which had a reddish-brown colour but no bad smell; poured them into the milk, which was then about the temperature of tea, and then poured it into an earthenware bowl; removed to a cold place during the night. On Wednesday, July 3rd, 9 A.M., the custard had become quite thin, of the consistence of cream. Poured it over 7 or 8 quarts of strawberries, about $1\frac{1}{2}$ quart of which had been gathered on the previous night. Whipped the whites of eggs used above with 1 lb. of sifted sugar and spread over strawberries and custard on glass dishes.

That the strawberries were the cause of the illness is negatived by the fact that three or four persons who used gooseberries and not strawberries with the custard were amongst the sufferers.

The inquiry is therefore narrowed to the question, Was the *matres morbi* in the milk or eggs? It would seem that some surprise was manifested by the custard remaining thin. When I first heard this fact I thought that the fluidity might be due to the liquefying influence which certain bacilli have on gelatine and albuminous matters, though the rapidity of their action in this particular case seemed surprising. I therefore had a custard made similarly to that described by the cook, and found that it remained as thin as rather thin cream. This want of consistency was, however, due to the albumin of the eggs not having been coagulated by heat, for when my custard was heated to near the boiling point (as should always be done) it became on cooling quite thick. That a highly poisonous substance (tyrotoxin) is generated in milk, not necessarily very stale, is well known. In the Limerick case the milk was at least two days old when consumed, as at 11 o'clock on the previous day it was skim milk of "the previous night." It was however boiled, and, after the addition of cornflour and sugar, again boiled.

The question is, could the milk in presence of sugar and cornflour have generated tyrotoxin from the time it was boiled at 11 o'clock on Tuesday until it was produced at dinner at 1 o'clock on Wednesday. The time of year was favourable to the fermentation of the unstable mixture. Suspicion falls stronger on the eggs. I have learned that they were market eggs and had been purchased four or five days before they were used. Though not putrid they were more or less stale, and one had a curious colour, described by one person as resembling that of claret. Now, after the addition of the eggs to the luke-warm milk, sugar, and cornflour, there was no further heating, and it is clear that the egg albumen was not coagulated. There is reason to believe that the discoloured egg was cracked and, if so, micro-organisms had access to its interior. The viscera of two of the ladies who succumbed to the attack were examined for ordinary poisons with negative results, but a substance was extracted from them which gave all the characteristic reactions of ptomaines. The quantity available for examination was altogether insufficient to differentiate the ptomaine or ptomaines present from others, of which there seem to be a very large number. I am not aware that in any case of ptomaine poisoning the ptomaine was extracted from the viscera and identified.

Another patient died on July 16th, thirteen days after partaking of the custard. The inquest was held same day, and the verdict given was in accordance with my evidence.

In this case it is much to be regretted that neither the custard nor the matter ejected from the patients on the first or even second day of their illness was available for bacteriological and chemical examination.

A case of poisoning from stale eggs is recorded by Dr. Marshall in the *Gazette Médicale de Paris*, 1839.

OBSERVATIONS ON THE ACTION OF THE LEE METFORD BULLET ON BONE AND SOFT TISSUES IN THE HUMAN BODY,

MADE DURING THE CHITRAL EXPEDITION.

BY SURGEON-LIEUTENANT JAY GOULD,
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AFTER the actions of Malakhand Pass, Khar, and Swat River, Major-General Alexander A. A. Kinloch, C.B., kindly allowed me to go into the surrounding villages, collect and treat Swatis wounded by the magazine rifle. After overcoming the suspicions of these tribesmen, I succeeded in

collecting some twenty-five or thirty cases, and herewith attach short notes of the most interesting of them:

CASE I.—A male, aged 25. The entrance wound was small, the edges cleanly cut and very slightly inverted. It was situated 2 inches below and behind the right great trochanter, and passed obliquely upwards and to the left through the sacrum. The wound of exit, above and behind the left great trochanter, was very little bigger than the wound of entrance; its edges slightly everted, but not lacerated. The sacrum was simply drilled; the bones were neither fractured nor splintered, the muscles and other soft tissues were apparently little damaged. With free drainage and the usual antiseptic precautions the patient rapidly recovered, and in about three weeks was ready to fight again.

CASE II.—A male, aged 18. The entrance wound was behind the internal condyle of the right arm. It was small, the edges cleanly cut and slightly inverted. It passed obliquely downwards and outwards through the olecranon and the upper part of the shaft of the ulna. The exit wound was 2 inches below the tip of the olecranon and half an inch to the outer side of the posterior border of the ulna. The olecranon was pierced obliquely, no fracture could be made out, and only very slight splintering of the bone. The damage to the soft tissues was trifling. Rapid recovery took place, with good movement of the elbow.

CASE III.—A male, aged 27. The wound of entrance was in the middle third of the inner aspect of the right thigh. It was small, the edges cleanly cut, and there was little inversion. It passed obliquely downwards and outwards through the extensor muscles, grooving slightly the front of the shaft of the femur. The exit wound was at the outer aspect of the thigh in the upper part of the lower third. The bone was not fractured, but a small amount of bone was removed in very small pieces. The recovery of the patient was rapid.

CASE IV.—A Mullah, aged 45. The entrance wound, small and sharply cut, was situated in the left submaxillary region, about the level of the hyoid. It coursed upwards and to the right, through the lower border and horizontal ramus of the lower jaw of the right side. The wound of exit in the lower part of the cheek was a little bigger than that of entrance and slightly everted, but its edges were not lacerated. The bone was not fractured, but the lower border was splintered, though not to any great extent; some small fragments were removed. The teeth were intact. The injury to the soft tissues was slight.

CASE V.—A male, aged 18. The entrance wound was 2 inches above the external condyle of the left arm; the exit wound exactly opposite on the inner aspect of the arm. Both entrance and exit wounds were small, and there was no laceration of skin. The bone was drilled, but not fractured or splintered. Recovery was rapid, the wounds being perfectly healed in fifteen days.

CASE VI.—A male, aged 35. The entrance wound was behind the surgical neck of the humerus. It passed backwards and towards the vertebral column, passing the axillary border of the scapula, and coming out over the centre of the infrapinnous fossa. The injury to the bone was slight. No splintering could be made out. The damage to the soft tissues was trifling. Recovery was rapid.

CASE VII.—A male, aged 20. The entrance wound in the upper third of the right forearm passed directly backwards through and to the outer side of the radius. The exit wound was opposite, on the posterior aspect of the forearm. Both entrance and exit wounds were small and sharply cut. The bone was not fractured, but slightly splintered, and several small pieces were removed. The damage to the soft tissues was slight. Recovery was rapid.

CASE VIII.—A male, aged 32. The entrance wound was at the anterior and inner aspect of the upper third of the right thigh; that of exit at the centre of the posterior aspect of the thigh 2 inches below the gluteal fold. Both wounds were sharply cut. There was no laceration or ecchymosis of the skin, and the damage to the soft tissues was slight. The bone was uninjured. Recovery was rapid.

CASE IX.—A male, aged 40. The entrance wound at the middle of the right forearm was small, the edges sharply cut, and slightly inverted. It passed directly backwards through the ulna. That of exit, on the posterior aspect of the fore-

arm was a little bigger. There was no laceration of its edges. The ulna was fractured, and slightly splintered. Some fragments of bone were removed. The damage to the soft tissues was slight. Recovery was slow, as the patient attended very irregularly, and allowed the wounds to get dirty.

CASE X.—A male, aged 17. The entrance wound was on the anterior aspect of the left forearm, in the lower fourth. It was small, and its edges sharply cut. It passed directly backwards through the lower extremity of the radius and out on the posterior aspect of the forearm above the wrist. The bone apparently was not fractured, but there was a slight amount of splintering, and a few small fragments were removed. The patient at the time of the report was making a good recovery; the movement of the wrist and fingers was fair, and improving daily.

CASE XI.—A male, aged 30. The entrance wound was at the anterior and posterior aspect of the middle third of the right thigh. That of exit was on the same level on the anterior aspect, the bullet passing outside the femur. The damage to the muscles, etc., was slight. Both entrance and exit wounds were very small, and there was no laceration of the skin. Recovery was rapid.

CASE XII.—Male, 75. The wound of entrance was at the inner and posterior aspect of the lower third of the right leg. It passed behind the tibia, through the fibula, and the wound of exit was on the external aspect of the leg on a level with that of entrance. The entrance wound was small, with sharply-cut edges; the exit wound a little larger, with edges slightly everted. The fibula was fractured and splintered, but not severely; several small fragments were removed. Recovery was rapid.

CASE XIII.—A male, aged 20. The bullet had entered through the left cheek below the malar bone, and found exit in the right cheek at the anterior border of the masseter muscle, and at a slightly higher level than the entrance wound. Both wounds were small and sharply cut. Both superior maxillary bones had been pierced, together with the nasal septum. The palatal process of the superior maxillary bones was uninjured. The second bicuspid and first molar teeth on the left side were loosened, and were subsequently removed. No splintering or fracturing of either bone could be made out, and there was little or no subsequent swelling or inconvenience. Rapid recovery ensued.

CASE XIV.—Male, aged 26. The wound of entrance was at the posterior aspect of the left shoulder below the acromion process. That of exit at the anterior aspect of the arm about 2 inches below the shoulder-joint. Both wounds were small. The edges of the exit wound were everted. The humerus was pierced below the head; a few small splinters were removed, but fracture could be made out. The soft tissues were apparently little damaged. Recovery was fairly rapid, with good movement of the arm.

CASE XV.—A male, aged 29. The entrance wound was over the left shin just below the patellar tubercle of the tibia. That of exit was at the back of the calf, 3 inches below the bend of the knee. Both wounds were small, and the edges sharply cut. The tibia was pierced, but not fractured, and there was a small amount of splintering. The soft tissues were apparently little damaged. During treatment there was a good deal of discharge. Two weeks after the wound was inflicted I enlarged the entrance wound, and removed two loose pieces of bone half and three-quarters of an inch long respectively. After this the discharge visibly diminished, and the patient made a rapid recovery.

CASE XVI.—A male, aged 17. The wound of entrance was at the outer side of the right arm, in the upper third. That of exit was at the posterior aspect of the arm, on the same level as that of entrance. Both wounds were very small. The edges were sharply cut, and there was no bruising or ecchymosis. The bone was untouched, and the damage to the soft tissues must have been very slight, as it healed up in a very short time. This man stated that he did not know he was hit, and that he had no pain at the time or afterwards.

CASE XVII.—A male, aged 40. The entrance wound was 3 inches above the ankle-joint, on the anterior aspect of the right leg; the exit wound was on the posterior aspect of the leg at the same level as that of entrance. Both wounds were small. The edges of the exit wound were everted. The tibia was pierced and splintered slightly, but there was no fracture

of the bone. The damage to the soft tissues was slight, and recovery was rapid.

CASE XVIII.—A male, aged 25. The entrance wound was on the outer side of the right thigh, about the middle, that of exit on the same level at the inner aspect of the thigh. The bullet had passed in front of the bone, not touching it. Both wounds were very small, and the whole damage very slight.

CASE XIX.—A male, aged 20. The entrance wound was at the anterior aspect of the left forearm, about 2 inches below the elbow-joint. The exit wound was on the posterior aspect at the same level. The bullet had passed outside the radius, but touched the bone, which on examination I found loose and rough. Two or three very small pieces were removed. The bone was not fractured. Only trifling damage had been done to the soft tissues, and recovery was rapid.

CASE XX.—A male aged 45. The entrance wound was just below the right malar bone, that of exit on the left side below the centre of the lower border of the zygomatic arch. The bullet had passed obliquely backwards from right to left. What course this bullet took I am not prepared to say, I could not pass a probe to any great length and found it utterly impossible to establish communication between entrance and exit. This patient had no severe symptoms, no pyrexia during treatment, and will soon be well and none the worse for being shot.

I have merely quoted in above cases the course of the bullet, giving in each case its effect on bones and soft tissues, purposely omitting details of treatment. Speaking generally my treatment of all cases of bullet wounds in the field is free drainage and surgical cleanliness, combined with as many antiseptic precautions as it is possible to apply in a field hospital on the move. The principal dressings used were iodoform in powder, boracic lint, and antiseptic absorbent wool.

There can be little doubt that from a humanitarian point of view the Lee-Metford rifle is a perfect weapon. The bullet obviously inflicts very little damage on the soft tissues and on bones its action is apparently not very severe, preferring rather to go through a bone than to badly fracture it. In one or two cases quoted the bone has been fractured, and in another case doubtful fracture. I am unable to state at what ranges these men were shot. Again I may have been unfortunate enough to treat only their slightly wounded cases, and the most unfortunate circumstance of all was my inability to get hold of any of their dead, open up the wounds and see what the actual effect of the bullet on bone is. These tribesmen almost invariably carry away their dead with them, and bury them rapidly.

From the little experience I have had in injury to bone tissue by the Lee-Metford bullet, I certainly think it causes but slight shock, and doubt its capacity of putting a man out of action. Instead of badly fracturing and comminuting the bone, it appears only to drill the bone and slightly splinter the edges. A hard bone like the shaft of femur it in all probability would fracture if it hit it fair, otherwise it would groove and glance off it. It apparently has little comminuting action even on the skull bones. How is it that this bullet does, or apparently does, so little harm? Is it that the small diameter, comparatively sharp apex and very hard thimble, combined with enormous spin and velocity, enable it to act as a rapidly working drill, and, consequently, simply bore a hole in the bone?

Very marked indeed is the action of the service bullet compared with Tweedie's, which is used for sporting purposes. In the latter the apex of the thimble is filed off, and its destructive effect on bone is enormous. On several occasions after shooting black buck and chinbara with a Lee-Metford sporting carbine, using Tweedie's bullet, I have dissected the wound, and found that the bones touched by the bullet were literally smashed in all directions.

On the strength of the few cases I have quoted and others still under observation I infer that the Lee-Metford rifle is an excellent weapon in every respect but one, that is, would it stop a rush?

S. J. AARONS, M.B., C.M., and W. Macrae Taylor, M.B. and C.M., have been appointed resident surgeons to the Edinburgh Royal Maternity and Simpson Memorial Hospital, and enter on duty on August 1st.