface of the cancellated structure upon the head of the thigh-bone.

The appearances which are found on the dissection of these injuries are as follow:

Dissection of this fracture.

The head of the bone remains in the acetabulum attached by the ligamentum teres. There are, upon parts of the head of the bone, very small ossific deposits, covered by the articular cartilage.

Bone.

The cervix is sometimes broken directly transversely, at others with obliquity. The cancellated structure of the broken surface of the head of the bone and of the cervix is hollowed by the occasional pressure of its neck attached to the trochanter, and consequent absorption; and this surface is sometimes partially coated with a cartilaginous deposit, which is in some parts studded with slight depositions of ossific matter in spots, so as to fill the cancelli, and produce a structure of a yellow colour upon the bone, which is rendered firm and smooth by friction, as we see in other bones which rub upon each other when their articular cartilages are absorbed. Portions of the head of the bone sometimes are broken off, and these are found either attached by means of ligament, or floating loosely in the joint covered by a ligamentous matter; but these pieces do not act as extraneous bodies, so as to excite inflammation, and thus produce their discharge, any more than those loose portions of bone covered by cartilage, which are found so frequently in the knee, and sometimes in the hip and elbow joints. Some ossific matter is effused on the neck of the bone connected with the trochanter, which is rendered short by an absorbent process; so as in some cases scarcely to project beyond the trochanter. (See Plate.) The appearance of the cancelli of the cervix femoris

differs much after this accident, being in some cases scarcely filled, and in others partially covered by a thin pellicle of cartilage, which, receiving afterwards an ossific deposit, puts on a yellower appearance than the original bone, and is smooth on its surface; generally, however, the cancelli are also partially covered by a ligamentous structure.

Ligament and synovial membrane.

The capsular ligament enclosing the head and neck of the bone becomes much thicker than natural, but the synovial membrane which lines it undergoes the greatest change from inflammation, being very much thickened, not only where it lines the capsular ligament, but also upon the neck of the bone, as far as the edge of the fracture.

Effusion into the joint.

Within the articulation a large quantity of serous synovia is found; by which term I mean to express, that the synovia is less mucilaginous, and contains more serum than usual: this fluid, by distending the ligament, separates for a time one portion of bone from the other; it is produced by the inflammatory process, and becomes absorbed when the irritation in the part subsides. I do not know the exact period at which this change takes place, but have seen it in the recent state of the injury. Into this fluid is poured a quantity of ligamentous matter, by the adhesive inflammation excited in the synovial membrane, and flakes of it are found proceeding from its internal surface, uniting it to the edge of the head of the bone. Thus the cavity of the joint becomes distended in part by an increased secretion of synovia, and in part by the solid effusion which the adhesive inflamma-

New ligament.

tion produces: the synovial membrane reflected on the cervix femoris is sometimes separated from the fractured portions, so as to form a band from the fractured edge of the cervix to that of the head of the bone; bands also of ligamentous matter pass from the cancellated structure of the cervix to that of the head of the bone, serving to unite, by this flexible material, the one broken portion of bone with the other.

Union by ligament.

The trochanter is drawn up, more or less, in different accidents; and in those cases in which it is very much elevated, I have known a considerable ossific deposit take place upon the body of the thigh-bone between the trochanter major and trochanter minor. When the bone has been macerated, its head and cervix are much lighter and more spongy than they are in the healthy state, excepting on those parts most exposed to friction, where they are rendered hard by a slight deposition of ossific matter, which has sometimes a polished surface.

It appears then, from this account of the dissection of those whose bodies are examined after having suffered from this fracture, that no ossific union is produced; that nature makes slight attempts for its production upon the neck of the bone, and upon the trochanter major; but scarcely any upon the head of the bone; and that if any union be produced, it is by ligament only.

These circumstances, which I have stated for many years in my lectures, and supported, as far as I was able, by the dissection of these fractures in the human subject, led me to prosecute the inquiry by experiments upon other animals. I found it difficult to succeed in

Experiments.

breaking the bone in the direction I wished; and after a great number of experiments, was only in four instances successful; the preparations of which I have preserved. (See Plate.)

EXPERIMENT I.

The neck of the thigh-bone was fractured in a rabbit, on October 28th, 1818; and on December 1st, 1818, as the wound had been some time healed, I dissected the animal.

Appearances on Dissection.—The capsular ligament was much thickened, the head of the bone was entirely disunited from its neck, but adhered by ligament to the capsular and synovial membranes; the broken cervix, which was very much shortened, played on the head of the bone, and had smoothed it by attrition; the head of the thigh-bone had not undergone any ossific change.

EXPERIMENT II.

The neck of the thigh-bone was broken in a dog, November 12th, 1818, and the animal was killed on the 14th of December following.

Dissection.—The trochanter was much drawn up by the action of the muscles, so that the head and cervix were not in direct apposition. The capsular ligament was much thickened, and contained a large quantity of synovia.

The joint was lined by adhesive matter of a ligamentous appearance, adhering to the head of the bone, which did not seem to be changed by any ossific process; but the thigh-bone

around the capsular ligament, and the trochanter major, and a little below it, was enlarged; we find, therefore, by this dissection, what appears in the human subject after this accident, happens in other animals; and motion, want of apposition, and pressure, with the little ossific action, in the head of the bone under these circumstances, produce the deficiency of bony union, as in man.

Having ascertained this, I was next anxious to learn if the head and neck of the thigh-bone would unite under circumstances in which apposition and pressure were maintained; and for this purpose made the following experiment:

EXPERIMENT III.

Longitudinal fracture.

I divided the neck and head of the thigh-bone longitudinally, by placing a knife on the anterior part of the trochanter major, and striking it down towards the acetabulum. The dog was killed twenty-nine days after, and the following appearances presented themselves:

A portion of the trochanter major had been broken off, and was only united by cartilage; the head and neck of the bone which had been longitudinally broken, were united; but the neck was joined by a larger quantity of ossific deposit than that which joined the separated portions of the head of the bone, and so irregularly as to make a beautiful preparation, and shews the circumstance most clearly. (See Plate.) This bone may be seen in the collection at St. Thomas's Hospital.—Whether the union began externally to the ligament, and proceeded inwards,

or whether on the whole surface at once, it is impossible to ascertain; but the coalescence was firm, though, as I have stated, I thought more so at the neck than at the head of the bone.

Thus, then, it appears, that if the bones be applied to each other, if they be pressed together, and in a state of rest, ossific union can be produced in a longitudinal fracture, although the ossific deposition is extremely slight when compared with that of other bones. This principle will be further explained by experiments on the fracture of the patella. The great difference, between the longitudinal and the transverse fracture of the cervix femoris, consists in this, that in the longitudinal, as both parts of the head of the bone are remaining in the acetabulum, they are pressed firmly together, and this contact produces their union, even under the slightest ossific action; beside which, the broken head and neck of the bone have sources of nourishment independent of the ligamentum teres; whilst, in the transverse fracture, the actions of the muscles have a constant tendency to separate the portions of bone, and the effusion of synovia and of ligamentous matter into the joint, prevent a continued contact of the fractured surfaces of the bones. Union of these.

The fracture of the neck of the thigh-bone may be confounded with the dislocation of the os femoris upon the dorsum ilii, in the ischiatic notch, and upon the pubes; as in all of these the limb is shorter.—From the two former, it may be distinguished by the eversion of the foot, and by the flexibility of the limb in the fracture; and from the latter, by the ball of

the os femoris being felt in the groin, which happens in the dislocation on the pubis; otherwise the eversion of the foot in both cases might lead to their being confounded.—(See Essay on Dislocation, in the first Part.)

Treatment. With respect to the treatment of the fractured cervix femoris within the capsular ligament, those who believe a union can be effected after a transverse fracture, will extend the limb so as to bring the bones in apposition by drawing down the trochanter, and by applying splints upon the thigh, and straps around the pelvis, to force the cervix femoris against its head; and the best means for the purpose will consist of an apparatus described in the succeeding pages, and delineated in one of the plates. And some surgeons have thought that in this way their efforts have been effectual in producing an union: but, from the history of the cases, it is clear they have not distinguished the fracture within, from that which is external to the ligament, in which union of the bone occurs as in other bones of the body: those, on the contrary, who have observed these accidents well, who see the fracture occurring at very advanced age, who only discover a crepitus when the bone is drawn down and rotated inwards, in whom the limb is considerably shortened, and the degree of pain they suffer comparatively slight to the fracture of the body of the bone, will be disposed to avoid confining the patient to any long or continued extension as being likely to be productive of ill health, without the probability of producing union.—The mode, therefore, which we now adopt in these cases, is as follows:—We place a

pillow under the whole length of the limb, and put another across this under the patient's knee; and thus, by keeping it elevated, we procure an easy bent position of the limb: in this situation the patient remains, until the inflammatory process consequent to this accident, has ceased, which is from a fortnight to three weeks; we then allow the patient to rise from her* bed, and to sit upon a high chair, to prevent a degree of flexion which would be painful; in a few days crutches are allowed, upon which the patient is then capable of taking exercise; after a time the crutches may be laid aside, a stick substituted for them, and in a few months the person is able to use that limb without any adventitious support. The degree of recovery, in these cases, is as follows: if the patient be very corpulent, the aid of crutches will be for a long time required; if less bulky, a stick only will be sufficient; and where the weight of the body is inconsiderable, the person is able to walk without either of these aids, but drops a little at each step on that side, unless a shoe be worn having a sole of equal thickness to the diminished length of the limb. In every case, however, in which there is the smallest doubt, if it be a fracture within, or external to the ligament, it will be proper to treat the case as if it were the fracture which I shall next describe, and which readily admits of union.

Degree of recovery.

Now and then this accident is destructive to life in very old and infirm persons, from the exhausted state of their frame.

Danger of.

* This accident more frequently occurs in the female than in the male.

Surgeon careful.

The surgeon must be careful of the opinion which he gives of the result of these cases; lameness is, in the transverse fracture, sure to follow; but its degree cannot, at the first of the accident, be exactly estimated.

It is gratifying to find opinions which have been long delivered, confirmed by the observations of intelligent and observing persons; and therefore it was with pleasure I read the accounts of the dissection of several cases of fracture of the cervix femoris, by my friend Mr. Collis, (who is a man excellently informed in his profession,) and who has published in the Dublin Hospital Reports, the dissection of several of these accidents, and found a similar want of ossific union in the fracture within the ligament.

Of Fractures of the Cervix Femoris external to the Capsular Ligament.

The symptoms of this accident in some respects so closely resemble those of the fracture internal to the ligament, as to require much attention to accurately distinguish them; but the result is entirely different: so that a favourable opinion may be given as to the restoration of the bone by an ossific union.

Symptoms.

In this accident the injured leg is a little shorter than the other; the foot and toe on that side are everted, from the loss of support which the body of the thigh-bone sustains in consequence of the fracture; much pain is felt at the hip, and on the inner and upper part of the thigh,

and the joint loses its usual roundness. These, then, are all marks of similarity between the two accidents; but still there are many distinguishing signs. First; This accident occurs frequently at the earlier periods of life; for it happens in the young, and in the adult under fifty years of age; I have known it at a later period, but less frequently; therefore, when the above symptoms are seen at any age under fifty years, it will be generally found to be a fracture external to the capsular ligament, and capable of having ossific union produced in it, and, consequently, of complete recovery.—The first case of this accident I ever saw, was in a man of middle age, at St. Thomas's Hospital, under Mr. Cline, senior, who had most of the symptoms of a fractured cervix femoris within the capsular ligament. He was placed in bed with his thigh extended over a pillow, and splints were applied; the man recovered with an ossific union, which was ascertained by dissection, as he died of a fever at the period at which he was to have been discharged from the hospital; and upon examination of the limb, the thigh-bone was found united; the fracture having been external to the capsular ligament through the trochanter major.

Diagnostic marks.

Union of the bone.

These cases may be in some measure distinguished by the severity of the accident which produces them, whilst the internal fracture, as we know, happens from very slight causes, this, on the contrary, is produced either from severe blows, from falls from a considerable height, or from laden carriages passing over the pelvis.

Causes severe.

It may be also generally known by the crepitus which usually attends it upon slight motion,

Crepitus.

for it is rarely necessary to draw the limb down, to distinguish the grating of one bone upon the other, and this happens from the less retraction of the limb; I have however seen a case where the crepitus could not be discovered unless the thigh was extensively moved.

Trochanter drawn forwards more than upwards.

The broken trochanter is in these cases drawn forwards, so as to be placed before the head of the bone nearer to the spine of the ileum than it is naturally seated. When the patient is sitting,

Hollow of the groin filled.

on the healthy side, there is naturally a depression in the groin, into which the hand readily sinks, but upon the fractured side this is not the case, for that part is occupied by the extremity of the broken bone, forming a prominence there, which is very distinct.

Severe pain.

This accident is generally marked by much greater severity of suffering than the fracture within the ligament, more especially upon motion, for then the broken ends of the bone rub violently against the muscles, and produce excruciating pain, which does not happen in an equal degree in the fracture within the ligament.

Limb very little shorter.

The limb is shorter, but not to the same extent as in the internal fracture, for it rarely amounts to an inch; this, however, will greatly depend upon its obliquity, and upon the degree of laceration of the surrounding parts, admitting of a greater or less retraction of the muscles.

Rotation greater.

In the external fracture, the rotation of the limb is more extensive than in the internal, because there is no cervix remaining attached to the shaft of the bone. If the upper part of the trochanter major be fixed at the time the body of the bone is rotated, and the fracture is through

the trochanter, the rotation of the thigh may be performed without giving motion to the cervix femoris.

Lastly, this accident may be distinguished by the ossific union which occurs in it, but this can only be ascertained at the distance of from eight to twelve weeks from the time of the injury. Ossific union.

Upon the dissection of these cases, the seat of the fracture is found to vary, sometimes it is at the part at which the cervix joins the trochanter major. Mr. Travers shewed me a specimen of this accident, in which the bone was divided into several portions. First, the trochanter minor was detached from the shaft of the thigh-bone. Secondly, an oblique fracture passed through the trochanter major, so as in part to detach it from the body of the bone. Thirdly, the head and cervix femoris were broken from the trochanter, and the fracture passed in part externally and in part within the capsular ligament. Dissection.

My friend Mr. Roux, sent me from Paris one of these cases, which was broken through the junction of the cervix with the trochanter, including a part of the latter. (See Plate.) In another plate, the fracture will be seen extending obliquely from the trochanter minor through the trochanter major, and the drawing is from a bone which has been long in my possession, and which is now in the Museum at St. Thomas's Hospital; it appears in this case, the thigh had been placed on its outer side during union, as it has united with the condyles exceedingly everted. Mr. Oldnow, surgeon at Nottingham, sent for my inspection two excellent specimens of this fracture, in which the neck of the thigh-bone was broken at its junction

with the trochanter major. The trochanter major itself was also broken off; the trochanter minor formed a distinct fracture; the broken cervix femoris had become united to the shaft of the bone; the trochanter minor was reunited to the thigh-bone, but was drawn higher than its natural situation. The trochanter major was in one of the specimens, completely united to the body of the bone, but not in the other. Thus the thigh-bone, at the trochanter, was divided into four parts, viz. the head and neck as one part, the trochanter major as a second, the trochanter minor as a third, and the body of the bone making the fourth; the bones uniting with very little shortening.

Although, then, this accident has some of the marks of the internal fracture of the neck of the bone, yet it unites by bone, and it will be seen that the union is similar to that of other bones external to the joints; cartilage is first deposited, and then the matter of bone, because in this case it can be brought into apposition, and the ends of the bones are confined together by the surrounding muscles; one portion is pressed against the other, and the neck of the bone sinks deeply into the cancellated structure of the trochanter, and thus direct approach and pressure are preserved when the fracture is at the junction of the cervix with the trochanter, and the nutrition of each extremity of the bone is well supported by the vessels which proceed to it from the surrounding parts.

Difference of opinion reconciled.

We now see the reason of the difference of opinion respecting the union of the fracture of the neck of the thigh-bone. In the internal the bones are not applied to each other, and the

nutrition of the head of the bone is imperfect, but in the external the bones are held together by the surrounding parts, and easily kept so by external pressure.

Much time is required in some of these accidents to produce a complete ossific union; and the head and neck of the bone received into the cancelli move for a long period in their new situation, although so far locked in as to prevent their separation. Mr. Travers has the most valuable specimen of this state of the bone which I have had an opportunity of seeing, and of which he has had the kindness to send me the following account:

"Richard Norton, aged 60, fell upon the curb-stone of the foot pavement, and struck the upper and outer part of his left thigh with great violence. He was admitted into St. Thomas's Hospital on the 24th of January, 1818. The tension was then considerable; the line of the tensor vagina femoris formed an arch, the limb was shortened, the foot inclined outwards; the motion of the limb free in all directions; but it was painful, more especially when the knee was carried over the opposite thigh. The crepitus of the trochanter major was distinctly felt in these motions, and the swelling of the parts, with the extensive crepitus, gave an idea that the accident was a comminuted state of the trochanter, and that the base of the cervix femoris was broken, hence the shortening of the leg and the eversion of the foot. After the use of evaporating lotions, for some days the tension subsided, so as to allow of the application of the long outer splint and two thigh splints well bedded. On the 4th of March the splints

were removed, and union appeared to have taken place, for the limb had resumed its natural figure, but was a little shorter than the other. In the course of a month more he began to use his crutches. On the 15th of April he was placed under the physician, for defect in his general health; and when he was upon the point of quitting the hospital he was seized with spasms in his chest, of which he suddenly expired.

"Upon examination, some old adhesions of the pleura and water in the chest and pericardium were found. The fracture was through the trochanter, as had been supposed, extending some way down the bone, and it apparently had united, with very slight deformity; but on maceration, the head and neck of the bone became loose in the thigh bone, and a fracture was found there, which locked the head and cervix in a shell of bone formed around them.

"B. TRAVERS."

Mr. Travers having sent me the bone, the following are the appearances of this curious case. The head and cervix had been separated from the trochanter major and body of the bone. The upper part of the thigh-bone was obliquely split, so as to receive the cervix femoris into the cancelli. This fracture of the thigh-bone separated the posterior portion of the trochanter major from the body of the thigh-bone, and the trochanter minor was removed with it. An union had taken place between the fractured portions of the trochanter, at a slight distance from each other, and thus a hollow was left, into which the cervix femoris was received, and it had not yet become united by ossific deposit, for upon

maceration the neck of the bone had free play in the cavity in which it had been received, and from which it could not be removed.

Treatment.

In the treatment of this injury we used to preserve the length of the limb by applying a roller around the foot of the injured leg, and by binding the foot and the ancles firmly together to prevent their retraction, and thus render the uninjured side the splint to that which is fractured, giving it a continued support. But as this plan makes the passage of the evacuations difficult, and it does not press the fractured portions firmly together, although it renders the length of the limbs equal, I adopt the following plan :

The patient is to be placed on a mattress on his back, the thigh is to be brought over a double inclined plane composed of three boards, one below which is to reach from the tuberosity of the ischium to the patient's heel, and the two others above have a joint in the middle by which the knee may be raised or depressed; a few holes should be made in the board admitting a peg which prevents any change in the elevation of the limb but that which the surgeon directs; over these a pillow is thrown to place the patient in as easy a position as possible*. (See Plate.)

* The construction of this inclined plane is so little complicated, that it may be made at the instant of two common boards, one of which is to be sawn through nearly at the middle, and if hinges cannot be immediately procured, the boards may be lashed together by cords; for the principle of this machine, I believe we are indebted to Mr. White, of Manchester, who had one made of iron, and hollowed to adapt it to the form of the leg and thigh, but this machine was too heavy and too complicated for use. Mr. James, of Hoddesdon, improved

When the limb has been thus extended, a long splint is to be placed upon the outer side of the thigh to reach above the trochanter major, and to the upper part of this is fixed a strong leather strap which buckles around the pelvis, so as to press the one portion of bone upon the other; and the lower part of the splint is to be fixed with a strap around the knee to prevent its position being moved; the limb must be kept as steady as possible for eight weeks, at the end of

upon Mr. White's idea, by having the instrument made of wood, with moveable splints upon the sides, which were to be adapted to the limb, and this construction rendered it more portable and less complicated than before; but as the addition of splints rendered the instrument less easy of adaptation, I thought it better to have it made merely an inclined plane, and to apply splints, or not, as occasion might require. I have now been in the habit for near twenty years of employing this instrument in fractures of the thigh-bone, and also of recommending it in my lectures, and do firmly believe that it will be found the best means of keeping the limb constantly extended, and preventing that contraction of muscles which is so apt to occasion deformity. When the thigh and leg are placed upon the machine, the patient rests upon his back, the knee is slightly bent, and the foot rests upon the heel, and the position is one of great ease to the patient. Although we are ready to acknowledge the high merit of the contrivances of Dessault and Boyé for fractures of the thigh, yet upon the whole we give a preference both to this instrument and to the position which we have just described, and which we have been in the habit of adopting in these cases. The same result may be produced by a long pillow reaching from the tuberosity of the ischium to the foot, and by a second rolled up under the knee; but the extension is neither so perfect at the moment, or so continued as when the limb is on the inclined plane, and it requires infinitely more care to prevent contraction. While I strongly recommend this double inclined plane, I should think myself dishonest if I did not acknowledge the source from which it was derived.

which time the patient may be permitted to rise from his bed if the attempt does not give him much pain; he is still to retain his outer splint for a fortnight, with the straps which I have mentioned, round the pelvis, and by this treatment he ultimately recovers a very good use of his limb. The following case shews the usual results of this accident when it is very severe. Recovery. Case.

Mr. Peggler, of Wanstead, aged 46, on the 13th of November, 1817, fell while walking, on a glass bottle which he had in his pocket, and when he attempted to raise himself from the ground he found he was not able to stand. In a quarter of an hour he felt great pain and could not bear the slightest weight of his body on the injured limb. Mr. Constable, of Woodford, was sent for, and he gave me this account. The foot at first did not appear to turn out, but when the patient was put into bed and laid on his back it became everted, the leg appeared somewhat shorter, but was with but little difficulty pulled down to its natural length; the foot was benumbed, and continued so for twelve months. He was placed in bed with a bolster under the hip, to prevent displacement of the bone, and his knees and ancles were tied together.

On the December following, about Christmas, I met Mr. Constable to visit a patient with a severe injury of the head, and he then requested me to see Mr. Peggler, whom I found incapable of turning in his bed without assistance, and the attempt gave him great pain; his injured leg was a little shorter than the other, with the trochanter drawn forwards towards the spine of the ileum, and could be felt consider-

ably separated from that portion of the trochanter connected with the neck of the bone; the foot was turned outwards, he could not sit, and the least attempt to raise himself produced excruciating suffering; in the horizontal position I brought him to the foot of the bed to make as accurate an examination as I could of the nature of the accident, and could have no hesitation in pronouncing it a fracture through the trochanter. In less than a month he began to use his crutches, and continued their use for three months; he then laid aside one crutch and employed a stick and crutch, and in a short time needed the support of a stick only; but it was twelve months before he recovered the entire use of his limb. The leg is still nearly an inch shorter than the other; the portion of the trochanter connected with the thigh-bone, has united with the fore part of the trochanter joined to the neck of the bone, and is consequently much nearer the spine of the ilium than usual; the foot also is slightly everted, but he walks extremely well; this day week he walked ten miles from home and returned the same day, and this day, July 28, 1819, he has walked from Wanstead to my house, and intends to walk back, a distance of near twenty miles.

This history of Mr. Peggler's accident is so similar to the cases of fracture through the trochanter major, which I have had an opportunity of seeing, that their detail would only become a useless repetition, the only variations that I have seen having been in the distinctness of the crepitus accompanying them, which is

less in proportion as the fracture approaches the capsular ligament.

I have received from Mr. Oldknow, of Nottingham, an account of some cases of the fracture external to the ligament, which occurred in persons very advanced in years, so that, as age is not a certain criterion, it becomes necessary to pay the utmost attention to the other discriminating marks of this not unfrequent injury.

Of Fractures below the Trochanter.

The thigh-bone is sometimes broken just below the trochanter major and minor, and a most difficult accident it is to manage, and miserable distortion the consequence, if it be ill treated. The upper end of the bone is drawn forwards and upwards, so as to form nearly a right angle with the body of the thigh-bone; the cause of this is evidently the contraction of the iliacus internus and psoas muscles, assisted perhaps by the pectinalis and first head of the triceps, which participate in the irritation the fracture produces, and are thrown into a state of spasmodic contraction; to give a better idea of this effect, (see Plate) in which the bone will be observed to be united not only with extreme shortening, but with a hideous projection forwards. If pressure be made upon the projecting bone in this case, it only adds to the patient's suffering, and to the degree of irritation of the limb, without preserving the bone in its proper situation. It will be seen that this fracture, although uniting, exceedingly overlaps, and that the union is very feeble, shewing what I have already

mentioned, the circumstance of fracture thus placed having the ossific deposition only on that side where the inflammation was kept up by the pressure of one bone lying on the other; this preparation may be seen at the Anatomical Museum at St. Thomas's Hospital.

To prevent this horrid distortion and imperfect union, two principles are required to be strictly observed; the one is to elevate the knee very much over the double inclined plane, and the other to place the patient in a sitting position, well supporting him by pillows during the progress of its union; the degree of elevation of the body which is required will be readily ascertained by observing the approximation of the fractured extremities of the bones; and this position is demanded, to relax the psoas and iliacus muscles, and thus prevent the elevation of the upper part of the bone. In this way, and thus only, can the great deformity I have described be prevented. When by this posture the extremities of the bones are brought into proper apposition, and all projection of its upper portion is removed, either the splints may be applied which are commonly used in fracture of the thigh-bone, or, what is better, a strong leather belt lined with some soft material, should by means of several straps be buckled around the limb.

OF DISLOCATION OF THE KNEE.

The broad surfaces of bone by which the os femoris rests upon the tibia are calculated to

prevent the ready dislocation of this joint, which would be otherwise very liable to happen, from the superficial nature of the articulating cavities on the head of the tibia, and also from the great violence to which this joint is frequently exposed.

The depressions upon the head of the tibia are however rendered deeper by the addition of the semi-lunar cartilages which rest upon the bone, they receive the condyles of the os femoris, and are attached by ligaments to the edge of the tibia. The fore part of the joint is defended by the patella, which has two unequal articular surfaces to play upon the condyles of the os femoris; the head of the fibula forms no part of the knee-joint, but is attached with the tibia from an half to three-fourths of an inch below its head.

Structure of the knee.

Bone.

The junction of the os femoris, tibia and patella, is produced by means of a capsular ligament, which proceeds from the os femoris to the head of the tibia, and is attached to the edge of the patella where it divides into two portions, forms wings to that bone, and takes the name of alar ligaments. On its outer side the capsular ligament is covered and greatly strengthened by the tendinous expansions which are derived from the vasti muscles, and which proceed to the head of the tibia. Internally the ligament is lined by the synovial membrane, which is folded within the cavities on the extremities of the bones, and is reflected from the ligament to the edge of the articular cartilages, and it is believed forms a covering to the articular carti-

Ligaments.

lages. Beside the capsular there are several peculiar ligaments. *First*, the ligamentum patellæ, which is stretched from the lower part of the patella to the tubercle of the tibia. *Secondly*, the external lateral or femoro fibular ligament, which passes from the os femoris to the head of the fibula, and which divides into two external lateral ligaments. *Thirdly*, the internal lateral or femoro tibial ligament being attached to the os femoris, and to the head of the tibia. *Fourthly*, the oblique or popliteal ligament, which proceeds from the external condyle of the os femoris obliquely to be inserted into the head of the tibia. *Fifthly*, the crucial ligaments which pass from the depression between the condyles of the os femoris behind; the one to a projection between the articular surfaces of the head of the tibia, and the other to a depression behind that projection, so that these ligaments cross each other from before backwards. The patella has a muscular connection with the os femoris by the insertion of the rectus, vasti, and cruralis, and by the ligamentum patellæ it is united with the tibia, and laterally it is joined to the capsular and alar ligaments. This ligamentous junction of the three bones is very firm, but it allows of free flexion and extension with some degree of rotatory motion when the knee is bent; but although great strength of union is produced of the joint, still excessive violence and extreme relaxation will occasionally lead to its dislocation.

On Dislocations of the Patella.

The patella is liable to be dislocated in three directions; namely, outwards, inwards, and upwards. In its lateral dislocation the bone is most frequently thrown on the external condyle of the os femoris, where it produces a great projection; and this circumstance, with an incapacity of bending the knee, is the strong evidence of the nature of the injury. Three directions. Symptoms.

The most frequent cause of the accident is from a person, in walking or running, falling with his knee turned inwards, and the foot outwards, and thus, by the action of the muscles to prevent the fall, the patella is drawn over the external condyle of the os femoris, and when the person attempts to rise, he finds himself unable to bend his leg, and the muscles and ligaments of the patella are all forcibly on the stretch. This accident generally occurs in those who have some inclination of the knee inwards, which, under the action of the extensor muscles, gives a direction to the patella outwards.—The internal dislocation is much less frequent, and it happens from falls upon a projecting body, by which the patella is struck upon its outer side, or by the foot being, at the time of the fall, turned inwards. Cause. Internal.

What the state of the ligament in these cases is, I have had no opportunity of learning, having never dissected a limb in which this accident had happened.

The mode of reduction in either case con- Mode of reduction.

sists in pursuing the following plan. The patient is placed in a recumbent posture, and an assistant raises the leg by lifting it at the heel; the advantage of which is, that it extends the limb in the greatest possible degree; then the surgeon presses down that edge of the patella which is most remote from the joint, be it one luxation or the other; and this pressure raises the inner edge of the bone over the condyle of the os femoris, and it is immediately drawn, by the force of the muscles, into its situation.

My friend, Mr. George Young, informed me, that he was called to a case of dislocation of the patella outwards, in which the reduction of the patella was very difficult. The patient was a female, who, by a fall in walking, had the patella drawn over the external condyle of the os femoris, where it remained. He employed, most perseveringly, pressure upon the edge of the patella, without being able to succeed, but at last reduced it in the following manner. He placed the patient's ancle upon his shoulder, and thus most completely extended the limb, and obtained a fixed point of resistance at the knee. Then grasping the patella with the fingers of his right hand, he pressed the outer edge of the patella with the ball of his left thumb and pushed it into its place.

An evaporating lotion of spirits of wine and water is to be applied, and in two or three days the limb may be bandaged, and it is soon restored to its natural uses, although it is somewhat weaker than before.

Dislocation from relaxation.

When the bone is dislocated from relaxa-

tion, (See First Part of these Essays) the patella is drawn upon the external condyle of the os femoris from very slight accidents, or from sudden action of the muscles. My neighbour, Mr. Hutchinson, who has seen a great deal of surgery, informs me, he has very frequently seen this accident, and that the tendency to it has arisen, in a large proportion of cases, from the relaxation produced by excessive indulgence in onanism.

The reduction, in these cases, is effected in the same manner as has been before described. After the reduction, to prevent any recurrence of the accident, and to support the weakened ligament, a laced knee cap, with a strap and buckle above and below the patella is to be worn.

On the Dislocation of the Patella upwards.

Upwards.

In this dislocation the ligament of the patella is torn through by the action of the rectus femoris muscle, and the immediate effect of the injury is to draw the patella upwards upon the fore part of the thigh-bone.—The appearances which this accident presents, are very decisive of the nature of the injury; for, besides the elevation of the patella, and its easy motion from side to side, a deep depression is felt above the tubercle of the tibia from the absence of the ligament: the patient immediately loses the power of bearing upon that limb, as the knee bends under each attempt, and he would fall if he persisted in throwing the weight of his body upon it. A considerable degree of inflammation follows.

Ligament lacerated.

Symptoms.

Treatment. Local depletion and evaporating lotions are to be used for from four to seven days, and then a roller is to be applied around the foot and upon the leg, to prevent it from swelling, the leg is to be kept extended by a splint behind the knee, and a bandage composed of a leather strap is to be buckled around the lower part of the thigh; to this is to be attached another, which is to be carried on each side of the leg, and under the foot, and is to be buckled to the circular strap; thus the bone is gradually drawn down, so as to allow of an union of the ligament. In a month the knee may be slightly bent, and as much passive motion daily given as the patient is able to bear; by these means the ruptured ligament becomes united, and the patella retains its motion. With very great attention this becomes perfect: for so it happened in a case which I saw with Mr. Burrowes, in Bishopsgate Street. Mr. B. paid great attention to the case, and the patient recovered without any diminution of the natural powers of the part, the patella being gradually drawn down, until the ends of the ligament were approximated and coalesced.

On Dislocation of the Tibia at the Knee-Joint.

Four directions. These dislocations occur in four different directions; but two of them are incomplete and lateral, while the others are perfect luxations, the tibia being thrown either backwards or forwards.

The lateral dislocations are but rare. In the

dislocation inwards, the tibia is thrown from its situation, so that the condyle of the os femoris rests upon the external semilunar cartilage, and the tibia projects much on the inner side of the joint, so as at once to disclose the nature of the injury. The first case of this kind which I ever witnessed was brought to St. Thomas's Hospital whilst I was apprentice there; and I remember being struck with three circumstances in the case: the first was the great deformity of the knee from the projection of the tibia; secondly, the ease with which the bone was reduced by direct extension; and, thirdly, the little inflammation which followed upon what appeared to be so serious an injury; for the man was discharged from the hospital, having suffered little local or constitutional irritation. Internal.

The tibia is now and then thrown upon the outer side of the knee-joint, the condyle of the os femoris being placed in the situation of the inner semilunar cartilage, or rather behind it, when an equal deformity is produced, as in the other dislocation. The reduction of the limb is equally easy with the former, and the patient recovers with little diminution of the powers of the part. It seems to me, that in both these dislocations the tibia is rather twisted upon the os femoris, so that the condyle of the os femoris, with respect to the tibia, is thrown somewhat backwards, as well as outwards or inwards. External.

CASE.

One of the aldermen of the city of London, Case.

riding down Highgate-hill during the night, and not being aware of a rail being placed across a part of the road which was repairing, the horse ran against the rail, and turning quickly, threw his rider over the rail, whilst his leg was confined between it and the horse, so that his body was on one side of the rail, and his leg on the other: the result of this was, that he partially dislocated his tibia outwards, throwing the condyle of the os femoris inwards. Being immediately taken to a public-house, the tibia was easily replaced, and being, some hours after, taken home, means were used to reduce the swelling and inflammation which in him became considerable. When he attempted to bear upon the limb he found the capsular ligament very feeble, and he was obliged to have a knee-cap made of very strong leather to support and connect the bones; and by the aid of this bandage he gradually recovered, and was enabled to walk well and to do duty on horseback, as a light horse volunteer, before twelve months had expired.

CASE.

Case of dislocation inwards.

I was consulted by Mr. Richards respecting Mr. Bovill, a gentleman from Barbadoes, who had dislocated his knee. I made a few notes on the case at the moment, which were as follow. The gentleman was thrown from a gig; the tibia was dislocated, and the fibula broken a little below its head. The head of the tibia projected much on the inner side of the condyle of the os femoris. My friends, Mr. Caddell and Mr.

Richards, surgeons in Barbadoes, saw him in a quarter of an hour after the accident; the leg was extended from the thigh-bone, in a bent position of the limb; the extension was a long time continued, and the force was employed by several persons for half an hour before the luxation was reduced. It became excessively swollen, and remained so for many weeks, the climate probably being unfavourable to his recovery; but at length the inflammation and its consequences were overcome by local depletion. When I saw him, eighteen months had elapsed from the accident, and he could not then bend the joint at right angles with the thigh; there was also an unnatural lateral motion of the joint, from the injury which the ligaments had sustained. The fracture of the fibula had injured the peroneal nerve, as was evident from the numbness of which he complained in the course of its distribution.

Dislocation of the tibia forwards.

The tibia is now and then dislocated in the direction forwards. In this accident, when the person is recumbent, the external marks of the injury are these. The tibia is elevated, the thigh-bone is depressed, and is thrown somewhat to the side as well as backwards. The os femoris makes such pressure on the popliteal artery, as to prevent the pulsation of the anterior tibial artery on the foot; the patella and tibia are drawn by the rectus muscle forwards. Such were the appearances in a man of the name of Briggs, brought into Guy's Hospital in the year 1802, not only with this accident, but with a compound fracture of the tibia of the other leg, with dislocation of the head of the fibula. Mr. Lucas was obliged to

amputate the compound fracture, and the man is now living at Walworth. The limb in this case was easily reduced, by extending the thigh from above the knee, and by drawing the leg from the thigh and inclining the tibia a little downwards. Directly as it was reduced the popliteal artery ceasing to be compressed, the pulsation in the anterior tibial was restored.

Dislocation of the tibia backwards.

The head of the tibia is sometimes dislocated backwards, behind the condyles of the os femoris, producing the following appearances: a shortened state of the limb, a projection of the condyles of the os femoris, and depression at the ligament of the patella, and the leg is bent forwards. The following case, for which I am indebted to my friend Dr. Walshman, who has ever been a man of close observation in his profession, and always practised it with attention, judgment, and with honor.

CASE.

Case by Dr. Walshman.

Mr. Luland, residing near the Elephant and Castle, at Newington Butts, a very robust and muscular man, on the 4th of January, 1796, dislocated his shoulder and knee at the same instant. The accident happened in the following manner: it being a very severe frost, and the ground very slippery, he being in his cart, the horse fell. Mr. Luland was thrown under the front rail of the cart and luxated the tibia backwards, whilst his shoulder fell on the saddle and dislocated the os humeri into the axilla. The head of the tibia was completely dislocated backwards, reaching behind the condyles of

the femur into the ham; the tendinous connection of the patella to the rectus muscle was ruptured; the external condyle of the os femoris very protuberant, the leg shorter, and there was a depression just above the patella. The patient felt most excruciating pain when the limb was moved, but there was not any considerable degree of suffering when it was at rest. The reduction was effected in the following manner: two men extended the limb upwards, one from the groin and the other from the axilla, whilst two others extended the leg from a little above the ancle in the opposite direction; and they gradually increased the force of their extension till the bone was reduced. The patient was placed on his back, and Dr. Walshman directed the head of the bone to its natural situation. Dr. W. then applied a flannel roller on the knee, placed the patient in bed with his limb upon a pillow, and directed the part to be kept wet with an evaporating lotion. He remained in this state a fortnight, free from pain; the Dr. slightly moved the part every other day, as far as he could without giving pain. In about a month Mr. Luland began to walk on crutches. Ten weeks after the accident he was able to sit at his dinner-table, and in five months he had given up the use of his crutches, and appeared perfectly recovered, being able to use that limb as well as the other. He died of dropsy, February 18, 1819. Case.

Dr. Walshman's treatment of this case was highly judicious. He suffered the parts, as he observes in his letter, to remain at rest till the

adhesive inflammation had united the lacerated ligament, and then, and not till then, began with passive motion.

On partial Luxations of the Thigh-bone from the Semilunar Cartilages.

From relaxation.

Under extreme degrees of relaxation, or in cases where there has been an increased secretion into a joint, the ligaments become so much lengthened as to allow the cartilages to glide upon the surface of the tibia, and particularly when pressure is made by the thigh-bone on the edge of the cartilage. That excellent practical surgeon, Mr. Hey, of Leeds, whose death will be severely deplored in the district in which he practised, and lamented by those in the profession who have its improvement at heart, was the first who clearly described the symptoms and cause of these accidents, and suggested a mode of treatment, which is ingenious, scientific, and generally successful. The most frequent cause of the accident is from a person in walking striking his toe when the foot is everted against any projection (as the fold of a carpet), he immediately feels pain in the knee, which is unable to be completely extended. I have known this accident also happen from a person having suddenly turned in his bed, and the clothes not suffering the foot readily to turn with the body, the thigh-bone has slipped from its semilunar cartilage. I have also known it occur from a sudden twist of the knee inwards when the foot was turned out.

Mr Hey's idea.

The explanation of this accident is as follows:

The semilunar cartilages which receive the condyles of the os femoris are united to the tibia by ligaments, and when these ligaments become extremely relaxed and elongated, the cartilages are easily pushed from their situation by the condyles of the os femoris, which are then brought into contact with the head of the tibia, and when the limb is attempted to be extended the edges of the semilunar cartilages prevent it. How then is the bone to be again brought upon the cartilages? Why, as Mr. Hey has advised, by bending the limb back as far as is possible, which enables the cartilage to slip into its natural situation, from the pressure of the thigh-bone being removed in the bent position, and the leg being brought forwards it can then be completely extended, because the condyles of the os femoris are again received on the semilunar cartilages. This plan is not however invariably successful, as the following case will shew. A lieutenant in the army had this accident repeatedly happen to him, and the limb was as often reduced by the above means; but at length in turning in bed, from the pressure of the bedclothes on his foot, the accident recurred. He came to town; but bending the limb had now no effect in enabling him to extend the joint, I therefore advised him to visit Mr. Hey at Leeds; but I learnt that in this case the joint was never reduced. I also made the following notes of the case of a gentleman who came to my house. "Mr. Henry Dobley, æt. 37, has often dislocated his knee by turning the foot inwards and the thigh-bone outwards, by accidentally slipping in walking on uneven ground, or under sudden

Explanation of the accident.

Mode of reduction.

Sometimes unsuccessful.

exertions of the limb; considerable pain is immediately produced, accompanied with a great deal of swelling. His mode of reducing it is as follows: he sits upon the ground, and then bending the thigh inwards and pulling the foot outwards, the subluxation of the os femoris being external, the natural position of the limb becomes restored. A knee-cap laced tightly around the knee is the usual preventive of the return of this accident, but it is not sufficient in Mr. Dobley, without the addition of straps, and more especially of a very strong leather one just below the patella."

Different mode of reduction.

Particular bandage required.

A young lady was brought to my house who was frequently the subject of this accident, but in her the cartilages had been several times easily replaced, and the return of the accident prevented by a bandage composed of a piece of linen with four rollers attached to it, (see Plate,) which were tightly bound above and below the patella, and she said, answered its intended purpose better than any other.

Great alteration takes place in the form and size of the knees, in some of these cases, from a chronic rheumatism sometimes attending them. I made the following notes of a case of this kind, about which I was consulted, but I have seen several similar to it.

CASE.

Case.

Lady D——, a year and a half ago fell and twisted her thigh-bone inwards at the knee, producing great pain on the inner side of the joint. Her ladyship immediately restored the

parts to their situation, by pressing the thigh outwards and the leg inwards, previous to which she could not move the joint. For a fortnight she was scarcely able to bend or straighten the knee, and the muscles felt to her to be in a state of cramp. She then began to stand upon the limb by the aid of crutches, but when she bore upon it considerably it suddenly bent back, with pain and subsequent swelling, and she felt the condyles at the time slip from the semilunar cartilages upon the head of the tibia. Any sudden motion produced the same effect for fifteen months, and each of these accidents threw her back for several weeks; the pain extended from the knee to the toe. For three months previous to her last accident she walked on crutches, and even at times with only the aid of a stick; when about two months since, in endeavouring to raise herself from a sofa, and turning quickly round to take her stick, the left knee gave way, as if the bone had slipped from its place, the thigh-bone being at the time twisted outwards; pain and swelling succeeded, and she has never been able to stand upright since. Her joints are all of them remarkably flexible, as the elbow may be easily bent backwards to form an angle with the os humeri. When a girl she had frequently the sensation of putting the knees out of joint, but they soon got well. The knees are now swollen, and effusion has taken place into the joints of a considerable quantity of synovia. When she attempts to stand she cannot straighten her knees, but would fall forwards if not supported. The principal treatment is to produce

absorption of the fluid which is effused, and then to give due support to the ligaments. For the first of these she was desired to apply blisters, which were directed to be kept discharging for a considerable time, and after they were healed she was ordered to make pressure upon the joints by a strong bandage, which was to be occasionally removed to give an opportunity of employing friction.

In the dissection of these cases the ligament is found extremely thickened; little pendulous ligamentous and cartilaginous bodies are seen suspended from it, a thick edge of cartilage projects from that of the articular cartilage, and a part of the latter is absorbed. When the bone is macerated, a great addition of ossific matter is found to have been made to the edges of the condyles of the os femoris.

On Compound Dislocations of the Knee-joint.

Of this I have only seen one instance, and I conclude it to be therefore a rare occurrence; and there are scarcely any accidents to which the body is liable which more imperiously demand immediate amputation than these.

CASE.

Case. On Monday, August 26th, 1819, at eleven p. m. I was sent for by Mr. Oliver, surgeon at Brentford, to visit Mr. Pritt, who I was informed had fallen from the box of a mail-coach, and most severely injured his knee. I met, at the house to which he was carried, Mr. Oliver

and Mr. Hunter of Richmond, surgeons, and immediately proceeded to examine the knee. A large opening was found in the integuments, through which the external condyle of the os femoris projected, so as to be opposite the edges of the skin. The os femoris was thrown behind the tibia on its outer side, but not so much on the inner, so that the external condyle of the thigh-bone was dislocated backwards and outwards; and the axis of the thigh-bone was twisted, and the internal condyle advanced upon the head of the tibia. We made attempts to reduce the condyle, but it could only be effected with extreme difficulty; and the bone, directly the extension was removed, slipped into its former situation. The joint being freely opened by the accident the bone dislocated, and when reduced easily slipping from its place, accompanied with an extremely irritable constitution, decided me at once to propose the amputation of the limb, which being acceded to, it was immediately performed. The symptoms of constitutional irritation which followed the operation became extremely severe, and he being delirious on the 31st, Mr. Oliver applied leeches to his temples, a blister under the occiput, and gave the saline medicine with camphor and the pulv. ipec. comp. On the following day I was sent for to visit him, but being absent from London, my most able and excellent friend Mr. Cline, senior, visited him, and ordered him,

Tinc. Opii. gtt. v.
Pulv. Castor. gr. x.
Mist. Camphor. ℥iss. M.
Ft. Haustus 4ta quaque hora sumendus.

Soon after the second draught was administered he fell asleep, and after several hours' repose he awoke perfectly sensible. He gradually recovered, and left Brentford on the 25th of October, with a small wound still remaining on the stump.

Dissection. I brought home the limb and carefully dissected it. Under the skin there was great extravasation of blood in the cellular membrane surrounding the knee; the vastus internus muscle had a large aperture torn in it, just above its insertion into the patella; the tibia projected forwards and the patella was drawn to the outer side of the knee, being no longer in a line with the tubercle of the tibia. Looking at the joint posteriorly, both heads of the gastrocnemius externus muscle were lacerated; the capsular ligament was so completely torn posteriorly that both the condyles of the os femoris were seen projecting through the laceration in the gastrocnemius; neither the sciatic nerve, the popliteal artery and vein, the lateral nor the crucial ligaments were ruptured. (See Plate.)

It is probable that all compound dislocations of the knee-joint will require a similar practice, unless the wound be so extremely small as to admit readily of its immediate closure.

On Dislocation of the Knee from Ulceration.

In the progress of chronic diseases of the joints, inflammation beginning in the synovial membrane and proceeding to ulcerate the articular cartilages and bone, at length affect the

Ligaments ulcerated. capsular ligament and even sometimes the peculiar ligaments of the joints; the bones are

thus becoming unconnected, the muscles irritat edby participating in the inflammation draw the limb into distorted positions, and thus one bone becomes gradually displaced from the other. In the hip-joint this is most frequently seen from the oblique bearing of the thigh-bone on the pelvis. In the knee it is also not unusual that the thigh-bone shall be placed out of its natural line with the tibia, projecting either on the one side or upon the other; but now and then most remarkable distortions are produced by the irritative and spasmodic action of the muscles succeeding the ulcerative process of the ligaments, of one of which I have given a plate; it was removed by amputation by Mr. Cline, sen. in St. Thomas's Hospital, and had been the consequence of what is vulgarly called the white swelling of the knee-joint; the leg was placed forwards at right angles with the thigh, so that when walking on his crutches he had the most grotesque appearance, as the bottom of his foot first met the eye when he was advancing. Upon inspection of the patella it was found anchylosed to the os femoris, and the tibia was also joined by ossific union to the fore part of the condyles of the thigh-bone.

Excessive distortion.

Case.

This state of parts may be prevented by opposing the action of the muscles when their irritability first begins to produce distortion, by the application of splints, and by the exhibition of opium to diminish the irritability of the system. Thus I have seen in cases of ulceration of the hip-joint, the irritative action of the flexor muscles diminished, and the distortion prevented by drawing down the limb and keep-

How prevented.

ing it in the extended position, but it is a most painful extension to the patient, and should be very gradually accomplished.

On Fractures of the Knee-joint.

I shall now, pursuing my former plan, describe the fractures to which the bones entering into the composition of this part are liable, and first the

Fractures of the Patella.

Transverse or longitudinal.

This bone is generally broken transversely, but sometimes, though rarely, longitudinally. It is liable also to simple and compound fracture, but fortunately the latter is but of rare occurrence.

Symptoms.

When the patella is transversely broken, the upper part of the bone is drawn from the lower, its superior portion of the bone being elevated by the action of the rectus muscle, which is inserted into its upper part, whilst the lower portion is still retained in its natural situation by the ligament of the membrane which passes to the tubercle of the tibia.

The degree of separation thus produced depends on the extent of laceration of the ligament, for when the ligament is but little torn the separation will be half an inch, but under great extent of injury the bone is drawn five inches upwards; the capsular ligament and tendinous aponeurosis covering it, being then greatly lacerated; and this is the greatest extent of separation which I have seen. The acci-

dent may be at once known by the depression between the two portions of bone, and by the fingers passing readily down to the condyles of the os femoris into the joint as far as the integuments will permit, and by the elevated portion of bone moving readily on the lower and fore part of the thigh. The power of extending the limb is lost, and likewise that of supporting the weight of the body on that limb if the person be standing, for the knee bends forwards from the loss of action in the extensor muscles. The pain of this accident is not very severe, and a simple fracture is not dangerous, for the constitution feels it but little. In a very few hours after the accident has occurred, a considerable degree of extravasation of blood takes place upon the fore part of the joint, so that the appearance is livid, having often a gangrenous character, but this disappears in a few days. Considerable inflammation and fever succeed, and more especially there is a great degree of swelling in the fore part of the joint, both from the free secretion of synovia, and the effusion arising from inflammation. No crepitus is felt in this fracture, for the bones cannot be brought sufficiently near each other to give this general discriminating mark of other fractures.

The separation of the bones is much increased by bending the knee, as it removes the lower from the upper portion of bone, pulling down the tibia ligamentum, patellæ, and lower part of the bone from the upper.

This accident arises from two causes: first, from blows upon the bone produced by falls upon the knee, or received upon the patella in Causes.

Blows or action of muscles.

the erect position of the body; and secondly, from the action of the extensor muscles upon the bone.

A gentleman walking in the country, and not used to jumping, leaped a ditch of considerable breadth; and when he reached the opposite bank he was in danger of falling and ran forward several steps, and with difficulty recovered himself. Whilst in this attempt to save himself from a fall, he felt the patella snap, and I was sent for to him, and found his patella broken, and the portions of bone considerably separated.

A lady, descending some stairs, set her heel near the edge of one of the stairs, and was in danger of falling, when throwing her body somewhat backwards to prevent the fall and to straighten the knee, the patella became broken.

That a bone should thus break by the action of muscles appears at first sight incomprehensible, but the solution of this circumstance is easily given. When the knee is bent, the patella is drawn down on the end of the condyles, so as to bring the upper edge of the bone forwards, and at that moment it is the patella is broken, by the rectus muscle not acting in a line with the bone but at right angles with it or nearly so, and upon its upper edge more particularly.

Explanation of it.

Mode of union.

With respect to the mode of union of this bone, whether the separation be great or inconsiderable, it is effected by an intervening ligamentous substance. The bone itself undergoes but little alteration; the lower portion, joined by ligament to the patella, has its broken cancellated structure still apparent, although a little

smoothed. The upper portion of bone has its broken cancelli covered by a slight ossific deposit, so that there is more ossific action in the upper than in the lower portion of the bone, and certainly much less than in bones which do not form a part of the joints. The internal articular surface of the bone preserves its natural smoothness. Blood is immediately deposited in the place of the injured ligament, but this in a few days is absorbed. Inflammation arises and pours out adhesive matter, which extends from one edge of the lacerated ligament to the other, and even between the bones, to each of which it is firmly united. (See Plate.) Vessels shoot from the edges of the ligament and render the new substance organized, and produce a ligamentous structure similar to that from which the vessels shoot; this substance is not however always perfect, for I have seen apertures in it; but this will greatly depend upon the extent of the laceration of the ligament, and the too early use of the limb. In the dog and in the rabbit, or almost any other quadruped, it is possible by experiment to trace the mode of union of this bone.

EXPERIMENT I.

I drew the integuments much aside in a rabbit, and dividing them, placed a knife upon the patella and struck it lightly with a mallet; the bone was broken and directly drawn up. I let the integuments go, and the wound was not opposite the fracture. In forty-eight hours I killed the animal and examined the part.

The bones were separated three-quarters of an inch, and the intervening part filled with coagulated blood.

EXPERIMENT II.

I repeated the former experiment, and killed the animal on the eighth day, and found most of the blood absorbed and adhesive matter occupying the space between the bones.

EXPERIMENT III.

The former experiment repeated; the animal examined on the fifteenth day. The adhesive matter had acquired a smooth and somewhat ligamentous character.

EXPERIMENT IV.

The same division of the bone being made, it was examined on the twenty-second day, when the new ligament was complete.

EXPERIMENT V.

The same repeated in five weeks. The part was injected, and vessels were found proceeding from the edge of the ligament into the adhesive matter, now become ligamentous. So that at the end of five weeks the vascularity is complete, and some vessels proceed from the bone and find the ligament. Upon the dog these processes may be equally well observed,

but they are not quite so rapidly produced in a large dog as in the rabbit.

The parts were dissected and preserved after these experiments both in the dog and rabbit, and I have them in the collection at St. Thomas's Hospital, where they may be always seen.

EXPERIMENT VI.

In a rabbit, having divided the bone, I sewed together the two portions by conveying a needle and thread through the tendinous covering of the bone, but the ligatures separated, and the bones still united by ligament.

EXPERIMENT VII.

I divided the bone, and cut the rectus muscle through, yet the patella united by ligament.

I could not either in the dog or in the rabbit succeed in producing a bony union in the transverse fracture.

Yet I once saw in a patient of my kind friend, M. Chopart, at Paris, a case which appeared to me to be united by bone, the separation was so small, but I should now suppose I was mistaken.

A ligamentous union of the transverse fracture of the patella is, then, probably that which constantly occurs; or if there be an exception, it is very rare. But still the principle which is to guide the surgeon's conduct is, to make that ligament as short as possible. If the ligament be of great length, there is a proportionate weakness; for as soon as the accident has happened, the rectus muscle retracts and draws up the bone, and in proportion to the retraction suffered

Ligamentous union as short as is possible.

to remain, is the degree of shortening of the muscle, and consequently the diminution of its power. Those, therefore, who have had the bones widely separated, when they walk quickly, do it with a halt, and are very liable to fall, and to break the other patella. Let then the muscle be brought as nearly as it can be into its natural length, and although complete apposition of the bone is very rarely effected, yet the ligamentous union is rendered as short as circumstances will permit, and the patient will recover the entire use of the limb.

The idea which was formerly entertained of the danger of squeezing the callus into a projection in the inner side of the bone so as to destroy the smoothness of its internal surface is not at all tenable.

Treatment. When called to this accident the surgeon places the patient in bed upon a mattress, extends the limb upon a well padded splint placed behind the thigh and leg, to which it is tied, and which splint should be hollowed. An evaporating lotion is then applied upon the knee consisting of Liq. Plumbi *s.* acetat. dilut. ℥. v. with Spir. Vini ℥. i.; and no bandage should be at first employed. The body should be slightly raised in bed to relax the rectus muscle, and the heel should be raised to bring up the lower portion of the patella. If, on the succeeding day or two, there be much tension or ecchymosis, leeches should be applied, and the lotion should be continued; when, after a few days, the tension has subsided, then, and not till then, should bandages be employed. I have seen the greatest suffering and swelling produced by the early application of bandages in these cases, even so

as to threaten sloughing of the skin when there had been much contusion. The means which are most frequently employed in the treatment of this case are as follow. A roller is applied from the foot to the knee, to prevent the swelling of the leg, and the upper portion of bone is pressed downwards as far as it can be without violence, towards the lower, so as to lessen the retraction of the muscles and produce the approximation of the portions of bone. Then rollers are applied above and below the joint, confining a piece of broad tape next the skin on each side, which crosses the rollers at right angles; these portions of tape are bent down and tied over the rollers so as to bring them near each other, and thus to keep down the upper portion of bone. Sometimes, instead of the tape on each side, a broad piece of linen is bent over the rollers on the fore part of the joint, and is there confined so as to approximate the pieces of bone, and to bind down the upper portion of the patella, that its lower broken edge may not turn forwards.

But the mode I prefer is as follows: A leather strap is buckled around the thigh, above the broken and elevated portion of bone, and from this circular piece of leather, another strap is passed under the middle of the foot, the leg being extended, and the foot raised as much as possible. This strap is brought upon each side of the leg, and buckled to that which is fixed around the lower part of the thigh. The strap may be confined to the foot by a tape tied to it, and to the leg at any part in the same manner; and

this is the most convenient bandage for the fractured patella and for the patella dislocated upwards by the tear of its ligament.

In this position, and thus confined, the limb is to be kept for five weeks in the adult, and for six weeks at a more advanced age.

Then a slight passive motion is to be begun, and this must be done gently and with so much circumspection, that the ligament, if not firmly united, shall not give way, and the bones recede. If the union be found sufficiently firm to bear it, the passive motion is to be employed from day to day until the flexion of the limb be complete.

If passive motion be not used, it appears that the action of the extensor muscles would never return; for those who are kept in bed, with the joint at rest, do not in many months acquire any power of bending and extending the limb; but when passive motion has been used, the patient is placed on a high seat and directed to swing the leg, by which motion is given to the rectus, and if the mind be then directed to the contraction of that muscle, its powers will be gradually renewed. When the rectus muscle has been shortened, and the upper portion of bone is drawn from the lower, all the disposition to action in that muscle ceases; and it does not seem disposed to recover its voluntary action until it becomes again elongated, which is effected after the union of the ligament, by bending the knee; and from this point of elongation the muscle begins to contract.

State of the muscle.

A young woman was brought into my house

in her father's arms, and he said, "I am obliged to carry her, for she has lost the use of her legs, having broken both her knee-pans eight months ago, and she has never been able to use her limbs since."—Passive motion was directed, and she was ordered to try to extend her legs when they were bent. At first she could effect but little: however, by repeated trials, she gradually recovered the use of her limbs. Mr. John Hunter, who raised surgery into a science, and who seems to have been the first who attended to the principles on which the practice of surgery ought to be regulated, always dwelt most ably upon this subject in his lectures. Patients, from the pain which passive motion produces, and the slow return of action in the muscles, are indisposed to suffer the one or to make trials of the other; but without them there can be no recovery. Case.

The degree of approximation of the bone is, as I have stated, a matter of great consequence. The bone is rarely, if ever, brought into contact so as to be united in the transverse fracture by ossific union; but the less the distance between the bones, the greater is the power which the muscle reacquires: for, in proportion as the muscle is shortened is it weakened; therefore the surgeon should bring the bones as near together as he can to render the ligamentous union as short as is possible, and consequently to leave the muscle with as much of its original power as the nature of the accident permits. Degree of approximation.

Of the perpendicular Fracture of the Patella.

We have in the collection at St. Thomas's Hospital a patella, one-fourth of which has been broken off; the edge is smooth, and no ossific union of the piece from which it had been separated appeared to have been produced.

Ligamentous union.

A gentleman consulted me who had about one-third of the patella separated from the other part of the bone; it had united by ligament, for there was free motion between the fractured piece of bone and that from which it had been removed. He recovered quickly from this injury, and it influenced his power of walking very little.

These circumstances surprised me, because I saw no reason why the bone should not be united when broken perpendicularly, as I thought the muscles would have a tendency to bring the parts together. I made it therefore a subject of experiment.

EXPERIMENT I.

Union by ligament, in experiments.

July 31st, 1818, I broke the patella of a dog, by placing a knife upon it in the longitudinal direction, having first drawn the integuments aside, and on the 12th of September following I examined the part, when I found the two portions of bone considerably separated from each other, and united by ligament. The cause was as follows: when I had divided the bone, the knee became bent, the condyles of the os femoris

pressed against the inner side of the patella, and thrust the parts asunder, and only a ligamentous union had taken place. (See Plate.)

EXPERIMENT II.

August 2d, 1818, I broke in the same manner the patella of a rabbit, and examined the parts on September 3rd, when I found the two portions of bone widely separated, and united only by ligamentous matter. I now began to think it impossible for the patella to unite by bone, but determined to make another experiment to determine this point.

EXPERIMENT III.

I divided the patella longitudinally in a dog, but took care that the division should not extend into the tendon above or to the ligament below it, so that there should be no separation of the two portions. I examined it three weeks after, and found it united; no separation existing between the two portions*. (See Plate.) Union by bone.

It appears, then, that under longitudinal and transverse fracture, a ligamentous union is generally produced, and that it arises from the separation produced in the bone; and that if it cannot separate, but its parts remain in contact, then ossific union will be produced.

In the summer of 1819, Mr. M. was thrown from his gig as he was passing along the Strand,

* The bone was, under maceration, found united in part by bone, and in part by cartilage, not yet completely ossified.

and fractured his patella by the fall transversely, and the lower portion of the bone was also broken perpendicularly, so that it was divided into three pieces. The transverse fracture united as usual by ligament; but the perpendicular, by bone. Mr. Parrott, of Tooting, who also attended the case, writes in these words:—"Dear Sir, I have great pleasure in replying to your letter; the longitudinal fracture of the patella of Mr. M. has become very firmly consolidated, but there is a line or ridge to be traced upon the surface of the bone, which marks distinctly the place where it had been separated.

"JOHN PARROTT, JUN."
Tooting.

Treatment. In the longitudinal or perpendicular fracture of the patella, the best treatment is, to extend the leg, to use local depletion, and evaporating lotions; in a few days to apply a roller around the limb, and then a laced knee-cap with a strap which buckles around the knee above and below the patella.

Of compound Fracture of the Patella.

From violence or ulceration. These occur from injury, or from an ulcerative process under peculiar circumstances.

The cases which I have seen of this accident, are as follows:

CASE I.

Case. A man was admitted into Guy's Hospital, under Mr. W. Cooper, with a compound fracture of this bone; violent inflammation followed; sup-

puration ensued, with the highest degree of constitutional irritation; and no opportunity was given for amputation from the great swelling of the thigh; and this man died. The bone is in the museum of St. Thomas's Hospital, as disunited as at the first moment of the accident.

CASE II.

Case. A man was admitted into St. Thomas's Hospital, under the care of Mr. Birch, with a fracture of the patella and a small wound extending into the joint. The knee was fomented and poulticed; inflammation and suppuration followed; and this man in a few days died with the highest symptoms of constitutional irritation.

CASE III.

Case. Mr. Hawker, surgeon, called me to visit a man who was just arrived in London; who was at work at a warehouse up one pair of stairs, and hearing the signal for dinner, and seeing the doors of the warehouse open, he walked quickly out and fell into the street. By this fall he had a compound fracture of the patella. The limb was attempted to be saved. The joint suppurated, the discharge became excessively great, and the symptoms of irritation ran so high that I thought he would not recover; but he became somewhat better, and I advised him to go into the country. I afterward heard that he gradually recovered with an anchylosed joint.

CASE IV.

Case. Mr. Redhead, residing at Kennington Cross, aged 39 years, was thrown from his gig on the 18th of June, 1819, against a cart-wheel. His knee came violently in contact with the wheel, which fractured his patella and opened the joint. Mr. Dixon, of Newington Butts, was sent for, and he found that the knee had bled freely from a wound on its outer side, from which the synovia freely escaped, and which readily admitted his finger to the shattered patella. The accident happened at ten o'clock, and I was sent for by Mr. Dixon, and when I met him at four o'clock I found a wound through which I readily passed my finger into the joint, and the patella was not broken transversely, but, as I have expressed it, shattered, that is, broken into several pieces, and a small piece which was separated from the rest I removed. It was agreed between Mr. Dixon and myself that the limb should be attempted to be saved, for the patient was of a spare habit, and from his great composure shewed he was not of an irritable constitution. I passed a suture through the integuments, knowing the difficulty of keeping the wound closed on account of the continued escape of synovia, but taking the utmost care that the ligament should not be included in the suture. Adhesive plaister was also applied over the wound, and rollers, lightly put on, which were kept constantly wet with spirits of wine and water. The leg was placed in the extended position, and he was ordered not to

move it in the slightest degree, and to live on fruit.

Saturday. He had passed a very good night, and was free from pain or fever.

Sunday night. He was restless, and it was thought delirious.

Monday morning. He had a dose of Ol. Ricini, which relieved him from his feverish feelings.

Tuesday. He stated he had a good night, and he afterwards had no bad symptom. As there was no swelling, no inflammation, and scarcely any pain, the suture was not removed until the 30th of June, when the adhesive plaister was renewed. He recovered without any untoward accident. Mr. Dixon ordered him from bed in a month. At the end of five weeks Mr. D. gave the joint slight passive motion, and on the 7th of August he walked across his room.

If the laceration be extensive, or the contusion very considerable in these cases, the operation of amputation will be required; but if the wound be small, and the patient unirritable, and no sloughing of the integuments or ligament is likely to occur from the nature of the accident, it will be best to try to save the limb; and the treatment of Mr. Redhead's case is that which I should pursue. The principal object is to produce adhesion immediately, and every means in our power must be used to effect it. I know well that sutures are generally objectionable, and I never employ them, if I can possibly succeed without them, but in moveable parts, in those which are unsupported, and in those through which a secretion is liable to

force its way, they are not only justifiable but highly necessary.

A compound fracture of the patella will be sometimes produced by an ulcer in the following manner.

CASE.

Ulceration.

A woman was admitted into Guy's Hospital in 1816, with a simple fracture of the patella, which had long been united by a ligament of about three inches in extent. Ulcers were formed upon different parts of the body, and unfortunately one of these upon the integuments over the union of the patella. It became sloughy, and extended through the new ligament to the joint which it laid open; violent constitutional irritation succeeded; a copious suppuration was produced, and no opportunity was given of amputating the limb, for the inflamed and swollen state of the thigh forbad it. This woman died.

On Oblique Fractures of the Condyles of the Os Femoris into the Joint.

Rare,

These cases are of rare occurrence, but when they happen it is difficult to prevent deformity, and to restore the patient to a sound and useful limb. They are known by the great swelling of the joint with which they are accompanied, by the crepitus which is felt in moving the joint, and by the deformity with which they

if either condyle.

are attended. The fracture is sometimes of the inner and sometimes of the outer condyle, and the bone is split down into the joint.

Whether the external or internal condyle is broken, the same treatment is required. The limb is to be placed upon a pillow in the straight position, and evaporating lotions and leeches are to be used to subdue the swelling and inflammation. When this object has been effected, a roller is to be applied around the knee, and a piece of stiff pasteboard, about sixteen inches long, and sufficiently wide to extend entirely under the joint, and to pass on each side of it, so as to reach to the edge of the patella, is to be dipped in warm water, and applied under the knee and confined by a roller. When this is dry it has exactly adapted itself to the form of the joint, and this form it afterwards retains, so as best to confine the bones. Splints of wood or tin may be used on each side of the joint, but they are apt to make uneasy pressure. In five weeks passive motion of the limb may be gently begun, to prevent anchylosis. I prefer the straight position in these cases, because the tibia presses the extremity of the broken condyle into a line with that which is not injured. Treatment.

Examples of compound fractures of the condyles are very unfrequent; the following was under the care of Mr. Travers in St. Thomas's Hospital, who was so kind as to send me the following history of it. Compound fracture.

Michael Dixon was admitted into St. Thomas's Hospital, September 17th, 1816, for a fracture of the lower extremity of the femur, occasioned by his legs being entangled in the spokes of a carriage-wheel in motion. There was much displacement of the fractured bone, and a small wound opposite the external con-

dyle. Upon examination, it was evident that the fracture had extended nearly in the direction of the axis of the bone, in addition to a transverse fracture of the shaft of the bone above the joint; the external condyle was moveable and thrown out of its place during the accident, as if it had been drawn by the leg which was twisted inwards. The limb was laid in a fracture-box, in a semiflexed position on the heel; the constitutional disturbance was very slight.

Oct. 5. The external condyle is still moveable; the integuments over it are ulcerated: so as to denude the bone; the health remains good.

Nov. 5. The broken bone protrudes and appears to be dead; it is surrounded by fungous granulations, and there is but little discharge.

Nov. 18. The protruded bone was gently twisted off by forceps shewing it to be the external condyle with its articular surface; there still protruded a small portion of bone, but this soon healed over; the limb was now placed in an extended position, as anchylosis was considered unavoidable.

Dec. 1. The boy has recovered almost the perfect use of his limb, and is enabled to bend and extend it without pain.

Dec. 6. The boy was discharged from the hospital. The wound was healed, and he can walk tolerably well with a stick.

On the February following he called at the hospital, walking without any support, and having free use of the joint.

Fractures of the Body of the Femur just

above the condyles require the bent position of the knee, to prevent deformity, which is sure to follow if the limb be placed in the straight position, and most miserable union I have thus seen produced. The thigh ought to be put over the double inclined plane, to constantly extend the condyles in a line with the shaft of the bone, and a roller is to be applied around the lower parts of the thigh-bone, to assist in pressing the bones together. These cases I have seen occur in persons prior to the age of twenty years, and it has appeared to me that the epiphysis has been broken off, but I have also known it happen in very old persons, and in one instance prove destructive to life.

Fractures just above the condyles.

The Head of the Tibia is sometimes obliquely broken, and if it be fractured into the joint the treatment which it requires is similar to that which is necessary in the oblique fracture of the condyle of the os femoris, that is, first, the straight position of the limb, because the femur preserves the proper position of the fractured tibia, by being a splint to its upper portion, keeping the articular surfaces equal; secondly, a roller, to press one part of the broken surface against the other; thirdly, a splint of pasteboard, to assist in the preservation of that pressure; and fourthly, early passive motion to prevent anchylosis.

Oblique fractures of the tibia into the joint.

But if the fracture of the tibia be oblique, but not into the joint, then it is best to place the limb upon the double inclined plane; and as the cause of deformity is the elevation of the lower portion of the tibia, which is drawn up

Fracture just below the joint.

on either side of the knee-joint, as the fracture is in the inner or outer side of the tibia, the weight of the leg keeps the limb constantly extended, as it hangs over the angle of the inclined plane, and thus brings the bone into as accurate apposition as the case permits.

On Dislocations of the Head of the Fibula.

Union with the tibia.

The fibula joins the tibia, three-quarters of an inch below the articulation of the knee. Its head is inclosed in a capsular ligament which unites it to the tibia, to which it is also joined through the greater part of its length by the interosseous ligament.

Produced by violence or relaxation.

This bone is liable to dislocation both from violence and from relaxation. I have only seen one case of it from violence, and in that instance it was connected with the compound fracture of the tibia.

—— Briggs, of whose dislocation of the tibia I have given an account, had at the upper part of the other leg a compound fracture of the tibia and dislocation of the head of the fibula. The limb was attempted to be saved, but the constitutional irritation ran so high that amputation was obliged to be performed, which was done by my colleague Mr. Lucas, and the man did well.

Dislocations of the head of the fibula from relaxation are more frequent, and the head of the bone is in these cases thrown backwards, and is easily brought into its natural connection with the tibia, but it directly again slips from its position. This state produces a consider-

able degree of weakness and fatigue in walking, and the person suffers much from exercise. As in these cases there is a superabundant secretion of synovia and distension of ligament, repeated blistering is required to promote absorption, and afterwards a strap is to be buckled around the upper part of the leg, to bind the bone firmly in its natural situation, which gives support and at least prevents the increase of the malady.

ON DISLOCATIONS OF THE ANCLE-JOINT.

Structure of the joint.

The bones which enter into the composition of the ancle-joint are the tibia, fibula, and astragalus. The tibia forms an articulating surface at its lower part, which rests upon the astragalus, and there is a projection on the inner side of the lower portion of the bone which forms the malleolus internus, and this part is articulated with the side of the astragalus. The fibula projects beyond the tibia at the outer ancle, and forms there the malleolus externus, which has also an articulating surface for the astragalus. The astragalus, which is the superior tarsal bone, rises between the malleoli, and the lower part of the tibia moves upon it principally in flexion and extension.

Bones.

Thus then nature has strongly protected this part by the deep socket formed by the two bones of the leg and by the ball of the astragalus, which is received into it.

Capsular ligament.

A capsular ligament, lined by a synovial membrane, joins the tibia and fibula to the astragalus. A strong ligament unites the tibia to the fibula, but without any intervening articular cavity, as the ligament proceeds from one surface of bone and is received into the other.

Peculiar ligaments.

The peculiar ligaments joining the tibia and fibula to the tarsus consist of a deltoid ligament, which proceeds from the tibia to the astragalus, os calcis and os naviculare. The fibula is united at its lower end by three excessively strong ligaments, one anteriorly from the malleolus externus to the astragalus, one inferiorly to the os calcis, and the third to the astragalus posteriorly; and it is the strong union of this bone which leads to its being more frequently fractured than dislocated; and even when the tibia is luxated the fibula is fractured in two of the species of dislocation of the ancle, and generally in all; but when the tibia is thrown outwards I have known the fibula escape a fracture.

I have seen the tibia dislocated at the ancle in three different directions, forwards, inwards, and outwards; but a fourth species of dislocation is said to occur occasionally, viz. backwards.

Of the simple Dislocation of the Tibia inwards.

Dislocation inwards.

This is the most frequent of the dislocations of the ancle; the tibia, in this accident, has its internal malleolus thrown inwards, which is so forcibly projecting against the integuments as to

threaten their bursting. The foot is thrown outwards, and its inner edge rests upon the ground; about three inches above the outer ancle there is a deep depression, and a general tumefaction, from extravasation, surrounds the joint. Symptoms.

Upon dissection, the internal appearances are as follow: the end of the tibia rests upon the inner side of the astragalus, instead of on its upper articulatory surface, and if the accident has occurred from a person jumping from a considerable height, the lower end of the tibia, where it is connected to the fibula by ligament, is split off, and remains connected with the fibula, which is also broken from two to three inches above the joint, and the broken end of the fibula is carried down upon the astragalus occupying the natural situation of the tibia; the malleolus externus of the fibula remains in its natural situation, with two inches of the fibula and the split portion of the tibia; the capsular ligament attached to the fibula at the malleolus externus and the three strong fibular tarsal ligaments, remain uninjured. Dissection.

This accident generally happens by jumping from a considerable height, or in running violently with the toe turned outwards, when the foot is suddenly checked in its motion while the body is carried forwards upon the foot, and the ligaments on the inner side of the ancle give way.

For the reduction of this dislocation the patient is to be placed upon a mattress properly prepared, and is to rest on the side on which the injury has been sustained; he is then to bend the leg at right angles with the thigh, so as to relax the gastrocnemii muscles as much Mode of reduction.

as is possible, and an assistant grasps the foot, and gradually draws it into a line with the leg. The surgeon fixes the thigh and presses the tibia downwards, and thus forces it upon the articulating surface of the astragalus. Great force is required if the limb be placed in the extended position, from the resistance the gastrocnemii give; and it is pleasing to observe, after most violent attempts, a well-informed surgeon gently bend the limb, and, under a comparatively slight extension, return the parts to their natural situation.

Treatment. When the limb has been reduced, it is still to remain upon its outer side in the bent position, with the foot well supported; a many-tailed bandage is placed over the part to prevent it slipping from its place, and this is to be kept wet with an evaporating lotion. Two splints are then to be applied; and that upon which the outer part of the limb rests is to have a foot-piece, to give support to the foot, prevent its eversion, and preserve it at right angles with the leg. If much inflammation succeeds, leeches are to be applied to the parts, and the constitution will require relief by taking blood from the arm, and by attention to the bowels; but I shall say no more on this subject until I describe compound dislocation. A person who has had this accident may be removed from his bed in five or six weeks, long straps of plaister being passed around the joint to keep the parts together, and he may be suffered to walk on crutches; but from ten to twelve weeks elapse before he has the free motion of his foot; and much friction and passive motion are required after eight weeks to restore the motion of the joint.

Of the simple Dislocation of the Tibia forwards.

In this accident the foot appears much shortened, the heel proportionably lengthened, and the toes are pointed downwards. Upon dissection the tibia is found to rest upon the upper surface of the os naviculare and os cuneiforme internum, quitting all the articulatory surface of the astragalus, excepting a small portion on its fore part, against which the tibia is applied. The fibula is broken, and its fractured end advances with the tibia, and is placed by its side; its malleolus externus remains in its natural situation, but the fibula is broken about three inches above the joint; the capsular ligament is torn through on its fore part; the deltoid ligament is only partially lacerated, and the three ligaments of the fibula remain unbroken. This accident arises from the body falling backwards whilst the foot is confined, or from a person jumping from a carriage in rapid motion, with the toe pointed forwards. Symptoms. Dissection. Cause.

The treatment consists in attending to the following rules: the patient is placed in bed on his back; one assistant grasps the thigh at its lower part, and draws it towards the body, and another pulls the foot in a line a little before the axis of the leg, and the surgeon pushes down the tibia to bring it into its place. The same principles are held in view in this mode of reduction as in the former, with respect to the relaxation of the muscles. A many-tailed bandage must be lightly applied dipped in an evaporating Reduction. Treatment.

lotion; and the local and constitutional treatment is the same as in the dislocation inwards.

As to position, it is best to keep the patient upon the heel resting on a pillow, and to have a splint properly guarded on each side the leg, having foot-pieces to keep the foot well supported at right angles with the leg, so as to prevent the muscles again drawing it from its place. As in five weeks the fibula will be united, there will then be no danger in taking the patient from his bed; and gentle passive motion may be begun.

Of the partial Dislocation of the Tibia forwards.

Symptoms. This bone is sometimes partially luxated forwards, so as to rest half on the os naviculare, and half on the astragalus. The fibula, in this accident, is broken; the foot appears but little shortened, nor is there any considerable projection of the heel. The signs of this accident are as follow: The foot is pointed downwards, and a difficulty is experienced in the attempt to put it flat on the ground: the heel is drawn up, and the foot is in a great degree immoveable.

Case. The first case of this kind which I saw, was in a very stout lady who resided at Stoke Newington, and had by a fall, as she said, sprained her ancle. When I examined the limb, I found the foot immoveably fixed and pointed downwards, attended with great pain just above the ancle. I attempted to draw the foot forwards and bend it, but could not succeed. Some years after I saw this lady at Bishop Stortford, walking

upon crutches; her toe was pointed, and she was unable to bring any other part of the foot to the ground; the degree of distortion was less than that which occurs in the complete luxation of the bone forwards; but now all tension having been subdued, the nature of the injury was more evident, though I should not have known it decidedly, but from an examination of a foot shewn me by my friend and late apprentice, Mr. Tyrrell, who was so kind as to give me the parts, and of which I have given a plate. The articular surface of the lower part of the tibia was divided into two; the anterior part was seated upon the os naviculare; the posterior upon the astragalus; these two articulatory surfaces were formed at the lower extremity of the bone, both of which had been rendered smooth by friction. The fibula was found fractured. (See Plate.) The result of this dissection clearly proves the necessity which exists in these accidents, however slight they may at first sight appear, of not resting satisfied until the foot be returned into its natural position; for if neglected in the commencement, severe inflammation and tension will prevent even a forcible extension being afterwards useful; and if still longer neglected, the changes in the state of the muscles, and the union of the fibula will preclude the possibility of a reduction, even under the most violent attempts. The mode of reduction and after-treatment will in no respect differ from that required in the perfect dislocation of the bone, either as respects the relaxation of the muscles, the bandages, or the local and constitutional treatment.

Dissection.

Treatment.

Of the simple Dislocation of the Tibia outwards.

This luxation is the most dangerous of the three, for it is produced by greater violence, is attended with more contusion of the integuments, more laceration of ligament, and greater injury to the bone; the foot is thrown inwards, and its outer edge rests upon the ground. The malleolus externus projects the integuments of the ancle very much outwards, and forms so decided a prominence that the nature of the injury cannot be mistaken; the foot and the toes are pointed downwards.

Symptoms.

In the dissection of this accident, it is found that the malleolus internus of the tibia is obliquely fractured and separated from the shaft of the bone; the fractured portion sometimes consists only of the malleolus, at others, the fracture passes obliquely through the articular surface of the tibia, which is thrown forwards and outwards upon the astragalus, before the malleolus externus. The astragalus is sometimes fractured, and the lower extremity of the fibula is broken into several splinters. The deltoid ligament remains unbroken, but the capsular ligament is on its outer part torn; the three fibular tarsal ligaments remain whole in most cases, but when the fibula is not broken, they are ruptured; none of the tendons are lacerated, and hæmorrhages scarcely ever occur to any extent, as the large arteries generally escape injury. This accident happens either by the wheel of a carriage passing over the

Dissection.

leg, or by the foot being twisted inwards in jumping or falling.

The mode of reduction consists, in placing the patient upon his back, in bending the thigh at right angles with the body, and the leg at right angles with the thigh; the thigh is then grasped under the ham by one assistant, and the foot by another; and thus an extension is made in the axis of the leg, whilst the surgeon presses the bone inwards towards the astragalus. The limb, in the simple dislocation, is to be laid upon its outer side, resting upon a splint, with a foot-piece, and a pad is to be placed upon the fibula, just above the outer angle, and extending a few inches upwards, so as in some measure to raise that portion of the leg, and support it so as to prevent the tibia and fibula slipping from the astragalus, as well as to lessen the pressure of the malleolus externus upon the integuments, where they have sustained injury. Reduction.

The local and general treatment will be the same as in the former cases, although more depletion is required as greater inflammation succeeds; the greatest care is required that the foot does not become twisted inwards or pointed downwards, as either of these states prevents the limb from being afterwards useful. Passive motion should be given to the joint in six weeks from the accident, when the patient may rise from his bed, and be allowed to walk upon crutches, unless great swelling of the ancle prevents it. In general in these cases from ten to twelve weeks elapse before the cure is complete. Treatment.

On the compound Dislocation of the Ancle-joint.

These accidents take place in the same direction as the simple dislocations, and the bones and ligaments suffer in the same manner as in those dislocations. The only difference therefore in these cases is, that the joint is laid open by a wound in the integuments and ligaments, opposite to the laceration of the skin, by which the synovia escapes, and through which the ends of the bone protrude; this opening in the integuments is generally occasioned by the bone, but sometimes by the pressure of some uneven surface on which the limb was thrown.

Opening into the joint.

The bones being replaced by the same means as are employed in the simple dislocation, the effect of this accident upon the parts composing the joint is as follows. The synovia, as I have stated, escapes by a large wound in the membrane secreting it, and in a very few hours inflammation begins; and when an additional quantity of blood is first determined to the part an abundant secretion issues from this membrane, and is discharged through the wound; the ligaments participate in the inflammation as well as the extremities of the bones, which enter into the composition of the joint. The inflammation of the internal secreting membrane of the joint in about five days proceeds to suppuration; at first but little matter is discharged, but it continues until it becomes very abundant, and the lacerated parts of the ligaments and periosteum also secrete matter. Under this process of suppuration the cartilages become partially

Local effects.

or wholly absorbed, but generally partially only; but the ulceration of the cartilage is a very slow process and attended with severe constitutional irritation, and often lays the foundation of exfoliation of the extremities of the bones. When they are completely absorbed, granulations arise from the surface of the bones and from the inner side of the synovial membrane, and these inosculate and fill up the cavity between the extremities of the bones. Sometimes we find after accidents to joints, that the adhesive process occurs at one part and that the cartilage is not absorbed, whilst granulations are formed at others where the cartilage was removed by ulceration, and I have seen after inflammation in joints the cartilages remain and their surfaces adhere.

This inosculation of granulations nor the process of adhesion, do not lead to permanent anchylosis, for if passive motion be begun as soon as the parts from cessation of pain and inflammation will permit, motion will be restored, not always entirely, but with very little diminution; and the other parts of the tarsus will acquire such an extent of motion as to render the deficiency in the mobility of the ancle-joint but little apparent; the aperture in the ligament is filled by granulations; and with respect to the extremities of the bone, when they are joined by ossific union, it is by the deposit of cartilage and by a secretion of phosphate of lime, in the usual manner in which bones are formed and repaired.

Thus then the compound dislocation of the ancle is leading to inflammation over a very extensive secreting surface, as well of bone

as of ligament; it next produces an extended suppuration over the lining of the joint, which leads to much constitutional derangement, and further it becomes the source of an ulcerative process, more or less extensive according to the treatment pursued, by which the cartilage is partly or wholly removed, and by which the irritative fever is supported for a great length of time; and the ulceration sometimes extends over the extremities of the dislocated bones, leading to great additional constitutional irritation and continued disease from exfoliation.

Constitutional effects.

These local effects are accompanied by the common symptoms of constitutional irritation. In two or three days from the accident, or sometimes as early as twenty-four hours, the patient complains of pain in his back and in his head, shewing the influence of the accident on the brain and spinal marrow. The tongue is furred, white if the irritation be slight, yellow if greater, and brown almost to blackness if it be considerable; the stomach is disordered, there is loss of appetite, nausea, and sometimes vomiting; the intestines cease to secrete, and the glands connected with them, as the liver, &c.; costiveness is therefore an attendant sign. The skin has its secretion stopped, it is hot and dry; the kidneys also have their secretion diminished; the urine is high-coloured and small in quantity. The heart beats more quickly and the pulse becomes *hard*, which is the pulse of constitutional irritation from local inflammation, and in great degrees of it becomes irregular and intermittent; the respiration is quicker in sympathy with the quicker circulation; the

nervous system becomes additionally affected in high degrees of local irritation; restlessness, watchfulness, delirium, subsultus, and sometimes tetanus occur. These are the usual effects of local irritation upon the constitution, occurring in different degrees according to the violence of the injury, the irritability of the constitution, and the powers of restoration.

Cause of the symptoms.

The cause of the violence of these symptoms is the wound which is made into the joint, and the great efforts required for its repair, for when there is no wound, and the process of adhesion can unite the part, little local inflammation or constitutional irritation occur; and if this be the cause of the violence of the symptoms, the principle in the treatment of this accident is easily comprehended, and it consists in closing the wound as completely as is possible, to assist nature in the adhesive process by which the wound is to be closed, and to render suppuration and granulation less necessary for the union of the opened joint.

Principle of cure.

Is amputation required?

The first question which arises upon this subject is the following: *Is amputation generally necessary in compound dislocations of the ancle?* My answer is, certainly not; thirty years ago it was the usual practice to amputate limbs for this accident, and it was then thought absolutely necessary for the preservation of life by some of our best surgeons; but so many limbs have been of late years saved, indeed I may say so great a majority of cases, that such advice would now be considered not only injudicious but cruel. It is far from being my intention to state that amputation is never required, but

only to observe that in by far the greater number of these accidents, that this operation is unnecessary.

But before I give the proofs of what I have advanced, let me state the mode of treatment which is to be pursued in these cases.

Treatment. When the surgeon examines the limb, he finds a wound of greater or less size, according to the degree of the injury. The extremity of the tibia projects if the dislocation of the tibia be inwards; and the tibia and fibula are protruded, if the dislocation of the former be at the outer ancle. The ends of the bones are often covered with dirt, from their having reached the ground. The foot is loosely hanging on the inner or outer side of the leg, according to the direction of the dislocation.

Artery divided. Sometimes, though very rarely, a large artery will be divided; and it is surprising that the posterior tibial artery so generally escapes; the anterior tibial being the only vessel I have known torn. The arrest of hæmorrhage is the first object; and for this purpose, if the anterior tibial artery be wounded, it must be secured by ligature. The extremity of the bone is to be washed with warm water, as the least extraneous matter admitted into the joint will produce and support a suppurative process, and the utmost care should be taken to remove every portion of it adhering to the end of the bone.

Loose pieces of bone. If the bone be shattered, the finger is to be passed into the joint, and the detached pieces are to be removed; but this is to be done in the most gentle manner possible, so as to do

no unnecessary injury; and if the wound be so small as to admit the finger with difficulty, and small loose pieces of bone can be felt, the integuments should be divided with a scalpel upwards, to allow of such portions being removed without violence; the incision should be so made as to leave the joint with as much covering of integument as possible. The integuments are sometimes nipped into the joint by the projecting bone, and it cannot be reduced, when this is the case, without making an incision upwards, to allow of the skin being brought from under the bone; and when the edges of the incised wound are afterwards brought together, no additional evil arises from the extension of the wound. Integuments.

The mode of reducing the bone is (in other respects) similar to what we have already described, when speaking of simple dislocation, by bending the leg upon the thigh, so as to relax the muscles before the extension is made. When the bone has been reduced, a piece of lint is dipped in the blood and applied wet over the wound upon which the blood coagulates, and forms the most natural, and as far as I have seen, the best covering to the wound. A many-tailed bandage is then applied, the portions of which should not be sewn together, but passed under the leg, so that any one piece may be removed when it becomes stiff, and by fixing another to its end, it can always be applied afresh, without any disturbance to the limb; this bandage is to be kept constantly wet with spirits of wine and water. A hollow splint, with a foot-piece at right angles, is to be applied on Reduction.

the outer side of the leg, in the dislocation inwards, and the leg is to rest upon its outer side: but in the dislocation outwards it is best to keep the limb upon the heel, with a splint both upon the outer and on the inner side, with an aperture in the splint opposite to the wound.

The patient's knee is to be slightly bent in each dislocation, to relax the gastrocnemius muscle. The foot must be carefully prevented being pointed; great care being taken to keep it at right angles with the leg, otherwise the limb will be useless when the wound is healed. The patient is to be placed on a mattress, and a pillow is to reach from half way above the knee to beyond the foot, and another is to be rolled under the hip, to support the upper part of the thigh-bone.

Constitutional treatment.

Blood-letting must be had recourse to or not according to the powers of the constitution, as it is necessary to bear in mind that the patient has a great trial of his powers to undergo, and will require, in the end, all the support which his strength can receive. Purgatives must also be used with the utmost caution, for there cannot be a worse practice, when a limb has been placed in a good position, and adhesion is proceeding, than to disturb the processes of nature by the frequent changes of position which purges produce; and I am quite sure, that in cases of compound fracture, I have seen patients destroyed by their frequent administration. That which is to be done by bleeding, and emptying the bowels, should be effected at the first hour of the accident, before the adhesive inflammation arises; after which the liquor am-

moniæ acetatis and tinctura opii, form the patient's best medicine, with a slight aperient at intervals.

Secondary treatment.

If the patient complains of considerable pain in the part in four or five days, the bandage may be raised, to examine the wound; and if there be much inflammation, a corner of the lint should be lifted from the wound to give vent to any matter which may have formed; but this ought to be done with great circumspection, as it is in danger of disturbing the adhesive process if that be proceeding without suppuration. By this local treatment it will every now and then happen that the wound will be closed by adhesion, but if in a few days it be not, and suppuration take place, the matter should have an opportunity of escaping; and the lint being removed, simple dressings should be applied. After a week or ten days if there be suppuration with much surrounding inflammation, poultices should be applied upon the wound, leeches in its neighbourhood and upon the limb at a distance the evaporating lotion should still be employed; but as soon as the inflammation is lessened, the poultices should be discontinued, as they encourage too much secretion, and relax the blood-vessels of the part, so as to prevent the restorative process.

Result.

If the cure proceeds favourably, in a few weeks the wound is healed with little suppuration. If less favourably, a copious suppuration takes place, the wound is longer in healing, and exfoliation of the extremity of the bone still further retards the cure. The motion of the joint is not always lost, but is sometimes in a great degree restored; but this depends upon the greater or less

extent of suppuration or ulceration. The patient after three months walks with crutches under the most favourable circumstances, but is many months in others, and he bears upon the foot at different periods of time in different degrees of injury, as in compound fracture when adhesion is not at first produced, only that the patient is in these cases longer in recovering.

I shall now proceed to state the cases which have induced me to say amputation, as a general rule, is improper in these cases.

Cases.

The first circumstance which led me to doubt the true judgment of the opinion which recommended an indiscriminate amputation of these injuries, was this—

CASE I.

I was, many years ago, going into the country with a friend of mine, and we met with a surgeon in our journey, who put this question—"What do you do in compound dislocations of the ancle joint?" I do not recollect the reply, but he proceeded to say, I have had a case of compound dislocation of the ancle joint under my care, in which I told the patient he must lose his limb; not approving this advice, his friends sent for another surgeon, who said he thought he could save it; the patient placed himself under his care, and the man, he added, was recovering.

CASE II.

More than twenty years ago I received from Mr. Lynn, of Woodbridge, now Dr. Lynn, the

astragalus of a man, broken into two pieces, which he had taken from a dislocated ancle-joint. His letter is as follows :

DEAR SIR,

J. York, aged 32 years, being pursued by some bailiffs, jumped from the height of several feet to avoid them. The tibia and a part of the astragalus protruded at the inner ancle. I immediately returned the parts into their natural situation. Suppuration ensued, and in five weeks a portion of the astragalus separated, and another piece a week afterwards, which when joined formed the ball of that bone. In three months the joint was filled with granulations; it soon afterwards healed, and the man recovered with a good use of the limb.

Yours, &c.

JAMES LYNN.

CASE III.

I attended a compound fracture of the ancle-joint, in the year 1797, with Mr. Battley, who then practised as a surgeon in St. Paul's Churchyard, and is now a chemist and druggist in Fore Street, of the first respectability and character; an account of which I shall give in the words of Mr. Battley.

In the month of September, 1797, a gentleman, lodging in Duke Street, Smithfield, in a fit of insanity threw himself from a two-pair of stairs window into the street, his feet first reaching the ground. He got up without as-

sistance, knocked violently at the outer door of the house, and ascended the stairs without the least assistance, bolted the door after him, and got into bed. He refused to open the door, and it was obliged to be forced. A neighbouring surgeon was sent for, who, on viewing the case, proposed an immediate amputation, which was not acceded to by his friends, but Mr. Cooper and myself were requested to take charge of the case. On examination there was found a compound dislocation of the ancle-joint; the tibia was thrown on the inner side of the foot, and when the finger was passed into the wound the astragalus was discovered to be shattered into a number of pieces; the loose and unconnected portions of bone were removed and the tibia replaced, after which lint, dipped in the oozing blood, was wrapped around the lacerated parts, and the limb was placed on its outer side, with the knee considerably bent. The parts were ordered to be kept cool by the frequent application of an evaporating lotion. The patient remained as quiet as could be expected, under his state of mind, until the third or fourth day, when a considerable inflammation appeared in the joint, and greatly increased the previous irritable state of his constitution. Leeches, fomentations, and poultices were applied to the limb, blood was taken from the arm, and purgative medicines were given, and afterwards saline medicines with sudorifics. Extensive suppuration ensued, and continued for six weeks or two months, when it began to lessen and healthy granulations appeared on the whole wounded surfaces; and about this time

the state of his mind began to improve, and it continued to amend as his leg advanced in recovery. At the end of four or five months the suppurated parts had filled up, the joint healed, and his mind recovered its natural tone. At the end of nine months he returned to his employment, but the ancle-joint was stiff. In two years he had so far recovered as to walk without the aid of a stick; and at the end of three or four years was able to pursue his avocations nearly as well as at any former period of his life.

RICHARD BATTLEY.

CASE IV.

On Compound Dislocation of the Tibia inwards.

I was sent for on the 11th of August, 1814, by Mr. Richards, of Seal, in Kent, to visit Mr. Knowles, a farmer, residing at TythamFarm, aged 48, who had been thrown from his chaise against the hinder wheel of a waggon, dislocated his tibia inwards, and fractured both the tibia and fibula.

Mr. Richards was immediately called to the case, reduced the dislocation, and endeavoured to heal the wound by adhesion. When I saw him, which was ten days after the accident, the wound wore a favourable aspect. The discharge was abundant, but not in a degree to excite alarm, and all I had to do was to praise the judgment which had led to the preservation of the limb, and to direct the continuance of the means which had been employed for that purpose.

Before I ventured to state the case to the public, I wrote to Mr. Richards, who informs me that Mr. Knowles's wound is perfectly healed, and that he walks without the use of a stick.

CASE V.

For the following details I am obliged to Mr. Rowley, apprentice to Mr. Chandler, surgeon to St. Thomas's Hospital.

DEAR SIR,

In answer to your inquiries, I beg leave to forward you the particulars of Elizabeth Chisnell's case, who was admitted into St. Thomas's Hospital, Saturday, May 29th, 1819, with a compound dislocation of the left ancle outwards, occasioned by her slipping from the footpath into the road-way. The wound communicating with the joint was situated upon the outer part of the leg, and was about four inches in extent, through which the fibula projected two inches, but it was not fractured; the ligaments connecting the malleolus externus and the astragalus were lacerated. From the inclination of the sole of the foot inwards, the whole articulating surface of the joint was so displaced as to allow two fingers to pass readily across, when I found the extremity of the tibia fractured. The parts were easily returned to their original situation by extending the foot, the leg having been first bent upon the thigh. During the reduction the integuments became confined between the malleolus externus and astragalus, so as to require an incision upwards by the side of the fibula, before it could be extricated; but that

being done, its lips were brought together by four sutures, and straps of adhesive plaister. Splints were applied, and the common applications to subdue the consequent inflammation used.

June 1. The adhesive plaister and sutures were removed, owing to the wound and adjacent soft parts around the ancle being in a state of slough. Poultice of linseed meal were ordered to be used daily.

June 5. The sloughs are separated, the sore is granulating, the discharge profuse ; a collection of matter has formed upon the inside of the leg, which was discharged by puncture. The wound was ordered to be dressed, and a roller was gently applied. The constitution during this time was but little affected. Bark and porter were ordered by Mr. Chandler.

August 7. The wounds are almost healed ; the girl sits up daily, and in a few days she will be allowed to walk. During the progress of her cure the constitutional disturbance has been trifling, indeed not more than in some favourable cases of simple fracture; it may be also well to observe that her bowels were regular during the whole time, so as to preclude the necessity of any laxative medicine, nor did she take any other medicine but the bark.

I remain, &c. &c.

R. ROWLEY,

Dresser at St. Thomas's Hospital.

The following accident I was requested to visit by Mr. Clarke, surgeon, in Great Turnstile, Lincoln's Inn Fields; and Mr. Clarke has

had the kindness to send me the following particulars.

CASE VI.

Mr. George Carruthers, aged 22 years, had a compound dislocation of the ancle-joint inwards, with fracture of the tibia, on the 6th of October, 1817. The accident had happened by the overturn of a stage-coach at Kilburn, from whence he was brought to his house at Lambeth. The end of the tibia projected through the integuments of the inner ancle to the extent of from two to three inches, and the bone was tightly embraced by the skin. The tibia was fractured, only a small portion of it remaining attached to the joint; the bleeding was stated to have been copious, but it had subsided before Mr. Clarke saw him; the fibula was badly fractured.

For the reduction of the protruded parts it became necessary to make an incision in the integuments, to loosen them on the tibia; and when the bone was restored to its place simple dressings were spread over the wound. A many-tailed bandage, wetted with an evaporating lotion and splints were applied, and the limb was placed in the slightly bent position upon a quilted pillow. Bleeding was had recourse to, gentle purgatives given, and saline medicines. Symptoms of great constitutional excitement naturally arose from so severe a local injury. Abscesses formed on the leg, and some exfoliations materially retarded the cicitrization of the wound, and produced considerable exhaustion of his strength. Openings were made into the

abscesses, adhesive straps were placed over the wounds, and lotions were applied on linen under oiled silk, which preserved the parts constantly wet. Bark and wine were given with occasional aperients. Mr. Carruthers left town on the 6th of October 1818, having then a small opening on each side of the limb, and suffering occasional pain, but his general health had been good for some months previous. In January last a considerable portion of bone came away and the sore immediately healed and has so continued; he has been ever since free from pain and is now in better health than before the accident. He employs himself in superintending a farm, around which he walks with one crutch and a stick, but if the ground be level, with a stick only, and the limb is becoming daily more and more useful.

THOMAS CLARKE.

CASE VII. and VIII.

To Mr. Somerville of the Stafford Infirmary I am indebted for the following letter.

DEAR SIR,

I take shame to myself for not having answered your obliging queries sooner, as to the cases of compound dislocation of the ancle which have fallen under my care; but the fact is, I wished to give you my answer in the most authentic form, by sending you a transcript of the cases from the minute books of the Infirmary; but after having caused the most diligent search to be made for them, I have now the mortification to learn, they are no where to be found; you will allow me therefore to plead this

circumstance as the real cause of my seeming inattention to your wish, and at the same time to offer it as an apology for the want of a more detailed account. I have a distinct recollection of two cases, though not of the manner in which the accidents were produced. The first occurred about fifteen years ago, the other a few years later. They were both dislocated inwards and were both discharged cured; the one at the end of the fifth, the latter not till the seventh or eighth week. In the first case the wound, which was lacerated so as to form a flap, healed by the first intention; in the latter it was kept open by the discharge which was at first purulent, afterwards limpid, but no untoward symptom supervened during the cure. The treatment in both cases was as follows.

After the reduction of the bone the patient was placed upon his side with the limb in a bent position; no ligature was used; but the lips of the wound were nicely approximated and retained *in situ* by straps of sticking plaister, of ample length, yet not sufficient to encircle the limb, lest they should, by causing undue pressure on the supervening tension, excite too much inflammation, and, in consequence, suppuration. To obviate, however, both tension and inflammation as much as possible, a plaister, spread moderately thick with Kirkland's Defensative, was placed round and in easy contact with the ancle, and over the whole a tailed bandage was loosely applied. A brisk purgative was given on the following morning, and low diet was ordered till all danger of inflammation was over. The adhesive plaister was removed on the second or third day and was not renewed,

but a pledget of mellilot digestive was placed over the wound, and the defensitive bandage *applied* as before. The subsequent treatment consisted merely in the daily renewal of the pledget and the proper adjustment of the plaister and bandage, both of which were gradually drawn tighter round the limb in proportion as the danger of inflammation supervening became lessened, and this with the view not only to give stability to the joint, but also to facilitate the progress of cicatrization.

The use of the plaister after the manner above mentioned, may, at first, appear to you a singular practice, but by being spread very thick, it seldom requires a renewal during the period of cure; unless the discharge from the wound should be so great as to render it necessary; but if it should not, it will appear obvious that there can be no necessity for disturbing or moving the limb from the position in which it is first placed; a circumstance which I have ever considered in cases both of compound dislocations and compound fractures, of the highest importance to facilitate the cure. It is composed of two parts of Emp. Plumbi and one each of oil, vinegar and chalk finely powdered; and is what I ever found a most powerful repellent in all cases of violent local inflammation.

I am, Dear Sir,
very respectfully,
Your obliged and most obedient servant,

HENRY SOMERVILLE.

Stafford, Aug. 31, 1819.

The following case I received from Mr. Scarr, surgeon of Bishop's Stortford.

CASE IX.

DEAR SIR,

John Plumb, who is the subject of the following statement, was in the thirty-eighth year of his age when his accident took place, which was about seven years ago. He was in the act of ascending a ladder with a sack of oats on his shoulders, and had mounted ten feet from the ground when the ladder slipped from under him and he was precipitated to the ground, lighting on his feet, but still sustaining the sack of oats on his shoulders. I was passing about two hundred yards from the place at the moment the accident took place, and was consequently in immediate attendance. On the removal of his stocking, I found that the tibia and fibula had penetrated through the integuments at the outer ancle, and were laying on the outside of the foot; the articulatory surface of the astragalus had penetrated through the integuments of the inner ancle, shewing on a view of the case the foot nearly reversed; the bottom of the foot being placed where the side of the foot is naturally situated; the wounds through which the surfaces of the bone had penetrated were free, which soon determined me in the line of conduct I should pursue, *viz.* to immediately reduce the joint to its natural situation with as little violence as possible, and which was effected with much less difficulty than I expected; the wounds were brought close by adhesive straps, the limb placed on its outer side, and cloths applied constantly moistened with

acetated lead lotion; he was then bled to about sixteen ounces, a saline diaphoretic mixture was given, and attention paid to his bowels; in short the antiphlogistic plan was persevered in with due regard to his constitutional powers, abscesses took place which were opened in the most favourable points, and after five and twenty weeks the man was convalescent; union of the articulatory surfaces took place, the wounds healed, and the man became enabled to walk and to work; he was not able to bear much on his foot to work till about twelve months after the accident, from which time he has constantly been labouring in his situation with Mr. Starkis, a gentleman of respectability of this town, and continues to do so at this time.

It is my intention to send this man up to you, that you may have a full confirmation from him of the accident, as well as from Mr. Cribb my present assistant, who was present at the time of my being called to him, being at that time with his father, Mr. Cribb, surgeon of this town, whom I consulted on the case at the time of the accident as well as during its continuance; trusting the statement and result may prove satisfactory to your inquiry,

I am, Dear Sir,

your most obedient,

August 16*th*, 1819. R. T. SCARR.

P.S. I hope Mr. Cribb and the man will be with you at the beginning of the next week.

This man was sent to town, and I had an opportunity of witnessing the happy result of Mr. Scarr's skill and attention. A. C.

CASE X.

For the following most interesting case I am indebted to a very excellent surgeon and ingenious man, Mr. Abbot, at Needham Market, Suffolk. It admirably shews what may be accomplished in these cases, by extraordinary skill and attention.

April 25, 1802, Mr. Robert Cutting, a butcher by trade, age near seventy, corpulent, very intemperate, and subject to gout from his youth. In a dispute, when in a state of intoxication, he was thrown violently to the ground, and suffered a compound dislocation of the tibia at the ancle-joint; the end of it was forced through the integuments near four inches; the wound was large and half circular; in the struggle to stand erect, he rested his weight upon the head of the bone, which was covered with sand and dirt; the cavity of the articulating surface of the joint was filled with blood and sand; the fibula fractured a few inches above the joint, and the foot completely turned outwards; in this state he was placed in an open cart, full four miles to his residence, Somersham, in Suffolk, about seven miles from Ipswich. It was near five hours, from the time the accident took place, before surgical assistance arrived, being in the middle of a cold night. I attended with a well-informed pupil of mine, Mr. John Jefferson, who now, and has, resided many years in Islington. A case so formidable, a large wound, the connecting ligaments so lacerated, the surfaces of the articulating parts, from long exposure and injured condition, led me to conclude,

that it would be impossible to save the limb, and in a constitution so disordered; however, no persuasion could prevail with a mind obstinate and inflexible, he would not submit to amputation. The surfaces were, carefully and expeditiously as possible, made clean with warm water; the reduction was easily accomplished, the lacerated parts suitably placed, the edges of the wound were nearly brought in apposition, without stitches and adhesive plaisters; the limb was laid upon a proper sized thin board, excavated so as to take the form of the leg, with an opening to receive the outer ancle; this was well padded, the foot part raised somewhat higher than the leg; plaits of lint wetted with the tinctura benzoini composita, were placed over the wound, which, in a few hours, formed a hard sealed cap, of a circumference that effectually secluded the air; a folded flannel bandage was applied; taking from the foot to the knee, the leg was laid in a flexed position. V. S. ℥xij. A saline purge every two hours until his bowels were relieved; milk broth only for his support, with common salt; sixteen hours after the dressing, his bowels had been properly evacuated, he was tranquil; heat moderate; a soft moisture was spread over the whole surface; pulse measured 86; and he had some hours of refreshing sleep. April 27th; A little active heat was raised; sleep interrupted; pulse 96; surface moist; darting uneasiness about the ancle and foot; no thirst; bowels kept cool, and the same support continued; common saline medicines were resorted to every

three hours. Upon unfolding the bandage, some swelling appeared to surround the ancle; a little gleety discharge had escaped from beneath the lower part of the dressing; the inflammation did not appear to be more than might be wished; lint, wetted with the tincture, was applied, so as to prevent the escape of any discharge, although a little distance from the wound, and to seal the covering more secure; half a dozen leeches were applied a small distance from the inflamed part; they bled freely, and afforded ease. April 29th; he passed a good night; heat lessened; free from thirst; limb easy, and free from tension; and the inflammation about the ancle abated. April 30th; a quiet good night, and every symptom appeared to promise his safety being secured. May 2nd; the pulse had regained the natural standard; upon examining the ancle, a small appearance of pus escaped from the lower part of the cap or dressing; lint wetted in the same manner, to glue the covering securely. From this time, my visits became less frequent; the tincture was used whenever the surface of the cap appeared to lose its hold. At the end of ten weeks he was taken from his bed daily, and laid upon a sofa. After the first stage of the interruptions, healthy actions became established, and he became perfectly well. Between the third and fourth month, the cap or dressing was taken from the ancle; the wound was completely cicatrised; a small abraded surface appeared over the cicatrix, occasioned by incrusted matter; simple dressing in a few days rendered the

place sound and well. During the time of the curative means, the fætor was very trifling. The thickening upon the wound was not more than might have been expected upon one or any muscular part; the form of the joint was natural, and bore the appearance of a perfect state. At the end of five months, he was allowed to go on crutches, with the frequent placing his foot upon the ground, and to allow of such a weight or pressure as his feelings could admit. For many months a long continued use of oil obtained from the joints of animals, was had recourse to, night and morning, for the space of an hour every time, by patient rubbing; and to please himself, he plunged his foot and ancle into the paunch of an ox. With these means, an imperfect motion in the joint was recovered, and within twelve months he could walk without a stick; he pursued his occupation, and lived to the age of 83. The last ten years he was able to walk as well as ever he could. Mr. Jefferson will be able to confirm this statement.

Since the case of Cutting, I have uniformly, in a variety of compound fractures, followed the curative plan of treatment by the first intention. Mr. George Lynn, of Woodbridge, my son-in-law, a deserving character in his profession, and the late Launcelot Davie, of Bungay, were pupils of mine, and attended many cases with me of a very formidable nature, successfully treated by the same means. A case of a compound fracture of the thigh, attended with considerable comminutions of the femur, occasioned by a waggon, loaded with twenty-five combs of bar-

ley, passing over it, perfectly recovered, by the same treatment, within six months.

With the greatest esteem,
I have the honour to be,
Your very much obliged
and faithful Servant,

Needham Market, Suffolk.

ROBERT ABBOTT.

To Mr. Ransome, surgeon, at Manchester, I am indebted for the following case.

CASE XI.

DEAR FRIEND,

In reply to thy letter, requesting to know the result of my experience in cases of compound dislocation of the ancle-joint, I have great pleasure in stating the following case, which has recently occurred. I take the liberty of briefly describing it, as there were some circumstances connected with it which did not afford the most flattering prospect.

In the autumn of last year, a female, aged about 45 years, of a strumous and leucophlegmatic habit, attended with a troublesome cough and occasional dyspnœa, fell from a high stool, and pitching upon the left foot, caused a compound dislocation of the ancle-joint; the foot was luxated inwards; the external malleolus was fractured; a lacerated wound extended half round the joint, and exposed the protruding portion of the malleolus, laying the cavity of the joint so open as freely to admit the finger,

and through which the synovial fluid escaped. I removed a portion of detached bone, reduced the dislocation, and brought the integuments together very slightly; the limb was laid upon the side, and kept constantly cool with the saturnine lotion combined with the liq. ammon. acet.; a small opiate, and a demulcent mixture were given at intervals. From the constitution of my patient, I must confess I feared the most serious consequences; but I was happily mistaken; but little inflammation followed, the wound healed without a copious suppuration, and she is now perfectly recovered, and walks to considerable distances. She was confined in a very small room, and in a part of the town not very famous for the purity and salubrity of its atmosphere.

I am, &c. &c.

T. A. RANSOME.

Manchester,
October 22, 1818.

Bengal Street, Canterbury.

MY DEAR SIR,

I take the earliest opportunity of complying with your request, to furnish you with the result of my observations on compound dislocation of the ancle-joint.

You will perhaps think it singular, that this division of Kent, which our hospital practice embraces, should be so destitute of causes giving rise to accidents of this nature, that only two cases have occurred, either in my private practice, or at our hospital, during the last fifteen years, or to my coadjutor, Mr. Fitch; and as these are the only occurrences, I fear it

would be deemed presumptuous in me to form an opinion upon the method to be adopted, and the probable termination of the generality of accidents of this nature. The favourable result however of these two cases, admitted under my care in the Kent and County Hospital, was so firmly impressed on my memory as to confirm unequivocally the precepts you early inculcated, to save the limb if possible in compound dislocations of the ancle-joint. In accomplishing so desirable a point, the advantages obtained in a country hospital will, I apprehend, bear a greater proportion in the scale of success than when the patient is placed in a crowded infirmary of a large manufacturing town, or in the metropolis, the constitution will in general be less impaired by excess, poverty, and other circumstances, whilst purity of air in large ventilated wards materially contributes towards recovery, even be the injury to the joint extensive; we consequently can be permitted to take greater latitude with our curative means upon an injured joint, relying on the powers of nature, without being under the immediate necessity of anticipating the issue resulting from unfavourable habits, and in situations inimical to disease.

My notes furnish me only with the brief details of one case.

July 1818. A bricklayer, æt. 36, of slender make, but of good constitution and of sober habits, fell from a height of between thirty and forty feet upon loose materials for building, and alighting upon his feet, he received a very severe shock attended with comatose symptoms, a fracture of the right thigh, a considerable

contusion and laceration of the left ancle-joint, accompanied with a dislocation of the bones inwards, (that is, the tibia rested upon the inner side the astragalus), a portion of the lower extremity of that bone fractured, and the fibula was broken about three inches above the malleolus externus, and the surrounding ligaments of the joint were lacerated, but little difficulty was found in reducing the dislocation and in replacing the fractured bones; but in consequence of the violent injury done to the joint, it became a question on the propriety of amputation. As the man had enjoyed uninterrupted health, and was of that constitution and habit least liable to the attack of inflammatory affection, I ventured to give a chance of saving the limb. An union by the first intention of the external wound, as far as practicable, was attempted, and the limb laid in the most convenient, yet relaxed and easy posture. Evaporating lotions were applied, and the strictest antiphlogistic system enjoined.

Considerable inflammatory symptoms ensued, with a copious discharge of synovial fluid; the limb and joint were much swollen, and it became necessary to vary the applications to warm spirituous and opiate fomentations and poultices, which appeared more genial to the patient's feeling, and were therefore continued. A disposition of the contused parts to gangrene appearing, muriatic acid was added to the cataplasm, and the medicines were changed according to the effect produced on the constitution by symptomatic irritation, and accruing from the discharge. Soon after the application of the muriatic acid the disposition to gangrene

ceased, (and from this medicine I have often derived, in similar states, great advantage.) After the first fortnight my hopes of saving the limb were confirmed by the pain and swelling subsiding, and the constitutional symptoms being less violent, the colour of the discharge improving, with less synovia, and granulations arising around the wound. The man continued gradually to improve till about the tenth week, when the wound was nearly healed. This man was discharged in fourteen weeks quite well, although with rather an unsightly and partial stiff joint.

The other case, of which I have no notes, was also a compound dislocation of the ancle-joint, but without the degree of injury the above had sustained; he was also discharged cured.

I have now to apologize for trespassing upon your time, in the attempt to give you the details of cases that might have been interesting if not so cursorily drawn; but as my notes were only penned to furnish me with hints for the future, from the distance of time the minutes have escaped my memory, and I doubt they are too inaccurate and too inconclusive to afford you any information; but the occasion serves me as a pretext for assuring you how much

I remain,

My Dear Sir,

Your very faithful and obliged Servant,

W. CHANDLER.

Royal Naval Hospital, Plymouth,
August 11, 1819.

MY DEAR SIR,

In answer to your letter inquiring of me whether I have had any cases of compound dislocation of the ancle-joint, with their treatment and their result, I beg leave to acquaint you that several of the above nature have fallen under my care and observation during the eight years I served as an assistant-surgeon, and the sixteen years I have been the first surgeon of this hospital, nearly the whole of which period the country was engaged in active naval warfare, and consequently this hospital was in the constant receipt of important surgical cases; and I have also witnessed a few more from other causes. The result of my observations has been, that in cases of compound dislocations of the ancle-joint there is not only a chance of saving the limb, but of that limb being at a future time useful. The dislocated bones should be replaced in their situation with as little violence and injury as possible to the surrounding parts; and should any difficulty arise in returning the bones, from the smallness of the wound, I freely enlarge it with a scalpel. After they are replaced, I lay the limb perfectly extended on very soft cushions of lint arranged on three pillows, the centre one reaching the length of the leg, the upper one crossing under the ham and inferior part of the thigh, and the lower one across under the heel, having previously placed on these pillows a fine sheet, folded so often that when its edges are turned in it might protect the limb from the pressure of the splints; under

this sheet are laid several slips of calico about eighteen inches long and three broad. When the limb is thus comfortably placed, taking care to fill up every hollow with lint, I draw the edges of the lacerated integuments as near together as they can be brought by the gentlest means, retaining them with small slips of adhesive plaister, and cover this with pledgets of soft lint; this done, I direct the foot to be kept very steady, whilst I ultimately place the slips of calico already described over the whole length of the extremity, draw up the edges of the sheet, and apply of each side of the leg, outside of all, a very broad long splint of common deal, and so long as to reach at least three inches below the foot and as far above the knee-joint, these splints being well covered with lint, and then to be so secured as to afford support (but no pressure) to the whole of the leg and foot, the breadth of the splint materially contributing to the latter purpose, and allowing the tape to pass around the limb without injury; the foot ought also to be prevented dropping or altering the least its position, by passing a broad tape through a hole in the lower ends of the splints, which tape is to be tied, securing between it the sole of the foot, which will effectually keep it up, further securing it by a stirrup bandage; when every thing is thus accomplished, the foot and leg are directed to be kept constantly wet with cold water, taking care not to sponge it immediately over the wound. The subsequent treatment of the patient, must depend upon the symptoms which arise. This is the plan pur-

sued by me, in those cases where there is a probability of saving the limb. I have seen more than one case, where, after great perseverance and risk, the limb has been saved, but when the wounds were all healed, found to be of very little or no use; as an example, a man who had had a compound dislocation of the ancle in the West Indies, from whence he was sent to England as an invalid, became my patient in this hospital, and when received, a period of thirteen months from the accident, had the whole of the lower head of the tibia (although in its proper situation) exposed, black, and carious, which at the end of a year and a half came away more than three inches in length, and at the expiration of three years and a half from the injury, quitted the hospital with the wound healed but with a shortened, deformed, and anchylosed leg, liable to break out on the slightest injury. The great point to be decided on, however, in these accidents is, in what cases the surgeon is justified in attempting to save the limb, and in what cases immediate amputation is necessary. From all I have seen, I should not hesitate the immediate removal of the limb, where the lower heads of the tibia and fibula are very much shattered; where, together with the compound dislocation of these bones, some of the tarsal bones are displaced and injured; where any large vessels are divided and cannot be secured, without extensive enlargement of the wound and disturbance of the soft parts; where the common integuments with the neighbouring tendons and muscles are considerably torn; where the

protruded tibia cannot by any means be reduced; where the constitution of the patient is enfeebled at the time of the accident, and not likely to endure pain, discharge, and length of confinement.

I have a fine specimen of injury done to the tibia, fibula, and tarsal bones, from a compound dislocation, producing amputation ten months after the accident, which occurred in the Mediterranean; it is very much at your service to see or copy, but must beg of you to have the goodness to return it, and as it forms part of a collection of bones, making by me for the last twenty years,

I am, &c. &c.

STEPHEN L. HAMMICK.

I beg Mr. Hammick to accept my thanks for his excellent letter.

The following case shews, that under the most unfavourable circumstances, these injuries are not destructive to life in persons of good constitutions.

Winchester, August 1*st,* 1819.

MY DEAR SIR,

In answer to your inquiries of my practice in compound dislocations of the ancle-joint, I can only say, that in almost every case that I have witnessed, the general injury has been so great as to require amputation. I do not recollect but one case which was not obliged to submit, and that was a patient at a distance, whom I was called to by a neighbouring practitioner,

about five weeks after the accident, to use his own words "to reduce a dislocation of the ancle, as he had reduced the fracture of the fibula." I saw the patient, but the fractured fibula was so firmly united, that the case was obliged to remain, the compound dislocation gradually got well, if you can call the greatest deformity I ever saw, well; however no bad symptoms arose, and I am persuaded, had the dislocation been reduced, that the case would have terminated in a most satisfactory manner.

I had a case of compound fracture of the elbow-joint, in the person of Dr. Wool, now head master of Rugby, which did well without leaving any perceptible degree of stiffness.

I remain, my Dear Sir,

Yours very truly,

W. WICKHAM.

28, *Park Street, Bristol,*
Oct. 20, 1818.

MY DEAR SIR,

During the twenty-two years I have been surgeon to the Bristol Infirmary, and I believe during my apprenticeship there, making in all nearly thirty years, it has been our invariable practice to endeavour to save the limb, in cases of compound dislocation of the ancle, unless where the chance was done away by some concomitant injuries or circumstances, but as a general rule it was always adhered to, and this would not have happened unless the great ma-

jority of cases had done well. We save the limb in private practice almost invariably, unless in very bad cases indeed.

I am,
My Dear Sir, &c. &c.
R. SMITH.

Sawing off the ends of the bones.

There is another mode of treatment in these accidents, which consists in sawing off the extremity of the tibia, before the bone is returned into its natural situation, and the reasons which may be assigned for pursuing this practice are as follow.

Difficult reduction.

First—That there is in some cases much difficulty in reducing the tibia, and that great violence must be employed to effect it.

Oblique fracture.

Secondly—The extremity of the bone is often broken obliquely, so that when reduced it will not remain upon the astragalus, but when the point is removed by the saw, it rests without difficulty upon the astragalus.

Spasms.

Thirdly—The spasmodic contractions of the muscles are much diminished, by shortening the bone, as they are all thrown into a state of relaxation by it; whereas when the bone is reduced by violence, when the saw has not been used, the spasm of the limb will be sometimes very violent.

Local irritation diminished.

Fourthly—The local irritation is much diminished by the greater ease with which adhesion is produced, both of the sawn extremity of the bone to the parts to which it is

applied, for it is a mistake to suppose that the sawn end of the bone will not adhere, as the contrary is seen in amputation, in sawing off a bone in exostosis, and in the union by adhesion of compound fractures; and that adhesive matter can be thrown out upon cartilaginous surfaces, is known to every person who has dissected a diseased joint; thus then the end of the tibia adheres to the surface of the astragalus.

Suppuration and ulceration lessened.

Fifthly—When suppuration does occur it is rendered much less, and a considerable part of the ulcerative process is prevented by the cartilage being mechanically removed, for nearly half the articular surface of the joint no longer remains. Cæteris paribus; therefore the case is sooner well.

Less constitutional irritation.

Sixthly—The constitutional irritation is very much lessened, both by the suppurative and ulcerative process being diminished, and the ease with which the parts are restored. In the cases which I have had an opportunity of seeing, there was not more irritative fever than in the mildest cases of compound fracture.

Bones shattered.

Seventhly—It has been found that in cases in which the extremities of the bones forming the joint have been broken into small pieces, and have been removed by the finger, that the irritation has suffered less, and the case more quickly recovered than when the bone has been returned whole.

No case of death.

Eighthly—I have known no case of death when the extremities of the bones have been sawn off, although I shall have occasion to mention some

in which the cases terminated fatally when this was not done.

Objections; limb shorter.

The objections which may be made to this mode of treatment are, that the limb becomes somewhat shorter by the removal of the cartilaginous extremity of the bone; but this I do not think an objection of any considerable weight if the danger of the case is, as I believe, lessened by it, for the diminished length, which is very slight, is easily supplied by a shoe made a little thicker than usual.

Anchylosis.

The other objection is, that the joint becomes necessarily anchylosed. I doubt very much the truth of that objection, as in two instances I have seen the motion of the part remains; but even when the joint becomes anchylosed, as it is liable to do in each mode of treatment, still the motion of the tarsal bones becomes so much increased as to be a substitute for that of the ancle; and the patient walks with much less halt than would be conjectured, and has a very useful limb.

Each mode useful.

It is not my intention however to advocate either mode of treatment to the exclusion of the other, but to state the reasons which may be justly assigned for the occasional adoption of either. It is only by a comparison of the different results of varied practice, that a safe conclusion can be drawn; and from what I have had an opportunity of observing in my own practice, and of learning from that of my friends, I feel disposed to recommend to those whose minds are not settled upon the subject, not to hastily determine against either treatment in

the different cases of this injury, as, from each mode, under varied circumstances, a strong and useful limb has been saved without any additional risk being incurred to the life of the patient.

Cases in which the one or the other should be employed.

If the dislocation can be easily reduced without sawing off the end of the bone; if it be not so obliquely broken, but that it remains firmly placed upon the astragalus when reduced; if the end of the bone be not shattered, for then the small loose pieces of bone should be removed, and the surface of the bone be smoothed by the saw; if the patient be not excessively irritable, so as to occasion the muscles to be thrown into violent spasmodic actions in the attempt at reduction, and which leads to subsequent displacement when the limb has been reduced. Under such circumstances the bones should be at once returned into their places, and by the adhesive inflammation the parts should be united; but rather than amputate the limb, if the above circumstances were present, I should certainly saw off the ends of the bones.

Cases.

I shall now proceed to state the cases which I have myself had an opportunity of witnessing, and some which have been given me by my friends, and leave the reader to judge of the propriety of the advice I have given.

CASE I.

On Compound Dislocation of the Tibia outwards, at the Ancle-Joint.

I was sent for to Guy's Hospital, to see Nathaniel Taylor, aged 13 years, and was directed

to bring my amputating instruments with me, as I was informed the boy had so bad a dislocation of the ancle, that the limb could not be saved.

As soon as I reached the hospital, I ordered the patient into the operating theatre; and making inquiries into the cause and nature of the accident, I found as follows:—The injury had been occasioned by a boat falling upon the leg. A large wound was seen at the outer ancle, through which the tibia and a fractured extremity of the fibula projected; one inch of the malleolus externus remained attached to the astragalus by its natural ligaments; the foot was turned inwards, so as to be able to be made to touch the inner side of the leg; and from the muscles being no longer on the stretch, the foot was very loose and pendulous. I tried to reduce the limb, but found that the bone could only by great violence be brought on the astragalus, and that it immediately slipped from its place. The case was, therefore, as regarded the state of the parts, the most unfavourable possible; and those around me urged an immediate amputation; but seeing the youth, and the character of health which the boy bore, I thought I should not be justified in dooming him probably to a life of mendicity, and I determined to try to preserve the limb. Finding that the lower end of the fibula, although still connected by ligament, was very loose and moveable, I removed it with the scalpel; I then sawed off half an inch of the lower extremity of the tibia. When these operations had been accomplished with the greatest care, I reduced the bones, and they maintained their situation,

as there was no force of muscular action upon them, on account of the shortening of the bones. Lint, wetted with the person's blood, was then applied, with adhesive plaisters over it, and the leg was put in splints, and placed on the heel. Scarcely any constitutional irritation occurred; the wound and ancle-joint secreted but little matter, and gradually healed. On the 17th day an abscess shewed itself on the tibia, which was suffered to burst, as it affected his constitution but little. For two months he was allowed to sit up and use his crutches. In twelve weeks the wound was healed, and the boy able to bear on his foot; and at the end of four months he walked well. I used to have inconceivable pleasure in seeing this boy walk before the students, at my desire, from one end of the ward to the other, four months after the accident, with very little lameness. There seemed to be some motion at the ancle, but the tarsal bones soon acquired sufficient mobility to give to the foot so much play as to prevent the appearance of stiffness, which a partially anchylosed state of the ancle would otherwise have produced.

CASE II.

Compound Dislocation of the Ancle inwards.

——— W., Esq. aged 40, on December 11th, 1818, jumped out of his one-horse chaise, alarmed by the horse's kicking. He fell, and when he attempted to rise, found his left ancle dislo-

cated, and the bone projecting through the skin. Mr. Mackinder, surgeon, brought him to the house of his father-in-law, in London, where Mr. Jones, of Mount Street, and myself, attended him.

Upon examination of the part, I found the tibia projecting at the inner ancle through the integuments, which were nipped under the projecting bone into the joint; the foot was loose and pendulous, and very much thrown outwards. Having prepared several pieces of linen to form a many-tailed bandage, and procured pillows and splints, he was placed on a bed on his left side, and an attempt made to reduce the bone; but finding that a most powerful extension must be made, hearing from Mr. Jones that Mr. W. was of a most irritable constitution, and finding that the integuments must be cut down opposite to the joint, so as to lessen the probability of an easy adhesion of the wound, which was placed one inch and an half above the articulation, I sawed off the end of the tibia, and the bone most easily returned into its natural situation, in which it remained without difficulty. The edges of the wound were brought together by a fine thread, so as to be very closely adapted to each other, and lint dipped in blood was applied over the wound; the many-tailed bandage was used; the limb was placed on its outer side, with the knee bent nearly at right angles with the thigh, and splints were applied. The leg was ordered to be kept constantly wet with the liq. plumbi. f. acetat. dilutus, ℥v. and spir. vini. ℥i.; a dose of opium was given him,

and ten ounces of blood were taken from his arm. In the evening more opium was given him, and a dose of infusion of senna and sulphate of magnesia, was ordered for the morning.

Dec. 12.—As the limb felt hot, the upper splint was removed, its pressure being somewhat painful, and it prevented free evaporation; opium was ordered at night.

Dec. 13.—The foot was vesicated; he had chilliness succeeded by heat; slight tension of the leg, and some pain for three hours. His mind was much agitated by seeing his children.

Dec. 14.—The limb was less inflamed, and he had scarcely any constitutional irritation.

Dec. 15.—A slight discharge of serum mixed with red particles from the wound; some pain in the foot and leg, but no irritative fever.

Dec. 16.—There was more discharge and some air passed from the wound; a poultice was applied, and a generous diet allowed, as his stomach, naturally weak, had become very flatulent; pulse 90.

Dec. 17.—A fomentation and poultice applied.

Dec. 18.—The discharge becoming purulent; but as his stomach was deranged, Dr. Pemberton saw him, who ordered him hyoscyamus with the mistura camphor in the day, and opium at night.

From this time to the 7th of January, the discharge from the limb was copious, but it then began to lessen; and when the leg was examined on the 12th of January, it had become firm; a small wound remained, on which the granulations were prominent. In the first week in February he was allowed to get upon his sofa, the limb being now firm, and only a small wound remain-

ing, from which an exfoliation will occur, as the bone can be felt bare.

In August I saw him; the wound still remained open, and the portion of bone had not separated.

This gentleman, with the worst constitution, as regarded the state of his stomach, did not suffer more, and, indeed, not so much irritation, as a compound fracture usually produces.

CASE III.

Mr. Charles Averill, dresser to Mr. Forster, surgeon of Guy's Hospital, has had the kindness to send me the following particulars of a case, the progress of which I often witnessed with pleasure.

John Williams, sailor, æt. 38, a very robust man, was brought into Guy's Hospital, under the care of Mr. Forster, August 9th, 1819, at four o'clock in the morning, with a compound dislocation of the right ancle inwards, and considerable injury to the left, occasioned by his falling from a height of about twenty-six feet, in endeavouring to escape from the Borough Compter, in which he was imprisoned. On examining the injured part, I found the tibia protruding three inches through a large transverse wound of four inches in extent, and resting on the inner side of the os calcis; the cartilaginous surface of the astragalus could be readily felt on passing my finger into the wound; the fibula was broken. I first sawed off the whole of the cartilaginous end of the tibia, when the bone was easily replaced, the edges of the wound were then brought as

much in contact as possible ; lint dipped in blood was applied, and over it straps of adhesive plaister ; the foot and leg were wrapped in cloths wet with an acetate of lead lotion, and the limb laid on its side. He complained of great pain in the left leg, which was very much swollen all round the ancle ; ten leeches were applied to it, and afterwards the liquor plumbi subacetatis dilutus, which relieved the pain ; thirty drops of laudanum were given, and he remained easy. The following day sixteen ounces of blood were taken from him, and five grains of calomel given. On the 12th, the dressings were removed, the wound looked well. On the 17th, suppuration had commenced, and the discharge having rather a fœtid smell, the nitric acid lotion was applied*. September 2nd, the matter gravitating to the outer side of the leg, an opening was made, by which it was discharged, and adhesive plaister applied to the original wound, which was healing fast ; the discharge gradually diminished, and on the 21st of September, six weeks from the accident, both wounds were quite healed. He has not yet left his bed. There is motion at the ancle ; the toe turns out but very little, and does not point downwards. He wears splints, and the strength of the limb is daily increasing. When the swelling of the left ancle diminished, a fracture of the external malleolus was also there discovered.

CHARLES AVERILL.

October 4th, 1819.

* The nitric acid lotion is the best application with which I am acquainted during the sloughing process. I order it in the proportion of fifty drops of the acid to a quart of distilled water, and apply it by linen covered with oiled silk.

A. C.

For the following letter I am indebted to Dr. Kerr, of Northampton, who, at the age of more than eighty, still continues to practise his profession with all the ardor of youth, and with a strength of intellect which has been seldom surpassed.

Northampton, July 28th, 1819.

MY DEAR SIR,

I have had the honour of your letter this morning, respecting compound dislocation of the ancle; several such cases have fallen under my care, and it has been uniformly my practice to take off the lower extremity of the tibia, and to lay the limb in a state of semiflexion upon splints; by this means a great deal of painful extension, and the consequent high degree of inflammation are avoided. The splints I use are excavated wood, and much wider than those in common use, with thick moveable pads stuffed with wool. I keep the parts constantly wetted with a solution of liquor ammoniæ acetatis, without removing the bandage. In my very early life, upwards of sixty years ago, I have seen many attempts to reduce compound dislocation without removing any part of the tibia; but, to the best of my recollection, they all ended unfavourably, or, at least, in amputation. By the method which I have pursued, as above mentioned, I have generally succeeded in saving the foot, and a tolerable articulation.

I am, with much esteem,
My dear Sir,
Your obedient humble Servant,
WILLIAM KERR.

To Dr. Rumsey, of Amersham, I am obliged for the following interesting communication.

CASE IV.

Amersham.

DEAR SIR,

I have the pleasure of forwarding to you the case of a compound dislocation of the ancle, which came under my care many years ago, and which had a fortunate termination, as the patient lived many years after the accident.

On the 21st of June, 1792, Mr. Tolson, aged 40 years, a respectable tradesman in New Bond Street, Westminster, was thrown from a curricle on Gerrard's-cross Common, eight miles from this place, in consequence of the horses taking fright, and drawing the carriage with great velocity against a tree. The injury he received from this accident consisted in a compound dislocation of the tibia and the fibula at the outer ancle of the left leg, with a fracture of the astragalus, (the superior half of which was attached to the dislocated bones of the leg,) and likewise (although, as we shall see, not immediately noticed,) a simple fracture of the os femoris on the same side. He was immediately conveyed to a friend's house on the common, where he had the advantage of an airy healthy situation, with every kind of domestic attention the family could administer. I saw him about two hours after the accident, and found the bones protruding at the ancle through a very large wound, with the foot turned inwards and upwards, and the integuments beneath the wound exceedingly

confined by the dislocated bones which descended nearly to the bottom of the foot. A considerable hæmorrhage had taken place, but was stopped by the spontaneous contraction of the lacerated vessels.

From such a formidable accident in so large a joint there appeared very little probability of the patient's recovery, without immediate amputation; I therefore requested that a consultation with some other surgeons might be expeditiously held on the case, and expresses for this purpose were accordingly sent to Mr. Pearson, surgeon, in London, and to my brother, Mr. Henry Rumsey, surgeon, at Chesham in this county. While I was waiting for their arrival, the patient requested me to examine his thigh, when I plainly discovered an oblique fracture of the os femoris at its superior part. This additional evil appeared to me a great obstacle to an amputation. My brother, when he arrived, being of a similar opinion, I attempted to reduce the fractured dislocated joint into its proper situation. This I found very difficult to effect without first separating that part of the astragalus which was pendulous to the tibia, having its capsular ligament lacerated one half way around the joint. This portion of the astragalus consists of the broad smooth head by which it is articulated to the tibia; of almost the whole of the inner and outer sides of this head, by which it moves on the inner and outer malleoli; and of about the upper half of the posterior cavity on its under surface, by which it is united to the os calcis; so that the bone was divided nearly horizontally,

and the part left behind consists of the lower half of the last mentioned cavity, and of the whole of the other or anterior cavity which connects it with the os calcis; and of the anterior portion or process by which it is articulated to the os naviculare; I therefore removed it without hesitation, being persuaded that if it had been practicable to reduce it into its original situation, so large and moveable a portion of bone would have been a source of pain and irritation, and have rendered the cure more difficult and uncertain. I then divided that portion of the integuments of the foot which was confined by the protruded end of the tibia, which enabled me with ease to reduce it and the fibula into their proper situation. I applied some dossils of lint dipped in tincture of opium to the wound, and covered the whole with a poultice of stale beer and oatmeal. We now reduced the fractured femur and placed the limb in a bent position, expecting that our greatest success would be in procuring a complete anchylosis, the failure of which I concluded would leave a useless foot. The under splinter was a firm excavated piece of deal, of the shape of the leg and foot, with a hole opposite the ancle. Mr. Pearson arrived in the evening, and approved of the preceding treatment, giving it as his opinion that it would be safer to attempt the preservation of the limb than to amputate under such complicated circumstances. The wound was concealed as much as possible from the external air, and the cataplasm renewed no oftener than the discharge rendered necessary.

22d. The preceding night had been very painful, with delirium and vomiting; the pulse was full and frequent; I took away ten ounces of blood, and gave potassæ tartras.; and manna in doses sufficient to procure stools. A common saline draught, with antimonial wine and tincture of opium, was given every four hours, and a fuller dose of tincture of opium at bed-time.

23d. The vomiting continued; the ancle and thigh had been less painful through the night; the saline draughts were continued, but without the antimony, on account of the vomiting; during this period the antiphlogistic regimen was strictly adhered to.

24th. The night had been tolerable; the vomiting had ceased; the pulse was softer; the saline draughts were continued with the opiate at bed-time; this evening the leg was very painful; he passed a pretty good night; a discharge from the wound now commenced, and the tension of the muscles of the thigh began to diminish.

26th and 27th. The same treatment was continued. The discharge increased, and the tension of the thigh still more abated.

28th. The ancle was much swelled and inflamed; I therefore exchanged the beer grounds in the cataplasm for the liquor plumbi subacetatis dilutus. The patient had this day much pain in the bowels from flatulence; from which circumstance, and that of the discharge being very thin, it was judged expedient to vary his mode of living, and likewise his medicines.

29th. He was allowed a small portion of ani-

mal food, some table-beer, and some port wine; and he took the bark liberally both in substance and decoction. This change of treatment agreed with him perfectly well. At this time I found it necessary to alter the position of the limb on account of the pressure on the wound, occasioned by its laying in the bent position, and the pain it gave in turning to dress it, which, from the copious discharge, there was now a necessity for doing night and morning. I therefore placed it on the heel, using the common deal flexible splint, of the length of the limb, and confined it in a box, whose sides and lower end let down; the space between the sides of the box and splint was filled with pieces of flannel. By these means, and the use of the eighteen tailed bandage, the dressings were applied with very little disturbance to the leg, whereby the patient escaped much pain. The upper end of the box under the ham was raised, which gave the muscles some degree of flexion, and at the same time was favourable to the discharge. The foot having a tendency to fall inward, and the end of the fibula to protrude through the wound, it required great attention to prevent the deformity the neglect of these circumstances might have occasioned. The mode of prevention I adopted, and which proved successful, consisted in employing a number of small deal wedges, about six inches long, two broad, and a quarter of an inch thick; as many of these as were found sufficient were placed opposite the inside of the foot, between it and the side of the box; others in the same manner on the outer side of the

calf of the leg; by which means the limb was kept steady, and by placing the heel easy and rather hollow, none of the usual evils arising from pressure on the heel occurred.

30th. The bark agreed very well; the opiate was continued at bed-time; the discharge was great, but more purulent; the pulse was become softer and less frequent; and the urine, which had hitherto been clear and very high-coloured, was now turbid; the pain and inflammation being much diminished, the cataplasm was discontinued, and the wound dressed with dry lint with a pledget of cerat. plumbi superacetatis over it, and a moderate compression was made by means of a bandage. From this period the wound progressively mended; the discharge diminished; granulations formed; and the surrounding skin began to heal. The use of the bark and of the opiate was continued till the beginning of August. About the end of July the progress of the cure was retarded by matter collected under the integuments, above the inner ancle, which on pressure came out at the wound. After trying the effects of permanent pressure, for the prevention of this deposit, in vain, I made an incision into the cavity, and filled it with dry lint, to produce inflammation on its internal surface, which consolidated it, and the wound became perfectly cicatrised by the middle of September, without any exfoliation of bone larger than the head of a pin having taken place. The fracture of the femur went on very well, excepting that the obliquity of it, with the impossibility of producing a permanent extension on account of the leg, occa-

sioned a degree of curvature which it otherwise would not have had. The limb gradually acquired strength, and the patient is able to walk very well with only the aid of a small stick, and even this assistance he will probably not require long. There is no anchylosis to render the ancle immoveable; but a sufficient firmness has been produced in the surrounding parts by the long continued inflammation to assist in the formation of an artificial joint, which possesses a degree of motion nearly equal to the natural one.

For the following most interesting case, I am indebted to Mr. Hicks of Baldock.

CASE V.

Baldock, August 10, 1819.

MY DEAR SIR,

In the absence of my son, I beg leave to forward you the following account of a case of compound dislocation of the ancle.

Case of John Curwan.—Early in the morning of November 10, 1812, the Stamford coach, from the guard neglecting to chain the wheel, ran with great velocity down the hill a mile below Baldock, and fell on its side a little before it reached the foot of the hill; in its fall the side of the coach caught the coachman's right leg and turned the foot upon the outside of the leg, by which the tibia became dislocated on the inner side; the tibia and fibula protruded through the integuments about four inches; the oblong end of the fibula was fractured and

several small portions of it remained within the integuments, the end of the tibia had some small portions chipped off it, appearing as if it had been ground by the side of the coach; in this state he was brought to Baldock, with his foot dangling to his leg; the wound was very large, so much so that the foot appeared almost separated from the leg, the ends of the bone were covered with dirt.

There not being the least chance of success in returning the tibia and fibula within the integuments, in this state, and as the patient was desirous of having his leg preserved if possible, which I likewise was very anxious to try, I judged it prudent to saw off the ends of the tibia and fibula, the foot at the same time laying on a pillow below the leg; after removing the ends of the tibia and fibula, I searched for the fractured portions of the fibula left within the integuments, by introducing the fore-finger of my right hand into the wound, and found its external malleolus fractured into several small pieces, but still adhering by its ligaments to the astragalus. Being fearful these shivered portions might be deprived of the properties of life, and if so, would produce much mischief, I resolved to dissect them out by means of a bistoury, through the wound. Having thus removed every fragment of the fibula, and rendered the ends of the tibia and fibula perfectly smooth by means of a saw, not only removing their fractured ends, but as high up as they were stripped of their periosteum, about one inch and a half in length, measuring from the malleolus internus, I then returned the remaining part of

the tibia and fibula that had perforated the integuments, placing it in a straight line with the leg, the lacerated integuments I brought into contact, and secured them by straps of adhesive plaister; the limb was then placed upon a soft pillow, supported by Mr. Potts' long splints placed on the outside of the pillow and fastened with tapes; compression of soft linen cloth was applied, and the leg kept constantly wet with the diluted solution of the acetate of lead, and the following draught was given for the first few days, every four hours, and afterwards every six or eight, with a regimen strictly antiphlogistic.

℞ Pulv. Ipecacuanhæ. c. gr. vj.
Magnes. Sulphat. ℥j.
Aquæ Puræ. ℥ix.
——— Menthæ. ℥iij.
Spt. Ætheris Nitros. ℥ss. M. Ft. Haust.

Through the whole of the cure the man went on remarkably well, and had little symptomatic fever; pulse constantly below the natural standard, between 60 and 70; skin soft and moist; the action of the intestines was regularly kept up by the draughts; the integuments united by the first intention, without the least secretion of pus. On the day seven weeks from the accident, the patient was removed from Baldock to his residence at Hewlington, and did not require chirurgical aid afterwards. In a few months after, he paid me a visit at Baldock, walked perfectly well, and the leg was very little shorter than the other. The last time I saw him was by chance, in April, 1815, at the

Bell New Inn about three miles below Baldock, where his coach stopped, and he descended and ascended his box with great agility.

I am, my Dear Sir,

Yours most respecfully,

GEO. HICKS.

My friend and late dresser, Mr. Cooper of Brentford, an ingenious surgeon and excellent man, sent me the following valuable communication.

CASE VI.

Case of Compound Dislocation of the Ancle-joint, by Mr. G. Cooper.

Thomas Smith, aged 36, by trade a painter, whilst at work on the 28th of October, 1818, fell with a ladder to the ground, when his leg getting between two of its steps, the foot was dislocated inwards. The fibula was broken five inches above the joint, the tibia was fractured from the ancle-joint longitudinally, about three inches; this small piece of tibia, three inches in length, remained attached to the joint at the inner malleolus, while an inch and a half of the remaining portion of tibia, with the extremity of the fibula, were thrust through an opening in the integument, at, and rather anterior to, the outer malleolus. I was passing at the time, and attempted by very moderate extension to reduce the dislocation; this not succeeding, and finding the integuments tucked under the protruding portion of bone, with a scalpel I dilated the wound anteriorly and posteriorly

about half an inch, and then by means of a metacarpal saw, removed rather more than an inch of the tibia and a small portion of fibula. The dislocation was now reduced without any difficulty. The wound was closed by two ligatures and a few straps of adhesive plaister. The patient was placed on a mattress with the limb on the heel, enveloped in an eighteen tailed bandage, which was applied just sufficiently tight to give moderate support, without producing or increasing tension; on either side was placed a splint, and the limb was kept constantly cool by means of an evaporating lotion.

Subsequent to the operation and during the whole of the night, there was some hæmorrhagy from the articular arteries, but not sufficient to induce me to undo the limb in order to secure the bleeding vessel, and I did not open it till the 31st of October, the fourth day, when considerable adhesion had taken place and the parts looked better than I could have expected; but on the eighth day there was a line of separation formed about five or six inches in circumference; the wound was now fomented, a linseed meal poultice applied to it every six hours, and the evaporating lotion was still applied to the limb above, as far as the knee. On the thirteenth or fourteenth day, the slough came away, and healthy granulations were observable, both upon the integuments and also upon the extremity of the tibia; when these granulations became exuberant, they were kept down by the nitrate of silver, and the wound slightly dressed either with Ungt. Cetacei or equal parts of Ungt. Resinæ and Cerat. Calaminæ. In five

weeks the wound was perfectly healed, and the union of the fractured portions of the tibia went on so well, and the ossific deposit at the joint became so firm, that on Christmas Day, being fifty-eight days from the time of the accident, I found the man sitting at his table dining with his family, and in three months he was in the street on crutches. This patient had repeatedly suffered much from colica pictonum, his digestive organs were unhealthy, and he was a man of nervous temperament, all which I had to discover after the accident. As early as the third day he was very restless, on the fourth his sensorium was much affected, and he was constantly vomiting; by the frequent administration, however, of the saline mixture in the act of effervescence, his stomach was quieted. I ought to have observed that, on the night of the accident, he took an opiate, and on the following day I purged him; but from the state of his pulse, and from the degree of hæmorrhagy, I did not find it requisite to take blood from the arm. By the eighth day, his stomach being tranquil, we were enabled to assist the separation of the slough, by invigorating the powers of the system with bark and port wine, from half a pint to a pint of which, with eight ounces of the decoction cinchonæ and opium, the quantity of which was regulated by his state of irritability, enabled him to support the immense suppuration at the joint, which from this time to the fourth week discharged most copiously. I may here mention that I never observed on the one hand the stimulating effects of opium, and on the other its sedative, so strikingly ex-

emplified as in this man, for if he did not take quite enough to produce sleep, he was literally mad, tearing the bed-clothes, swearing, praying, singing, and making the oddest grimaces possible; but if he had a full dose, which, by the third week, was two drachms of laudanum, he slept soundly and awoke refreshed; and I believe from his extremely susceptible state, that but for opium, which produced a directly sedative effect upon his nervous system, he would have sunk from constitutional irritation; at the end of the second week, his stomach being in a fitter state for digestion, he was allowed plentifully of animal food and good beer, with which and wine, bark and opium, continued for a week or two, he perfectly recovered.

I am, Sir, &c. &c.

GEO. COOPER.

CASE VII.

Worcester, July 30, 1819.

DEAR SIR,

I have had no case of compound dislocation of the ancle-joint under my care, since I have settled in practice; but my colleague, Mr. Sandford, gives me the following information, which I do myself the pleasure of transcribing.

A boy 15 years of age, was admitted into the Worcester Infirmary with compound dislocation of the ancle, the protruding portion of the tibia was sawn off, the anterior tibial artery was taken up, the limb placed on its outer side, the wound dressed superficially, and the dressings retained

with a many tailed bandage, kept wet with the liq. ammon. acet. Suppuration and granulation came on kindly, the boy wore tin splints for a length of time, and on his recovery had a slight motion of the ancle-joint.

I am, my Dear Sir,

Yours very respectfully,

J. CARDEN.

P. S. My late master, Mr. Trye, had under his care a case of compound luxation of the astragalus, where he cut out the luxated bone, and the patient had a good recovery, with a tolerably useful foot. This is, I believe, a very rare case.

CASE VIII.

Sept. 1, 1819.

MY DEAR SIR,

Some domestic events have delayed my reply to your letter.

I remember six cases of compound dislocation of the ancle-joint, four of which underwent immediate amputation. In the two other cases attempts were made to save the limbs and in one with success. Most of these accidents were produced by machinery, and the injury to the joints and soft parts was so great as to render all hopes of saving the limb vain.

In the limb that was not saved, though attempted to be so, there was too much mischief done, and after seven months' trial, amputation was performed.

I was called to a fine young woman of eighteen years of age, (who had been consulting me not an hour before on the case of her father) and who had fallen from her horse and suffered a compound luxation of the ancle-joint *externally*. The tibia and broken fibula protruded about an inch and a half through the wound on the outside of the limb. I sent her to the hospital, and in consultation, proposed that a sufficient quantity of the bones should be removed to admit of restoration. I advised this attempt to save the limb, from observing that the accident took place by a heavy fall with the sole of the foot to the ground, that it was unaccompanied by contusions, or violence committed by a blow or wrench, and that the patient was a very healthy country girl. There had been considerable hæmorrhage.

The extremities of the bones were removed; the reduction accomplished, and the limb supported by a tailed bandage, splints applied moderately tight, and the bandages were directed to be kept constantly soaked in a cold application; an opiate was given.

On the following day there had been considerable hæmorrhage, but the limb was not disturbed. Great suppuration took place about the joint, spread up the limb, and greatly reduced the patient, but she recovered. These collections were never opened, which I should have done early, and thus perhaps have prevented that extent of suppuration which so much reduced the patient.

Any further details I will give you if you require them, on this as on all occasions, with great pleasure, and I must hope that on all oc-

casions you will make use of me, and now accept my apology for not answering yours before.

Very faithfully yours,

R. FLETCHER.

The following I received from my friend Dr. Lynn.

CASE IX.

A man on board the Walmer Castle East Indiaman, in the year 1808, whilst the ship was off the Cape of Good Hope, fell between decks, and a cask of water rolled upon his ancle, producing a compound dislocation of the end of the tibia inwards. I sawed off the projecting portion of the tibia, brought the parts as closely as possible together, applied evaporating lotions to the limb, and the man recovered without any dangerous symptoms.

JAMES LYNN, M.D.

Cases requiring amputation.

But still cases occur, in which the operation of amputation will be rendered absolutely necessary, either to preserve the life of the patient, or to prevent his being doomed to the constant necessity of using crutches on account of the deformity and stiffness of the limb.

Does not always succeed.

It seems to me, however, to be by much too prevailing an opinion, that the amputation of the limb is a sure means of preserving life, for when this operation used to be more frequently performed in our hospitals than it now is, for compound dislocation of the ancle and compound fracture of the leg, a considerable number died.

Very lately a man at Tring had his foot torn off by a threshing machine, and the limb was obliged to be amputated at the usual place below the knee. The operation was performed by Mr. Firth, but the man died in the evening of the 6th day.

The circumstances which I have known give rise to this necessity are,

The advanced age of the Patient.

Under great age the powers of the body become so much weakened, that the patient is unable to bear the constitutional excitement which the suppurative inflammation of the joint produces, and as the operation of amputation does not expose him to this process, it is better to have recourse to it. However, I ought to observe, that when in my lectures I have stated what I have now advanced, the pupils have flocked around me after lecture, and have told me of cases of recovery even of very old persons; but in the practice of hospitals in this extended city, very aged persons sink under these accidents, if the limb be not amputated. Age.

A very extensive lacerated wound will give rise to a necessity for this operation. Laceration.

CASE X.

July 10th, 1806, Mr. Dudin, a gentleman residing in Horslydown, Borough, jumped out of his one-horse chair and dislocated the tibia inwards at the ancle through a large lacerated wound, and a portion of the malleolus internus

was broken off and remained attached to the astragalus. The wound bled freely, and the foot was loose and pendulous. I therefore felt myself obliged to amputate the limb.

Mr. D. after this operation, proceeded in every respect favourably, recovering without any untoward symptom.

Difficult reduction.

A difficulty in reducing the bones has been considered as a reason for amputation.

This circumstance, however, is rather a motive for removing the extremities of the bones by the saw, than for performing the operation of amputation, after which, the reduction of the tibia is easily effected, and an useful limb is preserved to the patient.

Bones shattered.

The bones are sometimes extremely shattered.

If the lower extremity of the tibia be broken into small pieces, the loose portions of bone ought to be removed and the end of the tibia be smoothed by a saw; but if in addition to this comminution, the lower extremity of the tibia be obliquely broken, and a large loose portion of bone be felt with the fingers, then it will be proper to amputate; also if the astragalus be broken, the portions of this bone should be removed or they will separate by ulceration, or occasion unnecessary local irritation. (See Dr. Lynn's and Dr. Rumsey's cases.) But if the end of the tibia and tarsal bones, as the astragalus and calcis, are broken, then the operation of amputation will be required. The following case shews well the necessity for amputation in such a state of parts.

CASE XI.

I was requested to see a lady, aged 34 years, who on August the 9th, 1819, had, in a fit of insanity, jumped out of a two pair of stairs window and produced a compound dislocation of the tibia and fibula at the outer ancle. I met at the house Mr. Stephens, a surgeon residing in Hunter Street, Brunswick Square, who had been called immediately after the accident. As she appeared almost insensible, and Mr. Stephens feared an injury to the brain, he took away twelve ounces of blood. When he examined the ancle he found the malleolus externus of the fibula projecting through the wound, but unbroken ; the tibia dislocated and broken ; the foot very much turned inwards. He extended the foot and thought that the bones had exactly returned into their natural situation ; adhesive plaister was applied upon the wound, and its edges nicely adjusted. She was placed on a mattrass with the limb upon the heel, and with a splint on each side of the leg. For seven days she complained of little pain, and had but slight constitutional disturbance ; on the day week from the accident, I was requested to see her, and finding little local or constitutional irritation, I recommended that the limb should not be disturbed, and the dressings were not removed.

On the 10th day from the accident, Mr. Stephens finding her in more pain, examined the wound, and found that it had not adhered.

On the 12th day a considerable discharge issued from the wound.

On the 16th day, a slough had separated and exposed the bones, which appeared shattered and projecting. On this day I again saw her, and upon examining the ancle, found the astragalus projecting and a portion of it broken, and as the surrounding parts were dead, I removed the projecting bone. Introducing my finger into the wound as soon as the astragalus had been separated, the tibia was found to be shattered and the os calcis broken into many pieces. As her pulse was 100 and small, and her strength was failing, I immediately recommended her to submit to the operation of amputation, to which she consented.

On the Monday following the stump was dressed by Mr. Stephens, and the greater part was adhering.

Two of the ligatures separated on the 10th day, and the other came away on the 16th day.

Sept. 29. The stump was healed, excepting about the size of the section of a pea, and she has no complaint remaining excepting a sore upon her back, and pain in the left foot.

It is proper to mention that she hurt her spine and kidneys by the fall, so as to discharge urine tinged with blood for three weeks after the accident.

The other ancle also was most severely injured, and she suffered exceedingly from pain in it.

Upon examination of the limb, the tibia was split up from the malleolus internus to the ex-

tent of three inches: the fibula was unbroken; the astragalus was broken and detached; the os calcis was fractured into several pieces.

The Dislocation of the Tibia at the outer ancle produces much more injury and danger than that at the inner, and amputation will be more frequently required for it, because both the bones and soft parts suffer more than in the dislocation inwards. Dislocation outwards.

It sometimes happens that when the bone is replaced it will not remain in its situation, and all the symptoms of the injury become removed.

This circumstance arises from the tibia in the dislocation outwards being obliquely broken, and only a small portion of the articulating surface remaining on the dislocated extremity of the tibia, it will not rest on the tibia when it is reduced. Mr. Andrews, of Stanmore, and Mr. Foote, of Edgeware, consulted me on the following case. Oblique fracture with dislocation.

CASE XII.

Mr. Andrews and Mr. Foote were sent for on August the 9th, 1817, to the Hyde, six miles from London, to visit Charles Tomlin, a higgler, 48 years of age, who, falling from intoxication, had the wheel of his cart pass over his left leg, which produced a protrusion of the bones through the integuments at the outer ancle. Mr. Andrews reduced the dislocation in the evening of the accident. On the same night Mr. Andrews and Mr. Foote visited him again, and found his pulse very quick, and

spasms in the limb, which had again displaced the bone. They gave him a large dose of opium, and succeeded in reducing the bones.

On the 10th he had a very quick pulse, accompanied with strong spasms in the limb, but not sufficiently severe to displace the bone.

On the 11th, I was requested by Mr. Andrews and Mr. Foote, as I was going through the village, to stop and see this man; and as soon as the bandages were removed a violent spasm again threw the bones from the astragalus, and all the efforts I could make would not replace them. Seeing therefore no hope of the man's recovering without the amputation of the limb, I immediately proposed it, and he readily gave his consent.

For three or four days he had a great deal of nervous irritation, which was most relieved by occasional doses of opium and æther.

On the 18th, the stump was inflamed, and in some parts sloughy, and on the 22d it bled, but not profusely.

On the 25th a poultice was applied, and from this time the appearance of the stump improved, and he proceeded without interruption in his recovery. In a month he returned to his home at Bushey, a distance of seven miles.

Upon examination of the limb, I found the cellular membrane around the ancle loaded with extravasated blood; the ligamentum annulare tarsi was torn. The muscles were all remaining whole, though some of them, as the peronei, were much put upon the stretch. The fibula was broken one inch above the lower extremity of the malleolus externus which remained in its place, still united by its ligaments

to the tarsus. The tibia was split down for two inches above the joint, leaving the greater part of the articulating surface still resting upon the astragalus, but the remaining portion of the articulating surface with the shaft of the tibia and the fibula passed through the wound at the outer ancle. If therefore the bone had been again returned to its situation, it could not have remained there from the small portion of articulating surface attached to it; and if the projecting portion had been removed by the saw it would not have adapted itself to the portion of the tibia, which remained attached to the astragalus.

Division of an artery

The division of a large bloodvessel might, with an extensive wound of the integuments, lead to a necessity for amputation,

but I should not at once proceed to the operation on that account. The case from Mr. Sandford, of Worcester, sent me by Mr. Carden, clearly shews that the division of the anterior tibial artery does not, if it be well secured, prevent the patient's recovery. I also once saw a compound fracture close to the ancle-joint, accompanied by a division of that artery; and although the patient was in the hospital, and a brewer's servant, who possessed the worst constitution to struggle against severe injuries, yet this man recovered without amputation.

The posterior tibial artery is a vessel of more importance, and is accompanied by a large nerve, which would not be likely to escape injury when the artery was divided by the dislocated bone. Yet the magnitude of the anterior tibial artery and its free anastomosis with

the posterior, would not entirely preclud ethe hope of the foot being preserved under an injury of the posterior tibial artery.

Gangrene. *Mortification of the foot*

sometimes ensues, and becomes a sufficient reason for amputating the limb; but this must be generally done when limits appear to be set to the extension of the mortification. However, it may be observed, that in the mortification which ensues from the division of a bloodvessel I have seen in the arm, where the brachial artery had been divided and the elbow-joint dislocated, the arm removed above the injured part, whilst the limb was still dying towards the seat of the wounded artery, and the patient did well. And I have also known a case of popliteal aneurism in which the artery and the surrounding parts were so compressed by the swelling, that mortification began at the foot and was extending to the knee, and although no limit was yet set to the mortification, the limb was amputated, and the patient did well. So that mortification, when it arises from injury to a bloodvessel, admits of a practice different to that which is pursued in mortification arising from constitutional causes.

Contusion. *Excessive contusion may be another reason for amputation;*

and therefore in those cases in which heavy laden carriages pass over joints, and bruise the integuments so as to lead to their forming extensive sloughs, and produce at the same time generally the worst examples of compound dislocations, as regards the state of the

bones, I should immediately amputate, for such cases are very different to those which occur from jumping from a considerable height, from a carriage rapidly in motion, or from slipping down in walking or running.

Extensive suppuration will also form a reason for amputation. Suppuration.

I have known after an attempt to save the limb, the patient have more extensive suppuration than his constitution could support, followed by an ulceration of the ligaments, by which the joint became additionally exposed, and the bones ultimately again displaced, leading to an absolute necessity to remove the limb for the preservation of his life.

A necessity for amputation may be also produced by exfoliations of portions of bone, Exfoliation.

which, locked into the surrounding parts of the bone, are incapable of becoming separated, and thus keep up a state of continued irritation. My friend, Mr. Hammick, has had the kindness to send me a specimen of this kind, which he was obliged to amputate. The loose portion of bone was seated between the lower extremity of the tibia and fibula, and reached to the ancle-joint; both the bones had been broken, and had become reunited, and the uniting medium had inclosed and incarcerated the dead portion of bone. It is probable from the appearance of the parts that this portion of bone never would have been able to have escaped from the place in which it was locked.

Deformity. *Excessive Deformity of the Foot*

will also give rise to a necessity for this operation; and this deformity will arise in three directions. First, when the foot is suffered to turn outwards at the time the leg is placed upon the heel, in the dislocation inwards. Secondly, when it turned inwards in the dislocation of the tibia outwards; and, thirdly, the foot being pointed. The first is best opposed by placing the leg upon its outer side when that is compatible with the treatment of the wound; in the second case, it is best to keep the foot on the heel, with splints having foot pieces both on the inner and outer side of the foot; and the third requires similar splints, and that a tape, as a stirrup, should be placed under the foot, and fastened to the splint on the fore and middle part of the leg to keep the foot supported.

The following case from Mr. Norwood, of Bath, shews the necessity for amputation, when great deformity is permitted to occur.

CASE XIII.

I was sent for to Bradford, some years since, to amputate a leg directly after an accident of this kind. I found the lower extremity of the tibia, with the astragalus loosely attached to it, projecting at the inner ancle. The wound was not large, and the soft parts were little injured. I removed the astragalus, and reduced the tibia, leaving it to rest upon the os calcis. I did not again see him during the healing of the wound; I believe it got well without any severe symptoms, but the os calcis became drawn up against the posterior part of the tibia, to which it firmly

united, and the foot became immoveable, with the toe pointed downwards. In this state he came to Bath two years afterwards; I amputated the leg, and the patient did well.

GEORGE NORMAN.

Bath, August 2nd, 1819.

Amputation has been recommended in those cases in which tetanus occurs after this injury.

Of tetanus, I have seen one case from compound dislocation of the ancle, and have heard of another. That which I saw was in a Mr. Yare, a stable keeper, who had a compound dislocation of the tibia inwards, and in whom I reduced the bones, and placed the limb on its outer side. For a few days he proceeded without any alarming symptoms. The only circumstance in which he differed from what I expected, was in the slight inflammation which succeeded upon the joint; for the restorative process seemed to be scarcely set up in him. When I paid him my morning visit, several days after the accident, he said, "Sir, I believe I have caught cold, for my neck is stiff;" and as he said this, with his lower jaw raised and his teeth closed, I begged him to shew me his tongue, to ascertain if his jaw were locked, and he tried to open his mouth to protrude the tongue, but he was unable to do so. I then desired that Dr. Relph might see him, who did all his mind could suggest to arrest the progress of the symptoms, but unsuccessfully, as the different muscles of volition became affected in the back, extremities and the abdomen, until he was exhausted by irritation. To amputate under such circumstances, would be most unjustifiable, Tetanus.

as far as the experience of cases in this climate will enable me to form an opinion. I have not seen amputation performed for compound dislocation of the ancle, but I have for compound fracture just above the joint; and it seemed to me to precipitate the fatal event. I have also known, in one case, the finger amputated for tetanus arising from injury to it, but still the patient died: and I have heard of a third case in which it was also practised, but still the issue was fatal. There is a species of chronic tetanus which sometimes even succeeds wounds, and which will occasionally get well, and apparently, it recovers, even if but little be done by medicine, and nothing by surgery. And in such a case it would not be justifiable to amputate, as the patient will get well without it. If medicine does any thing in these cases, submurias hydrargyri with opium, is that under which I have seen the majority of cases recover.

Constitution irritable.

A very irritable state of constitution

will sometimes render all treatment unavailing in the attempts to save the limb, and will now and then destroy, even if the operation of amputation be performed. There are some persons originally constituted with so irritable a system, that the slightest injuries will destroy them. There are a much greater number whose constitutions, originally good, have been so much injured by habits of excess, by want of exercise, by over exertion of mind, by drinking freely of spirits, and eating but little, that they are rendered in the highest degree irritable.

CASE XIV.

One of the most curious examples of this kind which I have seen, was in a man who worked at Barclay's brewhouse, in the Borough. The circumstances were these:—

On Saturday he was turning a cask, and a splinter of wood entered his thumb, which he immediately drew out.

On Sunday night he requested his wife to rise to make him a poultice, for his thumb, he said, was painful.

On Monday he sent for Mr. John Kent, surgeon, in the Borough, who found his thumb inflamed and painful.

On Tuesday the inflammation had extended to the hand and fingers.

On Wednesday a swelling appeared at the wrist, above the ligamentum annulare carpi, and the man had a great deal of irritative fever, and was obliged to keep his bed.

On Thursday, after lecture, Mr. Kent came to me, requesting I would see this man, who had been delirious during the night, his arm much convulsed, and his body was becoming generally so. I went with him, and, feeling the thumb, discovered a fluctuation in the theca. I put a lancet into the extremity of the thumb, and a considerable quantity of pus issued. Gratified with the expectation of his being relieved by the discharge of the matter, I was going out of the room to express this feeling to his friends, when I heard a rustling at the bed behind me, and upon Mr. Kent and myself turning back,

we saw him under the influence of a convulsive fit, which raised him in part from his bed: he fell back and expired.

Living as these persons generally do, principally upon porter and spirits, they have constitutions which render them the worst subjects for accidents.

The following case shews the violent symptoms and quick dissolution which will, from the same cause, occasionally destroy in compound dislocations of the ancle.

CASE XV.

On June the 10th, 1809, I was requested to go immediately to Gracechurch Street, to see a Mr. Fenner, who, in walking opposite to the City of London Tavern, had slipped down from the foot-way, and produced a compound dislocation of the ancle. The tibia projected at the inner ancle; the fibula was broken; the skin was tucked in under the extremity of the tibia.

1st. I immediately procured a mattress for him, instead of a feather-bed.

2nd. A many-tailed bandage; splints lined with wool; pillows and tapes.

3rd. The skin was divided, and the bone reduced; but it was much opposed by violent spasm of the muscles.

4th. The edges of the wound were closely adjusted.

5th. The bandage was applied, and splints; and the limb was placed upon pillows on its outer side, with the knee bent.

6th. Bled to 14$\bar{z}$, and opium given; tinct. opii. gtt. xxx.

June 11th.—He reported that his night had been restless; his tongue was white; his pulse beat 110 strokes in a minute; he had violent pains in the ancle, and he had vomited.—Ordered oleum ricini, as his bowels had not been relieved. Evening; he had almost constant spasms of the muscles of the leg; he has no sleep, and has no appetite. The oleum ricini had produced him four evacuations.

June 12th.—His pulse was 120; his tongue more furred. He has violent and very frequent spasms. He has nausea, but has not vomited since the last report. He has had one evacuation. Blood is extravasated about the ancle; a sanious serum is discharged from the wound. Ordered opium.

June 13th.—Had slept three hours. There is some inflammation about the wound and swelling of the leg, with spasms, but they are less violent. A poultice was applied to the ancle, and fomentations ordered. Pulse 120; his tongue was very much furred. Evening; in most violent pain; he was ordered submurias hydrargyri five grains, with two grains of opium, and the saline medicine with antimony.

June 14th.—The spasms continue, but the pain has in a great degree ceased. He has had several evacuations, but he has been delirious during the night. The limb is but little swollen; the foot looks slightly inflamed, but there is no healthy discharge or any granulations beginning to form. The former treatment ordered to be continued.

June 15th.—He passed a bad night, being delirious through a great part of it. He had a violent spasm in the limb this morning, by which he produced a slight hæmorrhage, which was stopped by pressure. Leg swollen; wound appears to be without action. His pulse is equally quick, and he takes no nutriment.

June 16th.—He has spasms in the thigh of the same side, and in the other leg, as much as in the injured limb; in other respects he remains the same.

June 17th.—He was delirious during the last night, and bleeding was again produced by the violence of the spasms.—His pulse was considerably quicker than before.

June 18th.—He died at 4 o'clock in the afternoon.

Persons who are much loaded with adeps are generally very irritable, and bear important accidents very ill; indeed they generally die, which ever plan of treatment be pursued: to this, however, there are exceptions in those who are corpulent, and who yet take a great deal of exercise, as they will retain much vigour of constitution; and in such persons the limb may be attempted to be saved, as in the case described by Mr. Abbott, surgeon at Needham Market; but in those who have become extremely fat, and who have been addicted to habits of indolence, there is little chance of preserving life but by the operation of amputation.

Corpulent persons.

I have thus endeavoured to explain what has fallen under my observation, or have been able to learn from others upon this difficult subject; and I beg leave to express a hope, that any of

my friends, who may have had cases under their care, which would throw further light upon the subject, will have the kindness to communicate them to me, whether they make for or against the advice I have given, as I have no further wish but that all the points respecting this severe accident may be fully elucidated and established.

ON DISLOCATION OF THE TARSAL BONES.

On the Dislocation of the Astragalus.

This bone is connected above and on the sides to the tibia and fibula by its trochlea; below, it has articulatory surfaces for its junction with the os calcis, to which it is united by means of a capsular ligament; and anteriorly to the os naviculare, by a capsular, broad, and internal lateral ligament. A simple dislocation of the astragalus sometimes, but rarely, occurs; and a compound luxation is still more rare. A simple luxation is a most serious accident, being very difficult to reduce; and should the reduction not be effected, the patient is ever after doomed to a considerable degree of lameness.

Junctions with other bones.

Simple dislocation.

I was sent for into the country to visit a patient, and the surgeon who I met there requested me to see a person who had a dislocation of the foot, which had happened several weeks, but it had not proceeded to his satisfaction. Upon

Case.

examination I found the astragalus dislocated outwards, and the tibia broken obliquely at the inner malleolus. Every attempt to reduce it was made, which the surgeon, who is an extremely well informed man, could adopt; five persons kept up a continued extension where the accident first happened, but without effect; the patient was then taken home, and several persons were employed in extending the foot, and it was thought, after a time, with some success, but the reduction could not, by all their efforts, be rendered complete; for the astragalus still remained projecting upon the upper and outer part of the foot. The extension could not be carried further, for the integuments sloughed from that already made, and the wound was a long time in healing. The limb deviates much from its natural shape; the toes are turned inwards and pointed downwards; there is some little motion at the ancle, and a slight degree of it between the projecting and raised astragalus and the other bones of the tarsus. This accident, then, is of a most serious nature; for this gentleman had placed himself under the care of a most intelligent and persevering surgeon, and yet the attempts which he made at reduction were not entirely successful, merely from the nature of the accident, and not from any fault in the means which were pursued.

Compound dislocations.

Of the compound dislocations of this bone, I have only seen one instance; and in that case the operation of amputation was performed. It will be seen, however, in the preceding pages, that Mr. Trye removed the bone in this accident, and the case did well.

The five anterior bones of the tarsus are sometimes dislocated from the os calcis and the astragalus. There is a transverse joint between these bones, formed by the astragalus and os calcis posteriorly, and by the os naviculare and os cuboides upon the fore part, which support the three ossa cuneiformia. This joint is sometimes, but rarely dislocated by very heavy weights falling upon the foot, of which the following is an example.

A man working at the Southwark Bridge had the misfortune to have a stone of great weight glide gradually upon his foot. He was almost immediately brought to Guy's Hospital, and the appearance of the foot was, that the os calcis and astragalus remained in their natural situations, but the fore part of the foot was turned inwards upon those bones. When examined by the young gentlemen, the appearance was so precisely like that of a *club foot*, that they could not at first believe but it was a natural defect of that kind; but upon the assurances of the man, that his foot, previously to the accident, was not distorted, an extension was made by fixing the leg and the heel; the fore part of the foot was then drawn outwards, and thus the dislocation was reduced. This person was discharged from the hospital in five weeks quite recovered, having the complete use of his foot.

The following interesting cases were under the care of Mr. Henry Cline; and for the particulars I am indebted to his apprentice, Mr. South.

CASE I.

Thomas Gilmore, æt. 45 years, an Irish labourer, was admitted, under Mr. H. Cline, into St. Thomas's Hospital, about eleven o'clock of the morning of

March 28, 1815. Whilst walking at the New Custom House this morning, he received a blow on the heel, from the falling of a stone, (said to be half a ton weight) which made a wound on the fore part of the ancle-joint, and dislocated the foot at the astragalus.

The parts were in the following state:—a wound extended from opposite the middle of the base of the tibia, round the upper part of the instep, to the external malleolus, which exposed the articulating surface of the astragalus with the navicular bone on the fore part, as well as that for the os calcis, on the outside, from both of which bones it was displaced; its connection with the tibia and fibula, however, was undisturbed; the tuberosity of the os calcis projected outwards, but the rest of the foot turned in, so that the toes pointed much inwards towards the opposite foot.

The reduction was effected by extending the foot, and rotating it outwards; the wound was brought together with straps of adhesive plaister; the leg was covered with soap plaister and put in a fracture-box, on the heel; the parts were kept uncovered, and a slight hæmorrhage supervening, linen rags dipped in cold water were applied.

He is a robust man, has been in the habit of drinking, and says he has been subject to the gout.

March 29. Had not slept much, as on falling asleep, spasm was produced; pulse about 80; skin cool; he has taken the sulphate of magnesia, which has produced two evacuations; the part is not tumefied but has been painful.

March 30. Has passed a very restless night, having been delirious; pulse 120; skin hot and dry; fauces parched; does not now seem quite clear in intellect; in the morning he has had more than one rigor; a dose of sulphate of magnesia, with infusion of senna, had procured three loose, but healthy stools; the part has become more swollen and painful; *ordered*, fever mixture, with ten drops of antimonial wine, every six hours; in the afternoon he had three more stools.

March 31. Is still delirious, and did not sleep last night; skin very hot and dry; mouth parched; pulse about 112; has had two stools this morning, without medicine; the rigors still continue occasionally, and he is also affected with tremors; the inflammation is extending up the leg, and a bruise, which he received on the same leg, is now ulcerating; to it, wax and oil dressing is applied.

April 1, 1815. Has been less delirious than on the two former nights; pulse 122; tongue cleaner; no stools.

April 2. Has slept better than he has yet done; is not at all delirious; pulse 96 and soft; skin moist, and he has perspired freely; no

stools; urine in large quantity, but said to be high-coloured; the tremors have a good deal left him, and he feels altogether comfortable, except that there is a good deal of pain in the injured part, which he ascribes to a rheumatic affection, to which he has been subject; there is a slight erysipelatous inflammation of the leg, with some œdema.

April 3. Has passed a tolerably good night; is sensible; pulse 100; bowels costive; the ancle easy.

April 4. Pulse 96; skin moist; has had two stools; the erysipelatous inflammation has extended rather above the internal condyle of the os femoris, and small yellow vesicles have formed; this seems to have proceeded from the bruise on the calf of the leg, which has now gone into a state of superficial ulceration; soap cerate was applied to this wound, and the spirit lotion on the limb as far as the inflammation extended; the wound on the ancle was dressed, for the first time, to-day, the ligaments appear to be sloughing; the strapping was left off, and wax and oil dressing applied.

In the afternoon, his pulse 104, seems restless and says his head feels rather light; had another stool towards evening.

April 5. Has been delirious all night; skin hot and dry; pulse 108, and weak; these symptoms indicating fever, of a different kind to the preceding, *viz.* secondary and sympathetic with the erysipelas; the wound at the ancle is granulating, and secreting healthy pus; that on the leg is very painful, and has taken on a

sloughy appearance: ordered decoction of bark every four hours, with opium, if diarrhœa is produced.

April 6. Was delirious; pulse 100 and weak; skin perspirable; has had two stools; the inflammation extends nearly to the groin, and at one part of the thigh, where the cradle has accidentally pressed the skin, seems as if it would slough; takes a grain of opium twice a day.

April 7. Slept pretty well; wanders; pulse 110, but strong; skin not very hot; no stool; much pus is discharged from the wound at the ancle.

April 8. Has been restless during the night; pulse 96, with some power; skin moderately hot; is thirsty; delirious; tongue rather foul; bowels costive; his urine, of which he still voids a great quantity, scalds him; pus is forming in different parts of the limb, and the inflammation on the thigh seems now to be stationary.

April 10. Slept well; is not delirious; pulse 96, not weak; skin not very hot; has appetite; the part is painful, but the inflammation on the thigh is considerably diminished, and the sloughs are circumscribed; pus healthy; a few days since, he was ordered a pint of porter daily, which is now increased to two pints.

April 11. Says he occasionally wanders; pulse 100, rather weak; appetite tolerably good; skin moist; has had stools.

April 12. The inflammation is less; the opium which he takes gives him good nights;

the wound at the ancle is much the same; the sloughy sore on the calf of the leg, better; to-day he was moved into a clean bed, and the limb placed on the outer side, as he wishes to lay on his side.

April 13. Is composed; pulse 98; skin cool; feels weak; has not much appetite, but likes his porter; the sloughs on the leg separate slowly.

April 14. The limb returned to its old position on the heel, as he was not so comfortable when it was placed on the side.

April 17. Pulse 92, and weak; has little or no appetite; the bark and opium were left off to-day, as they seem to affect his head; a poultice was applied to the wound on the calf of the leg, and strapping on that at the ancle; it being hoped, that by the support which it might afford, it would diminish the discharge.

April 22. As his appetite does not get better, and he gets no sleep, the bark and opium were resumed, and an additional pint of porter given, so that he now takes three pints a day; his pulse is not so weak; spirits good; at times he is in great pain; strapping is applied to all the wounds; the sloughs not separated.

April 28. Continues much the same; one slough on the leg has separated; that at the ancle not yet; the part is tolerably easy; the discharge not great.

May 15, 1815. All the sloughs have separated, and the wounds are gradually healing up, but he is very weak and his appetite is bad.

May 20. Oil was ordered to be rubbed on

such parts of the leg as would bear it, and then washed off, as it was thought this would promote circulation in the limb, which was œdematous; however it was soon left off, as it occasioned inflammation. About this time his medicines were omitted.

May 29. An abscess, which had formed on the calf of the leg, was opened.

July 14, 1815. All the dressings are left off to-day; he is perfectly capable of lifting up his leg, and has slight flexion and extension of the foot.

After this time he rapidly improved; and having left his bed, in a short time was walking about the square on crutches.

Sept. 21, 1815. He went out, being able to walk tolerably with a stick.

CASE II.

Martin Bentley, æt. 30 years, a sailor, was admitted under Mr. H. Cline, into St. Thomas's Hospital, at twelve o'clock at noon of

June 21, 1815. He had been overpowered this morning by some stones which he was endeavouring to sling in a ship's hold, which knocked him down and fell on him, causing a compound fracture of the tibia and fibula of the left leg, near the middle, with dislocation of the astragalus of the other foot from the other bones of the tarsus.

As there was much laceration of the skin and muscles, Mr. H. Cline thought right to amputate the limb below the knee, which was done about three hours after his admission. He

complained of much pain during the operation, with frequent jerking of the limb; the muscles were extremely rigid; five ligatures were applied, and the wound dressed as usual.

The other foot presented the following appearance: the protuberance of the os calcis had nearly disappeared, but the os calcis laterally and on the outer side projected much beyond the outer malleolus, just under which however was a remarkable depression; just below the inner malleolus was a remarkable and unnatural projection; the whole foot seemed somewhat displaced outwards, the toes turning out; the astragalus must here have been dislocated from both the navicular bone and os calcis, and thrown inwards, so as to have its under articulatory surfaces for the os calcis resting on the inner edge of that bone.

After the amputation the dislocation was reduced by fixing the knee, having the thigh bent at right angles with the body, then laying hold of the metatarsus and protuberance of the os calcis, and drawing the foot gently and directly from the leg. During this extension Mr. H. Cline put his knee against the outside of the joint, and the foot being pressed against it the os calcis and navicular bones slipped into their place, carrying with them the rest of the foot, and the deformity disappeared. He was then carried to bed, and an outside splint, being well padded, was applied, and secured by tapes, and the leg, as far as could be, placed on the outer side. Goulard's wash was applied.

June 24. The lead wash to be left off, and soap cerate put on the right leg.

June 25. The cerate has blistered his leg in several places, and he complains of more pain than yesterday, at his ancle.

June 28. The stump, which is going on well, dressed to-day; one ligature came away; the pain in his ancle has subsided.

July 1, 1815. Complains of uneasiness about the epigastrium, and sickness; pulse 112 and hard; ℥viij. blood taken from the arm.

July 2. All untoward symptoms have disappeared.

July 4. Two ligatures came away; a sore, which is the effect of the soap cerate, on the inner malleolus, is dressed with wax and oil. He is now capable of raising his leg, which however is numb.

July 13. The ligatures not seeming disposed to come away, a piece of whalebone was fixed on the side of the stump to which they were attached, and so kept constantly tight; was put on the house diet to-day; has previously been on the milk.

July 19. One of the ligatures removed, with some difficulty, by Mr. H. Cline; the other came away easily on the following day.

Aug. 7, 1815. Walked in the square, the first time since the accident.

Aug. 26. Went out; capable of walking tolerably well.

I conversed with Mr. Henry Cline on the subject of these accidents, and Mr. Green, who saw the preceding cases in the commencement, has sent me the following letter respecting them.

Lincoln's Inn Fields, Aug. 19, 1819.

MY DEAR SIR,

In the notes of Martin Bentley's case, which I made at the time he was under Mr. Henry Cline's care, in St. Thomas's Hospital, I find it stated that the right astragalus was dislocated inwards, *i. e.* that the os calcis, with the rest of the foot, was thrown outwards; and the description which I have there given of the appearances, is—that the whole foot seemed to be somewhat displaced outwards; that the os calcis projected laterally much beyond the outer malleolus, whilst the protuberance of that bone had nearly disappeared; and that in consequence of the astragalus retaining its situation, there was a remarkable depression beneath the outer malleolus, between it and the displaced os calcis; and as remarkable a projection produced by the astragalus, below the inner malleolus. This accident, which was accompanied with a compound fracture of the opposite leg, had been produced by the fall of several large stones. The reduction of the dislocation was effected without difficulty, first, by fixing the knee, then by making extension of the foot gently and directly from the leg, by laying hold of the heel with one hand and placing the other on the dorsum of the foot; and lastly, by pressing the foot inwards, whilst a counter-pressure was made with the knee upon the lower extremity of the tibia on the opposite side. The foot was afterwards placed on its outside, and secured upon a well padded splint.

In the case of compound luxation of the tar-

sal bones, likewise under the care of Mr. Henry Cline, it appears, according to my notes, that the astragalus was displaced outwards, *i. e.* that the other tarsal bones were thrown inwards. I find that the appearances are described to have been—that the foot was turned considerably inwards; that the articular surface on the head of the astragalus, which is received into the cup of the navicular bone, was exposed through an extensive but tolerably clean cut through the integuments, and that the articulating surface of the os calcis for the astragalus might also be perceived on the outer side. The accident was said to have been occasioned by the fall of a heavy stone, which had struck his heel. Reduction of the dislocated parts was accomplished, first, by bending the leg so as to relax the muscles, and then by extending the foot in the manner described in the former case, and by rotating it at the same time outwards.

The patient was a robust, but not corpulent, labouring man, between forty and fifty years of age. He stated that he had been in the habit of drinking, and that he was occasionally subject to gout.

You have already, I believe, been made acquainted with the particulars of the progress of the case, of which the most remarkable features appeared to be, that the primary constitutional irritation was violent, but of short duration, and that his recovery was retarded by extensive erysipelatous inflammation which terminated in sloughing, and by the formation of matter at the part, accompanied by irritative

fever and loss of strength; but that his recovery, although tedious, was complete.

I remain, my dear Sir,

Your obliged and obedient Servant,

JOSEPH HENRY GREEN.

Of the Dislocation of the Os Cuneiforme Internum.

I have twice seen this bone dislocated, once in a gentleman who called upon me some weeks after the accident, and the other case occurred in Guy's Hospital very lately. In both these cases the same appearances presented themselves. There was a great projection of the bone inwards, and some degree of elevation, from its being drawn up by the action of the tibialis anticus muscle, and no longer remaining in a direct line with the metatarsal bone of the great toe. In neither case was the bone reduced, but the former patient walked with but little halting, and I believe would in time recover the use of the foot, so as not to appear lame. The cause of the accident was in this gentleman, a fall from a considerable height, by which the ligament was ruptured which connects this bone with the os cuneiforme medium, and with the os naviculare.

The case in Guy's Hospital my apprentice, Mr. Babington, informs me, happened by the fall of a horse, and the foot was caught between the horse and the curb stone.

The treatment of this accident will consist,

in confining the bone in its place, by at first binding it with a roller dipped in spirits of wine and water, with which it must be constantly kept wet. When the inflammation is subdued, a leather strap is to be buckled around the foot, to keep the bone in its place till the ligament be united with the bone in its natural position.

The metatarsal bones I have never known luxated. Their union with each other, and irregular connection with the tarsus prevent it; and if it ever happens it must be a very rare occurrence.

The toes are sometimes dislocated; but I will reserve that subject until the dislocations of the fingers are described.

ESSAY II.

OF

UNNATURAL APERTURES

IN THE

URETHRA.

By Mr. ASTLEY COOPER.

Incised wounds rarely heal.

THAT openings made into the urethra by cutting instruments are healed without difficulty, is evinced by the operation for the stone in the bladder, in which this canal is extensively opened; and in the removal by incision of a calculus lodged in any part of the urethra. But when apertures are formed in this part, either from diseased states of the constitution and of the urethra, or from disease in the canal only, and when they are accompanied by any considerable loss of substance in the urethra and corpus spongiosum, they are generally very difficult of cure.

It most frequently happens that fistulous orifices from this canal are the result of strictures in the urethra. The impediment which this disease produces to the passage of the

urine enlarges the lacunæ situated behind the stricture, and the frequent pressure of the urine upon them and upon the sides of the urethra leads to an ulcerative process, by which the urine becomes applied to a new surface; it irritates the part, occasions the formation of an abscess, into which the urine gains access; and when the matter is discharged, be it by nature or by art, the urine passes through the aperture, and continues generally to do so whilst the stricture remains. As the seat of the greater number of strictures in the urethra is beyond the middle of the canal towards the bladder, the apertures are most frequently seated in the perineum; but they are in different persons from an inch within the urethra to its extremity at the bladder. Cause.

As soon as these abscesses, which are the forerunners of the fistulæ, can be distinctly discovered to contain matter, it is the best practice to pass a lancet into them, to discharge the matter. It is advantageous in preventing extensive destruction of the parts by ulceration, and they not unfrequently immediately heal even so as to prevent the fistulous orifice, and it becomes the means of lessening the tendency those dangerous extravasations of urine into the scrotum, which if they are not early opened often prove destructive to life. Treatment.

The mode of treatment of such apertures is easily understood in principle, and their cure in most situations is readily effected in practice. It consists in principle in removing the impediment to the passage of the urine, by enlarging the urethra at the strictured part, and thus

prevents the urine from making unnatural pressure against the side of the canal, and in practice it depends on the introduction of metallic bougies, increasing their size gradually until it reaches somewhat beyond that of the natural diameter of the passage, and thus the urethra becomes stretched in a degree to admit readily the passage of the urine through what was previously a contracted canal.

Catheter. In other cases it is sometimes required, to introduce a pewter catheter of large size into the bladder, to suffer it there to remain to draw the urine through it, and thus producing the double effect of extending the stricture and preventing the passage of the urine through the opening, it often becomes the means of permanent relief.

Size. The size of the instruments employed for these purposes must be varied according to circumstances, for there is in different persons a great diversity in the natural diameter of the canal, and at different ages, even after manhood, the urethra varies exceedingly in the dilatability of its canal.

Caustic. Caustic, which was formerly much employed, is now comparatively seldom used for this purpose; yet cases do occur in which, from long neglect, the urethra and the parts surrounding the stricture become so exceedingly altered in their structure that no instrument can be passed through the part without a degree of violence which will be dangerous to life, and in which the slower influence of the caustic will be attended with less danger than the use of the metallic bougie. But it is principally in the

class of patients who are admitted into our hospitals, in whom such extensive mischief has arisen from long neglect, as to require the application of the caustic.

Case of aperture from the prostatic part of the urethra to the rectum.

But there are apertures of this description so situated and connected with other parts as to preclude the possibility of healing them by the usual means of treatment, and in which other measures are consequently obliged to be employed.

CASE.

A gentleman came to London under the following circumstances. He had an abscess formed upon the anterior and lateral part of the rectum, which had discharged itself after long continued suffering into the rectum, just above the verge of the anus. The surgeon, whom he consulted in London, discovering the aperture, divided the sinus, and he returned into the country; but the wound did not heal, and a considerable discharge proceeded from it. Observing the discharge with attention, he found that after making water the urine passed through the aperture, and that consequently there was some communication between the urethra and rectum. Alarmed at this circumstance he came to London, and placed himself under my care. I examined his urethra, and finding some obstruction at the apex of the prostrate gland, advised him to make use of large metallic bougies until the natural diameter of the urethra at that part had been re-established, hoping that in this way the opening

would be disposed to heal as the urine found a more ready course than through its natural channel. He persevered in the use of these instruments for several weeks, but with no apparent advantage, as the urine still passed by the fistulous aperture. I therefore advised the introduction of a metallic catheter of large size into the urethra, and to give it full effect, recommended that he should steadily observe the recumbent posture, which he did for a month, during which period the urine did not pass by the rectum; but as soon as the instrument was withdrawn the urine resumed its former unnatural course. He returned into the country greatly disappointed, and after remaining there for some time, and finding his complaint increasing, he again applied to me, and I advised him to undergo the following operation for his relief. I introduced a catheter into his bladder, and my finger into the rectum, and then made an incision, as in the operation for the stone, in the left side of the rhapha, until I felt the staff through the bulb. I then directed a double-edged knife across the perineum, between the prostrate gland and rectum, intending thus to divide the fistulous communication between the urethra and the bowels. A piece of lint was introduced into the wound, and a poultice was applied over it. When the lint was removed the urine was found to take its course through the opening in perineo; the aperture in the rectum gradually healed, and that of the perineum quickly closed, after which the urine took entirely its natural course. Whilst the wound which I had made was healing, one of

the testicles became enlarged and inflamed, as I supposed from the irritation on the extremity of the vas deferens, or in sympathy with an irritated vesicula seminalis on that side. This inflammation left some hardness of the epidydimis, but no further inconvenience, and the urine has never since deviated from its natural channel.

Apertures are sometimes formed in the urethra from a process of ulceration beginning in a bad constitution, without their being accompanied with stricture. Ulceration.

A person whose constitution is broken by excess, or who is naturally feeble, will have a slight discharge take place from his urethra without any previous sign of disease, or without the possibility of a well founded suspicion of gonorrheal infection; a swelling forms in a line with some part of the urethra, which proceeds to suppuration; a poultice is applied, and the abscess breaks, or it is opened by art, and the urine takes its course through the wound, whilst a considerable discharge still continues from the urethra. These circumstances arise either from ulceration in the mucous membrane of the urethra, or from abscesses in the lacunæ; and I believe more frequently from the latter than the former. It is the usual practice in these cases to begin directly with the use of bougies, but it is not judicious to do so, as they only add to the tendency to ulcerate, and increase both the local and constitutional irritation. No bougies employed.

A nobleman came to London with one of these abscesses, and with a copious discharge from the urethra. His constitution was previ-

ously much enfeebled, and it suffered extremely from the local irritation. A bougie was once passed into his bladder, but no stricture was found. He had great fear of bougies, and requested that no more might be introduced. The abscess was poulticed, and the matter discharged by the perineum, but still it continued to pass both by the urethra and by the aperture in perineo. The poultice was continued, and his constitution was endeavoured to be improved by attention to his diet, by alterative and by tonic medicines. He soon amended in his general health; the discharge from the perineum gradually lessened, and that from the urethra entirely ceased. He recovered, and has remained well with respect to this disease for several years. Contrast this with the following example. A gentleman had a slight discharge begin from his urethra. He was a married man, of excellent moral character, who had never exposed himself to the possibility of any infection. The discharge from his urethra at first appeared gleety, but it afterwards became purulent, without any pain or difficulty in passing the urine. Notwithstanding this a bougie was employed, under the use of which the irritation increased, the discharge became greater, and his general health suffered. A swelling then formed under the urethra, within the scrotum, and which after great local and constitutional irritation discharged itself, and the urine passed through the aperture in the scrotum. The bougie was again employed, to extend the urethra and to heal the opening from it into the scrotum; but in a

short time another abscess formed in perineo, and from this the urine became extravasated into the perineum and scrotum, and a free opening was obliged to be made for its discharge; but extensive sloughs followed; his constitution became extremely irritated and reduced, and he died of this complaint. Upon opening him, two ulcers were found in the urethra, without any appearance of stricture.

If this disease had been from the first constitutionally treated, instead of being irritated by the injudicious employment of bougies, this person would probably have had his life preserved.

Loss of substance in the urethra.

Apertures connected with loss of substance in the urethra are extremely difficult to heal. They are usually seated in that part of the urethra which is placed before the scrotum. They generally pass longitudinally, and reach to the extent of from half an inch to an inch; sometimes one-third of the urethra is removed; at others, half the canal, and with the membrane of the urethra, the lower part of the corpus spongiosum which adhered to it. A part of the urine passes by this unnatural opening, and sometimes the whole of the urine and semen, when the opening is large. The patient's mind suffers extremely from the defect, as he considers himself emasculated; and the greatest inconvenience arises from the direction which the stream of urine takes in its discharge. The cause of the aperture is an abscess in one of the lacunæ, attended with a disposition to the sloughing process; and when the matter is discharged, the slough which follows removes the lower portion of the

urethra opposite to the lacuna, and thus produces a large aperture.

These cases are, I know, considered by some of my professional brethren as incapable of cure, and patients labouring under them have been abandoned to despair; but the following examples may, perhaps, lead to attempts at relief which have not hitherto been made; and it is the favourable result of these which has induced me to venture to give this short essay upon this subject.

CASE I.

A gentleman who had lately returned from India had a chancre at the orifice of the urethra, accompanied by a high degree of inflammation of the glans, prepuce, and skin of the penis, to the pubes and scrotum. The urethra sloughed at the junction of the scrotum with the penis, leaving an opening by which the urine was freely discharged. This opening became healed at its margin, but a large fistulous orifice still remained in the urethra shewing not the smallest disposition to heal, and exposing the patient to great inconvenience in the discharge of the urine.

The first surgeon whom he consulted advised him to introduce bougies three or four times in the day; which he persevered in doing, without effect. The next attempt which was made to heal it was by the application of blisters, probably in the hope that excoriating the edge might give a disposition to granulation, and thus lead

to the closure of the aperture. This plan was, however, entirely unsuccessful.

The next trial consisted in paring the edges of the wound, introducing pins, and bringing the edges of the wound together by the twisted suture; but this also proved abortive.

At this time he applied to me; and conceiving that a simple suture might answer the purpose better than the pins, I pared the edges of the sinus and sewed it together by two threads; I then passed a catheter into the bladder, to discharge the urine without inflaming the cut surfaces. On the third day, however, I found that the urine had passed by the side of the catheter, destroying the adhesive process; and when the ligatures separated on the fifth day, no union had been produced. Feeling it would be quite useless to repeat these trials, and seeing that the scrotum formed two thirds of the opening, and the skin of the penis the other one third, I thought that it might be possible to heal it upon the principle of the contraction of the skin in cicatrization. In June, 1818, I applied the nitrous acid upon the edge of the fistulous orifice and upon the skin, to the extent of three quarters of an inch around it; the skin sloughed superficially, formed granulations, and healed. It soon afterwards began to contract, so as to shew that the principle would ultimately much diminish the orifice. In the month of October succeeding, I again applied the acid, and with increased effect; at the end of November the application was repeated by himself, and the opening, from the size of a pea, was reduced to that of a pin. On January the 22nd, 1819, it was

again touched, but very lightly. In March the caustic was last applied, and in a fortnight the orifice was closed, and not the smallest quantity of urine has since passed. The mental sufferings produced in the patient by this orifice, cannot be described; and the happiness he felt in his recovery was unbounded.

New urethra.

But still it is only in cases in which the skin is very loose, or the scrotum is forming a part of the fistulous orifice, that this plan would succeed; as, when the skin is tight, it would be scarcely possible to draw it together so as to produce its union. Some other plan must be therefore resorted to when this is the state of the parts; and I thought that an operation might succeed similar in principle to that which has been performed for time immemorial, in India, of making a new nose, and which has been successfully performed by my friends, Mr. Carpue and Mr. Hutchinson, in London, as well as the operation of making a new under-lip from the skin beneath the chin, which was performed by my friend Mr. Lynn, surgeon of the Westminster Hospital, and is so highly creditable to him; by which, not only a new lip was produced, but even the beard growing upon that lip. I conceived that a piece of skin might be raised from the scrotum; that the edges of the fistulous orifice might be pared, and the skin removed to a small extent around it, and that the skin thus raised from the scrotum might be turned half round, so as to apply its raw surface to the opening, and upon the edges where I was in hopes it would unite. The case which led me to contemplate this operation,

I attended first with Mr. Tipple, surgeon at Mitcham; and when the patient removed to London with Mr. Hunter of Tower Street, and his son, a very excellently well-informed surgeon and amiable man, who has had the kindness to furnish me with the following particulars of a case, the result of which has afforded me a great deal of satisfaction; and as the operation is so simple that it may be performed even by those who are not frequently in the habit of operating, and is likely generally to succeed, I hope it will be useful to many who have been deemed incurable.

CASE II.

Of Abscess in the Urethra.

In the beginning of July, 1818, Mr. H——t, æt. 56, had a violent attack of inflammation in the penis and scrotum, attended with enormous swelling, the consequence of neglected stricture; this was treated in the usual manner, by purgative medicines, fomentations, and poultices. Aperture closed by a portion of skin.

July 9th.—A large abscess was opened opposite the bulb of the urethra, which discharged a great quantity of very fœtid matter.

July 30th.—Mr. Astley Cooper found it necessary to introduce a silver catheter, which was effected with great difficulty, on account of the resistance of two firm strictures, and the highly inflamed state of parts; this was worn for three weeks, during which time another abscess opened

at the under part of the urethra, immediately anteriorly to the scrotum; the swelling and inflammation gradually abated, and the fistulous orifice behind the scrotum closed; but that at the forepart continued to enlarge till it measured half an inch in length, and was of sufficient width to admit with ease the largest catheter; in this state it continued nearly four months without any sensible diminution in size; the edges were quite callous, and never shewed the least disposition to granulate, notwithstanding the repeated application of the nitrate of silver and other stimuli. Attempts were also made to produce union by adhesion, but from the great loss of substance it was impossible to keep the edges in contact. The urine passed almost wholly by this aperture, unless drawn off by a catheter. As there appeared no means of relief from this distressing condition, except by surgical operation, and from the extent of the wound, bringing the edges together either in the transverse or longitudinal direction, offered very little chance of success, Mr. Cooper proposed to supply the deficiency by a covering of integument from the scrotum. With this view the following operation was performed.

December 9th.—An elastic catheter being passed into the bladder, the callous edges of the opening were pared off, so as to produce an entire new surface; a portion of integument was then dissected from the scrotum (leaving it attached at the upper part) and turned over upon the wound, to which it was exactly fitted; this was held down by four sutures covered by small strips of adhesive plaister; a bandage was ap-

plied to support the scrotum, and the patient placed on his back in bed.

December 10th.—Much aching pain in the part; a slight oozing of matter by the side of the instrument at the extremity of the penis. An enema was exhibited to prevent straining during the evacuation of the bowels; a little urine was, however, forced through the wound.

December 11th to 14th.—The discharge of matter through the natural orifice of the urethra increased; scrotum swoln and inflamed; a small quantity of urine again escaped by the wound on the 12th and 13th; the bowels were kept soluble by the daily administration of clysters and mild aperient medicines. Saline medicines produced considerable inconvenience by their diuretic operation.

December 15th.—The dressings were entirely removed; the edges of the flap appeared in perfect apposition with the parts beneath, but the skin was thick and œdematous, particularly at the upper part; the sutures all retained their hold; the scrotum was much excoriated and inflamed by the acrid discharge; the wound was carefully cleaned; two straps of adhesive plaister were applied, over these a piece of lint spread with simple cerate, and the bandage to support the scrotum. After this the dressings were renewed every day in the same manner.

December 18th.—A little urine again escaped by the wound.

December 19th.—The catheter which had remained in the bladder ever since the operation, became this evening completely stopped up; it was therefore withdrawn, and another intro-

duced; the slight pressure upon the wound, in passing it, did not appear in the least to disturb the union, though it was followed by a great deal of pain at the end of the penis.

December 20th.—Much acrid discharge from the wound, (principally from a small opening on the right side); considerable excoriation of the cuticle.

December 21st.—The upper and left side of the flap appears perfectly united; the urine, which had hitherto been loaded with a thick mucus, and very offensive to the smell, assumed a more healthy appearance, and soon became perfectly natural.

December 22nd.—The two upper sutures ulcerated through the skin.

December 23rd.—The whole of the sutures were removed, as they kept up considerable irritation; the discharge from the wound passes only by the small sinus opening on the right side; the upper edge of the flap still very thick, owing perhaps to the slow circulation.

December 24th.—The wound looked less irritable.

December 25th and 26th.—Wound going on well; skin becomes rather thinner; a small pouch formed in the situation of the upper suture.

December 27th.—The catheter again withdrawn, and another introduced, which passed with very little difficulty; several hairs sprouting out on the flap of skin; the discharge still continuing from the sinus; the effect of pressure was tried in preventing it, keeping the sides together by a pad of lint bound down by adhesive plaster.

December 28th.—The compress has completely stopped the discharge by the sinus.

December 29th, 30th, and 31st.—Compress applied daily; no discharge from the sinus, but the opening does not appear perfectly closed; matter still passes through the extremity of the urethra; the edge of the flap becomes gradually thinner, beginning from that part which is least twisted.

January 1st and 2nd, 1819.—The same.

——— 3rd.—Passed a fresh catheter.

——— 4th.—He sat up; slight irritation in the urethra; matter tinged with blood.

January 5th.—Much pain and uneasiness in the bladder and penis, relieved by a dose of saline aperient medicine; a quantity of urine which passed through the urethra by the side of the instrument produced no effect upon the wound; the same thing occurred in a greater or less degree every day till this catheter was discontinued on the 18th instant, and without any apparent inconvenience.

January 10th.—Sat up without the instrument, between three and four hours; it was afterwards withdrawn daily, but he was not allowed to pass his water without it.

January 15th to 31st.—The catheter was withdrawn for a few hours every day; slight discharge from the wound.

February 1st.—Had an evacuation from the bowels during the time the instrument was out of the bladder, attended with a considerable discharge of urine by the natural passage, the first time it had occurred since the operation;

not a drop of urine passed by the wound, and no ill effects followed.

February 2nd to *March* 2nd.—As the flap of integument and adjacent parts had still rather an irritable appearance, and an occasional oozing was observed from a very small orifice on the right side of the wound, it was thought improper to hazard a repetition of this experiment; the catheter was therefore introduced twice a day, and continued in the bladder at night.

March 3d.—By the direction of Mr. Cooper, he now began to pass his urine without the aid of an instrument, using it only once a day (to prevent the return of an old stricture, of very long standing, in the membranous part of the urethra); after the first effort it came in a tolerably free stream, more so than it has done for many years. A weak solution of sulphate of zinc soon removed the irritable appearance of the integuments.

May 8th.—A common bougie was substituted for the elastic catheter, and introduced once every day till the latter end of September; since which time he has passed it but once in two days; he is now, October 14th, in perfect health, and very thankful for the operation; the stream of water becomes gradually fuller and stronger; the penis is somewhat drawn down by the contraction of the integument, and the small pouch which was formed by the ligatures at the upper part of the flap is removed. I have the greatest expectation that this operation will in others be found useful, as this gentleman's wound has remained perfectly well for seven months.

ESSAY III.

ON

ENCYSTED TUMOURS.

By Mr. ASTLEY COOPER.

Different kinds.

There are different species of encysted tumours in the body, but that to which I at present intend to confine my observations, is the tumour which is situated just under the skin, and is so frequently seen upon the head, the face, and upon the back, and occasionally, but less frequently, under the skin upon other parts of the body.

Having been myself the subject of one of these tumours, upon my back, I was led to observe it with more than common attention, and am induced to hope that I shall be able to shew from what source these swellings derive their origin.

Symptoms.

The encysted tumour is generally nearly globular, and when seated on the head feels very firm, but upon the face it possesses a fluctuation more or less obscure; the skin over it is generally

uninflamed, but it is now and then streaked with blood-vessels, which are larger than those of the surrounding parts.

In the centre of the tumour on the skin, it often happens that in this early state, a black or dark-coloured spot may be seen, which sometimes continues through the whole course of the disease, but this is by no means uniformly the case. In general they are unattended with pain, are never in themselves dangerous, and require removal from the parts in which they occur, and the defect in appearance they produce. They move readily within the cellular membrane, if they are free from inflammation, but the skin in general does not easily move over them.

Seat. The scalp is more subject to them than any other part of the body, but they also frequently are seen upon the face, and not unfrequently one is found at the outer canthus. Upon the shoulders they are often met with, more especially in men who wear braces, and in women who have very tight shoulder-straps to their stays. On the back they are occasionally formed, and sometimes, but much less frequently, upon the extremities.

Number. The greatest number which I have seen in the same individual, was in a patient of Mr. Hall's of Dulwich, who had sixteen upon his head, some of which, as large as a walnut, I removed. I have seen nine in another person, and four, five, and six, are not uncommon.

Size. The largest size I have known them acquire, has been that of a common sized cocoa-nut, and this grew upon the head of a man named

Lake, who kept the house called the Six Bells at Dartford. It sprung from the vertex and gave him a most grotesque appearance, for when his hat was put on, it was placed upon the tumour but scarcely reached his head, and this man will be, on this account, long remembered in that neighbourhood. The cyst is in the collection at St. Thomas's Hospital, and an excellent cast of his head, taken just prior to the operation. He recovered very well and I believe is now living, at least he was when I last inquired, and it is now many years since the operation was performed. In a relation of Mr. Toulmin of Hackney, I saw one on the arm of very considerable size, but in general these swellings do not exceed from one to two inches diameter.

Hereditary.

They are in some degree hereditary, for often I hear a patient observe, I have several swellings upon my head, and my father (or my mother) had several.

They also occur in several of the same family. I was asked by Dr. Pacifico to remove some of these tumours from the head of one of a family who resided near him in Bury Street, and when I had accomplished this, another said, and I will be obliged to you to do the same, and then a third made the same request.

When these cysts are opened, a curd-like substance is generally discharged from them, having a sour and sometimes a most abominably offensive smell, if the swelling has undergone any change from inflammation.

When they acquire any size, there seems to be an attempt made by nature for their removal; the skin inflames over them and the

swelling then becomes painful, ulceration slowly follows, and the curdly substance mixed with pus is discharged; the opening sometimes closes, but often remains fistulous, occasioning some inconvenience to the patient.

Sudden decrease.

When they have acquired their usual size, from one to two inches diameter, they sometimes suddenly decrease, and then again begin to enlarge and acquire their former magnitude.

Sometimes in combing the head, the tooth of the comb is caught in the swelling, and a suppurative inflammation is in this way induced, which removes the swelling for the time and even sometimes permanently.

Dissection.

In dissecting these swellings, they are found to adhere to the skin, but not upon the whole of the surface firmly, but by the cellular membrane only on the greater part of their surfaces.

The skin being removed, a cyst is found which is embedded in the cellular membrane, and extends from the skin to different depths, according to the size of the swelling; this cyst is composed of a membrane differing in thickness in the different parts of the body. If placed on the face or near the canthus, the cyst is thin so as to bear little pressure without bursting, but if seated on the back it is much thicker; on the head it acquires the greatest density, for on this part it is so thick and firm as to maintain its form when its contents are discharged, and so elastic that if it be compressed, it expands itself readily to its former size.

Within the cyst there is a lining of cuticle, which adheres to its interior, and several des-

quammations of the same substance are formed within the first lining, apparently secreted at various periods of the growth of the cyst.

The substance which is contained within the bag, has the character to the eye of coagulated albumen, but as it varies much, this swelling was formerly absurdly named, according to the appearance of its contents, atheroma or meliceris, a name which only expressed different states of the substance contained in the same disease.

If the vessels which nourish these cysts are injected, they are found to be but of small size although they are numerous.

Hair.

These cysts sometimes contain hair when they are situated upon the temple and near the eyebrows, and in other hairy parts of the body; the hairs have no bulbs or canal, and differ therefore from those which are produced in those surfaces of the body which naturally form hair*.

The cyst is sometimes ossified, and of one of these I have given a view. (See Plate.)

Horny excrescences.

From these cysts horny excrescences are sometimes growing, and in the Plate I have given a view of two of these, one of the natural size taken from a preparation in our Museum, and the other a section of one which I removed from the pubes, and which is also in the Anatomical Museum. For the former of these I am indebted to my friend Dr. Roots, of Kingston, who wrote me the following letter respecting the man, and who, before he operated, had the kindness to send the patient for my inspection.

* These cysts in the sheep sometimes contain wool.

" MY DEAR SIR,

" The case of Kennedy, the gardener, is as follows :

" In the year 1796, John Kennedy, a gardener, in the service of the late Sir Richard Sullivan, Bart. of Thames Ditton, in the county of Surrey, first perceived a tumour growing on the upper part of his head, which was taken off by the knife, in about three years from its first appearance, and shortly after this operation, a horny substance began sprouting forth on the same part, which continued increasing during the four following years, till it accidentally fell to the ground, whilst the patient was taking off his hat to some company walking in the gardens, at which time it was not more than three inches in length, and it was particularly observed by myself and others, that the surface from which it dropped, was perfectly smooth and free from any discharge whatever. In a few months from this time, a new horn began to appear, putting on the figure and resemblance of a ram's horn, which I suffered to continue growing during the seven following years, keeping a constant watch upon its progress, and expecting it would drop off *de se*, when it had arrived at a certain stage of maturity, and which process had taken place under my own observation in its former period.

" But in the year 1811, the poor man suffering greatly from its increasing inconvenience, and becoming, in a measure, the laughing-stock of his ignorant neighbours, I was induced, *after having shewn it in its living state to yourself*, to put

an end to his misery, not only by amputating the horn, but by dissecting out every portion of the cyst, so as to prevent any fresh formation of the horny matter, and in consequence of the entire extirpation of the part, there has been *no appearance of the disease recurring up to this date*, which embraces an interval of eight years. For a further account of this curious case, I refer you to the article of *Horny Excrescence* in *Dr. Rees's New Cyclopædia.* It has been stated, that this identical gardener had another formation of the same nature, *after the operation I have just mentioned*, but this statement is erroneous, as I have not lost sight of the man up to the present time.

And I have the pleasure to be,
My Dear Sir,
much and truly yours,
W. ROOTS."

Kingston on Thames,
Oct. 15th, 1819.

Sir Everard Home has, in the Philosophical Transactions for the year 1791, given an excellent account of the growth of these horny excrescences, and has clearly shewn they owe their origin to these cysts.

The manner in which these horny excrescences grow is as follows:—The horn begins to grow from the open surface of the cyst; at first it is soft, but soon acquires considerable hardness; at first it is pliant, but after a few

weeks, it assumes the character of horn: sometimes several of these grow from the same scalp.

In their removal it is necessary, to prevent their recurrence, that the cyst as well as the horn should be dissected out.

Origin. With respect to their origin, I believe this tumour arises from a follicle extremely enlarged and incapable of discharging its contents from an obstruction of the orifice, by which it opens on the surface of the skin.

A follicle is a glandular pore which are found in numbers on the surface of the skin, more especially about the face and head.

These follicles appear upon superficial examination to be only pores in the skin, but upon the introduction of a fine probe they are found to proceed through the skin into the cellular membrane beneath it. They are productions from the skin, and are lined naturally by cuticle, and their internal surfaces secrete a sebaceous matter, which lubricates and defends the surface of the skin upon which they are found. This matter may be pressed from the follicles of the nose in the form of worms, very considerably longer than the skin is deep; and therefore proving that these pores extend beyond the skin.

The first circumstance which induced me to believe that an encysted tumour was an obstructed follicle, was examining a tumour of this kind situated upon my own back. It had acquired a diameter of about two inches, and was situated at the lower part of the dorsal vertebræ. I thought of requesting a friend to remove it, but examining it by means of two mirrors, I saw a small black spot in the centre

of the swelling; and picking this, I brought out a piece of sebaceous matter with a black head, like those seen on the nose. I then squeezed the tumour, and through the orifice occupied by the black sebaceous matter I emptied the tumour, by squeezing out a large quantity of sebaceous substance. This was effected without pain, and without succeeding inflammation, but gradually the secretion became renewed; but by frequent pressure I have now for several years kept it empty.

A lady applied to me with one of these swellings upon her shoulder. It had a small black spot upon its centre, through which I could squeeze its curdly contents. I removed it with the skin over it, and found that the opening was a follicle leading into the hollow of an encysted tumour, which contained sebaceous matter and lined with cuticle, and having a cyst of the usual character. (See Plate.)

Often have I since seen the follicular aperture over these swellings, by which the point of a tent probe was readily admitted into the cavity of the cyst, and through which I could immediately squeeze its contents. The follicle is however generally entirely obstructed at its orifice, and a depression only is seen, (and not always even this) when the sides of the swellings are compressed.

These encysted tumours begin as follows:— A follicle becomes obstructed at its termination upon the skin. The secretion still proceeding, its sides become extended in the cellular membrane, where it can most easily yield; and this obstruction of its secretion produces a swelling of greater or less magnitude, according to the

degree of obstruction and the duration of the disease. If it be said, how is it possible that a follicle can be thus extended? the answer is this, other membranes expand to much greater comparative magnitude. An ovarium, which would not contain within its membrane more than two drachms of water, will expand to a magnitude capable of containing ninety-seven pints, for of such an ovarium I have a preparation in our collection.

The cysts forming these swellings are more or less dense according to the nature of the follicle: as the skin of the head is very firm, so is the cyst; the skin of the back also produces cysts of considerable thickness, but that on the face is thin and delicate.

The cyst also acquires density according to its duration, for constant pressure of it does not produce high inflammation, and is known to add to the density of parts.

Pressure is very frequently the cause of these swellings, as is seen upon the shoulders, where the braces produce them. I have also seen them in the circle pressed upon by the hat, probably from some obstruction being thus produced at the extremity of the follicle. But in a diseased state of the secretions, a want of due moisture will produce the same effect, by inspissation of the substance secreted, and by its incapacity to pass the orifice of the follicle.

When parts are exposed to pressure I have seen the follicle obstructed at its mouth, dilating a little, but elongating still more, forming a black head, and a worm of sebaceous matter is thus formed of considerable magnitude. (See Plate.)

The reason that these cysts do not inflame when opened will now be seen; they are naturally external surfaces, that is, the follicles have an aperture through the skin; down this the cuticle is reflected, and on its outer side is the secreting portion of skin which forms the follicle. All that is done then by opening them, is to make their communication with the surface of the skin more free, and the cuticle is exposed, but not a new surface, and the cyst will continue to secrete so long as any part of it remains, just as the original follicle did.

Now also will be seen the reason for their sudden diminution. They open at the follicle, discharge and lessen, but the follicle becomes again stopped, and the swelling is renewed.

Treatment.

With respect to their treatment, it consists in adopting the following rules. If the follicle can be seen only as a black spot filled by hardened sebaceous matter, a probe may be passed through it, and the sebaceous matter squeezed from the tumour, which is done with little inconvenience.

But if violence would be required to squeeze out the contents, inflammation will follow, and the best plan is to make the opening larger, and to squeeze out the contents of the cyst. The relation of Mr. Toulmin, of Hackney, had an encysted tumour upon her arm. I thought too large for removal, and from this the follicle was seen opening of considerable size. I pressed out the contents of the swelling by the aperture; but finding the contents less curdly than usual, I made a large opening, and thus in a great degree emptied the swelling, and directed her to continue to do so.

Removal. The common mode adopted for their removal is, to dissect them out, but the best manner of doing it is not to dissect them out whole, but first to make an incision into them, and then by pressing the sides of the skin together the cysts may be easily everted and removed. If attempted to be removed whole, the dissection is most tedious, and before it is completed the cyst is either cut or burst; so many incisions and so much pain may be readily avoided by opening it freely by one incision, and taking it between forceps to dissect it from its adhesion to the surrounding cellular membrane. When a swelling of this kind in the scalp is to be removed, make an incision from one side of the tumour to the other, directly through its centre, and its contents, which are very solid in this case, are directly discharged in form similar to the tumour; then put a tenaculum into the cyst, raise it, and it becomes most easily separated. In half a minute the operation may be accomplished, and with scarcely any pain. The hair is then braided together from each edge of the wound, and the edges are thus approximated being clotted together by means of blood. Pressure upon the little vessels which are divided in this simple operation will be sufficient to stop the bleeding.

The swelling of this description which takes place at the outer canthus is the most difficult of these encysted tumours to remove; it passes within the orbit, and often adheres to its periosteum, and the inner part of the cyst is with great difficulty reached in the operation. This operation is always very tedious and painful. The removal of cysts is not entirely

unattended with danger; I have seen three instances of severe erysipelatous inflammation succeed the operation of removing these swellings upon the scalp, and I believe it is owing to the tendon of the occipitis frontalis being wounded when they are attempted to be dissected out whole. It is well known in cases of injury of the head, that when this tendon is contused and inflamed, the inflammation extends often over the head and face. Trifling as the aperture appears, occasioned by this operation, care must be taken for a few days after it, when the swelling is seated upon the head. A lady had an encysted tumour on the scalp removed; three days after she went into a cold bath; soon after she left the bath she was seized with a rigor and severe pain in the head; an erysipelatous inflammation succeeded upon the head and face; and notwithstanding she had promptly the most able medical assistance in Dr. Baillie, she fell a victim to this inflammation.

Fig. 1.

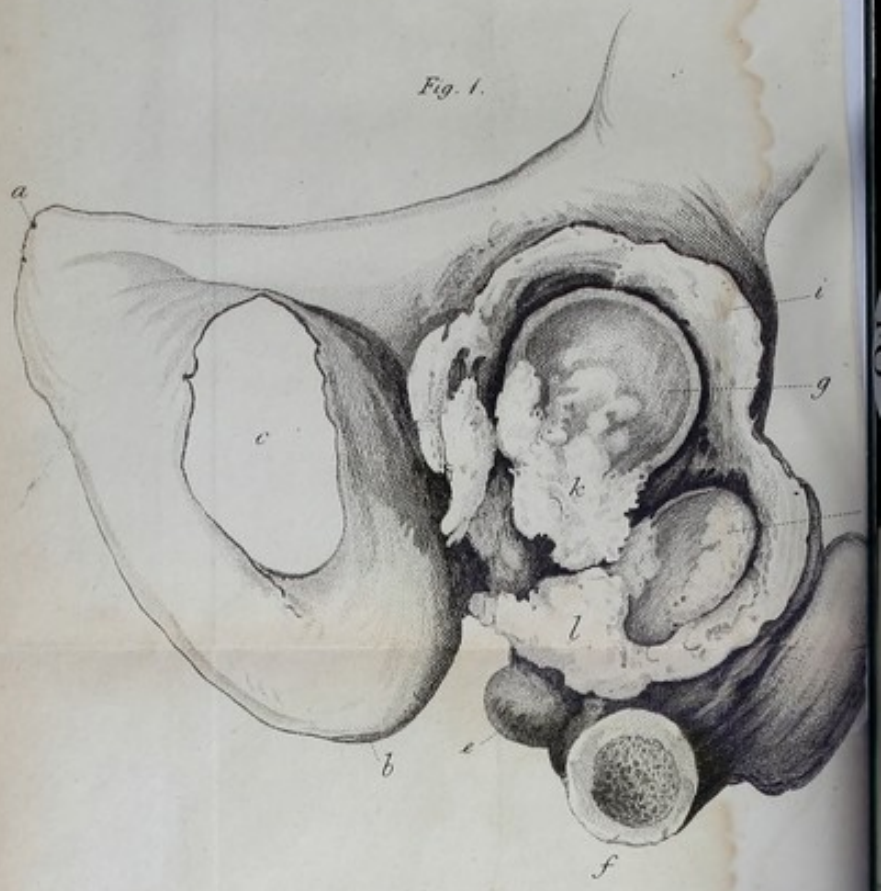
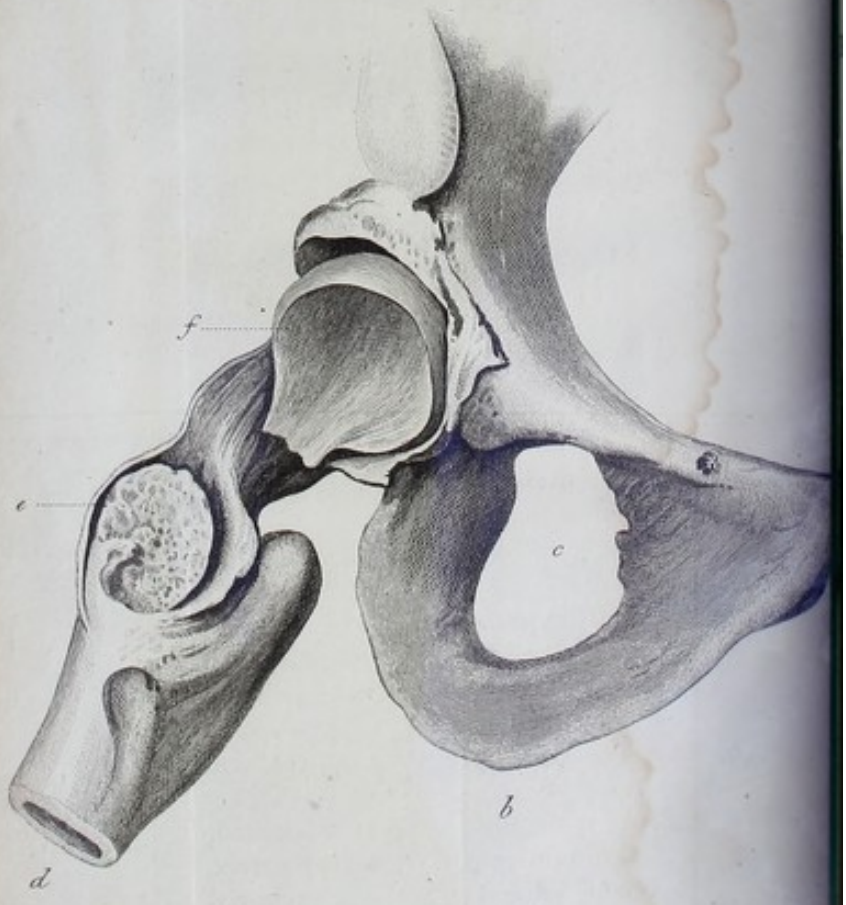


Fig. 2.



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Engd by J. T. Wedgwood.

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EXPLANATION OF THE PLATES.

PLATE I.

Shews fractures of the neck of the thigh-bone; the one from a wet, and the other from a dried preparation.

FIG. 1.

Is a view of a fractured cervix, preserved in the collection at St. Thomas's Hospital.

a, Pubes.
b, Ischium.
c, Foramen ovale.
d, Trochanter major.
e, Trochanter minor.
f, Os femoris.
g, Head of the bone broken at its cervix; little ossific projections seen on it; and ligament, effused by inflammation, adheres to the bone.
h, Fractured cervix absorbed in part, and therefore much shortened.
i, Capsular ligament extremely thickened.
k, Ligament adhering to the broken cervix.
l, Ligament effused from the synovial membrane.

PLATE I.

Fig. 2.

Is a view of a dried preparation in the anatomical collection at St. Thomas's Hospital.

a, Pubes.
b, Ischium.
c, Foramen ovale.
d, Os femoris.
e, Fractured cervix, shewing the shortening of the neck of the bone by absorption, and the cancelli unfilled by bone.
f, The head and neck of the bone shews the cancelli filled, and the broken bone quite smooth.
A portion of the capsular ligament remains connecting the os femoris to the acetabulum.

Fig. 1.

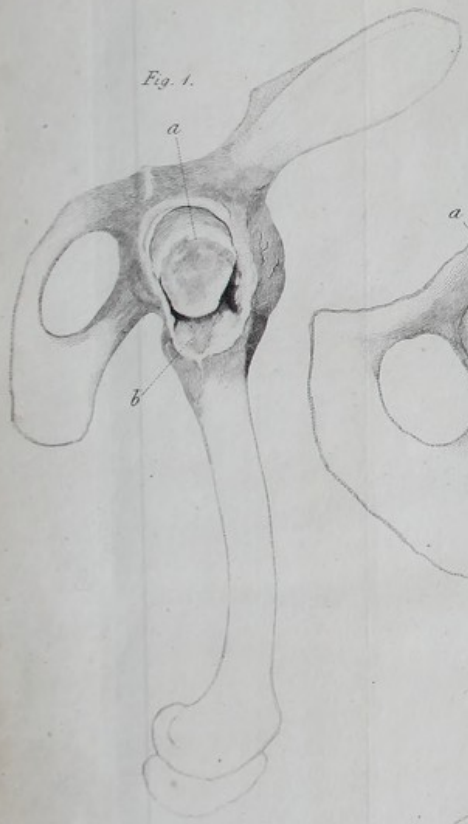

Fig. 2.

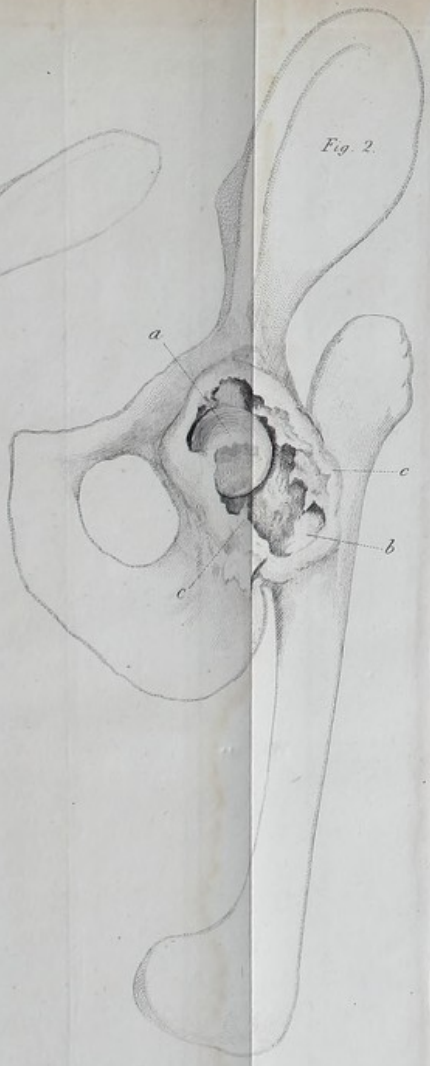

Fig. 5.

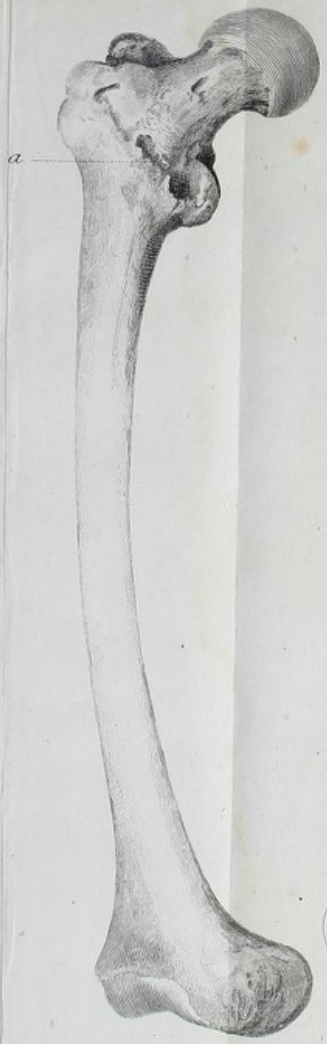

Fig. 4.

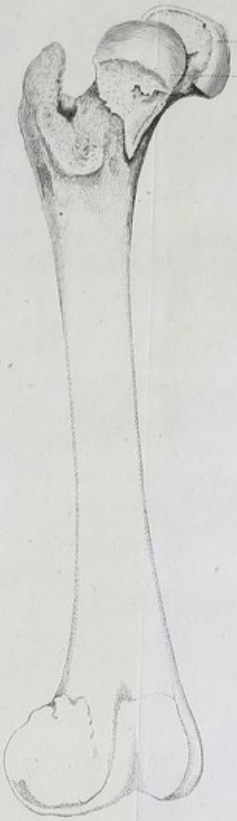

Fig. 3.

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PLATE II.

Containing views of fractures of the neck of the os femoris, from preparations which I have sent to the collection at St. Thomas's Hospital.

FIG. 1.

Fracture of the neck of the thigh-bone within the capsular ligament in the rabbit.

a, Head and neck of the thigh-bone.
b, Neck and shaft of the thigh-bone; surfaces smoothed, and some ligament secreted upon them; capsular ligament thickened.

FIG. 2.

Fracture of the neck of the thigh-bone in the dog.

a, Head of the bone.
b, Its cervix.
c, Capsular ligament thickened and inflamed; the synovial membrane lining it having the adhesive inflammation proceeding in it, and throwing out ligament, which adheres to the head of the bone; a considerable quantity of fluid was formed on this joint.

FIG. 3.

Shews the os calcis broken near the insertion of the tendo achillis, and the bone drawn up by the action of the muscles.

a, Os calcis.
b, Broken and elevated portion of bone.

PLATE II.

c, Ligament formed instead of bone, to unite the elevated portion to that from which it had been separated.

FIG. 4.

Os femoris of the human subject broken through the trochanter and neck externally to the capsular ligament.

At *a*, the oblique union is seen, and if the condyles are compared with the head of the bone, it will be seen that the knee and foot had been suffered to be turned much outwards, which, without care in this fracture, is very liable to happen.

FIG. 5.

Head and neck of the thigh-bone of a dog split down and afterwards united, but unevenly; the union has been effected at the cancelli with scarcely any change upon the surface of the bone; and the union at the neck of the bone is firmer than at its head.

a, Head of the bone.
b, Broken head of the bone and its cervix.

Part of the fracture was within a part external to the capsular ligament.

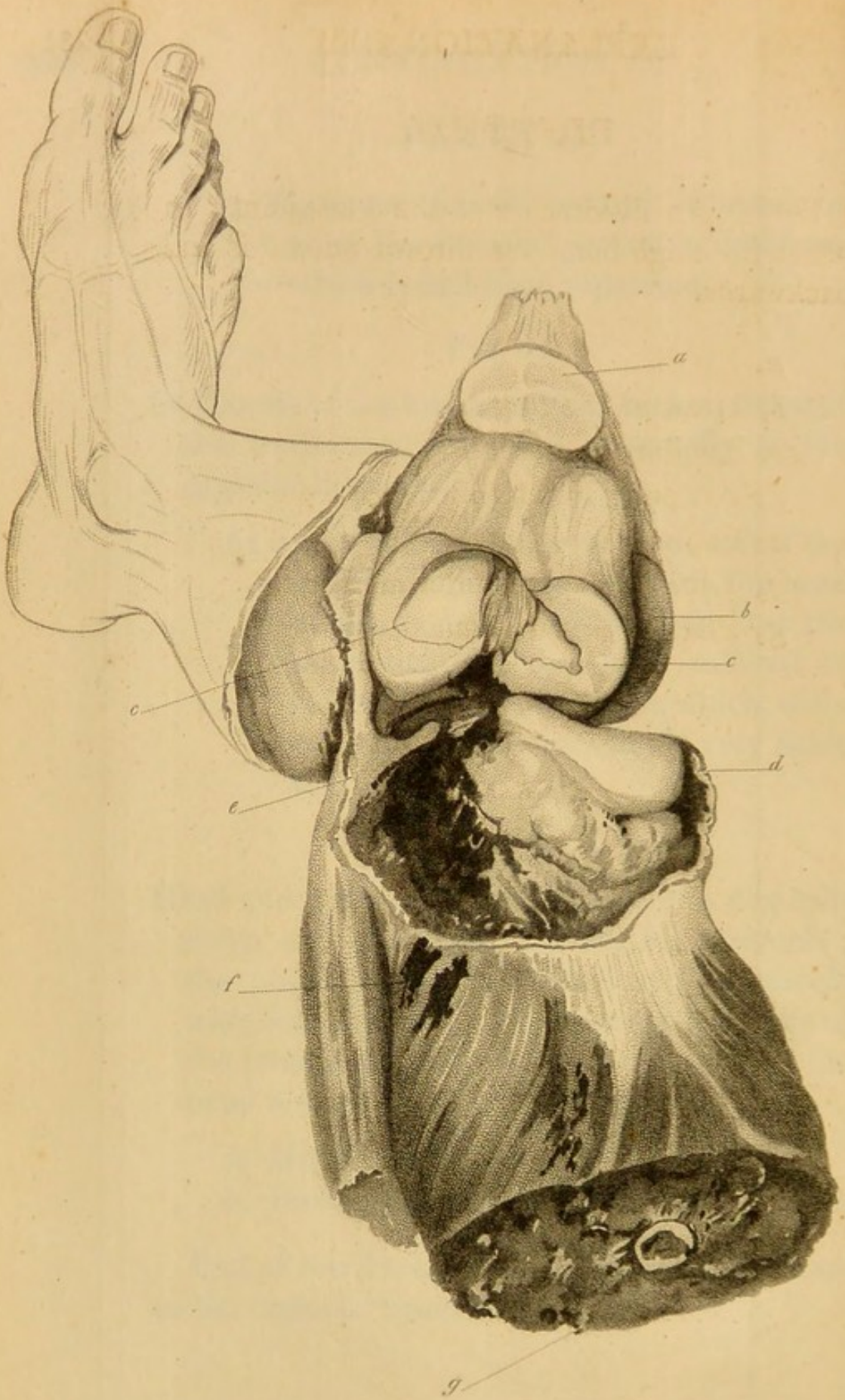

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PLATE III.

Shewing a dislocation of the knee-joint; in which the thigh-bone was thrown outwards and backwards.

a, Patella.
b, Head of the tibia.
cc, Semilunar cartilages.
d, Articular surface of the os femoris.
e, Capsular ligament.
f, Lacerated vastus internus muscle.
g, Place of amputation.

PLATE IV.

Views of transverse and longitudinal fractures of the patella.

FIG. 1.

Shews the patella broken transversely in the human subject and united by ligament.

a, Upper portion of the bone.
b, Lower portion.
c, Ruptured ligament.

From *b* to *c* is the new ligament uniting the bones.

FIG. 2.

A transverse fracture of the patella, which I produced in the dog, shewing the new and uniting ligament.

FIG. 3.

Shews the appearance for the first week after this experiment. Blood is effused, which is gradually absorbed.

FIG. 4.

Is a view of the fracture after a fortnight, shewing the adhesive matter producing the ligamentous union.

FIG. 5.

Shews the new ligament after three weeks, extending from *a* to *b*.

FIG. 6.

Is a view of a longitudinal fracture of the patella which I produced in the dog; from *a* to *b* is the new ligament by which the bone was united.

Fig. 1.

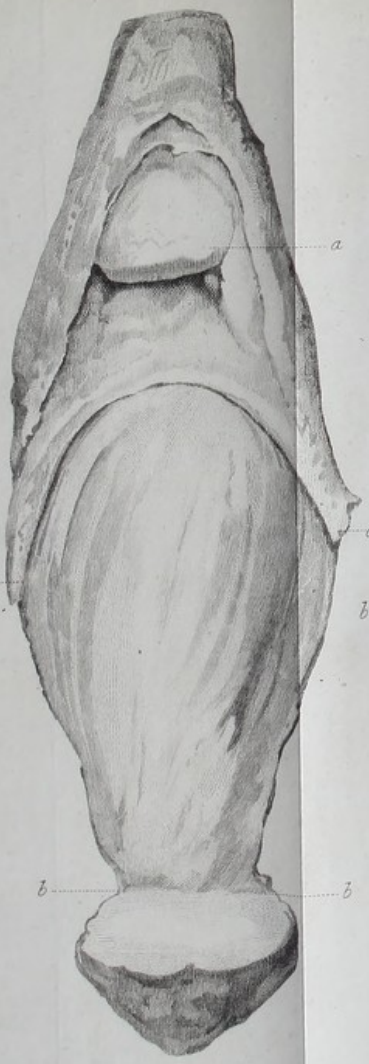

Fig. 2.

Fig. 6.

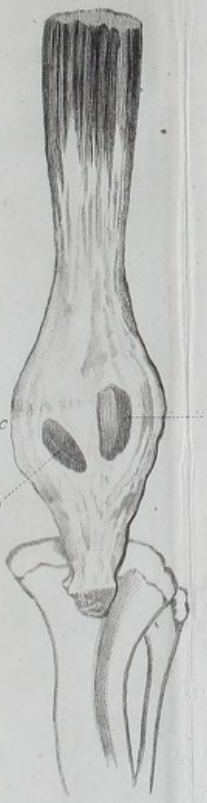

Fig. 3.

Fig. 4.

Fig. 5.

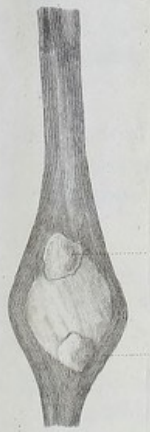

Fig. 7.

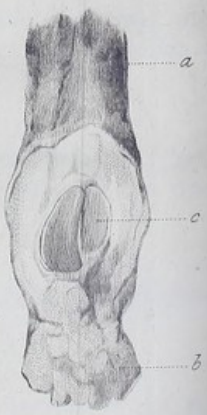

Fig. 8.

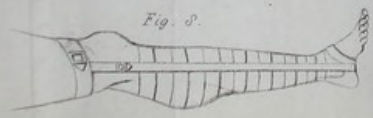

Fig. 9.

Fig. 10.

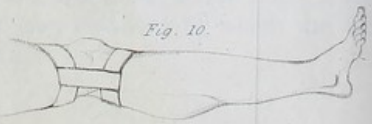

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PLATE IV.

FIG. 7.

Shews the longitudinal fracture of the patella united by bone; the parts having remained in contact because the division had not been extended to the muscles *a* or ligament *b*; *c* is the ossific union; some cartilage remained not yet ossified. By the side of this Fig. is seen the patella after maceration, to shew the ossific union when the cartilage was macerated away.

FIG. 8.

Shews the leather strap for the fractured patella.

FIG. 9.

Exhibits other bandages for the fractured patella. The lateral, the most frequently used, confined by rollers above and below, which are approximated by tying the lateral tapes. The broader tape used in the fore part of the patella is also seen.

FIG. 10.

Shews the bandage applied for partial dislocations of the knee, and the rollers unapplied to shew the form of the bandage.

PLATE V.

Exhibits the partial dislocation of the tibia forwards upon the astragalus, which I have described.

FIG. 1.

a, Tibia.
b, Astragalus.
c, New articulatory surface and end of the tibia.
d, The original articulating surface of the astragalus.

FIG. 2.

Opposite view of the same preparation.

a, Tibia.
b, New articulatory surface of the tibia.
c, Astragalus.
d, Fibula.
e, Malleolus externus of the fibula, which had been broken off, and has been irregularly united.
f, Former articulating surface of the astragalus.

Fig. 1.

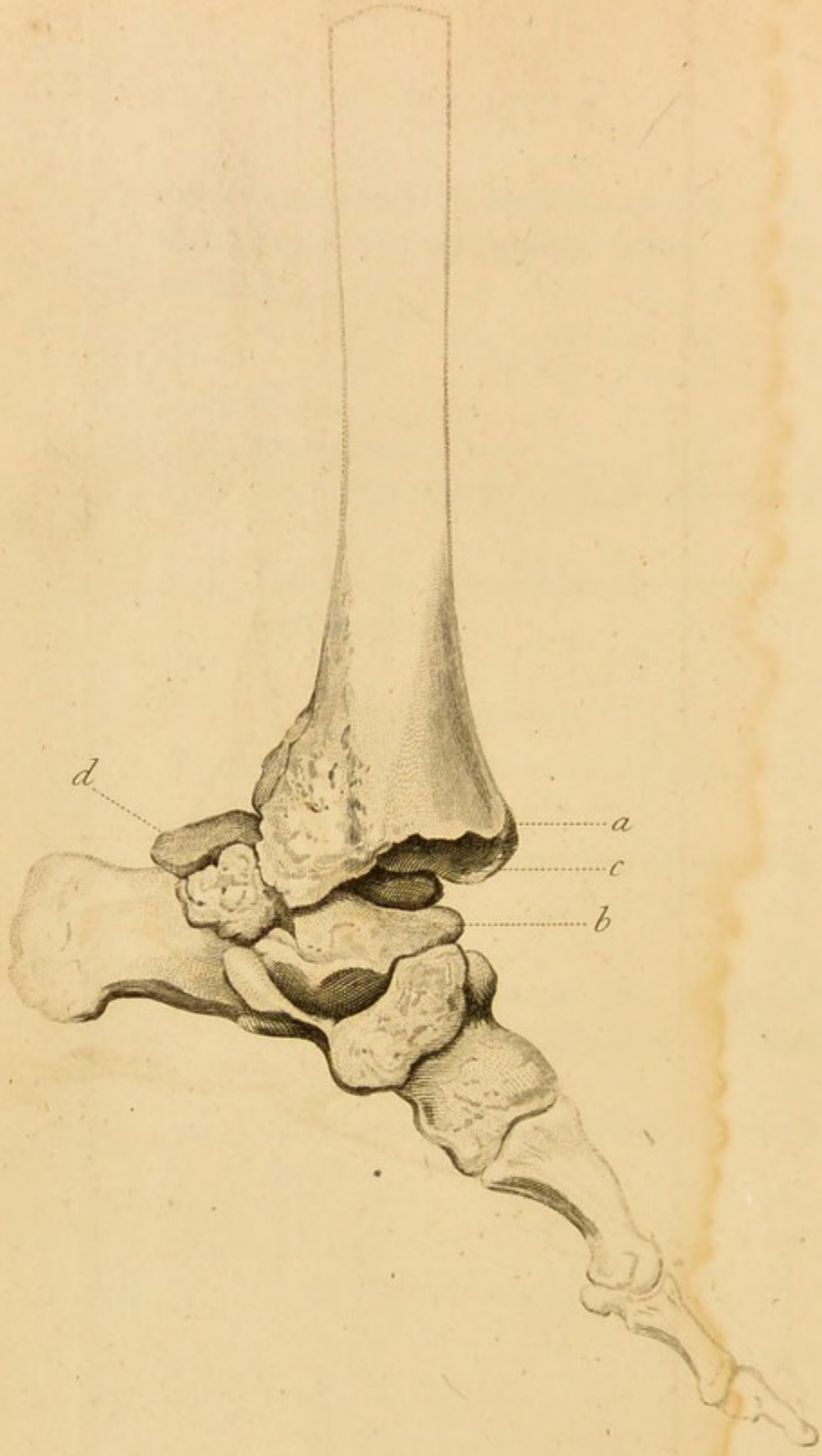

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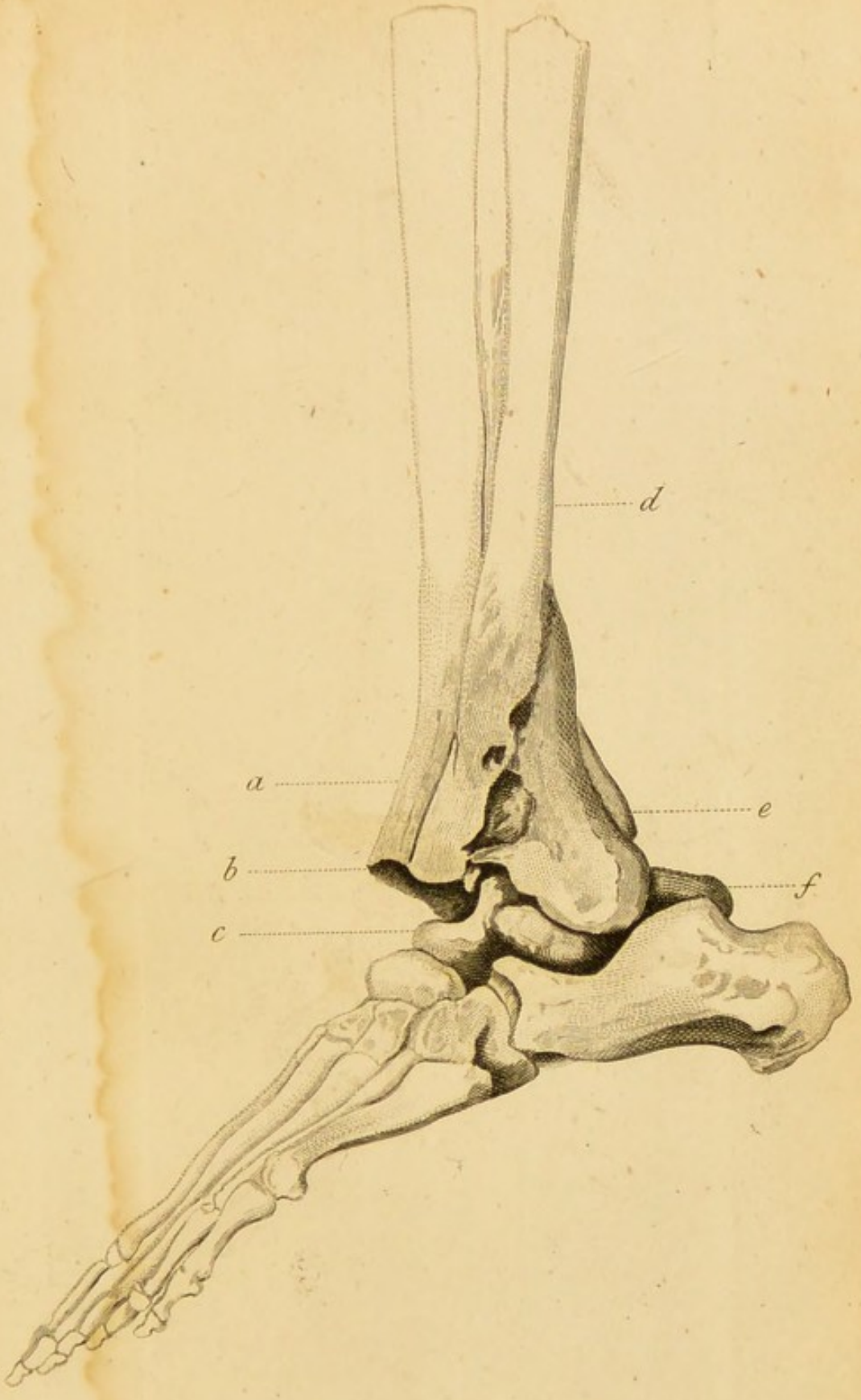
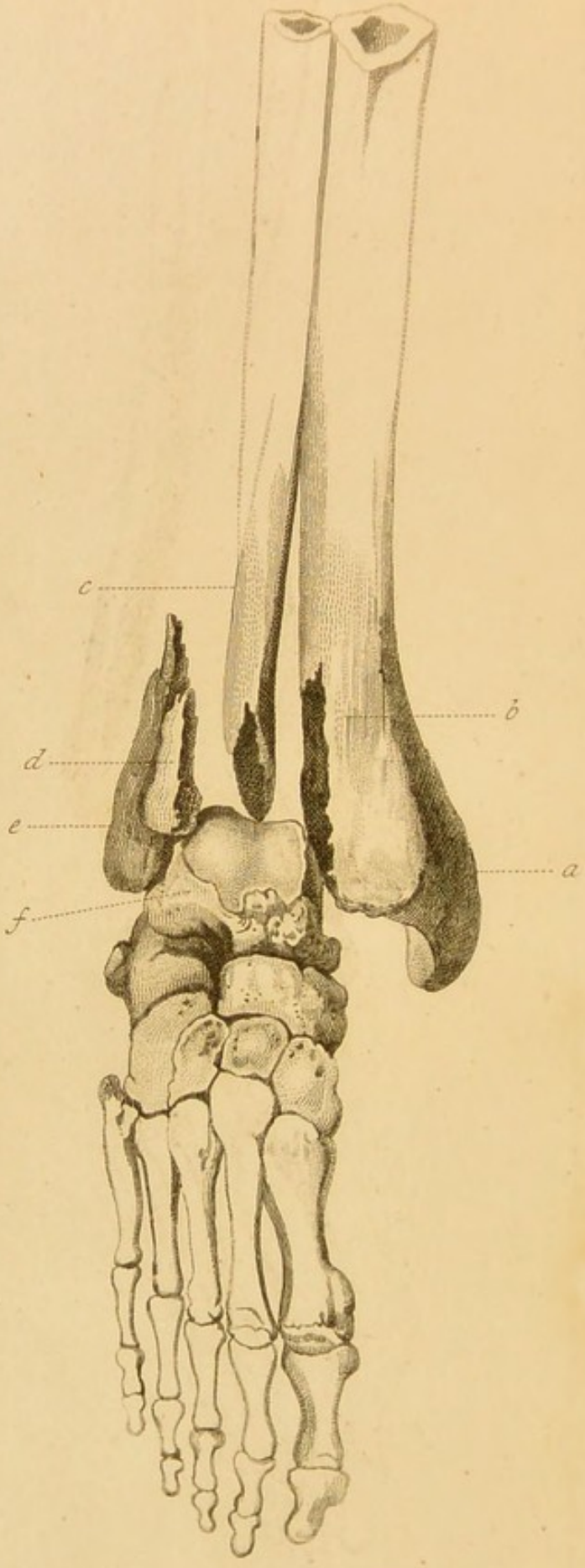
Fig. 2.



Engd. by I.T. Wedgwood.

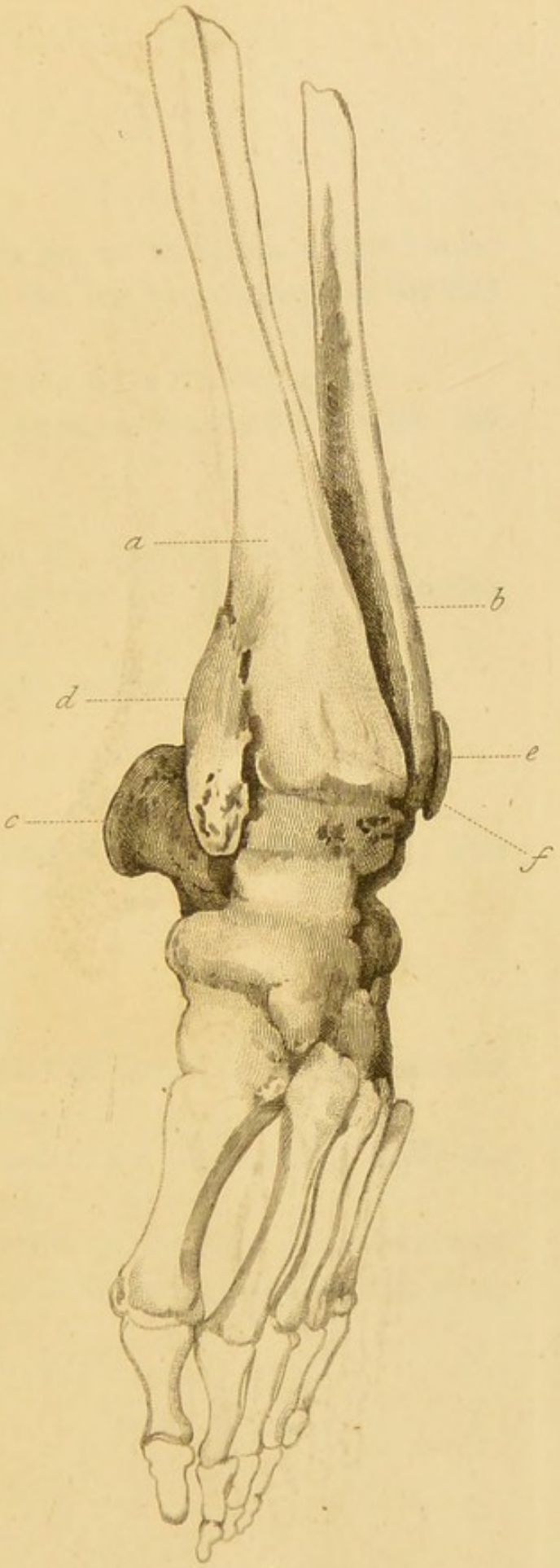
J. & J. Brown, Paternoster Row.

Fig. 1.



Drawn by H. Thomson.

Fig. 2.



Engd by I. T. Wedgwood.

PLATE VI.

Fig. 1.

Shews the dislocation of the tibia at the ancle-joint inwards; the leg was amputated for this accident.

a, Tibia thrown from the astragalus.

b, Tibia, broken at its junction with the fibula.

c, Fibula.

d, Portion of the broken tibia.

e, Broken end of the fibula or malleolus externus.

f. Articulatory surface of the astragalus.

Fig. 2.

Shews a dislocation of the tibia outwards; this accident had been partially reduced.

a, Tibia.

b, Fibula.

c, Os calcis.

d, Broken end of the tibia at the malleolus internus.

e, Broken end of the fibula at the malleolus externus.

f, Tibia thrown on the side of the astragalus, and it is anchylosed in that situation.

PLATE VII.

Exhibits views of encysted tumours and their productions.

FIG. 1.

Shews an encysted tumour of the usual size.

a, The cuticular lining of the cyst.

b, A flap of the cyst turned back to shew its interior.

FIG. 2.

Shews one of these tumours from the head with the cyst opened to shew its thickness, and its lining in part peeled off.

FIG. 3.

Is a cyst which shews hairs in its interior; this cyst was growing just at the outer end of the eyebrow.

FIG. 4.

Shews the cyst ossified, which sometimes happens in those which have existed long.

FIG. 5.

A cyst with a follicle over it, filled with dried sebaceous matter, and this follicle directly opens into the interior of the cyst, of which it is a part.

FIG. 6.

A portion of the skin with a cyst adhering to it. In the skin the follicle is seen which opens into the cyst, and a bristle is introduced to shew its passage into the cyst.

Fig. 5.

Fig. 4.

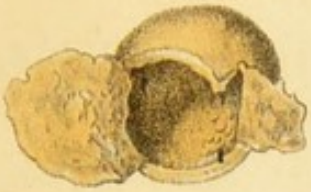
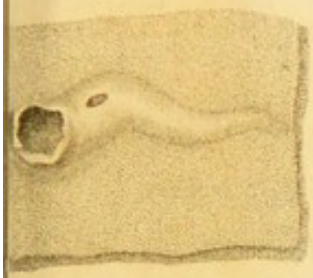


Fig. 6.

Fig. 7.



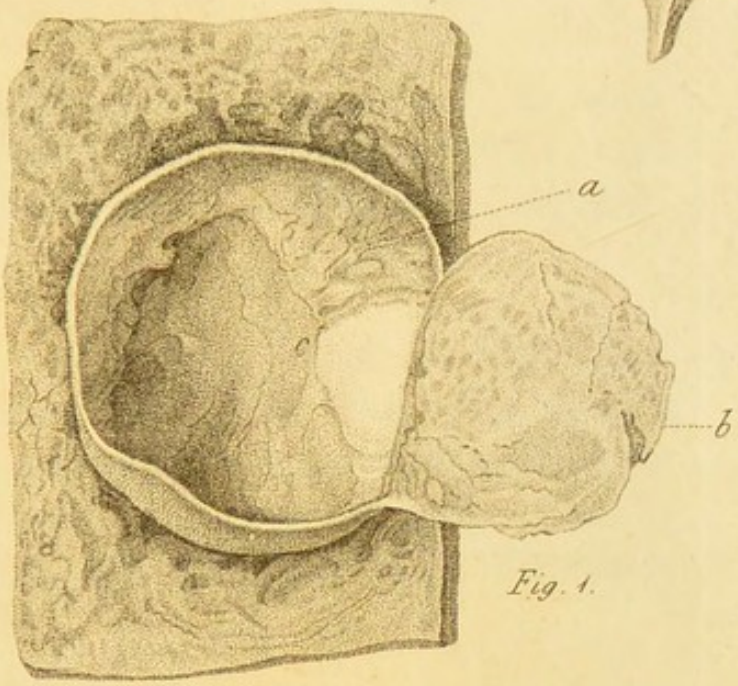


Fig. 1.

Fig. 3.

Fig. 9.

Fig. 2.

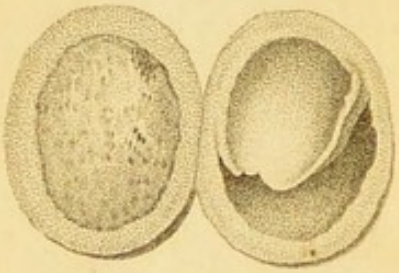
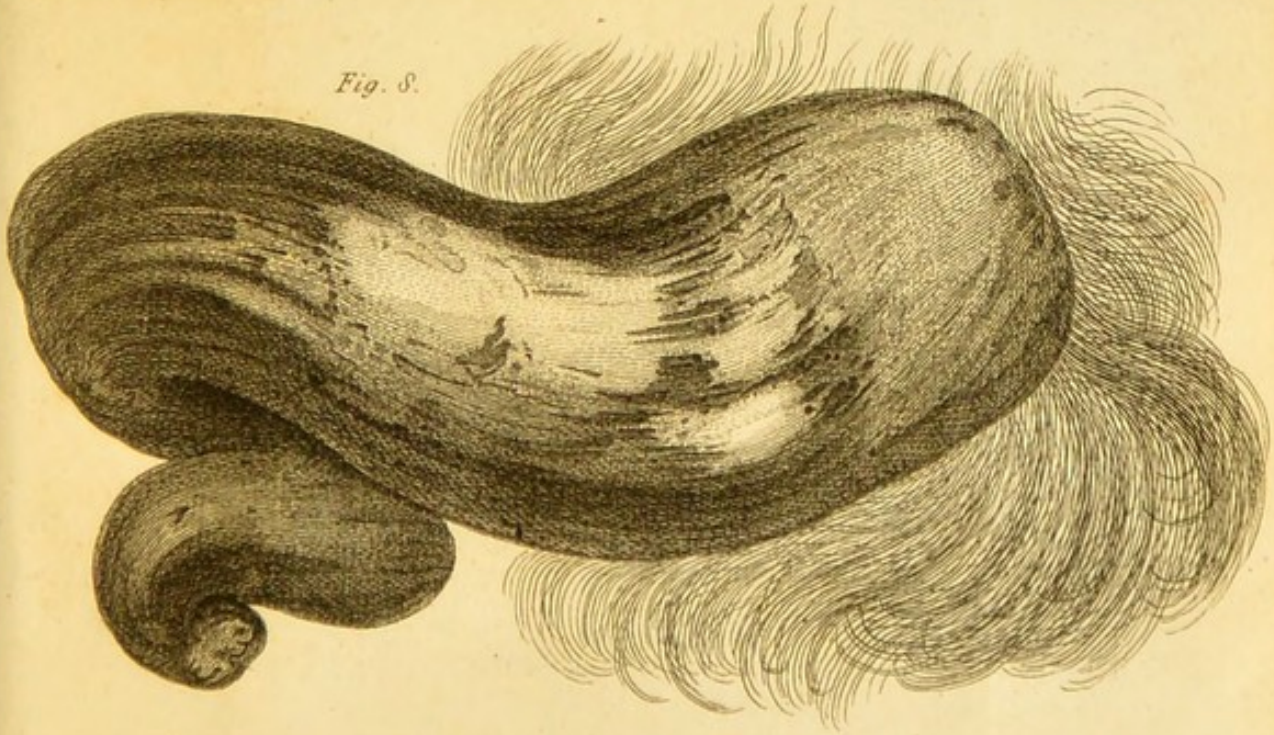


Fig. 8.



Drawn by H. Thomson.

Engd by I.T. Wedgwood

PLATE VII.

FIG. 7.

A follicle beginning to enlarge, and its open extremity filled with sebaceous matter, and the distended follicle stretched under the skin.

FIG. 8.

A horn of the size which it had acquired when removed from the head, (See Dr. Root's Case,) the hair of the scalp surrounding its root; the horn curled at the end. This is preserved in the collection at St. Thomas's Hospital.

FIG. 9.

Section of a horn I removed, which was laminated internally, as is here shewn.

PLATE VIII.

FIG. 1.

Sketch of a fracture of the cervix femoris, within the capsular ligament.

a, Head of the bone.
b, Cervix, broken.
c, Capsular ligament.

FIG. 2.

Fracture of the neck of the bone and trochanter externally to the ligament.

a, Head of the bone.
b, Thigh-bone.
c, Fracture through the trochanter.

FIG. 3.

View of a preparation sent me by Mr. Oldknow.

a, Head of the bone.
b, Trochanter broken off.
c, Trochanter minor broken.
d, Cervix femoris broken at its junction with the trochanter.
e, Thigh-bone.

FIG. 4.

Section of a broken cervix at the trochanter, given me by Mr. Roux.

a, Head of the bone.
b, Trochanter major.
c, Thigh-bone.
d, *d*, Broken cervix sinking into the cancelli, and there united by bone.

PLATE 8.

FIG. 1

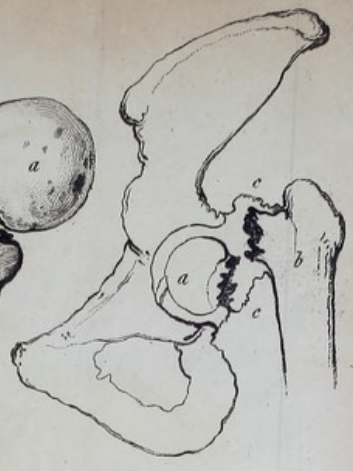


FIG. 3

FIG. 4

FIG. 6

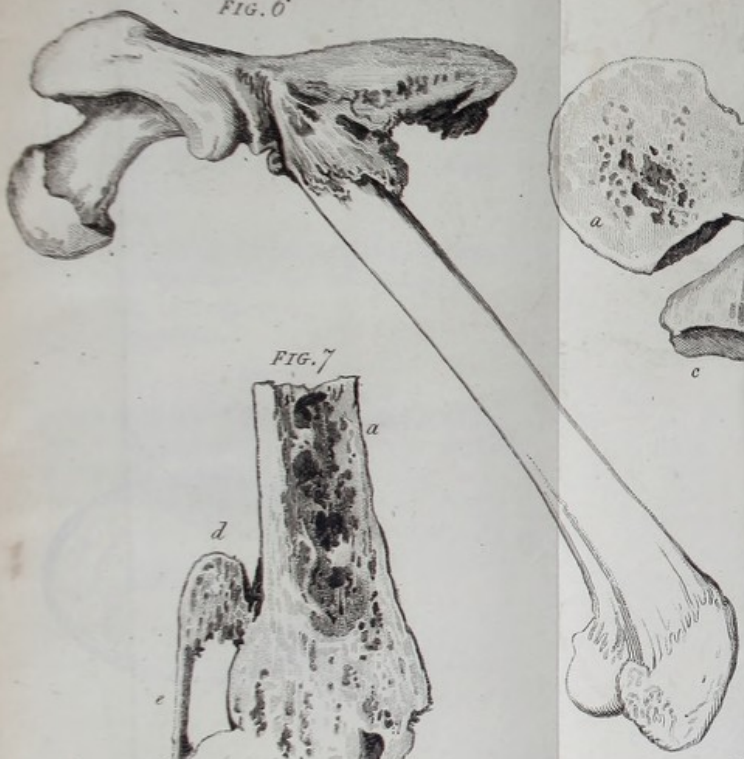


FIG. 7

FIG. 2

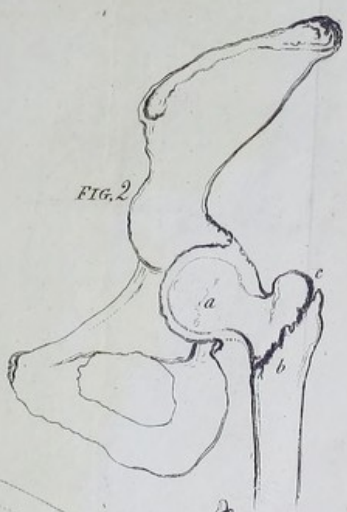
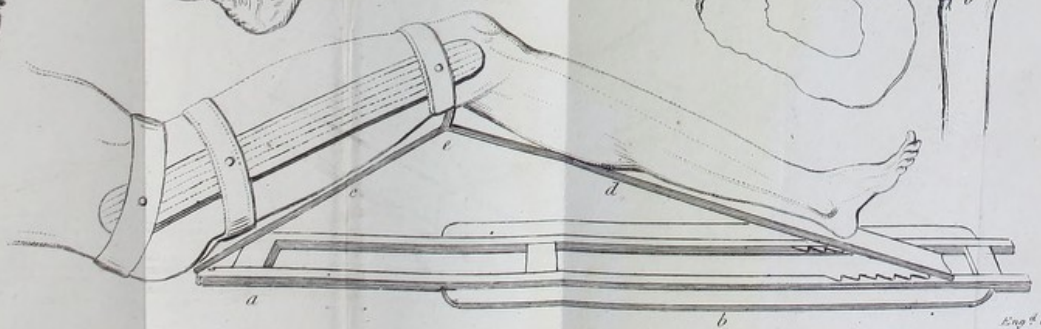


FIG. 5



Drawn by H. Thompson.

Engd by J. Kennerley.

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PLATE VIII.

FIG. 5.

The machine which has been for near twenty years used in Guy's Hospital, for fractured thighs, simplified from the invention of Mr. White of Manchester, and Mr. James of Hoddesdon.

a, Stand.
b, Additional pieces to it to give firmness.
c, One portion of the inclined plane.
d, The other portion.
e, The joint.

FIG. 6.

Shews a fracture of the os femoris, a little below the trochanter minor, and a most miserable union of the bone from inattention to position. This is the case in which the knee must be much raised, and the body preserved in a sitting position, as far as the patient can bear it.

FIG. 7.

Dislocation of the knee from ulceration, in which the tibia is thrown forwards at right angles with the os femoris.

a, Os femoris.
b, Tibia.
c, Fibula.
d, Patella anchylosed.
e, Ligament of the patella.

END OF PART II.

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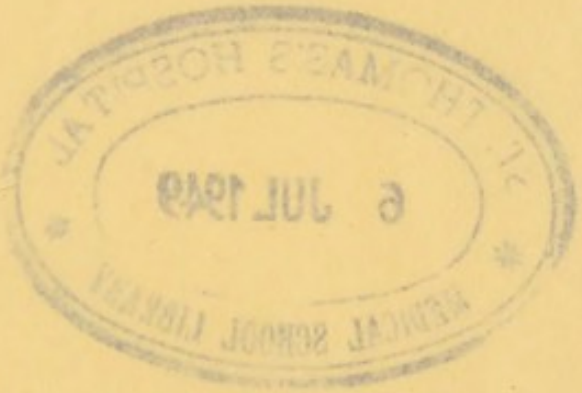
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