TABLE V.—Showing the Number of Times *Trypanosoma brucei* was found among the 180 Wild Animals Examined and the Species of Game which Harboured it.

Species of Animal.	Number Examined.	Number Infected with <i>T. brucei</i> .	Species of Animal.	Number Examined.	Number Infected with <i>T. brucei</i> .
Eland ...	10	0	Duiker ...	7	1
Sable ...	5	0	Buffalo ...	9	0
Waterbuck	13	3	Lion ...	1	0
Koodoo ...	3	0	Hyaena...	3	0
Bushbuck	10	0	Elephant	2	0
Hartebeeste	35	5	Warthog	33	1
Reedbuck	19	3	Wild cat	3	0
Oribi ...	25	1	Porcupine	1	0

Three other species pathogenic to the domestic animals are also found—*Trypanosoma pecorum*, *Trypanosoma simiae*, and *Trypanosoma caprac*—*Trypanosoma pecorum* in 14.4 per cent.; *Trypanosoma simiae* in 1.7 per cent.; and *Trypanosoma caprac* in 11.1 per cent. of the wild game examined; therefore I do not think I was using too strong language when I wrote in a report to the Royal Society:

It is self-evident that these wild animals should not be allowed to live in "fly country," where they constitute a standing danger to the native inhabitants and the domestic animals. It would be as reasonable to allow mad dogs to live and be protected by law in our English towns and villages. Not only should all game laws restricting their destruction in "fly country" be removed, but active measures should be taken for their early and complete blotting out.

It must be strictly borne in mind that this only refers to wild animals living in "fly" areas. No pathogenic trypanosomes have up to the present been found by the Commission in the blood of animals living in fly-free areas.

NERVE SUTURE FOR BULLET WOUNDS.

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WHILE acting as consulting and operating surgeons to the French army during the last six months, we had many opportunities of seeing cases of nerve injury caused by modern weapons, and we performed several operations for their relief. In only two cases, however, were the patients under our observation for a sufficient length of time to allow us to judge the results of these operations. The following is a short account of these two cases:

CASE I.—Bullet Wound of Ulnar Nerve.

A. P., a soldier wounded at the Marne by a rifle bullet, September 7th, 1914, was seen by us in December. He then had two unhealed wounds on the front and back of the inner side of the left forearm, about 2 in. below the elbow; the x rays showed a united fracture of the ulna with several sequestra and small pieces of metal, probably pieces of the mantle of the bullet. There was complete loss of function of the ulnar nerve, paralysis of the muscles with claw-contraction of the three inner fingers, and loss of sensation of the ulnar side of the hand and inner two fingers back and front.

An operation was performed on December 18th for the removal of the sequestra and pieces of metal, after which the wounds healed rapidly.

On January 19th, 1915, a vertical incision was made over the course of the ulnar nerve for about 4 in., the nerve was exposed above and below the seat of injury, and then traced through a dense mass of fibrous tissue. There was continuity between the two segments of the nerve, but in the region of the wound there was a large, somewhat oval mass of tissue, almost as hard as cartilage, and the upper part of the distal segment was greatly wasted. It was necessary to remove nearly 1 in. of tissue before nerve fibres could be found on the cut surface of either end. In spite of freeing the proximal end of the nerve up to the internal condyle and the distal end for several inches, and flexing the wrist and fingers, it was found impossible to bring the cut ends into contact, and they were finally sutured together, leaving a gap of about 1 centimetre between them.

Two relaxation sutures of No. 1 silk were passed at some distance from the cut ends, which were then sutured with No. 1 and No. 0 silk; altogether there were over a dozen strands of silk bridging the gap between the two ends of the nerve.

The operation wound healed normally, and the flexion of the wrist and fingers was gradually reduced after the first fortnight; massage, movements, and electrical stimulation (both faradic and galvanic) were then started and continued until the patient's discharge from the hospital early in May.

Within two months of the operation there was good voluntary power of contraction of the flexor carpi ulnaris, and on rolling the ulnar nerve under the finger between the internal condyle and olecranon a tingling sensation was felt down to the base of the little finger; before operation this sensation had only been felt down to the level of the wound. From this time on improvement was continuous, and on his discharge from hospital, about 3½ months after the operation, motor power had returned in the flexor carpi ulnaris, probably in the flexor profundus digitorum (shown by his better power of flexion of the phalanges), there was commencing response of the intrinsic muscles of the hand to faradic stimulation over the course of the ulnar nerve, and sensation had returned completely with the exception of the little finger, though tingling could be felt to the tip of this finger on stimulation of the nerve above the point of suture. The characteristic deformity of the hand had almost entirely disappeared.

Between the time of injury and the operation the patient stated that there had been no change in the condition of his forearm and hand, and during the month he was under our observation between the two operations there was no change, except a slight increase in the deformity, although he was daily receiving massage and electrical treatment.

CASE II.—Bullet Wound of Musculo-spiral Nerve.

B. D., a soldier, was first seen by us on December 28th, 1914. He had been wounded by a rifle bullet on the outside of the right arm, just above the elbow, about a fortnight before. He was treated at a hospital close to the front. While there he had, about five days after he was wounded, a severe haemorrhage, for which an operation was performed to stop the bleeding, and at the same time the musculo-spiral nerve was sutured. Whether the nerve had been divided by the bullet or was cut during the operation we were never able to discover.

When the patient came under our care he had a large oblique incision, nearly healed, running upwards, outwards, and backwards for about 4 in. from the outer part of the front of the elbow. There was complete loss of power of the extensor muscles of the wrist and fingers, and loss of sensation over the area of distribution of the radial nerve. He was treated by massage, movements, and electricity (both faradic and galvanic). At the end of two months sensation was commencing to return, and at the end of April he was transferred to a special hospital for mechanotherapy. Sensation was then normal, and he was able to raise the hand when prone from the fully flexed position to the straight position. Power of extension of the fingers was almost, if not quite, non-existent.

The improvement in this case was not so marked as in the other, but this may be explained probably by the fact that the patient did not seem to take so great an interest in his own treatment and cure, and therefore made less voluntary effort to recover the lost movements.

In only one case did we have an opportunity of suturing a nerve at an early stage after injury.

CASE III.—Bullet Wound of Ulnar Nerve.

Soldier, wounded March 23rd, 1915, by a rifle bullet which passed through the inner side of the right forearm just below the middle, fracturing the ulna. On admission to hospital, three days later, there was loss of sensation of the little finger, back and front, with paralysis of the intrinsic muscles of the hand supplied by the ulnar nerve. As the loss of sensation was only partial we hoped that the nerve was only slightly injured and that recovery would be rapid, and massage and electrical treatment were commenced after a few days.

At the end of three weeks the condition was in no way improved and well-marked contraction had commenced in the three inner fingers. On April 14th, therefore, an incision was made and the nerve exposed in the region of the wound, which had healed. It was found that about three-quarters of the nerve trunk had been divided and that the cut ends were considerably separated and turned backwards into the muscles. There was a great deal of soft granulation tissue surrounding the injured portion of the nerve, which would in time have formed the very dense, hard, fibrous tissue we found in all the cases operated on at a late period after injury. The cut ends were freed and sutured together with silk without interfering with the undivided portion of the nerve. When this patient was last seen, about six weeks after operation, there was no appreciable change in his condition.

In another case only a portion of the nerve was divided, but it did not come under our care till several months after the injury.

CASE IV.—Bullet Wound of External Popliteal Nerve.

A soldier was wounded in the right knee in August, 1914, by a bullet which entered just behind the border of the biceps tendon and fractured the femur. There was some loss of power in the

muscles of the anterior tibio-fibular compartment with marked foot-drop, the paralysis was not absolutely complete, and sensation, though dulled, was not wholly lost over the region supplied by the musculo-cutaneous and anterior tibial nerves.

The condition of this patient's leg had remained stationary for several months in spite of massage and electrical treatment. On February 25th, 1915, an incision was made exposing the external popliteal nerve behind the knee. There was a large thickening of the nerve at the level of the joint, and just above this a branch nearly half the size of the nerve apparently passed into the biceps tendon. This proved to be a divided portion of the nerve firmly adherent to the tendon. It was separated and the trunk of the nerve freed for about 2 in. from the abundant fibrous tissue which was present; the nerve was then split vertically in the thickened portion, and as what appeared to be nerve fibres were found, the branch was implanted in the split and the nerve sutured together over it.

This case was transferred to another hospital for special treatment a few weeks after operation, before there was time for the appearance of any change in the condition.

In two cases of division of the musculo-spiral nerve one was divided just above the bend of the elbow by a rifle bullet, and in the other the nerve was divided in the middle of the arm and the case was complicated by a comminuted fracture of the humerus. In another case the ulnar nerve was divided by a bullet close to the junction of the upper and middle thirds of the forearm. These three cases were not seen by us until several months after the receipt of the injury and were transferred to other hospitals too soon after operation to allow of any improvement taking place before we lost sight of them.

We saw a few cases with wounds in the neighbourhood of large nerves, which showed only temporary signs of loss of function; in these the loss of sensation was only partial and the paralysis was not absolute, and the symptoms cleared up within a fortnight. These cases may be spoken of as nerve concussion, the nerve not being materially injured, its function being interfered with or lost for a short period.

CONCLUSIONS.

From our experience of these cases we have drawn the following conclusions concerning nerve injuries caused by modern missiles:

1. The function of a nerve may be interrupted without material injury, in which case the loss of function is only partial and returns early, probably always within a fortnight or three weeks.
2. When a nerve is partially or wholly divided loss of function is marked and permanent, and may even tend to increase. In these cases it is useless to expect spontaneous regeneration owing to the distortion and separation of the cut ends and the great development of dense fibrous tissue which appears to follow in all cases.
3. When a nerve is divided, the sooner an operation for its suture is performed the easier it is and the greater the likelihood of an early cure. In cases, however, where the wound is septic, it may be advisable to allow time for the wound to heal.
4. Even when nothing has been done for several months, there is still a chance of a successful result if late suturing is undertaken, so that no case need be looked upon as necessarily hopeless.

LOCALIZATION OF FOREIGN BODIES BY X RAYS.

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THE method of localization which I use in this hospital (described in a paper to be published by the Röntgen Society) may be of interest to your readers. It is simple and accurate, and abolishes measurement and calculation.

If, during the two exposures of an ordinary localization, an opaque body lies at the same depth from the plate as the foreign body whose position is required, then the shadow displacement of this control body is of course equal to that of the foreign body. As the depth of the foreign body is initially unknown it is necessary for the control body to exist at all possible depths, and for its various points to be recognizable from their shadows. I fulfil these conditions by using as the control a sort of miniature ladder with lead wire rungs, parallel and equi-

distant, but oblique, as shown in Fig. 1. The step distance is 1 cm., and the length of each rung 3 or 4 cm. The ladder is set up with its plane perpendicular to the photographic plate and its end AB as close as may be to the plate. Its position is chosen so that the two shadows of the rungs thrown on the plate in the two exposures of the localization lie one on each side of the base of the ladder, as in Fig. 2, a tracing from a negative. Thus any two corresponding points in the pattern are immediately referable to the point on the ladder whose shadows they are—for example, the points marked by dots and referred to as A_1 and A_2 are the shadows of a point half-way along the third rung, that is, of a point 2.5 cm. from the plate. Now the distance $A_1 A_2$ is equal to the distance $X_1 X_2$, between corresponding points of the shadows of the foreign body, which is therefore also 2.5 cm. from the plate.

Fig. 1.

The procedure, then, to determine the depth of the foreign body, is to set off the distance $X_1 X_2$ with dividers, transfer the latter to the ladder pattern, and find there the points $A_1 A_2$ showing the same displacement. Of course, care must be taken that $A_1 A_2$ is parallel to $X_1 X_2$, and that A_1 and A_2 are on the two shadows of the same rung—that is, are shadows of the same point on the ladder. The distance (if any) from the plate to a fuse-wire cross on the skin can be similarly found and deducted from the previous measure to give the net depth of foreign body below the skin. Usually, as in Fig. 2, the plate is close to the skin, and there is no deduction to be made.

Fig. 2.

If the fuse-wire cross has not been set exactly over the position of the foreign body by one of the usual screen methods, the point on the plate which is exactly over the foreign body can be found by Barrell's method, using the vertical lines through the two ends of the lead rungs instead of two vertical cylinders. That is to say, the lines CB and ED are produced; they meet at a point on the plate vertically over the focal spot of the target in the first position of the bulb. The lines FB and HG similarly intersect in the corresponding point for the second position