

TEACHERS." The battle of Waterloo was won by the men—loyal to their commander, loyal to their officers, loyal to their comrades—will any one deny that these men were weak individually? It was their loyalty which gave them strength, self-reliance.

Socialism in the highest sense is based on individualism—the best Socialist is the man who does his duty as an individual. Self-reliance and true service are foster-brothers—have both and this college is strong. Like the Highlanders at Waterloo be able to form a square the type of loyalty to one another, or, as at Balaclava, a "thin red line" where self-reliance was their mainstay. Cherish both faculties as your dearest birthright. Let the teachers encourage self-reliance in their students, let the students practice loyalty to their teachers and their school, and the Dick College will more than hold its own as a great Scottish centre devoted to the advancement of veterinary science and the practice of veterinary medicine and surgery.

ANTISEPTIC SURGERY.¹

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TWENTY years ago, in the early seventies, Professor, now Sir Joseph, Lister was fighting almost single-handed the cause of antiseptic surgery.

Although he had been working for years against discouragements that would have dismayed most men, his enthusiasm sustained him, while the certain knowledge that he was right and that truth must ultimately prevail kept him on his course.

The principles he then taught were not even accepted in the school in which he was teaching except by a few of the younger men, while the older and better known surgeons, if they did not treat the system with open contempt, did all they dared to discredit it.

As indicating the manner in which the system was then regarded by the Medical World I will quote an extract from an editorial in the *British and Foreign Medico-Chirurgical Review* as late as July 1874. In referring to a discussion on the pathology of septicaemia and allied diseases, which had taken place at a meeting in London a short time before, it said :—"Among the London authorities at the debate alluded to, the 'germ theory' was at such a discount that not one could be found to advance it or even allude to it. Contempt for its pretensions or the fear of the ridicule which weaker brethren might attach to it must have been the cause of reticence so unanimous. A mere uncertainty as to its truth or falsehood could hardly, in an age and profession so pre-eminently tentative, have effected so curious a manifestation."

It could scarcely be believed by those who were not conversant with the great controversy at the time that what was then termed the "germ theory" could have been treated, in any assembly of medical men, as unworthy of serious consideration so late as 1874.

But 20 years have worked great changes. These 20 years have revolutionised surgery.

¹ A Paper read before the Border Counties' Veterinary Medical Association, Nov. 1893.

Lister had able co-workers in Pasteur, Beale and Tyndall. And he would be a bold man who would stand up to-day, in any assembly of surgeons in the world and openly declare his unbelief in the "germ theory" of disease. If an unknown man his ignorance would be considered only equalled by his presumption, and if a well-known man there would probably be many wise head-shakings and whisperings of fears regarding the condition of his mental equilibrium.

The bitter discussions which took place regarding the system for many years, and the fierce antagonism by which it was assailed from nearly all quarters only served to throw on it a brighter light and bring it more prominently into notice. And all the time that it was meeting with so strong opposition it was slowly but surely influencing and modifying the practice of every surgeon who kept himself in touch with the politics and literature of his profession. Aye, even of its bitterest opponents. It might be unintentionally, often perhaps unconsciously, but it was having its effect in the greater attention to cleanliness, to the drainage of wounds, to the use of antiseptic substances known to prevent decomposition and putrefaction of animal fluids, in attention to hygiene or cleanliness in the surroundings of the patient and the presence of abundance of fresh air.

The treatment which Professor Lister then elaborated was based on the belief, now generally acknowledged as fact, that the suppurative and putrefactive changes that take place in open wounds are of a fermentative nature and due to the action of living organisms which gain access to the wounds from the outside.

At that time it was believed that these particles mostly gained access to wounds through the medium of the atmosphere, and hence the introduction of the carbolic spray. It is now known that ordinary atmospheric air, where ventilation is good and hygienic measures thoroughly attended to, is comparatively harmless, that the living organisms it contains are mostly innocuous or non-pathogenic, and that the deleterious or septic organisms mostly gain access to wounds by contiguity of texture from the adjoining skin or are introduced by means of dirty instruments or hands.

But so much opposition was manifested that after the recognition of the principles was spreading and the advantages of the antiseptic system could no longer be ignored, the system of treatment introduced by Professor Lister was branded as Listerism, as something apart and altogether distinct from antiseptic surgery, which it was held could be carried out in all essential particulars without being tainted by his methods. They either failed to see, or attempted to ignore, the fact that all that the great apostle of antiseptic surgery was contending for was the recognition of a principle, and that the method of putting it into practice was only a matter of detail. I have no doubt Professor Lister was, and is yet, very pleased to avail himself of every hint from whatever quarter, and every advance in the practice of others that would enable him to simplify the details of his treatment.

In an address delivered only this year, and in reference to the general harmlessness of atmospheric germs, he says:—"Hence we may dispense entirely with irrigation, either in the form of spray, which was a kind of irrigation, or in any other; in fact our operations may be performed with the same simplicity as in former years."

However, open opposition has long ago disappeared. But in this connection it is only right to acknowledge a debt of gratitude to the Germans, who accepted the "germ theory" and the antiseptic system of wound treatment with much greater readiness than they were received with in Britain. The system certainly made more rapid progress in our own country after it was seen how cordially it was received and adopted by the leading surgeons of Germany.

By its adoption in its entirety sloughing phagedæna or hospital gangrene was absolutely banished from the hospitals; while erysipelas, pyæmia, and other septic processes became of much more rare occurrence.

The reasons for this became more apparent year by year as it was gradually proved how dependent these processes were for their inception and development on the presence of living micro-organisms.

A great stimulus was given to the investigation of these subjects when a townsman of mine, Dr Alexander Ogston of Aberdeen, published his observations on the presence of micrococci in acute abscesses in 1881-1882.

It set bacteriologists and pathologists everywhere to investigate the causes of suppuration, until the proofs are rapidly accumulating to show that suppuration cannot take place even in deep-seated abscesses without the presence of living organisms.

Therefore the beneficial effects of antiseptic remedies in the treatment of suppurative processes becomes much more easily understood.

Since the introduction of the antiseptic system many a limb has been spared and many a life saved that would previously have been sacrificed, and undoubtedly much more good has been done by preventing serious complications than in remedying grave conditions when already present.

But in the treatment of diseased joints; in resections of joints and ununited fractures; in the treatment of inflamed and distended bursæ; in the evacuation of large sub-acute abscesses, especially in connection with bone, and in empyema; and above all in the region of abdominal surgery, the revolution it has effected has been extraordinary.

But you will ask, what has all this to do with us as veterinary surgeons? Resection of joints and the opening of psoas abscesses are possibly of great interest to the human surgeon, but how can you expect them to prove either interesting or instructive to us? Well, I expect that if they prove instructive they will also be found interesting, and possibly we may be able to derive some useful lessons from them.

Although our profession has not been slow in improving its methods and elaborating and perfecting the details of operations and treatment, it has been mainly dependent on the sister profession for its principles in the past. Nor need this surprise us considering the much greater value of human life, the much larger numbers engaged in the practice of human surgery, and the hitherto incomparable opportunities afforded for their education and training.

In this country we labour under a considerable disadvantage compared with continental countries, where the veterinary schools are mostly subsidised by the various governments, and in fact are generally

state institutions; whereas our veterinary schools, although partly controlled and assisted by corporate bodies, are in the main due to private enterprise. And if we have no British names in our profession fit to rival those of Bouley and Chauveau, we can comfort ourselves with the assurance that it is advancing rapidly, that it no longer requires to be indebted to the sister profession for its physiology or pathology, and that it is being daily more and more recognised as a power in the state.

Although the antiseptic system cannot be employed in veterinary surgery to the same extent and with the same confidence as in the human subject owing to the much greater difficulty in maintaining dressings in position, and the want of the intelligent assistance of the patient in avoiding contamination of the wounds, still there are many cases in which it can be beneficially employed.

Take *e.g.*, the old operation of tenotomy or division of the flexor tendons for the relief of contraction and knuckling forwards at the fetlock joint, as practised by the late Professor Dick and by his father before him. Primary adhesion of the edges of the cuticular wound was never anticipated, suppuration invariably took place, and the wound healed by granulation.

This usually required a month or six weeks with daily dressing of the wound, while it generally resulted in considerable thickening, matting together of the tissues, and blemishing at the seat of operation.

When the benefits of what is termed "subcutaneous operation," came to be better understood and appreciated, the advantage of making a small incision was seen, and an endeavour was made to obtain healing of the skin wound by first intention. This was perhaps more frequently a failure than a success, which is not surprising considering that the causes of failure were only imperfectly understood. No attempt was made to cleanse and disinfect the skin, to insure the asepticity of the tenotome, or prevent the subsequent contamination of the wound.

A subcutaneous operation is "par excellence" an ideal aseptic one. If the skin is unbroken and the tissues healthy the skin forms a very efficient protective and dressing for the major operation, and we have only to consider the treatment and protection of the small cuticular incision.

Leaving out of consideration meantime, as unnecessary in the present connection, any preparation required for the foot or adjustment of shoe, we will inquire how our operation ought to be conducted in order to insure as far as possible the asepticity of our operation and consequent rapid healing of our wound.

Have the hair clipped off over the seat of operation and for several inches around, as bare as possible, and the leg well washed with soap and warm water.

This ought to be done before the horse is cast for operation. The part is then disinfected by being well rubbed with a reliable antiseptic solution, say 1 in 20 carbolic lotion. A tray, basin, or vessel containing a 1 in 40 solution should be at hand to lay our instruments in, and in which our fingers ought to be dipped when we have reason to touch our wound or its neighbourhood. Our hands should be thoroughly cleaned previously with the same strength of

wash as is used for cleaning our patient's skin, and as those engaged in general practice can seldom be sure that their hands may not be contaminated by septic organisms it is better to use a nail brush with soap and warm water freely first, and also to use it in applying the antiseptic.

All this having been attended to and our animal having been secured, we make an incision through the skin with a sharp-pointed scalpel, parallel to the long axis of the limb and opposite the front of the flexor tendons. A small wound not over half an inch long is quite sufficient. It is better to choose a point for our operation below the junction of the subcarpal ligament with the perforans tendon. As a rule there is not the same amount of inflammatory thickening and matting together of different parts as there is higher up. When there is not much inflammatory thickening there is no necessity to use the sharp-pointed scalpel farther than to make the skin incision. Little force is required to push a probe-pointed tenotome either subcutaneously behind the tendons or through between the tendons and the suspensory ligament. In the event of pushing it subcutaneously behind the tendons there is less risk of running the point of the instrument through the skin at the opposite side, while the very slight sawing motion of the knife required, if the movements are very short, are not likely to divide the blood-vessels. If there is no matting together of the vessels by inflammatory adhesion they are comparatively loose, roll when touched with the knife, and so escape injury; while the tendons, being taut and resisting, are easily cut, and give way with a snap when divided.

As soon as section is accomplished the divided ends retract, leaving a space of from $1\frac{1}{2}$ to 3 inches, and at that moment air is apt to rush in to fill the space left vacant by the tendons. Although there is little reason to apprehend any risk from this, it is advisable to try and prevent it. As soon as the tendons give way the knife should be turned on its flat while the thumb and forefinger compress the skin at the edges of the incision against it.

After the ends of the cut tendons retract some bands may usually be felt tightly stretched under the skin, and one is tempted to apply the knife again. But don't. The tight bands are the vessels and their sheaths now rendered tense by the retraction of the tendons, and being tight the least touch with the knife will now divide them. If the tendons have retracted $1\frac{1}{2}$ or 2 inches there is little fear but everything necessary has been divided.

As the tenotome is carefully withdrawn the thumb should be kept over the wound until a pad of tow squeezed out of 1 in 20 carbolic lotion is applied over it. This tow should overlap the wound in all directions for several inches, but especially below where any discharge is likely to find its way. A considerable pad of teased oakum should be applied over this, extending round the back and both sides of the leg to keep the tendons in line with the centre of the limb and not press them to one side. This must be kept in position by a bandage, and the whole leg bandaged from the foot to the knee. If there has not been any large vessel divided there will be no necessity for looking at the wound for a week, by which time, if the operation has been thoroughly successful, the skin wound will be found healed, and no swelling or inflammatory appearance about the limb.

The gap left between the divided ends of the tendon will be filled up, and if the bandage has been pretty firm may not be any thicker than the original tendon. As the new material is still unable to bear any strain, the bandages should be re-applied after dusting the region of the wound with an antiseptic powder and applying a thin layer of antiseptic tow over it.

Now, although division of the flexor tendons is not an important operation as far as difficulty of performance is concerned, it is a comparatively serious one for the animal. But I have only selected it to show the benefits of the antiseptic method of treating wounds, as in this operation there is little difficulty in getting asepticity effectually maintained.

Although the wound has healed by the first intention the new tissue is soft and tender, and requires from two to three months before it is strong enough to justify us in putting the animal to work. But the new uniting piece is better and more like the normal than when suppuration takes place, when it is formed by means of granulation tissue with matting together of all the structures, thickening of the limb, and an unsightly blemish left. The daily dressing, the risk of pus finding its way along the tendons into the fetlock bursa, and the risks of pyæmia, septicæmia, and tetanus are also avoided.

In the practice of antiseptic methods in our animals, and in neatness of manipulative detail, we labour under considerable disadvantages compared with the human surgeon. Except in very painful operations, or where special accuracy in operation is a "*sine qua non*," we seldom use anæsthetics, and our animals are apt to struggle against us while we are operating. The struggling distracts our attention, interferes with our manipulations, and is likely to disturb gross particles of dirt which may fall on our operation wound. Therefore, when great importance is attached to the asepticity of the operation anæsthesia is indicated.

As already mentioned, we now know that atmospheric germs in an ordinarily pure atmosphere are mainly non-pathogenic, and that in a healthy wound they may be disregarded.

But we must protect our wounds from septic matter which might be introduced into them by dirty hands, instruments, or sponges, or by the struggles of the animal; and also purify the surrounding skin as already mentioned. A choice of antiseptics may be had for our purpose, but as sentiment is seldom of much account in veterinary practice the cost of the antiseptic is of some importance.

Corrosive sublimate is perhaps the cheapest, and for purifying the skin may be used of the strength of 1 in 500. It has a disadvantage in that it does not mix well with greasy substances, and the sebaceous secretion of the skin may prevent its satisfactory action. As a disinfectant for dirty wounds 1 in 1000 is usually employed, while for dipping the hands, sponges, etc., and for purifying wounds not suspected of being septic a strength of 1 in 2000 is considered sufficient. Notwithstanding its powerful antiseptic properties and its cheapness it has several disadvantages. When often used it has a disagreeable effect on the hands, the skin becomes rough, harsh and is apt to chap; while the finger nails become of a dusky hue. And on coming in contact with pus, serum, or the discharges from wounds it forms an insoluble albuminate which may prevent its penetrating to the

necessary depth. This may be prevented by adding a little common salt to the lotion, or five parts of hydrochloric or tartaric acid to each part of the corrosive sublimate.

It is also very bad for instruments, whether steel or plated.

Creolin, or as it is most commonly found in commerce—Jeye's fluid, is a powerful antiseptic and pleasant for the hands. It is freely miscible with water, forming a white emulsion. It does not harm instruments, but its white colour renders it opaque so that instruments lying in it cannot be seen, while sponges dipped in it and used for absorbing blood during an operation are more apt to have their pores clogged up than with some other antiseptics.

Iodine is sometimes used, but is more irritating. It may be used to wash wounds of the strength of 1 dram of the liquor iodi to a pint of water.

Chloride of zinc is a very powerful antiseptic and the best known for purifying dirty suppurating wounds, and for that purpose may be used of the strength of 40 grs. to the ounce of water. It not only purifies the wound but penetrates the tissues, so that it prevents decomposition from recurring in the wound for several days.

Thymol, eucalyptus, and salicine are too dear for ordinary use when we can get as satisfactory antiseptics cheaper.

Iodoform is a peculiar antiseptic, in that it is of little use as a disinfectant, or for purifying septic wounds, but it is a valuable antiseptic in preventing putrefactive changes from taking place, and as it is very non-irritating can be used solid in the form of a powder. It produces very little irritation even when sprinkled somewhat thickly into wounds. A very elegant mode of applying it is to make a saturated solution of it in æther and spray it on to the wound. The æther evaporates rapidly, leaving the iodoform in a finely divided state coating every recess of the wound.

Boric acid is also a very mild antiseptic and has the great merit of being cheap. It can also be used dry as a powder and is very bland and non-irritating.

Much discredit has been cast upon sponges used to absorb blood during operations, as being the means of introducing septic organisms into wounds. So much is this the case that perhaps the majority of those surgeons who aim at asepsis in their operation wounds have given them up altogether and use pledgets of tow, lint, cotton wool, or old thin rags to absorb the blood. In visiting the Veterinary Schools of Brussels and Paris during the past summer I don't think I saw a single sponge used for the purpose. Now I confess to a great weakness for the sponge as an absorbent. None of these substitutes can approach it in that respect, and I am very sceptical as to sponges being so difficult to render aseptic as all that means. If a sponge is well washed with soda and water until no gross particles of dirt are visible in it, then washed in 5% carbolic lotion and allowed to soak in it for 24 hours, it must be a grossly dirty sponge if it is not rendered aseptic. A sponge is nothing if not pervious; the antiseptic has not to penetrate into it like into a piece of solid tissue, but can pass freely through it in every direction. We would never think of using sponges for operations that have been used to clean dirty suppurating or sloughy wounds, but a new sponge can be used for a considerable number of operations before it is laid aside for less important work.

Professor Lister recommends that they be put in ordinary water until decomposition takes place, when any particles of fibrin soften, break down and are easily washed out. After washing he allows them to soak in the carbolic solution for 24 hours, and then dries them to have them ready for use. He also recommends the boiling of the sponges when there is not time to purify them otherwise. I have had sponges boiled, but don't mean to do it again. The great merit of the sponge as an absorbent is that it is resilient,—tends to return to its original form when compressed, and in so doing to absorb any fluid that is in contact with it, and the boiling in great measure destroys this resilience.

As suture material we may have occasionally to use cotton or linen thread, but vegetable substances are unsatisfactory. They do not become absorbed, but cause irritation usually resulting in suppuration. Silk, thoroughly asepticised by boiling and soaking in an antiseptic solution, is a very satisfactory ligature. If the threads are fine and the ends cut off short they seldom give any trouble even in deep wounds. But when a strong coarse thread has to be used irritation is more likely to occur, and occasionally they either suppurate out or require to be removed. But in deep wounds where primary adhesion is anticipated, when a strong thread is required, catgut is more satisfactory.

Well-prepared dry chromicised gut, rendered thoroughly aseptic, is sufficiently durable, causes no irritation, softens, and becomes gradually absorbed. Ordinary carbolised gut softens too rapidly and should not be trusted except for tying small vessels during an operation, when fine silk is perhaps better.

For superficial sutures nothing can surpass horse hair. Ordinary horse hair from the tail of a good cart horse makes a splendid suture. It is easily cleaned and rendered aseptic, will last for generations almost if kept dry, is very cheap, can be got almost anywhere that a veterinary surgeon is likely to be requiring sutures, and is so unirritating in the tissues that the sutures might be left from June to January, as the saying is, without exciting suppuration. It will be objected to as not being strong enough. Why, an ordinary hair from a cart horse's tail, such as we would be using as a suture will lift a pound. I have even lifted four pounds with four hairs, which means much more owing to the difficulty of subjecting each of the four to an equal strain. Where there was likely to be any strain on the sutures I have used four hairs double. Now no one will contend that a strain of four pounds, or half of what such a suture is calculated to stand, is likely to be required. Even two pounds is a great continuous strain, and if there is as much as that they ought to be assisted by the button suture. Hair does not stand the same strain when kinked or twisted; it is like manilla hemp, it breaks at the knots. So when there is likely to be much strain on the sutures they should be supported by button sutures. Sutures of relaxation they have been called. They are easily manipulated, slackened or tightened. Oval-shaped pieces of zinc suit very well. They may be of various sizes—from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in their longest diameter, with a hole in the centre large enough for the passage of a good strong needle. Soft suture material is not satisfactory to use with them, as it is apt to cut on the edge of the hole in the button, and the fine pliable tinned iron wire

used by aerated water manufacturers suits exceedingly well. If more apt to oxidise than silver it is really very unirritating, much stronger and very much cheaper. One of the buttons is first secured to the suture wire, the needle inserted at some distance from the edges of the wound,—from $1\frac{1}{2}$ inches upwards according to the depth of the wound, nearly perpendicular to the surface at first, it crosses the wound at a considerable depth, is drawn through a similar button on the other side with the necessary tightness, and secured by getting a turn round the button. The oval shape of the button prevents the wire from slipping off round the end. These stitches can easily be relaxed or tightened as required, and with superficial horse hair sutures to maintain co-adaptation of the cuticular edges, the materials are all thoroughly aseptic.

In large wounds and in lacerated or irregular wounds some provision for drainage is often required. Perforated rubber tubing may be used, the canal of which is $\frac{1}{4}$ of an inch upwards in diameter. But owing to the nearly constant movement, which it is almost impossible to prevent, in our animals, these tubes are very liable to slip out, even when attached to the nearest suture at the surface extremity. I have often used several pieces (4 to 8), of common hard hemp cord after being boiled and soaked in a weak solution of chloride of zinc. They are not so easily displaced, and can be pulled out singly as seems necessary. But no drainage tube should be used where it is not required. They are at best a sort of necessary evil, their presence actually encouraging effusion, and should be dispensed with in 2 or 3 days, or at the earliest possible moment.

But it is in the matter of dressings to cover and protect our wounds that we are most severely handicapped compared with the human surgeon. It is only about the extremities that they can be applied with any facility. When we come as high as the arms and thighs our difficulties begin. We also require them in such quantities that the price is in many cases almost prohibitive, or at least sufficient to deter many from attempting to carry out the antiseptic system in its entirety. The various gauzes used in human surgery, Gamgee's absorbent tissue, wood-wool, wadding, etc., are out of the question for general use. So we are mostly reduced to tow and oakum. Carbolised tow as sold in the market is by no means cheap, and not altogether satisfactory. Oakum is also an unsatisfactory dressing over a wound where much discharge is expected. Owing to the tarry substance in it, to which it owes its antiseptic property, it almost refuses to absorb any discharge. In fact it seems nearly waterproof in that respect. Therefore when we expect much discharge we are almost reduced to tow. Hitherto when anxious about any operation that I wished to keep aseptic I have prepared the tow by soaking it in a $\frac{1}{2}$ per cent. sublimate solution, along with a little common salt and glycerine, which renders it, after drying, more readily absorbent. But it is in wounds from which we do not expect much discharge that it is most useful, when we wish healing to take place without any blemish as in tenotomy and neurotomy wounds, in opening hygromas and distended bursæ, etc. In these cases very good results can be obtained by applying a pad of tow squeezed out of 1 to 20 carbolic lotion at the time. Where little but healthy skin is exposed to the action of the acid it does no harm. No doubt it soon dries and the acid evaporates, but

if there is no discharge it is quite sufficient to maintain the asepticity of the wound. If the wound, skin, and tow are rendered aseptic to begin with it would do this where there is no discharge, in the same way as cotton wool keeps atmospheric germs out of our cultivation tubes.

Wounds, whether operation or accidental, are better to be covered when possible, but under some circumstances and with some animals it is nearly impossible. But if we can cover them it enables us to apply light equable elastic pressure by means of a pad of dry aseptic tow; even firm pressure if elastic and uniform is often beneficial. It assists in maintaining immobility and co-aptation of the surfaces, and acts as a mechanical astringent by lessening effusion into the wound, thereby diminishing the discharge and consequently the risk of putrefactive changes. If the deeper parts of a wound are only loosely applied together it is an encouragement to effusion, and the effusion may separate them altogether, resulting in tension, inflammation and fever. In any case if there is much effusion the presence of heat and an animal fluid makes an ideal breeding-ground for putrefactive organisms, while if our wounds can be kept dry there is little risk of either suppuration or putrefaction.

In the operation of neurotomy, as already indicated, union by the first intention should be of easy attainment. The leg should be cleaned and disinfected as directed for tenotomy. There is no necessity to wash out the wounds with an antiseptic lotion before closing them if the hands and instruments have been rendered aseptic, but simply to bring the edges together by a horse hair suture. But care should be taken to prevent contamination of the wounds in turning the animal to operate on the other side. The wounds should be covered with tow soaked in the 1 to 20 carbolic lotion and bandaged. If everything seems to keep right they need not be looked at for a week. I have had very good results in treating enlarged bursæ in much the same way. After cleansing and disinfecting the skin I have opened them by free incision with a scalpel, applied large antiseptic pads over them to compress the walls of the bursæ, and absorb any remaining discharge from the cavity. I have opened very large thorough-pins in this way with results that certainly cannot be obtained by any other known method.

In ascending the limbs there is more difficulty in applying dressings and bandages, but I once opened a very large hygroma in front of the stifle of a valuable Clydesdale stallion with very gratifying success. The skin was cleaned and disinfected as usual and the hygroma opened by a free incision. As soon as the cavity had emptied it was at once injected with a solution of iodine about half the strength of the tincture, and a blister was applied over the whole surface of the sac, overlapping considerably. The blister, a mixture of cantharides and biniodide of mercury, was used for the purpose of causing swelling, to compress the walls of the cavity, and to assist in keeping the leg quiet. The biniodide of mercury was chosen because it is a very powerful antiseptic, and being applied in the form of an ointment and not very soluble it was expected to maintain the asepticity of the skin for several days. The same purpose can be effected by the use of corrosive sublimate, 1 each of sublimate and cantharides to 8 of lard or vaseline. It may be used stronger over a limited area where

the skin is thick, and weaker or not so thickly applied over a large surface or on a thin skin. In this case no suppuration took place, the discharge soon ceased, and the result exceeded the most sanguine expectations. It is found that there is no necessity for injecting a solution of iodine into these serous sacs. If the walls of these bursæ can be kept in apposition while the fluid drains away, without decomposition occurring in the sacs, the secretion of fluid soon stops and the cavities shrink and disappear. A similar action is found to take place in opening large abscesses in the human subject, as empyemas and psoas abscesses. When opened antiseptically and the tension relieved the secretion of pus is almost immediately arrested, becomes serous, and soon stops altogether.

In the treatment of open joint our methods have been modified and our success increased by a knowledge of the causes which lead to inflammation in the joint. We know that a joint may be open for days and even weeks and little harm result if suppuration does not take place in it,—in other words provided micro-organisms do not gain access to it. Hence the necessity of maintaining at any cost the asepticity of an open joint, hence also the beneficial effects of continuous cold water irrigation, now almost universally recognised in the treatment of open joint even after inflammation has commenced. By reducing temperature it acts as an astringent, it reduces inflammatory action, it tends to repress or inhibit metabolic changes and the development of micro-organisms, and by flowing over the wound keeps it constantly clean while permitting the freest escape of the discharges.

In injuries and operations about the feet the antiseptic system is of great benefit. Even from picked or gathered nails many horses are lost. This should not be the case if they are seen sufficiently early, even although the navicular or corona-pedal articulation may be opened. If there is reason to believe that the offending nail has reached the articulation there is no use of temporising with it. The foot should be thoroughly cleaned and disinfected, and the horn well thinned and stripped off around the puncture so that there may be no difficulty in ascertaining the depth and direction of the puncture, or risk of confining any discharge in the wound. In doing this it is necessary to have the animal thoroughly secured, which may be done in the stocks, and a tourniquet applied, otherwise the hæmorrhage is likely to obscure and interfere with the satisfactory performance of the operation. The wound itself should be thoroughly bottomed with a fine probe, with a few fibres of tow or cotton wool on it that have been soaked in chloride of zinc or sublimate lotion; or iodoform dissolved in collodium may be used. A little time is well spent in disinfecting the puncture, as it is very important. The piece of stripped sole should be pretty thickly dusted with iodoform or boric acid, especially about the puncture, well covered with antiseptic tow, or oakum in which a little iodoform is shaken. A leather sole may be put on under the shoe to keep this in position, or even a thin flat slip of wood fastened by a cross slip under the heels after the shoe is fixed on. Some attention is required if in a hind foot to prevent the dressings becoming soaked with stable fluids, and a leather boot is an advantage. If in a fore foot there is little risk. This dressing may be left on for several days and re-applied as seems necessary, until a satisfactory pellicle of horn is formed.

Some may think the treatment severe and out of all proportion to the gravity of the wound; but if we think of the number of horses that are lost from gathered nails, through suppuration extending into the joints of the foot, and even from tetanus although the joints are not opened, no one can consider a little attention and a few extra days off work misspent in the immensely increased safety given.

In severe operations about the feet, such as that for the removal of a lateral cartilage in a case of quittor, a foot suits wonderfully well for antiseptic methods. Get the shoe taken off, all loose and ragged horn removed, the hair clipped off up over the fetlock, and the whole thoroughly washed with soap and hot water. It should then be disinfected by immersion in a sublimate bath. This operation for quittor is now much simplified by the knowledge that there is no risk in dividing and reflecting the coronary band, and even in removing completely any diseased spot. But the operation is not without risk, especially if there is much of the cartilage affected, or if the quittor is situated anteriorly. However skilfully and carefully the operation may be performed, when suppuration occurs in the wound ulceration or sloughing may open the coffin joint and our operation lead to a rapidly fatal termination. But if dressed antiseptically the risk is immensely diminished. After the operation iodoform may be freely applied over the wound, aseptically tow over it, and the whole foot enveloped in a thick wrapping of oakum. This can be kept in position by a piece of stout sheeting tied over it, and the whole firmly fixed round the foot with strong cord. The cloth can be rendered nearly waterproof by painting it with tar all over, and protected from wear by a couple of strong bands of plaited straw crossed and tied together under the foot, the ends being brought up in front, behind, and at each side and tied at the pastern. But care must after all be taken to prevent the horse standing wet in the stable. If there is much hæmorrhage and effusion the dressing may require to be changed next day; if not it may be left for a week.

But it is perhaps in the region of abdominal surgery that the greatest advances have been made owing to the recognition of the importance of strict antiseptic methods. The advance in human surgery has been enormous; not only in the dreaded operation of ovariectomy but in divers laparotomies. The publication in the *Lancet* in 1886 of two cases of rupture of the bladder in men, operated on by abdominal section,—one of them 26 hours after the accident,—the suturing of the rent in the bladder and the washing out of the peritoneal cavity, each of which made a successful recovery; showed the benefits to be derived from a thorough appreciation of aseptic methods.

And in veterinary surgery, in operations for hernia, in operations on the ovaries and uterus,—especially in the smaller animals, and in castration, more particularly the castration of cryptorchids, the employment of antiseptics gives confidence to the operator and much greater success. It is now known that the intestines of the horse,—an animal supposed to be particularly liable to peritonitis, may be exposed to the atmosphere in considerable quantity for some time and successfully returned, provided strict aseptic cleanliness be observed, not only during their return but in the treatment of the wound.

One ought to remember in these abdominal operations that when

an animal is on its back and struggling it is apt to dislodge gross particles of dirt which may fall on the operation wound.

Provision ought therefore to be made to prevent it by wrapping wet cloths around the feet and legs, which in the region of the operation should be soaked in an antiseptic solution. The employment of all these measures are considered a great trouble and hindrance until we become somewhat accustomed to them, even the dipping of our hands and instruments each time they are brought in contact with the wound requires at first a considerable effort, but practice soon makes it easy until it comes to be done almost mechanically, or at least unconsciously and without effort, and the trouble is soon well repaid in the increased confidence given compared with that previously possessed. I live in the hope that calculi and dust balls obstructing the canal of the intestines will yet be successfully removed by lapar-enterotomy. Undoubtedly many cases are too rapidly fatal and many others might prove unsuitable, but there are cases where it would afford the animal a chance of recovery.

No doubt we are heavily handicapped here again by that perpetual financial question. If we obtain the consent of the owner to any new or hazardous operation, it is too often only on condition that we do it entirely at our own expense. So that no one who has not an enthusiastic love for his profession and a pretty well-lined pocket will be likely to attempt it. In the various tapping operations also, whether for the relief of tympany or the evacuation of fluids, attention to thorough cleanliness of the instruments, and of the skin at the point of operation, diminishes immensely the risk of untoward complications.

With regard to operations and methods not so much affected by antiseptics veterinary surgery has been rapidly advancing. The treatment of rabies by Pasteur led to the employment of inoculation, or vaccination as it is termed in France, for the prevention of anthrax and black-quarter. Unfortunately the employment of these methods in this country has not yielded the results which the success ascribed to them on the Continent led us to expect. But the discovery of tuberculin and mallein and their employment in the detection of tuberculosis and glanders is sufficient of itself alone to mark an epoch in veterinary surgery.

In more purely surgical methods,—although the operation for roaring, regarding which such a brilliant future was predicted, has proved a failure, it has not left us in despair of obtaining a cure. It has rather stimulated to increased effort, as we have Professor Smith attempting a cure by intercepting and utilising another nerve supply to the paralysed muscles. I am sure we all wish that he may be successful.

Then there is the treatment of canker so successfully planned, elaborated, and explained by Mr Malcolm of Birmingham, and the various operations on the foot connected with the name of Professor Smith.

With regard to the treatment of such joint diseases as spavin and ringbone we may not be progressing rapidly, but I cannot subscribe to the dictum of Professor Smith when he says that it was about as satisfactory 200 years ago as it is to-day. With our pointed penetrating cauteries we can produce a greater effect with far less

blemish than when the skin was seared and seamed throughout its entire depth, and by the use of anæsthetics we can operate painlessly. Then we have very much improved dental instruments compared with 20 years ago, and altogether there is evidence of continuous progress.

If surgery has not progressed so rapidly as pathology it has at any rate been distinctly advancing and giving ground for hope and encouragement regarding the future. There must be no standing still, but each one continually striving to perfect his methods and improve on his practice. The wise man said long ago that "a contented mind is a continual feast." As far as surgery is concerned I would be inclined to say that it was conclusive evidence of ignorance and incompetence. The surgeon who imagines that he has reached perfection in his practice is only too short-sighted to see beyond his own narrow horizon.

Had time permitted I would gladly have looked at the doctrine of phagocytosis, or the manner in which healthy tissues are supposed to be protected from the action of pathogenic organisms when only present in small numbers.

The question of open joint also merits much more thorough consideration. And I would have liked to call your attention to the attempts that have been made to perform castration in the horse antiseptically, and to obtain healing of the wounds without suppuration. In fact many subjects I have only touched the fringe of, but time has precluded their further consideration for the present.

FURTHER OBSERVATIONS REGARDING TUBERCULIN.

By J. M'FADYEAN, M.B., B.Sc., Royal Veterinary College, London.

IN an article which appeared in the Journal for June last I published an account of the experiments and observations which I had made up to that date regarding the employment of tuberculin as an aid to the diagnosis of tuberculosis in cattle. Since then I have had an opportunity to further test the value of this agent, and I trust that the interest of the facts which I am about to disclose will be considered sufficient excuse for such an early return to the subject.

In the latter part of September last, at the request of Professor Brown, I paid a visit to Althorp Park in order to inspect a herd of Jersey cattle belonging to Lord Spencer. I had previously been informed that two animals had recently died in the herd, and that Mr Merrick, sen., M.R.C.V.S., of Northampton had on *post-mortem* examination discovered that the cause of death was tuberculosis.

On the occasion referred to I met Mr Merrick at Althorp Park, and we conjointly made a careful examination of the surviving animals with a view to detecting signs of tuberculosis in them. At this date the herd comprised 18 cows, 1 bull and 4 yearling heifers. In one of the cows distinct enlargement of a pharyngeal lymphatic gland was detected, and in two others the temperature was a little above the normal (102.4° and 102.6°). In one of the yearling heifers the temperature was 102° and in the others 102.2° . In none of the animals were the respiratory movements notably disturbed, and the cow-man reported that all the animals fed well and that he had not