end. Two such bars are supported at their extremities by 6-ft. uprights placed so that the rails are 3 ft. 3 in. apart and parallel to each other. The uprights are firmly fixed

Fig. 6 (from a photograph).—Leg suspension applied. P Z, Perforated zinc.

to the floor by suitable stays, and the pair at the head end is joined by a transverse bar.

Cradle.—The material is 3 in. by 1 in. (all dimensions are outside measurements). The travelling cradle is rectangular with sides (F1 and F3) 4 ft. in length, carrying two window-sash pulleys, each let in 4 in. from the extremity R1, 2, 3, 4. The ends F2 and 4 are 3 ft. 4 in. in length. This rectangle is divided by a transverse stay, T, at 1 ft. 5 in., and the two smaller rectangles thus formed have diagonal stays, D1 and 2, to prevent racking and give rigidity. On F2 and T iron checks, X2 and 1 (6 in. by 1 in. by $\frac{1}{2}$ in.), project vertically downwards, just clearing the horizontals BH1 and 2. Strong 2-in. screws are fixed half in into the inner sides of BH1 and 2 to engage with these checks. These are best adjusted experimentally. Sixteen round-headed

Fig. 7.—The same, showing patient raising pelvis unaided four days after injury. P Z, Perforated zinc.

2-in. screws are fixed half in into the upper edges of F2, T and F4 in the following way (Fig. 5): On F2 four screws at the 6th and 15th inch from each side. On

T four screws at the 2nd and 11th inch from each side. On F4 eight screws at the 4th, 9th, 14th, 19th, 21st, 26th, 31st, and 36th inch.

There are now sufficient for a right and left leg, and are for the attachment of the single blocks of the Hodgen's splint ($\frac{1}{2}$ in. block is the best size).

In slinging a right fractured femur in a Wallace's splint, blocks are attached to screw S1, 2, 5, 6, 13, 14, 15, 16.

There are four eyes of wire fixed to the splint, two on the ring (one on each side below the bars of the splint), and the other two to the transverse bar carrying the foot-piece.

Four cords—C1, 2, 3, 4—are attached to these eyes; watch-chain hooks are very convenient, and each passes through its respective two blocks, while a suitable weight is attached to the other end.

Cord C1 from outer foot attachment passes through block B1, which is attached to screw S5 on T, then through block B5, which is attached to screw S13, and carries a weight of about 7 lb.

Cord C2, from inner foot attachment, passes through B2, which is attached to screw S6 on T, then through block B6, which is attached to screw S14, and carries a weight of about 7 lb.

Cord C3 from outer ring attachment, passes through block B3, which is attached to screw S1, then through block B7, which is attached to screw S15, and carries a weight of about 14 lb.

Cord C4, from inner ring attachment, passes through block B4, which is attached to screw S2, then through block B8, which is attached to S16, and carries a weight of about 14 lb.

This suspension allows the patient very free movement, is a great comfort to him, and nursing is made comparatively simple. Fig. 7 (from a photograph) shows the patient, who has a fractured femur and ulna, raising his pelvis unaided four days after injury.

AN OPERATION FOR THE OBLITERATION OF THE CAVITY IN THE TIBIA REMAINING AFTER SEQUESTROTOMY.

By WILLIAM GEMMILL, F.R.C.S.,

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The operation described is after the osteoplastic method recommended by M. W. af Schulten.¹ The patient was a man aged 61 whose left leg had been crushed nineteen years previously. At that time he was for four months in hospital; according to his own statement some dead bone came away from the lower part of the leg, and the wound healed. About a year afterwards the upper part of the leg, which had remained swollen, became very painful, was laid open, and part of the bone was removed. The wound produced at this operation had never healed, but the patient for sixteen years pursued his occupation with frequent intervals of incapacity due to the discharge becoming more profuse and foul. During this period he had four operations, which, he said, consisted in "scraping the bone," and one in which an unsuccessful attempt had been made to obliterate the cavity by filling it with wax.

The condition of the limb before operation was as follows: The whole of the shaft of the left tibia was much thickened and rounded, and scars of old sinuses were present over the lower part. The upper third of the shaft presented a cavity with overhanging edges about an inch apart at the outlet. The depth was one inch and a quarter, and the length three inches and three-quarters. The upper limit of the cavity reached to within one inch and a quarter of the knee-joint. The epithelium had grown well down into the cavity, leaving the posterior wall, however, covered with weak exuberant granulation tissue. There was some sero-purulent discharge.

Under a general anaesthetic, the limb having been rendered bloodless by means of a tourniquet, the cavity was thoroughly swabbed with pure carbolic acid. An incision down to the bone was made round the opening of the cavity just outside the margin. The epithelium

within the incision and the granulation tissue in the cavity were thoroughly removed with a sharp spoon till healthy hard bone was reached all round. From the upper and lower extremities of the wound vertical incisions were made, terminating at the levels of the roof and floor of the cavity, and what remained of the bony part of the anterior wall of the cavity was removed. A transverse incision was now made at the upper, and a corresponding one at the lower, end of the wound reaching down to the bone, care being taken at the same time to avoid injury to the tibialis anticus muscle. Each incision was $3\frac{1}{2}$ in. in length, and reached on either side to the junction of the lateral with the posterior wall of the cavity. Through these incisions the attachments of the lateral walls to the roof and floor were now severed by means of a small saw. The lateral walls, consisting of skin, subcutaneous tissue and bone, now remained attached only to the posterior wall, and the next step consisted in severing the bony attachments. This was done by means of a chisel and mallet, working from the inside of the cavity, the last part of the separation being completed by using the chisel as a lever and breaking through the outer shell, in order to preserve the periosteum intact. The lateral walls could thus be turned outwards as two flaps. Sufficient bone had now to be chiselled away from them and from the posterior wall to allow the flaps to lie against the posterior wall and their edges to be brought together. Unfortunately, before this step was quite finished the condition of

Diagram of transverse section through cavity in tibia. Shaded part represents bone removed to allow flaps *a* and *b* to come together; *c* = periosteum, *d* = tibia.

of the patient, who had all along been taking the anaesthetic badly, became so unsatisfactory that the operation had to be completed rapidly. The flaps were stitched together with silkworm gut through skin and periosteum, but the edges remained separated by about a quarter of an inch. The transverse incisions also could only be closed in part. Dressings and a back splint were applied and the tourniquet removed. The leg was dressed next morning as blood had appeared through the dressing, and

was again dressed on the seventh day, when the stitches were removed.

The wound healed partly by first but mainly by second intention, and with the exception of two small sinuses, one at either end, which admitted a probe and led down to small points of bare bone, had entirely healed by the seventh week. Three weeks later the sinuses had disappeared, the bony flaps had joined solidly to the shaft, and the patient was walking about. The resulting scar consisted of a vertical part with a transverse piece at either end.

Two points worthy of note arose during the operation. The first was that the amount of bone which had to be removed before the flaps could be brought into apposition was much greater than I had anticipated, and the other that before the edges of the transverse incisions could be brought together it was necessary to bevel down the edges of the overhanging bone at the roof and floor of the obliterated cavity.

Had the condition of the patient under the anaesthetic permitted of sufficient bone being removed to bring the flaps accurately together recovery should have been more rapid.

REFERENCE.

¹ *Archiv f. klin. Chir.*, lii, 145.

THE Prefect of Police in Berlin has notified the German medical profession that the authorities are disquieted by the great fall in the number of pathological specimens sent to the laboratories for investigation. He points out that this slackness on the part of medical men greatly increases the chances of epidemics. However much the ranks of the medical men may be depleted by the demands of the army, the authorities, he declares, cannot allow practitioners to neglect one of the most important measures for the early detection and localization of infectious diseases.

THE TREATMENT OF SEPTIC WOUNDS BY THE ELECTROLYTIC BATH.

BY

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THERE has lately been much discussion of the possibility of sterilizing wounds by antiseptic lotions. A weak solution will not kill the septic organisms, and a strong solution will kill those it can reach, but produces a slough, which provides excellent culture material for those deeper in the tissues. The question asked was: "How can we attack those germs which remain in the tissues?" Bacteriologists have had some success in this direction with vaccines and serums, utilizing and fortifying the natural resistance of the body to the infection.

It did not occur to any one to ask, How can these germs be induced to leave the deep parts? The idea that a Pied Piper should arise to call them from their fastnesses to be destroyed seems fantastic; yet it appears that this is not only possible but in many cases easy. The credit for the discovery belongs to Dr. Charles Russ,¹ who found that nearly all germs are carried towards the positive pole of an electric current passing through a solution of sodium chloride, and that the small current required is lethal to the bacteria without the need for any aid from the ionization of various drugs, such as the salts of zinc and copper, which have been much used for the purpose of introducing an antiseptic into the cell's.

The practical results of treatment seem to support Dr. Russ's observations. I have been much impressed by the success obtained in every case that I have treated. I will only describe one, a perforating gunshot wound of the foot, with a crater on the dorsum leading to a tunnel through which the little finger could be passed and which opened on the sole of the foot. The whole wound was welling with pus and it seemed doubtful whether the man's leg could be saved; five days later granulation tissue was level with the skin at both wounds, which were surrounded by a healthy looking ring of new skin.

The action of the current is not confined to carrying bacteria from the wound, but also stimulates the formation of granulation tissue and epithelial growth.

The treatment opens up a wide field for further research in the treatment of many intractable conditions. Dr. Russ reports some cases of chronic cystitis in which it has produced very satisfactory results.

Apparatus.

The only apparatus required is a battery of 20 to 30 dry cells with a current collector and a good milliamperemeter reading to 25 m.a. with a shunt to 250 m.a.

Baths.—A Schnee four-celled bath is very convenient, but any vessel will do if it is long enough to immerse the forearm and hand, or deep enough to cover a wound of the foot or leg, wounds of the other parts can have a local bath applied, such as a glass cylinder made water-tight with plasticine, as suggested by Dr. Russ, and filled with a warm saline solution.

Electrodes.—Two electrodes are necessary—the carbon of a Leclanché cell serves admirably, or they can be cut from sheet zinc. One is immersed in the bath with the wounded limb, and this must be connected with the positive pole of the battery, marked +. The negative pole has to be connected to some (indifferent) part of the body, either in another bath, or the electrode may be placed under the back of the patient, separated from the skin by sixteen thicknesses of lint well soaked in warm salt solution—this pad should be 12 in. square, and must be well washed after use to remove any trace of caustic soda produced by the current.

Method of Treatment.

The wounded limb being placed in the bath and covered with warm normal saline solution, the negative pole connected to some other part of the body, the current should be slowly turned on from zero until the meter registers 20 to 30 milliamperes. This current, which the patient will barely feel, is sufficient for an average bullet wound; for larger wounds the current must be increased proportionately. The patient must be warned not to take the