And now, gentlemen, I have passed in review, far too briefly, the points which appear to me most interesting when the eye glances back over the varied, smooth and rugged, light and dark, fertile and sterile regions which a man passes over as time carries him, but too quickly, from youth to age. To me the retrospect is cheering; it has given me fresh hope for the continued advance of our knowledge and for the progressive usefulness of our profession. I feel, as I have lightly passed over the records of the profession's work and gains in the last forty years, that we have played no unworthy part in the great drama, and that among the restless activity of modern times and the marvellous growth of newly born sciences, an old art has not stood still, but with ever increasing power is still, as it has always been, the Friend of Man, and a very present help in time of need.

ADDRESS IN SURGERY.

BY

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MR. PRESIDENT AND GENTLEMEN,—The responsible duty of delivering to so important an audience an address upon a subject well worthy of more able powers, has come upon me at short notice as the "proximè accessit" to one whose reputation as an author and teacher of surgery had entitled him to the first place in your consideration. The indisposition which led to this, I fear, somewhat unsatisfactory alteration in the programme of our proceedings has been, I am happy to say, but temporary in its nature. I trust that it will entail upon him no consequences more painful than your disappointment and his own, and upon me, nothing more disadvantageous than those comparisons which you may not be able to repress, and which the short notice I have had has not enabled me to diminish, except by an appeal to that liberality which is rarely wanting in our profession. A stimulus to increased mental effort (of which your professional experience will well enable you to estimate the value in critical cases) was supplied to me by the knowledge of the place in which we were to assemble, and the feeling which I entertained of the great worthiness of the occasion. Within these walls and under these auspices I could not refuse to tax my powers, and even to risk that suspicion of temerity which may be attached by some to the undertaking.

The present state of surgical knowledge indicates quite as much as that of any department of human progress that thorough movement in the dry bones of systems, which, we may hope, is the prelude to more perfect constructions, to an advance in directions more likely to lead to the attainment of that satisfaction which comes from a clear knowledge of what we can and ought to do. As our notions are at present, we require the exercise of a shrewd judgment, acting upon an extended acquaintance with facts, and in many cases a very delicate balance of opinion indeed, to determine what is the right thing to do even in the commonest cases. The prime wisdom is now, even more than in Milton's days—

"Not to know at large of things remote
From use, obscure and subtle, but to know
That which before us lies in daily life."

The multitude of counsellors and the diversity of counsel is so great that a surgeon can find authority for almost every variety of opinion and practice. And I believe that no opinions which are honestly advanced, with due regard to the elements of truth and probability, will remain long without supporters even in the living generation.

In medical science, gentlemen, we have no Pope and no Syllabus. Our councils are liberal assemblages such as that we form to-day, and our appeal lies to an educated jury,—the public opinion of the profession,—and this jury, moreover, is fortunately by no means compelled to be unanimous in its decisions. And if, by reason of great originality, or by that sort of miscarriage which is not uncommon in the production of men of genius—viz., that of being born before his time—a man's views and deeds are not rightly estimated by his contemporaries, there still remains that ultimate appeal to the judgment of posterity which the possession of a free press and the facility of publication places within the reach of every one.

It is no wonder if those who have lived to see the rise and fall of many theories and many systems are tempted to become converts to

the doctrines of Finality, and to consider it very probable *a priori* that whatever is new is therefore not true; and, if by any chance it should happen to be true, it would certainly prove not to be new. When this frame of mind grows upon us, it is well to consider that the Past, of which we think so highly, was once a Future, and had a more undeveloped Past before it, and that the old ways have been led up to by ways still older and, no doubt, worse to travel over.

The study of pathology and the natural history of disease have led to a simplification of medical treatment which in some quarters has advanced to the extreme phase of the "expectant" system, which prescribes little beyond the primary necessities of food and drink, with a regimen which allows the patient ample scope to be comforted by faith, and supported by resignation. In the present condition of public intelligence, deplorably wanting in the knowledge of the laws of health and disease, there is required an amount of natural gifts which is not conferred upon every man, to inspire in the patient such a robust quality of the former blessings as to enable him to nourish the latter upon so simple a thing as orange-flower water. While we are looking for the coming rain-cloud, which brings relief to, or release from suffering, by the operation of laws of which we know more or less perfectly the course and certainty, but which our patient cannot see, it is but natural that he should speculate, from his observation of our conduct, upon the perfection of our eyesight. The talented author of *Middlemarch* has fairly recognised the ideas which prevail in what truth compels us to call the greater portion of our population in Mrs. Mawmsey's remark upon the new medical light who had appeared in her native town, and who, as she was told, went about saying that physic was of no use. "Does he suppose that people will pay him only to come and sit with them, and then go away again?" Such are the intelligences that a doctor has now far more frequently to deal with than those of the calibre of Mr. Trumbull, who characterised himself as "one who was not altogether ignorant of the vis medicatrix," who went without shrinking through his abstinence from drugs, much sustained by the application of the thermometer which implied the importance of his temperature, by the sense that he furnished objects for the microscope, and by learning many new words which seemed suited to the dignity of his secretions."

In the practice of surgery we meet happily with fewer difficulties of this kind than in the sister art of medicine; but occasionally, in obtaining the advantages which result, especially in cases of joint disease, from the intelligent application of the principle of "rest" so conclusively set forth by our distinguished President of Section, Mr. Hilton, we have to contend with the impatience of the patient or his friends, and perhaps may even fall into the error of giving too much of a good thing, and thus may reach, not the "be thankful" stage, but that of fibrous ankylosis. Here we may have the ill-luck, too, to leave our patient open to the temptations of the quack bone-setter, lately subjected to the serviceable exposure of Dr. Wharton Hood. That last infirmity of long-suffering patients applies his material force upon the hit or miss principle, and, straight, the bone which had been "put out" is set with an audible snap, which proves the evident correctness of the remarks upon the numerous fallacies of the faculty with which the operator improves the occasion, and piles up the agony of his *éclat*.

In face of the latest developments of surgery, it becomes more and more difficult to endorse the opinion of the eccentric veteran surgeon Vincent, that it was doubtful whether the human race would be worse off than it is if there were no doctors, no accoucheurs, no physis, and no instruments at all. The utter extinction of the weak and sickly might indeed improve the race physically, if not numerically, as is said to be the case among savages; but, as in them, it would in the meanwhile press very hard indeed upon individuals, and ultimately improve the whole tribe off the face of the earth. To a civilised community, hard-heartedness and cruelty are so abhorrent, and the instinct to heal and to relieve pain is so deeply inrooted, that a reaction against such a *law of neglect* would infallibly reproduce that kind of superstitious remedy which has already caused in the world's history more suffering than it has relieved.

In this respect this innate feeling resembles that instinct of religion with which it was so closely interwoven by the greatest Exemplar of both. We could no more prevent the growth of doctors than of preachers and moralists.

The noblest function of the wisest among us is to enlighten and guide this innate impulse, to keep it under the control of the calm, reflective intellect and of the tender conscience, to prevent the crystallization of ideas into fixed dogmatic formulae, which hinder development in science and art, as well as in language and literature, and to maintain the honour and true interests of the healing art. There is no better way of doing this than by the promotion of friendly inter-

course among the members of the profession; and this I take to be the aim of the great Association under whose auspices we now meet.

On the occasion of the visit of so many leading provincial surgeons to our great metropolitan centre, it would seem to be incumbent upon me to allude especially to subjects which chiefly occupy attention at the present time and upon which the foremost minds throughout our own country and the civilized world are now employed, and I do not hesitate to say, as successfully employed in the provinces as in London, and in our own country as in any part of the world. Time will not permit me to give more than a glance at some of these topics, several of which are dealt with in papers read in the Surgical Section much more in detail than I can hope to do.

In their selection I am naturally disposed to take those to which my attention has been most practically directed during the past year. I shall thus speak, and I trust that my audience may listen with that interest which attaches itself to subjects of actual experience.

Pyæmia, septicæmia, and erysipelas are undoubtedly the greatest troubles of modern surgery. Without their baneful influence the success of our improved methods would be enormously increased. By their occurrence the best laid plans go wrong, and may result in the death instead of the restoration of the patient; and this is more deplorable when, as often happens, the operation is one which is not absolutely necessary to save life, but to remove a disability which might be an ill "better to bear than fly to others that we know not of." When, therefore, a system of dressing wounds is brought before us, sanctioned by worthy names and supported by the results of cases, offering a means of escaping these terrible enemies, it is our bounden duty to give it a fair and full trial.

Such is the antiseptic system of dressing wounds originally developed by Le Maire in 1860 and 1865—in the use of coal tar, and its derivative carbolic acid, as an application to wounds. As long ago as 1815, French chemists had proved the antiseptic qualities of oil of tar. As long ago as 1834, Runge discovered carbolic acid and its properties. So slow is the growth of improvement. Coal tar itself, made into an emulsion with saponine by Le Bœuf, and combined with plaster of Paris by Corne and Demaux, in 1858, has continued to be used by French surgeons, and has lately been employed in combination with charcoal by Beau, of Toulon.* A great impulse was given in this country to the use of carbolic acid by Professor Lister, in February, 1867, well known to the Association from the exposition of his method by that talented surgeon to the meeting at Plymouth. Since that time I have given his system, I believe, a fair trial at King's College Hospital. At the same time, and under the same conditions as far as could be obtained, I have employed the solutions of carbolic acid in oil and water, and those of metallic salts, as well as other antiseptic substances, such as chlorozone, &c., but without the elaborate attempts to exclude the unpurified atmospheric air which Lister deems essential.

I shall not attempt, gentlemen, to discuss the question of atmospheric germs, or of indwelling bacteria-like bodies and their influence upon disease. This question is one of a far wider nature than can be conveniently discussed here, and it involves other departments of medical science besides that of surgery. In common with, and in relation to, the question of suppuration in general, and its connection with tubercle, it can only be solved by the prosecution of those lines of research in pathology and medicine which have been followed so skilfully by Drs. Burdon Sanderson and Wilson Fox, and which may prove to be converging lines towards an important discovery. As an experimental and scientific mode of research, which may turn out to be also a converging line in Surgery, I have the highest possible respect for Professor Lister's system of treating wounds.

Upon his theory of germs, it is consistent and simple enough; but it is as a practical method of treating open wounds, available under ordinary circumstances in hospitals and private practice, in emergencies, and on the battle-field, that it must be estimated and will ultimately take its place; and it is with that view that I have put it, as far as possible, to the test. I began it at a time when the hospital was in a good hygienic condition, and the cases for that time did admirably. I had some cases quite equal to any described by Professor Lister himself. I, at the same time, tried the application of dry lint, without any moisture whatever, to the wound, and in many cases, especially in breast cases, the results were also perfect. In one breast case union by adhesion occurred throughout the wound. I also tried the application of the chloride of zinc solution in the manner originated by Mr. De Morgan, and very good results ensued, viz., healing with the formation of little or no pus. After about six months, there came into the hospital a very unfavourable change, and, from inquiries made at the

time, I concluded that a similar condition prevailed in most or all the London hospitals. Erysipelas and its concomitant pyæmia began to show themselves, the former not springing up in the hospital itself, but imported with patients. The wounds now began to suppurate more, primary healing was less common, and the erysipelatous blush appeared with blameworthy impartiality in cases treated in all kinds of ways, and almost as impartially on my own antiseptic side of the hospital as on my colleague Sir William Fergusson's non-antiseptic side. But this I feel bound to say, that there was little or no putrefaction, as evidenced by the odour, in any of my cases, which my eminent colleague shrewdly attributed to the carbolic smell overpowering all others. Upon this point, however, I must say I did not agree with him. I had one case of amputation of the thigh for a tumour of the lower end of the femur, in a man about 60. I treated it by Lister's method, carefully carried out, and, from beginning to end, there was very little discharge and no putrid or offensive smell whatever; but the wound did not heal, the end of the bone remained unadherent and devoid of granulations, and the man lingered for two months in a declining and emaciated state, and finally succumbed to chronic pyæmia with secondary abscesses in various parts. The occurrence of many other cases similar in character to this has convinced me that the agencies, whatever they are, in pyæmia, operate in the general system, or, if through the atmosphere, in other channels besides the wounded part, as in cases of pyæmic poisoning from deep internal glandular pus deposits and in other acute and chronic tubercular affections.

Some time afterwards I had a case of compound fracture of the tibia and fibula, with a limited aperture in the skin, in a man nearly 70 years of age. I put it up carefully in Lister's method, carbolic spray, prepared gauze and jacquette, complete. On dressing it several days afterwards, suppuration was found to have occurred, and the pus had accumulated considerably in the dressings. The treatment was continued, and kept the wound free from all unpleasantness, but still the amount of suppuration was very considerable. There was burrowing of pus along the muscles and bones, and a total want of union. In this case I was ultimately obliged to amputate below the knee. The amputation wound was also treated antiseptically, but still the amount of pus was considerable, and, although from the man's age and reduced condition, the progress of healing by granulation was slow, the case did ultimately exceedingly well, and made an excellent stump.

In some cases of psoas abscess treated by Lister's method we had marked success so long as the hospital was healthy. When erysipelas and pyæmia appeared, however, we had others in which the pus in the abscess became putrid and offensive after the first evacuation under the spray and with all the precautions, and I was obliged to make free openings and introduce drainage tubes through which the abscess could be washed out thoroughly with antiseptic. Such cases show that we cannot without danger depart, in the generality of wounds, from the old rule of providing a free exit for all purulent and offensive discharges, and, for the want of this, the exclusion of air is not a sufficient compensation. I cannot, consequently, approve of the plans originated by Baron Larrey and followed by Gosselin,* and, more lately, by J. Guerin and Maisonneuve, of "occlusion pneumatique"† the amount of resemblance to which, in Lister's method, constitutes, it seems to me, some part of its deficiencies. To a great extent, this objection also exists to the plan followed during the second siege of Paris by Alphonse Guerin, of using thick investments of compressed cotton wool after washing the wound with alcohol, and then leaving it, without disturbance or removal of the deeper layers, for periods varying from a fortnight to two months, or even more. This plan for keeping from the wound injurious atmospheric influences upon the purifying results of the Professor Tyndall's experiments upon the purifying results of the cotton filter of Pasteur. It was shown by Hervey‡ that, as used by Guerin, it neither prevented putrefaction and fætor in the wound, nor the formation of abundance of microzoa therein. Here again, we have instances of the propriety of that regular and systematic inspection of wounds which the practice of hermetically sealing them up prevents us from obtaining.

With respect to the employment of cotton wool combined with due drainage, I look forward with interest to the paper promised for this section by Mr. Callender, who has, he informs me, obtained much success from its use combined with his own form of drainage tube. Cotton wool has one great advantage as a dressing in cases of emergency. It is usually easily to be obtained in the necessary quantities after battles and railway accidents, when it is necessary to remove patients directly

* *Des Pansements Rares*, 1851.

† *Gazette Médicale*, 1866, p. 7.

‡ *Archives Générales de Médecine*, December, 1871.

* *Du Traitement des Plaies*, Baillière and Fils, Paris, 1873.

after injuries or operations; it provides better than most other methods for the protection of the wound or stumps from injury. Tanned oakum possesses all these advantages to an equal degree, and has the superior quality of being also cooler and more antiseptic. Mr. C. Heath, of University College Hospital, tells me that he prefers it to any other dressing, and, in the cases in which I have used it, it has answered admirably. In the free use of cotton wool as a dressing during hot weather, I have found patients to complain of the heat of the wound or stump. At these seasons I believe oakum to possess a greater advantage. In cold weather cotton wool is comfortable enough, and affords an admirable elastic support and due compression to the wound; but, in my opinion, it has, if used without antiseptics, one great disadvantage which is shared by charpie and other absorbent applications, and which is increased tenfold when used, as in the French hospitals, for stuffing the interior of wounds and stumps to prevent union by adhesion and to absorb discharges. While kept in the wards in readiness for the dresser, these substances, as proved by the experiments of Chalvet and Reveil, as well as those of Eiselt and Kallman, absorb the infective and putrefactive particles which float about in times of epidemic influences, or as exuviae in a crowded aggregation of wounded patients, and so may become direct vehicles of communication of local infection. The same may also be said of the water and lint used in the wards for the simple water dressing. Warmth and moisture without antiseptics are very favourable to the diffusion of contagion. And the risk is increased by the carelessness or thoughtlessness which you cannot entirely eliminate from nurses and dressers in passing from one patient to another.

Professor Humphry has informed me that he is quite satisfied with the plan of leaving wounds and stumps uncovered by dressing, and entirely undisturbed, having only the discharges wiped or washed away. I am informed by Dr. Weil, late assistant to Billroth, that this plan is uniformly followed in the large hospital at Vienna. Here atmospheric influences have full local play, aided by the accidental contaminations of water, sponges, or tow; and yet, in the spacious and well-ventilated wards and pure air of Addenbrooke's Hospital at Cambridge, the results are far from being unsatisfactory. In a time of bad hygienic influences, epidemic erysipelas, pyæmia, or of an accumulation of wounded patients in a London hospital, it is probable that this would not be the case.

After frequent trials, I have come to consider that a plan comprising the free use of Chassaignac's drainage tubes passing from the surface of the wound, or from its interior if deep and sinuous, and with their outer extremities imbedded in cotton wool or oakum, well permeated with MacDougall's or Calvert's powder, or other disinfectant and absorbent of discharges; the surface of the wound washed over after bleeding has ceased with a mixture of solutions of chloride of zinc and carbolic acid or sulpho-carbolate of zinc; the same solution to saturate the lint, applied in the same way as in water dressing, and enveloped in thin gutta serena tissue, the whole supported by strapping and a light bandage, affords the readiest, lightest, coolest, and the most generally useful application of the antiseptic method. An outer envelope of cotton wool or oakum, and dressing every day after the first opening of the primary dressing, complete a method from which I have obtained as good results as from any other that I have tried, and, what is perhaps important, I have found it less difficult to ensure its being properly carried out.

From this you will gather that I agree with Mr. Lund's view, as expressed in his able paper of "Observations" as to the general efficacy of antiseptics, and in his position with respect to the germ theory explanations, although I do not consider the great elaboration of the carbolic or other dressings to be so necessary as he appears to do. I hope to learn somewhat more from his forthcoming paper on the same subject.

In clean incised wounds, where the formation of pus is not likely to occur, as in some plastic operations, the hermetically-sealing plan will no doubt maintain its position in general use in its most useful form of collodion. But, when suppuration ensues, it must be got rid of. Its absorption by dry earth, as advocated by Dr. A. Hewson of Pennsylvania,† has the disadvantage of being dirty and offensive to the patients, and of obscuring by its colour the natural appearance of the wound when in contact with it, but as a substitute when better absorbents cannot be obtained, it seems to be of some value. Much the same may be said of charcoal. When this substance is combined with coal-tar, however, as in the way advocated by Dr. Beau, it would seem that a great part of the antiseptic vapour would be absorbed by the charcoal, and the two remedies to some extent thus neutralise each other.

Erysipelas does not seem to be much influenced by antiseptic measures. Such cases as are recorded by M. Chédevergue* as an instance of the detergent power of alcohol as a topical application—viz., of erysipelas appearing upon the body of a patient, but not at all invading the wound itself—have several times occurred to me, and I dare say to most surgeons; and it proves no more than that erysipelas is a constitutional disease; and that, though usually, like scarlatina, when happening to wounded patients, showing itself first at the wounded part, it does not invariably do so. But when

"The life of all the blood
Is touched corruptibly."

and pyæmic symptoms force upon us the momentous question, "What should we do to save the patient? and can we do anything?" the answer which was made to me by a surgeon of experience in a case in which the patient got well, "You can do nothing, it is useless trying," would, I suspect, be given by many. In at least four cases of undoubted pyæmic infection, as evidenced by rigors, exacerbations of temperature, secondary abscesses, and lobular pneumonia, the treatment to which I subjected my patients, with little better hopes at first than those which drift into the law of neglect I have alluded to, was attended with success. They were far from being slight cases; and I had not the advantage of being able to send them away to the benefits of purer air and beyond the reach of hospital influences, as so powerfully inculcated by the teaching of Sir James Paget.

Besides persevering in the antiseptic local treatment, and giving free access of fresh air, I surrounded my patient with a highly antiseptic atmosphere, by placing muslin bags of McDougall's powder around and within the bed, and in abundance about the wound, so that he should both breathe the carbolic and sulphurous vapour, and imbibe it as far as possible through the skin. If the stomach were not feeble or irritable, but able to take abundant nourishment (the primary element of restoration), I also gave three to six grain doses of the sulpho-carbolate of iron, with a view of testing the practice so ably advocated by my friend Dr. Sanson.† I took care, as far as possible, not to give the drug soon after nourishment was taken, so as not to interfere with the first stage of digestion, and I discontinued it at once if the appetite fell off, or there was pain after taking it. Three of the cases showed in from a week to ten days' time, that peculiar slate-coloured or olive green colouration of the urine, the cause of which was attributed in a description given by me of one of these cases (in 1869), after a chemical examination by the late Professor Miller, to a modification of the yellow colouring matter of the urine by the action of the carbolic acid upon it. This curious change was first observed, it is said, by Mr. Berkeley Hill, and has been noticed by Drs. Fuller, Stevenson, and Wallace. These four cases completely recovered; but I am bound to say that in some others, not apparently more serious, but perhaps more insidious, the patients died quite as comfortably as under any other plan, whether officious or let-alone in character.

I believe that cases of recovery frequently occur under other methods, or no methods, and that at least as much depends upon the age and reparative power of the patient, the amount of blood poison formed or absorbed, and the general conditions of the atmosphere as upon any system of treatment whatever.

I attach much importance, as I have said, to free drainage in dressing wounds, and when these are made by the surgeon a good deal more may be done to favour this by a judicious choice of the direction of the incision in resections, etc., and the position of the flaps, etc., in amputations. The plan of making a puncture in the popliteal space, proposed by Mr. Jonathan Hutchinson in excision of the knee joint is one which illustrates my meaning. The wound should if possible be made to slope towards that part which is most dependent when the patient is laid in bed. In amputations of the thigh, I think for this reason that the circular operation is most objectionable, on account of its forming a hollow funnel-shaped wound, which, in the necessarily raised position of the stump upon a pillow, holds the discharge like a bucket slightly tilted. Very good drainage is accomplished in the late Mr. Teale's excellent plan of a single square anterior flap. I have practised Mr. Teale's method with the best results in the leg and forearm; but for other reasons, I prefer in the thigh an oblique double flap, with the outer end of the incision placed lower than the inner, and the front flap placed somewhat outside the limb, and longer than the hinder. After many trials, I am quite convinced that this both gives the most complete drainage, prevents the bone protruding, and makes a very shapely and serviceable stump, with the cicatrix placed well behind the point of pressure. Another important point bearing on this matter in

* Printed in the *Manchester Medical and Surgical Reports*, 1870.

† *Essays as a Topical Application in Surgery*, Philadelphia, 1872.

* *Bulletin Général de Thérapeutique*, 1864, p. 240.

† *On the Antiseptic System*, 1871.

favouring the escape of discharges from the interior of a wound, lies in the manner of securing the arteries. When an artery is twisted in, as in the ancient Roman system, revived by Amassat and Velpeau, and lately tried by Mr. Cooper Forster* and Mr. Bryant†, or when it is secured by a pin or wire, as advocated by the late Sir James Simpson, and practised at Aberdeen and elsewhere; or when it is secured by an antiseptic catgut ligature, cut off short on the vessel, as revived by Professor Lister, and tested by Mr. T. Holmes, the theory is, that the wound should heal in the deeper parts as well as in the more superficial, by the direct adhesive process. But this, in the amputation of an extremity, or a large resection, is not the rule, and, moreover, in large cities is not usual. Now the parts that are most disposed so to heal are the smoothly cut, self adapting and vascular tegumentary structures, and these sometimes close up by adhesion, leaving interior cavities, especially about the bone, and between the muscles, containing decomposing blood or pus, which afterwards accumulate, burrow, give trouble, and delay the cure, or cause by pyæmia the death of the patient. To prevent this subsequent inconvenience, after experience of it, seems to be the only rational explanation of the continental method still employed of stuffing the whole wound with charpie, so as to ensure healing from the bottom, which seems so strange to our notions. If we could be quite sure that by torsion, metallic or antiseptic ligatures, we could secure complete adhesion throughout, the case would be made very much stronger in their favour. But this is certainly the exception, and not the rule. There are other elements at work influencing this, even more powerful than the local treatment. Now I believe with my colleague Sir W. Fergusson, that so long as we have this want of entire union, ligature threads may have the advantage of keeping open channels for the escape of discharges from the close neighbourhood of the tied arteries, the accompanying veins of which are frequently the sources of effusions of blood after the wound is dressed, and these afterwards clot, and may putrefy. The ligature threads I usually have well steeped in carbolic oil, and saturated so as to be unable to absorb discharges, and so utilised to spread around an antiseptic influence. Sometimes in deep narrow wounds I place them within or alongside of a drainage tube. They can thus be made into channels for the introduction of antiseptic agents to the deeper parts, and this consideration may add to the much greater sense of security given to the surgeon's mind on leaving his patient, arising from the use of a safe knot and a string to remove it by when it has performed its work. There is one point in the section of flaps which may I think have influence sometimes upon the introduction of pus or septic matter into the cut veins. When these are cut obliquely with the face of the flap, they are opened in a large conic section in the shape of a pen, and left, when placed on the underlying flap, in an attitude well adapted for receiving and conducting into their interior pus and putrid discharges which gravitate from the surrounding hollow and often funnel-shaped sides. To obviate this, I invariably, after a flap amputation, cut off the larger veins transversely.

The next subject I shall touch upon, belongs to one to which I have directed attention for some years; viz., the radical cure of rupture. I have long thought that we might, in favourable cases, safely do more than we now attempt, to prevent a return of the protrusion after the operation for the relief of strangulation. After performing operations for the radical cure more than two hundred times, I had grounds for the belief (which other operations on the peritoneum also favoured) that in a healthy subject, the peritoneum might be dealt with as freely and as safely as any other tissue; and also, that the chances of bad results from peritonitis would depend upon the injury sustained by the bowel in strangulation, rather than upon any way of dealing with the peritoneal sac and parietes after the strangulation had been relieved, provided that due drainage be secured. In cases where the bowel and omentum are congested only, and most likely to recover when placed into their natural cavity, especially in young and healthy subjects, I concluded that the attempt would be justified, and would probably be successful. If so, the advantage of preventing a lifelong trouble by the operation which relieves strangulation is obvious. The kind of cases I selected for such an attempt, and the nature and results of the proceeding will be best conveyed to your minds by a short *résumé* of the three cases where I have had the opportunity of carrying it into practice.

On June 29th, 1868, was admitted into King's College Hospital, a young man, Alfred Fuller, aged 21, 61, Warden Road, St. Pancras, with a strangulated right oblique scrotal hernia. The tumour had occurred suddenly from lifting. It was of the size of the fist, and had been strangulated twenty-four hours. He had constipation, violent

retching and vomiting (not fæcal), a quick pulse, and anxious face, pain in the epigastrium, and much pain and tenderness in the tumour, upon which several ineffectual attempts at taxis had been made. I put him well under chloroform, and made a fair and full attempt at reduction by the taxis, but in vain. I then made an oblique incision over the tumour, dividing the layers in the usual way, and laying open the sac to the extent of three inches. The sac contained a moderate amount of omentum, covering a knuckle of bowel, all congested, and the bowel slightly ecchymosed, and there was about an ounce and a half of bloody serum in the sac. The point of strangulation was, at the deep inguinal ring, and it was divided by an upward cut. The bowel was then drawn down slightly, and carefully examined. It presented the usual indentation, but was smooth and shining. It was then returned, and after it the omentum; the latter being carefully spread over the deep opening. The sides of the sac were then brought together, so as closely to embrace the cord over the whole length of the canal. The handled curved hernia needle used in my operation for the radical cure, armed with silvered wire, was then employed to bring together the sides of the sac, together with the aponeuratic structures along the whole length of the canal. A good view of the conjoined tendon was obtained, and the wire fixed in it in two places. The loop and ends of the doubled wire were then brought out at the upper and lower ends respectively of the incision. Four interrupted wire sutures were then placed through the skin between these points. The wound was dressed with carbolic lotion, and covered with gutta-percha skin, and cotton wool powdered with McDougall's powder to absorb the discharges. The interrupted sutures were removed on the fourth day, primary union having been by that time obtained throughout, except where the thick wires passed through the extremities of the wound, and effectively kept up the drainage. These were kept in for ten days. There was not the slightest sign throughout the case, of the peritoneum being inflamed, and the abdominal tenderness which was present at the time of the operation, passed away entirely. The sickness ceased directly after the operation, and the bowels were opened naturally two days afterwards. Erysipelas being present at this time in the ward, the patient was attacked by it on the sixth day. A partial reopening of the wound was the consequence, together with suppuration in the fundus of the hernial sac. The pus passed freely along the wires, and there was no burrowing. The suppuration in the sac caused obliteration and shrinking of that structure, and the testis was drawn by the subsequent contraction into the upper part of the scrotum. The patient was discharged wearing a light truss, August 15th, 1868.

During the first year after the operation, I saw him twice or three times. There was no cough impulse whatever when last seen; all the parts being very firmly traced up in the groin and around the cord. As he was repeatedly enjoined to show himself at once if any pain or weakness showed itself, and seemed fully impressed with the danger from strangulation which he had escaped, I have, I think, some right to conclude that there has been no return. The difficulty of following cases for a number of years in the nomadic habits of that part of our population which furnishes the most numerous favourable cases for the radical cure is one which I experienced in this case.

The next case was in a patient who had wished much to be operated on for the radical cure before the rupture became strangulated, in consequence of the impossibility of keeping it up with a truss, and the consequent disability from following his employment. I had refused to do so because of his age and the direct nature and great size of the openings.

Martin Webster, aged 52, had suffered from a large right direct inguinal rupture for twenty-six years, which, though at first entirely reducible by rest and the recumbent posture, could not for many years past, on account of the large size of the opening, be entirely pushed back or kept up by any of the great number of trusses which he had tried. He was admitted April 14th, 1872, had been vomiting for eight hours, and was very weak and low. The tumour filled the scrotum, was of the size of the two fists, and was tense, tender, and painful, with the skin of the scrotum red and inflamed from handling. A somewhat prolonged trial of the taxis being made under chloroform, and after the application of ice for three hours and by inversion of the patient without success, the operation of herniotomy was proceeded with by a single oblique incision four inches long. On opening the sac, a very large mass of omentum was found adherent at the neck, but not elsewhere, and covered by it was a large fold of small intestine, dark and congested, but still smooth and glistening. After division of the strangulating band at the deep opening, the bowel being found not much damaged at the strictured part was easily reduced. The omentum was congested, but not gangrenous, and, on account of its size and the adhesions somewhat recent at the neck could not

* *Trans. Clinical Society*, 1870.

† On the Torsion of Arteries, *Medico-Chirurgical Transactions*, ii, p. 199

be fairly reduced or retained in the abdomen. The mass of fat, about three quarters of a pound weight, was then cut off close to the adhesions at the neck of the sac. Such vessels as bled were tied separately, and, the stump being enclosed between the sides of the serous sac, four interrupted sutures of carbolised hemp were applied through the sac and tendinous parietes, and tied up so as to embrace the cord pretty closely. The two uppermost sutures were passed through the stump of omentum itself. These and the ligatures upon the arteries were then tied up in one knot and left hanging out of the lower angle of the wound to act as a drain for the discharges from the face of the omental stump. Lateral pads of lint and a spica bandage were applied, and the patient placed with his knees drawn up and shoulders raised, and five grains of pilula saponis cum opio given every four hours. The vomiting and distress at once ceased; there was no tympanitis and but little tenderness, and the bowels were freely acted on the third day. An abscess subsequently formed in the lower part of the enormous sac, and a small slough formed in the scrotum over the testis. Through the aperture left by this, the gland showed some tendency to protrude, but was easily kept in place by strapping and pads. By the use of a drainage tube through the lower part of the primary incision and out at the aperture left by the slough, the matter flowed away freely, and there was no tendency to burrow. The ligatures and sutures had all come away by the 29th April, and on June 22nd he left the hospital with the parts much thickened, firmly braced up, wearing a truss with a large ring pad. I have seen this patient several times since then, once in this present year. There was then a bulge felt in the groin when he coughed (and he has always a bad winter cough), but there was no sign of any descent into the scrotum, and a light truss kept him very comfortable and able to do a good day's work without inconvenience. He also promised to come to me at once if he had any more trouble with it.

The third case was that of Edward Brown, a waiter, of 14, Surrey Street, Strand, aged 21, in whom the rupture, a right oblique scrotal one, had not been observed till the day before his admission, when, after lifting a heavy box, he felt pain and sickness, and felt a lump in his scrotum. A doctor to whom he applied gave him an aperient, after which he began to vomit, and pain was worse, and the tumour increased in size and filled the scrotum. This rapid appearance and increase of the rupture were afterwards explained by its proving to be a congenital hernia with the sac formed by the tunica vaginalis, of which these peculiarities are very characteristic. On the 28th March, twenty-four hours after the occurrence of the rupture, the symptoms were very intense, and the taxis, with inversion and chloroform, having been fairly tried after two hours' application of ice-bags, I performed herniotomy exactly as in the first case I have described. The omentum and bowel were found in the tunica vaginalis, both congested, and slightly ecchymosed, with some effusion of bloody serum. The knuckle of bowel was strangulated, not only by the deep ring, but also by a band of the omentum, necessitating the drawing down of both until the constricted part could be seen and released. It was a case in which the bowel might easily have been passed into the abdomen with the stricture undivided. After the operation the patient was at once relieved; the bowels were opened normally on the third day; no tympanitis or tenderness became apparent. The central part of the incision healed by adhesion; a little discharge passed along the wires, which were withdrawn on the fourteenth day after the operation. He was sent out of the hospital April 26th, 1873, with a firm adherent cicatrix, and no bulge whatever. On the 12th May he showed himself, wearing a light horse-shoe pad truss; not the slightest sign of a return was evident. This patient is, I expect, in attendance here to-day.

It has been said with respect to this operation, that evidence is wanting as to the permanency of the cure, and I am free to confess that it is exceedingly difficult to watch a couple of hundred cases for the space of ten or eleven years. The constitution of human nature is such that you cannot hope for the generality of patients to show themselves occasionally for such a length of time, or even to write reports to the surgeon if they are not further troubled with the ailment of which he has cured them. It requires that powerful spring of gratitude which was said by the cynical French philosopher to consist in "a lively sense of favours to come," which is wanting in a case where there is no more for the doctor to do. I have found that the unsuccessful cases are more likely by the law of gratitude just enunciated to return upon your hands than the successful ones are, as a bad shilling expects to be replaced by a good one. I think, therefore, we have the better right to the position of reckoning in the same proportion of failures and cures cases which have not been seen twelve months after the operation, as those which have been examined after that time.

Now, out of 188, most of them unselected cases of inguinal hernia of which I have notes (including 7 females and 4 cases of double rup-

ture, both operated on) in 107 cases, the results are pretty perfectly known. I find that 51 of these were more or less unsuccessful; 42 returned in the first year after operation—that is, the patient could not do without wearing a truss after the first year. Of these, by far the greater number were so much improved that they were made comfortable by a truss, which was not the case in most instances before the operation. Some, but not many, were as bad as before the operation. Mr. Kingdon, of the City of London Truss Society, has kindly forwarded to me the names of twelve of those who had applied to that institution for the supply of a truss after an operation at my hands.

56 out of the 107 were cases which continued to be successful subsequently to a year after the operation, as ascertained either by direct examination by myself, other surgeons, or satisfactory to the patient himself, and either wearing no truss at all, or only occasionally, as a precaution, after the first year from the operation. Of these—7 were noted from thirteen to twenty-one months after the operation; 7 two years; 7 three years; 7 from four to six years; 7 from six to eight years; and 4 from nine to eleven years after operation. Reckoning operations on both sides and repetitions of the operations, I have done the operation more than two hundred times. Out of these, I have had three deaths: one from pyæmia, one from erysipelas, and one from peritonitis. These have been made public to the profession on more than one occasion, because I judged it right and fair that in an operation of this kind the facts should be made known as far as possible. In the last case, as shown by the *post mortem* examination (published in the *Medical Times and Gazette* in 1866), the peritonitis was found not to have originated in the parts operated on, but in a knuckle of bowel which had been lodged in the hernial sac before the operation, while the patient was wearing a strong truss. The cases in which any signs of peritonitis were observed were not more than about twenty in the whole number. One and a half per cent. is not a high average of deaths from surgical accidents, and there are very few operations of like kind, as, for example, for the removal of deformity, the cure of prolapsus of viscera, or of hæmorrhoids, which could show more favourably either in this respect, or in respect to the somewhat severe test of the length of time in which they have been known to be without a relapse after the operation. And since 42 out of the 51 known unsuccessful cases proved to be so within the first year after operation, and most of the cases were examined once or more at various intervals of time after the operation, I think that, in respect to this point we have a right to claim the probability of more and the certainty of at least as many good results for the 81 of which I have not been able to get notes after the first twelve months, as for the 107 in which I have done so. Under the age of twenty-one years the results in known cases are much more satisfactory. But of dry statistics you will think that I have given you, perhaps, more than enough.

The determination of the question as to whether the operation for the radical cure is an appropriate alternative to a life-long wearing of a truss, and a valuable supplement to the slow and very uncertain cure by truss pressure, will continue to depend upon the age, habits, circumstances, mode of life, and, to some extent, the cruel experience of trusses and wish of the patient after having the matter fairly put before him, and, perhaps nearly as much, upon the anatomical knowledge, skill, energy, and experience of the surgeon, or his disposition to that finality frame of mind to which I have alluded. In any case, whether universally or only occasionally resorted to, it forms, I think, a valuable addition to the resources of surgery.

Cases of *Ectopia vesicæ* and *Epispadias* possess an interest for surgeons who have a tendency to plastic efforts which results partly from the well-known futility of all operations to relieve them until recent years, and partly from the frequent appeals for relief from the very miserable condition to which the unfortunate patients labouring under this deformity are reduced. During the last ten years that my attention has been directed to this deformity, I have met with between forty and fifty cases, and more have been recorded by my fellow-labourer in this direction, Professor T. Holmes, who first practised successfully in this country in March, 1863,* the plan followed by Paucoast and Ayres in America in 1858. It had been suggested, apparently, by M. Richard's unsuccessful application in 1853, of Nélaton's principle of laying a flap upon the parts to be covered, with the skin surface downwards, and covering it with another. Other cases have been operated on in various ways by Messrs. Simon, Lloyd, Sydney Jones, and Thomas Smith, with, I believe, but little success. I have operated, up to the present time, for the relief of sixteen cases. All except three were males. Of the three females, one, aged 9, died from

* See *Lancet* for June 27, 1863, and his work on *Surgical Treatment of Diseases of Children*.

uræmic poisoning, the kidneys being found extensively affected with cystic degeneration, one being entirely converted into a membranous sac. The other two unsuccessful cases were operated on at too young an age for the extent of the deformity which was present, the constant efforts of crying after the operation acting upon the very protruding bladder and causing entire separation of the flaps after they had partially united.

My first case was operated on by lateral flaps only, not reversed, in October 1863; and was, after two supplemental operations, entirely successful. The boy died afterwards from erysipelas of the head and face; and I had an opportunity of preserving the parts operated on, which may be seen in the adjoining museum of preparations collected for the purposes of the present Association. It is interesting, as showing the formation of a smooth serous membrane on the deep surface of the enclosing flaps.

All my other cases were more or less successful. Two were shown in the course of last year at the Pathological and the Medico-Chirurgical Societies, in one of which the artificial covering was so complete and perfect that for a short time the boy could be made to hold his water by the application of an India-rubber ring around the penis and including the newly formed preputial covering of the urethra. All the thirteen successful cases could be kept dry and comfortable by the application of a guard and India-rubber tube and bag, as in a railway urinal. Eight cases (seven male and one female) were published in the *Medico-Chirurgical Transactions* of 1868 (vol. lii). Eight more (six male and two female) have been operated on since that date.

Time will not allow me to give further details of the various methods I have employed to obtain these results. Some of these had been previously employed by Nélaton and his pupils, Richard and Follin, and followed by Pancoast, Ayres, and Holmes. A full description of my methods has been published in the *Medico-Chirurgical Transactions* just alluded to.

I am able to give the members of the Association an opportunity of seeing in the neighbouring wards of King's College Hospital, three cases, one of which has not been operated on unsuccessfully, one in which the first stage of operation has been reached, and one in which the operations are completed. From these, they can judge for themselves of the value and utility of the work done.

For the analogous but less disabling condition of *epispadias*, I have operated twice by Nélaton's method with favourable results. For *hypospadias*, in which the urethra was deficient below as far as the scrotum, I have operated three times, upon a plan somewhat similar—viz., a reversed flap from the side of the opening, with another from the scrotum superimposed upon it. In one case—a boy of 1½ years—which had been interfered with considerably by a former unsuccessful operation, the result was an entire failure. In another, a boy of 6 years, the result was so far successful after one operation, that another slighter one will complete it. In a third case, that of an adult male aged 24, the result after two operations was an entire success, enabling him to pass his water comfortably over his trousers, and giving to some extent the power of sexual connexion.

A similar plan, combined with internal section and dilatation of the strictured urethra, I have found to succeed admirably and completely in two cases of penile urinary fistula communicating with the urethra in front of and close to the scrotum, accompanied with a hard cartilaginous stricture of the urethra. One was a bad traumatic case, which had before been operated on unsuccessfully by another surgeon. Cases of this kind have been long considered to resist all the efforts of plastic surgery; and, before adopting this plan, I have frequently been baffled in attempts to close the fistula.

In connexion with the subject of the treatment of stricture of the urethra, I may mention that among the novelties of the past year is the plan of M. Demarquay, of passing a long flexible hollow bougie through a perineal urinary fistula previously enlarged by the bistoury, and then one end forwards through the stricture and out at the meatus, and the other end backwards into the bladder.

The ingenious plan of Mr. Furneaux Jordan of Birmingham, of treating obstinate impassable strictures by attacking them in the rear through an opening from the rectum into the dilated urethra behind the stricture, is a valuable contribution of the year to surgical resources in troublesome cases.* Mr. Jordan informs me that he has operated in three cases of the kind with complete success.

In other kinds of plastic surgery, much has been done of late years. Since my own successful case of transplantation of skin from the abdomen to the arm for the relief of a frightful deformity of the wrist,†

I have had two more successful cases. A similar operation has been also successfully performed by Mr. Thomas Smith in the wards of St. Bartholomew's Hospital; and my colleague Mr. Henry Smith has quite lately had a very good case of operation upon the same plan, for the relief of an extreme contraction of the elbow after a burn in the left arm of an adult female. In *Rhinoplasty*, in which so much good work has been done by Mr. Hamilton of Dublin, I have had some good cases of restoration of the nose from the cheeks and upper lip. Some of these are found among the photographs laid before the meeting. The last case I have undertaken is about the most difficult one I have ever had to deal with, in the width of the chasm and the extensive loss of substance. The nasal bones, the vomer, ascending process, and a considerable part of the alveolus of the superior maxillary, and the whole of the ethmoid except the cribriform plate, have necrosed away, as the result of scrofulous lupus. A great prominence of the frontal sinus also constitutes an element of difficulty. To afford a basis for the new nose to be turned down from the forehead, I have resorted to the plan frequently followed successfully by Sir William Fergusson, of dissecting off and bringing towards the median line of the whole of both cheeks. To secure the union of these, and to afford a prominence to the point of the nose, I followed a plan that I had before employed in three bad cases with very satisfactory results, two of which are shown in the photographs which lie upon the table. At the same operation, I turned up the middle third of the upper lip, and split it up from its lower edge, turning over the borders, so as to afford a bridge of support and an extended raw surface for union with the apposed cheeks. This was rendered necessary, to enable the cheeks to meet in the median line, as well as to ensure their union to each other. When this was entirely healed, by a second operation I dissected up the mucous membrane from the bridge made of lip-tissue, and reflected it over the gap still left between the eyes, so as to form another bridge of support for the root of the new nose, and to prevent it from sinking into the gap so as to become too much depressed. I then turned down the new nose from the forehead after the Indian method, fitting it on to the raw surface, which gave it admirable support; and kept up the point of the new nose in a manner which one does not commonly see after this operation. This patient is now under treatment in the wards of King's College Hospital.

The very original and ingenious method of M. Reverdin I have practised with advantage in many of these rhinoplastic cases, to eke out any deficiencies of skin in corners where it was desirable to prevent puckering, if possible, from contraction, or to substitute skin-tissue for mucous membrane exposed by reversal of the upper-lip structure. This is rather apt for some time to show its parentage too plainly, unless subjected to more friction than is agreeable or possible upon a newly formed nose. In applying this method to large sores of the leg, or those resulting from burns, where the contraction of cicatrization is impossible or injurious, only a limited amount of success has been obtained. Perhaps the healing is somewhat expedited; but it is certainly accomplished more by the cicatrization and contraction of the original edges of the ulcer, than by the increase of the transplanted patches. We have also found a tendency in the resulting cicatrix to ulcerate again readily. I do not think that this method will supersede the necessity for larger transplantations of skin in those severe cases which call most urgently for surgical interference.

Among the recent innovations in operative surgery, I have barely time to notice one which "l'audace" of the French school is applying in a manner which those who have reached the rest and be thankful stage in surgery may call daring, if not rash. I refer to the use of the *aspirateur* of M. Dieulafoy to relieve distension by puncture of the bladder in cases of retention of urine, and of the intestine in abdominal obstruction, and in joints affected with hydrops articuli, and even to evacuate the fluid contents in strangulated hernia. In the first named of these conditions, it is no doubt valuable as an adjunct to other remedies. In intestinal obstruction, Demarquay has not found it of much practical use, because of the rapid re-formation of flatus, which quite corresponds with my own experience of puncture in desperate cases without the aspirator. In the puncture of joints and in the cure of hydatids, I have used it, but not frequently enough to pronounce upon its capabilities. I have not yet arrived at the measure of audacity to use it in strangulated hernia. It scarcely agrees with my own impression as to the importance of avoiding any injury to the bowel in dealing with strangulated or other hernia. The propriety and the limits of the use of this instrument are still *sub judice*, and we must wait for more bad consequences following its employment, than those which have already occurred, before we can pronounce fairly upon its merits. I am glad to see that the ingenious inventor is to give us a demonstration of the use of this instrument in surgery.

* See BRITISH MEDICAL JOURNAL, Nov. 9th, 1872, No. 619.

† Published in the *Medico-Chirurgical Transactions* for 1863, vol. xlv.

In the use of *anæsthetics*, we find now rising a revival of the rivalry between chloroform and ether, which the fame and support of the late Sir James Y. Simpson had decided in this country in favour of the former. We follow but tardily, in this old country, in that combination of pleasure with utility which has led lately the inventive genius of our transatlantic brethren to the association of æsthetics with anæsthetics in the performance of operations under these agents to an *obligato* accompaniment upon the organ, and an appropriate address by a popular preacher, improving the occasion on behalf of morals. The comparative safety of these agents is unquestionably a most important point, and one that must ultimately decide the matter in favour of that anæsthetic the use of which involves the fewest casualties. The chief difficulty in determining this is the natural disinclination to make public such cases. It is less objectionable, however, to do so when a certain lapse of time has occurred after the accident; and it is to be hoped that, in the not very far future, we may arrive generally at that philosophic frame of mind which will consider it as much a duty to publish unsuccessful cases as it is a gratification to achieve the glory of a brilliant result.

In the domain of surgery, gentlemen, are so many regions now undergoing exploration and re-examination, that I may fairly claim an excuse for having led you chiefly over ground which I have myself travelled, and for omitting many equally important territories perhaps more effectively mapped out, and to some of you more interesting. In exploring this domain, many pioneers are required, and many very qualified ones are busily at work. Those who have skill and pluck enough to find a new road of investigation, even if it be only to prove that it leads no whither, deserve commendation for this proof, which is itself good work done. They demand our sympathy, perhaps, more than those who are lucky enough to lead up to the most auriferous diggings. The age we live in is too much given to the worship of success to afford much of this sympathy; and it accords, usually, too little merit to such as have contributed to prepare a way for the honour which another has reached, profiting, it may be, by their mistaken vestiges in travelling upon the same errand. As we advance, our horizon itself extends; the very multitude of objects brought into view perplexes the perception of them; and even our instruments for detecting and examining them become so numerous as to be themselves *impedimenta* to our progress. The difficulty of deciding upon any given point becomes greater as differences become more minute, and proof more complex and further from our standpoint. The use of the imagination in science has already been powerfully justified; and the time may yet come when a complete and logical proof will be as little possible in scientific knowledge as in dogmatic theology. The theory of probabilities will doubtless be more employed to compensate for the imperfection of the record, and may be turned to advantage in archebiosis and the germ-theory, as much as in the Darwinian. It will thus become easier for the critic to fall into the error of asking for more evidence than the nature of the subject admits of—a sure sign of the limited area of his habitual observations. But even this tendency is productive of good. It is merely the redundant energy of a single-minded instinct in this natural enemy of inventors and innovators—sent, doubtless, as hawks to keep down sparrows, to insure proper limits and decent order among the more imitative minds who follow, prove, and sometimes improve, upon originators, and form schools and fashions. They thus accumulate a chastened experience. When weighted by the synthetical faculty, this instinct constructs eclectic systems, more than ever needed in the present chaos of crude ideas and undigested opinions, to which these swift-winged writers are fearsome scourgers. By their keen research they discover when and how things are re-invented and re-discovered, show the limits of their application, give warnings of danger and excess, which, if often falsified, at least inspire an useful caution, or lead to a more insured confirmation. Still more useful are they in deciding when discoverers disagree about priority. Whether right or wrong, they ultimately have the effect of consolidating and rendering more certain a well-grounded reputation. Misled by the Chasles forgeries, they found out that Newton had been preceded in his discovery of gravitation by a French savant, and thus elicited an elaborate and conclusive proof of its great originality. They have lately asserted that Harvey had been forestalled in his discovery of the circulation of the blood by Walter Warner, and have thus given us the benefit of the profoundly learned vindication of the Linacre professor of anatomy and physiology at Oxford.

A still greater influence and responsibility than heretofore will rest upon these labourers in science. The fruition of really great discoveries has been, and will, no doubt, continue to be, postponed by the blind opposition of those who form the scientific opinions of the age, and, though they usually check one another, so as to act, on the

whole, with advantage, yet their neglect or prejudices may undoubtedly prevail, so as to inflict injustice upon individuals, and do injury to science and to mankind, the more lasting in proportion to their position, ability, and conscientiousness.

ADDRESS IN PHYSIOLOGY,

BY

JOHN BURDON SANDERSON, M.D., F.R.S.,

Professor of Practical Physiology in University College.

THE subject on which I have to address you to-day is Physiology, but we are met for the purpose of promoting the progress of medicine. We are, I venture to say, rather a practical than a scientific body, having ends and aims which concern our own good and that of the community, rather than the promotion of science. Yet, notwithstanding, we all feel that we take a great interest in science, not only in those branches of it which have to do with our every-day work, but in those which have little or no connection with our art.

There exists, I doubt not, in the minds of all of us, a conviction that science possesses a certain intrinsic value not dependent on its immediate applicability to useful ends. Every day we, like other men, are becoming more and more convinced that it is a desirable thing to search after truth by the observation of nature—that those who occupy themselves in this pursuit are substantial benefactors of their country and of the human race—that the scientific labours of a few men, who do not set forth philanthropy as their motive, who do not profess to sacrifice themselves for the good of mankind, who live quiet unobtrusive lives, and are known for the most part only by their work, may accomplish more for the material welfare of the community than the efforts of armies of philanthropists. If I were to attempt to illustrate this, I should have to turn to other subjects than those which we have before us, for physiology has as yet done little for our art, and, consequently, little for humanity. I should have to seek for examples among the professors of those sciences which are sufficiently advanced to be brought into practical application. When I think of a life like Faraday's, every year of which brought a new accession of knowledge, and in the end enriched this country to such a degree as ought to secure him the posthumous adoration of all Mammon worshippers, however little they thought of him when alive; and when we compare the results of his life with the life itself, with the contracted laboratory in which he laboured, with the mean salary on which he lived, with his quiet devotion to science, with the constancy of his religious faith, and finally with the end of that life—mind and body exhausted in work—how great in such a man does that insatiable spirit of inquiry seem, which finds its constant and all-sufficient pleasure in the discovery of new truth—in wresting from Nature her secrets by strenuous intellectual effort!

In an address, which I had the honour of giving at the opening of the Physiological Section of the British Association, I endeavoured to combat the now prevailing view, entertained by many men of science, that it is desirable, in the interests of Physiology, that it should be as completely as possible separated from medicine, on the ground that, being founded on experimental research, and using the same methods of investigation as are used in the sciences of physics and chemistry, it ought, for all purposes of teaching and study, to be regarded as part of them. I was then addressing an audience of zoologists and botanists, scarcely any, or at all events few, of whom were medical men. I was, therefore, not surprised that the views then expressed as to the necessary connection which exists between Medicine and Physiology, were strongly objected to, and that my belief in the association of practical medicine with any subject deserving the name of a science was attributed to my own professional bias.

I founded my argument on the natural relation which must always exist between every art and the sciences on which it is founded; maintaining that to try to separate medicine from Physiology would be as unreasonable as to separate telegraphy from electricity, engineering from mechanics, or navigation from astronomy.

When I was called upon to deliver the address on Physiology before this Association, I at once determined to follow out the same line of thought—not going over the same ground, but pursuing it in a direction which was before precluded, and which would have neither fitted the occasion, nor the composition of the audience at Brighton. Then it was necessary to look at the question from the side of physical science, now I propose to look at it from the side of medicine.