one or both fail to expand. The disturbance caused by Eustachian inefficiency is better known to those who are familiar with the effect of passing through sudden changes of atmospheric pressure, as caisson. Divers know to their anguish the pain in ears caused by entering the compression chamber with a cold in the head, which prevents equalisation of pressure on the drums; giddiness, staggering, or vomiting may occur. High-flying airmen who return from atmospheric pressures of 360 mm. Hg on the drums of the ears know the necessity of "clearing" the ears by some procedure, such as "frequent swallowing" or by self-inflation by Valsalva's method. The Eustachian tubes are normally closed, except during the act of swallowing, when they should open for the fraction of a second and close again like the shutter of a camera.

It is when the tubes fail to open through some inefficiency, such as is produced by congestion or swelling of the mucous membrane due to a cold or catarrh, or when blocked by tenacious mucus or by temporary engorgement of the blood-vessels which supply the pharyngeal end of the tube, that the regulating action fails. A too tight collar in some is known to produce the same result. Why is this mechanism necessary? Because, as I have shown from laboratory experiments, a sudden change of pressure from low to high or high to low in the normal labyrinth on one side, or an asymmetrical change of pressure through the two sides, sets up temporary vertigo with nystagmus and other forced movements which characterise vestibular disturbances.

Treatment.

What, then, is the treatment for the great majority of cases of so-called Menière's disease? Having scientifically excluded other factors, the treatment is directed to the Eustachian tubes. Continue to treat local catarrh and remove its cause, and train the patient to keep his Eustachian tubes free. Carry a Politzer bag, and if you intend to make sure of arresting an attack or series of attacks employ the Eustachian catheter. Do not despise it. Learn its uses accurately and carefully, for cases needing experience and practice are common. Only in cases of special difficulty need the physician despair. Are we, then, to regard bromides, iodides, purgatives, rest, and so on as erroneous measures? Far from it; their value is too well known, but their method of acting is not altogether clear. Is it possible that bromides diminish the reactivity of the individual to labyrinthine disturbances? Perhaps the iodides influence the naso-pharyngeal secretion of mucus and make it more watery, as in other parts of the air-passages. Quinine in minute doses, though possibly sedative to the vestibular system, just as large doses are irritative, may also derive its reputation from its anti-catarrhal action, for we know of certain persons, subject to winter head colds, who appear to derive immunity while taking minute doses of quinine daily without other drugs, or change of habits, residence, or mode of living.

We do not know with certainty how these drugs succeed and why they often fail, but I have attempted to suggest how they may sometimes succeed in restoring Eustachian tube efficiency. If this is a correct interpretation it enables us to understand the subtle relationship between the majority of cases of recurrent vertigo, commonly known as Menière's disease, and Eustachian tube obstruction or inefficiency.

FRACTURES OF TIBIA AND FIBULA: THEIR TREATMENT BY PLATING OPERATIONS.

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DURING the past year I have had a very large number of fractures of the lower limb under my care at No. 1 Chinese General Hospital. This paper deals with 15 consecutive cases in which I have plated the tibia, and in some cases the fibula also. In all cases under consideration both these bones were fractured.

The hard work that fell to the Chinese Labour Corps behind the lines and at the bases and ports where munitions and stores were unloaded had exposed them to accidents of all kinds. No. 1 Chinese General Hospital had 2000 beds, it had the status of the usual general hospital in France, and in its equipment and general management left nothing to be desired save that all the nursing was done by Chinese male dressers. There has never been a matron and staff of nursing sisters. It is true that during the first six months the hospital was in existence we had no X ray department, but this was installed later, thus making the equipment complete. Before its installation all cases needing radiography were taken to Abbeville, ten miles away.

The injury in the cases to be described was severe, as in every case both bones were broken. In the great majority of the cases the fracture of the fibula was at about the same level as the tibia, being the result of direct violence, and in many instances the bones were badly comminuted at the site of fracture.

It is encouraging to note that in each of the 15 cases a perfect result was obtained, despite the absence of a highly trained nursing staff. All were cases of simple fracture due to direct violence, except perhaps one, in which the skin was broken at the level of the break; the wound did not communicate with the fracture, and operation was delayed until this was healed. I do not advocate plating of compound fractures. Experience in our military hospitals during the war is directly against this procedure unless under exceptional conditions.

Importance of Expert Technique.

It is now 25 years since Sir W. Arbuthnot Lane first introduced the then novel and revolutionary treatment of operating on cases of simple fracture and uniting the fragments in position by plates screwed into the bones. Since then many surgeons have adopted the practice in selected cases with varying results. Many have made hopeless failures through bad technique or lack of surgical skill, and consequently this treatment of fractures is frequently derided. But this series shows that, if the principles of aseptic surgery are scrupulously carried out and the operating surgeon understands the technique of bone plating, this method, far from being a failure, becomes an unqualified success.

Undoubtedly a very great deal depends upon the skill of the operating surgeon, and this method of treatment should only be adopted by those who possess that necessary gift. Many brilliant general surgeons, according to Lane, do not advocate the plating of simple fractures because they are not conversant with the technique of bone plating.

Desirability of Early Operation.

Speaking generally, the nearer the time of the operation to the date of the injury the better will be the result. It certainly makes the operation infinitely easier if it is performed before callus has been laid down. If the operation takes place within 14 to 21 days after the injury the ends of the fragments are clean, sharply defined, and when brought together dovetail into each other beautifully, so that the result is perfect, with no shortening of the limb and no stiff joints; in fact, a limb as sound and useful anatomically and functionally as the one unbroken.

For the first six months I was working at a great disadvantage in the absence of X ray installation at the hospital. This fact has, fortunately, not militated against the results of the first cases, which are in every way satisfactory. From personal observation of hundreds of fractures, especially of the tibia and fibula, where both bones are transversely broken and there is great displacement of parts, I have come to the conclusion that no other treatment offers the patient the same hope of getting a perfect limb, functionally and anatomically, as an early plating operation.

Treatment of Two Cases of Long Standing.

I have learned that in plating old-standing cases of fracture of both tibia and fibula, where there is mal-union with shortening of the limb, it is not sufficient to deal with the tibia alone; it is necessary to cut down upon the fibula, expose the fracture, and chisel through the callus *before* putting the plate on the tibia. Case 24330 shows this. In this instance I did not interfere with the fibula. The operation was undertaken four months after the injury, and there was strong callus formation both of tibia and fibula. I should have obtained a better result had I exposed the fibula and chiselled through the callus uniting it in the mal-position in which the radiograph showed it to be. This manoeuvre enables more freedom of movement in getting the tibial fragments into perfect apposition, which is the most important consideration.

To get an ideal strong tibia it is necessary to have the lines of force conducting the body-weight in the same vertical plane, and not to have them transmitted to the lower fragment through a deflection, as in mal-union. This ideal can only be obtained by a method, such as a plate, which keeps the broken fragments in perfect apposition.

In only one case (No. 6724) had I to shave the broken ends in order to bring the fragments of the tibia and fibula into apposition. In this case there was excessive shortening ($2\frac{1}{2}$ inches) and the operation was not undertaken until eight months after the injury. There was no union of either bone. This was the more remarkable because at the same time the patient had sustained fractures of the right humerus, ulna, and radius. When he came under my care all these fractures were perfectly healed, with full use of his right arm. His left leg was encased in plaster, and on removing this I found the limb shortened as above with no union at all. There were pressure sores on the heel and over the lower end of the upper fragment of the tibia. The radiograph taken showed grave displacement of the bones, the ends being eburnated and rounded with no attempt at callus formation. He had not left his bed for eight months, as he was unable to put his foot to the ground. Operation was postponed till two months after the pressure

sores were healed. Eventually the patient only had $\frac{1}{2}$ inch shortening, which is very little considering the great displacement and the long time elapsing between the injury and the operation. When he had been on duty a month he met with another accident to his left leg, falling heavily over a tent rope in the dark. He was readmitted into the hospital under my care with his left knee-joint distended with blood, but the bones and the new union had stood the strain of the fall without giving way. I maintain that no other method of dealing with the fractures would have given such an eminently satisfactory result.

Of the whole series this is the one operated on at the greatest distance of time after the injury—namely, eight months, and yet the end-result has been all that could be desired except for the inevitable shortening.

The Technique.

A few observations about the technique employed, the incision, and the after-treatment may be of some interest.

The incision should be a long one—9 to 12 inches. The best position for the incision is a quarter of an inch external to, and parallel with, the crest of the tibia. This should be performed with one cut, which goes through skin and superficial and deep fascia, exposing the tibialis anticus, which is then gently separated from the tibia with a periosteal elevator. No vessels or nerves are encountered in this incision, and it gives access to as much of the tibia as need be exposed. It is a great mistake to make the incision too short, and there is no need to make it over the superficial surface of the tibia. Another incision over the fibula should be made if that bone has to be exposed. It is essential to have a complete set of Lane's special plating instruments, and another essential, in my opinion, is to have plenty of assistants; three are the minimum, and four are desirable. One is told off to hold the foot and to do nothing else, as very much depends upon this assistant carrying out the minute instructions of the operating surgeon. Lane's large long-handled curved periosteal elevators are now passed round the tibia from either side, completely exposing the fracture; the ends are seized with the special bone-holding forceps and the fracture brought out of the wound. The ends are cleaned and brought into perfect alignment and apposition, and held in place with another special forceps, which allows a plate to be placed over the fracture without again disturbing the forceps holding the fragments in place.

The Site of the Plate.

In every case the plate should be applied to the external surface of the tibia, which is as easily exposed as the antero-internal surface. Here the plate is screwed on and is tucked away between the tibia and the fibula, out of the way of all tendons passing to the foot.

A fairly long plate should be used, 6 or 8 inches long, with room for three screws on either side of the fracture. If the fracture is in close proximity to the ankle-joint shorter plates bent to the curvature of the tibia should be used.

In fractures involving the tibia 1 to 3 inches above the ankle-joint the incision needs to be carried downwards in front of the joint and the tendons of the tibialis anticus and extensor proprius hallucis drawn outwards. These tendons never need be severed. The upper part of the anterior annular ligament may need to be severed, but this is not

important; it reunites and its function is not impaired.

Further Details.

The plate and screws should be kept in boiling water until they are wanted, and grasped by means of instruments. The operator should not touch the patient with his hands from the beginning to the completion of the operation. No vessels will need ligaturing; if any are cut they should be clamped with Spencer Wells, which can be removed before the wound is closed by Michel's clips, which are ideal for this purpose. Thus not a single ligature or stitch is used; in fact, frequently even with much exposure of the tibia not a single pair of Spencer Wells is required, as with careful technique not a single blood-vessel needing ligaturing is encountered. Moist eusol dressings are applied to the wound and the limb is firmly bound over cotton-wool. I prefer to keep the limb slung in a Thomas splint with a moderate amount of extension until the clips are removed 11 to 14 days after the operation. Six weeks later it should be difficult to find the incision. Passive movements of the knee- and ankle-joints are commenced when the clips are removed. After a month the limb should be put on to a back splint with a foot-piece.

Massage, if necessary at all, should not be commenced till two months after the operation. Usually it is not required at all. After three months, but not before, the patient may be allowed to walk, putting weight upon the limb. By then the callus uniting the bone is sufficiently strong to stand the weight of the body, although it may not reveal its presence in a radiogram. After four months the fractured limb should be as strong and useful as the good one, with no disability whatever, no shortening, and not a vestige of stiffness in any joint.

This sounds very ideal, but in all the cases described it was the result obtained, the only case of shortening being the one where the ends of the bones, eight months after the injury, had to be pared to give them approximating surfaces. If the patient is anxious to get about after a month he may be allowed up in a calliper splint, but it is better not to permit even this until two months after the operation.

In my opinion the reason that screws work loose is that weight is allowed to be put upon them before there is a sufficiently strong callus laid down; this is not strong under three months. The function of the plate and screws is not to bear or even transmit weight; it is simply a scaffolding to hold the fragments in apposition and correct alignment until Nature has supplied the new bone, which it always does in my experience. I have never seen a loose screw in any of my cases of tibial platings.

Details of Cases.¹

CASE 986.—Admitted 7/2/18 with fracture of left tibia and fibula. Large piece of wood fell on the left leg causing transverse fracture of the bones just above the ankle-joint. Brought the same day from Dieppe. Radiograph showed great displacement of the lower fragments inwards.

18/2/18: *Operation.*—Tibia exposed by longitudinal incision along the outer side of the tibial crest. The fragments thoroughly exposed and isolated and easily brought into excellent apposition. The plate was first bent to accommodate itself to the outward slope of the tibia and screwed on, maintaining the broken fragments in apposition. Wound closed with Michel's clips. No vessels were cut or ligatured during the

operation. Limb put up on back splint with foot-piece and side pieces.

1/3/18: Michel's clips removed; the wound perfectly healed; movements of knee- and ankle-joints carried out. 4/3/18: Daily passive movements of joints. 16/3/18: Radiographed; shows fragments in perfect apposition and the fibula also brought into good alignment. 17/3/18: Splints removed. 17/4/18: Getting about with aid of crutches. 18/5/18: Walking quite normally with no assistance from crutches or sticks, no discomfort of any kind complained of. 18/6/18: Radiographed; shows excellent callus formation with bone in perfect position. The fibula now is united with no displacement of parts. 22/8/18: Radiographed; it is now not possible to see where the break occurred, the fibula has come into perfect alignment and a new medullary cavity is in process of formation. 27/8/18: Discharged to duty. This has resulted in an eminently satisfactory way.

CASE 24330.—Admitted 29/11/17 with fracture of right tibia and fibula 4 in. above ankle-joint, having been knocked down by a motor lorry. The M.O. in charge of ward put him up in a box splint. Massage commenced 8/12/17; fragments apparently in good position. 17/12/17: Slight œdema of leg; no sign of callus formation. 10/1/18: Considerable œdema and tenderness over site of fracture. 14/1/18: Put up in a Thomas splint with extension. 25/1/18: Thomas splint removed. Patient cannot elevate leg from the bed, but can move his toes and flex his ankle. (At this stage patient came under my care.) 9/2/18: Radiographed; shows fragments in very bad position, greatly displaced laterally and inwards.

20/2/18: *Operation.*—Longitudinal incision 9 in. long on outer side of crest of tibia; bone exposed; callus broken down and chiselled away. Fragments brought into good apposition. Plate screwed in on outer surface of tibia, wound closed with Michel's clips; limb put up in a Thomas splint.

5/3/18: Michel's clips removed; wound completely healed; passive movements of knee- and ankle-joints commenced. 17/3/18: Thomas splint removed. 25/3/18: No shortening of leg; ankle-joint normal. 3/4/18: Radiographed; shows fragments of tibia in fairly good position, but it also shows that if the fracture of the fibula had been broken down at the operation the result would have been much better. The fibula being firm made it difficult to get the tibial fragments into the best position. 17/4/18: Getting up on crutches. 25/6/18: Radiographed; shows excellent callus formation. 5/8/18: Discharged to duty. Limb strong and free from pain or any discomfort.

CASE 59790.—Whilst at work accidentally knocked down, fracturing the left tibia and fibula. Admitted two months later with $\frac{3}{4}$ in. shortening of leg. 8/3/18: Radiographed; shows oblique fracture of the tibia at junction of middle and lower thirds, with much displacement of lower fragment outwards and fracture of fibula in upper third.

28/3/18: *Operation.*—Site of fracture in tibia exposed through longitudinal incision to outer side of the crest. The callus was chiselled through, the ends of the bone cleaned and brought and held in good apposition with much difficulty, owing to the shortening of the fibula. The plating was done three months after the accident at the special request of the patient. The callus was well formed, but not very hard. Wound closed with Michel's clips, and limb put up in a Thomas splint with extension.

10/4/18: Michel's clips removed; wound perfectly healed. 28/4/18: Splint removed; movement of joints free. 28/5/18: Getting about on crutches; no shortening of limb. 28/6/18: Allowed to walk without aid. 6/8/18: Radiograph shows firm union, with plate and fragments in excellent position. 22/8/18: Radiographed; shows perfect bony union, and no trace of the break. 27/8/18: Returned to duty, a most satisfactory result.

CASE 21681.—Admitted to hospital 6/3/18 with fracture of left tibia and fibula. Whilst at work on the railway a sleeper accidentally fell on to his left leg, causing the above injury. He had previously to my seeing him been treated in a box splint. Shortening of limb 1 in.

¹ A series of excellent radiograms accompanied this article and fully bear out the statements in the text.—ED. L.

X rays showed fragments to be in very bad position, with outward displacement of the lower fragments of both tibia and fibula.

9/4/18: *Operation*.—Longitudinal incision 9 in. long to the outer side of the crest of the tibia. Muscles separated from the tibia and the site of the fracture exposed. A fair amount of callus had to be chiselled through. The ends of the fragments were cleaned ready for apposition. Before doing this a separate incision over the fibula was made, the bone and fracture exposed, and the callus uniting the fibula in the malposition chiselled through. It was then quite easy to bring the tibial fragments into apposition. This being done, a plate was screwed on, the tibia being in excellent alignment. No plate was put on the fibula. Wound closed with Michel's clips.

21/4/18: Clips removed; primary union. 6/5/18: No shortening of limb. 18/5/18: Massage; patient allowed up on crutches. 18/6/18: Walking with aid of sticks only. 30/6/18: Walking well and painlessly without aid. 28/7/18: Patient walking normally. He has never complained of any discomfort or disability whatever since the operation. 5/8/18: Returned to duty.

CASE 6724.—Admitted to hospital 13/3/18 with ununited fracture of left tibia and fibula (1/9/17). Whilst attending machinery he was caught in a revolving lathe, whirled round, and then thrown violently to the ground, fracturing left tibia and fibula and the right humerus, radius, and ulna. Taken to a hospital in Boulogne for six months, where the humerus, radius, and ulna united perfectly with excellent functional result. On admission the left leg was in plaster. This being removed, the tibia and fibula were found to be ununited; there was a pressure sore on the heel of the left foot, and another one over the lower end of the upper fragment of the tibia. Operation was deferred until the pressure sores were quite healed.

25/4/18: *Operation*.—A longitudinal incision 9 in. long was made $\frac{1}{4}$ in. to the outer side of the crest of the tibia, the bone exposed, and the muscles separated. The ends of the fragments were rounded and eburnated. There was a slight amount of callus between the apposing lateral overlapping surfaces of the tibia, but none from the ends, the foot being quite flail. The ends were sawn off. Through a separate incision over the fibula this bone was exposed and found to be in the same state as the tibia, the ends rounded, and no callus thrown out. The ends were sawn off. Then the tibial fragments were brought into perfect apposition and a plate screwed on holding them in good position. A plate was also put on to the fibula. The wounds were closed with Michel's clips and the limb put on a back splint with a foot-piece.

9/5/18: Clips removed; wounds perfectly healed. 16/7/18: Radiographed; shows excellent position of bones. 26/8/18: Walking without pain and without aid. 10/9/18: Plate on fibula removed as it was subcutaneous and in the way of a boot, the upper rubbing against it. 16/10/18: This has been a most satisfactory case. When he came he had no union, had been unable to put his foot to the ground, and was confined to bed. Now he walks perfectly well, with no pain or discomfort. 18/10/18: Discharged to duty.

CASE 45619.—Fracture right tibia and fibula. Admitted to hospital 21/6/18 with history of a piece of wood having fallen out of a lorry on to his leg, causing a transverse fracture of both bones at the junction of the middle and lower thirds. X ray showed transverse comminuted fracture of tibia and fracture of fibula at the same level, lateral displacement, and antero-posterior bending.

8/7/18: *Operation*.—Incision to outside of crest of tibia 9 in. long, exposing the bone. At the site of the fracture there was a large triangular-shaped piece of the tibia broken right away from the bone, from the external and posterior aspects, just where the plate should be fixed. The ends of the tibia were cleaned and brought into good apposition, and a plate applied and screwed on over the triangular broken piece, which was held in position by the plate, but no screws were driven through it. The wound was closed with Michel's clips and the limb put up in a Thomas splint with extension.

15/7/18: Michel's clips removed; wound healed, primary union. 20/7/18: Thomas splint replaced by a short back splint with foot-piece. 20/8/18: Splint removed. 22/8/18: Radiographed. X ray shows parts in excellent position and quite a fair amount of callus formation. The triangular piece of bone, which was completely severed, is in excellent position. 8/10/18: Radiographed; very satisfactory result shown. 30/10/18: Getting about and helping in the ward. 2/11/18: Discharged to duty.

CASE 28572.—Fractured right tibia and fibula. Admitted 31/5/18. While attending a water-cart it tipped up and fell on patient's leg, causing a fracture of the right tibia and fibula. X ray. Radiograph shows transverse fracture of tibia and fibula at the same level, at the junction of the middle and lower thirds, with inward displacement of the lower fragments. There is also some comminution of both bones.

8/7/18: *Operation*.—The tibia was exposed through a longitudinal incision external to the crest and the fracture exposed. Some soft callus was chiselled away and the ends brought into excellent apposition. Plate applied to external surface and screwed on. Wound closed with Michel's clips and limb put up in a Thomas splint with extension. With a view of obtaining a good result without operation this fracture was treated in a Thomas splint with extension for a month. Extension was continuous and adjusted every day, yet at the end of a month there was still shortening and malposition of fragments.

17/7/18: Clips removed; wound perfectly healed; kept on splint. 22/7/18: Thomas splint removed, back splint and foot-piece applied. 23/7/18: Radiographed; parts shown to be in excellent position. 5/9/18: Right knee-joint found swollen, not painful. Aspirated, 2 ounces clear straw-coloured fluid removed. 8/9/18: Stereoscopic radiograph shows tibia in excellent position. 16/11/18: Radiographed; as above. Measurements both legs equal. 28/11/18: Discharged to duty.

CASE 4807.—Admitted 28/6/18 with transverse fracture of left tibia and fibula only $1\frac{1}{2}$ in. above the ankle-joint, caused by foot being run over by a light railway truck.

10/7/18: *Operation* 12 days after the accident; very much displacement of parts. Small plates were put on both tibia and fibula. The plate applied to the tibia had to be bent so as to conform to the curvature of the bone. Both tibia and fibula were brought into perfect apposition. Wound closed with Michel's clips. Limb put up in a Thomas splint with weight extension.

18/7/18: Michel's clips removed; wounds perfectly healed. 26/7/18: Thomas changed for back splint with foot-piece. Movements of joints carried out. 19/8/18: Back splint removed; knee- and ankle-joints freely mobile. 2/10/18: Allowed to get up and walk with aid of crutches. 21/1/19: Discharged to duty. Limb as sound as the one unbroken, no shortening and perfect union of fragments, no break being visible in the X ray.

CASE 130213.—Admitted 28/6/18 with transverse comminuted fracture of the right tibia and fibula, injury five days previously, lower fragments displaced outwards.

12/7/18: *Operation* 19 days after the injury. The ends of the broken tibial fragments were cleaned of intervening tissues and brought into good apposition. On the postero-external aspect a triangular piece of the tibia was broken right off, being quite separated from the bone. This was replaced in position and the plate applied over it, though no screws were driven into it. The fibula was exposed through another incision, and a small amount of callus already formed chiselled away and the ends brought into perfect apposition and a plate applied. The wounds were closed with Michel's clips and the limb put up in a Thomas splint with extension.

20/7/18: Michel's clips removed and wounds perfectly healed. 22/7/18: Thomas splint substituted for back splint with foot-piece. 19/8/18: Splint removed; movement of knee- and ankle-joints perfect. 2/10/18: Allowed up and to walk with aid of crutches. 25/11/18: Getting about without stick or crutches. 21/1/19: Discharged to duty. The limb is the same length as the other; no pain, no disability of any sort, and the point of

union of the bones has disappeared, and the medullary cavities are normal.

CASE 37651.—Admitted 19/8/18 with transverse comminuted fracture of the right tibia and fibula 2 in. above the malleoli, the lower fragments being displaced inwards.

28/8/18: *Operation* ten days after the injury. Longitudinal incision along outer border of crest of tibia. Fragments exposed and brought into perfect apposition. Plate screwed on to outer surface of tibia, holding the fragments in excellent position. Wound closed with Michel's clips. Limb put up in a Thomas splint with weight extension.

7/9/18: Michel's clips removed; wound perfectly healed; limb put up on back splint with foot-piece; movement of joints carried out. 28/11/18: Allowed up on crutches. 28/12/18: Up and about, no stick or crutches being used. 21/1/19: Discharged to duty. Limb as sound and useful as uninjured one; no shortening, no lameness, no disability of any kind. An excellent result.

CASE 92666.—Fracture right tibia and fibula. Admitted to hospital 12/8/18 with history of being struck by iron crane while working on the wharf at Dieppe. Radiograph showed very nasty comminuted fracture of both tibia and fibula, with much displacement of fragments, the lower fragments displaced outwards.

10/9/18: *Operation*.—Longitudinal incision to outer side of the crest; fracture exposed. Great difficulty was encountered in getting the fragments into good position on account of the amount of comminution of the posterior aspect of the bone at the site of the fracture. Plates applied and screwed on, holding the fragments in a very good position. Wound closed with Michel's clips. Limb put on back splint with a foot-piece. The skin was broken near the wound, but this was avoided.

22/9/18: Michel's clips removed; wound perfectly healed; movement of joints carried out and limb replaced on splint. 30/11/18: Commencing to get up on crutches. 5/12/18: Radiographed; tibia and fibula in perfect alignment, with excellent callus formation; medullary cavity in fibula commencing to be formed. 13/1/19: Radiographed; excellent result. The site of fracture can still be seen in the lateral view only. 10/2/19: Radiographed; excellent result. 12/2/19: Discharged to convalescent ward.

TOPOGRAPHIC PERCUSSION AND VISCERAL TONICITY.

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IN a recent communication,¹ "L'orientation des animaux et les influences magnétiques," by Jules Regnault, before the Society of Comparative Pathology, the following observation is made:—

"My studies on orientation have been controlled by the observation of Abrams. To obtain the best results subjects must stand on a grounded plate and colours and intense light avoided. Under these conditions my investigations with colleagues at Vichy, Granville, and Toulon show the following: When the heart area was defined by percussion (patient facing west), then percussed again with the patient facing east, north and south, the area of dullness was notably diminished in the latter positions. The liver border in the right parasternal line diminished 2 to 4 cm., and the upper heart border was lowered from 8 to 10 mm. when the subject was turned from the position 'face to the west' to the position 'face to the north.' We proved Abrams's studies, which show that the visceral reflexes² attain their maximum reaction from electronic energy³ when the subject faces west."

In my book on "New Concepts in Diagnosis and Treatment" (1916) I have expressed myself as follows:—

"Tone is an essential attribute of all living organisms, and relaxation is its antithesis. The nerve centres are in a condition of tonic excitation, from which impulses pass to the viscera, maintaining them in a state of tonic stimulation. Every living being transforms energy from the universe. The ideal man is a perfect transformer, and 'Life is a continuous adjustment to the environment' (Spencer). The attraction of man by the sun and the mechanical energy imparted to him by the sun, rotation of the earth, atmospheric pressure, and the electric potential at billions of volts all influence the microcosm by the macrocosm—the world machine."

The writer has shown that the magnetic elements influence visceral tonicity, and that the output of energy varies in relation to the posture of the individual, because the intake of energy is similarly influenced. The organs are in a varying state of tonicity, and the tone may be normal (orthotonic), increased (hypertonic), diminished (hypotonic), or absent (atonic). A relaxed organ will yield a smaller area of dullness than an organ which is in a state of tone.

To accurately reproduce the area occupied by an organ it must possess tone, otherwise topographic percussion is unreliable. It is easy for the physician to show that the borders of the heart will vary according to the posture of the patient, on whom percussion is executed. It will be found that the area of the heart, or, for that matter, any viscus will be greater when the patient faces the geographic west than when he faces the other points of the compass. Note that, when the patient stands in the magnetic meridian supreme tonicity is conferred on the viscera. The latter manoeuvre is equivalent to organismal induction from cosmic energy. The writer wishes to emphasise an important fact in the technique of sphygmomanometry (like percussion)—viz., the necessity of taking pressure in a definite position.

Any physician can easily prove that variations, however slight, do occur, and they are most manifest when the patient faces the geographic north during the time pressure is taken. Vital phenomena are dynamic, and organismal action is a process, not a structure. All problems dealing with the physiology of man not in accord with the progress made in physical science are doomed to perish.

In my book the electrophysiologic structure of man is shown with the hands and feet as polar termini. With an apparatus constructed by the writer (electroradiometer) it can be definitely shown that the polarity of the hands and feet of a normal male is positive on the right and negative on the left side. This polarity is reversed in the normal female.

Let the reader forget for a moment that the latter observation is correct and try the following. Percuss the area of the heart with the patient facing the geographical west. Instruct the patient to bring both feet in apposition. Note that the area of the heart is diminished. Instruct the patient to approximate his finger-tips in addition to his feet, and note that in many instances the area of cardiac dullness is practically annihilated. Note, furthermore, that the moment the feet of the patient are approximated, there is a momentary inhibition of the pulse. When the feet and hands are approximated the manoeuvre may be likened, in the animal machine to a short circuit in a

¹ Séance, July 8th, 1919; THE LANCET, 1919, ii., 498.

² Handbook of the Medical Sciences, vol. vii.

³ International Clinics, vol. i., 27th series.