A line drawn from the source of the Tyne in Northumberland to that of the Kennet in Wiltshire, will cut through all the districts which lie on the back-bone of England, separating the eastern from the western watershed. Again, if we colour, according to their mortality, the districts along this elevated ridge, we shall find, with few exceptions, that they all indicate a very low mortality, especially along the northern portion, where the districts lie on the hard carboniferous limestone, and are fully exposed to the wind from both seas. The lowest mortality is to be found between Bellingham and the north of Staffordshire, the most exposed part of England.

From the north of Staffordshire another line may be drawn around Wales, which separates the coastal from the inland watershed: the latter includes the catchment basins of the Severn and the Wye. From one end to the other of this semicircular line is a continuous series of low mortality districts, all of which are the most elevated and most exposed localities in Wales, and their geological formation is the hard and unyielding Silurian rocks.

From Penzance to the South Foreland, another elevated ridge of an irregular course is seen; in the west of England it separates the northern from the southern coastal watershed, and in the east of England the south watershed of the Thames from the coastal river system. Along both these ridges we find again a continuous line of low mortality districts; and it is noteworthy that the most exposed, like those in Wales, have the lowest death-rate from cancer.

The ridge north of the basin of the Thames, which stretches from Warwickshire through Northamptonshire, Buckinghamshire, Bedfordshire, and Hertfordshire, to the north bank of the Thames opposite Gravesend, where the chalk appears, is again another instance of elevated site and a continuous line of low mortality districts. This ridge, with the southern one just described, and that portion of the central ridge of England in Wiltshire, entirely encompass the basin catchment of the river Thames and its oft-flooded valley. We have seen, therefore, that almost without exception the great ridges of England and Wales which determine the watershed of our country are the sites where the low mortality from cancer is almost invariably found. The most exposed, the most elevated districts, and those having a hard rocky foundation, are those where the very lowest mortality is to be found.

We must now turn our attention to the watersheds and river-basins and see what they indicate. In the first place, let us take the Severn and Avon, and the Wye included, within the main ridge of England and the circular ridge of Wales. Instead of districts coloured red, we find in all these rivers their courses are followed by high mortality districts; and that the most intense blue, or highest mortality, is to be found in those districts which, from the confluence of rivers within them, are most liable to be flooded. When a river cuts its way through a narrow defile in a hard obstructing rock, there we find the mortality lessened; the banks do not then admit of flooding.

Again, if we attentively look at the catchment basin of the Thames, we shall see how remarkably the high mortality districts group themselves along the course of the river and along those of its tributaries, forming the largest cancer field in England and Wales.

Going northward, if we trace the Trent and the great Yorkshire rivers, we shall find their courses characterised by high mortality districts, especially where they pass through a low and sheltered country, which offers facilities for flooding. Again, in Cumberland we have a remarkable group of high mortality following the rivers Eden and Derwent, and sheltered by the high ridges of the Northumbrian and Cumbrian hills.

Descending to the south, we see the Wiltshire Avon followed by high mortality districts; and the same is seen to be the case along the rivers of Devon and Cornwall, especially in the former county. Along Sussex and Hampshire, south of the ridge which forms the boundary of the Thames basin, the rivers there again are followed by high mortality districts, especially where the rivers are of any importance, and, from the nature of their courses, are liable to overflow their riparian districts.

Recapitulation.—We have seen that the analysis of the geographical distribution of cancer by the registration districts corroborates what was foreshadowed by the divisions, and more clearly defined in the counties: 1. That, geologically, the hardest and most elevated rocks are the sites where the least mortality from cancer is found; 2. That, along the river-courses which flood their banks seasonally, such as the Thames, the Severn, the Mid-Devon, and Yorkshire rivers, are to be found the districts in which the highest mortality takes place; and 3. That wherever, from the nature of the rocks forming the watershed, the floods are much discoloured by alluvium, and where from the flatness of the country the floods are retained and not easily drained off, there we find the greatest mortality from cancer among females.

RECOLLECTIONS OF WORK IN AN AMBULANCE.

By WILLIAM MAC CORMAC, F.R.C.S., Surgeon to the General Hospital, Belfast.

IV.

September 4th.—But few fresh cases were admitted on this day; and on this and the next few days we enjoyed a respite to a certain extent. The fatally injured had died, and we were able to discharge a good many—amongst whom were a few malingerers, fellows with trivial wounds of the hand and foot, who had contrived to elude our vigilance at the door. In consequence of this, the wards were not so crowded. We found time to number the beds, to assign them to different surgeons, to organise our nursing staff better, and to put our commissariat into good order. I devoted all the leisure time I could spare to taking short notes of the cases. These notes are, of course, very imperfect. It was very difficult to take them at all, on account of the little time there was available; and the difficulty was greatly increased by the patients being moved from one part of the building to another. My notes, too, do not include the cases of some patients who died during the first two days, when it was simply impossible for any record to be taken, as everyone was employed with other and more pressing work. Such as they are, however, the brief histories which I was able to take of our patients and of the nature of their injuries, is all that there is to form the basis of a surgical report of our work, and it is therefore a valuable record.

We tried to-day, for the first time, to get some letters conveyed to Belgium, in order that our friends might hear of our safety; and we sent off two of our corps to the Belgian frontier in order to go to Bouillon, the nearest post-town, where they were to post our letters and procure as much eggs, butter, fowls, vegetables, and other food, as they could. One of the gentlemen spoke French and German, the other neither. In place of going to Bouillon, they strayed into the road to Mézères, and soon fell in with the Prussian patrols, who considered it very strange that, while proposing to go to Bouillon for supplies for an ambulance, they should be striking straight for Mézères, a fortress, then as now, in the hands of the French. In short, they were looked upon as spies, and taken before the officer commanding. We only learnt, on the return of the party, how very great a risk they had run, for it appeared that one of the letters they carried contained matter tending to implicate a person in Paris as a Prussian spy. Only when about to be searched did our messenger recollect this document. He was certainly endowed with presence of mind, for, immediately feigning sickness and diarrhoea, he begged to see a surgeon, who administered a dose of laudanum. He got thirty drops, he said, though he would not have hesitated to swallow a hundred. He was then permitted to go aside, when he effectually disposed of what might have been the means of placing his life in very great danger. Our letters were afterwards given to an Englishman, an officer in the Prussian army, who promised to send them for us by an early opportunity; but up to the present time they have never reached their destination, and now, I suppose, never will.

During the day I took a walk for the first time. Standing on the ramparts just behind the hospital, we could see the late French positions for two or three miles. Dead soldiers and dead horses were still lying in great numbers on the field, and we could see a few burying parties at work. In the fosse at our feet and on the glacis the dead were lying in some places quite thick, and the heavy sickening odour that pervaded the air was very shocking. In the afternoon, Dr. Tilghmann and I rode over the battle-field. It was a sad, sad sight. For miles the ground was studded over with dead men and horses. Decomposition was setting in, which rendered the sight still more ghastly. In most instances the men were lying with arms and legs extended, generally on their backs, sometimes on their faces. Several soldiers had died preserving the last attitude they had assumed in life, with their arms raised, and as if holding a gun which they were about to fire. We passed the body of a poor officer who had died in a ditch after having had both legs amputated, and a dog watching the grave of his dead master. Next day I sent a person to find the dog and bring it to me, but my messenger failed to execute his mission—perhaps never tried. We passed along roads encumbered with guns and ammunition of all kinds, past houses burnt by the shells, went through gardens once beautiful—now a scene of utter ruin—everywhere the same desolation, and no life anywhere. The stillness during our ride that bright sunny autumn afternoon was oppressive; and the beautiful sky overhead formed a contrast to the earth beneath that afforded food for reflection. To-day I used the trephine in a case of depressed fracture with compression of the brain from effusion.

CASE XVIII.—This man had been struck at the apex of the occipital bone. He became violently delirious; the left pupil contracted to the size of a pin's point; the right was normal in size. The left side was completely paralysed, while the right arm and leg were in constant motion. After the depressed skull had been elevated, a quantity of grumous blood, mixed with portions of the brain, flowed away, and the patient became quite tranquil. But, as might be expected, the result was not very satisfactory. Of injuries of the head generally we have not many examples.

CASE XIX is interesting as being typical of the uncertainty both in diagnosis and prognosis often found in this class of injuries. Dupré, Captain of the 36th Regiment of Infantry, was struck by a ball which entered the crown of his kepi at one side, and, after making a *ricochet* off the vertex, came out at the other. There are the two holes in the cap in the flat oval disc which formed the upper surface of it, quite plain to see, as the cap was preserved. On examining the head, there was observed a contused wound at the middle of the sagittal suture. With the probe, the bone could be felt fractured and somewhat depressed. The patient was perfectly sensible, said he had no headache, and there was absolutely no symptom demanding interference. I thought it likely, from the oblique blow the skull must have received, and from the absence of any symptoms, that the fracture was not extensive, and that it would be wiser to let the patient alone. He got on quite well for ten days, never during that time suffering from a headache. Then he appeared to become stupid, and hiccough came on. On the 12th September, I made a crucial incision, through which were removed several loose pieces of the skull. I found the dura mater intact. This operation was not followed by any change for the better, and he died on the 18th September. No *post mortem* examination was made.

CASE XX forms a contrast to the last. It was one of simple scalp-wound, with exposure of the bone, received on September 1st. Neither fissure nor fracture was discovered in it; nevertheless, the right side of the body was completely paralysed. On the 10th September, the power of motion had partly returned to the arm, but the leg still remained paralysed. The man was discharged on the 22nd with imperfect use of the leg.

CASE XXI.—Chaumont received a small scalp-wound, exposing the bone. He died quite pyæmic, and with well marked trismus. I have not notes of any other cases of pyæmia following scalp-wound with injured skull; but it is a very frequent result in both military and civil practice. The principles on which to conduct the treatment of injuries of the head are so generally recognised as to need no allusion to them here. One point regarding which opinions vary somewhat is respecting depressed fracture, unaccompanied by symptoms, and with an external wound. When there is no wound, he would be a hardy operator who would cut down upon a depression in the skull, in the absence of any symptoms of compression. When there is wound, however, the case is different; but even here I question much if the surgeon should do more than simply remove loose fragments. Where depression of the skull and symptoms of brain-injury coexist, it may seem advisable to interfere. As a general rule, however, the largest proportion of good results will obtain amongst those cases where the amount of operative surgery has been at a minimum.

September 5th.—Every morning at six o'clock we hear the lively strains of martial music, with which the unfortunate French prisoners are daily marched out of Sedan, on their road to Germany. To-day I was annoyed to find that a cut I had received on the finger had become poisoned, and that the lymphatics up the arm were inflamed. I had a smart rigor, and felt very unwell for a day or two, but then I got quit of it; and, although I afterwards repeatedly jagged myself with needles, and had several cuts on my fingers, which were constantly dabbling in the offensive discharges from wounds, it seemed, strange to say, as if the first inoculation had procured for me future immunity, for I experienced no further trouble from that cause whatever. On account of the indisposition I felt, I went out for a walk towards Balan, when I first visited my amputation cases, which I had not seen since the battle. Dr. Blewitt had been taking capital care of them, and they were doing first rate. I then, with Dr. Frank, saw several of his most interesting cases. He had about one hundred and twenty patients, chiefly Bavarians, under his care, most of them at this time getting on well. They were distributed, part in the Mairie, part in the houses of the village; and it required Dr. Frank's and Dr. Blewitt's whole time (for they were alone) to attend to them. They just worked quietly all day long, and in that way succeeded in getting over their patients. They were at that time about to take possession of a beautiful château, belonging to the Comte de Fiennes—the château of Montvillet, in a lovely park, with nice old trees, an orangery, a splendid garden, and ornamental waters, round it. A more lovely spot I never saw. This château is at the now famous town of Bazeilles,

or rather what was once a town. When I saw Bazeilles, it was a heap of smoking ruins, with no living thing about. The sloping lawn of the château had been the scene of a fierce fight, and many were the wooden crosses dotted over it. Dr. Frank organised a hospital here, and the wounded soldiers treated there were in clover during their convalescence. It was beautiful autumn weather a good part of the time; and I saw them wandering about the orange-trees with their crutches or their bound-up arms or heads, or paddling about the lake in the pleasure-boat. Dr. Frank offered me the use of the place as a convalescent hospital for our secondary operations; but we found it impossible to manage it. Indeed, the country all round Sedan is very lovely, consisting of undulating hill and dale, with the Argonne mountains in the distance, and the Meuse meandering through the valley yet more than does the Meander itself. The natural beauty of the country serves only to throw out in blacker, more fearful relief, the horrible desolation of the battle-field.

CASE XXII.—That evening, before I returned to Asfeld, I assisted Dr. Frank to amputate the thigh of a poor *chasseur de Vincennes* named Lyon. He was only just brought in from the field, having lain in a trench, where he had been wounded, until that very day; and he said, I am sure with truth, that for two days before the battle he had not tasted food, and that he had had hardly anything since. He was struck by a Bavarian ball, which flattened itself out against the right femur a little above its middle, shattering the bone extensively. He said that for four hours after he fell he was under the hail of the *mitrailleuses*, whose fire passed just over him. The limb was greatly swollen and emphysematous in the neighbourhood of the wound; but his pulse was good, his face tranquil, and his courage prodigious. The first thing he demanded was a cigar; and this he continued to smoke until with reluctance he laid it aside in order to inhale chloroform. The operation was most beautifully performed by oval skin-flaps and circular division of the muscles. No blood was lost; and, although the amputation was through the upper third of the thigh, the shock was comparatively trifling. The first thing poor Lyon did, on rousing out of his chloroform-sleep, was to demand his cigar, saying that he might as well finish it whilst we were getting ready to cut off his limb. He went quite gaily to bed when assured that all was over; and, puffing his cigar the while, declared that he did not care how many of his legs we cut off. Such a man should have recovered, and every one was shocked and grieved to find symptoms of tetanus supervene on the fifth day. These increased in violence, and he soon died. No doubt the exposure and privations to which this gallant fellow was subjected, enough, as it were, to kill three men, were the important antecedent in causing the attack of tetanus.

Dr. Frank had two or three cases of perforating chest-wounds, in which, with marked temporary relief, he made counter-openings for the escape of fluid.

We had a very large number of wounds of the chest, about which there could be no manner of doubt that they were penetrating. As near as may be, half of them died, some from the immediate inflammatory consequences of the wound, some from mere exhaustion, and some from pyæmia. Two bullets were cut out of the back, as is elsewhere mentioned, in one of which a piece of clavicle was imbedded, while a portion of rib was found sticking in the other.

In three instances, the ball, which lodged in the lung, had traversed the centre of the deltoid muscle, and passed straight through the head of the humerus, before piercing the thoracic cavity. Of course, operative interference was not thought of under these circumstances. It would have been, I think, rather reckless surgery.

In some instances, the clavicle was fractured; in many, one of the scapular fossæ was perforated; and in one case both of these bones were fractured.

CASE XXIII.—Reyet, 3rd Chasseurs, was shot through the infraspinous fossa of the right scapula. The ball passed forwards and upwards, smashing the centre of the right clavicle as it emerged. In spite of so extensive an injury, the man rapidly recovered.

CASE XXIV illustrates the tenacity with which life clings to some persons. Captain Founel was shot through the left lung, and through the pelvis on the opposite side, with implication of the serous sac of the peritoneum. He was also shot through the forearm. Notwithstanding great difficulty of breathing, and acute peritonitis, along with pneumonia, he lived till September 8th. The lung was, however, completely traversed several times; and it appeared to give rise only to the most trivial symptoms after the first day or two. There was seldom—never, I believe—any hæmorrhage from these cases of chest-wound. Invariably there had been profuse hæmoptysis and difficulty of breathing, lasting often two or three days.

I am sure the plan so unhesitatingly denounced in the Report of the Surgeon-General's of the United States Army, is a bad one, and

worthy of the censure with which it is stigmatised; viz., hermetically closing such wounds. On the contrary, the better practice would be to make free counter-openings, and let the collection of purulent fluid, almost sure to supervene, have a ready means of escape.

We had a considerable number both of shell and bullet-wounds which traversed the walls of the chest without penetrating the pleural cavity. I have seen bullet-tracks ten, and even twelve, inches long, not causing penetration, or even fracturing the ribs, whose elasticity and freedom of motion must, to some extent, protect them. In several instances we had one or more ribs fractured, always producing more or less serious symptoms, and sometimes even death. We had a remarkable case in which a bullet traversed the axilla from behind forwards. The points of entrance and exit were such as to make it seem impossible that the great vessels and nerves could escape. Yet there was no damage done to any important part.

Of penetrating wounds of the abdominal cavity we had but few, and those few all died rapidly of peritonitis and shock. We were not tempted, as suggested by an eminent German professor, to perform an operation, as if for ovariectomy, to find out the perforated stomach, intestines, or liver, as the case might be, sew the wounds up, clean out the cavity of all clots and foreign substances, close the external wound, and then hope for a favourable result. I fear the hope would have to be deferred for a very long time.

We had several instances of wounds of the abdominal parietes without penetration. There was little that was peculiar about them, and it is sufficient to cite one example.

CASE XXV.—Blondel was sent to us from another ambulance on the 14th September, having been wounded by a fragment of shell on the 1st. Dr. Clarke extracted two large pieces of lead-casing, which had lain embedded in the abdominal muscles all that time, causing very little trouble. The patient soon recovered sufficiently to leave the hospital.

We had two or three examples of extensive subcutaneous ecchymosis of the abdomen and thighs from a shell-explosion, which did not cause other mischief.

In connection with abdominal injuries, the following cases are of considerable interest.

CASE XXVI.—Jean Allary, 5th Regiment of the Line, was wounded on the 1st September. The ball entered the outer side of the left thigh, three inches below the great trochanter, and slightly anterior to it. The wound of exit, much smaller in size, was situated a little to the left of the fourth lumbar vertebra. When the dressings were removed, a large quantity of fluid feces came away from both wounds, but chiefly the inferior one. The patient remarked that all he swallowed flowed the wrong way. When the abdomen, which was neither swollen nor painful, was pressed upon, the bowel contents could be made almost to jet out. In the course of a fortnight the wound in the loin closed. In three weeks exactly the feces ceased for a time to flow by the lower opening. This wound re-opened for a short time; but when the patient left hospital, on October 8th, the discharge had ceased, and he was quite convalescent. Allary was lying down when he was hit, and the ball must have twice perforated some portion of the descending colon without opening the peritoneal cavity.

CASE XXVII.—Was also an example of double fecal fistula. The ball entered near the apex of Scarpa's space on the left side, and emerged through the centre of the right buttock. In this example the rectum must have been wounded. It would be interesting to learn if any constriction followed upon recovery.

CASE XXVIII.—Hautefeuille, a young fellow of twenty-two years of age, a soldier of the 1st Marines, also wounded on the 1st September, was struck by a ball, which entered on the left side of the coccyx, traversed the rectum and bladder, and emerged just above the symphysis pubis. For a considerable time all the feces passed by the posterior opening, while the urine flowed entirely from the anterior wound. He recovered without a single unfavourable symptom. Both wounds had closed by the 18th September, and remained so until his discharge from hospital on September 25th, when he appeared as if nothing had happened to him.

In a Belgian ambulance I saw two cases of urinary fistula recovering without a bad symptom. In one the ball had entered just above the pubic symphysis; and, as it had not made its way out, the patient will probably have to submit to a future operation for the extraction of the bullet, as had a soldier during the American War, in whose bladder a piece of shell lodged. In the other case the ball entered just above the tip of the right trochanter major, passed through the iliac bone, and emerged a little to the left of the symphysis.

There were several other cases of similar injury which I did not see, and which, I was informed, were doing well. *A priori*, one would certainly not expect that such serious visceral lesions would produce so little constitutional disturbance.

CASE OF OVARIOTOMY: TUMOUR TORN AWAY FROM THE PEDICLE WITHOUT HÆMORRHAGE; NEITHER CLAMP NOR LIGATURE REQUIRED.*

By RICHARD H. MEADE, F.R.C.S.,
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ON May 20th, 1870, I saw, in Halifax, with Dr. Synnott, a lady suffering from ovarian disease, which she was anxious to have removed by operation. She was a married woman, aged 48, who had had several children. Menstruation ceased four years before, and she had noticed the abdominal enlargement (which commenced on the right side) for about two years. Her general health was good, and the distention of the body was not so great as to cause much interference with respiration. On examination, the abdomen was found to be filled with a thin fluid (fluctuation being very distinct), but the walls were not so tense as to prevent a large hardish tumour from being felt at the lower part towards the right side. On percussion, resonance was met with in the epigastric region.

I recommended tapping, as a preliminary measure, before any other operation was decided upon. This being agreed to, I introduced a trocar, and removed two gallons of clear yellowish ascitic looking fluid. After this had escaped, a freely moveable tumour, as large as a child's head, four or five years old, could be plainly made out, apparently springing from the right ovary. No untoward symptoms followed the tapping, but the abdominal cavity rapidly filled again with fluid; so that in five weeks she was about as large as before. The patient being still anxious to have something more done, I operated on June 24th for the removal of the tumour.

The patient being under the influence of chloroform, I made an incision about four inches long in the lower part of the linea alba; carefully opened the peritoneum; and evacuated nearly two gallons of ascitic fluid. On enlarging the opening in the peritoneum to the same extent as the external wound, the ovarian tumour at once came into view. I now directed an assistant to compress the abdominal walls with his hands, one placed on each side, so as to press the edges of the wound backwards; while I endeavoured with my hands to draw the tumour partially through the opening. In doing this, the walls of several of the small cysts of which the tumour was principally composed (being very thin), were ruptured by the pressure of my fingers; and a considerable quantity of thick brown fluid, like dark-coloured linseed-tea, escaped. The edges of the wound were so well compressed that none of this ovarian fluid was allowed to enter the peritoneal cavity. The tumour was now found to be firmly adherent to the free extremity of the great omentum; these adhesions were carefully and slowly torn through, and the whole mass was then easily drawn through the wound. It was now found to contain a good deal of heavy solid matter; and, on turning it over to examine its attachments, the pedicle, which was small and thin, to my dismay and annoyance at the time, gave way, and the tumour tore itself loose from its connexions. Fearing hæmorrhage, I kept hold of the remains of the pedicle, but very little bleeding followed; and I could find no vessel requiring ligature.

I kept a large piece of softened sponge applied to the torn pedicle, as well as to the adherent portion of omentum (which was much thickened) for fully a quarter of an hour, the abdominal walls being well covered up with hot flannels; I also had the actual cautery in readiness; but all oozing soon ceased; so I left the pedicle without any fastening, and proceeded to close the wound. I inserted a number of thick silk sutures greased with carbolic ointment (made by melting one part of carbolic acid with seven of lard) deeply through the sides of the wound; but *not* through the peritoneum. The line of incision was then covered with a piece of lint, thickly spread with the carbolic ointment; and over this a sheet of cotton-wool and a flannel bandage were applied.

The patient took chloroform very well, but retched slightly before the incision was closed. After she was placed in bed, and before the effects of the chloroform had quite gone off, I injected a sixth of a grain of hydrochlorate of morphia under the skin of the arm. The pulse was now rather feeble, but not quick, and she looked pallid and felt cold; but upon my seeing her again in an hour and a-half, I found her with a moderately full pulse of only 80 in the minute, and comfortably warm. There had been no more retching nor sickness, but she complained of abdominal pain: so I injected another sixth of a grain of morphia. On leaving, I directed that she should swallow nothing but a little iced water, with a few drops of brandy in it, if she were faint.

* This paper was announced to be read at the last meeting of the British Medical Association at Newcastle-upon-Tyne, but the author was unable to be present.