the condition of the bone he would conserve. He must take it for granted that he is dealing with a number of long fissured fragments held together by periosteum; he must gently push back into their places such of them as protrude, and arrange as best he can for the drainage and "asepticity" of the wound, and the securing of the injured parts in a position of immobility. Excuse me if I appear to you to speak dogmatically. It is the first time, as far as I know, that anyone who has verified, by observations made on active service, the important experiments of Professor Longmore already referred to, has spoken on this subject. My observations convince me that experiments on the dead body afford a perfectly reliable means of ascertaining the effect of projectiles on living tissues. And as there is no doubt that each weapon inflicts its own peculiar wound, a wound having often not only special characters, but also requiring a special treatment and a special prognosis, it seems highly desirable that further experiments should be carried out, till the characters of the wounds produced by every weapon of warfare have been accurately and fully ascertained.

The wounds produced by the Remington rifle were altogether different from those of the Martini-Henry. As in no case did death or necessity for removal of a limb follow such wounds, I can only describe their external appearances. Their leading feature was the slight disturbance, both of soft and of hard parts, caused by the bullet. Its track was, as a rule, so closed up by the coming together of parts which it had separated without destroying, that union was easy and rapid. Let me, in illustration, refer to two cases of gunshot-wound of the elbow. Private J., Shropshire regiment, was wounded on March 13th. A Martini-Henry bullet completely shattered the lower two inches and a half of the humerus, and drove many of the fragments through a large lacerated wound of exit situated over the internal condyle. In its course, it divided the ulnar nerve. The joint was resected, and the ends of the divided nerve stitched together. The wound healed; but so extensive had been the injury both to the bone and the soft parts, that an useless limb, which was subsequently amputated, resulted.

Private C. B., of the Berkshire Regiment, was wounded on April 2nd, in the zereba at Tamaai. The bullet, a Remington, entered between the olecranon and internal condyle, and, passing through the olecranon, lodged underneath the skin on the external aspect of the arm. There was almost no loss or displacement of tissue in the wound, which appeared to have closed round the bullet as it passed. The arm was secured in a straight position, to keep the olecranon in its place, and a Lister's dressing applied. The wound healed kindly, with full movement of the joint, and without evil results of any kind.

These two cases give a very good idea of how different are the wounds produced by the two weapons of which I have been speaking.

Wounds of the head furnished some of our most serious cases, and all made good recoveries. I will refer to two of them.

Private F., Berkshire Regiment, was wounded on March 11th, during a night attack on the camp of the Ordnance Department. He received three sabre-wounds of the head, and five spear-wounds on other parts of the body. One of the former was situated on the right side of the head where the hair meets the forehead, and was caused by two sword-cuts, which were so placed as to include between them a piece of the frontal bone, three by two inches, which lay loose on the wound, and a corresponding portion of the underlying brain, which was deeply incised, and bulged upwards in the wound. The detached piece of bone was removed; the prominent brain-tumour was interfered with as little as possible, and all his wounds were dressed antiseptically. He made a good recovery, without impairment of any of his senses.

Corporal J. B., 1st Coldstreams, was struck on March 24th by a bullet, which entered at the internal canthus of the left eye and came out $1\frac{1}{2}$ inches above the right ear, in a line with its anterior boundary. The wound of exit was a lacerated one, through which brain-substance and fragments of bone protruded. The right eyelid was closed and much distended, not, however, with the injured eye-ball, as was first supposed, but with brain-substance; the eye-ball must have dropped out at the time of the injury. To ensure drainage, the orbicularis muscle was cut across at the external canthus, and the wound of exit was enlarged with the same object. This patient also made a good recovery; and when I saw him at Netley on my return, he was up and about, and in full possession of his faculties.

To refer to wounds of other organs would, I fear, carry me beyond the limits of time fixed for the reading of a paper. I will therefore conclude with a few general remarks.

The anæsthetic most commonly used was ether. Although given most freely, it never produced any dangerous symptoms, whereas chloroform, though used in but a few cases, had very nearly to be credited with a fatal result. Ether, although it would take up

more room, should, I think, be the recognised anæsthetic of the services.

When amputation was considered necessary, it was usually done by prolonging the incision made for the examination of the wound till uninjured bone was reached, and, using this as a lateral incision, a skin-flap, a long anterior one when possible, was cut by incision: the second flap was also generally cut by incision, and was made to fit to whatever shape circumstances had caused the first one to assume.

To ensure drainage, the drainage-tubes were, as a rule, stitched to the edges of the wound. This is a very necessary precaution where wounded men pass from one medical officer to another, and where, therefore, tubes that have been inserted may escape notice.

Another useful detail to attend to is the giving to the patient a duplicate of whatever dressing may have been originally applied, wrapped, of course, in a close envelope to prevent its being soiled. On active service, it is impossible to say when, where, or under what circumstances the second dressing of a wound may take place, and a precaution such as I have suggested ensures a continuance of one treatment. I cannot refer to-night to the antiseptics used, but it may be well to state that ten yards of gauze and one pound of antiseptic wool was the average expenditure per wounded man.

This concludes, gentlemen, what I have to say to-night of the surgery of the Suakin expedition. The etiquette of the service has prevented me referring, in the course of my remarks, to the work done by particular medical officers. There was, however, associated with us one, of whom as he was not in the service, I may speak, and without the mention of whose name my paper would not be complete. He is one whom the world recognises as one of the pioneers of surgery—one who left a high position, and came out to us to make himself useful, and who succeeded in doing so most perfectly, whether he was advancing with the bearer-companies to pick up wounded, assisting us with his advice in consultation, or giving at an operation the help that means doing the operation without holding the knife. He did so, moreover, with a suppression of self that asserted itself in spite of him, and won the admiration of all. A hundred grateful and pleasant reminiscences crowd on me as I conclude this paper with the name of Professor Ogston of Aberdeen.

NOTES ON SOME SURGICAL CASES IN THE RECENT SUAKIN CAMPAIGN.

By HAROLD HENDLEY, M.R.C.S., Surgeon I.M.S.,
Surgeon in Charge of a large Field-Hospital for Followers of all Nationalities.

CASE 1. Bayonet-wound: Death from Compression of Lungs by Air in Pleura.—The first in interest from its result is a case of bayonet-wound in a Somali camel-driver, aged 23, admitted to hospital April 4th, for a bayonet-wound received during a quarrel. The patient walked from his camp, near which he received the wound, to the hospital, a distance of 200 yards, without any symptoms of discomfort. Examined by the apothecary on duty, he was detained in hospital more from the situation of the wound, than from its apparent danger to life. In the left a.r.n. over the body of the biceps, two small wounds, two inches apart in a horizontal direction, were found connected by a passage between the skin and muscle, through which a gunshot-probe could be passed with little difficulty. Corresponding to the inner of these wounds, when the arm was brought to the side, was a small wound in the mid-axillary line just below the seventh rib, apparently superficial. There were no symptoms of penetration, no cough, hæmoptysis, emphysema, or difficulty of breathing. There was a slight scalp-wound; and this, with the others, was dressed with wet lint and bandage. After remaining in hospital about an hour, the patient absconded, returning to his own tent. On arriving there, he began to experience some difficulty in breathing; and, being again seen about three hours from the time of the accident, he was found dying of asphyxia.

Post Mortem Examination, sixteen hours after death.—The wounds described were little altered, except for slight emphysema around the chest-wound, which, when probed, seemed to be quite superficial. On opening the thorax, a large quantity of inoffensive air escaped from the left pleural cavity. Both lungs had collapsed, and occupied on each side one-fifth of their usual space. Four ounces of venous blood were found in the left of the chest. The lower lobe of the left lung was found to be connected with the chest by old adhesions, which surrounded a small roughly triangular wound having a slightly thickened, rounded, congested edge, through which a large gunshot-probe could be introduced with ease for two inches. The left bronchus was stained with blood; the heart was contracted;

there was no blood in the cavities: the abdomen was normal; the diaphragm uninjured. On tracing the wound to the chest-wall from without, it was followed in an oblique direction over the eighth rib, there passing through its lower border by a triangular opening, with sides and base formed by bone, the latter slightly detached from the main portion. It communicated directly with the pleural cavity, corresponding to the wound in the lung.

REMARKS.—Owing to the position of the adhesions, the wound in the lung was firmly held in a patent condition within about half an inch of the chest-wall. Blood escaped, but not to a large extent, at first probably staying the passage of air by blocking the wound. The air, profiting by the man's exertions, began to find its way into the pleural cavity; the fatal pumping action went on till the lung performing this suicidal process began to affect its companion; pressure within equalled pressure without; and, the chest-walls failing in their duty, the lungs collapsed. The absence of lung-symptoms, the presence of adhesions, and their effect on the results, together with the opening in the rib, giving the exact shape of a triangular bayonet, are noteworthy.

CASE II. *Bullet-Wound (Remington Rifle).*—Rajah Ram, Indian mule-driver, aged 23, wounded by the enemy whilst asleep on the night of April 26th, was admitted from Otao, May 5th. There were two small superficial wounds on the right thigh, joined by a slight thickening of the tissues beneath the skin; one situated slightly external to the middle line of the front of the thigh, and near its centre in a vertical direction; the other five inches from it, and on rather a higher plane on the inner side of the limb; constituting respectively the entrance and exit of a Remington bullet. The bullet had then passed into the left foot, just in front of the astragalo-scapoid articulation. It had been searched for at Otao several times without success.

Under chloroform, on May 6th, a digital examination showed the scapoid bone in a state of disintegration, and the middle and internal cuneiform bones much injured. Nélaton's probe was used with but little success; the earthenware was slightly marked, due probably to particles of lead adhering to the bones. Again the finger was introduced, the limbs having been carefully placed in the position in which they were supposed to have been at the time the wound was received. By palpating with the disengaged hand over the sole of the foot, a rounded oblong mass was made out, lying deep between the two inner metatarsal bones, just in front of their bases. There could be no reasonable doubt that this was the missing bullet; it was cut down upon, and removed. There was now no direct communication between the small cavity in which it was found and the original wound. A little bloody serum escaped. A drainage-tube was forced through from above, and the wound dressed with carbolic lint, iodoform, tenax, and splint.

By May 19th, the superficial wounds in the thigh had healed. In the foot, small pieces of bone had separated; the remainder were becoming nicely covered. An extra counter-opening was made in the sole, the other being found to be too far forward. On May 21st, he was invalided to India.

REMARKS.—The position of the patient at the time the wound was received was one often adopted by natives when at rest, reclining towards the right side, the right leg and thigh slightly flexed, and the opposite foot drawn up into the fork, with the toes turned out. The bullet was very little damaged; two or three small pieces of bone adhered to a grazed surface near its apex. It would be difficult to find a case similar in character to this amongst Europeans, the exit being on the inner side and higher up the thigh than the entrance, yet with the bullet (next to no resistance having been met) passing into the opposite foot, with a general direction from above downwards, as shown by skin and bone. There was no trouble with the thigh-wound; it healed very quickly.

CASE III. *Suture of Median Nerve and Tendons.*—Emanka Matoseey, aged 30, a Greek, was transferred on March 26th from one of the field-hospitals, where it had been considered necessary to resect the lower end of the radius, owing to a deep horizontal sword cut across the front of the right wrist, extending from the radial side of the ulna round to the dorsal surface of the radius, and then becoming superficial.

On admission, the major portion of the wound had healed, unfortunately leaving complete loss of sensation in the thumb and next two fingers and a half, and but slight movement in the hand. By April 26th, I had lost all hope of any improvement without an operation. It being decided to reopen the wound, a vertical incision was made through the cicatrix, and prolonged upwards over the ordinary course of the median nerve. After some dissection, the ends of the palmaris longus and flexor carpi radialis tendons and median nerve were discovered much separated; the central end of the latter, superficial

and bulbous, and the peripheral, deep and apparently normal, were both imbedded in the cicatrix. After cutting off the bulb, and paring the opposite end, the parts were brought together slightly overlapping, and made fast by three catgut sutures. The tendons were treated in like manner, care being taken to keep the hand flexed. The wound was then closed with silver wire sutures, and dressed with carbolic lint, iodoform, and tenax, whilst the flexed position was secured by a splint and starched bandage.

On the 18th, it was dressed, and found to be doing well.

By the 23rd, a small portion of the cicatricial tissue had commenced to slough; there was a considerable discharge from the wound, and a good result seemed doubtful.

However, on May 1st the wound was looking healthy. Sensation, too, in a modified degree, had returned to the middle and radial side of the second finger; the hand was still kept slightly flexed; the fingers moved fairly well.

The wound was healed by May 26th; the patient was discharged June 5th, with complete sensation in the whole hand, except two small patches over the dorsal surface of the metacarpal bones and the thumb and index-finger, just above the superficial portion of the sword-cut; power of movement in the hand, under the influence of sham-pooing and passive motion, was increasing daily.

REMARKS.—The importance of joining all structures in recent wounds of this description cannot be too much insisted upon; the results generally more than repay for the trouble taken, even often under most unfavourable conditions.

CASE IV. *Ununited Compound Fracture of Radius and Ulna (middle third) of Right Arm.*—Danāvāh, aged 20, a native of India, was admitted on March 25th with the effects of a camel-bite, an open, profusely granulating, pus-discharging wound, situated over the middle third of the dorsal surface of the ulna, communicating with a fracture of that bone, and indirectly with one of the radius; over this bone also there was a recent cicatrix. With a good permanent splint, there was hope that the parts would unite; it was tried, but, although the discharge became less, and the granulations took on a healthier action, union seemed as far off as ever.

On April 22nd, an examination was made under chloroform; the ends of the bones were found necrosed, and partly separated by soft tissues; no callus had been thrown out, nor any other attempt at union made. After enlarging the wound over the ulna, and reopening that over the radius, the ends of the bones were resected obliquely, so that the corresponding surfaces might be applied to one another; holes were then drilled through, and the extremities of the respective bones drawn well together with silver wire, which was then left depending from the wound. The dressing consisted of drainage-tubes, carbolic lint, tenax, and iodoform.

By the 28th, on which day he was invalided to India, the wounds were fast healing, there was little discharge, and there seemed to be every prospect of union taking place.

REMARKS.—This was one of several cases of camel-bite treated in the hospital, and with all I had a good deal of trouble; in one, it was found necessary to resect the end of the ulna; in another, a large part of the head of the tibia necrosed. Where the bones escaped, the soft tissues suffered in like manner; large sloughs came away, leaving unhealthy looking ulcers.

CASE V. *Removal of Epithelioma.*—Karak Singh, aged 30, a native of India, was admitted on April 11th for a malignant looking ulcer over the pubes, of 180 days' duration, and measuring $3\frac{1}{2}$ inches in a vertical, and $2\frac{1}{2}$ in a horizontal, direction. Its edge, irregular, raised, rounded, and hard, was partly covered with blue cicatricial tissue; its remaining portion was dotted with small pieces of new tissue, between which ran tortuous channels of ulceration, leading to a central deeper ulcer with a firm indurated base. The inguinal glands were very slightly enlarged on each side.

On the 17th, under chloroform, I removed the whole mass, giving it a fairly wide berth; the central ulcer gave some trouble, as it was firmly attached to the linea alba. Proceeding with the operation, a flap of skin was brought down from the right of the middle line, twisted on its base, and attached by its free end to the loose skin of the penis; the sides and under surface were also secured, leaving only a small portion on the left of the wound still uncovered. Dressing—carbolic oiled lint, tenax, and iodoform. The skin of the abdomen was brought towards the middle line by means of strapping, and the legs tied together. On the 18th, when the man was sent on board-ship for passage to India, the skin had already adhered, and the whole promised well. I heard afterwards that the patient did remarkably well, returning to his home after a short stay in hospital in India, quite recovered.

GENERAL REMARKS.—The dressings referred to were those most

commonly used; carbolised oiled lint, iodoform, and tenax, combined or otherwise; the three made an excellent dressing. The iodoform was sprinkled on the wound; then a small strip of lint, covered by the tenax, was bound on by a gauze-bandage, rendering it completely antiseptic. Although flies abounded, they only gave trouble in two or three cases; the following powder, used sparingly outside the bandages, I found very useful in warding them off. *B. Iodoform 5j; zinci oxidi 3ij; pulv. McDougall ad 3ij.* Most wounds in Europeans (from the Mediterranean) and Asiatics did well when not complicated by ague or dysentery. The most obstinate cases were those amongst Africans from the Somali coast. Their wounds healed very slowly, and often resulted in unhealthy looking ulcers, which were aggravated by a native treatment in which they have unbounded faith, and which consists in pressing a copper coin firmly over the wound, a larger one being substituted when the ulcer appears beyond its margins.

GUNSHOT-WOUNDS OF THE HEAD IN CIVIL LIFE.

Read before the Yorkshire Branch.

By EDWARD ATKINSON, M.R.C.S. Eng.,

Surgeon to the Leeds General Infirmary; Lecturer in Surgery to the Yorkshire College.

THIS class of wounds is not very common nowadays in England, since the days of duelling are past, and, when seen, are generally self-inflicted with a suicidal intention. They have, however, several points of interest when compared with similar injuries received in warfare. It has been my lot to meet with four such cases within the last fifteen years, and hence I am induced to bring them before you (one of the four, of which I have very full notes, being of peculiar interest), and to offer one or two reflections upon them. I will first read the cases.

CASE I.—In 1870, I was sent for to a young gentleman, E. T., aged 13, who had been accidentally shot in the back of the head with a small saloon-pistol. His brother and he were amusing themselves by shooting at swallows in the stable-yard. One knelt behind the other, and rested his pistol-hand on his brother's shoulder. Just at the moment of discharge, the boy in front jumped up, and received the bullet in his occiput. On arrival, I found an unmistakable penetrating wound on the right side, midway between the occipital tuberosity and the mastoid process. The hair was matted with blood, and undoubted portions of brain-substance; but there was no wound of exit. Symptoms, beyond those of concussion, there were very few. The pupils were unaffected; there was no stertor, no paralysis, either at the time or afterwards. The wound healed in the ordinary course, and no ill effects followed. The bullet is still in his head; and, though no longer resident in this neighbourhood, I believe he is now, at the age of 28, an useful member of society.

CASE II.—W. B., aged 20, in July, 1882, after firing two barrels of a revolver at his master, turned the weapon towards his own head, and discharged it within an inch or two of his forehead. Upon my seeing him, he was already recovered from the slight degree of concussion which followed the shot. The forehead was blackened and scorched with powder, and in exactly the centre was a small aperture in the integuments, through which a probe touched metal. This I enlarged by a small crucial incision, and found the bullet flattened to about the size of a sixpence against the external table overlying the frontal sinus, his ignorance having happily directed him to the thickest point of his skull. He made a good recovery, without any complications.

CASE III.—J. F., aged 16, printer, was accidentally shot on May 13th, 1885, under the following circumstances. Three boys playing in the street had an ordinary muzzle-loading pistol, which they all believed to be unloaded. One of them laughingly pointed it at another, who said, "Fire away." He fired, and the victim immediately dropped. When brought to the Infirmary a few minutes later, he was insensible, with symptoms of compression. Breathing was irregular and stertorous, and at times sighing. The left pupil was contracted; the right moderately dilated. There was some vomiting once. Mr. Jessop was sent for, who enlarged the wound, and removed four or five small pieces of bone; the internal table was found (as usual with a spherical bullet) more splintered than the outer. Half an hour afterwards, he was in the same condition. About one hour later, the pulse, which had been slow (52) from admission till then, suddenly rose to 150. The respirations were not more than ten or twelve. In another half hour, the pulse became imperceptible, and breathing took place by gasps. He died two and a half hours after the accident.

Post Mortem Examination.—On removing the skull-cap, the path of

the bullet was found to be as follows. After piercing the dura mater, it had entered the first frontal convolution about one and a half inches from the anterior extremity, passed obliquely through this, across the longitudinal fissure, and into the right hemisphere, two and a half inches from the anterior end of the brain, and one inch from the upper surface. Continuing its course in a direction outwards and downwards and backwards, it passed through the frontal and part of the parietal lobes, reaching the surface of the brain just in the Sylvian fissure, about one inch from its termination. On the interior surface of the parietal bone, one and a quarter inches behind the coronal suture, was the mark of the bullet, three-quarters of an inch behind the anterior branch of the middle meningeal artery, and just on the mark of the posterior branch. From this point the path of the bullet was deflected, again traversing the brain-substance at nearly a right angle to its former course, and lodging in the posterior extremity of the gyrus fornicatus, lying half imbedded in that body, and half projecting into the longitudinal fissure, immediately above the posterior part of the corpus callosum. There was much blood under the dura mater; none between that membrane and the bone.

CASE IV.—J. P., aged 42, brewer's drayman, a large powerful man, attempted suicide on February 27th, 1885, by discharging a revolver into his mouth.

On admission into hospital soon afterwards, a ragged wound was found just internal to the last right upper molar tooth. The little finger could be easily passed into the wound; the course of the bullet was apparently upwards, and slightly backwards. He bled profusely while being brought to the Infirmary, and vomited a large quantity of blood afterwards; he was quite sensible, though very irritable and excited. There was no counter-opening, though the bullet, judging by one found in an undischarged chamber of the pistol, was conical. There was no paralysis; the pupils were equal and slightly contracted; there was no effusion under the conjunctiva. With some difficulty the right posterior naris was plugged, and the wound was plugged also with dry lint; this controlled the hemorrhage. As he became collapsed, a little brandy and warm milk was given, hot bottles, etc., applied. He soon rallied, and passed a quiet night.

February 28th. He said the right eye was slightly dim. The ocular movements were not quite so free as those of the left eye. The right pupil was smaller than the left; both reacted to light. There was no paralysis of limbs, nor loss of mental functions.

March 1st. There was now some ptosis of the right eye; the external rectus was partly paralysed; the right pupil was more contracted. He complained of numbness in the left arm, also of some loss of power, but not complete paralysis; there was no facial paralysis or difficulty in swallowing. He had pain in the head, especially in the right temporal and frontal regions. Temperature, 100°; pulse moderately slow and soft. His mind seemed clear, though he said he did not remember shooting himself.

March 2nd. There was complete ptosis, with paralysis of all the ocular movements of the right eye, and the sight of that eye was very dim. There was no facial paralysis; he was completely deaf on the right side. He had pain over the frontal and temporal regions, most severe just below the right temporal ridge; the pain was of a stabbing character. Sensation was impaired all over the body and limbs, almost totally absent from below the middle of the arms and thighs. Voluntary movements were feeble, but there was no complete paralysis; the movements of the left arm were weakest; tendon-reflexes were almost absent; superficial reflexes were much increased, especially in the thighs and legs. Breathing was rather slow and laboured (17); pulse 70, deliberate, soft, and compressible. He swallowed without difficulty, but said it hurt him; his speech was thick; temperature, 100° at night. There was some exophthalmos; no marked change in the optic disc.

March 5th. Sensation was improved, but there was no increase of power. The right eye was just the same; the exophthalmos had increased. Some conjunctival ecchymosis appeared on the lower half of the eyeball. The left hand and arm were weaker.

March 8th. Numbness was still present all over. He could hear a watch tick when in contact with the right ear. The pain in the right temporal region was severe, and slightly paroxysmal. His mental faculties were quite clear.

March 10th. The exophthalmos was not so marked; the ecchymosis was disappearing. The sight of the left eye was now clear, and he could see slightly with the right.

March 12th. Last night he had very severe pain in the head, relieved by one-eighth of a grain of morphine. He had good sleep. He still discharged rather fetid pus from the wound in the palate.

March 15th. The paralysis of the left arm was much improved; sensation all over was still rather deadened, but mending.