25th. April. 1918.

To:- Major R. F. Flegg.

You will please read the attached, sign the certificate hereunder, and hand to the next Officer on the list, who will hand it on to the third and so on. The last Officer on the list will return the attached to the Orderly Room.

Wallace A. Scott

COLONEL. C.A.M.C.,
Officer i/c Hospital.

I certify that I have read Vol. 1., No. 2., Bulletin of the Canadian Army Medical Corps.

	Signature.
Major R. F. Flegg.	R. F. Flegg
Captain A. E. Mackintosh.	A. E. Mackintosh
Captain E. M. Blair.	E. M. Blair
Captain V. H. Storey.	V. H. Storey
Captain N. H. Little.	N. H. Little
Captain F. L. Neely.	
Captain V. E. Barrow.	V. E. Barrow
Captain J. G. McCammon.	
Captain R. V. McCarley.	R. V. McCarley.

FOR OFFICIAL USE ONLY Vol. I. No. 2. APRIL, 1918.

Bulletin

OF THE

Canadian Army Medical Corps

ISSUED FROM THE OFFICE OF THE D.M.S. CANADIANS

CONTENTS

This Bulletin is issued to every unit of the Canadian Army Medical Corps. It will be passed for reading, and will be initialled by all Officers. After return it will be kept on file by the Officer Commanding for further reference.

KRIEGSOEDEM AND BILATERAL PAROTID ENLARGEMENT.

By CAPTAIN F. A. PARK,* M.B.

(1) *Kriegsoedem.*—This is a condition so peculiarly German that to give it an English name would accuse us of want of chivalry. Over and above this, to speak of the condition as "war œdema" is incorrect; it is not war, but purposeful underfeeding that is the primary cause. It is a famine œdema, not a war œdema.

During the past thirteen months, from January, 1917, to February, 1918, while working as medical officer among the prisoners of war at the German camp of Minden in Westphalia, I saw a large number of cases of this condition, which the Germans have called "Kriegsoedem" or "Erschoepfungszustand mit Oedem" (state of exhaustion with œdema). This disease occurred among the prisoners of all nationalities who were fed on German rations only. Russians and Rumanians afforded the greater number of cases, but the French who had been sent to prison camps and there deprived of their private food packets, and those English who, having been detained for work on the lines of communication, had not been reported as prisoners and therefore did not receive parcels from England, suffered also. Latterly the Italians formed the bulk of the cases. The largest numbers were seen in April, May, and June, 1917, when the Russians and Rumanians who had been employed in building the Hindenburg line were brought back to Germany. In all I saw about 400 cases of this condition. It is inevitable that I speak in somewhat general terms, since in the first place facilities for proper investigation were not obtainable, and in the second place the regulations forbade the collection of statistics. I cannot, therefore, give any definite statements regarding blood picture, blood pressure, histological findings, or chemical analyses of the urine and other excreta, nor can I give any figures as to the German ration values, although I understand that these are now known to the authorities at the War Office.

Etiology.—Undoubtedly insufficient food is the chief cause of the disease. The German ration is low in protein and is almost fat free. As the food is chiefly in the form of soup, a large amount of fluid is ingested to obtain a small amount of nourishment. Many of these men were in the habit of taking large amounts of common salt in solution as an addition to their soup, so that chloride retention may be an additional factor in causing œdema. Myocardial weakness is probably an adjuvant.

Clinical History.—The condition commences as slight œdema of the feet and legs, disappearing when the patient is recumbent. Patients are seldom admitted to hospital in this stage, although proper feeding with rest in bed would completely restore them in a few days. The usual type found in hospital presents a massive œdema of feet, legs, thighs, and scrotum, with some puffiness under the eyes. Ascites is common. The patient is pale and dull; indeed, the appearance is strikingly like that of a case of parenchymatous nephritis. There is extreme muscular wasting and weakness. Dyspnœa is only present on exertion, except when there is hydrothorax. The heart is slightly enlarged; the action is regular, but usually slow; the muscle tones are poor, and the second aortic sound is not accentuated. Blood pressure is low. There are commonly many moist râles in the lungs posteriorly, especially towards the bases. Uncomplicated cases are afebrile. In the most serious cases there is a general anasarca, the chest and abdominal parietes are œdematous, and all the serous sacs become filled with fluid. In one case I removed 15,000 c.c. of watery fluid from the pleural sacs in a series of six punctures during two weeks. In a few cases paracentesis abdominis was done. Hydropericardium was common, but never extensive enough to require withdrawal.

The urine was scanty in severe cases, but as patients recovered there was polyuria. *It never contained albumin or casts.* The specific gravity was usually about 1015. No quantitative chemical tests could be made.

Course of Disease.—Most uncomplicated cases improved slowly with rest in bed and an additional half ration. Where abundant food, with meat and fat, could be obtained and was tolerated, improvement was rapid. Digitalis was employed without appreciable result. Diuretin also had little effect. The quality of the drugs, however, was questionable. Œdema of the legs, after work, persisted for several months after the patient's general strength had improved. A few uncomplicated cases became progressively worse and died.

Complications.—Dermatitis of the legs was common, giving rise in a few cases to lymphangitis and cellulitis. One case of thrombosis of popliteal vein occurred. Bronchitis was common, and most of the fatal cases had broncho-pneumonia and œdema of the lungs. Colitis, with mucus and blood in the stool, was a common and serious complication. No specific organism was isolated as the cause of this colitis. It is significant that very few cases occurred among the well-fed prisoners, and these were immediately amenable to treatment. As a complication of the œdema, colitis was very intractable and often fatal. Parotid enlargement is referred to in a separate note.

Pathological Findings.—About twenty autopsies were performed on cases of various orders. The most striking feature was the absence of fat throughout the body. At the normal sites of fat deposit, viz., the subcutaneous tissue, in the great omentum and the mesentery, and about the heart, the fat was replaced by œdema, an extreme condition of serous atrophy. The heart muscle was pale and the ventricles usually dilated. Pericardium, pleural sacs, and peritoneal cavity were filled with pale clear fluid. The kidneys were pale, but appeared otherwise normal. The liver was usually decreased in size and was pale. Spleen pale. The lungs were œdematous, and usually showed patches of broncho-pneumonia. In cases where diarrhœa had been marked there was thickening and hyperæmia of the mucosa of the sigmoid and rectum. Two cases of superficial ulceration were found. Unfortunately facilities for microscopic examination of tissue were lacking.

CONCLUSIONS.

(1) Kriegsoedem is the result of underfeeding, especially in fat and protein.

(2) It can be cured easily in the early stages by sufficient diet.

(3) When well established it is frequently complicated by a colitis, when the mortality is high.

(4) The ration issued by the German Government to prisoners of war is insufficient to maintain life and must be supplemented by food from home.

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(2) *Bilateral Enlargement of the Parotids.*—Among these 400 cases I encountered some twenty cases of a condition hitherto unknown to me, nor since my return have I found any reference to it in the literature, a condition of enlargement of the parotid glands which was always bilateral. The German medical officers in the camp who, when they were not student probationers (Feldunteraerzte), were country practitioners of little capacity, diagnosed these cases as Mumps, but Mumps they were not. (1) The enlarged glands were at no time hard or painful, but rather they were soft and doughy, the swollen regions being easily pinched between the finger and thumb. (2) The condition was afebrile; in no uncomplicated case did I encounter rise of temperature in association with it. (3) It was never accompanied by orchitis, and (4) it tended to persist indefinitely. Under the diagnosis of infectious parotitis these cases were sent to the Isolation Hospital, and on hospital diet their general condition immediately improved. I saw several cases three months after the onset and could observe no change in the condition.

The German medical staff were in some difficulty about these cases, having diagnosed them as Mumps, and, the swelling still continuing, they could not return them to the main camp and to work without admitting that they had made an incorrect diagnosis. It should be added that in a few cases the submaxillary glands were also involved.

I hesitate to speak of this condition as one of chronic parotitis in the complete absence of any indications of inflammation; but if not of infectious origin, then we must admit that chronic inanition may lead to parotid enlargement, but whether this enlargement is due to hypertrophy or to local œdema must remain an open question.

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* Captain Park, when M.O.—Canadian Infantry Battalion—was taken prisoner at Zillebeke in June, 1916, and was only returned at the end of February, 1918. After seven months internment he made application to be given employment as M.O. in a prison camp, and in January, 1917, was given service as M.O. at Minden.—EDITOR.

LIQUID-TIGHT CLOSURE AND THE TREATMENT OF WOUNDS.

By WALTER HERBERT TAYLOR, M.D., C.M.Tor.,
AND
NORMAN BURKE TAYLOR, M.B.Tor., M.R.C.S.Eng., F.R.C.S.Edin.,
Captains, C.A.M.C.

IN the *Lancet* of September 22, 1917, we described under this heading a device designed to render a wound watertight during its irrigation, and so dependably watertight that any desired degree of positive or negative pressure might be employed. We suggested that by alternating these pressures in the wound an ebb and flow might be set up that would reach into its deepest crevices. We called this a tidal flushing of the wound, and compared it to the way in which a sponge is cleansed by squeezing it in a basin of water. We held that in deep wounds there was no other plan of treatment which could give similar results.

Since that publication the device has been improved, its application simplified, and many complicating features eliminated. It is no longer necessary to shave the part. There are now no exhaust tubes to get out of order. A shield of poroplastic felt is not required, the device being held on merely by an ordinary roller or many-tailed bandage. We have, on several occasions, given the device to one of the nursing sisters to apply, and she has been able to provide a watertight closure and to flood and aspirate the wound in about the time she would have required to do a dressing.

This is the desideratum which for nearly two years we have striven to attain, yet hardly any effort would have seemed disproportionate to the want which to us appeared a very obvious one. The need of some means of providing liquid-tight closure has perhaps always existed. In civil practice, and quite apart from the treatment of ordinary wounds, it is often desired to hold the negative pressure in the pleural cavity during the drainage of empyemas. It is also often necessary to institute continuous aspiration of the bladder. The success that has attended these attempts has not been great, even though the establishment of negative pressure alone was aimed at and its suction effect could be requisitioned to maintain the joint. There have been several efforts during the War to provide such a closure for wounds, all of which would appear to indicate that the need has at least been felt.

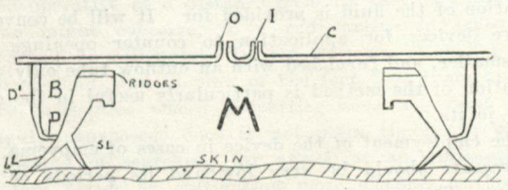

Fig. 1.

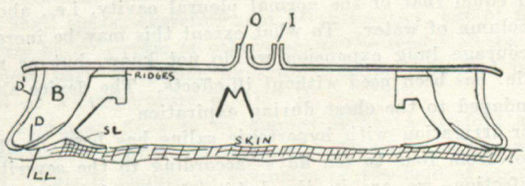

Fig. 2.

DESCRIPTION OF THE IMPROVED DEVICE.

Figs. 1 and 2 are diagrammatic. The relative thicknesses of rubber are approximately correct as shown.

Fig. 1 shows the device merely lying on the skin.

Fig 2 shows the same more or less squeezed down by bandage pressure. In fig. 2, when the outflow O is closed and the inflow I is opened, water pressure immediately commences to accumulate, resulting in an expanding force between the cover C, which is held down by the bandage, and the skin. This force also acts in an eccentric direction against the inner surface of the large lip LL and against the upper surface of the small lip SL. It is obvious that a watertight joint should result at the junction of the small lip and the skin. It is conceivable, however, that the water pressure acting upon the inner surface of the large lip LL might raise it like a curtain, allowing the pressure on the small lip SL to buckle it out and underneath with consequent leakage. This difficulty, however, has been overcome by applying the same pressure of fluid to the outer as to the inner aspects of the large lip. To do this we formed an annular chamber B, external to the large lip, the said chamber being bounded by the thin bottom D, the thicker external wall D1 and the corresponding portion of the cover C. This chamber communicates freely with the main chamber M by means of radiate ridges on the broad top of the large lip LL. These ensure a circulation between the chambers B and M. The cover C is attached to the top of the thick vertical wall D1.

The fluid in the chamber B will neutralize the pressure in the main chamber M, thus obviating the lifting of the large lip when the pressure is increased. Pressure upon the bottom D bulges it against the skin; pressure against the thick wall D1, and a corresponding portion of the cover C, will be restrained by the bandage.

Assuming that this device lies always on the skin, as the drawing indicates, it is evident that leakage is impossible. But so to devise it that its several parts will slide into position without buckling or kinking during its application, and afterwards to have them "stay put" during the various alterations of pressure, muscular action, rolling in bed, &c., has been the chief difficulty encountered; particularly since the changes in construction could not always be effected by the hand-working of rubber, but required a new steel mould to embody each improvement. Altogether we have tried and discarded over thirty different appliances.

The increased efficiency of the present form of the device is due chiefly to the fact that the small lip is attached to a point below the middle of the large lip, so that during the eccentric spreading of the latter produced by bandage pressure, the small lip is carried outward, too, and consequently placed upon the stretch. Its adaptability to the different curved surfaces of the body has been thereby enhanced. Its mechanical integrity was shown by subjecting it to a pressure of 20 ft. when applied to an unwounded forearm. Such a pressure, of course, is not relevant to any possible contingency incident to the treatment of wounds.

TECHNIQUE OF THE APPLICATION AND USE OF THE DEVICE.

No drainage tubes are used in the wound. These tend to block side pockets and to prevent thorough cleansing of the granulating surfaces with which they come into contact. Furthermore, drainage tubes, as a means of conducting fluid into the depths of a wound, are rendered superfluous by the fact that the fluid pressure beneath the cover of the device is continuous with that in the wound. In some cases, however, with small wound outlets, as seen in chronic sinuses, a freer entrance to the fluid and exit for the pus may be provided by spreading the lips of the wound. For this purpose a small wire "cage" is used, resembling in shape a couple of hairpins with their loops joined at right angles (see fig. 3). The looped extremity of the cage is passed into

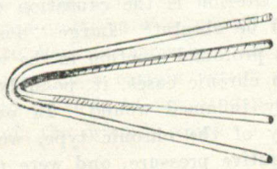

Fig. 3.

the wound and its limbs spread out to produce gaping. The projecting free ends are bent over so that they lie parallel to the skin.

The device is now applied with its centre coinciding roughly with the centre of the wound and is bandaged to the part. The bandage, which should be preferably of calico, is extended for at least an inch beyond the upper and lower margins of the device, its pressure being snug and sufficient to produce collapse of the vertical walls of the appliance without constricting the part or causing discomfort. In cases where there is difficulty in moving the part a many-tailed bandage is the most convenient to use. It is advisable, where possible, to place the inner lip of the apparatus out of contact with depressed scars or sharp elevations of the skin. Where these cannot be avoided, a little vaseline or a thick bismuth paste will overcome the difficulty.

A glass reservoir capable of holding from three to six pints of fluid, adjustable to any level, and provided with a length of ¼ in. tubing and clip, should be ready to hand. The reservoir tube is now connected to the smaller of the two tubes issuing from the device. The larger or outflow tube, arising from same, is joined to a short length of tubing which is pinched off and led into a waste pail. The reservoir, filled with a 5 per cent. saline solution at 115° F., is placed

at the required level. The inflow tube is then opened and the space beneath the cover allowed to fill with fluid. When the level of the fluid in the reservoir has ceased to fall the inflow should be closed and the outflow opened. The ensuing establishment of negative pressure causes a "setting" of the circumferential flanges to the contour of the skin. The apparatus is now in readiness for the institution of ebb and flow irrigation (see fig. 4).

Regulation of the Irrigation.—It is not possible at this time to lay down rules as to the degrees of pressures, and the alternations to be employed in the various types of wound. Each case must be judged upon its merits and the pressures graded accordingly. The avoidance of any pain, no matter how slight, is a guiding principle of the first importance.

Positive Pressure.—In all cases where there is much discharge, pressure, to start with, should be low—usually from 6 to 12 in.—as measured by the height of the column of fluid above the level of the wound. When no free pus issues from the mouth of the wound upon removal of the device, and little or none can be expressed by milking along its tracks, the pressure may be increased. It is doubtful whether it is ever necessary to go beyond a pressure as represented by an 18 in. elevation above the part, though the employment of positive pressure above this, even up to 3 ft., has in no way been associated with untoward effects.

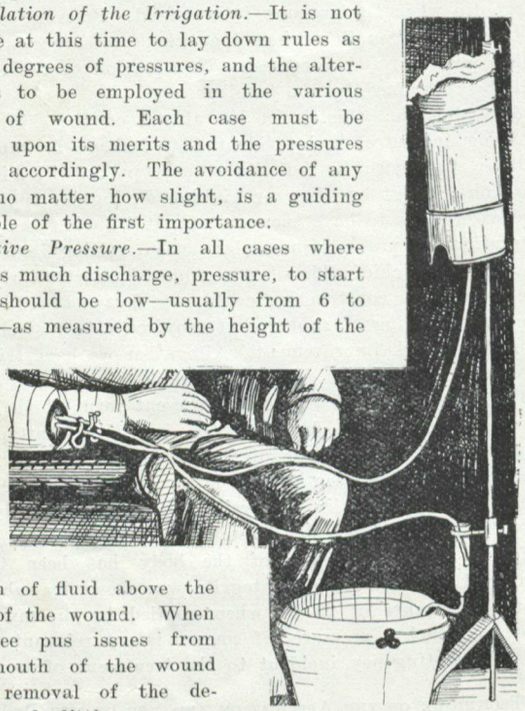

Fig. 4.

Negative Pressure.—More care must be exercised in the use of negative pressure. In old chronic sinuses, even though discharging profusely, the maximum amount of negative pressure which the height of the ordinary military bed permits—about 2½ ft.—may be used with impunity. In acute cases, on the other hand, it must be greatly reduced, and our one reliable criterion is the causation of pain, freedom from which should be absolute. Large "doses" of negative pressure produce a profound reaction in the wound, and while this is salutary in chronic cases, it, possibly, may be otherwise in an acutely inflamed wound. In our earlier cases, which were mostly of the chronic type, we underestimated the potency of negative pressure, and were much puzzled by the occurrence, sometimes, of a slight initial rise of temperature (½° to 1°) after the device had been in operation for a few hours. As this rise ran parallel to a marked cleansing and freshening of the wound, and a notable improvement of all local signs, it struck us in the light of a phenomenon, until the same pressure was employed in an acute case when the stimulating effects of negative pressure became rather too evident. In this case the patient had complained of pain; nevertheless, in a few hours the wound opening, which had been previously pouring pus, was found to be filled with lymph and blood; there was an improvement in the general appearance, there was less swelling and tenderness, and yet the temperature was elevated. We then came to look upon this rise of temperature as being of a reactionary nature and consequent upon the pouring out of lymph and the extravasation of blood, with their content of ferments, into the cavity of the wound. We have been led, therefore, to consider it of kindred nature to the aseptic fever following operations and accidents.

In very acute cases minus pressure may be greatly reduced or even abolished until the more urgent symptoms subside. To measure its amount with accuracy we use the barrel of an ordinary 3-oz. glass syringe, which is attached to the reservoir stand by means of a sliding collar, and thereby adjustable to any level (see fig. 5). The outflow tube arising from the device is made to empty into the glass barrel, whilst a length of tubing attached to the syringe nozzle leads into the waste pail.

The depth of the pendant column of fluid upon which the negative pressure depends is in this way varied as desired.

In cases with much swelling it may be necessary, as this disappears, to readjust the bandage. Sometimes the subsidence of swelling is remarkably rapid, in which event, of course, the bandage may become loose and the device thereby allowed to rise from the skin.

Alternations of Pressure.—The variations between positive and negative pressures are accommodated, as regards duration, to the particular features of the case. At the commencement, and until the effluent becomes fairly clear, the alternations should be of about fifteen minutes each, or fifteen minutes positive, and from five to ten minutes negative.

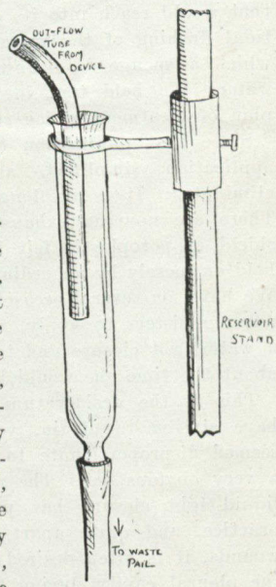

Fig. 5.

After this the positive pressure is prolonged to half an hour or so, and the duration of negative adapted to the type of wound, being long in chronic and short in acute cases. As a general rule the duration of negative pressure should not exceed twenty minutes, and never be long enough to produce pain. These alternations may be regulated by the patient himself during waking hours, and, for the sake of convenience, the periods of positive pressure may be prolonged during the night, and the duration of negative be just sufficient to freshen the solution in the wound (about ten seconds).

A wound with a counter opening should be treated by the application of two devices. The device covering the main wound should have its *outflow* tube occluded by means of a short length of glass rod for the course of the case. The device covering the counter opening should have its *inflow* occluded in the same way. Thus through and through circulation of the fluid is provided for. It will be convenient to have devices for application to counter openings made much smaller, and furnished with an outflow tube only. This application of the method is particularly useful in the drainage of joints.

In the employment of the device in cases of empyema, positive pressure should be very low and its periods of short duration. The negative pressure exerted in the intervals should equal that of the normal pleural cavity, i.e., about a 3-in. column of water. To what extent this may be increased to encourage lung expansion we do not know, but as much as 12 in. has been used without ill-effects. The device should be bandaged to the chest during expiration.

After irrigation with hypertonic saline has been in operation for from four to ten days—according to the severity of the infection—we are in the habit of removing the device for two or three hours. If then no pus appears, clear lymph and blood alone occupying the mouth of the wound, the device is re-applied, and irrigation continued with an antiseptic solution for forty-eight hours, our idea being to effect a final sterilization. Latterly we have been using a 1 in 5,000 solution of flavine in hypertonic saline.

RESULTS.

Certain phenomena have been observed to follow so constantly the employment of this method of irrigation that we are able now to predict their appearance. Though our investigations as yet have been largely confined to stubborn old sinuses, and not to recent wounds, this form of irrigation has, on many occasions, been instituted at the time of an acute flare-up. We have not, it is true, an imposing array of cases as regards number, but our results have been of a very positive nature. We do not propose to weary our readers with individual instances, but shall wait until our series is compiled for presentation in tabulated form. The results which we have observed may be epitomized as follows:—

(1) Rapid softening of indurated tissues and a return to their normal colour.

(2) Disappearance, often within twenty-four hours, of swelling.

(3) Profuse discharge of pus for the first twelve hours and its rapid diminution afterwards, the secretion becoming sero-purulent, then lymphoid in character.

(4) On an average, in chronic cases, the wound is cleansed of pus in thirty-six hours—that is to say, the pus is removed as soon as it is formed.

(5) Granulations become bright in colour and bleed more readily. After four or five days, if the device be removed, an old chronic sinus usually fills up with lymph and blood.

(6) The almost instant relief from boring pain which may have worried the patient for months.

(7) The improvement in the general health and morale of the patient, incident to these local changes, is often remarkable.

RATIONALE.

To be able to irrigate a wound as often and as freely as desired, to flush it out or aspirate it under any degree of plus or minus pressure, or of temperature, is a convenience certainly, but the question at issue here is, why, in the case of deep wounds, do we secure results that are undoubtedly superior to those obtained where the principle of ebb and flow is not employed? Why, for instance, does an old compound fracture of the thigh, that has been running a temperature for weeks or months and disgorging large quantities of pus at every dressing, with the surrounding tissues swollen, indurated and tender, clear up, as it assuredly does, within a week or ten days? This seems to call for explanation. We have already in our previous paper dilated upon the rationale; but the importance of the subject is such that we may perhaps be excused for recapitulation with some additional detail.

If some new chemical should be advocated for the treatment of wounds, its alleged superiority over existing germicides would have to depend upon (1) its increased bactericidal power, (2) its osmotic pressure, or (3) its less inhibiting effect upon the natural defensive mechanisms. It would not seem that there is much scope for advance in these directions. But, should this antiseptic evince in addition some quite new property, let us say a selective action on bacteria operative at a distance from its seat of application, due, we might conceive, to a radio-active influence, this indeed would be millennial. In lieu, however, of such a happy therapeutic find, and in view of the fact that there are few, if any, antiseptics whose properties have not been pretty thoroughly canvassed, does it not seem timely to suggest that, instead of searching far afield for an antiseptic, we might fare better by cultivating more efficient methods for the mechanical cleansing of wounds.

We shall speak, therefore, not of antiseptics, but of fluids, let these be antiseptic or otherwise, as the reader elects. For the most part we prefer hypertonic saline delivered in the wound at a temperature of 115° F.

An irrigating fluid as we employ it has a twofold action in the wound. First, far-reaching cleansing of the wound cavity. This is merely an extension of the field of operation for a fluid as commonly employed. Second, there is the actual transmission of movement from a tidal irrigating fluid to the cellular elements and tissue juices in the region of the wound.

(1) Discussing first what appears to occur in the wound cavity as opposed to the tissues, we know that most shrapnel wounds have a multiplicity of pockets which are often plugged with pus. There is an apposition of surfaces or atelectasis of portions of the wound wall, behind which are spaces filled with pus that is discharged as its pressure increases. Nothing but positive pressure of the irrigating fluid can reach such pockets directly, and only a variation in pressure can cause them to empty prematurely. Although fluid not under pressure in the wound, but flowing easily in and out of its larger spaces, undoubtedly assists drainage from these smaller pockets, as a wet dressing applied to the wound opening promotes drainage from the wound, it does not wash them out.

The practice used to be to stick one or more large tubes in the wound after a flush-out on the operating table, and to apply a fomentation which was moistened afterwards from time to time, the excess of pus being discharged from the wound cavity into the dressings and, possibly, some of the antiseptic trickling down the drainage tube into the wound. Wright and Carrel have gone as far beyond this as the mechanical facilities at their disposal permitted. They convey the fluid in and out of the wound and its larger spaces. Subsidiary crevices are permitted merely to discharge into these, as formerly the wound was encouraged to discharge into the dressings. In this connection it is to be observed that the surface area of all these convolutions of the wound wall are probably many times greater in extent than that of the main channels. The washing of subsidiary pockets, therefore, is not a matter to be regarded as of subsidiary importance.

The effect of ebb and flow is to cause pockets to disgorge their content of pus and bacteria, to refill with a dilution of the same, to disgorge again, and so on, until the entire wound becomes clean. After two or three days the altered appearance of a chronic infected sinus suggests nothing so much as an old oil painting that has been renovated, all its dirty, dusky colour tones having been lightened and freshened up.

In the case of purely surface wounds infected with ordinary pyogenic organisms, difficulty is rarely experienced in clearing them up, whatever method be used. This is largely accounted for by the ease with which the mechanical removal of pus cells and bacteria is effected when the wound is shallow. To all intents and purposes a deep wound by this method is converted into a superficial one.

In this connection we quote from Child's translation of Carrel and Dehelly's "Infected Wounds," p. 70:—

"We have often seen *surface wounds** yielding many microbes become sterilized in forty-eight hours. The tardiness of sterilization in irregular wounds appears to be due to the presence of diverticula into which the liquid does not penetrate, and where microbes swarm. . . . There is not, in fact, any theoretic reason why a large and irregular wound should sterilize more slowly than a small one with even walls. But it is much more difficult to make the liquid penetrate all the irregularities of a deep wound than it is to bring it into contact with the entire surface of a smooth one.

"The duration of the application of hypochlorite in deep wounds will lessen when it becomes possible to apply continuously the antiseptic to the entire surface of the wound. Our technique is still too clumsy, and the methods of distributing the liquid in use to-day do not succeed in placing every portion of a large wound simultaneously under the influence of the bactericidal substance. It is quite probable that different portions of an extensive wound are sterilized successively, for the bacteriological examination shows that after the lapse of several days certain portions of a wound are sterile, whilst others continue to harbour microbes. Besides, rapidity of sterilization increases to a certain extent with the quantity of liquid employed—that is to say, it depends on the extent of the surface of the wound which is acted on by the liquid. . . ."

Now whether it is the antiseptic, as Carrel maintains, or the cleansing action of a simple fluid that is responsible for the sterilization of wounds, the implication nevertheless amounts to this: that the present methods are not always adequate to reach remote diverticula, and that it is a matter of supreme importance to convey the fluid to them.

It may be well here to anticipate the possible misconception that the fluid is suddenly forced into these minor pockets. It is to be remembered that the fluid is delivered primarily into the opening of the wound or into its main channels, and that from here it seeps eccentrically in all directions until the pressure becomes gradually equalized throughout. So that once the outflow tube is clipped and the level of the fluid in the reservoir has ceased to fall, the height of this level above the wound becomes an index of the pressure in all parts of the cavity, both central and remote. It is necessary, of course, that a sufficient time be allowed for this to occur, but that static pressure is always equally distributed is a fact of elementary physics. Therefore it may be definitely asserted that, by this means, the solution may be made to reach any part of a wound that is permeable to fluids, and from which pus can exude.

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* The italics are ours.

We have had ocular demonstration of this in the case of a double wound with openings on opposite aspects of the limb, and not communicating with one another, so far as could be judged by previous attempts to force fluid through by means of a syringe, though at an earlier stage in the progress of the case these wounds had intercommunicated. After applying the device to one of these no change in the uncovered opening was observed for several hours, during which ebb and flow was continued in the primary wound. It was then noticed that the purulent discharge from the untreated wound was becoming thinner, and this continued until it became perfectly obvious that the irrigating fluid was "worming" its way through. The effluent from the secondary wound finally became quite clear. This was regarded as an illustration of how seepage occurs, and an indication, presumably, of what happens in blind off-shoots from the main channels of a wound during ebb and flow. It is a natural corollary to this that whatever virtue an antiseptic possesses will likewise be exerted to the maximum. The same applies to hypertonic solutions, as well as to the therapeutic use of heat, a fomentation being virtually applied to the *interior* of the wound.

(2) As opposed to this gross cleansing action on the wound, let us now consider the action, which for the sake of a better term may be called micro-mechanical, upon the tissues. As to what exactly does occur in granulation or other tissue lining the walls of a wound when subjected to alternating pressures, we do not pretend to determine. It is known, however, that the pressure of the blood in the capillaries is something under 40 mm. of mercury, or roughly that of an 18 in. column of a watery fluid. A pressure, therefore, beneath this should not blanch granulations, and the amount of negative pressure that would just be sufficient to create the correct degree of vascular dilatation might be worked out.

Harm, however, will not result if such fine degrees of pressure, based upon these physiological considerations, be not rigidly adhered to. Though there must be an optimum for these, clinically we have found that any pressure, positive or negative, which causes no discomfort to the patient is salutary only in its effects. Just what degrees of pressure, and what lengths of alternations will be found the best, is matter for future inquiry. The following rough experiments bear out our experience in cases undergoing actual treatment:—

With a view to observing the effect of positive and negative pressure upon granulation tissue we improvised a manometer by modifying the device as follows: A disc 2 in. in diameter was cut out of the centre of the rubber cover, and a collar of stout rubber cemented around the opening so formed. A circular glass window, 3 in. in diameter, was then placed within the collar, which latter, being put upon the stretch, gripped it tightly. The inflow and outflow of the fluid were served by a single-branched tube inserted near the margin of the window. The apparatus was then bandaged over the wound to be investigated—necessarily a superficial one covered with clean granulations.

With the granulations in full view beneath the covering glass we were enabled to draw some broad inference with regard to what takes place during this form of irrigation. We found that the positive pressure required to blanch the capillaries increased with the chronicity of the case. In acute cases with young granulations, a pressure from 16 to 20 in. was usually sufficient, whereas in old indolent wounds the vessels remained pervious under the pressure of a 3-ft. column of water.

Similarly, the effects of negative pressure varied with the acuteness or otherwise of the cases. In old cases a pressure as represented by a 2½-ft. pendant column of fluid produced no obvious rupture of the capillary walls, but after this steady pull had persisted for twenty or thirty minutes the fluid beneath the cover was moderately tinged with blood. Less chronic cases showed minute ecchymoses after the action of this amount of negative pressure had been exerted for the same period of time. A negative pressure of 2½ ft. produced in acute cases a marked engorgement of the vessels and definite extravasation of blood. In the most recent wounds there was oozing of blood with a negative pressure as represented by a few inches only. In all a marked outflow of lymph was produced which collected in considerable quantities beneath the glass.

One may fairly assume that the alternate compression and dilatation of these minute vascular structures profoundly affects the wound. Yet how far beneath the surface of the walls of a sinus these influences extend we do not know. That capillary loops and lymphatic spaces, however, do not lie inert under such variations of pressure is certain. It is common knowledge that an outflow of lymph is produced by negative pressure, and our own observations have assured us that the degree we use is sufficient to effect this to a marked degree. Is it unreasonable to infer that this lymph carries its quota of bacteria? Whether the emigration of leucocytes is encouraged by these activities has not been determined.

Its Use in Dressing Stations and Ambulance Trains.

For the purpose of this argument let us ignore whatever special therapeutic values we have attached to this plan of treatment, and consider its adaptability to the work of a dressing station when the fight is on. Let it be regarded merely as a portable wound-bath which becomes part and parcel of the patient during transportation, and to this end a convenience, but in a place and at a time when such a convenience means much.

Now that the technique of its application has been reduced to elemental simplicity and the bugbear of leakage overcome, the query becomes more insistent than ever: Why should not this device be used in dressing stations and on hospital trains? It is suggested that this question be closely examined.

It is now within the reach of practical surgery to bind a pint or more of antiseptic fluid to the part, so that the remotest recesses of a wound may be bathed by it, and this not laboriously or precariously, but with confidence and dispatch. Both tubes leading from the main chamber might then be tied off and the patient evacuated, the fluid to be drained away and replaced by fresh at the next stop without so much as undoing the bandage. Agitation of the limb, incident to transportation, assisted by convection currents and diffusion, would ensure an interchange of fluid, so that at no time would that in the wound be more vitiated than the total content employed. And this treatment, when instituted before bacterial growth had advanced, would allow of an antiseptic acting in the approved Listerian fashion, as a result of which we would expect to have many deep wounds close without the accompaniment of the otherwise almost inevitable infection. It was with this end in view that we have laboured to simplify its technique so as to render it serviceable as near the firing line as possible.

There will be those, of course, who will ask: "What about sealing a wound in the presence of the anaerobic bacilli of gas and tetanus?" But why a large body of oxygen containing antiseptic for a limited period of time should imply the exclusion of oxygen, or why a deep wound swathed about with more or less impermeable dressings and filled with a mass of reducing organic material should be in any better posture as regards oxygen, are questions that may be left to find their answers.

Two chief points are to be considered before deciding whether the employment of this method in field ambulance work should be given a trial. The first is, whether casualties coming through during a "push" could be handled in this way without congestion. The second is the matter of expense.

Let us visualize the two sets of operations. Nothing could be superior as regards simplicity and speed to the application and bandaging on of a moist dressing. Basins of eusol, pads of gauze, absorbent cotton and bandages, safety-pins and ampoules of iodine are ready at hand. The wounded are hurried in, dressed, and gone again, and still they come. This technique is as speedy as it well could be. Anything much less so would not do.

How, then, would the method here suggested compare in point of speed? Let us visualize again. We should have as before our gauze pads, bandages, &c., and in addition a large tub of solution containing a plentiful supply of these rubber devices. There would be depending from the ceiling a large reservoir provided with a rubber tube and pinch-cock and filled with antiseptic solution.

In all wounds likely to become seriously infected we should use this device, which, when it is clapped upon the skin and momentary pressure exerted to exhaust the air, clings to the surface while the bandage is being applied. It remains but to insert the irrigating nozzle into one of the short tubes

leading from the device, allow the fluid to run in, tie off the tube, and evacuate the patient.

We believe that the difference in time required for these two sets of operations would be slight. If at the main dressing station supplying some one casualty clearing station in France, this method were to be tried in that one grave type of wound to which it seems particularly applicable—we refer to compound fracture of the femur—we believe the results would furnish a surprise.

As regards the question of expense, it is to be borne in mind that these devices are practically indestructible, and if torn or punctured they can be patched as readily as a rubber glove. No gauze or cotton is required; merely a stout calico bandage, which does not easily become soiled, since it is always dry. At this time, when cotton is in demand for the manufacture of explosives, this phase of the matter may be worth considering.

SUMMARY.

The following advantages, it is believed, are associated with this plan of treatment:—

(1) The penetration of the fluid to, and the tidal evacuation of, distant loculi, resulting in thorough mechanical cleansing of the wound cavity.

(2) The establishment during negative pressure of an outward flow of lymph with, presumably, its quota of bacteria.

(3) The avoidance of the large mutilating incisions required for the evacuation of deep pockets and the insertion of fluid-conducting tubes.

(4) The concentration of an antiseptic or hypertonic fluid remains constant, since, the freedom of its delivery into the wound being unrestricted, the solution can be frequently renewed.

(5) The ease with which the beneficial effects of heat, in the interior of the wound, may be secured.

(6) The elimination to a large extent of the personal equation.

(7) The ensurance of dry beds and a sense of comfort to the patient, who is enabled in many instances to be out of bed whilst undergoing treatment.

(8) The economy in time, effort and material.

(9) The presumed adaptability of its use to dressing stations and ambulance trains.

CONCLUSION.

This, then, is the substance of our brief for the mechanical cleansing of wounds. Whether the method be looked at from the therapeutic viewpoint, irrespective of its palpable convenience or whether it be regarded as a convenience only, yet one which would render the bath treatment of wounds possible near the firing line and during transportation, the implication surely is that this measure should be tried.

We have yet to hear a criticism adequate to convince us that our results are a matter of mere coincidence. For that they are too uniform. As to the ultimate recognition of the principle herein advanced we are confident enough. That in some quarters opposition may be looked for as the sparks fly upward, we can quite foresee, and there will be those unquestionably who will regard it as a fad. But, in the end, that it should be opposed by something more responsible than prejudice and ill-conditioned theories is what we seem entitled to expect.

It is not a fad. It is the combination of several well-recognized principles that have not heretofore been combined. To suck wounds, to manipulate them gently, to open pus pockets, to bathe and to apply fomentations to them are procedures with the prestige of centuries behind them as well as the approval of modern surgery.

Under ordinary circumstances we might well afford to wait whilst we built up a structure of evidence that would be irrefutable. With hostilities in progress the case is different, and we dare hardly hope that our isolated work, "cabined, cribbed, confined" as it is, will be conclusive enough to convince by statistics, sufficiently comprehensive, within any time limit that has been conservatively set for the duration of the War. We crave, therefore, the indulgence of the reader if we have appeared to plead that the verity of our results and the reasonableness of our contentions be put to the proof, that they may be confirmed or confuted.

EXERCISE IN THE TREATMENT OF WEAK FEET.

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INTRODUCTORY.

FROM the time the War was declared and thousands of men of all ages and occupations were called to the Colours, until our disabled soldiers are rehabilitated, the question of weak feet is facing us. Despite new inventions in the way of guns and aeroplanes, it is the infantry soldier who is winning the War, and he must proceed on his feet. Unfortunately the knowledge of the general medical profession on feet was lamentably meagre. Such things had been largely left to the shoe clerk, or the very severe cases to the orthopædic specialist, the average civilian practitioner not having either the time or the inclination to study the subject.

A few days after that eventful 4th of August, 1914, local doctors in hundreds were called upon to examine men for service at the Front. The Army standards in Canada were fairly high, but from lack of knowledge a great many weak feet were passed and many perfectly normal feet were rejected. What steps were taken during the period of severe military training and long marches to make the feet of the recruit more capable of doing their work? The Swedish system of physical training lays practically no stress upon feet. It deals principally with the man's carriage because the exercises were designed for a peace time army.

In the first few months of war men with weak feet who could not stand the extra work of training were culled out and discharged. At the present time, when every man counts, can we not do something with these rejected men? It is the object of this paper to show how this can to some extent be accomplished, and how the orthopædist may be assisted in his work with the weak feet of the returned soldier when wounds and active service have produced this condition.

DEFINITION.

Weak, splay, everted, or flat feet. Any condition in which the foot does not functionate properly and is unable to bear the weight of the body for long periods without pain, either across the instep or in the heel, so that it becomes everted and a decided limp is the result.

ETIOLOGY.

Man was never intended to wear boots, and this defiance of Nature's plans is responsible for a great deal of the trouble. In civilian life ready-made shoes, fitted by an up-to-date shoe clerk who wants to sell the shoe with the biggest profit in it to a somewhat vain customer who walks a great deal on granolithic sidewalks, is one of the chief predisposing causes of weak feet. The Army has taken such a man, has him fitted with a large, coarse pair of Army boots by a quartermaster-sergeant who is absolutely ignorant of shoecraft, and who has a very meagre assortment of sizes. He is given long hours standing on parade and sentry duty, long marches carrying a heavy pack over rough roads, and brisk squad drills where the heels are brought smartly down on the ground at every halt. At the end of an all too brief period he is sent to England to wet, muddy camps and a rheumatic climate, then on to France to the trenches. Here he is put on fatigue and carrying parties, does sentry duty standing for long periods in the cold, wet mud, has to wade about muddy, waterlogged trenches often without waders, and then come out for long marches back to billets over the cobble stones of the Flemish villages. What steps do we take in our training of men to prepare them for these conditions? Frequent foot inspections are a help, but too often these are carried out by young subalterns who look for corns, blisters, and poorly manicured toe-nails, but to whom the anatomical structure of the foot is a complete secret. Of course, trench conditions are every day being improved, but as we advance more and more in the north of France the lengthy rainy seasons must be looked forward to, and conditions very like those experienced on the Somme and at Ypres must be prepared for.

Wounds of the feet and legs are most common, and as in nearly every case infection occurs, the muscles, tendons,

and bones are often so altered that the feet do not functionate properly.

Considering the type of warfare now being fought, the number of wounds below the knee is surprising. Probably the difficulty in getting the proper elevation in shooting may account for this, as most musketry instructors will state the the tendency of the beginner is to shoot low. In Gallipoli this was particularly noticeable, the Turk on a straight shot with either rifle or machine-gun usually shooting low, and at other times slanting his rifle on the parapet and lobbing them over at random, so that the bullets pitched low. Bomb wounds, of course, usually damage the lower extremities more than the upper, and this is also the case with howitzer shells and trench mortars. Because of leg wounds the percentage of stretcher cases after an attack is certainly high. The War Office has not published any statistics on this point that are available, but the large number of leg amputation cases amongst our returned soldiers is a good indication of its frequency. Gunshot wounds of the legs are certainly very apt to produce flat feet, partly because of the resulting limp, but principally by the weakening of the supporting muscles and tendons by severance, infection, or loss of the normal angle of pull by distortions in the shape of the bones. Posterior tibial nerve injuries usually produce a weakening of the arch of the foot by the paralysis of the short flexors of the toes. Fractures of the *os calcis* or general ankylosis of the ankle-joint are also predisposing causes, as in such cases the foot has to be everted because of the pain and loss of its lever action in ordinary walking.

Trench feet tend to cause undue hypersensitiveness of the sole and the patient is apt to put too much weight on the heel and evert the foot, particularly when marching over rough ground. This may to some extent be the cause of flat feet in these cases, or it may simply be the result of the general inflammatory condition following the return of sensation, bringing about weakening of the ligaments supporting the arch.

Rheumatism of the feet is, of course, very common, and is apt to make the patient evert the foot in order not to bend the inflamed metatarsal phalangeal joints, and a fallen arch results. The general inflammation probably causes a softening of all the supporting structures of the arch.

It has been noticed at the Military Orthopædic Hospital, Toronto, that a fallen arch occurs quite frequently in the good foot of an amputation case because of overwork. This is undoubtedly true, especially in those patients with previous weak foot tendencies. Unfortunately we have no statistics on this subject other than that it has been necessary to order special boots or arch supports for a great many cases of leg amputation.

STRUCTURE OF THE FOOT.

The twenty-six bones of the foot are arranged in two arches, an antero-posterior or long arch, resting on the ground in front and behind, and a lateral arch only supported on the outer side, and incomplete unless the two feet are placed together. The long and short plantar calcaneo-cuboid ligaments act as bow-strings and bind these arches together, the inner and incompleted part of the lateral arch relying on muscles and the tendons for support, thus making the foot the splendid shock absorber it is in walking, running and jumping.

A study of the bones of the foot shows that the astragalus is the keystone of the arch, but that the calcaneus is the main foundation-stone. The astragalus is gripped so completely by the two malleoli and their tendinous appendages that it forms an almost perfect ginglymus or hinge-joint, having, according to most authorities, no lateral movement whatever. The position of the calcaneus and scaphoid, however, may alter with the position of the foot when bearing weight. For example, if the foot is everted or abducted into the passive attitude the weight of the body comes on the inner edge of the calcaneus, and it tends to become abducted from the straight line and the navicular to slide out, allowing the arch to sink. On the other hand, if the weight is put on the outer edge of the calcaneus and the foot is inverted the opposite condition occurs, and the arch is made more perfect.

Whitman states that in bad flat foot cases a subluxation of the astragalus occurs, putting the whole mechanism out of gear and the normal motion of the foot is restricted. The leg has a tendency to slip down off the foot, and practically the whole of the weight is borne by the ligaments and muscles, thus causing the pain and ache that occur in these cases.

The two calcaneo-cuboid ligaments are next to the patellar the strongest in the body. Because of their lack of attachment to the first metatarsal bone these ligaments do not give much support to the inner side of the foot, but bind the outer part together so strongly that it acts as practically one piece.

Eight muscles control the movements of the foot—three plantar flexors; gastrocnemius, soleus and tibialis posticus, assisted to some extent by the long and short flexors of the toes; four turning the sole inwards—tibialis posticus and anticus, gastrocnemius and soleus; two turning the sole outward—peroneus longus and brevis.

The important muscles are, therefore, the gastrocnemius, soleus, peroneus longus, tibialis posticus and anticus. Injuries of any one of these will interfere considerably with the proper functioning of the foot. The gastrocnemius is the largest and most powerful of these muscles, and on looking closely into its action one finds it extends the foot, and acting through the plantar ligaments depresses the outer margin of the foot more than the inner. The position of the *os calcis*, whether straight or somewhat abducted, alters the pull, the muscle acting more powerfully when the weight of the body is on the outer side of the foot and the calcaneus turned inwards, and less powerfully when the calcaneus is swung out from the mid line, as when the foot is in the passive attitude. This explains to some extent why persons with weak feet find it difficult to rise on the toes and why injuries to this muscle produce a tendency to evert the foot. The tibialis anticus is a most powerful elevator of the inside of the foot, tending to turn the sole slightly inwards, flex the proximal joint of the great toes, as well as dorsi-flex the foot. Injuries or weakness of it causes a sinking of the arch. Dr. W. E. Gallie, Toronto, from his somewhat extensive work on tendon fixation, states that not sufficient importance is placed on the tibialis posticus, because of the great leverage of its large strong tendon it is the most powerful internal elevator of the arch, turning the sole inwards and plantar flexing the foot. The peroneus longus prevents the lateral arch from spreading, depresses the great toe, and increases the curve of the arch because of its diagonal line of pull.

EXAMINATION.

Too much stress cannot be laid on the correct examination of soldiers' feet. In most cases this is done in the most cursory way, and a man may be diagnosed "flat feet" because he complains of pain in the arch with the hope of being kept away from the Front. Pain in the feet and pain in the back are the commonest complaints of the malingerer, as every battalion medical officer knows.

At Hart House we first notice the patient's walk, whether there is a limp and whether the foot is everted. He then is made to stand on a chair with the feet close together. First, facing the examiner, the presence or absence of the notch in between the feet is noticed, and whether one foot appears wider than the other. He then attempts to lift the inside of the feet, at the same time curling up the toes. The power and strength of the tibialis muscles can in this way be compared. Second, facing away from the examiner with the feet about 6 in. apart and parallel, the curve or general direction of pull of the tendo Achillis can be noted, and whether one malleolus tends to bulge in more than the other, or if the calcaneus is straight. The patient is then asked to rise on his toes with heels turned outwards, and the normal pull of the gastrocnemii compared. Third, the foot is painted with a solution of perchloride of iron containing a little glycerine and made to step on a blank sheet of paper, putting the whole weight on the foot. The print is then brushed over with some weak tannic acid solution, being careful that the fluid just runs to the edge of the print, and an excellent black impression is obtained, leaving the patient's foot perfectly clean. When the print is dry a careful study of it will enable one to determine the exact condition of the foot; a comparison of the prints of each foot will show the weak points. For example, whether or not the inside hollow is obliterated as in a completely flat foot, whether the os calcis is twisted and the inside of the

heel bears most of the weight, or whether the first metatarsal phalangeal joint of the great toe is enlarged. In addition to the above, the patient's boots should be examined to see if the inside or outside of the heel is getting the more wear. Where possible photographs of the foot should be taken, and facilities for making such records of each case are being obtained at Hart House.

Foot impressions of the type described are taken of each patient every three weeks during treatment, and the exact length and breadth of the foot, together with notes on the progress of the case, are filed.

TREATMENT.

We believe that exercise of the weak muscle group responsible for the condition is the rational way to treat weak feet. These can usually be determined by the methods outlined above or directly by the location of wounds. In order to prevent the patient from everting his foot between treatment periods, the arch should be supported by a Whitman plate, or preferably by specially made boots with a built-up instep and swing toe or adducted last. In addition to this, he should be coached in the proper way to walk and to stand, so that he will not by habit revert to the old methods of locomotion.

Feet have been classified into two categories: inflammatory and non-inflammatory. The former, those with a great deal of pain and some swelling, or œdema about the instep after walking or exertion, we have not attempted to treat at Hart House. In the small series of cases of the non-inflammatory group that have been treated, we believe that active exercise has been responsible for relieving the pain and limp by increasing the tone and strength of the weak muscle group. The Whitman plate or built-up instep should only be regarded as a brace, and sooner or later it will cause such a weakening of the plantar ligaments and short flexors of the foot if worn continually as to bring on a relapse. The swing toe or adducted last boot is splendid as long as the patient wears it, but he may not always go to the expense of buying special orthopædic boots at twelve or fifteen dollars a pair. As soon as he can again do all the normal movements of the foot, such as tip-toeing without a limp, rising on the toes with the heels turned out, hopping or dancing, we advise him to get a pair of correct hygienic boots and practice walking correctly.

The exercises should all be done in stockinged feet, or preferably in soft rubber-soled shoes on a firm gymnastic mat. The only appliance we have found of use is a series of strong bed springs connected in a frame with a hand-rail.

EXERCISES.

(1) *Position.*—Standing, hips firm.

Movement.—Placing the foot in front and its outer side, curling up the toes, and putting as much weight on it as possible. Repeat as many times as patient can, and increase five daily.

(2) *Position.*—Feet about 6 in. apart and parallel, hips firm.

Movement.—Lifting the inner side of the feet, at the same time curling up the toes. Repeat as many times as patient can, and increase by three daily.

(3) *Position.*—Toes turned in and heels out, hips firm.

Movement.—Rising on the toes, throwing the instep and heels well out. Repeat as often as possible, and increase by two daily.

(4) *Position.*—Sitting, feet 18 in. apart, and toes turned in.

Movement.—Plantar-flex the foot, at the same time curling up the toes, keeping the toes turned in; then dorsi-flex the foot, at the same time extending the toes, keeping the foot pronated. Repeat as often as possible, and increase by three daily.

(5) *Position.*—On tiptoes, heels well turned out, feet crossed, so that the weight is on the outside of the foot.

Movement.—Tiptoe forward, stepping on the outside of the feet. Start with fifty paces, and increase by five daily.

This exercise is greatly improved if done on the bed springs, as mentioned above, as every muscle is brought into

SUMMARY OF RESULTS.

Name	Hospital	Condition on admission	Treatment at hospital	Dur. exer. Hart House	Result
Dodgson ...	M.O.H.	Marked limp; walked with cane; right foot everted. Print shows torsion calcaneus	Whitman plate	8 weeks	Limp cured; walks without cane; calcaneus corrected; $\frac{1}{8}$ in. shortening
Gosby ...	M.O.H.	Pain in right instep. Print shows complete loss of arch	Whitman plate	3 weeks	Pain much less, foot stronger, $\frac{1}{8}$ in. shortening
Andrews ...	M.O.H.	Pain in both insteps. Complete loss of arch of both feet	Patient met with an accidant, fracturing his leg;		treatment not completed
Frost	M.O.H.	Pain in both insteps following rheumatism; unable to hop or tiptoe	Orthopædic boots	9 weeks	Patient cured; $\frac{1}{4}$ in. shortening
Smith, G. ...	M.O.H.	Pain in both insteps; torsion right calcaneus		8 weeks	Pain gone; foot of normal shape; $\frac{1}{8}$ in. shortening
Smith, J. A.	M.O.H.	Tender feet following trench feet. Torsion heel, hallux valgus	Whitman plate	10 weeks	Feet much stronger; torsion of heel corrected; hallux valgus less pronounced.
Day, C. E. ...	Spadina	Pain in arch right foot following G.S.W. Unable to tiptoe or rise on toes; torsion calcaneus.		3 weeks	Rises on toes and hops readily; pain gone; $\frac{1}{8}$ in. shortening
Patton, F. W.	C.O.C.H.	G.S.W.'s; leg weakening: tibialis anticus and soleus. Unable to rise on toes or hop. Torsion calcaneus. Pain in arch and heel	Whitman plate	8 weeks	Pain gone from instep and only sligh in heel. Can tiptoe and hop. Calcaneus straighter; $\frac{1}{8}$ in. shortening
Harwood, E.	M.O.H.	Pain in arch; feet everted; hallux valgus and limp left foot. Unable to rise on toes or hop	Whitman plate	8 weeks	Pain gone; can tiptoe and hop; hallux valgus less pronounced
Coss	M.O.H.	Pain in both insteps, probably follow- rheumatism. Unable to tiptoe or hop		6 weeks	Pain entirely gone; patient can tiptoe and hop
McMath ...	C.O.C.H.	G.S.W. right foot, severing tendon Achillis and fracturing fibula. Patient unable to tiptoe or rise on toes. Dorsi and plantar flexors very weak		4 weeks	Patient can tiptoe without limp; dorsi and plantar flexors much stronger; can hop on foot
James ...	Spadina	Injury 1st metatarsal with axe; difficulty in rising on toes. Print shows torsion left calcaneus. Feet tender		5 weeks	Foot much stronger; can tiptoe without difficulty; can hop on foot and it perspires less
Lickers ...	C.O.C.H.	G.S.W. right knee; flexion 10°; arch right foot depressed; walks foot everted. Torson of right calcaneus. Instep pains after walking. Unable to rise on toes		4 weeks	25° flexion of knee. Can hop and tiptoe. Pain entirely gone from foot; $\frac{1}{8}$ in. shortening
Richardson ...	C.O.C.H.	Bomb wounds both legs, fracturing calcaneus of right and passing through left ankle, fracturing tibia. Cannot adduct left foot; both arches painful; cannot tiptoe or hop		4 weeks	Pain gone; feet and legs practically normal; runs, hops and dances on toes. Complete recovery.

great play by the attempt to hold the balance and keep the heel from touching. This seems to be particularly good in curing limps.

CONCLUSION.

In view of the experience we have already gained in the War, and the very large percentage of weak foot cases, should we not make every effort to improve our present system of military training? Should not medical examiners be made more familiar with the salient features of weak feet? In our opinion a little special attention paid to proper exercise of the feet preparatory to leaving for the Front would more than repay us, both by increasing the efficiency of our troops and by lessening hospital expenses in the care of such patients.

Efforts should also be made to improve the condition of men turned down for weak feet. We may need every male between the ages of 20 and 45 to win against such a marvellously organized and ruthless enemy. Can we afford to lose the services of so many otherwise perfectly efficient soldiers by not attempting to improve the condition of their feet? We feel it is our duty to bring these points before both the military authorities and the medical profession.

Regarding our returned and disabled soldiers, our results, although somewhat meagre, will, we hope, emphasize the necessity of having such exercises carried out under the close supervision of capable medical officers and as an essential part of the patient's treatment. Specially qualified and trained N.C.O.s, themselves returned men, should be at the disposal of the orthopædic specialists to assist them in carrying out the treatment.

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EYE INJURIES FROM BROKEN EYEGLASSES.

By PERCY G. BELL, M.D., Manitoba,

Lieutenant-Colonel, O.C., No. 12 Canadian Field Ambulance.

INJURY to eyes from broken spectacles is extremely rare. When the number of individuals who wear glasses, both in civilian life and in the Army, is taken into account, this would appear surprising. The matter is of some interest at present, as certainly in no former war has the relative number of men wearing glasses approached that in the armies of to-day.

Hans Lauber, writing in the *Ophthalmoscope* in April, 1914, states that out of 150,000 eye cases passing under his notice in Vienna between 1901 and 1914, there occurred only five cases of lesions from broken eyeglasses (i.e., 1 in 30,000 cases). He was able to find only two papers dealing with the subject. Both mention the rarity of the occurrence.

In June, 1914, I reported a case in the *Ophthalmoscope* of grave injury resulting from a broken rimless eyeglass requiring enucleation of the eye. The traumatic agent was a broom-handle during a game of curling. I am now able to add a military case. The facts briefly are as follows:—

Private X was referred to me from another Field Ambulance. The right lens of a pair of small nickel-rimmed spectacles (-1 O.U.) had been shattered by the metal valve of an air pillow, thrown at him playfully by a comrade. The glass was fractured into a large number of pieces in radiating lines. One or two fragments were missing, but the nickel frame had held the others in place.

Examination of the Eye.—No foreign body in cul-de-sac, a small linear abrasion on the cornea, about six o'clock, staining readily with fluorescein. Right pupil somewhat contracted and reacting sluggishly, while the iris showed a tiny hæmorrhage, corresponding in site to the corneal wound. There was no fundus change. Under two or three instillations of atropine, boracic bathing, and a bandage the patient recovered in a few days. His ultimate reading with —1 D. sph. was 6—6.

This case represents one of a mild injury similar to two cited in Lauber's list. There is no doubt that the frame prevented serious damage to the eye, and in this connection it is interesting to note that the present glasses supplied to the Army have heavy frames. One occasionally finds men who have had glasses broken in situ, but I am unable to recall in the field another case of injury to the eye from such a cause.

LAUBER. *Ophthalmoscope*, April, 1914.
BOURGEOIS. "Blessures oculaires par les lunettes de travail." *Recueil d'Ophthal.*, 1901.
VOGT, A. "Einige Augenverletzungen durch Brillenglas Scherben." *Centralbl. f. Augenheilk.*, Bd. xxxvi, 1912.
BELL. *Ophthalmoscope*, June, 1914.

PROCEEDINGS OF MEDICAL AND CLINICAL SOCIETIES OF THE C.A.M.C.

CLINICAL SOCIETY OF No. 1 CANADIAN GENERAL HOSPITAL.

On Members of the Typhoid Group as Causative Agents in P.U.O.

AT the meeting of the above Society, held on December 13, 1917, Captain C. F. Moffatt demonstrated the following case:—

Tomkins, S., rifleman; No. 554906 2nd/11th London; age 19; service nine months.

Admitted on November 20, 1917, complaining of headache, pain in the back and legs.

At the casualty clearing station he had had fever ranging between 100·4° and 101° F. for about three days.

On admission to No. 1 Canadian General Hospital the patient was afebrile, but in a very weak and listless condition. During a period of ten days there were two small rises of temperature, lasting about twelve hours. On account of his poor physical condition it was decided to send him to England, but on the day before evacuation he was seized with severe abdominal pain, nausea and vomiting, and seemed distinctly an ill boy. Temperature rose to 102° F., pulse 120. Although there was much abdominal tenderness, there were no signs of local inflammation. By the next day he presented a typical appearance of a severe typhoid infection; muttering delirium; subsultus tendinum; dry brown tongue; distended abdomen; spleen was not felt; there were no spots. The leucocyte count was low—5,000—and it was considered from the general examination and condition that the patient was suffering from an acute infection by some member of the enteric group, or possibly from a miliary tuberculosis. Fever continued high. Patient sank and died.

The vomiting and diarrhœa had subsided; the urine had shown a trace of albumen; the second blood culture taken two days before death grew out the typhoid bacillus, and the typhoid bacillus was recovered from the stools.

He had been given the double inoculation of T.A.B. in March, 1917.

Agglutination results showed typhoid, 1 in 3,000.
" " " paratyphoid A, 1 in 200.
" " " paratyphoid B, 1 in 200.

At the autopsy, in addition to minor changes elsewhere in the body, the spleen was found large and soft. The lymph follicles of the intestinal tract were universally swollen and congested. In the last 6 ft. of the small intestine the Peyer's patches were all markedly swollen and stood out prominently. They were in most cases merely congested, but in several active loss of substance had occurred. The cæcum and colon showed a most extensive condition of folliculitis. Little or no ulceration was to be seen. On section of an ulcerated Peyer's patch there was found superficial necrosis, marked infiltration of the lymphoid tissues by the huge endothelial leucocytes, which can be seen in places to be containing red blood cells, and some of the smaller lymphoid tissue cells. The picture is typical of the lesion described in typhoid infection.

The culture from the gall-bladder gave an active growth

Bacillus typhosus; from the spleen and intestine a *B. coli communis.*

Captain C. F. Moffatt opened with a short résumé of the clinical aspect of typhoid fever. He explained that he wished to contrast the disease as recognized in civil practice with the course of a great number of cases passing through our wards, whose diagnosis is at present so often obscure, but in which infection by the typhoid group was so frequently suspected. He then gave the above details of the case of typhoid fever, in which it had been fully proved that the infection was typhoid. He showed several charts of cases which had come under his observation in which the remarkable feature had been the relapses into high fever, with definite intervals between. He pointed out that the course of fever in these cases was quite different to that of the typical typhoid, and admitted that he had revised his opinion as to their cause during his work in France. He had at first been inclined to class them as paratyphoidal infections, but now thought that some at least could not be so classed, and yet the case of typhoid fever given above certainly strengthened the view that these cases of irregular fever might be of typhoidal origin, for the temperature in this case was just as irregular and atypical as in any given case of obscure fever.

Major MacDermot showed some charts of irregular fever, and drew attention to the fact that in some of these the diagnosis of paratyphoid had been formed at a later date in the Isolation Hospital. He had been impressed by the great number of cases exhibiting this type of temperature, and only could conclude that if the typhoid group was at the bottom of the trouble its power must have been considerably weakened, and this could only have been due to the effect of inoculation. It was remarkable that cases should have such long-continued temperature and yet show so little clinical evidence of acute illness. The appetite was quite frequently good, and the general condition of the patient comfortable, except for the aching of the legs and lumbar muscles. Enlargement of the spleen, however, was a fairly constant accompaniment.

Major Ower said that he thought there was a definite group of cases which were not typhoid. In these the intervals between the rises of temperature were more marked and clear cut than in the ordinary "trench fever" type. They constantly showed a high leucocyte count, as against the low count of the ordinary "trench fever." He had, however, arrived at no conclusion as to their cause.

Colonel Gunn remarked that in any case the degree in which typhoid fever had been controlled during this War was most noteworthy. He spoke from the point of view of the surgeon as regards complications, which he had not yet come across in his experience in France.

Captain Kenny thought that the inoculation had undoubtedly modified the disease. His experience had shown him that cases of undoubted typhoid had had a most unusually mild course.

Major Ower gave a short account of the laboratory details in regard to the diagnosis of typhoid fever.

At the meeting of the same Society, held on January 10, 1918, Lieutenant-Colonel J. A. Gunn and Major H. E. MacDermot presented a case of acute cholecystitis due to paratyphoid B.

(*a*) Major MacDermot.

The patient had had a week's fever before being admitted to the hospital, and had complained of general malaise and aching. He had had a previous attack of fever in November last, but neither in that attack nor at the onset of the present illness had he complained of abdominal pain. The temperature was falling, but suddenly patient was seized with pain over the region of the gall-bladder and with vomiting. For three days he was seen constantly by Colonel Gunn, but as he seemed to improve, and the temperature dropped like a crisis, it was finally concluded that the pain had been due to some pleural involvement.

White blood corpuscles on the first day 14,000; dropped to 12,000, and patient improved quickly and asked for food. Some increase in the diet was made, and was followed by a slight rise of temperature next day, and the day following by a higher rise, with chill and return of pain. Late in the day the patient was apparently improving; temperature was falling; pulse 72, but on account of the persistent rigidity in the upper right quadrant and the severe pain on pressure, it was considered wise by Colonel Balance, Consultant in Surgery, to exclude an abdominal condition. At operation the omentum was found adherent to the gall-bladder, which was full, but not distended, dark in colour, and showing two patches of lymph on its surface. Aspiration removed considerable purulent bile. The gall-bladder was opened and drained. It was noted at the time that the tissues of the gall-bladder were extremely friable. Patient did remarkably well for three days, when he was seized during the night with acute respiratory distress. The examination early next morning showed that, in addition to a probable broncho-pneumonia, the patient had acquired a collapse of his whole right lung. The condition cleared quickly, and patient has done well. From the fluid removed at operation *Bacillus paratyphoid* B was cultivated in the laboratory.

(*b*) Lieutenant-Colonel Gunn.

When I first saw this patient he had had rise of temperature, vomiting, and pain in the upper part of the abdomen. Our examination seemed to show that the condition was pleural rather than abdominal, but the examination four days later induced me to change my opinion, and when seen with Colonel Balance late in the fourth day it seemed wise, as mentioned before, to exclude an abdominal condition, although the patient now was in excellent shape, with falling temperature and slow pulse. A steadily increasing temperature, with the septic manifestation of a chill, suggested with the other symptoms a possible gall-bladder infection.

Major Gwyn suggested at the time that the infection might be found to be due to some member of the typhoid group.

Sir John Rose Bradford discussed the case, and cited a similar one.

Major Gwyn discussed the case, and dwelt upon the fact this was the fourth instance in which a mild P.U.O had been proven bacteriologically to belong to the typhoid group. Of the three previous cases, one had developed serious symptoms and had shown paratyphoid B in his blood; the second had run a similar course, and had shown *Bacillus typhosus* in the blood; a third had died, and had shown the classical lesions of typhoid fever. All the cases were men who had been inoculated within a period of two years. Major Gwyn further stated that of the new wards built, two or three would be reserved for cases of P.U.O. so-called, which would be treated as typhoid or paratyphoid, in the hope that the frequent relapses seen in these P.U.O. cases might be avoided by a careful dieting and treatment. Certainly we were not disposed to consider P.U.O. as a disease of a light nature in view of our experience with these four cases.

Major Ower spoke on the bacteriological findings, and demonstrated the high agglutination shown by the patient's blood towards the *Bacillus paratyphoid* B.

At the meeting of January 17, Major MacDermot gave a brief account of the case presented at the last meeting, and detailed the attack of acute pulmonary distress which had taken place during the night following the operation. According to the signs and symptoms, he stated, it would appear that this case had had the interesting complication of collapse, partial or complete, of the right lung, following his abdominal operation. After a very brief period of distress the patient showed marked improvement, and the physical signs of collapse of the upper lobe had disappeared quickly. There still remains some indication of broncho-pneumonia at the right base, and it was to be remembered in considering the case that he had had cough and expectoration, with limitation of the breath sounds at the right base just previous to operation.

MEDICAL SOCIETY OF THE 5th CANADIAN DIVISION.

THIS Society was established on October 8, 1917, Colonel Lorne Drum, A.D.M.S., 5th Canadian Division, being appointed Hon. President, and Major J. W. Shaw, M.O. 161st Battalion, President.

The first regular meeting was held on October 15, 1917,

when the constitution as drafted by the Committee was adopted.

The second regular meeting was held on October 22. Major Duncan Graham of No. 4 Canadian General Hospital delivered an address on "The Pathology and Bacteriology of many Medical and Surgical Conditions in War."

The third meeting was held on October 29, 1917. Captain B. M. Almquest of the Canadian Special Hospital, Witley, presented several cases for examination. This was followed by an address by Captain Almquest on "The Diagnosis and Treatment of Syphilis," with the demonstration of the technique of the intravenous administration of novarsenol and the intramuscular injection of mercurial oil. The paper was followed by an active discussion.

The fourth meeting was held on November 5, 1917. Captain T. R. Little, O.C. No. 1 Canadian Mobile Laboratory, addressed the Society upon "The Wassermann Reaction and its value in the Diagnosis and Treatment of Syphilis," laying stress upon the value of early diagnosis by means of recognition of the spirochætes. He emphasized the value of Benians' Congo-red method of diagnosis and its advantages compared with the Burri Indian ink method.

The fifth meeting, held on November 12, was addressed by Colonel A. Primrose, Consultant in Surgery, C.A.M.C., on "The Recent Developments in War Surgery," speaking at some length of the work at the recent Congress at Paris, at which he represented the Dominion. He gave a detailed description of the Carrel and Chutro methods.

The sixth meeting was held on November 19, 1917, and was addressed by Lieutenant-Colonel J. G. Adami, A.D.M.S. Headquarters, London, on "The Subject of Advance in Medicine and Surgery," with special reference to the work done by Canadians in the War.

The seventh meeting was held on November 26, 1917. Captain Marr, of the Special Hospital, Witley, presented a case showing chancre of the lip. The address of the evening was given by Colonel G. E. Armstrong, C.A.M.C., on "The Surgery of the War," more particularly on the subject of the Carrel-Dakin treatment and B.I.P.P. He discussed the work done by the pathologists at Taplow, regarding the importance of *B. sporogenes* with reference to the closure of wounds.

The eighth meeting was held on December 3. Major S. S. Skinner was appointed President. Following upon this, Colonel L. Drum, A.D.M.S. 5th Canadian Division, addressed the Society upon "The Methods of Evacuating the Wounded in the Canadian Army Corps, as carried out at Passchendaele," giving a very full, detailed description of the work accomplished.

The ninth meeting was held on December 10, 1917. Lieut.-Colonel J. Amyot, Consultant Sanitary Officer, Canadians, addressed the meeting on "Problems in War Sanitation," giving a history of the development of the Army Sanitary Service, and the results which had followed this development. He laid stress on the immediate removal of all cases of P.U.O. from the Front and the method of treating infectious disease. After a reference to the successful prevention of trench feet, he took up the matter of suppression of vermin and prevention of venereal disease. The address was followed by an active discussion, in which Brigadier-General Dodds, 5th Canadian Division Artillery, Colonel Drum, and Captain Gray took part.

The tenth meeting was held on December 17, 1917. The speaker of the evening was Colonel R. D. Rudolf, Consultant Physician, Canadian Forces, the subject of his address being "Gunshot Wounds of the Chest," illustrated by an X-ray series of chest cases exemplifying the points on which he had dwelt.

The eleventh meeting was held upon January 7, 1918. Captain A. H. Pirie, Radiologist, Moore Barracks Hospital, took up the subject of recent advances in X-ray work due to war conditions, and discussed the main methods of localization of foreign bodies.

The twelfth meeting, held on January 14, 1918, was addressed by Mr. Thomson Walker, F.R.C.S., who spoke upon "Gunshot Wounds of the Spine," with special reference to the disturbance of bladder function. He gave a résumé of the anatomy and physiology of the process of micturition, recognizing three centres. He followed this with a summary of his own observations on some 1,500 spine injury cases, and the deductions he had reached regarding treatment.

The thirteenth meeting, held on January 21, 1918, was opened by an exhibition of clinical cases by Captain de Beaupré (diffuse lipomatosis) and Captain McLean (tertiary syphilis of the tongue and lips). The address of the evening was by Colonel F. G. Finley, C.B., Consultant in Medicine, Canadian Expeditionary Force, on "War Diseases occurring in France." He dwelt upon the infrequency of acute rheumatism, lobar pneumonia, and typhoid fever, and took up the three common disorders in the Army, spirochætal jaundice, war nephritis, and tetanus, with particular reference to local tetanus.

The fourteenth meeting was held on January 28, 1918. The paper of the evening was by Lieutenant-Colonel W. H. Mewburn, Senior Surgeon of the Duchess of Connaught Canadian Red Cross Hospital, Taplow, who read a paper upon "War Injuries of Peripheral Nerves," detailing his methods of treatment.

The fifteenth meeting was held on February 6, 1918. Major Nicholson, M.O. 14th C.F.A., was elected President, and after the presentation by Captain Little of specimens of a case of tracheal and laryngeal diphtheria, Major French, R.A.M.C., Consultant in Medicine for the Aldershot Command, opened a "Discussion of a series of small points," each in turn being taken up by the members present. He took up the matter of (1) Laminations and discolorations of the finger-nails and their significance. (2) Broadbent's sign, pointing out its value in discriminating between functional tachycardia and the tachycardia of chronic adhesive pericarditis. Tachycardia accompanied by Broadbent's sign is always organic and never functional. (3) The frequency of tachycardia as a sequel to trench fever, with a description of the work now being done at the Special Trench Fever Hospital at Hampstead. (4) Vomiting in relation to pyloric stenosis, pointing out that the absence of vomiting is no proof that the patient does not suffer from stenosis, and the value in these cases of a succession of bismuth and X-ray plates. (5) The value of the tuberculin reaction in the diagnosis of early doubtful cases of phthisis, with a description of the procedure by minute successive doses of Koch's old tuberculin.

The sixteenth meeting was held on the evening of February 11, 1918. Major L. M. Murray, C.A.M.C., of the King's Canadian Red Cross Hospital, Bushey Park, gave a paper upon "Heart Disorders in Relation to the War," dwelling particularly upon the work done by Sir James Mackenzie and Dr. Lewis, and especially upon the value of graduated exercises as a means both of diagnosis and of treatment. Captain A. A. McKay, M.O. 42nd C.I.F., described the treatment of gas and shell-shock cases at casualty clearing stations.

The seventeenth meeting was held on February 18, 1918 Captain Almquest, of the Special Hospital, Witley, presented three cases of syphilitic lesions. His demonstration was followed by an address by Captain T. R. Little, O.C. No. 1 Canadian Mobile Laboratory, on the work done in an Army mobile laboratory. He dwelt more particularly upon the routine undertaken in cases of outbreaks of diphtheria and cerebro-spinal meningitis, and then took up the subject of typhoid diagnosis, Wassermann reaction, and the production of autogenous vaccines.

The eighteenth meeting was held on February 25, 1918. Captain Almquest presented a case of tubercular disease of the testicle, probably initiated by gonococcal infection, which has been present since May, 1915, in the form of urethritis. Bacteriological examination of the discharge from the sinus that is present revealed tubercle bacilli in large numbers.

Then followed the address by the speaker of the evening, Captain J. Patterson, of Granville Special Hospital. To introduce his subject of "War Orthopædic Surgery," he drew attention to the fact that whereas originally the subject of orthopædics was confined to children, now it has a large sphere in adult life as well. The normal weight-bearing surface of the foot is a dome, made up of the heel, the outer side of foot, ball of great toe, and pads of all the toes. The normal child without boots must use every muscle of its foot in walking, and it is only by the constant use and exercise of these that a perfect foot is developed. Only since the advent of shoes, especially ill-fitting ones, have we been confronted with hammer-toes, hallux valgus, metatarsalgia, flat foot, bunions and corns. The great import-

ance, therefore, of equipping the soldier with well-fitting shoes was strongly insisted upon. For Army work, a boot should be worn that is three sizes larger than the man's foot. Small boots will bring on foot troubles, one important one, metatarsalgia, or Morton's disease, is characterized by pain on walking, situated between the heads of the fourth and fifth metatarsal bones, which if neglected goes on to pain over all the metatarsal bones, and a falling of the transverse arch. In order to overcome this disability, a pad of leather should be placed across the sole just behind the metatarsal heads.

True flat foot can always be distinguished from an apparently flat one. The apparent height of the arch is a worthless and misleading indication. The true guide of a perfect foot is the free and painless movement of all its muscles and tendons. A flat foot always presents painful spots along the line of the tibialis posticus muscle, down to its attachment at the first cuneiform bone. These areas are exaggerated by everting the foot, thus putting this muscle on the stretch. The mechanical readjustment of flat foot consists in placing along the inner edge of the sole and heel of the boot a leather bar. This acts by throwing the body's weight on the outer side of the foot, thus allowing the stretched muscles and ligaments to rest and regain their normal tone. The proper walking attitude must be carefully adopted--namely, feet pointing straight ahead. To arrive at this position ankle-rocking exercises while the foot is in an adducted position is a great help. The speaker then compared the merits of a Kitchener and a Canadian boot, which revealed the fact that the latter, because of its pliability, straight inner side, and better fitting ankle and heel, is preferable from a soldier's viewpoint.

Derangements of the internal cartilage of the knee-joint were then dwelt upon. These are produced by a sudden twisting or a blow struck on the leg whilst the foot is in a position of eversion. The body weight is borne upon the inner surface of knee when the foot is straight ahead, but in the position of attention it is mainly distributed to the outer side. In the speaker's own experience, treatment of such cases is best carried out by raising the inner surface of the boot, thus establishing an ankle and knee-rocking habit. A demonstration then showed that each time there was an internal rotatory movement of the knee the vastus internus muscle strongly contracted, thereby protecting the integrity of the joint. A discussion of this very interesting paper by the members present then followed.

The nineteenth meeting was held on March 11. Major Sir A Macphail gave an address on "Policy and Organization."

MEDICAL SOCIETY OF No. 16 CANADIAN GENERAL HOSPITAL.

(Ontario Military Hospital.)

THE first meeting was held on January 7, 1918.

Aortic Aneurism.—Lieutenant-Colonel Futcher presented several cases of this condition, and discussed them from the standpoint of etiology and pathology.

Arterio-venous Aneurism.—Lieutenant-Colonel Gilmour presented two cases of traumatic arterio-venous aneurism, one in association with the common femoral artery, the other with the axillary, the latter being complicated by a lesion of the ulnar nerve. Lieutenant-Colonel Gilmour demonstrated the anatomical associations of the ulnar to the axillary artery and vein.

Chronic Hypertrophic Pulmonary Osteo-arthropathy.—Captain Morton presented a case of this rare condition, together with X-ray plates of the bones involved. This was associated with a pronounced condition of bronchiectasis with abundant discharge of watery sputum.

Transfusion of Blood.—Colonel Primrose then addressed the meeting on the subject of transfusion of blood, giving his experience in this procedure, both before the War and at Salonika. He described the methods and discussed the value of the procedure. An active discussion followed upon his address.

The second meeting of this Society was held on January 21, 1918, the President in the chair.

Œsophageal Stenosis.—Captain A. W. Macbeth presented two cases of this condition, the one following the swallowing of an acid, the other due to spasm of the cardiac orifice. This latter case showed in addition a diverticulum of the œsophagus. X-ray plates following a bismuth meal were exhibited.

Leucoplakia.—Major Wilson demonstrated two cases of this condition with associated Vincent's angina. His experience of the cases seen had been in those addicted to the extensive use of tobacco.

Syphilitic Periostitis.—Two cases of this condition were presented, with marked changes in the long bones; in one of these the history was that of congenital syphilis, with first recognition of the periostitis at the age of 12.

Anæmia, with Splenomegaly and Enlarged Liver.—This was a case presenting mitral and aortic regurgitation. The red cells were reduced to 1,800,000; in the differential count nothing abnormal was observed. The spleen and liver were notably enlarged.

The third meeting of the Society was held on February 4, 1918, the President in the chair.

Shell Shock.—Captain C. E. Frain demonstrated a series of cases of paresis due to war shock. These were of long standing, as a result the evidence of improvement under treatment was very slight.

Orthopædic Cases.—Captain I. W. Dickson presented several cases of elbow injuries, illustrating points in the treatment.

Preventive Orthopædics.—The address of the evening was delivered by Colonel A. Carless, F.R.C.S., Consultant in Surgery, Eastern Command. The address was a study of cases of deformity and the methods whereby these cases might be counteracted. It was pointed out that the greater part of the cases in General Hospitals in this country presenting themselves for orthopædic treatment are preventable by proper treatment, and should never have been permitted to occur. Colonel Carless laid down the principles which should determine the early treatment of bone lesions and fractures.

ADMINISTRATION NOTES.

MEDICAL WAR LITERATURE.

THERE is a very natural and proper desire on the part of hospital units, both in England and overseas from England, to be provided each with its medical library for reference. As a service our first duty is to the wounded and the sick, and it is to the interest of these that they be given the benefit of every advance. The best and the latest medical literature therefore, as far as is possible, should be at the disposal of the hospital staffs.

Taking into account war conditions, how and to what extent can medical headquarters meet this undoubted and admitted need? Works of reference are bulky, costly, and, on account of successive editions, rapidly deteriorate in value. The same is true in general with reference to medical journals. Each branch of medical science has now its special journals, English and American, and the subscriptions to secure a representative series for each hospital would entail an expense so heavy as to ensure severe criticism were it entered into.

Thus the temporary nature of war hospitals overseas, and the need to cut down impediments to a minimum, demand in this matter a policy that will secure the most in the smallest bulk. Each General Hospital, that is, should be supplied with the latest authoritative systems of medicine and surgery, and to ensure a prompt knowledge of recent advances, not special journals, but those general journals which endeavour week by week, or month by month, to keep in touch with all that is best in medical war literature, should be subscribed for. The foremost of all these, as supplying the widest series of abstracts of current literature, is the *American Medical Association Journal*. Another excellent American periodical which has established a special section upon war literature is the *American Journal of the Medical Sciences*. Unfortunately these reach us after many weeks delay. Most hospitals, therefore, find the *Journal of the R.A.M.C.*, the *Lancet* and the *British Medical Journal* more serviceable, and, as a matter of fact, in most hospitals one

or other member of the staff takes in one or other of these journals and places it at the disposal of his *confrères*. And now this year the Medical Research Committee and the American Red Cross have stepped into the breach, and by their *Medical Supplement* and *Medical Bulletin* respectively have filled the breach. The problem, therefore, has been largely solved.

It deserves being more widely known than appears to be the case that the libraries of the Royal Society of Medicine, 1, Wimpole Street, W., and of the *British Medical Journal* at 1, Agar Street, Strand, have generously been thrown open to the officers of the C.A.M.C. Officers on leave, and those stationed in the neighbourhood of London, will find all help afforded them at these admirable libraries. Where officers at a distance urgently need to consult particular books or papers, application to the office of the D.M.S. (A.M.D.8) will in general secure either that the needed volumes are forwarded to them for perusal, or, failing this, upon request arrangements be made to secure abstracts of the articles required.

CORPS NEWS.

C.A.M.C. PROMOTIONS.

(Gazetted since January 1, 1918.)

Lieutenant-Colonel to Colonel: Acting Lieutenant-Colonel Snell, A. E.

Majors to Lieutenant-Colonels, substantive. Majors: Leask, T. Mc; Snell, A. E., D.S.O.; Donaldson, A. S.; (Acting) Moshier, H. H.; Macdonald, R. H.; Vipond, C. W.; Gwyn, N. B.; Leask, T. Mc; Donaldson, A. S.

Captains to Majors, substantive. Captains: Graham, D. A. L. (Acting Major); Lockhart, W. T.; Walter, A. B.; Shaw, R. M.; Francis, W. W.; McKim, L. H.; Reford, L. L.; Shannon, W. L.; Logie, F. G.; Hutchinson, J. W.; Burgess, H. C.; Wickham, J. C.; Henderson, A. T.; Pirie, A. H.; Robertson, R. B.; McDiarmid, G. A.; Boyer, G. F.; Rice, L. M.; Lowry, W. H. (Acting Major); McPhedran, J. H.; MacDonald, R. St. J. (Acting Major); Chapman, A. B., M.C.; Kelly, B. E.; Gardiner, R. J., M.C.; Scott, W. Hepburn, M.C.; Hall, G. W.; McGill, H. W., M.C.; Bell, T. H., M.C. (Acting Major).

Acting Majors, Captains: MacDonald, R. St. J.; Bell, T. H., M.C.; Wadge, H. W., M.C.; Laidlaw, W. C.; Gardiner, R. J., M.C.; Hall, G. W.; McGill, H. W., M.C.; Scott, Walter H., M.C.; Ewing, W. T.

AWARDS.

To be additional Member of the Military Division of the Third Class or Companion of the Most Honourable Order of the Bath:—

Col. Frederick Gault Finley.

To be additional Members of the Third Class or Companions of the Most Distinguished Order of St. Michael and St. George:—

Col. Kenneth Cameron.
,, George Septimus Rennie.
,, Wallace Arthur Scott.
,, Walter Langmuir Watt.
Lt.-Col. John Andrew Amyot.
Col. R. D. Rudolf, Commander of Order of the British Empire.

AWARDED THE DISTINGUISHED SERVICE ORDER.

Col. Charles Ayre Peters.
Lt.-Col. Alfred Turner Bazin.
,, Percy George Bell.
,, James Edgar Davey.
,, Charles Harold Dickson.
,, James Johnson Fraser.
,, Thomas McCrae Leask.
Lt.-Col. Thomas Joseph Francis Murphy.
Lt.-Col. Clifford Hamilton Reason.
Maj. George Sidney Mothersill.
Capt. H. G. Young.

STRUCK OFF STRENGTH, HAVING BEEN RETAINED IN CANADA.

Surg.-Gen. G. C. Jones.
Col. H. M. Jacques, D.S.O.
Lt.-Col. J. R. Spier.
,, F. C. McGavish.
Maj. W. A. Groves.
,, W. W. L. Musgrove.
,, G. E. Gilles.
,, J. P. Quigley.
Qr.-Mr. Hon. Capt. J. F. McKirley.
Capt. D. P. Miller.
,, G. A. Macpherson.
,, W. P. Freeman.
,, J. H. Jones.
,, A. J. Weart.
,, A. C. Scott.
Capt. J. T. Whyte.
,, B. A. Sandwith.
,, V. L. Turrill.
,, S. R. D. Hewitt.
,, M. A. Carmichael.
,, W. K. Colbeck.
Capt. B. C. Reynolds.
,, M. Shipley.
,, C. W. Saunders.
,, G. T. Bailey.
,, O. Stephensen.
,, J. Moore.

AWARDED THE MILITARY CROSS.

Capt. Herbert Charles Allison.
,, Charles Philip Fenwick.
,, Robert John Gardiner.
,, Richard Todd Wilson Herald.
Capt. (now Maj.) Arthur Llewellyn Jones.
Capt. Harry Wishart Whytock.
,, G. M. Foster.
,, A. S. Porter.
Capt. W. F. Abbott.
,, H. C. Davis.
,, J. F. S. Marshall.
,, J. W. Moore.
,, H. F. Preston.
,, W. H. Scott.
,, E. C. Whitehouse.
,, F. W. Lees (Bar to).
No. 32785 Sgt.-Maj. Oscar Percy Stensrud.

AWARDED FOREIGN ORDERS.

Qr.-Mr. and Hon. Capt. J. H. Diamond, Order St. Stanislas.
Capt. C. A. Yates, Order St. Stanislas.
No. 107748 Sgt. A. Gillespie, Cross St. George.
No. 16963 Sgt. W. S. Kelly, Cross St. George.

AWARDED THE ROYAL RED CROSS, 1ST CLASS.

Matron Myra Moffatt Goodeve.
Acting Matron Janet McGregor Macdonald.
Matron Jean Urquhart.
N/S. Helen Donaldson Shearer.
Acting Matron Nella Myrtle Wilson.

AWARDED THE ROYAL RED CROSS, 2ND CLASS.

N/S. Annie Baillie.
,, Elizabeth May Best.
,, Mabel Emma Bruce.
,, Isobel Connor.
,, Winifred Heath Fray.
,, Margaret May Galbraith.
,, Sarah Heaney.
N/S. Sarah Persis Johnson.
,, Elizabeth Martin.
,, Margaret McCort.
,, Sarah Jane Robley.
,, Annie Maud Stirling.
,, Ethel Frances Upton.

MENTIONED IN DESPATCHES.

Staff.

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Lt.-Col. (Temp. Col.) C. A. Peters.
Col. A. E. Ross, C.M.G.
Maj. (Temp. Col.) A. E. Snell, D.S.O.
Lt.-Col. (Temp. Col.) R. P. Wright, D.S.O.

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Wilson, Lt.-Col. F. W. E.
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Ferris, No. 20177 Pte (A/Sgt.) G.
Fowlie, No. 1276 Cpl. J.
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McArthur, No. 33246 Sgt.-Maj. C. E.
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Wilkins, No. 1792 Sgt. E. D.
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