and the entire surface exposed to view. There may be some oozing of blood going on, or, more often, the mere exposure to air at once arrests any further hæmorrhage; and in some cases the exposed surface of the stump looks like sodden skin, showing a want of vital power and consequent failure to throw out granulations—the only process by which the wound can be filled up, aided of course to some extent by vital contraction in the surrounding parts. Any stimulating dressing in such a case as this now brings on a healthy condition on the face of the wound. A case precisely similar to the one described occurred in the Infirmary, where more than a pint of blood was lost in a gush. The tourniquet was at once applied, and I was sent for. By the advice of a very experienced colleague (the late Mr. Lowe), the artery was not tied, but the stump was opened in the way described. Not a drop of blood could be seen, merely the sodden surface just described. The large bleeding must have been from the surface; it was kept in by the dressings, had accumulated until the wound was mechanically distended by the large amount of fluid and could contain no more, when it suddenly burst through the coverings; and this led to the supposition that the main artery had given way.

In both these cases the wound healed rapidly under the usual applications, and without the use of carbolic acid or an invasion from those "septic germs" supposed by some to be such potent agents for mischief.

The healing of wounds is a subject which has lately been so prominently brought before the profession, that I cannot conclude these remarks without taking the opportunity of giving one more caution, which is, not hastily to accept the doctrines now taught by Professor Lister. Most of those present will, I think, agree with me, that there is nothing new in much of this system. There is nothing new in the attempt to convert a compound fracture into a simple one, by closing the external wound and excluding the air; and the same may be said of other wounds. There is nothing new in the "antiseptic" treatment; every one knows that antiseptics have been freely used by hospital surgeons for many years. There is nothing new in the doctrine that wounds can heal without granulation and suppuration: this doctrine was taught by Macartney in his lectures at the University of Dublin, and published in his work on *Inflammation*. Having been a pupil, and afterwards assistant, to that distinguished teacher, I was a convert to his opinions; and when I became surgeon to a large hospital, I fully carried out his views, and only gave them up on becoming convinced that they were untenable in practice.

What is really new is the carbolic acid treatment of wounds. This application will, I am confident, be found no better than other remedies of the same class which we already possess; it is either an escharotic, stimulant, or astringent, according to the proportions used; and I cannot but think that to "putty" over or by any other contrivance to keep in pus, which is, as it were, struggling to get out, is more likely to retard than to hasten the healing of a wound, and is opposed to one of the most important rules of surgery—always to promote the discharge of pus. This fluid, if allowed to remain, decomposes, in hot weather quickly, and then becomes the most frequent cause of pyæmia.

If the new system be true, then the principles of John Hunter are false; and the doctrines contained in Hunter's immortal work on *Inflammation*, accepted and taught by the best teachers in these countries during the present century, are entirely fallacious. Not alone the present able teachers in London, but the great men who have just passed away, men whose names shed a lustre on our own time, and whose recorded opinions influence the practice of surgery throughout the civilised world—Abernethy, Cooper, Lawrence, Brodie, Travers, and Bell—have taught and written what is erroneous. But it is not so; Hunter's principles will stand as the rule of practice in surgery long, very long, after the new system will have been pronounced by the profession as unsound in theory and erroneous in practice.

"Organic germs," with their most extraordinary performances, make up no small part of the new system. It may be true that there is an amount of animal and vegetable life in a minute form to be found in certain conditions of the atmosphere. But we know so little about those germs, their generation, conditions under which they live, or their influence in the generation or propagation of disease, that we can in the present state of our knowledge admit nothing more about them than that they are ready at hand to perform a part in any hypothesis which a fertile imagination may allot to them. Pasteur's opinions about these germs are being disproved in France, and the same fate seems in store for the startling announcement made by Professor Tyndall. The practical suggestion, to open an abscess with a hot knife to burn out these terrible germs, approaches so closely to the ludicrous, that I suspect the profession will not adopt it.

In conclusion, I take leave to say that nothing is further from my intention than to impute blame to any one. Accidents have happened and will happen to the best men. During a lengthened education, I

have seen them happen to those who deservedly stood high in their profession: but if the relation of these cases can save one life from similar accidents, and perhaps one sensitive mind from the reflection of having occupied the foreground in one of these sad pictures, then this chapter of accidents has not been read in vain.

RECOLLECTIONS OF WORK IN AN AMBULANCE.

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

VI.

September 12th.—All our tents were pitched: these were thirty-six in number. They were soldiers', not hospital tents, and calculated to hold eight persons each. We considered four about the proper number. They were spread over the hospital enclosure, now made clean, and trenches had been dug round them. We were distributing some of our cases amongst them, when the even tenour of our way was disturbed by the arrival of a message to prepare to receive a number of fresh cases, and forthwith the patients appeared, borne upon stretchers. The weather was as bad as bad could be, cold and stormy, and the rain came down in torrents, without a moment's cessation. The inequalities of the coverlets over the men served but to form receptacles for little pools of water. There were one hundred and thirty of these poor fellows, all French, sent up to us that fearful day. Some of them were in a truly wretched plight. These patients were transferred to us from the ambulance installed in the fine large building of the College or District Public School, previously occupied by the wounded French, who were removed by the German authorities to make room for their own wounded; and this was done, under the circumstances which I have detailed, in most villainous weather. These patients were not convalescents. There were amongst them two cases of tetanus. One of the patients died on the day of his arrival; two died the following day; several in three or four days afterwards. Some absolute necessity for it, or some adequate explanation, may be forthcoming of what certainly appeared to us at the time, and under the circumstances, a most unkind and cruel act. I, for one, should be delighted to receive some explanation. But, as it stands, the case seems to me to be a distinct violation of the Geneva Convention, since a wounded man becomes *ipso facto* a neutral, and should cease, so far as the doctors are concerned, to possess any nationality whatever. I would not dwell upon this topic, but that it had so direct and unfortunate an influence upon our own well-being. Upon the accession of so many fresh cases, the hospital became at once fearfully overcrowded. One hundred and five of the new-comers had sustained serious injuries, demanding in many instances severe operations; the remaining twenty-five were cases of fever and dysentery.

Very few days passed until the wounds of those previously under treatment began to alter in appearance for the worse. Secondary hæmorrhage became frequent; and, worst of all, some of our best and most promising cases of operation began to show symptoms of pyæmia. All the patients, in fact, sickened more or less. The difference was felt even amongst the staff; for one and all of us got attacks of some sort of illness. One had severe diarrhoea, another a feverish attack, a third violent headache, a fourth an attack of vomiting, and so on. Dr. Sims alone was exempt.

There can be little doubt that the overcrowding which we suffered from at this time was a most potent cause in inducing an increased death-rate. For instance, in thirty-three cases death arose from acute pyæmia, in its most typical form of rigors, drenching sweats, diarrhoea, jaundice, and finally death; the *post mortem* examinations revealing abscesses, often in the joints and limbs, but more frequently in the liver and lungs, never in the spleen or kidneys. Without doubt, the agglomeration of bad cases has, whatever else may have, a good deal to say to the production of pyæmia. That many other deaths were due to the same cause I am very certain, although it has not been so noted.

Amongst those admitted during the first two days of September, and those sent in on the 9th, 10th, and 12th, the deaths from this cause were about equal, namely, seventeen of the one class, and sixteen of the other. It is perhaps noteworthy that of the seventeen deaths from pyæmia, occurring amongst our original patients, twelve took place between the 21st and 27th days of the month, seven of the twelve being on the 21st and 22nd September. Again, eight of the sixteen deaths from pyæmia amongst the patients admitted from the 9th Sept. to the 12th September took place also from the 20th to the 27th of the month, five of the eight being on the 20th, 21st, and 22nd September. Assuming the duration of a case of acute pyæmia to be from ten to fourteen days, this would determine the commencement of the disease

as the very time at which we were encumbered with the influx of new cases.

I am aware it is rather dangerous to draw large deductions from limited premises; but it is a fact well worthy of remark, that so many as twenty of the thirty-three noted deaths from blood-poisoning took place within a very few days of each other, and that twelve of the twenty occurred within a few hours of each other. If the disease run an approximately fixed course as to time, the inference clearly is that it commenced in these different cases about the same date; and other considerations fix that date as being from the 9th to the 12th Sept., when the large numbers of fresh patients were crowded in upon us.

In the large majority pyæmia was found to arise only in those cases in which the bone had been injured, or in which amputation had been performed. It was far more frequent also after secondary than after primary amputations.

Before proceeding to consider wounds of the extremities, with or without fracture of the bone, necessitating in some cases amputation, in others resection, I should wish to narrate briefly the particulars of some other cases of pelvic gun-shot injury.

CASE XXXVI.—Lieutenant Sécheras, Chasseurs-à-pied, was struck by a ball on September 1st. The point of entrance was three inches below the tip of the great right trochanter, but a couple of inches anterior to the bone. The point of exit was almost symmetrically placed on the opposite side, being three inches below the tip of the left trochanter. In place of being in front of the femur, it was two inches behind the bone. The urethra was wounded, but not completely divided by the ball. There were frequent fits of retention of urine, and the greatest difficulty was experienced in introducing the catheter. The laceration, which was in the lower wall of the urethra, could be distinctly felt while the instrument was being passed. The particular charge of this case, as well as of the other wounded officers, was entrusted to Dr. Tilghman, than whom none could be more faithful or intelligent in the discharge of his duties. He conducted the case to a successful issue, and this officer left the hospital quite convalescent, and warned of the necessity for combatting the tendency to stricture which must inevitably ensue after a contused wound of the urethra.

In two other cases, where the upper part of the thigh was pierced, a large part of the scrotum was torn off; in one case the testicles were not injured, and in the other the corpora cavernosa were almost completely divided, the urethra being left intact. Recovery took place in both.

CASE XXXVII.—Colombain, a soldier of the line, was struck by a bullet just over the right anterior superior spine of the ilium. He must have been carrying his watch just at the place where the ball struck, for it was carried bodily into the wound. Dr. Duncan extracted portions of the watch and of cloth over the sacro-iliac synchondrosis on the same side. Unfortunately, the watch was not in such a state of preservation as to be of much further use as a time-keeper. The man made a good recovery, and was discharged convalescent from hospital.

We had altogether 124 cases of injury to the upper extremity, 18 of which terminated fatally. These may be analysed and tabulated in the following manner.

	Cases.	Deaths.
Wounds around the shoulder not penetrating the joint ...	7	0
Penetrating wounds of the shoulder-joint ...	7	3
Wounds around the elbow-joint not penetrating ...	1	0
Penetrating wounds of the elbow-joint ...	14	6
Gun-shot wound of arm without fracture ...	22	0
Gun-shot fracture of arm ...	25	9
Gun-shot wound of fore-arm without fracture ...	8	0
Gun-shot fracture of one or both bones of fore-arm ...	12	0
Gun-shot wound of hand with and without fracture ...	28	0
	124	18

The operations which these injuries entailed were as follow:—

	Operations.			Deaths.		
	Prim.	Sec.	Tot.	Prim.	Sec.	Tot.
Disarticulation at shoulder-joint ...	2	0	2	2	0	2
„ elbow-joint ...	0	2	2	0	2	2
„ wrist-joint ...	2	0	2	0	0	0
Amputation of arm ...	19	1	20	8	0	8
„ fore-arm ...	3	0	3	0	0	0
Partial amputation of hand ...	11	0	11	0	0	0
Resection of shoulder-joint ...	1	1	2	1	0	1
„ elbow-joint ...	6	3	9	2	2	4
Double resection of shoulder- and elbow-joints in the same arm ...	0	1	1	0	0	0
Resection of three-fourths of ulna ...	1	0	1	0	0	0
Total.....	45	8	53	13	4	17

There were besides two instances of double amputation in the upper extremity: in one case, the arm and fore-arm were removed; in the other, amputation of the arm and disarticulation at the shoulder were performed: both patients died.

On the whole the recoveries, both after wounds and from operations, in injuries of the upper extremity, are, as might be anticipated, exceedingly satisfactory for military practice. The proportion of deaths, both after amputation and resection, was comparatively small, and the patients recovered well, with scarcely any exception, from simple flesh-wounds. The proportion of deaths in the fractures of the upper arm seems very high, but in many of the cases so noted amputation had subsequently to be performed. While on the subject of gun-shot fracture of the upper arm, I should like to notice the triangular cushion used by Stromeyer, that veteran authority in military surgery, for the treatment of these fractures. He has observed, he told me, the excessive danger which exists of producing gangrene, or other unfavourable result, when any constricting apparatus is applied to the fractured upper limb, and he says there is a fatal facility for gangrene to occur if any tight bandaging be applied, and the circulation materially interfered with. The cushion is a right-angled isosceles triangle, four inches thick at the apex, which rests against the chest and supports the elbow, the fore-arm being bent at a right angle with the arm; the cushion gradually thins down till the base is a mere edge; and of the other angles, one is passed up into the axilla, while the other rests on the chest under the wrist. The cushion is readily fastened in its place by a tape round the neck, and once round the body. When this cushion is applied, the arm rests upon it, beautifully supported, and in excellent position. Whilst lying in bed, nothing beyond the ordinary dressings are required for the wound; and if the patient need to be transported from one place to another, or is fit to walk about, this can be arranged with the utmost facility, as cushion, arm, and all can be bound by a broad bandage to the body, and thus form an immoveable whole. Stromeyer himself told me that, so highly did he estimate the value of this cushion, he considered it the most valuable thing he had invented during his life, which is very strong language from a man who, like him, has done so much for surgical science.

I have tried this mode of treatment myself and found it answer every purpose. The cushions are very readily made, and can be manufactured of different sizes; a very good size is one where the sides measure about fourteen or fifteen inches in length.

Stromeyer's Cushion for Gun-shot Fracture of the Humerus.

I may here put upon record one or two of the more interesting cases of injury of the upper extremity which fell under our notice.

CASE XXXVIII.—Roux was wounded on the 31st August by a fragment of a shell striking the front and outer part of the left shoulder. The greater portion of the pectoralis major was torn away, and part of the deltoid muscle, leaving between the two a species of bridge of skin and other tissue. Most of the deltoid was in fact divided across, and the wound in front was a deep hole five inches in diameter. The shoulder-joint was fully opened, and the head of the humerus somewhat comminuted. The first and second stages of the axillary artery were exposed, and the beating of the great humeral vessel was very distinctly seen. The clavicle and the scapula were not broken. This patient was treated in a very simple manner. All loose pieces of bone were removed, both at first and whenever they were disposed to exfoliate. The wounds, which were of enormous size, were carefully dressed and attended to by Mr. Hayden, who deserves great credit for the painstaking attention

which he bestowed upon this, and indeed upon all the other cases of which he had the care. Pieces of bone from time to time came away, and the wounds began to fill up. Three weeks afterwards, the report states that the patient had been getting on admirably, and was then all but convalescent, and that the expectant mode of treatment had proved most satisfactory. The Dutch surgeon under whose care he was left wrote to me a report up to November 21st of this and the other cases left behind, and I am sorry to chronicle an unfortunate issue to this case. "Roux" he writes, "died a few days ago. At first he was doing nicely. The caput humeri, and also a large piece of the humerus, became loose, and had been removed; the wounds had filled up with good granulations, but an attack of fever and diarrhoea soon made an end of him." His death, therefore, could not at an interval of ten or eleven weeks be attributed, except indirectly, to the injury from which he was then rapidly recovering.

CASE XXXIX.—I mention this case not for its surgical so much as for its psychological character. Payer, a private soldier in the 50th Regiment of the Line, received a gun-shot wound which traversed the left wrist-joint, shattering the bones so extensively as to render resection of the joint impracticable. The soft parts were also a good deal injured. I amputated in the middle of the fore-arm, and the patient was removed to the next ward to bed. I may here mention that all our operations were performed at the end of one of the wards opposite the large window, and in the presence of a number of the patients; for, since all the beds, for a considerable time at best, were full, we could not empty any portion of the hospital to make an operation-theatre. This operation was performed on September 1st, and during that entire day we were exposed to the heavy fire of the Prussian batteries just opposite, whose shells often struck, but fortunately never entered, the hospital-building. The constant whizzing of the shells in our ears was anything but reassuring. But, to return to our patient: in about ten minutes after he had been sent to bed, he left his own ward and returned to the operating-ward, where we were administering chloroform to a poor fellow whose leg required amputation. We were all amazed at Payer's *sang froid*. He asked for a cigar, which he commenced to smoke, and chatted to those around him unconcernedly. We could not persuade him to return to bed. As we had not any time to lose, he was allowed to remain. He inspected all the steps of the operation with much interest. He said he could not understand in his own case why he had felt no pain, and he wanted to see how such a feat of magic was accomplished. After he had seen the stump put up, he returned to bed perfectly satisfied. It is perhaps unnecessary to add that this young man rapidly recovered. His wound healed by the first intention almost, and he left the hospital on the 22nd September.

I do not think I have anything to note about amputations of the arm. They were generally performed with oval skin-flaps and circular division of the muscles. In respect of the mortality after this operation, we find, as before stated, that it is large. The cases of double amputation were both fatal. In one curious case, the same ball traversed both arms without injuring the trunk.

ACTION OF HYOSCYAMINE AND DATURINE.—MM. Oulmont and Laurent, having made a number of experiments on the action of hyoscyamine and daturine, sum up the results at which they have arrived as follows. 1. Hyoscyamine and daturine act specially on the great sympathetic nervous system. 2. In small doses, they reduce the capillary circulation; in large doses, they produce paralysis of the vessels. 3. The arterial tension is increased by the administration of weak, and is diminished by poisonous, doses. These results are not modified by section of the pneumogastric nerves. 4. The frequency of the pulse is increased, and their fulness diminished. 5. Hyoscyamine renders the movements of the heart regular; daturine often produces intermittence and arrest of action. When applied directly to the heart, these alkaloids diminish the frequency of the beats, and produce complete arrest of the heart's action. 6. Hyoscyamine and daturine always accelerate respiration. 7. Hyoscyamine and daturine have no direct action on the nervous system of animal life. Sensation and motor power are not modified by them. In toxic doses, they blunt cutaneous sensibility. 8. These alkaloids have no action on the excitability of the striated muscles; they do not modify their structure. 9. In small doses, they accelerate the movements of the intestines; in large doses, they paralyse them. 10. The general phenomena observed when these alkaloids are given are due to modifications of the circulation, and disappear rapidly. The alkaloids are soon eliminated, especially by the urine, in which they may be found. 11. The dilatation of the pupil which is produced is due to stimulation of the sympathetic; the third pair of nerves is not concerned in its production. 12. Small doses generally give rise to slight increase of temperature; large doses diminish the central temperature.—*Archives de Physiologie*, No. 3, 1870.

NOTES ON THE EPIDEMIC OR RELAPSING FEVER IN LIVERPOOL.

By ROBERT GEE, M.D., M.R.C.P.,
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VII.

I WILL now refer, in a cursory manner, to the etiology of the epidemic. That relapsing fever, as its synonym *famine-fever* would imply, is dependent on destitution, is not borne out by our recent invasion. There have been seasons of great distress without the appearance of the disease; and while it has prevailed there has been no excess of poverty among the labouring classes. In a large town with a fluctuating population, having uncertain or intermittent occupations, and of improvident habits, there must at all times be a great amount of poverty; and this, unfortunately, is the normal condition of the mass in the low district of our town. [That it has not been excessive, is evident from the following return, supplied by the relief department of this parish, of the average number of paupers chargeable for four weeks in each of the following months.

	1867.	1868.	1869.	1870.
April	13,592	14,109	12,387	11,366
May.....	12,528	12,966	11,294	10,691

This table shows that there was a decrease in 1870 as compared with the previous years. This statement is corroborated by the patients who have been admitted into the Hospital, and by their condition on admission. With very few exceptions, they presented no emaciated appearance; and, though their clothing was poor, their bodies were generally well nourished; and only twelve per cent. acknowledged that they had been what is called "badly off". There are thus three sources of information or grounds for an impartial judgment on this point; viz., the records of the parish relieving-offices, the condition of the patients, and the statement of the sick themselves. To these may be added the testimony of Mr. Canning, the superintendent relieving-officer, that the majority of applicants for hospital admission-orders were not persons in receipt of parochial relief; they belonged to that class who were able to gain their own livelihood, but who, through want of thrift, had no means to fall back upon in case of illness; and, consequently, when attacked, became for the time objects for parochial relief. That relapsing fever is a *hunger-pest* must, therefore, as far as the present epidemic in Liverpool is concerned, be disclaimed.

Overcrowding prevails here to a lamentable extent; the houses being too closely packed together, and too densely occupied. Interested owners and builders have, in time past, converted what should have been gardens or yards into sites for the erection of court-houses—hence the number on a given area is something alarming when viewed from a sanitary stand-point. These courts are destitute of adequate means of ventilation, being surrounded by high walls or the backs of neighbouring houses, which serve the double purpose of preventing the free circulation of air and of excluding the light of day. The health-authorities, under the advice of Dr. Trench, the medical officer of health, have demolished some of these courts and have opened up others, whereby more ventilation and light are secured to the occupants. If the construction of our courts be objectionable, the practice of overcrowding *within* the houses, carried on as it is to a great extent, is still more so; the inevitable result being the moral and physical degradation of their occupants.

Drunkenness must be added to the list of depressing agencies rife in Liverpool. The practice of dram-drinking is prompted, to a great extent, by the unhealthy state of the atmosphere which many are compelled to breathe, and, when once established, leads inevitably to drunkenness, followed by poverty and its long train of disastrous results. These act and re-act on each other until the individual is degraded to the lowest possible condition. Drunkenness gives rise to poverty and filthy habits, and necessitates a residence in unhealthy, overcrowded, dark nooks; while these, on the other hand, engender a craving for stimulants which, under the circumstances, cannot be withstood.

Want of cleanliness, both in the houses of the poor and in the streets and courts of the town, has had its full share of the responsibility of the epidemic. The state of both is truly deplorable, notwithstanding the large amount of money annually expended on sanitary measures; but the inhabitants are more culpable on this score than the Corporation. The efforts of the sanitary officers are greatly frustrated by the filthy habits of the people with regard to the exterior of their dwellings, whilst the internal arrangement of the households, with the exception of those of lodging-houses, cannot be interfered with by them.

That overcrowding, the faulty construction of courts and dwellings, drunkenness, and filthy habits (bad drainage or an insufficient supply of