An ophthalmic retrospect / F. Fergus.

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Surgeon to the Glasgow Eye Infirmary.

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GENTLEMEN,—In the first place, allow me to convey to you my deep and respectful thanks for the honour which you have done me in electing me your Honorary President for this year. There is no one with any proper feeling who can receive a compliment of this sort without a very deep sense of gratitude to the gentlemen who have conferred it upon him. When a man is thus singled out by *confrères*, to many of whom he is personally unknown, there naturally arise one or two thoughts in his mind—some of them agreeable, others of a more mixed nature. Thus it must be obvious to him, however much he may wish to shut his eyes to the fact, that he is amongst the senior members of the profession, for such honours are not bestowed upon those who are young in years. It is an indication to the recipient that years are passing, or rather that they have passed in considerable numbers, and that he cannot much longer expect to have such vigour as he may hitherto have enjoyed. But with this thought there comes the opposite and somewhat consoling one, that although the years that have gone may to himself have been in many ways unsatisfactory, although he may look back upon the time that is past as one that might have been spent to better purpose, still, that his work has been such as at anyrate to secure the kindly regard of colleagues well qualified to judge, and that, however unsatisfactory he may have been to himself, he retains the good opinion of many gentlemen whom he respects.

The chief difficulty which I have had in accepting this position is to select a suitable subject for an address, for, to tell the truth, I would much rather listen than speak.

The science of medicine has changed, and is changing so

[1] Address delivered to the Greenock and District Faculty of Medicine, 21st October, 1909.

rapidly that no man who occupies the ordinary platform of a practitioner can keep himself thoroughly in contact with the momentous advances which are every day being made by those who have the privilege of being modern pathologists and biological investigators. The vistas which their researches are constantly opening up are of great importance. Progress has unquestionably rested on a secure foundation in the departments of public health and of surgery, and the progress made is very largely summed up in the one phrase, Biological Pathology. However much I may have benefited personally by modern biology in its practical aspects, I cannot claim to have been in any way, in this department, an original investigator—all I have attempted to do is to avail myself of the great principles of practice which we owe to the genius of Lister and which more recent observers have only amplified. Moreover, the pure specialist labours under great disadvantages; he runs a risk, confined as he is in his field of observation, of not seeing the forest for the trees. Francis, Lord Bacon, was not in all respects a praiseworthy man. When he had mounted to the pinnacle of fame he found it convenient to kick away the ladder by which he had risen, and his conduct to Essex, who had been his patron and supporter, must always be a very dark stain on his character, yet his *Organum* was an epoch-making book, for in it he clearly laid down the inductive method—a principle to which all recent scientific researches owe so much.

I mention the book simply because in it we find a classification of the sources of human error into four great groups, namely, (1) the *eidola* of the tribe; (2) the *eidola* of the cavern; (3) the *eidola* of the market-place; (4) the *eidola* of the theatre. It is particularly to the second of these, the *eidola specus*, that the specialist is liable, for, as already indicated, his field of observation is limited. Yet it is from the particular that we rise to the general; while, on the other hand, the general proposition often throws light upon the particular. So the specialist should, so far as in him lies, use the special branch of medicine which he is pursuing to arrive at general laws, not forgetting that the disease of the organ to which he directs his attention is often conditioned and more frequently influenced by the general state of the patient.

I have, therefore, ventured to think that some account of the changes which I have seen in ophthalmic practice since I began my studies of it, now a good number of years ago, may be of some interest to the members of this Society; and

here may I premise that personally I have little or no hope of sound, permanent, and satisfying progress being made on anything else than a scientific basis. There is, I fear, little prospect of haphazard empiricism ever giving us real advancement. Some remedy of value may no doubt be discovered long before there is any scientific explanation of the benefits to be derived from its use, but unquestionably, if patience be exercised, the scientific explanation will come. Thus, the beneficial effects of solutions of mercuric chloride in washing and cleansing of wounds were known long before there was any germ theory of inflammation. We venture to think that no part of the healing art rests more thoroughly on a scientific basis than does modern ophthalmology. It essentially consists in the practical application of three sciences, physics, physiology, pathology—the three Ps as I call them—and all real and true progress has been made along these lines. All rational treatment is the practical application of the lessons derived from these three sciences.

My own career began after the establishment of the new era, but I well remember Mackenzie, who was the last great man of the old school, and who was probably, if we except Graefe of Berlin, the greatest of them all. According to his day Mackenzie was a clinician of the first rank, and although his great book has long ago passed out of the sphere of practical work, yet its pages show that Mackenzie in his time was a man of keen penetration and of the scientific spirit. That Mackenzie was fully alive to the scientific side of his subject is abundantly proved by the fact that in 1840 he published a book of considerable dimensions on the *Physiology of Vision*, which was, in its day, a masterly production, although it is not so well known at present as is his treatise on the *Diseases of the Eye*.

The idea that a large part, perhaps the greater part, of ophthalmic practice is nothing more nor less than a practical application of physics based on a sound knowledge of physical and geometric optics was not at that time an acknowledged doctrine of medical practice. No two things could have been more thoroughly disassociated from each other than the pathology of that day and the therapeutic practice. Of times more recent than Mackenzie's the same remark holds good.

When I myself was a student in the late seventies and early eighties pathology chiefly consisted in morbid histology, and it never seemed to occur to anyone that the work of the pathological laboratory ought to form the essential basis of therapeutic effort. Morbid histology has unquestionably its

uses, but these are for the most part diagnostic, and it is chiefly valuable as being of assistance in the diagnosis of tumours after they are removed. To a considerable extent, also, it has been of service to the physiologist. Take but one example. Without its aid the system of canals percolating all through the cornea would never have been discovered. But apart from such special uses it is of little value to the clinician. Many of us think that it certainly has been of service in the hands of Mr. Collins and of Mr. Priestly Smith in elucidating the nature of glaucoma, but, at this present moment, even that is called into question. Thousands upon thousands of sections of diseased tissues which have been duly labelled and put past have thrown, I fear, almost no light on the nature of pathologieal processes. For all practical purposes the cellular pathology of Virchow is as much a thing of the past as is the corpuscular theory of light, or the doctrine of the four elements, earth, air, fire, and water.

The new era in ophthalmology, as in surgery, seems to me to have begun with the philosophic researches of Joseph, Lord Lister. Till his time, disease seemed, in the hands of the morbid histologist, to be a sort of original sin inherent in the tissues. He it was who first pointed out that in many cases, particularly in the disastrous results which too often followed operation, the cause was not what might be called original sin on the part of the cells of the tissues, but was due to the influence of micro-organic life. I venture to think that no discovery has ever been made more fruitful in its results to suffering humanity. There is no more outstanding example of the triumph of science over empiricism than Lister's work, and it is some consolation in these days, when Germany and other countries are quoted to us almost every day of our lives, and that sometimes on inadequate grounds, to know that the modern practice of surgery has its basis on the scientific and philosophical work of a subject of Queen Victoria. At the same time I fully appreciate the immense importance of most of the work done in the Kaiser's realms. Nor is it any exaggeration to say that Lister's views as regards the origin of certain pathological conditions are the real basis and foundation of the modern science of public health. His conception of disease has invaded the province of the physician, and thus such diseases as tuberculosis, pneumonia, the specific fevers, and many others are also acknowledged to be micro-organic. It is difficult now to name almost any morbid state which is not likely, sooner or later, to be associated with micro-organisms. In my own time, when I was passing

through the classes of medicine, only one was mentioned by Sir William Gairdner as due to a definite germ, and that was anthrax. A considerable number of years after I graduated, Professor Koch announced that tuberculosis was due to a bacillus, and from that time the whole aspect of medical practice has been materially altered. No doubt, much remains to be done, but most of the advancement will depend upon the work in the pathological laboratory, for the *rôle* of the therapeutist will more and more be to apply the teachings of biological pathology to the treatment of disease.

Lister's views, correct in themselves, had become prevalent by the time I was a student on the surgical side. We all believed as we were taught, that if certain precautions were taken, germ life was impossible. I, therefore, remember very well the surprise almost amounting to shock which I received one morning in the wards of the Royal Infirmary, about the year 1879. I found there a surgeon who clearly believed that the means adopted for the prevention of micro-organic infection were for the most part inadequate. I remember this surgeon taking a piece of a dressing that had come off a wound, which dressing was well impregnated with carbolic acid, and demonstrating under a high power of the microscope —the first high power I had ever seen—that, notwithstanding the carbolic acid, the piece of gauze was simply teeming with micro-organic life. It is almost superfluous to mention that the surgeon here indicated was William Macewen. It was on that interview and on the work which I then saw that I have endeavoured to the best of my ability to form my own procedure as regards the surgical part of ophthalmic practice.

My early studies on the clinical side of ophthalmology were undertaken in the Glasgow Eye Infirmary. I had there the opportunity of seeing the work of several gentlemen of more than average dexterity and of great conscientiousness, and I could not help being struck by the fact that a very considerable proportion of the eyes operated on for cataract, either by extraction or by needling, were lost, either from suppuration or from acute irido-cyclitis. I am well under the mark when I say that the percentage of losses was at least 15. I remember three patients in my father's practice being operated on in the course of two winters: two of these were lost from suppuration, the other from irido-cyclitis.

On graduation, I at once went to Paris, and then on to Holland. The results in these countries were better than I had seen, but still left much to be desired. Meyer, of Paris, was in every respect an expert and good operator, yet again

and again, after cataract extraction, I saw him compelled to perform the operation of iridotomy, because the whole of the pupil had become obliterated with a mass of plastic exudation. Professor Snellen, of Utrecht, was perhaps the most dexterous handler of surgical instruments that I have ever seen. As regards the technique of his operations, the thing was perfect; and I must say that his results seemed to me better than any I had previously beheld. Yet every now and again a case went wrong in his hands, although I think that his percentage of successful results was better than I had seen elsewhere. I am not prepared to say what exactly was the difference, for I have not, except for the Glasgow work, any access to reliable statistics; but these were the impressions which I formed from what I saw. Landolt was perhaps the greatest physical clinician of the lot, so far as the application of physical science to the practice of ophthalmology was concerned; but he was also no mean operator. Yet, if my memory serves me right, at one period of his career he made a communication to the effect that needling, either for a soft cataract or for secondary membrane, was, if possible, to be avoided, for that a considerable percentage of such cases were lost, either from suppuration or from plastic iritis.

Such was the state of my information when I myself was compelled to begin the active work of an ophthalmic surgeon, and, like my neighbours, I was by no means free of disaster. There is nothing more trying than when a surgeon has conscientiously taken every precaution that suggests itself to his mind, or which the text-books enunciate, to find a case going wrong in his hands. If his work has been conscientiously gone about, and every possible precaution taken of which he is aware, then, under these trying circumstances, he is much to be sympathised with, even by the patient, for his distress of mind is perhaps equal to the acute disappointment of his client. Whether I were more or less fortunate in these early days than my colleagues, I know not. The statistics could easily enough be obtained, but I have no wish to rake them up. All I can say is, that every care of which I was at that period aware was duly taken; and I have no doubt that the same remark is equally true of the other members of the staff of the hospital with which I was connected. A comparison of that kind, being of the nature of a competition, is one of the comparisons which are odious, and, therefore, which I have never made. Early in life, however, I seemed to have grasped—I believe, chiefly from Sir William Macewen—the idea that all post-operative inflammation was

micro-organic in origin, and, therefore, in theory at least, preventable. With a view of improving matters, I introduced the use of sterilised dressings. In these days it was not possible to procure them at the Eye Infirmary, so for many years every piece of dressing that was to be used for my operation cases was prepared in my own house, and duly carried down to the Eye Infirmary. I also introduced the thorough sterilisation of instruments by boiling, a thing which I had seen done in one of the Dublin clinics in 1889. Under these circumstances, matters began to improve, but still left something to be desired. Well do I remember the first case which to me was definitely instructive. It was a patient who came from Glenluce, and who had already been operated on for cataract in one eye. Panophthalmitis set in, and the eye was lost. I thought to myself that if I could discover the cause of this disaster, following what was no doubt a well-performed operation for cataract, it would throw considerable light on my own troubles, and that, *inter alia*, I might be able to operate on the other eye with some degree of success. The conjunctiva of the other eye looked perfectly healthy; it was perhaps a little redder than the average conjunctiva, but not more so than was compatible with a perfectly healthy condition, and there was no discharge. It occurred to me that the bacteriological investigation of the conjunctiva on the side that had already been operated on might reveal something of importance. I was not then, as I am not now, a bacteriologist, so I availed myself of the services of Dr. R. M. Buchanan, who immediately found the pneumococcus in both conjunctival sacs. That seemed to me a perfectly adequate explanation of the disaster which had followed the first operation, and I determined to get quit of the pneumococcus on the other side before undertaking any operative procedure. Here I encountered a fresh difficulty, and that was in the getting quit of the parasite. My first attempts were with weak solutions of bichloride of mercury. The human conjunctiva will not stand a stronger solution than 1 in 8,000. So the eye was bathed with a solution of that strength for some days, at the end of which time a further examination was made by Dr. Buchanan, who found that the parasite was as abundant as ever. It was obvious that with this so-called antiseptic, as applied in that particular case, we had effected nothing. The next effort was made to kill it with nitrate of silver, and a strong solution, such as was at that time employed in the treatment of ophthalmia neonatorum, was used daily. At the end of a week the conjunctiva had

become so red and inflamed that no surgeon would have thought of attempting any operation, and, what seemed most surprising, Dr. Buchanan's examination showed that the micro-organisms continued to flourish. Looking back on it, I think that probably all we had effected was the destruction of the protecting epithelium, in consequence of which the parasite had obtained an even greater hold.

My old patient by this time began to suspect that she was the subject of some ominous experiment, and was getting very uneasy in her own mind, while I myself felt almost at my wits' end, and wondered if the eye was ever to be in a condition which would admit of operation. As a last resource, I visited the home in which she was placed twice or thrice daily, and everted the eyelids, and thoroughly scoured the conjunctival sacs with plain sterilised water, then applied gauze moistened with sterilised water so as to swab them out thoroughly. What the so-called remedies did not effect, this simple treatment at once attained. Within ten days the conjunctival sacs were pronounced to be free from pathogenic micro-organisms, and ultimately good sight was obtained.

That is only one of several cases which I carefully investigated at that time, but as it is typical, and as the others are simply a repetition of much the same sort of thing, I will not detain you further with their enumeration. I learned from this case that so-called antiseptics had only a limited application; that if they were to be applied strong enough to kill micro-organic life in such a tissue as the human conjunctiva, then we must be prepared for the destruction of the conjunctiva, and probably also of the cornea. No one denies for a moment that germs can be killed by these remedies, but the strengths in which they must be used to effect this end are such as to render their application to ophthalmic surgery absolutely impossible. From that time to this I have never willingly opened an eyeball for operation without first carefully investigating the condition of the conjunctival sac, or, at anyrate, having it carefully investigated for me, and I have come to the conclusion that no one is justified in operating on an eye when the conjunctival sac contains such micro-organisms as the pneumococcus, the streptococcus, the staphylococcus aureus, and several others. So far as I remember, there is only one exception to this rule, and that is in cases of acute glaucoma, where even the delay of an hour or two must make a difference in the prognosis as regards vision; here we must run the risk. But apart from this, no one is entitled to operate on an eye unless the

patient has been for a matter of five or six days under observation, during which the eye is carefully prepared.

There is a kind of comparison which is not odious—at anyrate, if it is made purely in the interests of scientific investigations—and the one which I would most respectfully submit is the result of my earlier operations with those of recent years. I have not looked up the figures for the first few years of my work in the hospital, but I quite admit they were not too good. My colleague, Dr. A. C. Russell, has recently taken the trouble to investigate all my cataract operations done at the hospital during the last ten years. These amount in all to 710. The summation of my ten years' cataract work in the Eye Infirmary is as follows:—

OPERATIONS.

Extraction of hard cataract, ...	384
Discissions, ...	265
Extraction of soft cataract, ...	61
Total, ...	710

Iritis followed operation in eight cases, in four of which the patient had removed the dressings shortly after the operation. In no case was an eye lost from suppuration, and only in one from irido-cyclitis. Taking the eight cases of iritis—in four, the dressings had been tampered with by the patients shortly after the operation; one was unquestionably associated with rheumatism. If these are excluded we have only three cases—in two of these the attack was extremely mild, the third was that of acute plastic irido-cyclitis.

That result is, I think, very fair, and is one which I personally attribute to the remark made by Sir William Macewen thirty years ago in the Royal Infirmary as to the inadequacy of remedies to kill germs. If we admit, as a fact, that post-operative inflammation is invariably the result of micro-organic life, then in theory, at anyrate, although not in practice, it is always preventable. To the end of time I presume there will be points overlooked even by the most careful, simply a reminder to him that thinketh he standeth to take heed lest he fall. There is one class of case which still to myself is disappointing. Gouty or rheumatic patients are apt to have an iritis following a carefully performed extraction. That probably is due to a parasite of some sort, although at this present moment we have no proof that it is so.

But other changes have necessarily followed on this development which we owe to modern biological pathology. The patient is no longer kept lying straight and stiff on his back for days together with the view of preventing inflammation. No longer is a special diet considered to have anything to do with the healing of an aseptic wound. Within reasonable limits he may have his ordinary food, and above all, it has abolished what used to be frequent in Glasgow, and which I never saw done anywhere else, a preliminary iridectomy. Iritis is not due to the pressure of the lens on the iris; it is due, and invariably so, to micro-organic invasion. Therefore, as two operations expose the eye twice to the risk of septic infection, the preliminary iridectomy seems to me a piece of grossly bad surgery, except when performed for the purpose of maturation.

Before I pass from the discussion of the changes which have taken place in cataract extraction, I would like to mention that the President of this Society, my friend, Dr. Cluckie, has quite recently obtained excellent results by what I think may fairly be called a form of sub-conjunctival extraction. The operation as described by him to me seems a good one. It is done so as to insure primary and immediate union of the conjunctiva, which, if it take place, the deeper structures can, as it were, heal up at their leisure, amply protected by the united conjunctiva from all risk of septic invasion.

May I crave your further indulgence briefly to discuss two other matters, namely, the treatment of conjunctival inflammatory affections and corneal ulceration? The treatment of the former has undergone a radical change since it has become a recognised doctrine that all acute conjunctivitis is but the expression of the presence of micro-organic life. That was a doctrine wholly unknown in my student days. It was well established that two forms of acute conjunctivitis were distinctly contagious, namely, granular ophthalmia and the purulent conjunctivitis which we now for the most part associate with the action of the gonococcus. But it never occurred to anyone in these days to consider that almost all inflammatory conjunctivitis was highly contagious. Time and again I have looked up the text-books of that period to find it attributed to such causes as the incidence of cold, bad ventilation, too much indulgence in tobacco and alcohol; never a word was said as to the proximate cause being the presence of germs. The pathology which we learned was equally obscure; it was of course entirely histological. Films

were prepared in great abundance, and we were shown numerous cells, both from the secretions and from the tissues themselves, undergoing active proliferation. Trachoma follicles were examined by the dozen, but there was no explanation as to why these follicles appeared.

Nor was even the most advanced pathology of that time in any way associated with rational treatment. In fact, the views then held differed in no essential from the attitude of mind of Mackenzie and his predecessors. As a student, I myself have seen setons passed through the tissues of the temple and blisters applied over the mastoid process for severe conjunctivitis. The drugs applied to the inflamed membrane were for the most part caustics, such as solutions of nitrate of silver and zinc sulphate; while a lotion of mercuric chloride was about the only one that I ever personally saw used for acute ophthalmia. One fact from that period remains true to this day, namely, that in certain cases of acute conjunctivitis the disease rapidly disappeared on the application of zinc sulphate. We now know that that is true of those cases in which the trouble is caused by the presence of the Morax-Axenfeld diplo-bacillus, and of those only.

I well remember the first incident which disturbed the ideas which I had rightly or wrongly obtained from text-books and from teachers. Several children, all from one tenement in the High Street, presented themselves at Charlotte Street Eye Dispensary, each of them suffering from very acute conjunctivitis. I was struck with the fact, and on pursuing investigation found that a considerable proportion of the inhabitants of that tenement were similarly afflicted. About a year afterwards I happened to read Weeks' papers on his discovery of a micro-organism which caused an acute and infectious ophthalmia. That changed the whole aspect of affairs. Acute conjunctivitis was no longer to be attributed to what these excellent men, the Presbyterian divines, would call original sin on the part of the tissues; but was to be regarded very much in the same light as the specific fevers.

Thanks to the labours of biological pathologists, this view of the matter has become more and more established, and those of us who are simply clinicians are by their work now enabled in most cases to make an accurate diagnosis, and to pursue a more rational kind of treatment. An infection of that sort will run its course very much as one of the specific fevers, and as most physicians have adopted almost exclusively the expectant method in treating fevers, so have we given up all very active treatment in dealing with acute ophthalmia.

It has specially sounded the death knell of treatment with strong caustic solutions, for it has been proved beyond possibility of reasonable doubt that a strong caustic solution, without killing the micro-organisms, destroys the protecting epithelium and allows the parasite to have a firmer hold. It has thus become established once and for all that an oil immersion lens is as essential an instrument for diagnosis in an ophthalmic clinic as is an ophthalmoscope, and should be used as freely. Biological pathology has therefore come to play the chief *rôle*, not merely in affording us a method of accurate diagnosis, but also an invaluable aid in judging of the effects of treatment.

As for treatment, I now personally rely entirely upon irrigation with normal saline in dealing with all forms of catarrhal conjunctivitis, the one exception being that I use zinc sulphate for the special form due to Morax organism. A pint of saline should be passed through the conjunctival sac at least once in four hours. By so doing the discharges are thoroughly removed, and the condition rapidly improves.

Never again will I employ the strong nitrate of silver in specific purulent conjunctivitis. I have never seen good result from it, but very often an immense amount of harm.

Some two years ago I read a very large number of essays on the subject of ophthalmia neonatorum, and was not surprised to find that one maternity clinic gave statistics of several thousand births in which not a single case of ophthalmia neonatorum had occurred, and in which no other precaution than thorough irrigation of the eyes with saline had been adopted. The prophylaxis, then, consists in washing, and not in the drug, which is held in the solution.

Of recent years there has been the introduction into practice of certain substances which are known as organic salts of silver. Their use has been chiefly advocated by a Frenchman of the name of Darrier, and their introduction was heralded as a new epoch in ophthalmology.

When I got his book I confess I was sceptical, for the simple reason that it contained mere statements of opinions concerning matters which might quite well have been put to an exact test. It seemed to me that in that work biological pathology had been thrown to the winds, and that we had returned to the crudest days of the worst empiricism. Fortunately, I had working with me Dr. Muir Kelly, who was able to put the various salts recommended to accurate tests. I confess that in my own hands they had never given me much in the shape of results. I found that when solutions

as recommended were applied to an inflamed conjunctiva that the micro-organisms did not diminish in number, and that it made practically no difference to the course of the disease. Not having sufficient leisure to undertake a long investigation of this sort, I availed myself of the services of Dr. Kelly. His results were published in the *British Medical Journal* for 23rd November, 1907. I do not intend to quote them *in extenso*, but there are one or two paragraphs which merit our consideration. He says:—

"In conjunctival infections the germs, such as the Koch-Weeks' bacillus and the gonococcus, are often intracellular and more or less deeply embedded in the tissues; consequently, the bactericidal agent will not be efficient unless it has power to penetrate the tissues.

"Accordingly, an attempt was made to compare the combined diffusible and bactericidal properties of protargol and silver nitrate.

"After immersing a one day's growth in a 0·5 per cent solution of silver nitrate for ten minutes, all the organisms were killed; but when a ten days' growth was exposed to a 1·5 per cent solution for the same time, a growth was obtained on the first day, so that the solution had not penetrated the growth deeply enough to come into contact with all the cocci. We are aware that the action of the silver salts on the cocci in an agar-agar growth is very different from that on germs in living tissues, but the results obtained in the following series of experiments are so marked as to warrant some deductions being based on them. From a culture on agar-agar a large number of tubes were inoculated, and when the growths were three days old the tubes were filled with solutions of protargol and silver nitrate. After certain periods the solutions were poured off, and a flow of sterilised water was run over the growths, from the thickness of which agar-agar slants were inoculated. Altogether over seventy experiments were performed, with the following results:—

"*Silver nitrate.*—A 0·5 per cent solution killed the organism in thirty minutes, a 0·75 per cent solution killed them in twenty minutes, and a 1 per cent solution required ten minutes to kill them.

"*Protargol.*—A 5 per cent solution and a 10 per cent solution failed to kill the organisms in thirty minutes, but a 20 per cent solution killed them in that time. A 30 per cent solution killed them in twenty minutes.

"Since the cocci were killed in twenty minutes by a 0·75

per cent solution of silver nitrate and by a 30 per cent solution of protargol, it would seem that in combined penetrating and bactericidal powers silver nitrate is about forty times stronger than protargol; but in the former series of experiments, where the antiseptic fluid came as much as possible in contact with the cocci, these were killed in ten minutes by a 0·5 per cent solution of protargol, so that the bactericidal power alone of silver nitrate is 263 times that of protargol. We may thus conclude that protargol has greater powers of diffusion, but these do not sufficiently compensate for the superior bactericidal powers of silver nitrate.

"In regard to argyrol, as it had previously been found to be almost inert, a culture was immersed in a 50 per cent solution for twenty-four hours, and from it a growth was obtained on the first day. On several occasions the culture was immersed for forty-eight, seventy-two, and ninety-six hours, but no subculture could be obtained."

If these drugs are so impotent when there is constant and complete immersion, of what avail can they be when only a few drops of a weak solution are momentarily put into the conjunctival sac? I have used solutions of the strength of from 4 grains to 20 grains to an ounce of water of silver nitrate without making the slightest difference to the vitality of the gonococcus. I have never yet seen these old solutions used without the condition of the eye becoming much worse. I am glad to find that in the clinic of the Glasgow Eye Infirmary none of the in-door patients are treated with any silver salts, organic or otherwise.

It is quite true that argyrol and protargol act infinitely better than does nitrate of silver, but the plain truth is that they do so because they are inert, and do not injure the tissues, which nitrate of silver does.

If I have not by now exhausted your patience, I should like briefly to speak of the change which modern biological pathology has, for me at anyrate, made on the treatment of dacryocystitis. Seldom, if ever, have I known a case of purulent dacryocystitis cured by the time-honoured custom of passing probes and syringing. As for slitting of the canaliculus, I know no basis of reason on which it rests. The mistake has been that up till now such cases have been treated as primarily due to stricture between the lachrymal sac and the lachrymal duct. Now it seems to me perfectly obvious that the *fons et origo mali* lies in the fact that the lining membrane of the sac simply becomes pyogenic. The condition may be brought about by such infections as the

pneumococcus or the streptococcus or by the tubercular bacillus; but it is not primarily a stricture. For these reasons I have long ago ceased to treat it as such, and if simple irrigation does not suffice to rectify the condition, then I invariably remove the lachrymal sac altogether. A septic membrane of that sort close to the cornea is such a real source of danger that it invariably should be put right by operative interference. For the purpose of irrigation, normal saline is the best. Mercuric salts are inadmissible since a considerable portion of the solution finds its way down by the nose into the stomach. Occasionally argyrol solutions are used with a view of putting the septic condition of the membrane right. Recently we saw a case in which this had been done. The only effect of the treatment had been the production of a most disfiguring and permanent argyrosis all round the orbit on the affected side. The lachrymal sac exuded pus as freely as ever.

Modern pathology, too, has entirely altered our views of the treatment of corneal ulceration. The prognosis of a corneal ulcer depends upon the bacteriological condition of the patient's conjunctival sac. Therefore, in all cases of corneal ulceration that should be investigated at once. The prognosis is extremely bad when the pneumococcus or streptococcus is found in the secretion. Here, again, the most reliable form of treatment is simple irrigation, and the keeping of the eye perfectly uncovered. Compresses and bandages ought practically never to be used. All they do is to foment the eye with its own septic secretions, and, therefore, I never employ them except when there is a threatening of the formation of a staphyloma. They do not keep the eye at rest, and they certainly are of no use in keeping out cold. The temperature of an eye beneath a bandage does not materially differ from that of an eye without one. For my own part, I prefer, in dealing with corneal ulceration, to use a myotic rather than a mydriatic, for it has been proven that with the use of a myotic, toxins in the anterior chamber are more rapidly eliminated than when atropine is used. Cocaine should never be employed unless for anæsthetic purposes in operative work. It should never be prescribed for regular use, as it has a most injurious effect on the corneal epithelium.

The cautery is often useful in corneal ulceration, and is especially so when it can be definitely employed for the destruction of the nidus of infection.

Vaccine treatment seems to have a great future before it in septic conditions of the eyeball, but up till the present

the data are too uncertain and the results too few to enable us to speak dogmatically on the point. One sometimes envies the younger men who are just beginning their careers, for in their hands biological pathology is likely to yield great and important results of a practical kind.

On one disease even the most recent researches have thrown no light, and that is on sympathetic ophthalmia. It remains yet the terror of the ophthalmic surgeon; and although it is now all but universally admitted that it is micro-organic in origin, still we are in no better condition to treat it than in the days of Mackenzie.

In conclusion, I would mention just two other recollections which I have of my earlier days. When I returned from the clinic and laboratory of Donders, I wrote a note to the only member of the School Board of Glasgow with whom I was personally acquainted, to suggest that the condition of the eyesight of all the children attending the schools in Glasgow should be made the subject of inquiry, to which I got an answer that there was no need of anything of the kind. On another occasion I attacked Dr. J. B. Russell with the suggestion that proper accommodation should be provided at the City Fever Hospital, Belvidere, for the reception of patients suffering from trachoma and from gonorrhœal ophthalmia. The directors of eye hospitals very properly have decreed that such patients shall not be treated in the wards of their infirmaries, and, as a consequence, thorough treatment is not possible, and the risk of contagion to those in their environment is very great. Dr. Russell's reply was that, unfortunately, there was no clause in any Act of Parliament entitling the authorities to provide such accommodation.

That incident happened twenty years ago. More recently I have communicated with my esteemed friend, Dr. J. C. M'Vail, on the same subject; but there is still the technical difficulty. In many continental clinics a special pavilion is provided for the reception of such cases, and I cannot help thinking that the sooner we have arrangements of that sort in this country, the better for the patients and the better for the public.

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