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EDITORIAL NOTES.

CASUALTIES.

KILLED in action on 21st March, Captain ROBERT FERGUSON COPLAND, R.A.M.C.

Captain Copland graduated M.B., Ch.B. at Aberdeen University in 1915.

DIED on service on 15th November, Lieutenant-Colonel MATTHEW HOLMES, New Zealand Medical Corps.

Lieutenant-Colonel Holmes was educated at Edinburgh, where he graduated M.B., Ch.B. in 1902 and M.D. in 1908, also taking the diploma of F.R.C.S.(Edin.) in 1905.

DIED on 18th November, Lieutenant-Colonel JAMES MORE REID, R.A.M.C. (retired).

Lieutenant-Colonel Reid graduated M.B., C.M. in 1878 and M.D. in 1880 at Edinburgh University. Entering the R.A.M.C. in 1884, he served in the Tirah Campaign of 1897-98, and in the third China War of 1900. He rejoined for service in the present war in January 1915.

DIED on service, Captain EDWARD DAWSON KEANE, R.A.M.C.

Captain Keane graduated M.B., Ch.B. at Aberdeen University in 1901.

DIED on 21st November, Lieutenant-Colonel WILLIAM MALCOLM STURROCK, R.A.M.C.(T.F.).

Lieutenant-Colonel Sturrock was educated at Edinburgh, where he graduated M.B., C.M. in 1883.

DIED on service on 10th November, Major ROBERT CHARLES IRVINE, R.A.M.C.

Major Irvine graduated M.B., Ch.B. at Edinburgh University in 1913.

11559

Died of influenza on 9th November, Captain Henry Paterson Crow, R.A.M.C.(S.R.).

Captain Crow graduated M.B., Ch.B. at Glasgow University in 1915.

Died of influenza on 5th November, Captain John Dow, Indian Medical Service.

Captain Dow was educated at Elgin Academy and at Aberdeen University, where he graduated M.A. in 1910 and M.B., Ch.B. in 1914.

Royal College of Surgeons of Edinburgh.

At a meeting of the College held on 18th December the following gentlemen, having passed the requisite examinations, were admitted Fellows:—John Ellison, L.M.S.S.A.(Lond.), M.B., B.C.(Camb.), St. Helens, Lancashire; Robert Joseph English, M.B., Ch.M.(Sydney), Yass, New South Wales, Australia; James Burnett Hogarth, M.B., Ch.B.(Edin.), Captain, R.A.M.C.(T.), M.O. City of London Military Hospital; Robert Lyle Hutton, M.B.(Toronto), M.C.P. & S.(Sask. and Alberta), Captain, R.A.M.C., Brantford, Canada; Millen Alexander Nickle, M.B.(Toronto), M.C.P. & S.(Ont. and Sask.), Captain, C.A.M.C., Saskatchewan, Canada; Ibrahim Abdell Razzak, M.R.C.S.(Eng.), L.R.C.P.(Lond.), Cardiff; James Ness MacBean Ross, M.B., Ch.B., M.D. (Edin.), Temp. Surgeon, Royal Navy, Galashiels; Augustus George Stewart, M.B., Ch.B., M.D.(Aberd.), Captain, R.A.M.C., Medical Superintendent, Paddington Infirmary, London; David Laurence Tate, M.B., Ch.B. Glasg.), Captain, R.A.M.C., Surgeon i/c Tankerton Hospital, Whitstable, Kent; William Robert Tutt, M.B.(Toronto), M.C.P. & S.(Ont.)., Captain, R.A.M.C.; Wilson Tyson, M.R.C.S.(Eng.), L.R.C.P.(Lond.), B.C., M.D. (Camb.), Lowestoft, Suffolk.

Owing to the increased cost of production the subscription to the *Edinburgh Medical Journal* has been raised to thirty shillings per annum.

A NEW METHOD OF WOUND TREATMENT BY THE AGENCY OF LIVING CULTURES OF A PROTEOLYTIC SPORE-BEARING ANAEROBE INTRODUCED INTO THE WOUND.*

By ROBERT DONALDSON, M.A., M.D., Ch.B.(Edin.), F.R.C.S.(Edin.), D.P.H., Pathologist, Royal Berks Hospital, Reading; Bacteriological Specialist, War Hospital, Reading, etc.

The most efficient method of treating wounds is one of the oldest of medical problems, and one which, after years of Listerian practice, still awaits solution. If antiseptics be the last word in wound treatment, then the ideal antiseptic yet remains to be discovered. It is possible, however, that there are other ways of dealing with the problem, and the new biological method advocated in these pages is a step in this direction. It constitutes a complete break with tradition since, instead of attempting to kill the organisms present in a wound by means of antiseptics, other organisms are actually introduced, and their services enlisted on the side of the surgeon.

To many this will sound like rank heresy. So contrary indeed is it to all that has been taught since the time of Lister that one must expect it at first to be regarded with suspicion if not with actual disfavour. Facts, however, are difficult obstacles to put aside easily, and after all it is a comparatively simple matter for the sceptic to convince himself of the practical utility of the new method.

In order, however, the better to follow the evolution of the theories on which this new method is based, I may perhaps be excused if I make brief reference to the chief methods of wound treatment in common use prior to the war.

Broadly speaking, these may be divided into two: viz. pre-Listerian and the antiseptic. The former rested on empiricism and gave place to the second, which originated as a result of the epoch-making discoveries of Pasteur and the application of his discoveries to surgical practice by Lord Lister. To Pasteur we owe our knowledge of the reason why wounds go wrong—the significance of organismal implantation—while to Lister we are indebted for our knowledge of how this may be prevented. Lister's work lay in the direction of prophylaxis—prevention of

* Extracted mainly from a thesis awarded the degree of M.D.(Edin.) with commendation.

the entry of organisms by the use of antiseptics—and from this it was but a step to the employment of antiseptics in wounds which had already become infected; in this way the era of antisepsis was ushered in.

Wounds came, however, to be differentiated into two categories—those made by the surgeon into non-infected tissues, and those inflicted by other means and in which pathogenic germs had already gained a footing. With a recognition of this important distinction came a modification of Listerian practice. It was argued that since a wound made by the surgeon into non-infected tissue contains no organisms, it was therefore unnecessary to introduce an antiseptic into such, especially as the chemical employed often possessed irritating properties which militated against rapid healing. It was sufficient simply to render the skin more or less sterile by the use of some antiseptic, while instruments, etc., were freed from organisms by boiling. In this way the aseptic method of treatment came into existence as an offshoot of the antiseptic.

In the use and application of these two methods, the younger generation of medical men at least have been trained, and in view of the facilities existing in civil life for the rapid and thorough treatment of freshly infected wounds, coupled with the progress made in hygienic matters, these methods have been found on the whole satisfactory in perhaps the majority of cases. With various adjuncts, such as vaccine therapy, wound infections had largely been robbed of their terrors. Notwithstanding this, the ability to stay the progress of infection in a wound by these means was still of the nature of a variable quantity. The mortality from wound infections had been tremendously reduced, but no one antiseptic had been found, the employment of which could always be depended upon to render a septic wound rapidly sterile. Hence there arose a rivalry between various types of antiseptic and various methods of application, exaggerated values being attached to these various substances as a result of deductions drawn from *in vitro* experiments. To the surgeon the septic wound was one containing organisms. These had to be exterminated. *In vitro* this was easily achieved by means of antiseptics, therefore, it was argued, the latter ought to be equally efficacious in wound treatment. The all-important fact was not grasped that the living wound is very far from being on all-fours with a test-tube experiment. The former contains complex bodies not present in the test-tube where two factors only are in operation, viz. the organism and the antiseptic to which it is exposed. It is this failure to recognise anything else in a septic wound, saving the presence of the infecting organism, that is responsible for the continued efforts to find the ideal antiseptic the application of which to such a wound would speedily and certainly put an end to organismal life without, at the same time, inflicting a fresh injury on the tissues. The ideal antiseptic, however, is a veritable Will-o'-the-Wisp that has so far eluded capture, although from time to time someone comes forward to claim the honour of having at last found it. As a result of the various tastes and fashions in antiseptics, the Listerian school became subdivided into various coteries, each coterie the advocate of its own particular antiseptic to which it pinned its faith.

With the outbreak of the present war, however, the false sense of security engendered in civil life by circumstances already alluded to was rudely shattered.

Like a bolt from the blue it was found that the antiseptics hitherto in general use were comparatively powerless to stay the ravages made by infecting organisms in modern gunshot wounds. Men were unaccustomed to deal with such wounds, or with such heavy and virulent infections. Apart from the extensive laceration and destruction of the tissues, the mode of infliction, by its very nature, carried infection deeply into the wound. Moreover, the infecting flora were of such variety and virulence as had hitherto been unknown in the course of ordinary civil practice. It was easy to understand that it should be so when we consider the very highly manured state of the soil on which the fighting is taking place. Further, the conditions of trench warfare, which evolved after the preliminary manœuvring of the hostile armies, were such as literally to saturate the clothing and to plaster the bodies of the soldiers with mud and filth highly charged with organismal life. These were factors entirely new to men who had had to deal only with the wounds and infections of civil life.

Recourse was therefore had to the strongest weapons known for combating infection. It was the supreme test of the efficacy of such antiseptics as were then in use. How they failed is now common knowledge. In many, many cases they were useless in the hands of the surgeon, and it was at this juncture that Sir A. Wright came forward as the determined opponent of antiseptic methods, and the apostle of the so-called "physiological treatment," by means of hypertonic saline solutions. In this way the first blow was delivered against Listerism, and the physiological method introduced to take its place. It is not my purpose here to discuss the question of antiseptics *versus* hypertonic saline, nor do I propose to canvass the theories or criticise at any length the methods of treatment advocated by Sir A. Wright. These theories have already been subjected by other and more competent workers to sufficiently trenchant criticism. Moreover, that Wright himself has not only modified his original methods of application of hypertonic solutions, but has even modified his original views regarding their mode of action, seems to point to the fact that a complete understanding of the physics and of the biological properties of hypertonic saline has yet to be achieved. From the practical point of view, while it might only show ignorance on their part or inability to use the method of treatment so strongly advocated by Wright, the fact that it has been abandoned by many surgeons for other methods seems peculiarly significant. The chief merit of Wright's work consists, in my opinion, in the fact that he helped to break the spell which had hitherto bound surgeons to the exclusive use of antiseptics. To the surgeon the septic wound was a solution of the continuity of some part of the body into which organisms had gained an entry. The chief factor, if not the only one which rendered the wound unhealthy, which prevented its healing, and which, in certain cases, even menaced the patient's life, was, in his eyes, the infecting organism. Obsessed with this idea, his one aim was to rid the wound of its infecting flora, and for this purpose the chief weapon in his armamentarium was the antiseptic, and this weapon had failed him. Wright then came forward and directed the surgical mind to a second factor in wound treatment, the importance of which had not been sufficiently emphasised, viz. the protective mechanism of the patient's own tissues. This, he argued, ought to be given full scope for action, best achieved by abstaining altogether from the use of antiseptics and by employing, instead, hypertonic solutions of salt. The fact that he laid emphasis on the ability of the patient to combat his own infection if given a chance seems to me of more importance than the particular method which he devised to attain this end. The disappointment following on the comparative failure of antiseptics thus found expression in the dogmatic statements of Wright.

In this way, so far as their methods go, there came to exist side by side two diametrically opposed doctrines of wound treatment. Both, however, are based on the idea that the infecting organism is the chief, if not the only, factor to be considered in a gunshot wound. One school endeavours to exterminate the infection by the use of such artificial means as chemicals, the other relies on the living defensive mechanism of the patient. Both equally fail, however, to grasp all that is involved in the term "infected gunshot wound." The latter is not merely a solution of the body's continuity which has become infected. There is a third factor whose importance has hitherto not been sufficiently realised, viz. the presence in that wound of devitalised or dead tissue. The missile which inflicts the trauma does not merely cause a solution of the body's continuity, through which pathogenic organisms enter; it also devitalises more or less of the living structures, and it is this last factor whose significance has been overlooked. Force of circumstances, however, has compelled surgeons to take cognisance of it. Dissatisfaction with the older antiseptic methods and with the newer physiological treatment has led them to advocate complete and immediate excision of the wound, so that a third method of treatment has come into vogue, which in the following pages I shall call the Surgical method. The increasing tendency on the part of surgeons to employ the latter indicates a tacit recognition of the fact that neither the antiseptic nor the physiological method can be implicitly relied upon for success, and both, it is well known, are liable to fail, with disastrous consequences to the patient. There must be some explanation, common perhaps to both, to account for the frequent failure attending their use, and this explanation, I venture to submit, will be forthcoming only when we can visualise the *rôle* played by the dead tissues in a wound, and the biological processes occurring therein as a result of bacterial implantation. The third, or surgical, method of treatment was introduced ostensibly to remove infecting organisms before they had had time to proliferate seriously. To do so obviously involved removal of a certain amount of tissue, mainly dead or badly damaged. The significance of this dead tissue seems to me to be of such importance that I would here urge a revision of the usual surgical text-book definition of a wound. I would suggest that in that definition be incorporated due reference to the fact that a wound consists not merely of a solution of the continuity of some part of the body, but a solution accompanied by devitalisation or even death of part of the tissues involved. Such a definition would emphasise the importance of the damaged tissue in the wound, and an appreciation of this fact would lead to a clearer understanding of the sequelæ of wound infection. From the wound inflicted by the surgeon's knife, where the devitalised tissue is small in amount, there range all degrees of damage, varying according to the instrument producing the trauma and to the force employed. The gravity of a gunshot wound, for instance, compared with that produced by an unclean surgical scalpel, depends, apart from the number and type of organisms present, on the greater amount of devitalised tissue in the former, and the opportunities this affords for organismal activity whereby weapons of offence in the shape of toxins, etc., are formed. The ability of a patient's own defensive mechanism to deal with infecting organisms would lead us to suppose that, if it were possible to inflict a wound without the production at the same time of even the minutest trace of devitalisation or of necrosis, any infecting organisms which might find an entrance would be promptly dealt with by the defensive cells, and sepsis would not occur, the patient's general power of resistance being normal. In such a wound antiseptics would be a danger and physiological saline unnecessary. Where, however, dead or damaged tissue is present, we have a fresh obstacle to successful treatment, whether hypertonic saline or antiseptics be used. Remove this base and either method may then suffice to keep further infection at bay.

I wish, however, to refer again to the physiological method of wound treatment. The means by which Wright sought to achieve the end he had in view was indirectly the stimulus which prompted the present investigation. Wright drew attention to the use of ordinary salt as the means *par excellence* of inducing the body to undertake its own defence against invading bacteria. Colonel C. B. Lawson and Colonel H. M. W. Gray, C.B., A.M.S.,[1] basing their theories of treatment on those formulated by Wright, introduced, in order to promote a so-called lymphagogue action and to obviate the need for elaborate drainage or continuous irrigation, the now familiar method of treatment by means of salt packs.

Briefly put, the merit of the salt pack lies in the ease with which it can be applied, in the fact that it can be left undisturbed *in situ* for five or six days, with great comfort and advantage to the patient, and in the fact, according to its original advocates, that it effects more or less closely the changes which Wright insists upon are necessary for the rapid and successful cleansing of a wound from infection. Whether or not salt acts physically, as Wright and his followers seem to think, does not particularly concern us at this point. The physics of its action, not to talk of the biological processes involved, still await more accurate scientific explanation than has so far been advanced. Suffice it to say that, according to its advocates, salt acts in the first instance as a lymphagogue, so preventing a wound from becoming in Wright's words, lymph-bound; that the lymph flow also tends to loosen sloughs so that they separate more readily, and that later the salt solution of reduced tonicity exercises a chemiotactic influence on the leucocytes which, together with the salt present, complete the victory over the invading bacteria. In addition to the active defence in the form of phagocytes and what Wright calls "bacteriotropic" substances there is a passive defence which he defines as "the protection against infection obtained by preventing microbes converting to their uses the nutrient substances of the blood fluids."[2] In other words, there comes into play the antitryptic power of the blood, a power which is said to be increased in all severe wound infections.

All this may be true of salt when employed as Lawson and Gray recommended, without necessarily being the real explanation of the success of the salt-pack method of treatment, which, as I shall try to show, depends on another factor altogether. One of my colleagues, Major Joyce, R.A.M.C.(T.), in charge of certain surgical wards at the Reading War Hospital, was in the habit of employing this salt-pack method of treatment for gunshot wounds under his care. His results were, as a rule, excellent, and tallied more or less closely with the published results of others who have employed this method of treatment. The salt certainly seemed to be able to effect a marvellous change in the local and general condition of the patient. Admitting for the moment the claims of the protagonist of the hypertonic saline method as to its action in the wound, the question arose, Did this action result in a reduction in number of the infecting bacteria? At my colleague's request I made a series of observations on such wounds before the introduction of the salt packs, and again after their removal. The results, however, were disappointing, inasmuch as the bacterial flora seemed to be as numerous immediately after removal of the salt pack as before its use. To a certain extent this is what one might have expected, for salt packs practically constitute what is to all intents and purposes a pus poultice, and produce a totally different condition from that resulting from continuous irrigation, which, by mechanical flushing, keeps the wound free from accumulations of pus. Yet that the wounds so treated did well and recovered probably sooner and with less disturbance than by any other method was a clinical fact clearly proved by the published experience of several surgeons. Girling Ball,[3] for example, states that "the salt causes an exudation of fluid which washes out the bacteria not only from the surface of the wound but also from the deeper tissues, thus affecting them in a manner which no antiseptic applied to the surface will do. Whether this is due to osmosis or irritation is difficult to say; the clinical fact remains . . . it is a great advance in the treatment of infected wounds." As a matter of fact the outflow of fluid which follows insertion of the salt bags takes place for the most part entirely within the first twenty-four hours, whereas the bags remain for days *in situ* and, as I have said, come to form a veritable pus poultice. In spite of such a condition, Roberts and Statham[4] declare that cases received from the clearing stations, treated by the salt-bag method, generally arrived in excellent condition—much better than those treated by other methods—but they can offer no explanation of the mechanism by which this is achieved.

Several others have written with equal enthusiasm about the superiority of the salt pack over other methods of wound treatment, but no one, with perhaps a single exception, so far as I remember, has recorded any failures. Perhaps they had none to record. It was a failure, however, that led to my undertaking the investigation on which the new method of treatment rests.

My colleague, Major Joyce, had noticed that in one or two instances the salt-pack treatment had been a failure, and in such this method had to be abandoned for some other. The reason for these failures was not at first apparent, until he became aware that whereas all successfully treated salt-bag wounds emitted a strong offensive odour—a characteristic referred to by all who have written about this particular treatment—it was completely absent from certain cases under his care which had definitely failed to clear up after salt packing. No surgeon hitherto had coupled absence of smell with failure of the wound to improve under salt-bag treatment. It was a point, however, of considerable importance, for on it hinged the subsequent laboratory work upon which the new method is based.

Impressed by the observation he had made, my colleague approached me with the query, Why do some salt-packed wounds smell while others fail to do so? The simplest and most obvious answer to the question was that a certain organism or combination of organisms, present in some wounds but absent from others, would probably be found responsible for the odour in question.

To determine if this were so became my immediate aim. In the course of investigation, however, new ideas occurred to me as well as fresh problems for solution, and these, when they had been followed up, elucidated and tested, furnished the data for the method of treatment as formulated in these pages. In carrying out this inquiry I am indebted to my colleague, Major Joyce, for affording me free access to the patients under his care, for granting me every facility for the collection of material and clinical data, and for his kind co-operation when the time came to put the new method to clinical test.

For reasons which I need not enter into here, I resolved in the first instance to investigate the anaerobic bacteria present in wounds undergoing successful salt-pack treatment. The first case from which I made cultures yielded a mixture of two spore-bearing anaerobes which, as a preliminary to further study, I ultimately succeeded in separating by a method described elsewhere.[5]

One of these organisms possessed round terminal spores, the other oval subterminal ones. Pure cultures of the latter, grown for two or three days in cooked meat medium, developed the same peculiar odour which characterised successful salt-packed wounds. Further investigation of a series of cases so treated showed that this bacillus was present in all that were doing well and smelling, but that it was invariably absent from those which were making no progress. It established the fact that this particular odour might be regarded as an indicator of the success of the salt packs in any given case. The next step was to study the morphological and cultural characters of the new organism, and to determine its pathogenicity, if any, towards animals. This has been fully dealt with in my thesis and an abridged account of it will be found in another journal.[6]

For reasons given in that article I have named the organism thus isolated, the "Reading bacillus." Comparative work shows that it is closely related to the B. sporogenes of Metchnikoff. There are reasons for believing, however, that the latter name probably covers not one strain but several, all nearly related, but differing from each other in certain points, and it seems probable that the Reading bacillus is one of that group.

The Reading organism is a spore-bearing anaerobe possessing strongly proteolytic properties. Its behaviour in a medium of cooked meat at once suggested to my mind the possible *rôle* it played in septic wounds, viz. that it broke down or hydrolysed the dead protein tissue, and by so doing destroyed the pabulum on which pathogenic organisms flourished. Other possibilities were investigated later, but this seemed at first the simplest explanation of its action. Given suitable conditions for active growth and proliferation, it probably did in the dead tissues of the wound what it obviously did *in vitro*, viz. it digested them.

Further laboratory work showed that this bacillus possessed no directly inhibitory effect—for example, by the production of organic acids detrimental to organisms grown in symbiosis with it—and no bacteriolytic property was demonstrable. These experimental results agreed with observations made on the bacterial content of salt-packed wounds, to which reference has already been made.

In view of the strong proteolytic properties of the Reading bacillus—its chief characteristic in fact—I felt that here was the explanation of the success following salt-pack treatment. This view was further supported by the clinical phenomena seen in wounds so treated. Previous to the introduction of the salt packs the wound is lined with devitalised or dead tissue in greater or less amount. On removal of the packs from a successful case in five, seven, or nine days' time, it will be seen after irrigation that the previously black sloughy material has disappeared—has been digested, in fact—and in its place bright red healthy granulations are visible, with perhaps a few somewhat emaciated sloughs loosely adherent. The bulk of the damaged tissue has disappeared, and with its disappearance there has been a steady improvement in the patient's general condition.

Bacteria require sufficient pabulum for their successful growth and proliferation. This, as a rule, is an easy matter *in vitro* and, given a proper adjustment and supply of this pabulum, will go on indefinitely because unhampered. In the human body, on the other hand, it is quite another matter, since the body cells are endowed with a complex mechanism of defence having for its object, amongst other things, the destruction of pathogenic organisms which may threaten the well-being of that body. The unfettered growth and proliferation of bacteria are thus held in check by this defensive system, and unless the latter be naturally, or at the time of attempted bacterial invasion, imperfect, or unless the mass attack by the bacteria be overwhelming, the body is quite able to conduct its own defence and to destroy the invading organisms.

Many of these bacteria will not grow on healthy living tissue but only on what is damaged or dead. The latter forms the base from which they draw their supplies, and from which also they produce those substances which may be regarded as their weapons of offence. These weapons are toxic in character—the degradation products of organismal activity—and they act as a set-off against the body's defensive mechanism. A wound, as I have said, implies the presence of devitalised or dead tissue—tissue no longer in possession of the full powers of defence which it possessed previous to infliction of the trauma. Such material constitutes a more favourable culture medium for bacterial growth than do the uninjured tissues of the body, and the bacteria very properly make use of it.

It is not quite such a favourable breeding ground, however, as, for example, is the medium contained in our culture tubes, since the proximity of the living to the dead tissues allows a certain degree of scope for the body's defensive mechanism to come into play in the shape of phagocytes and bactericidal substances. A single or an occasional attempt to invade the body may be easily repulsed by its defensive mechanism, but when a base has been established in the shape of devitalised tissue it is quite another matter to deal with repeated attempts of this kind. The danger lies in frequent small attacks made by bacteria or their toxic products and continued over a period of time. This mode of attack may be compared to the "wearing-down tactics" of warfare, and its severity will depend, amongst other things, on the size of the base from which the organisms operate. The larger the base, the greater the opportunities for organismal proliferation, and consequently the greater will be the amount of toxic material available. The danger to the patient will depend on the length of time we allow the infected base to exist and on the volume of dead tissue present in the wound. The latter may actually tend to increase, for not only do the toxic substances operate injuriously on the patient's general condition, but they may also exert a local effect on the adjacent healthy tissues whereby the latter in turn become damaged and finally die. Hence, both a general and a progressive local destruction may occur simultaneously.

The danger would be entirely eliminated or at least largely minimised if one could destroy the base from which the hostile activities proceed without at the same time laying the foundation for a fresh base. This is exactly what the Reading bacillus does, and what to a large extent is achieved by the surgical method which, in this respect, is superior both to antiseptic and to physiological measures. Wound excision, however, possesses certain disadvantages which detract from its value and render it inferior to treatment by means of the Reading organism. For instance, the exact amount and extent of dead or dying tissue cannot always be appraised by the naked eye, and, moreover, the very act of excision inflicts a fresh trauma, leaving behind it a zone of death liable to become immediately re-infected. It is equivalent to the substitution of a small amount of dead tissue and presumably a minimal infection for a large mass of damaged tissue and a heavy infection. The surgical method is, moreover, a gross and mutilating form of attack, and, for anatomical reasons, is not always possible.

The Reading bacillus, on the other hand, is able to dissect away, as it were, not only the macroscopically but also the microscopically dead material in a way that no surgeon's knife ever can, and that without at the same time inflicting any fresh trauma. The devitalised tissues are largely all removed in the course of a few days, and with their disappearance the breeding ground of the pathogenic organisms is destroyed. The Reading bacillus acts, in short, as a bacteriological scalpel. The living tissues, relieved of the strain of ever having to withstand a continual bombardment from bacteria and their toxins, while endeavouring at the same time to cast off the dead sloughs, are now able to throw all their energies into the work of repair, as is evidenced by the rapid formation of healthy granulation tissue which quickly becomes an effective barrier against further organismal advance.

Hence the importance which I attach to the presence of dead tissue in a wound, and it is precisely because of this dead material that the antiseptic and the physiological methods so often fail. They take account of the bacteria, in different ways it is true, but fail to appreciate the importance of getting rid of the base. The larger this is, the more inaccessible are the bacteria to the influence of the antiseptics. Unless the latter are such that they can saturate every part of the damaged tissue and act on all the organisms there breeding in the same way that they will act on a simple suspension of organisms in a test-tube, they must to that extent be regarded as failures, and so far as I am aware no antiseptic has yet been devised which will fulfil these conditions. The most that an antiseptic can do is, by frequent and it may be by prolonged application, to kill off a sufficient number of bacteria to allow the defensive mechanism of the body to get the upper hand. Hence the time factor comes into play, and is important for two reasons. At the present juncture it is essential that the period of convalescence be reduced to the minimum. As a rule antiseptics do not achieve this. The wards of any hospital will furnish many cases that have gone on suppurating for weeks under and in spite of antiseptic treatment. Further, it is important, from the patient's point of view, to hasten recovery, inasmuch as the longer the dead tissues are allowed to remain, the longer is the body likely to be exposed to the sustained action of bacteria and their toxic products. This continued absorption spells serious, often permanent, damage to the more highly specialised cells of various organs, and may in time so exhaust the defensive mechanism that the patient finally succumbs to his infection. A fatal septicæmia may follow the prolonged toxæmia. The same objection applies in a certain measure to the physiological method, with this difference—that the latter is not liable, like some antiseptics, to cause further death of the tissues, and does not therefore increase the area suitable for bacterial activity.

It is perhaps an error to place all antiseptics in the same category, since hypochlorous acid preparations ought more properly to be regarded as exceptions. These, it is interesting to note, have proved themselves so superior in many ways to most other antiseptics, that the very pertinent question arises, Do they act by virtue of their antiseptic properties, or is there some other explanation of their success? It is a matter of common knowledge amongst those who have employed such "antiseptics" as eusol, Dakin's solution or chloramine-T, that under their influence sloughs separate readily. Dakin,[7] in one of his papers, states that "the solvent action of hypochlorites on necrotic tissue is a great advantage when contrasted with the coagulating effect of many antiseptics on blood-serum and wound exudates. The former action of hypochlorites permits the wound surface to remain moist and so removes obstacles to the outward flow of lymph, which is so readily checked by antiseptics which are protein precipitants."

In another place[8] he says, with reference to chloramine, that "the results were clinically similar to those observed in the early treatment of infected wounds with sodium hypochlorite, with the exception that the sloughs are dissolved somewhat more readily by the hypochlorite than by the chloramine." Again, in the course of a discussion following a paper on the "Secondary Closure of War Wounds," read at a meeting held at the Paris Academy of Medicine, M. Dastre[9] and others expressed the opinion that "the beneficial effect of hypochlorite was due to its ability to clear away damaged and necrotic tissue and to destroy toxins rather than to its antiseptic action." I shall refer at a later stage to the question of toxin destruction.

Similarly, Fleet-Surgeon Dalton,[10] R.N., quotes as one of the advantages of the use of sodium hypochlorite solution, "the rapidity with which sloughs separate and clear granulation tissue is formed in a wound under its influence," while, in a still more recent paper,[11] the very decided view is expressed that "eusol as an antiseptic is quite unimportant, but that its great and undoubted value lies in its power to destroy dead tissue, so depriving the infecting organisms of their pabulum." Exactly the same theory had been put forward to explain the action of the Reading bacillus in a paper[12] published some months before the above statement appeared.

The claim of eusol to be regarded not as an antiseptic merely is still further strengthened by the extraordinary results obtained by Professors Lorrain Smith, Ritchie, and Dr. Rettie in certain cases treated by the intravenous injection of eusol—a full account of which has already appeared in this *Journal*.[13]

The hypochlorites certainly differ from other antiseptics in so far as the former possess the power to disintegrate dead tissues, and there is reasonable ground for supposing that their virtue in wound treatment depends almost entirely on this power. The similarity between this and the method of treatment which I advocate in these pages will be at once apparent. Treatment by means of the Reading bacillus differs, however, in certain points from the hypochlorite method. The former, for instance, effects its results entirely by virtue of its proteolytic powers, with this very important difference—that it is a living catalyst as distinct from an inorganic one, and it is precisely on this account that the biological method possesses an advantage over the use of hypochlorites. The value of the latter depends on bulk chemical action, and this necessitates the observance of a direct ratio between the quantity of dead tissue to be destroyed and the amount of chemical necessary to effect that change. This involves considerably more in the way of technique than does treatment with the Reading bacillus. For the chemical to be efficient there must be frequent manipulation of the wound—a proceeding bad for the patient, since it breaks the cardinal rule that a part which is injured demands rest. In the second place, the application of hypochlorites seems to provoke unnecessary bleeding, which, although in many cases unimportant, may, nevertheless, in some be a matter for concern. Their use is, moreover, not altogether free from the charge that they may even act injuriously on the living tissues, and in this feature they resemble the action of antiseptics. The Reading bacillus, on the other hand, once introduced with the appropriate dressing, goes on automatically proliferating till its work is complete, and, what is of vital importance, it appears unable to damage living healthy tissue. It is entirely non-pathogenic, and does not in the course of its attack on the dead tissues give rise to degradation products of a toxic nature. This, however, is not its whole action. Certainly, at first, I was inclined to attribute the success of the treatment entirely to the destruction of the dead tissue base by the proteoclastic activities of the bacillus, but this theory did not quite explain all the clinical phenomena observed in cases so treated. Where the organism happens to be present or is purposely sown and the conditions are favourable to its growth, improvement in the patient's general condition usually begins by the third day at latest, and sometimes earlier. This clinical observation has been recorded by all who have described cases treated by the salt-pack method. If this improvement depended entirely on the destruction and disintegration of the dead tissue by the Reading bacillus, one would scarcely expect it to begin till the disintegration process was completed or at least well advanced. At the time when constitutional improvement begins, however, proteolysis is far from complete, and even at the end of seven days there may still be a few threadbare sloughs left. While still convinced that proteolysis was the key to the explanation, it became necessary to take a wider view of the organism's range of activity. As the main point still awaiting adequate explanation was the reason for the rapid improvement in the constitutional symptoms, and as the latter were, in my opinion, probably caused by toxic substances constantly finding their way into the patient's system as a result of the activity of pathogenic organisms, two explanations occurred to my mind. The first of these was the possibility of an inhibitory action on the growth of the pathogenic organisms present by the formation on the part of the Reading bacillus of some organic acid or acids. Investigation, however, in this direction failed to furnish any evidence of such action.

The second explanation was based on the supposition that just as the Reading bacillus was able to disintegrate gross protein matter, so in the same way it might also be able to split up the toxic degradation products of pathogenic organisms. In other words, what time the Reading bacillus was busy destroying by proteolysis the base from which the pathogenic organisms derived their supplies, it was also actively engaged, by virtue of the same property, in splitting up the toxins formed by these organisms. In this way, pending complete removal of the dead tissue, further absorption of toxins by the body was being prevented. There were obvious difficulties, however, in the way of testing experimentally whether all the toxins elaborated in infected wound tissues are really so split up, and, in order to acquire some experimental proof of this, I had perforce to choose powerful toxins which lent themselves to accurate measurement and whose effects could at the same time be experimentally demonstrated. To this end I carried out an extensive series of experiments with tetanus toxin, diphtheria toxin, and with toxic filtrates obtained from cultures of B. perfringens, using guinea-pigs for purposes of inoculation. At the same time the ability of various other organisms to modify these toxins was investigated and careful controls were kept. For details of these experiments reference must be made to my original thesis. It is sufficient to state here that, of all the organisms investigated, the Reading bacillus alone, and, to a less extent, B. sporogenes (Metchnikoff) yielded evidence of ability to destroy these toxins. For instance, a guinea-pig was able to withstand nearly 150 times the M. L. D. of tetanus toxin in which the Reading bacillus had previously been grown. In other words, this bacillus was able to exercise on the toxins investigated a somewhat similar effect to that which it produced on the dead tissue in wounds. It does not necessarily follow of course that because these three toxins can be rendered comparatively harmless by the proteoclastic powers of the Reading bacillus, all toxins produced by pathogenic organisms will be similarly modified. Sufficient, however, has been done to justify the assumption that probably all toxins of a protein character or dependent on protein elements may similarly be split up and robbed of their toxicity. It is, at all events, a reasoned attempt, based partly on clinical, but mainly on experimental, grounds, to explain the working of an organism whose power to cleanse wounds and hasten convalescence is an undoubted clinical fact. Such a conception of the organism's activity opens up new possibilities in the treatment of such toxæmias as are dependent on toxins of protein structure, and suggests that means may be found along similar lines to reduce them to non-poisonous elements.

In connection with the experimental work and the theories built thereon, it is a matter of some considerable interest to find that support is forthcoming from other quarters, although I was ignorant of it at the time when I began my investigations. In the hands of Dean and Adamson,[14] for instance, eusol—one of the so-called antiseptics whose success probably depends mainly on their protein-splitting power—has been found capable of destroying the toxic bodies formed by B. dysenteriæ (Shiga) in the course of the latter's growth on culture media. A similar conception of the possible *rôle* played by hypochlorite solutions in relation to their toxin-splitting powers has been referred to in another quotation[9] already given. Indeed, the possible ability of eusol, introduced intravenously, to destroy toxins in cases of toxæmia is actually one of the theories advanced by the advocates of this treatment to explain its *modus operandi.*

This ability, then, to disintegrate not only sloughs but also toxins of protein composition is due to an enzyme or enzymes produced by the Reading bacillus. The enzyme is of the nature of a protease and can be demonstrated in filtrates obtained from broth cultures of the organism. While most bacteria possess the power of attacking protein, only a few possess the power of forming proteases in any appreciable amount, and probably still fewer possess the power of hydrolysing proteins in such a way that their destruction products are themselves non-toxic. That the Reading bacillus appears to belong to this select group seems proved by the clinical and experimental observations which I have made. The difference between pathogenic organisms and the Reading bacillus is this—that the former, in the course of their attack on the protein pabulum, split off bodies—degradation products—which are highly injurious to the body cells. These degradation products are the toxins, and their presence in the blood constitutes toxæmia. As these are themselves probably protein in composition, they are capable of being split up, or still further hydrolysed, into elements devoid of toxicity under the influence of some catalytic agent. The Reading bacillus appears to be such an agent. The end products of its enzymic action on proteins are, so far as all clinical and experimental proof goes, absolutely devoid of toxicity. The organism is, in short, entirely without pathogenicity, and is therefore unique as an instrument of treatment. It may be regarded as a permanent manufactory of a proteoclastic enzyme whose initial velocity will be more or less maintained throughout owing to constant removal by the wound discharges of the products of its hydrolysis. It is a living catalyst as distinct from such inorganic catalysts as eusol, and, because of this, it possesses, as I have already mentioned, inherent advantages over the hypochlorites. In a way it may be said to resemble trypsin, which, be it noted in passing, is also able, to a certain extent, to detoxicate the toxin of tetanus. It is even possible that the application to a wound of a solution of a ferment like trypsin might act in a somewhat similar manner to that of the enzymes produced by the Reading bacillus. As a matter of fact, there exists a reference in one of the journals [15] to the use, by a German surgeon, of artificial gastric juice in the treatment of gangrenous wounds, while, as an empirical attempt in a similar direction, may be instanced the immemorial use of the leaves of Pinguicula (butterwort) by shepherds in the Alps as a cure for ulcers on the udders of cows.[16] The therapeutic value of these leaves appears to depend on a vegetable trypsin, by means of which the plant is able to proteolyse the bodies of insects caught in the leaves. The Reading bacillus, however, possesses well-defined advantages over ferments such as these. The latter, to be of any value, must be kept constantly renewed, since much of them will speedily be carried away in wound discharges, whereas the Reading bacillus, once implanted and given suitable conditions for its growth, will go on automatically supplying fresh enzyme so long as there is necrotic material to be hydrolysed. In the one case there are limits to the enzyme's range of action, so that, as in the case of eusol, it needs constant renewal, whereas in the other the manufactory is on the spot, and is able to turn out all the enzyme that may be needed. Before leaving this subject, it is perhaps worth mentioning that not every organism endowed with proteoclastic properties is able equally to hydrolyse toxins. For instance, B. histolyticus, a much more actively proteolytic agent than the Reading bacillus, is nevertheless quite unable to modify the toxins of tetanus or of diphtheria.

If the Reading bacillus acts in the way described, why had its activities been manifested only in successful salt-bag cases? Why not in wounds dressed otherwise? A study of its cultural characters supplies a probable answer. It is a strict anaerobe, and as such will only grow in the absence of air, provided oxygen is supplied to it in a form which it is able to utilise. This suggests that the salt-pack acts more or less as an anaerobic plug. The latter fills the wound completely, and, when it becomes saturated with fluid, forms a plug capable of preventing the access of air to the wound tissues in which the organism is present, while not so impermeable that the gases generated by the activities of the Reading bacillus cannot escape. These gases probably accumulate at the site of organismal growth, and, as their pressure rises, must gradually displace any air that may have been imprisoned at the time of packing. The slight pressure thus formed will also prevent further entry of air into the wound. Without such an anaerobic plug, growth of the organism does not occur. This is proved by the fact that the Reading bacillus odour is absent from wounds treated by the more usual type of dressings, whereas many cases, long treated by the ordinary methods, begin within a few days of employing salt-packs to develop the characteristic smell. In such cases the organism in its active form can be demonstrated in large numbers, indicating that it must have been present in the wound in the dormant form of spores which only became active when the necessary anaerobic conditions had been established. Where the spores are not already present, the salt-packed wound emits no characteristic odour, and the clinical progress of the case presents an entirely different picture.

As success or non-success seemed to depend on the presence or absence of the specific bacillus, the question arose, Was the salt an essential factor for the growth of the organism? Those who have practised the salt-bag method of treatment have for the most part been under the dominance of Wright's hypertonic theories. It was obvious, however, that whatever truth there might be in those theories, salt could not be regarded as essential, in view of the fact that some cases absolutely failed to respond to this form of treatment. Cultures made from such invariably failed to grow the Reading organism, which, as I have elsewhere indicated, can always be recovered from successful salt-packed wounds.

Experimental work undertaken to corroborate this supposition of mine showed that salt in the strength used was not only unnecessary but even inimical to the growth of the bacillus, which refused to proliferate in a concentration greater than 5 per cent. Why, then, does it grow at all in wounds packed with salt in this way? Probably the answer to this question is, that if the initial concentration of salt could be maintained, no growth would take place.

As a matter of fact, however, it is easy to see that the original concentration must steadily diminish—rapidly at first, especially during the first twenty-four hours, when there is a tremendous outflow of fluid from the wound, carrying away in solution much of the salt into the cotton-wool coverings.

Girling Ball [3] indeed has investigated the content of salt packs after the latter have been *in situ* for four days. After soaking such packs and expressing the fluid contained in them, he has only been able to recover 2 per cent. of the salt! This seems to show that in four days a very considerable reduction must have taken place in the initial salt concentration. Hence in salt-packed wounds the Reading bacillus is probably only able to grow out when the salt concentration has become sufficiently reduced. These considerations seemed to indicate that the salt was merely an accident, that it constituted in the wounds, as I have said, merely an anaerobic plug. To test this hypothesis further, I suggested to my surgical colleague that he substitute for salt a comparatively inert substance, such as sterilised sphagnum moss. As pus and fluids accumulated, the moss, I conjectured, would swell, and so mould itself more closely to the shape of the wound. The interstices and chambers would become filled with fluid and the whole thing would then form a most efficient anaerobic dressing. The technique of its application was the same as for salt packing, the moss being contained in small gauze bags. In the cases so treated the salt factor was thus completely eliminated. As I anticipated, these cases followed exactly the same course as did those in which salt bags had been successfully employed. I wish therefore to make it clear that the new method of treatment put forward does not depend on the use of salt packs, which are a mere accident, and that therefore it is not synonymous with salt-pack treatment as that was originally conceived. Whatever can be relied upon to provide an anaerobic environment will serve just as well as salt, provided the Reading bacillus is present. The latter is the essential factor, but, in order that it may become active, suitable conditions for its growth must be provided, and these may be attained in a number of ways. Where, on the other hand, the Reading bacillus is absent from the wound, the salt pack, in spite of the salt and all its lymphagogic action, will fail as an agent for cleansing the wound or for improving the condition of the patient.

Having determined from the cases at my disposal that the Reading bacillus was present in its active form in all successful salt- or sphagnum-moss-packed wounds, while it could not be grown from similar wounds which had failed to respond to this treatment, it still remained to apply a crucial test to prove the causal connection between the activities of this organism and the successful cleansing of the wound.

To do this involved the deliberate introduction of living cultures of the Reading bacillus into a wound which had previously failed to clear up under salt-pack treatment and from which the Reading bacillus was known to be absent. As a preliminary to such an experiment it was of the utmost importance to ascertain whether the bacillus was pathogenic or not. To this end I inoculated a long series of animals—rabbits, mice, and guinea-pigs—intravenously, intraperitoneally, subcutaneously, and intramuscularly. Cultures of all ages and grown on various types of media were injected on different occasions, using a range of doses. On none of these animals was there the slightest ill-effect, nor was there ever any evidence that the degradation products of its growth in culture media possessed the slightest toxicity. No œdema and no gangrene ever resulted. Experiments were carried out to show the fate of the organisms so introduced, and it was found that they provoked a polymorph leucocytosis, the polymorphs more or less rapidly ingesting the bacilli and their spores. It was therefore evident that in animals, at least, the Reading bacillus was unable to attack healthy living tissue. This has a certain though perhaps a subsidiary bearing on the treatment of wounds by the new method. Since the bacillus grows easily and rapidly on dead proteins but will not attack living tissues, it is necessary to make sure that before sowing and packing a wound the organism has free access to every part of it. This necessitates thorough opening up of all pockets and sinuses and the evacuation of all collections of pus, etc. The organism will not grow through a barrier of living tissue.

As a further safeguard, before deliberately sowing the organism in the wounds of human beings, I investigated, as already mentioned, the flora from a series of successful salt-pack wounds and found in all the Reading bacillus. Therefore, having proved it by experiment to be non-pathogenic to animals and by investigation to be present in the wounds of many without producing any injurious effects, it seemed legitimate to carry out, as indicated above, a crucial test of the theories formed concerning its mode of action. My colleague, Major Joyce, was willing and eager to allow this to be done. A suitable gunshot wound was chosen fulfilling the above conditions, and this I sowed liberally with a living culture of the bacillus, after which my colleague immediately re-packed it in the usual way. In three days' time the patient's temperature had come down, the wound was emitting the foul characteristic odour associated with the active proliferation of the Reading bacillus and the patient was comfortable. The packing was left *in situ* untouched for some days, and within a day or two of its removal the wound was found to be absolutely clean, devoid of all sloughs, a brilliant scarlet colour like fresh raw beef, and covered with healthy granulations. There was a striking contrast between the results obtained after the first and second packings respectively, where the only factor of difference, on the second occasion, was the assured presence of the Reading bacillus. The case was its own control, since, as a result of the first packing, the wound did not develop the characteristic smell, the patient did not improve, and the Reading organism was found to be absent.

The crucial test had been passed and it only remained to prove, by treating other cases in the same way, that the first was not merely a fortuitous happening. Since then, wounds of various kinds, such as septic knee-joints, etc., have been sown, always with successful results and never with any ill-effects. For details of these reference must be made to my original thesis. The wounds so treated have not all been of one type, although all agree in having been the result of gunshot injuries. As such they practically always involved muscle, parts of which were dead or dying as a result of the trauma. The tissues were generally dirty, sloughy, and purulent, while the surrounding areas were frequently œdematous and almost always inflamed. In many cases the patient was obviously ill, in pain, and running a temperature. The wounds were generally five or seven days old at least before the patients reached Reading, and in some instances they had been suppurating for weeks. They came with all sorts of wound dressing. Some had undergone "Bipp" treatment, others had had a long course of Carrel-Dakin treatment, while others had been treated in a variety of ways at different times. The fact that some of them had been suppurating for weeks labelled them at once antiseptic failures, notwithstanding the fact that the latest antiseptic methods had been employed. It is true that no acute cases of gas gangrene were admitted here, so that from my own personal experience I have not had an opportunity to observe the effect of the Reading bacillus on such wounds. I can, however, point to the published experience of certain medical men who have used salt packs with success in cases of gas infection occurring in France. Roberts and Statham[4] give brief details of seventeen cases treated by means of salt bags. Six of these cases were examples of gas infection. All improved rapidly under salt-bag treatment with the exception of one, which at first improved but later flared up so that recourse was finally had to amputation. From one at least of the five successful cases B. perfringens was easily obtained, affording bacteriological evidence of the presence of virulent gas-forming bacilli. If, then, salt packs were successful in these gas infections, and since the efficacy of the treatment depends not on the salt but on the presence of the Reading bacillus, it follows that there is likely to be little or no danger in deliberately sowing such wounds with the Reading organism.

Certain criticisms, however, have been urged against the claims which I make on behalf of the bacillus. For instance it has been suggested that the success which follows treatment with the Reading bacillus is due not to the activities of that organism but to the preliminary free opening up of the wound, to the evacuation of collections of pus, and to the removal of any foreign bodies that may be present. This line of argument is not really a serious one, and very cogent reasons can be advanced by way of meeting it. If the bacillus be merely an accident and without any beneficial influence on the condition of the wound, the question may be asked, Why do some wounds fail to get better under salt-bag treatment although this has been preceded by free incisions and removal of pus, fragments of bone, or other foreign body? Moreover, the subsequent history of wounds which have been most thoroughly explored and submitted to minor operative interference as well as to subsequent antiseptic treatment is entirely different from that which is true of wounds treated with the Reading bacillus. Every hospital can provide illustrations of what I mean. In such cases no definite time-limit can be set to the cessation of the infective process. It may go on for days, weeks, or months, as a glance at the temperature chart of almost any severe wound infection will show. In these cases the morbid process is essentially progressive in character, while convalescence is at best protracted. Not once only, but many times, in the course of a wound's history may operative measures of a minor character be required. The very fact that they are so often necessary is ample proof that the method adopted for the cleansing of the wound is to that extent lacking in efficiency, and furnishes an answer to the objection raised above. It is precisely for that reason that surgeons find themselves compelled to adopt a more radical method of treatment in the shape of complete wound excision. Nor is the insertion of salt packs, even after thorough exploration and free incisions, always followed by success. Each minor operation performed on the wound succeeds simply in removing part of the effect, but fails to eradicate the cause. The recurring abscesses or the necrosis of fragments of bone furnish proof of this, for they are merely the resultant of organismal forces acting on tissue already dead, as a result, it may be, of the operative interference.

It was precisely to find out the reason for such salt-bag failures that the present investigation was undertaken, culminating in the method of treatment now actually in use, and, if further evidence be required, it may be found in the record of cases recorded in my thesis. In some of them, as described above, every possible claimant for the honour of being regarded as the sole curative agent has been eliminated and only the Reading bacillus left.

The gunshot wound, then, is to be regarded as a solution of continuity of the body, produced by violence, and characterised by a greater or less amount of dead or dying tissue in juxtaposition to the living and less damaged. This dead tissue is more or less heavily infected with organisms, most of them pathogenic and many highly virulent. Trouble, local and constitutional, arises from the interaction of these pathogenic organisms with the necrotic tissue. Bacterial enzymes are formed, and, in addition, leucocytic and other tissue ferments are liberated in the course of the morbid process. As a result of this multiple hydrolytic action, degradation products, many probably of a toxic character, are formed. Some of these act injuriously on partially damaged or even on undamaged tissues adjacent, so that the necrotic process goes on gradually involving more and more of the living structures. Others probably enter the patient's system, giving rise to toxic symptoms, of which evidence is afforded by the temperature chart, the pulse, and other constitutional disturbance. In order to counteract these destructive processes, various methods of attack have been adopted, and these may be divided into two main categories. The first includes all those which aim at setting a limit to further breaking down of the tissues. To this group belong practically all the usual methods of wound treatment. It embraces all antiseptics with, perhaps, the notable exception of eusol and similar substances. Omitting these, the rest may be said to be directed against one factor only in the morbid process. They aim either at destroying the pathogenic organisms, or at inhibiting their growth, leaving Nature to cast off slowly the dead tissue. Such methods overlook the sinister *rôle* played by necrotic tissue in the wound, and for various reasons even the best of them must be regarded as crude.

Not only can they not be relied on to render the wound sterile or to prevent the continued absorption of toxic products by the patient, but some of them may actually cause fresh tissue necrosis. The most that can be claimed for them is that they keep bacterial activity within reasonable limits, what time Nature is endeavouring to cast off the dead tissue which the antiseptic itself is powerless to do. The healing of a gunshot wound under such circumstances must be at best a tardy process, liable at any time to be interrupted by renewed organismal activity, and for that reason requiring the frequent assistance of minor operative measures. During all this time the patient is probably absorbing more or less of the toxic products, which in turn may initiate further morbid changes in his body. Indeed, the absorption of such toxic substances over a prolonged period may have the same end-result as an initial overwhelming infection. The comparative failure of antiseptics has led to the substitution for them of treatment by complete excision of the wound. This method, however, belongs also to the first category, inasmuch as its aim is, once and for all, to put an end to further breaking down of the tissues by the rapid removal of the organisms, together with their breeding ground. In other words, although ostensibly intended to rid the wound of its infecting bacteria, this procedure at the same time removes the dead tissue, and on this account it is, in my opinion, superior to antiseptic methods. It possesses, however, certain limitations, to which reference has already been made.

In the second category I would place all methods which accelerate proteolysis in the wound. This, I am aware, is in direct opposition to the tenets of many. To this group, in which inorganic catalysts like eusol and Dakin's solution should be placed, belongs the new method now advocated. As it is dependent upon the vital activities of a living organism, I have called it the Biological method, to distinguish it from the antiseptic, the physiological, and the surgical respectively. It is not, as I have said elsewhere, synonymous with the salt-pack method of wound treatment, although the latter certainly depends upon it for success. The Reading bacillus, however, not only possesses the power of accelerating proteolysis so that the dead tissue disappears from the wound, but it appears to be endowed with the further property of being able to render non-toxic the degradation products of pathogenic organisms. Over and above all, its hydrolytic action is confined to the dead tissue, and does not extend to the living. This fact must be borne in mind by those to whom anything calculated to hasten proteolysis is anathema. It is an entirely new method of treatment, pregnant with possibilities for the future and full of suggestions for new lines of research.

The employment of the biological method, however, does not mean that no surgical interference is necessary. Here, as with every other method, it is essential that the wound be thoroughly laid open in the first instance, exposing every pocket and sinus, so that the organism, together with the packing, may be brought into direct contact with every section of the raw surfaces.

The advantages of its use include simplicity of application, the avoidance of the necessity for daily dressing and therefore daily disturbance of the wound, the rapidity with which a sloughy wound becomes a healthy granulating surface, the absence of secondary hæmorrhage, together with the remarkable and speedy improvement which takes place in the general condition of the patient, all of which mean considerable curtailment of the time usually spent in hospital. It is, in short, a method essentially conservative of life and of limb, while at the same time it is eminently safe.

In conclusion it may be of interest to outline the chief points in relation to the technique of wound treatment by this method. It ought to be a fundamental axiom that all gunshot wounds be freely opened up to begin with and thoroughly explored. In order that this may be done efficiently the patient will require to be anæsthetised. Every pocket should be laid open, so that the subsequent packing shall come directly into contact with all parts of the wound surface. As such wounds are frequently of an irregular and burrowing character, to do so efficiently will frequently call for ingenuity on the part of the surgeon. All foreign bodies ought if possible to be removed, and care should be taken to ensure that no adjacent collection of pus has been missed.

The interior of the wound is now irrigated with very hot sterile water or saline solution to wash away obvious pus or blood and to assist in checking capillary oozing. By means of a pipette the whole surface of the wound is liberally sown with a living culture of the Reading bacillus, commencing first with the deeper parts. The cultures which I am in the habit of using have been grown in cooked meat broth. It is perhaps an advantage for some reasons to use a three-day-old culture, but one many months old will serve equally well. Immediately after sowing, the packs, whether of salt or of sphagnum moss, slightly moistened with sterile water or saline, are introduced, and so arranged that they fill up the wound cavity completely, leaving only the tails of the bags projecting. In some cases it may be found more convenient to distribute the culture over various parts of the wound in turn, packing each section as it is sown.

When all the packs are *in situ*, several layers of plain sterile gauze, moistened with sterile water or saline, are laid over the packing, in such a way that they overlap the edges of the wound. The whole is then enveloped in thick layers of cotton-wool and firmly bandaged. It is an additional advantage if some form of splint can be applied to aid in steadying the part.

The surgeon ought always to have a large supply of packs available before beginning the operation. These packs are really small gauze bags containing either salt or moss. It is an advantage to have them made in various sizes, from which those most suitable for packing a given type of wound may be chosen. A good average size is one measuring about 5 or 6 ins. long and about 2 fingers'-breadth wide. During the first twenty-four hours there is a very copious outflow of fluid from the wound. This is generally ascribed to the hypertonicity of the salt. The same thing, however, occurs where sphagnum moss has been used instead of salt. By the end of this period the outflow has very perceptibly diminished, and thereafter remains small in amount. Where salt has been used the patient will, for a few hours after packing, probably complain of slight pain and smarting, due to the irritant effect of the salt. Where sphagnum moss has been used the patient does not experience any immediate pain, but after twenty-four or forty-eight hours may suffer some discomfort owing to swelling up of the moss by imbibition. This can be obviated to a large extent by making due allowance at the time of packing for subsequent increase in bulk.

Whatever form of packing is employed, the temperature will probably rise higher on the day following than it was before interference. Towards the end of the second or third day the temperature usually begins to fall and a very definite improvement takes place in the patient's general condition. This improvement ought to be steadily maintained. There is no daily dressing to worry the patient except, perhaps, the substitution of fresh for soiled cotton-wool. His appetite improves and he is able to obtain sound and refreshing sleep. There is only one objectionable feature and that is the characteristic penetrating odour, whose presence is not a danger signal, as some have thought, but an indication that the organism is becoming active. If the odour fails to develop, there has been some flaw in the technique. The smell generally begins to manifest itself towards the end of the second or third day, corresponding roughly to the time found necessary for active proliferation of the organism in test-tube experiments. As a matter of interest it is worth noting that it is about this time also that the temperature begins to alter for the better. Although in some cases the latter may not come down to normal, on the third or fourth day or thereabout it will almost certainly be lower, and will finally fall for good on removal of the packing at the end of the appointed period. Occasionally a case may be met with where the temperature is not influenced at all, and where the patient does not show the progress he ought to do although the organism is at work. In such it is well to consider the possibility of there being some other focus of infection which has been missed, while at the same time one ought carefully to scrutinise any other wound if such be present. It may be that a collection of pus requires evacuation, arising from some small focus shut off and so overlooked at the time of the original exploration, or the treatment adopted for some other wound, considered too trivial to require the application of the Reading bacillus, may not be satisfactory.

Just how long the packs require to be left in will probably depend on the size of the wound and the amount of dead tissue present, but in human beings the period ought probably to be at least seven to nine days. In horses and mules, owing to the rapid growth of healthy granulation tissue, I am given to understand by a veterinary authority that the period should be somewhat shorter. At the end of this time the packing may be removed without the aid of an anæsthetic. The superficial layers of gauze will be found set hard as if starched, and more or less firmly adherent to the skin.

After gently detaching the board-like upper dressings, the actual packing, be it salt or moss, comes out easily *en masse*, bathed as a rule in bright yellow pus, from which the Reading organism can be recovered if desired.

The wound surfaces are then irrigated with eusol or with warm sterile saline to wash away all clinging pus and *débris*, after which the wound will be found, as a rule, perfectly clean.

Perhaps one or two somewhat delicate sloughs still remain slightly adherent, and these the irrigating fluid causes to wave about like little fragments of transparent seaweed. All œdema and inflammation, however, have disappeared. The wound is then lightly dressed with plain sterile gauze wrung out of eusol or sterile saline solution. Once a day thereafter it is irrigated and dressed in the same manner. In the course of one, two, or three days the wound surfaces will present a brilliant red colour, devoid of sloughs, and covered by firm healthy granulations. Such a wound heals rapidly or, if deemed necessary, may be covered with skin grafts, or have its edges approximated in some way. The end-result is usually a firm, more or less linear, scar.

One point, in conclusion, deserves special notice, viz. that in no case where this method of treatment has been employed in Reading has secondary hæmorrhage ever occurred.

Indeed, I have copiously sown with this organism a wound in which the tissues were so rotten that secondary hæmorrhage had just occurred. This particular wound was thereupon packed in the usual way, and no recurrence of the bleeding took place. Absence of secondary hæmorrhage is a feature remarked upon by all who have published accounts of salt-bag treatment. Major A. J. Hull,[17] R.A.M.C., for instance, even goes the length of saying that in his hands the salt-bag method of treatment has actually been one of the most generally applicable of procedures for the treatment of secondary hæmorrhage.

All this is in direct opposition to the published statement of Sir A. Wright,[18] who has said, with reference to secondary hæmorrhage, that the aim and object of treatment must be to prevent any digestive action in the neighbourhood of the endangered artery. Basing his conclusions on histological grounds, Bashford[19] takes up a similar attitude when he advocates surgical interference as the only sure way to prevent further ravages by the organisms and their products on vessels, etc., in the damaged area. Yet the whole success of the biological treatment which I here advocate depends entirely on the active proteolytic power of a bacillus. The reason for such apparently conflicting statements is probably due to a failure to discriminate between the various types of organism present and their resultant action. It does not follow that because some are to be feared, all are bad. Because many are highly virulent, it must not be taken for granted that none can be beneficial. That one at least of the organisms hitherto indiscriminately condemned is not only not virulent but actually beneficial is proved by the experimental work on which this new method of treatment is based. Its free use by various surgeons in various hospitals has always been attended with success, and has demonstrated that this bacillus at any rate can be introduced into septic gunshot wounds not only with impunity but with marked benefit to the patient.

Summary and Conclusions.

1. The preceding pages deal with a new form of treatment for gunshot wounds, which I have called the biological method to distinguish it from the antiseptic, the physiological, and the surgical respectively.
2. It is based on revised ideas which I have formed regarding the relative importance to be attached to the various factors which prevent wound healing and is the outcome of work which I undertook with the original intention of finding an explanation for a clinical observation made by a surgical colleague.
3. The new method depends on the introduction to the wound of a spore-bearing anaerobe of a saprophytic character belonging to the proteolytic group of organisms. I have named it the Reading bacillus.
4. It is non-pathogenic when introduced into gunshot wounds and in the course of its activities does not give rise to toxic products injurious to the patient. Its morphological and cultural characters, together with the experimental work which I have carried out in connection with it, are described in another journal.
5. The Reading bacillus is probably to be found in the majority of gunshot wounds, but is unable to exert its beneficial action except where anaerobic conditions obtain. Hence the reason for its appearance in salt-packed wounds, from which I isolated it in the first instance.
6. The biological method is not synonymous, however, with the salt-pack method of treatment, although the latter is dependent upon the Reading bacillus for success. Salt is not only not essential but may actually impede proliferation of the organism. Sphagnum moss or any-

thing, indeed, that will secure anaerobic conditions in the wound may be substituted for the salt packs with equally good results. The rationale of the salt-pack treatment, therefore, cannot be explained along the lines suggested by the adherents of the physiological school.

7. All methods of wound treatment hitherto in use have been directed almost solely towards destruction of the infecting flora and arrest of proteolysis in the wound. Their relative efficiency actually depends, however, on their influence, if any, on the necrotic tissue present.
8. Special emphasis is laid on the supreme importance in a wound of dead and damaged tissue, and I have attempted to show that this should be the chief point to which treatment should be directed.
9. The antiseptic and the physiological methods fail to realise this, and consequently find themselves in process of being supplanted by the surgical, or method of wound excision. The superiority of the latter over the two first-named depends not so much on the speedy removal of infecting organisms, for which purpose it was originally intended, but on the fact that it removes a large part of the dead tissue as well.
10. The surgical method, however, is not always anatomically possible, may fail to remove all the dead tissue present, is a mutilating form of treatment, and by its very nature inflicts a fresh trauma, leaving a zone of death behind to form the base for fresh organismal activity.
11. The biological method, on the other hand, belongs to quite a different category, inasmuch as its avowed object is to hasten proteolysis and, with the possible exception of eusol and kindred substances, it is the only one in this class.
12. The Reading bacillus has a twofold action. It not only disintegrates the dead tissue upon which pathogenic organisms live and from which as a base they are able to keep up a continual bombardment of the patient's body by means of toxic degradation products but, to judge from my experimental work, it is probably able also to destroy these toxins so that they are no longer absorbed.

12\. The former action brings about a local improvement in the wound which is rapidly, automatically and easily freed from all necrotic material, while the latter puts a stop to continued toxæmia as is proved by the rapid constitutional improvement which takes place. Pending removal of the supply base by the Reading bacillus, the further absorption of toxins by the patient is prevented.

13. Both results are achieved by reason of a proteoclastic enzyme produced by the Reading organism. This enzyme acts as a living catalyst which is able to hydrolyse not only dead protein but also the toxic degradation products of other organisms. Once introduced into the wound and given suitable conditions for development, the Reading bacillus will go on forming enzyme as long as there is any dead protein to hydrolyse. For these reasons, therefore, it differs from all other known methods of wound treatment hitherto employed, and while opening up new possibilities for the more efficient treatment of toxic absorption in general, raises other side issues of considerable importance. It becomes, in short, a problem in colloid chemistry.
14. The technique of wound treatment by this method is briefly described.
15. The advantages claimed for it include simplicity of application, the avoidance of daily dressing and daily disturbance of the wound, the rapidity with which a sloughy wound becomes a healthy granulating surface, the absence of secondary hæmorrhage, together with the remarkable and speedy improvement which takes place in the general condition of the patient, all of which mean considerable curtailment of the time generally spent by a wounded man in hospital.

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INCOME TAX INFORMATION.

By JOHN BURNS, W.S., Edinburgh.

II.

HAVING in the first article set out the leading general rules, we shall now show how these are brought to a point in the actual adjustment of the tax payment and repayment.

RATES OF TAX.

Considerations of space lead us to confine attention to the current year, but we may state that the rates during the three preceding years were lower. The rates for the current tax year, April 1918 to April 1919, are:—

Total Income from all Sources (Including Wife's Income) not Exceeding	Rate of Tax on the Part of the Income which is Earned.	Rate of Tax on the Part of the Income which is Unearned.
	s. d.	s. d.
£500	2 3	3 0
1000	3 0	3 9
1500	3 9	4 6
2000	4 6	5 3
2500	5 3	6 0
over 2500	6 0	6 0

Thus, if your total income (as already explained) exceeds £500 but does not exceed £1000, the true rates are 3s. on the part which is earned, and 3s. 9d. on the part which is unearned. On the earned part the true rate will be charged on the direct tax assessment. But in the case of the unearned part (mainly dividends and interests on investments) there is the difficulty that much of that income is taxed "at the source" before you receive it. One way to handle that is to send in a claim for repayment by the department. But it is better, if possible, to arrange to have the adjustment made by an allowance from your direct tax assessment. Thus, suppose the tax on your business profits would be £50, but your (or your wife's, or both) income from investments is all taxed at the source at the full 6s. rate, so that in that way £40 will be deducted from that part of your income, whereas your true unearned rate is only 3s. 9d., there is a rebate of £15 due to you. So, to save trouble, that sum will be allowed off the Schedule D profits tax, which will be thus cut down from £50 to £35.

ABATEMENTS.

We have given the rates of tax, and we have stated how these rates are arrived at, namely, according to the total income. But it may have been noticed that we have not said that these rates are charged on every part of the total income. Thus, a doctor may have an income of, say, £700, and yet he may be taxed on only, say, £365. The difference of £335 would be explained by the various abatements to which he might be entitled. Thus (1) he gets £70 free simply because his income does *not exceed* £700, without any other reason; and we have further assumed that he (2) has a wife (£25) and (3) four children under 16 years of age (£100); (4) maintains an incapacitated dependent relative (£25) and (5) pays £115 a year for premium of insurance on his life. But pray note that these abatements do not pull down his "income" to £365. Not at all, it is still the £700, and so his rates of tax are 3s. (earned) and 3s. 9d. (unearned) because the income is over £500, and not 2s. 3d. and 3s., which would be the rates if the income did not exceed £500. We shall now briefly state the different abatements.

Small incomes, that is, total incomes not exceeding £700, are entitled to a certain part free of tax, thus:—

Total Income not Exceeding	Abatement.
£400	£120
600	100
700	70

Wife.—If the total income does not exceed £800, £25 is allowed free if the taxpayer is married and husband and wife live together. This dates only from April 1918.

Widower's Housekeeper.—This is the same as the wife abatement in all respects as just stated. But the housekeeper must be a relative of the taxpayer or his late wife, and there must be a child under 16 years of age.

Children.—This abatement is more than four years old, but during those years the conditions have varied a great deal. Now the rules are that the abatement is £25 for each child in life and under 16 years of age at the start (6th April) of the year of assessment if the total income does not exceed £800; or for each such child after the first two, if the income exceeds £800 but does not exceed £1000. In both cases adopted children and step-children count. It is not necessary that the children (except adopted children) should be living with, or be maintained by, the taxpayer.

Incapacitated Dependent Relatives.—This dates only from April 1918. The abatement is £25 of income free of tax for each relative of the taxpayer or of his wife maintained (wholly or partly) by him, provided the relative is incapacitated by age or infirmity and has an income, if any, not exceeding £25. This, amongst other things, enables an abatement to be obtained for an incapacitated child over the age of 16 years.

Life Insurance.—In this case there is no limit of income. The abatement entitles the taxpayer to total relief from tax on the amount which he pays for premiums of insurance on the life of himself or his wife not exceeding one-sixth of the year's income or (if greater) of the income of 1913-14—the last pre-war year. But there are certain restrictions. Thus no premium can be passed to an extent exceeding 7 per cent. on the *original* sum insured. On policies effected after June 1916 there is a limit of relief to 3s. per £, but that is still total relief to any professional man whose total income does not exceed £1000. There is more liberal treatment in regard to war "extra" premiums. The following kinds of policies qualify for the abatement:—ordinary life policies, endowments, double endowments, partnership policies (sometimes not; care is necessary), accident policies if covering fatal accidents and to the extent of the proportion of premium corresponding to the death risk; also contributions to widows' funds whether the taxpayer is married or not.

Operation of Abatements.

The fundamental distinction is between a deduction from income on the one hand and tax abatement on the other hand. The one reduces income; the other does not. And they respectively operate very differently on the amount of tax which is payable. The rules regulating the operation of tax abatements are these:—

1. One abatement does not confer, increase, or diminish any other abatement.

2. No abatement reduces the rate of tax.

3. All abatements come off income chargeable at the lowest rate of tax in the particular case, except that—

4. War pay, if any, is taken last.

We shall now proceed to illustrate the application of these rules.

Rule No. 1.—*One abatement does not confer, increase, or diminish any other abatement.*

ILLUSTRATION NO. 1.

Income		£900
Life insurance premium		100
		£800

The taxpayer is not entitled to take his income as £800, and so claim (1) wife abatement £25, (2) incapacitated dependant abatement £25, and (3) for his two children £50, which, if claimable, would have been paying tax on only £700. His income is £900 and so his only abatement is the insurance. He pays tax on £800. But if he had *more than* two children under 16, he would receive an abatement of £25 for each after the first two, because his income does not exceed £1000.

ILLUSTRATION NO. 2.

Income		£700
Wife	£25	
Three children under 16 . . .	75	
		100
		£600

The taxpayer is also entitled to a scale abatement. He claims £100 because £600 is the income limit for the £100 scale abatement. That is wrong. His income is £700, scale abatement £70, which leaves him paying tax on £530, his full abatements being £170, namely (1) scale £70; (2) wife £25; (3) children £75.

ILLUSTRATION NO. 3.

Income		£600
Abatements—		
Scale	£100	
Wife	25	
Three children	75	
		200
		£400

The taxpayer pays £100 in life premiums. What is his insurance abatement? One-sixth of what? It is one-sixth of his income, which is £600. Therefore the whole £100 passes, and he pays tax on £300.

Rule No. 2.—*No abatement reduces the rate of tax.*

This is the enforcement of what we pointed out at the beginning, namely, that tax abatements do not alter income.

The income is just the same as it would have been if the law had not granted those abatements. If a practice yields £100 less, that is one thing; but it is a totally different thing to receive a concession of the tax on £100, on account of the payment of life insurance premiums to that amount, the income remaining stationary.

ILLUSTRATION.

Income		£650
Abatements—		
Scale	£70	
Wife	25	
Three young children . . .	75	
Incapacitated dependant . . .	25	
Life insurance	75	
		270
This leaves . .		£380

to pay income tax. At what rate? We assume that the income is all earned. The rate is 3s., which is the earned rate for incomes over £500 and up to £1000, and not 2s. 3d., the rate for incomes not over £500. The reason is that while only £380 remains to be taxed, the rate is fixed by the total income, and that is £650.

Rule No. 3.—With the exception stated in rule 4, all abatements come off income chargeable at the lowest rate in the particular case.

Suppose an income of £600, half earned and half unearned; abatements £300; remains taxable £300. The earned rate is 3s. and the unearned 3s. 9d. If the abatements were given off the higher taxed unearned income, the tax payable would be 3s. on the earned £300, which is £45. But they are actually given off the lower taxed earned income, leaving the taxpayer to pay tax on the unearned £300 at 3s. 9d., which is £56, 5s. This rule thus makes him worse by £11, 5s.

ILLUSTRATION NO. 1.

Income from practice	£600
Income (including wife's) from investments . .	100
Total income, . .	£700
Abatements—(1) scale £70; (2) wife £25; (3) child £25; (4) life insurance £45; in all . . .	165
Leaves . .	£535

The tax payable is—

1. Earned income	£600		
Less abatements . . .	165		
Tax at 3s. on . .	£435	£65 5 0	
2. Unearned income			
Tax at 3s. 9d. on . .	100	18 15 0	
	£535		
Total tax, . .		£84 0 0	

It will be seen that the whole abatement is taken off the lower 3s. rate, leaving only part of the earned but all the unearned income to pay tax.

Illustration No. 2.

Practice	£1500
Investments	300
	£1800
Life premiums	300
Taxable, . .	£1500

The tax payable is—

1. Earned income £1500; less life insurance £300; tax on £1200 at 4s. 6d. . .	£270 0 0
2. Unearned £300 at 5s. 3d. . . .	78 15 0
Total tax, . .	£348 15 0

Illustration No. 3.

Practice	£600
Wife unearned income (liferent under her father's will)	3600
Total income, . .	£4200
Life insurance premiums	700
Taxable, . .	£3500

The tax payable is—

1. Earned £600, cancelled by part of the insurance abatement, therefore no tax.	
2. Unearned £3600 less balance £100 of the insurance abatement; tax at 6s. on £3500 . . .	£1050
Total tax (but super tax in addition), . .	£1050

Rule No. 4.—War pay, if any, is taken last.

This rule was new in April 1917. Assuming the possession of three classes of income—(1) war pay, (2) other earned income, and (3) unearned income—abatements were, before that date, taken off in the above order. Now the order is—(1) *other* earned income, (2) unearned income, and (3) war pay. If the only income is

(1) other earned income and (2) war pay, or (1) unearned income and (2) war pay, then the abatements are taken off in that order. But the deduction for officers' uniforms of necessity comes off the pay, for it is treated as an expense of earning the pay, and is an actual income deduction, not merely a tax abatement.

It is known that correspondence is at present proceeding with the Treasury and the War Office regarding the right of doctors in charge of military hospitals but not holding commissions to the special low rate of tax on the pay for these services. It is akin to the question—already raised in Parliament—of the same claim on behalf of women doctors doing service with the Forces but holding no commissions, which will on no account be granted to women. It is probable that the other question also will be brought up in the House of Commons shortly.

Marginal Relief.

Enough has been said to show how much one might be prejudiced by having an income just a little above some step in the scale. Thus an income of £700 gets an abatement of £70; an income of £701 does not. An income of £1000 gets abatement for children over two in number, and is charged at rates of 3s. and 3s. 9d.; an income of £1001 is excluded from that abatement and pays 3s. 9d. and 4s. 6d. But these absurd results are not in fact allowed to arise. You pay to the Exchequer the £1 (or other excess over the scale) and then you are put in the same tax position as if you had never had what you thus surrender. But in the case of a partnership this relief is dependent, not on the firm's income but on the total income of each partner separately. Thus the firm's profits might be £1001, yet the marginal relief might not operate at all, for each partner's *total* income might be, say, £1200. On the other hand the firm's profits might be £1000, yet both partners might be entitled to it, for their total incomes might be, say, £505 and £810 respectively.

Time Limit.

There are exceptions, but the general rule is that repayment claims are in time if sent in within three years of the end of the tax year to which the claim relates. That means that up to 5th April 1919 you may go back to 6th April 1915. The tax year 1915-16 ended on 5th April 1916. Three years from that date expire on 5th April 1919. But this does not make it less necessary for you to appeal at once against any assessment notice served upon you if you consider that it is excessive. Many mistakes arise in that way.

OBITUARIES.

ROBERT ALEXANDER LUNDIE, M.B., C.M., F.R.C.S.E.

Many, now far from Edinburgh, who were students here in the seventies, either in Arts, Science, Divinity, or Medicine, will share the keen regret with which his professional brethren heard of Dr. R. A. Lundie's sudden death on 18th December from the results of a bicycle accident. Among the many brilliant students attending the University in these years there were few who surpassed him in strength of character, vigorous intelligence, and width of interests, and not many who stood so high as he did in the estimation of his fellows and for whom a career of future eminence was so confidently predicted.

Robert Alexander Lundie was born in Birkenhead in 1855, the elder son of the Rev. Dr. R. H. Lundie, a well-known minister of the Presbyterian Church of England, who took a leading part in social work in Liverpool. His mother, who survives him, is a daughter of the late Charles Cowan of Westerlea, Member of Parliament for the City of Edinburgh.

Having received his early education in the Upper School of Liverpool College, Lundie entered Edinburgh University at the age of sixteen, and, from that time onward, paid all his expenses out of the bursaries and scholarships which he gained. In most of his classes he took a distinguished place; and, as illustrating his varied interests, it may be mentioned that, amongst other honours, he gained in his Arts course the first prize for Latin Verse, the third for Logic, the first medal in Natural Philosophy, and a medal and prize in Mathematics. In 1875 he graduated as M.A. with First-Class Honours in Mathematics.

From the Arts classes he passed to those of Science, and in these also he was one of the foremost men of his year. He won medals and other honours in Botany, Chemistry, and Geology, and gained the Robert Wilson Memorial Prize as the best student in Senior Chemistry and the Falconer Fellowship in Geology. It was expected by many of his friends in these days that he would make a career and a name for himself in science, or possibly as an explorer. In 1877 he took the degree of B.Sc., qualifying for it doubly—in Mathematics and in the Natural Sciences.

At this time, like many other sons of the manse who have ultimately joined the ranks of medicine, he had thoughts of entering the ministry of the Presbyterian Church, and became a student in the New College. There he was associated in close companionship with Henry Drummond, Robert W. Barbour, David Patrick, George Adam Smith, and many others who became his life-long friends.

Dr. R. A. Lundie.

After one year spent at the College, however, he felt that his life-work lay in another direction, and he returned to the University to study medicine. Although he did not take quite so distinguished a place in the medical classes as he had done in those of the other faculties, he continued to be a very enthusiastic and successful student.

Having graduated M.B. and C.M. in 1880, he acted as House Physician to Dr. Brakenridge and as House Surgeon to Professor Chiene in the Royal Infirmary, and he was also one of the Presidents of the Royal Medical Society.

In 1881 Lundie decided to devote himself to medical practice in Edinburgh, but his plans were delayed by a serious attack of typhoid fever, after which he made two voyages to South Africa as a ship's surgeon. On his return he settled down in the Grange district of Edinburgh, in which locality he has spent thirty-seven strenuous years in general practice. During twenty-two of these years he was associated with his friend Dr. R. H. Blaikie as Assistant Medical Officer to the Longmore Hospital for Incurables.

In 1884 he was married to Annie, daughter of Mr. Charles Henry Moore, who soon became a friend of his friends, and to whose watchful care and sympathetic comradeship in all his varied interests he owed his singularly happy home life. In the same year he became a Fellow of the Royal College of Surgeons of Edinburgh.

During the earlier years of his practice Lundie made a thorough study of the subject of ophthalmology, to which his scientific attainments specially inclined him. For several years he was private assistant to Dr. Argyll Robertson, and he acted for some time as Assistant Ophthalmic Surgeon to the Royal Hospital for Sick Children. He also wrote at least one valuable paper on an ophthalmological subject. After Dr. Robertson's death he had some thought of devoting himself entirely to this branch of medicine, but he finally decided to continue in general practice, the human interest of which had great attractions for him, and for which his kind heart and ready sympathy fitted him in no ordinary degree.

Not many men in large practice are able to keep themselves so well informed as he did in regard to the recent advances in scientific medicine. As illustrating his keen insight and enterprise, it may be recalled that he was one of the first in Scotland to make use of the thyroid treatment of myxœdema, and that he discovered for himself (in July 1892) the important fact that the remedy could be as efficaciously given by mouth as by subcutaneous injection. This, it was afterwards found, had been discovered shortly before by Professor Howitz of Copenhagen, Dr. Hector Mackenzie of London, and Dr. E. L. Fox of Plymouth, but, at the time when Lundie made his observations, their experience had not been published—in this country, at least.

He was also the first in Edinburgh, and one of the very first in this country, to perform successfully an emergency operation for perforated gastric ulcer. This operation, which was performed in 1894 in a private house on a servant girl who was not able to be removed to hospital, has frequently been referred to, with good reason, as a very remarkable achievement for a general practitioner.

Although never a fluent speaker, Lundie frequently took part in the proceedings of various medical societies, and contributed a number of papers on medical and surgical subjects which were models of lucid and logical statement. One of the best of these was the admirable summary with which he opened the Discussion on the Treatment of Myxœdema in the Medico-Chirurgical Society on 15th February 1893.

His abounding energy found further outlet in medical politics, and he was an active and useful member of many committees and associations. At the beginning of the war he was Chairman of the Edinburgh and Leith Division of the British Medical Association, and at the time of his death he was Treasurer and President-Elect of the Edinburgh branch of the same body.

He always retained his keen interest in pure science, and he contributed two original papers to the *Proceedings of the Royal Society of Edinburgh.* One of these (read on 20th December 1897) was "On the Passage of Water and Other Substances through India-rubber Films"; and the other, written a year later in collaboration with Dr. Cargill Knott, dealt with the obscure subject of "Dew-Bows." Both of these communications aroused much interest when they were delivered, and are still regarded as authoritative. For many years he has acted as Examiner in Physiology to the Royal College of Surgeons.

In the intervals of his busy practice he found time to write occasional papers on scientific subjects for lay publications such as *Chambers' Journal.* He also was responsible for a large proportion of the medical articles in *Chambers' Encyclopædia*, the editor of which, Dr. David Patrick, was one of his oldest and most intimate friends.

Lundie was widely read in general literature and had a retentive memory, especially for poetry. Those of his friends who accompanied him on botanical and geological excursions or fishing expeditions will recall how Browning, Lowell, and Bret Harte, the *Border Ballads*, and the *Ingoldsby Legends* shortened many a long day's tramp over the hills.

Since 1914 he has thrown himself with his usual tireless energy into all sorts of war work in a way that would have tried the strength of many a younger man. He acted as Convener of the Edinburgh and Leith Medical Emergency Committee, as Chairman of the Edinburgh and Leith Local Medical War Committee, and served on several other Boards. He also undertook extra hospital work and looked after many patients for colleagues who had gone on foreign service.

He took a hearty interest in the work of the Grange United Free Church, of which he was an elder for about thirty years, and also in many charitable and philanthropic causes. Some years ago he spent much unavailing energy in endeavouring to persuade the authorities of some of the Presbyterian Churches in Edinburgh to keep their doors open on week-days for rest and private prayer.

Only a few weeks before his death he had the great sorrow of losing his only son, Captain (Acting Major) R. C. Lundie, D.S.O., an able and gallant officer in the Royal Engiueers who had won high distinction in France.

It is not for us to say what Robert Lundie's death means to his wife, to his only daughter, and to his aged mother, nor is it easy to write of what it means to the many who had the privilege of knowing him well. At every stage of his career his strong steadfast character and eager friendliness drew other men to him, and they remained his friends for life. Though many of them have latterly seen him but seldom, they always found the old ties as close as ever in spite of new interests, new friends, and new associations. Principal Sir George Adam Smith—a fellow-student of New College days—writes: "He was dearly loved by his friends; and on the occasions I have met him since—alas! too few—I have never failed to be profited by our intercourse. . . . We shall always remember him as one devoted to the service of his fellow-men from his earliest days till his death, as a very hard, thorough, accurate, and unselfish worker, and as the kindest and most gentle of friends."

Robert Lundie was a man of strong and unselfish character, who warmly appreciated the good in others and ever thought little of himself. He has left behind a host of friends who will always feel that they are better men for having known him.

> How happy is he born and taught
> That serveth not another's will;
> Whose armour is his honest thought,
> And simple truth his utmost skill!
> . . . .
> This man is freed from servile bands
> Of hope to rise or fear to fall;
> Lord of himself, though not of lands,
> And having nothing, yet hath all.

J. T.

CAPTAIN DENIS COTTERILL, R.A.M.C., F.R.C.S.

There is no armistice with Death. Three weeks after hostilities had ceased, and when we at home were beginning to look to the future with lighter hearts and clearer vision, the sad news came through that Denis Cotterill had died at Bohain on 2nd December. Cotterill was among the first of our younger surgeons to volunteer for service with the Army; he joined the staff of No. 11 Stationary Hospital at Rouen in November 1914, and was actively engaged on military duty till the end. The long-continued strain of arduous work had not been without its effect even on his wiry constitution, as his friends regretfully noticed when he was home on what proved to be his last leave; and when he was stricken down with an attack of virulent influenza, followed by pneumonia, it was more than he could withstand.

Denis Cotterill was born at Edinburgh in 1881, and after passing through the Edinburgh Academy he commenced his medical studies at Cambridge, where he was a member of Christ's College. After two years at Cambridge he returned to Edinburgh and graduated M.B., Ch.B. at this University in 1906.

From his school-days onwards he was keenly interested in outdoor games and field sports, and in every branch he took up he excelled. But he had other interests; he was fond of music and was an excellent draughtsman. Although he was of a modest and gentle disposition, his general all-roundness gave him affinities with a wide circle of companions, who valued his friendship and appreciated his sterling qualities.

On the completion of his university course he elected to take up surgery, for which he had inherited a natural aptitude. He was specially attracted to the department of orthopædics, before it had become a cult, and studied the subject at various continental and English schools before he obtained the Fellowship of the Royal College of Surgeons in 1910. Three years later he was appointed an Assistant Surgeon to the Royal Infirmary.

Those who worked with him in Edinburgh soon came to recognise his ability as a surgeon, and even in the short time that was given him to prove his powers he had shown that the school had enlisted one who would maintain its best traditions. Much was expected of him when he went to France, and that even the highest hopes of his friends were justified is abundantly borne out by the testimony of those in authority with whom he was associated there, and who had the best means of assessing his achievements. Lieutenant-Colonel Tabuteau, Officer Commanding No. 11 Stationary Hospital, said of him in the beginning of 1918: "Nothing I can say can express my appreciation of his work. A more hard-working, conscientious, and loyal officer I have never served with. His surgical technique and attention to detail are excellent. He is full of initiative and keen on anything new in his profession. Captain Cotterill, by his skill and attention to his patients, inspired confidence in all those with whom he came in contact." Referring to the two and a half years during which Cotterill was in charge of and responsible for the work of the surgical division of the Scottish section of No. 11 Hospital, Lieutenant-Colonel Jameson,

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Photo. by Moffat.]

Captain Denis Cotterill, R.A.M.C.

his O. C., says, "His surgical work was of an exceptionally high standard"; and he, too, makes special reference to his keenness and hard work. Colonel Pilcher, Consulting Surgeon, Rouen Base, writes: "He has had a very large experience of war surgery, and has done excellent service in times of great stress, as, for example, in the Somme fighting in 1916. I wish to bear cordial testimony to his dexterity in manipulative surgery; to his mechanical genius, as shown in adapting splints and apparatus to the needs of individual cases; to the tact, unwearied patience, and kindness he showed to his patients; to his great zeal and industry, and to the many admirable social qualities which endeared him to his brother officers." Another consultant surgeon bears testimony to the high standard of his surgical work, and to the tactful manner in which he had performed duties of unusual responsibility.

After serving at No. 11 Stationary Hospital for over three years, Captain Cotterill resigned his appointment, and was transferred to No. 50 Casualty Clearing Station. At the time he took up duty at the C. C. S. place names were not mentioned, but field-cards were signed, and from these his friends learned that in the perilous days when the fate of Paris was still in doubt and the Montagne de Rheims was the centre of our anxious thoughts, he was on one of the most vital fronts.

With the turn of the tide he moved further north till he reached the St. Quentin-Le Cateau section of the line. On the way much was required of him, and how he met the call his Commanding Officer, Colonel Simpson, records: "He displayed an energy and devotion to duty which were the admiration of us all. During the early days of the Allied push on the Marne, in July, when this unit worked almost without cessation day and night for several days, he displayed untiring energy. Later, when the attack was being carried out against the Hindenburg line and the unit was again called upon to work at full pressure, Captain Cotterill showed the same perseverance and devotion to duty." On the 4th of December his brother officers carried him to rest in the British Military Cemetery at Prémont, about five kilometres north-west of Bohain.

Many of those who knew Denis Cotterill and were cognisant of his work in the war have testified in the most emphatic and generous terms to the excellence of his surgical work, to his self-sacrificing devotion to duty, and to the great affection and regard which he inspired in his patients, his fellow-officers, and in all with whom he was associated in his work. His many friends at home will feel that they have lost one who by his character and by his sweet and gentle disposition was specially endeared to them. We can but mourn his loss, and offer our heartfelt sympathy to his widow and children, and to his father, Lieutenant-Colonel J. M. Cotterill, C.M.G., and his family, in this their culminating sorrow. A. M.

THE TRAINING OF THE STUDENT OF MEDICINE.

An Inquiry Conducted under the Auspices of the Edinburgh Pathological Club.

LX.—ON THE TEACHING OF OPHTHALMOLOGY TO MEDICAL STUDENTS.

By E. TREACHER COLLINS, F.R.C.S.

THE advantages to be derived from instruction in ophthalmology by medical students may be discussed under three headings:—I. The assistance which it affords them in the diagnosis and prognosis of general diseases. II. The capacity which they acquire of recognising and treating the commoner local affections of the eye, and in avoiding mistakes, which are not only disastrous in themselves, but which may add to the burdens of the community. III. The training which they receive in attention to detail and exactness of observation.

I. It is now nearly seventy years since Helmholtz invented the ophthalmoscope—since Graefe for the first time saw the background of the eye, with its nerve entrance and its blood-vessels, and jumped up, with flushed cheeks, exclaiming, "Helmholtz has unfolded to us a new world." This new world has, by the labours of many careful observers, been thoroughly explored and charted; yet it is a remarkable fact that for the majority of medical practitioners it is still a *terra incognita*.

Every medical student provides himself with a stethoscope, and devotes much time and patience to training his auditory faculties for its use. Comparatively few purchase an ophthalmoscope or make attempts to train their eyes to see the wonders which it reveals. For purposes of diagnosis the latter instrument is, in its way, just as valuable as the former. In proof of this I would put before you the following brief statement of information which may be obtained from an ophthalmoscopic examination apart from anything else:—

(*a*) That a patient has suffered from syphilis, or that a child has descended from parents who have suffered from that disease; (*b*) that a patient is suffering from tubercle, or that a meningitis of doubtful origin is due to tubercle; (*c*) that a patient complaining of headache and sickness has intracranial pressure, and is probably suffering from a cerebral tumour; (*d*) that a patient apparently in good health has "contracted granular kidneys," and will probably not live for more than a year; (*e*) that a patient is suffering from arteriosclerosis, and will probably die of cerebral hæmorrhage; (*f*) that an individual, apparently robust and well nourished, is suffering from glycosuria; (*g*) that a patient has aortic regurgitation, and has probably suffered from rheumatic fever; (*h*) that a patient who complains only of dimness of sight will ultimately develop locomotor ataxy or general paralysis; (*i*) that a child who has weakness of the back and who is thought to be rickety or marasmic is of Jewish extraction, and will shortly die of an affection of the ganglion cells of the brain and spinal cord; (*j*) that a man who has been passed for military service and graded for the fighting line is unable to see at night, and if put into the trenches, or on sentry duty, will be a source of danger to his fellows; (*k*) that a patient has an enlarged spleen and is suffering from leucocythæmia.

II. Medical practitioners of good standing often remark "that they do not dabble in eyes, but send at once any of their patients suffering from eye symptoms to a specialist." One is, moreover, bound to admit that, under the circumstances in which they are placed, it is wiser for them thus to confess their incapacity rather than to profess to deal with what they do not understand. This is not a position, however, which the rising generation of practitioners should be encouraged to adopt. The General Medical Council advocate, and many universities and other licensing bodies insist, on the attendance of a medical student at a course of instruction in ophthalmology before he presents himself for his Final Examination. After three months' diligent attendance in an ophthalmic out-patient department an average student, provided he has a good teacher, should be able to recognise and treat many of the commoner and less severe forms of eye disease. Knowledge so obtained will not only add largely to his reputation, and be of benefit to his pocket, but will also tend to decrease the overcrowding of ophthalmic out-patient departments.

There are some eye affections about which it is a medical practitioner's duty to be well acquainted. Anyone who practises obstetrics should know how to prevent, recognise, and treat ophthalmia neonatorum. It is a disease which is preventable and curable without loss of sight if taken in time, and yet it is the commonest cause of loss of sight amongst the inmates of blind asylums. This deplorable loss of sight, dating from infancy, which renders those affected a burden on the community for the whole of their life, is generally attributed to the ignorance of midwives. My own observations, extending now over several years, show that the culpable person is more often a medical practitioner.

The general and local symptoms of acute glaucoma cannot be too often dinned into the minds of medical students, so frequently is the eye affection, as the cause of the general disturbance in these cases, overlooked, and the time when active interference would save sight and relieve suffering allowed to drift away, hopeless blindness resulting.

III. Subjects are often included in an educational curriculum not only for their intrinsic worth but also for some ulterior object which their study is likely to effect. Thus the study of classics is advocated because it improves the student's powers of expression, and the study of Euclid because it stimulates the reasoning faculties. In the same way the study of ophthalmology is of value to a medical student, apart from its intrinsic worth, because it affords such an excellent training in precision and accuracy of observation. In this respect I claim it to be superior to that of any other branch of medicine. As, however, my opinion on this matter may be thought to be a prejudiced one, I will quote as an authority Dr. Hughlings Jackson, who said that "he regarded it as the luckiest thing in his medical life that he began the scientific study of his profession at an ophthalmic hospital, because he had there the opportunity of being well disciplined in exact observation."

Having thus summarised the advantages of a training in ophthalmology for medical students, I propose next to consider how best it may be carried out. The methods usually adopted are, as in other branches of medicine, by lectures and clinical demonstrations. Both as a teacher and examiner I have always considered the capacity for observation of greater merit than the mere remembrance of facts. For the training of the capacity for observation practical demonstrations and quizzing classes are far away better than systematic lectures. The former are indispensable to the study of ophthalmology; the reading of a good text-book may well replace the latter. Indeed, the reading of a good text-book is often preferable to listening to a bad lecturer. With regard to text-books, some American students at Moorfields' were much impressed when, on asking one of my former colleagues "which was the best text-book for them to read," he turned round, and with a dramatic wave of the arm to the crowd of out-patients behind him, said, "There, that is the best text-book."

What is most desirable in teaching is to show typical cases, and get their characteristic features firmly fixed in the students' visual memory, so that they recognise them at once when they see them again, recalling also associated facts which they have been told in connection with them respecting treatment, etc.

The value of clinical teaching, like the value of a course of lectures, largely depends on the teacher. No better judges exist of a teacher's capacities than the students themselves. Some years ago, at a large medical school, where the ophthalmic teaching was not all that it might have been, the students were in the habit of publishing in their journal facetious examination papers. One of the questions which they set was, "Write all you learnt in the eye department on the back of your visiting card."

All students should be encouraged to learn the use of the ophthalmoscope, for the reasons already stated. For this purpose every student should be advised to purchase an instrument of his own. The mere possession of an ophthalmoscope excites a desire to be able to use it, more especially if the expense to acquire it has been incurred by the owner himself. When I examined at the Queen's University at Belfast, we expected all the candidates for the M.B. to show their capacity of seeing the fundus of the eye with the ophthalmoscope. For this purpose we asked them to draw the arrangement of the retinal blood-vessels as they saw them emerge from the optic disc.

To attempt to teach medical students, as a body, to correct errors of refraction with spectacles is, I think, a hopeless waste of time. Some students show special aptitude for this class of work—I reckon about one in five. These should be encouraged and have facilities afforded them. The capacity to correct errors of refraction is a very valuable asset to a medical practitioner's capabilities. There is any amount of it to be done, and the only *raison d'être* for a "sight-testing optician" is the inability of the medical profession to undertake the whole of it. Uncorrected errors of refraction give rise to many aches and pains, for which much physic is prescribed, their real cause being overlooked. An old-fashioned general practitioner once remarked "he did not think much of this astigmatism which was so largely talked about nowadays. He had been in practice for twenty years and had never met with a case."

In conclusion, I would strongly urge that an examination in ophthalmology, conducted by those who have special knowledge of the subject, should be made part of the Final Examination for a medical qualification at all Universities and other licensing bodies. This has been the custom at the Irish universities and colleges for several years, and has more recently been adopted at Birmingham and Liverpool. For three years I examined in ophthalmology at the final M.B. at Queen's University, Belfast, and thereby came to realise what an additional stimulus such an examination was to students to work at the subject. In London no special examinations are held at its University or at the College of Surgeons. An ophthalmological question is occasionally set in the surgery paper. I know as a fact that the surgeons who are examiners have sometimes had to cram up the subject themselves before they are able to cope with the answers. Nothing is so unfair and unsatisfactory for candidates as to be examined by those who are imperfectly acquainted with their subject.

LXI.—THE PLACE OF OPHTHALMOLOGY IN THE MEDICAL CURRICULUM.

By FREELAND FERGUS, M.D.

For about thirty years I have been engaged in teaching medical students the elements of ophthalmology, and indeed I believe that I have taught more students the elements of that subject than any man who has ever lived in the West of Scotland. I do not think that any part of my strictly professional work has been more interesting to me, and therefore I hope I am not presumptuous in thinking that I am entitled to say something about the place which ophthalmology should have in the training of the present-day medical student. The time at the disposal of the modern medical student is far too short to teach him ophthalmology. No attempt should be made to go beyond those beggarly elements which are essential if he is to be made a reliable and, from the point of view of the public, a safe practitioner of the healing art. The attempt to teach everything in a very limited space of time only succeeds in making quite certain that the student learns nothing. Any attempt to overload the ophthalmic course, which at present is confined to twenty meetings, will be not only foolish but disastrous. A teacher of the subject ought to make an endeavour to instruct the pupil in those parts of the subject which are essential to every practitioner. The student ought not to be taught so much the treatment of ophthalmic cases as he ought to be made familiar with the light which ophthalmic methods of examination throw upon other conditions. You cannot teach much of such a huge subject in a matter of twenty lessons. No doubt this limitation is a very absurd arrangement—nearly as absurd as the syllabus of the Triple Qualification Board in Physics. There has recently been a re-issue of that document, and I venture to say that no man of average ability could master the subjects therein specified in a shorter course than one of two years.

When I was a student in Holland I found that ophthalmic studies were very much more prominent in the training of medical students in that country than they were or are in our own. During three years of his course the Dutch medical student had at that time to attend a certain amount of ophthalmic instruction which was very largely clinical. Personally, when I was teaching large classes I regarded the twenty meetings as totally inadequate, and as a matter of fact the class met on four days a week during a ten weeks' session, giving, roughly, about forty meetings, or twice the amount demanded by the Regulations. Of that course one-half at any rate was devoted to clinical work and the other half to lectures. The first half was almost entirely a clinical course and included diseases of the conjunctiva and cornea; diseases of the eyelids and lachrymal passages; diseases of the uveal tract, including iritis, choroiditis, glaucoma (at that time I thought I had some idea as to the pathology of glaucoma, at present I have got rid of any such notion); cataract; diseases of the retina and optic nerves. Every effort was made to illustrate the relationship between local conditions of the eye and systemic disease. I have never conducted a clinic without laying special stress on the study of diplopia, for I regard this subject as being of very great importance to all classes of practitioners. Every student was also trained in the examination of pupillary reflexes.

The second half of the course, which half formed the subject of lectures chiefly, with, of course, a little clinical practice as opportunity afforded, included the following:—First, white and coloured light, with a fairly extensive description of the phenomena of reflection and refraction, and a discussion of lenses and prisms as remedial agents. Second, the refraction of the eye. Third, range of accommodation, both absolute and relative. Under this last heading was also given a short account of the metric angle and of the relationships of the range of accommodation to convergence in emmetropia, hypermetropia, and myopia. Fourth, the sense of sight divided into (*a*) the sense of form and visual acuteness; (*b*) the sense of colour; (*c*) the sense of light; (*d*) the sense of projection; (*e*) the estimation of distance. Fifth, the field of vision for white and coloured lights. In this section perimetry and hemianopia were both discussed. Lastly, the affections of the extrinsic ocular muscles, including squint. That may seem a very ambitious course to be undertaken in forty meetings—twenty clinical and twenty lectures. In addition to that, numerous exercises were always prescribed on the physical part of the subject, and a very large number of the students took part in this voluntary work. Now I do not argue that a course of this kind, limited though it be, is one adapted for all medical students; I know it is not. You cannot make ophthalmic specialists in twenty meetings of a class—the minimum number required by the present ordinances; and the question then comes to be, What information in a short course can you give that will be of advantage in after-life? And here let me once and for all enter my protest against two things. The first is that the student should receive only twenty lessons in such a very important branch of his training. It is far too short. The Dutch limit is a much better one. I wish also to enter a very firm protest against an abuse which has in some places crept in, namely, the substitution of pictorial representations, either by diagrams or by lantern projection, for actual clinical work. The ordinances have shown a development in the right direction. At least fourteen of the twenty meetings of any qualifying class must be clinical, that is to say, I presume, they must be held in a hospital or in an ophthalmic clinic, for the purpose of examining patients, and not in a lecture-room. If a student has attended lectures these will, to the extent of six, count in making up the twenty attendances. Thus the ordinances give prominence to the idea that the courses for general practitioners as distinguished from specialists must be essentially clinical, and therein I think they are quite right. I wish, however, that they had gone much further and made the clinical training in ophthalmology a more extensive one. I imagine that if it were found that a particular course was largely or predominatingly a lecture course and not actual clinical work that that course would, if the question were raised, be found not to qualify for medical graduation. Not long ago I came upon some students who had passed through their ophthalmic course but had never used an ophthalmoscope and had never even seen it employed by anybody else. They had, on one or two occasions, been shown pictures of the fundus, but that was all. Such a course seems to me a farce. It is a pure contradiction in terms to call a performance of that kind clinical work. So much for the negative side, and now for the positive.

What, going on my own experience, such as it is, do I regard as the subjects which should be taught in a clinical class of ophthalmology to men and women who are going to undertake the responsibilities of the profession of medicine in general practice? Tuition in ophthalmology I think has a twofold object. In the first place the student ought to learn the signs and symptoms of the more important ophthalmic diseases. He ought also, so far as is practicable, to study those which are symptomatic of diseases of the general system; and lastly, and very importantly, he ought to be able on leaving his ophthalmic course to use such instruments as are of special value in investigating diseases of the eye, particularly of those diseases which are related to systemic ailments. To speak quite plainly, I would not let a man enter the medical profession unless he could use an ophthalmoscope almost with the same facility as he uses a clinical thermometer. These are the ends and objects which I steadily kept in view in dealing with students, and the rest of this short communication will simply be an elaboration of this aspect of the subject.

Personally, I would not regard a man as fitted to enter the profession of medicine unless he could use an ophthalmoscope to examine the fundus. And here again I would limit my ambition. It is the use of the ophthalmoscope as an instrument of medical research rather than of ophthalmic investigation that is of importance. I think an effort should be made to teach the student to recognise the healthy optic nerve and to know optic nerve hyperæmia, optic neuritis, and optic nerve atrophy when he sees them. I would also make quite sure that he could recognise retinal hæmorrhages and the various features which are characteristic of retinitis albuminurica. It would be well also that he were able to recognise a case of choroiditis. Further than that, I would not insist on his knowing much of the ophthalmoscope. He ought, of course, to be able to examine the crystalline lens as to its transparency. It must be remembered, however, that as the ophthalmoscope is an optical instrument a student will be at a great advantage if when using it he has a certain knowledge of physiological optics. It is not a very difficult matter to impart to him the required amount. Just start with a statement, as I generally do, that when a person sees a portion of the fundus of an eye which he may be examining, that portion and its image on his retina must be conjugate foci. A few minutes with a blackboard and a piece of chalk in a lecture-room some morning will teach a student all that he needs to know of this matter. Incidentally there will be brought before his notice the various conditions under which the patient's retina and his own may not be conjugate foci, and the student will be gradually led to see how these hindrances may be removed by the use of appropriate lenses. And thus the teacher incidentally gives the student all the elementary instruction which I think should be imparted as to the essential nature of emmetropia, hypermetropia, and myopia. I always introduced the study of the refraction of the eye in connection with ophthalmoscopic examinations. The definitions which I have given for many years are as follows:—If a portion of the retina be the source of light, luminous by reflection, the pencils emergent from the cornea are approximately parallel in emmetropia. Under the same circumstances, in myopia, the emergent pencils are convergent, while in hypermetropia the emergent pencils are divergent. At once the student sees what is required to overcome the divergivity in hypermetropia and the convergivity in myopia. No attempt should be made in the ordinary clinical course qualifying for graduation to endeavour to make the pupil an expert refractionist. It cannot be done in the time at his disposal, and all that you will manage is to take his attention away from work which concerns general practice much more closely. I have had special courses for instruction in refraction-testing and in the making of other physical measurements, but these matters, I think, should be rigidly excluded from a course specially destined for those who are going to be general practitioners. A mere indication of the methods employed should be all that is given. I regard it as entirely wrong to make any considerable portion of the clinical work which the student must do, under the present ordinances, refraction-testing.

As indicated above, I always take care both in the lectures and in the clinic, particularly in the latter if suitable material be available, to instruct students as to the examination of persons suffering from diplopia. It would certainly in an elementary course be a mistake to dwell on the binocular field of fixation. I do not think that it is even justifiable to treat at any length, if at all, of the measurement of the positive and negative ranges of convergence, but I do say that a man would be failing in part of his duty if he did not teach a student the differential diagnosis of diplopia so that the muscle, or group of muscles, affected by the lesion may be well ascertained. I have never found any difficulty in teaching students the study of diplopia in terms of rectangular co-ordinates. Modern medical students all but invariably have some acquaintance with the elements of co-ordinate geometry. It lightens a student's work immensely if he is told that the fixation point is the intersection of the abscissa with the ordinate and that the position of the false image may be resolved into horizontal and vertical components. Moreover, such a method of presenting a case allows the observer to estimate from time to time what progress is being made by the patient, for at a constant distance the value of the vertical and horizontal components can of course be ascertained as often as may be deemed necessary. For my elementary students I always have divided cases of diplopia into two groups, namely, those in which there is no vertical component, or, at any rate, one that is negligible, and those having a marked vertical in addition to a horizontal component.

I think it is also necessary to detail the chief facts as regards the development of strabismus. There can be no doubt whatever that in most cases of ordinary concomitant squint occurring in young children the onset of amblyopia in the squinting eye can be prevented and good vision insured for both eyes by rational and timely treatment. I imagine there is no ophthalmic surgeon of any experience who has not often met cases hopelessly and permanently amblyopic in which the patient, when a young child, was taken to a general practitioner and his parents or guardians told that it would come right as the child grew older. The intelligent exposition of a fallacy such as that cannot but be of service to the public. I have always found it most easy to explain squint, for I start with the definition that when the visual axes do not intersect at the point of fixation then there is squint. From that it is very easy to detail the factors which may cause a want of intersection. I think it would be improper to elaborate to any extent the study of muscular anomalies in a course specially destined for general practitioners, but a careful explanation of the damage that will inevitably be done by neglect in the case of concomitant squint in a young child would lead all conscientious general practitioners to take proper measures when they are brought face to face with such a contingency.

It goes without saying that all medical practitioners should be taught carefully and well how to test pupilary reflexes.

It is equally true that every medical student should be taught how to take the visual acuteness. Personally, I think Landolt's test is much the best, but it does not seem to have caught on either in this country or in the United States of America. It has many advantages, an especial one being that it is equally useful for the literate and illiterate, for those who know the Roman characters, for those who only know the Hebrew or Teutonic characters, and for those who know none. It is a universal test suited for every intelligent member of the human race. It is almost absurd to have to say it, but every medical student should be warned that in stating a visual acuteness he should invariably say, visual acuteness admitted is so and so. That is all that he or anybody else, apart from the examinee, knows of the matter.

I would not, in an elementary course, give any attention to the various methods of testing the light sense. No doubt that is a matter of considerable importance, but I do not think that any general practitioner is likely to have the apparatus necessary to carry out such an investigation. Probably, although not so certainly, the same line of argument applies to the testing of the colour sense. That is a very special part of ophthalmic work. Investigations of the colour sense, however, do not as a rule throw much light upon disease, except perhaps in the well-known case of central colour scotoma occurring in such conditions as tobacco amblyopia, and the occasional case of transposition in the field of vision of some of the colours in cerebral tumour. These are matters which may, however, very properly be discussed under the heading of perimetry.

There can be no doubt whatever that every medical student should be fully instructed in the methods of using a perimeter both for white and coloured lights. It is an instrument which gives valuable aid to the physician, to the surgeon, to the ophthalmic surgeon, and to the general practitioner. I do not perhaps lay the same stress upon teaching a student the use of the perimeter as I do upon teaching him the use of the ophthalmoscope, but it is an important instrument, with the use of which students should be made thoroughly familiar. It is perhaps quite true to say that there is no modern text-book on medicine where the perimeter is not mentioned. The same is largely true of text-books on surgery, which facts are tantamount to an admission that the instrument is of extreme importance in the examination of a large variety of diseases.

In the public interest I would lay special stress on a student acquiring a competent knowledge of the appearances and symptoms characteristic of glaucoma, both acute and chronic. Many an eye has been lost because a young practitioner has failed to realise what he is dealing with. There is no ophthalmic surgeon of the older school who has not seen that again and again. A case may be, by a practitioner who has been ill trained, carelessly diagnosed as incipient cataract, and special advice may not be sought till it is much too late to be of any practical value. On the other hand, an intimate knowledge of the particular features of glaucoma would often lead a practitioner to hold his hand before using a mydriatic. I, for one, think that every student should be warned of its danger and should be sufficiently instructed by the practical examination of actual cases to know the disease when he sees it. No doubt there are many interesting points in the discussion of the pathology and treatment of glaucoma, but surely that is scarcely the thing to give to an undergraduate in medicine.

Wounds of the eyeball will certainly be seen by the student during a good clinical course. He ought to be informed as to the danger of wounds of the eyeball in their connection with the possibility of sympathetic ophthalmitis. He ought to be taught the treatment of simple wounds of the eyeball which are not complicated by the presence of a foreign body in the eye, and he should also be carefully instructed as to the diagnosis of foreign bodies in the eyeball. Certainly, wounds of the eyeball should be properly brought to his attention, but unquestionably the best way of doing it is to let him see them as they occur in the ordinary clinic. A student will learn far more in a clinic where several cases of eyeball wounds may be seen daily than by spending a month or two in reading or in hearing lectures about them. Lectures as a method of teaching a clinical subject are an entire mistake.

Little remains to be said except regarding those diseases which are usually called externals. I refer to the various forms of conjunctivitis, diseases of the cornea, iritis, and diseases of the lachrymal passages and to those of the annexa of the eye.

Thirty years ago, acting, as I believed, in the best interests of the public, I wrote a letter to Dr. J. B. Russell, then Medical Officer of Health for the City of Glasgow, saying that both ophthalmia neonatorum and trachoma should be made notifiable diseases. I got back a letter to say that he saw no occasion for any such action. Within recent years they have very properly come under the auspices of the Public Health Authorities. That means that they are both a danger to the public health. Students should, in the public interest, unquestionably be taught the diagnosis of such diseases, and that from the actual inspection of cases and not from text-books or pictures. Further, the other common forms of conjunctivitis should be illustrated by suitable cases. I do not say accurately diagnosed, for the diagnosis of most cases of conjunctivitis depends on the oil-immersion lens. In 1891 I introduced into my own clinic the rule of having all cases on which it was proposed to operate competently investigated by a bacteriologist. Since that day I have not seen a suppuration after cataract extraction. I have seen one after a needling. Shortly thereafter, my colleague and friend, Dr. Lewis M'Millan, took up the subject in the ordinary everyday clinic, and thus from 1891 the oil-immersion lens has been used daily for all cases of conjunctivitis. You cannot possibly expect a general practitioner to examine conjunctival secretion, notwithstanding the fact that it is a vastly important investigation. That is no reason, however, why he should not be taught to recognise ordinary conjunctivitis and the differentiation of that condition from ophthalmia neonatorum, from trachoma, and even from that special form which is still, for the most part, called phlyctenular. I always insist that a student shall realise that a conjunctivitis is a septic infection of the conjunctival membrane. The microscope or cultures may show him, if he has time to apply such methods of research, what particular organism he is dealing with, and it may well be worth his while to take pains to make such inquiries, or to have them made for him, but not for a moment should he lose sight of the fact that an inflamed conjunctiva, like inflammation of any other mucous membrane, is most frequently micro-organic in origin and must be treated on precisely the same principles and from the same point of view as any other inflamed mucous membrane. No application of a so-called antiseptic is of the slightest avail, for, up till now, we have not found anything which may be said in general terms to kill the organism without at the same time killing the corneal or conjunctival tissue. The only exception to this general rule which occurs to me just now is the influence which zinc sulphate undoubtedly has in the removal of the Morax diplobacillus. One point should always be emphasised, and that is that a case of iritis is apt to be mistaken for acute conjunctivitis. I invariably make students, in the presence of a case of ordinary catarrhal conjunctivitis, examine the pupilary reflexes. Most cases of iritis can be treated perfectly well by a general practitioner, excepting those in which there are great oscillations in tension; such cases should be in the hands of an ophthalmic surgeon.

Regarding iritis, the important point to get the student to realise is that it is not primarily a disease of the iris but is the expression of an infection. The first duty of the practitioner in charge of such cases, be he a general practitioner or an ophthalmic surgeon, is to find out the nature of the infection. That is the first step towards treatment. Thus inflammation of the iris while forming a condition which requires the closest attention of the practitioner who may be attending the patient, sometimes throws considerable light on other diseases of which the patient is the victim.

As regards the cornea, there are some conditions which I would insist upon a student knowing—ulceration with or without hypopyon, suppuration, interstitial keratitis and cicatrices, such as nebulæ or leucomata resulting from local diseases of the membrane. A student certainly ought to be instructed as to how to diagnose ulceration of the cornea and interstitial keratitis. Here, again, the oil-immersion lens may come into use. On one thing I am quite clear, and it is that the oil-immersion lens is sometimes of particular use in prognosis. Given a pneumococcal infection, the prognosis is much more grave than in many other conditions. The plain fact is that the practising physician can, if he likes, get the greatest possible assistance in the way of accuracy of work from modern pathology. I do not say that I would insist on every student who is going to be a general practitioner going through a special course of ophthalmic bacteriology: certainly not. It would be wrong to occupy any large proportion of the time at the student's disposal with any such study, but if a student attends a good clinic for some months he cannot but pick up some knowledge of ophthalmic bacteriology from the everyday practice which he sees, and, further, it is satisfactory to know that the present-day medical student receives competent training in bacteriological work in his pathological course and therefore has little, if any, need of special training in ophthalmic bacteriology.

No lasting or definite progress is likely to be made on anything else than a strictly scientific basis. Ophthalmology in its true sense ought to be the practical application of physics, pathology, and physiology, with something also of the therapeutic art.

LXII.—THE TEACHING OF EYE DISEASES IN THE CURRICULUM.

By WILLIAM GEORGE SYM, M.D., F.R.C.S.

As the matter presents itself to my mind, the principal danger to be avoided is the tendency to teach the subject of diseases of the eye (and all such special subjects) as separate entities and not as departments of medicine and surgery, and to inculcate in the student a specialist's knowledge rather than a general practitioner's knowledge of the subject. Notice that I speak meantime of the student proper. I ought—I wish to speak for myself, not to preach to others—to regard my class-teaching as a portion of the class-teaching of surgery; the general surgeon cannot overtake all the branches of surgery (for more reasons than one), and to him is relegated general surgery, to me the ophthalmic aspect of surgery, to another the gynecological, to another the aural. I am not expected to teach the more erudite developments of ophthalmology to the student, nor is it desirable that I should endeavour to transform him into an oculist before he has even become a licensed practitioner of medicine and surgery. That, in brief, is what I look upon as my duty from the negative point of view; from the positive, it is to teach him such portions of the subject as he is likely to require to know in any circumstances, such as he might meet with on the day on which he goes into general practice, leaving for further study the more precise and intimate details of examination, of work, and of investigation. Let me give a simple example: I endeavour to instil into the student an understanding of what the expression "error of refraction" signifies, of the reasons for which such error is of high importance in the economy of the eye itself and in that of the general health, of the signs and symptoms which point to such a condition, and of the more ordinary means by which such error may be recognised, measured, and treated; but I do not bamboozle a man who has still to pass his Final Examination in Medicine with details as to the first principal point of the eye, or the theory of the ophthalmoscope, nor do I expect him to be able to estimate with precision the degree of fault in a given case.

I therefore agree in the main with the sound good sense of the authorities who have restricted the various teachers in regard to the frequency of attendance on lectures and demonstrations, and to the scope of the teaching—that they may make sure that on the shoulders of an already heavily-weighted student a burden is not laid which he is unfit to carry. The course of twenty-four lectures and demonstrations, with a little tutorial instruction in the ophthalmoscope, is, I think, neither too short nor too long for the purpose. As to the ophthalmoscope—using that instrument as an example of several, the mode of employment of which ought to be more or less familiar to the student—what is the right course? It is obvious that to become an expert a man would require a great deal more instruction than it would be right to inflict upon him in a class adapted to the needs of *every* student. The average practitioner, even one in general practice, rarely, I think one might say almost never, uses an ophthalmoscope, but I do not consider that when one has said that one has closed the question, for if he were better able to employ it perhaps he would more frequently do so. Still, when all is said and done, the ophthalmoscope will remain, nineteen times out of twenty, a specialist's instrument, simply because the efficient use of it demands incessant practice, and that is what the family practitioner cannot give to it. I consider our present plan quite a suitable one: we teach the student how to use the instrument, to do so sufficiently to understand how the tool is worked: its more intimate manipulation he must postpone till after graduation.

The weak point about the present teaching arrangements is this: I consider that with the class recurring during each of three sessions per annum, one is so kept at the grindstone that there is neither time nor strength for higher teaching in the subject. (Of course during war time there are no post-graduates to teach.) I wish it could be arranged that during two of the sessions one of the colleagues lectured and he was set free for senior work in the third, and similarly that the other had senior teaching during one session (not the same session as his fellow), and taught students in the other two. That plan would give quite sufficient facilities, I should suppose, for the students, and yet would afford some relief, some variety, some encouragement to the teachers themselves.

Another point on which I must dwell for a moment is that of the examination. No teaching of ophthalmology can be satisfactory unless the student is subject to examination.

> The fear o' hell 's a hangman's whip
> To haud the wretch in order.

We have allowed some other universities to get before us in this matter; for years I have been examiner in ophthalmology for the Final Examination in Medicine, first in the Royal and now in the National University of Ireland. At one time it was considered sufficient in our own university that when he was passing through the sieve of clinical surgery the candidate should be shown a patient from the eye department and asked for a diagnosis by the ordinary examiner in clinical surgery. When I became university lecturer I declined to have any dealings with so palpable a fraud, and refused to supply from my wards patients for the surgeon to employ in the examination of students. These, probably, being fresh from a class on diseases of the eye, knew a good deal more about the matter than the examiner, who never dealt with such cases in his practice from year's end to year's end. I consider it eminently desirable that the student should be examined in the subject, but the examination should be a fair and honest one.

The plan which has been hit upon for the avoidance of the difficulty is that our class certificates are held to indicate that the student's knowledge has been found to be sufficient to allow him to escape further examination in that particular subject. I consider this plan quite unsatisfactory, first because it violates the principle that no candidate should be rejected in any subject except by the agreement of two examiners, since it throws upon the teacher alone the responsibility of passing or rejecting; and secondly, because that mode of dealing with class certificates is limited to these subjects. Would the physicians, may I ask, be satisfied that a class certificate (popularly known as a "D. P.") of attendance at Dr. Z.'s class should clear a man from any examination on practice of physic as an integral part of his Final Examination? Why then should this be done as regards diseases of the eye and of the ear?

I have suggested before, and now suggest again, a method by which the difficulty may be got over; that to examine every student in diseases of the eye, the ear and throat, and in diseases of children, would entail a heavy strain on the candidates, and a serious increase in the cost of the Final Examination. My plan is this: Let it be assumed for the moment that each candidate is at present examined on three patients in clinical surgery. Divide the candidates into five groups of equal numbers—A, B, C, D, E—by lot, or in any other manner which would completely obviate any candidate knowing until the day of his examination into which group he fell. Every candidate would now have two cases in clinical surgery, and those in sections A and B would have three, and they would have no "special" subject; those in section C would have two clinical surgery cases and be sent to the eye department for their third; those in sections D and E similarly with diseases of the ear and throat and children's diseases. Thus every candidate would require to be ready in every subject, yet the actual examination of any one would be limited, the labour curtailed, and the examination be conducted by a person really familiar with the subject in which he was an examiner.

What value, for examination purposes, ought to be placed upon the special subject? I do not suppose that anyone would suggest that, should a candidate do well in clinical and systematic surgery he should be stopped altogether if he came down badly in eyes or in throats, but such a contingency very rarely happens in my experience elsewhere. If a man is good in surgery he is at least fair in ophthalmology; if he is bad in ophthalmology he is no better than very moderate in surgery. In the university in which I examine, the value of ophthalmology, relatively to surgery, is (I must not give away secrets) in the proportion of something like one to four or so. It is so adjusted that the risk of a good surgeon being stopped because he is a bad ophthalmologist is reduced nearly to zero when the values are added, and also that a good ophthalmologist may have a figure or two to spare to help to keep his feet clear of the bar in the larger subject. In practical experience it is not found to be true that that favourite bugbear of the general surgeon is of any real importance, the danger, namely, that the specialist may rate a knowledge of his subject too high and expect too much of the candidate. Such an error is not found to exist. In speaking thus of numerical values I speak in complete ignorance of the methods used in the Final Examinations here; that is a matter regarding which I have never made any inquiry, and I have no information whatever. But in the estimate of a man's position in reference to knowledge of his work, to justify his receiving or being refused licence to practise, a moderate acquaintance with these two branches of surgery, eye and ear, ought to have a definite value, and to have it because they are parts of a big subject, parts which in point of fact *are excluded* unless they are in some such way included. For one must recognise that the so-called general surgeon is a specialist in his own portion of surgery just as I am in mine; his scope may be wider, but the essential fact is the same in both instances.

LXIII.—THE TEACHING OF DISEASES OF THE EYE TO MEDICAL STUDENTS.

By J. V. PATERSON, F.R.C.S., Ophthalmic Surgeon, Royal Infirmary.

SPEAKING as a teacher of considerable experience I would consider the following points of special importance :—

1. When should the students attend the class on eye diseases?

2. How much of the subject should they be taught, and what time is adequate for the proposed instruction?

3. Should the student require to pass a qualifying examination, and what should be the type of examination if such a test is made compulsory?

As to 1, I am very strongly of opinion that the students ought to be as far advanced as possible in their study of general medicine and surgery before they begin the study of eye diseases. If they have not a reasonable knowledge of these subjects the teacher is necessarily at a great disadvantage and many of the most important clinical facts in ophthalmology cannot be seen in their proper bearing and perspective, *e.g.* changes in the pupils, optic nerve and retinal changes depending on diseases of the nervous system or on circulatory or renal trouble. Diseases of children should also be studied before eye diseases, as eye conditions of great importance occur so frequently in children and local treatment is so often of secondary value when compared to general re-establishment of the child's health.

2. What should students be taught? They must be taught to recognise the commoner eye ailments, to know what cases they can safely and efficiently treat and those which they ought to send promptly to an eye hospital, or to a specialist for consultation. The making of a diagnosis implies thorough training in how to examine an eye and how to note the points on which diagnosis is based and estimate their value.

The anatomy and physiology of the parts have usually to be re-stated from the clinical point of view. Teaching must be mainly clinical and the students must closely examine a large number of cases so that they have a good opportunity of becoming really familiar with the common external eye diseases, as, for example, conjunctivitis, hypopyon ulcer, phlyctenular keratitis in a child, interstitial keratitis, iritis, cataract, glaucoma, squint. Injuries of the eye form an important group of cases and must be dealt with in considerable detail.

In dealing with the question of defective vision after injury the teacher should, in my opinion, do his best to enlighten the student on the question of visual efficiency in workmen.

Certain of the more abstruse conditions on which great stress is laid in many of the text-books should, in my opinion, not be discussed in any great detail. A good example of this is the differential diagnosis of the various muscular palsies.

In the case of medical students it is enough to demonstrate a case of diplopia and to call their attention to the significance of diplopia in medical diagnosis.

With so little time at his disposal I do not think the wise teacher will show his students a large number of the major eye operations, but a few typical operations should be shown in order to indicate to the students the scope and therapeutic result of operative treatment on the eye. Minor operations on the lids, tear passages, etc., will be of daily occurrence in the out-patient room, and with the technique of these the student should have the opportunity of becoming thoroughly familiar. A certain amount of systematic instruction must be given in order that the student may be able to piece together what he has learned from the cases demonstrated and so obtain a clear idea of the subject as a whole.

The programme of teaching so far indicated seems varied and somewhat lengthy, but, given plenty of material, the teacher should be able to overtake his subject in a single term with meetings three times a week, *i.e.* about twenty-seven meetings in all.

The size of class that can be efficiently dealt with when so much of the teaching is done by demonstration of actual cases will, in my opinion, be limited to forty at most.

So far I have not spoken of a part of the teaching quite as essential as that which I have been discussing. I refer to the training in the use of the ophthalmoscope. For this training the students attend tutorial classes in the evening in sections of eight to twelve. Each section meets six or seven times, but the number of meetings might with advantage be increased to eight or nine.

No part of the body affords so good a field for accurate clinical study as the fundus of the eye, and training in the use of the ophthalmoscope has, in my opinion, a very special educational value for the student apart from the help in diagnosis which it may afford him in his work as a practitioner.

In these tutorial classes the students also receive elementary lessons on errors of refraction and in the method of estimating and recording the amount of a patient's vision. The methods of taking and recording the field of vision are also demonstrated.

No attempt whatever should, in my opinion, be made to teach the students how to prescribe glasses, as this can only be learnt by long practice in an eye clinic.

This tutorial instruction should be made compulsory.

With regard to the special conditions prevailing in Edinburgh, there is no doubt that the teaching in the eye department would be improved if freer use were made of the help of the assistant surgeons. In the absence of the clinical tutors on war service, Dr. Traquair has been good enough to undertake the tutorial teaching, at great personal inconvenience. In normal times, when the number of medical students is much greater than at present, the assistant surgeon should certainly have a share in the teaching of the students, more especially in the demonstration of cases to the students in smaller groups.

3. With regard to the question of examination, I would be content if the students were made to realise that they cannot be granted a class certificate by the teacher unless they really have a satisfactory knowledge of diseases of the eye.

The present method of demanding 30 per cent. on a class examination paper seems to me to be something of a farce and a higher standard should be required. An adequate test of a student's knowledge would, I think, be best made by a written paper followed by a short oral examination.

NEW BOOK.

Hysterical Disorders of Warfare. By LEWIS R. YEALLAND, M.D. Pp. xii. + 252. London: Macmillan & Co. 1918. Price 7s. 6d. net.

WITH Boswellian frankness Dr. Yealland has laid bare his method of removing gross hysterical manifestations; and if the end of the treatment of these patients be to terminate the paralysis, tremor, contracture, or other obvious symptom, his success has been considerable. He has shown that the one thing necessary is unlimited self-confidence on the part of the physician, and that, granted this, it matters not what means are employed. This confidence he communicated to the patient through the medium of an electric battery and of a somewhat pompous method of speech, the details of which have been set out with a candour that is probably without parallel in medical literature. The result has been that every patient has been cured of his main symptom at one sitting. Almost nothing, however, is said about the subjective symptoms from which these patients suffer—the insomnia, headache, depression, etc.—except that the removal of the physical disabilities produced an improvement in the mental condition—a statement often made, but of more than doubtful truth. From the experience at other hospitals it seems clear that the cure of an hysterical symptom is not the same thing as the cure of the patient. Apart from this we cannot think that the methods described in this book are to be commended. Surely at this stage of knowledge of hysteria it is indefensible to push electrical treatment to the length of throwing the patient into convulsions or causing him to faint (pp. 135 and 200). The use, too, of the wire brush as an instrument of persuasion might well be dropped. That every hysterical disability can be removed at once without torture has been demonstrated at most neurological hospitals, and it almost seems that an official pronouncement on the subject might be given with advantage. Neither do we think it commendable that pomposity of speech, if necessary at all, should be employed deliberately to bamboozle the patient. "'Do you understand what I mean?' 'Yes, sir,' he said, 'I think I do'—apparently confused. He began to demonstrate to me that he understood. 'That is splendid,' I said; 'flex your right thigh—flex it; flex it.' He became confused at such an order." He did not, in short, understand at the time that he began to demonstrate that he did understand, and Dr. Yealland knew that he did not, and the whole incident was designed to show the patient how much inferior he was to Dr. Yealland intellectually. This is not psychotherapy. These patients are anxious to learn and can be taught much that will be useful to them in after life; but if this is the idea of psychotherapy that obtains at Queen Square it is small wonder that Colonel Farquhar Buzzard should write in a preface to this volume: "There seems no good evidence forthcoming to support the view that any therapeutic measures can alter the temperamental instability of these patients." Assuredly the methods, physical and psychical, pursued at this hospital in the treatment of hysterics are not likely to make them less unstable.

NEW EDITIONS.

Eye, Ear, Nose, and Throat: A Manual for Students and Practitioners. By H. C. Ballenger, M.D., and A. G. Wippern, M.D. Second Edition. Pp. vii. + 524. With 188 Engravings. Philadelphia and New York: Lea & Febiger. Price $3.50.

Our knowledge of the diseases of these organs has progressed so rapidly since the first edition of this book was issued that it has been found necessary to rewrite almost every chapter in this volume. Dr. Wippern, who is responsible for the section on the eye and its affections, treats his subject very methodically but in too technical a fashion for either students or practitioners. The different elements which compose the eye are taken *seriatim*, their anatomy described, and then the diseases affecting them gone into. It is curious that no mention is made of tobacco amblyopia, though this must be a fairly common condition in a race of smokers like the Americans.

The chapters on the ear, nose, and throat, from the pen of Dr. Ballenger, are written in an easy, pleasant style and more suited to the needs of students and practitioners. The book concludes with a series of prescriptions which the practitioner will find very useful.

Infection, Immunity, and Specific Therapy. By JOHN A. KOLMER, M.D., D.P.H., M.Sc., Assistant Professor of Experimental Pathology, University of Pennsylvania. Second Edition. Pp. xiii. + 978. With 143 Illustrations. Philadelphia and London: W. B. Saunders Co. 1917. Price 30s.

IN these days of serum and vaccine therapy the enormous amount of work which has been done on subjects relating to infection and immunity becomes of very practical interest. Dr. Kolmer has, we think, been exceptionally successful in providing the student and practitioner with an admirably clear exposition of the extremely complicated problems with which his book deals. After a very practical section on the laboratory methods required for immunological work, the great questions of infection and immunity are discussed in detail, and plenty of space is devoted to the consideration of vaccines, antitoxins, and the agglutinin, precipitin and complement-fixation reactions. The chapters on anaphylaxis strike us as particularly good, and here, as elsewhere in the volume, Dr. Kolmer moves easily among conflicting theories, preserving a judicial mind himself and leaving a clear idea of the subject in the mind of the reader. The section on specific therapy is also very well done, and the practitioner, who is most interested in the practical application to medicine of much of the scientific research work described in the volume, will find many useful hints regarding the employment and dosage of serum and vaccines, and also a chapter on chemotherapy chiefly devoted to salvarsan. The book ends with the syllabus of an interesting experimental course in infection and immunity, which will be found of value by teachers of the subject, and which is so arranged that it could be probably carried out by an industrious and conscientious student with very little help or supervision. A word of praise is due to the illustrations, all of which are appropriate and helpful. We consider that Dr. Kolmer's book cannot fail to be of great assistance to all laboratory workers, that it is worthy of the careful study of all practitioners interested in specific therapy, and that it is an absolutely necessary addition to the library of all fever hospitals.

Foods and their Adulteration. By HARVEY W. WILEY, M.D. Third Edition. Pp. xiv. + 644. London: J. & A. Churchill. 1917. 24s. net.

ALTHOUGH not intended specially for medical men, and in no way a guide to clinical dietetics, Dr. Wiley's book on *Food Adulteration* is full of interest. It is a very complete and exhaustive account of its subject, and, especially at the present time, when camouflage has extended from howitzers and sea-going ships to pastry, butter, and puddings, a great many useful hints can be gleaned from it by those who are incurious about food adulteration on the commercial scale. There are chapters on infants' and invalid foods and on vitamines which have a more strictly medical bearing than the rest of the volume, and the book as a whole will be found as trustworthy and complete an exposition of the subject of foods and their composition as any available.

A Text-Book of Obstetrics. By BARTON COOKE HIRST, M.D., Professor of Obstetrics in the University of Pennsylvania. Eighth Edition. Pp. 863. With 715 Illustrations. Philadelphia and London: W. B. Saunders Co. 1918. Cloth, 21s.

A WORK which has reached its eighth edition may be said to have so established its reputation as to require little recommendation. One notices that Simpson's forceps is "the best modern instrument for ordinary use," and yet it is the old form (without axis-traction rods) which is shown in the illustration. The use of the "binder" is distinctly advised, while early getting up after childbirth is a "passing fad which will soon be given up." Surely the author's teaching that perineal suture (where necessary) should not be performed till the end of the first week after delivery is undesirable. The advantages claimed for this procedure are outweighed by its drawbacks in ordinary class practice.

Diseases of Children. By GEORGE M. TUTTLE and PHELPS G. HURFORD. Third Edition. Pp. 599. With 50 Illustrations. Philadelphia and New York: Lea & Febiger. 1917. Price $3.50.

THIS volume is intended to be a manual for students and practitioners, and in their endeavours the authors have succeeded well. The book is compact and at the same time comprehensive. There is much advantage to be gained by including the acute infective fevers in a manual dealing with the medical diseases of children, but apart from such inclusion it is perhaps hardly necessary to introduce into the book so many conditions which are not peculiar in childhood, which would seem to be more properly discussed in a book on general medicine, and some of which are extremely rare in childhood. In the section dealing with the artificial feeding of infants we are glad to read:—"Simple Dilution of Whole Milk.—This is manifestly the simplest of all methods. More than that, it is perfectly satisfactory in the majority of healthy babies, and is coming gradually into greater favour all the time."

A Text-Book on Gonorrhœa and its Complications. By GEORGES LUYS. Second Edition. Translated and Edited by ARTHUR FOERSTER. Pp. xxi. + 386. With 204 Illustrations. London: Baillière, Tindall & Cox. 1917. Price 21s.

THE first edition of Dr. Georges Luys' *Traité de la Blennorrhagie* appeared in 1912, and was promptly translated into several other languages. The present volume represents the second revised English translation. As there has been no radical advance in the treatment of gonorrhœa in recent years, only minor alterations and additions have been made in the new edition.

Dr. Georges Luys rightly emphasises the importance of educating both the medical profession and the public in regard to the seriousness of gonorrhœa. Much physical and mental distress is undoubtedly due to chronic and latent infections, and it is incumbent on medical men to treat their cases more effectively than is often done at present, and to caution their patients against the risks of marrying before cure is complete.

The first chapters of the book deal with the history of gonorrhœa, and with the social and legal aspects of the disease. A full account of the gonococcus and of the other causal organisms of urethritis is given. The pathology, symptomatology, and diagnosis of urethritis are fully discussed, and special chapters are devoted to gonorrhœa in women and children. Dr. Luys is a great believer in the value of the urethroscope, both as a means of diagnosis and of treatment, and one of the most valuable chapters deals with the use of this instrument. Finally, the treatment of acute and of chronic gonorrhœa, and of its numerous complications, is exhaustively discussed. It is impossible in a short review to mention even a few of the many excellent methods of treatment which are recommended. It is sufficient to state that in this text-book we have the subject of gonorrhœa described by one of the first authorities of the day, and that there is no detail of diagnosis, or of treatment, which is not fully and satisfactorily explained. The value of the text is enhanced by numerous excellent illustrations.

Handbook of Operative Surgery. By WILLIAM IRELAND DE C. WHEELER. Third Edition. Pp. viii. + 364. With 226 Illustrations. London: Baillière, Tindall & Cox. 1918. Price 10s. 6d. net.

THIS book was originally written for students attending a course of operative surgery. Its scope has been extended in the present edition, and it should now prove useful to young surgeons, with limited experience, who have to operate either in civil or in military hospitals. Although almost a third of the volume is devoted to ligature of arteries and to amputations, the remaining chapters are wonderfully complete. By the conciseness and clearness of his descriptions the author has succeeded in giving a satisfactory introduction to operative surgery. The illustrations are numerous and are well designed to assist the reader in understanding the technique described in the text.

NOTES ON BOOKS.

Mr. Rutherford Morison has given us a most readable and useful account of the *Bipp Treatment of War Wounds* (Henry Frowde and Hodder & Stoughton) in one of the latest volumes of the Oxford War Primers. Those who have seen many wounds coming from France after treatment by this method do not require further evidence of its efficacy. Mr. Morison's *brochure* indicates how the use of the method may be extended to other than recent wounds, and gives clear and definite instructions as to its application. It should be carefully studied by all who have to deal with war wounds.

The *Medical Annual* for 1918 (John Wright & Sons) maintains the reputation of this publication as a reliable and complete summary of the recent progress made in all departments of medicine. The able staff of contributors has spared no pains to bring before the reader all that is of value in the current literature of the year. The editor's review of the year's work shows at a glance the trend of medical thought in all directions, and particularly how the war has influenced it in many ways. It is unnecessary for us to praise a work which has become indispensable to every practitioner who desires to keep abreast of the times.

The President — Joseph L. Goodale—in his thoughtful address calls attention to the frequency of lesions of the upper air-passages in the present war, on account of (1) the use of asphyxiating gases, (2) the rapid spread of inflammations of the nose and throat among the troops, and (3) the dampness, darkness, and want of ventilation of the dug-outs. In another portion of his address Goodale emphasises the importance of science in general education, and recommends that the natural sciences should be made an integral part of the educational course in all the great schools. He holds that the medical profession in America runs the risk of being outstripped unless it rests upon a secure foundation of scientific training.

The *Transactions* also contain interesting papers by Delavan and Watson on "Radium Treatment," by Ingals on "Intranasal Operations on the Frontal Sinus," by Loeb on "Infection Due to Incompletely Removed Tonsils," on "Accessory Nasal Sinusitis in Children" by

Coffin, and lastly on "Foci of Infection in the Nose and Throat" by Joseph B. Greene.

As usual, *The Transactions of the American Pædiatric Society*, of which vol. xxix. lies on our table, yields a harvest of interesting papers on the diseases of childhood. Papers on metabolism and physiology are this year rather fewer than is the rule, while those dealing with interesting and rare diseases preponderate.

BOOKS RECEIVED.

Barrett, J. W., and P. E. Deane. The Australian Army Medical Corps in Egypt (*H. K. Lewis & Co., Ltd.*) 12s. 6d.

Bruce, J. Mitchell, and W. J. Dilling. Materia Medica and Therapeutics. Eleventh Edition . . . . (*Cassell & Co., Ltd.*) 9s.

Chandhuri, Tarini Charan. Modern Chemistry and Chemical Industry of Starch and Cellulose . . . . (*Butterworth & Co. (India), Ltd.*) Rs. 3.12

Cobb, Ivo Geikie. The Organs of Internal Secretion. Second Edition (*Bailliere, Tindall & Cox*) 7s. 6d.

Hewer, Mrs. J. Langton. Our Baby: For Mothers and Nurses. Sixteenth Edition (*John Wright & Sons, Ltd.*) 2s. 6d.

Hirschfelder, Arthur Douglas. Diseases of the Heart and Aorta. Third Edition (*J. B. Lippincott Co.*) 30s.

Johnstone, R. W. A Text-Book of Midwifery. Second Edition . (*A. & C. Black*) 12s. 6d.

Lane, Sir W. Arbuthnot. The Operative Treatment of Chronic Intestinal Stasis. Fourth Edition . . . . (*Henry Frowde, Hodder & Stoughton*) 20s.

Loeb, Jacques. Forced Movements, Tropisms, and Animal Conduct (*J. B. Lippincott Co.*) dols. 2.50

Luff, Arthur P., and Hugh C. H. Candy. A Manual of Chemistry. Sixth Edition (*Cassell & Co.*) 12s.

Macdonald, R. St. J. Field Sanitation . . (*Henry Frowde, Hodder & Stoughton*) 6s.

Muir, Ernest. Kala-Azar: Its Diagnosis and Treatment (*Butterworth & Co. (India), Ltd.*) Rs. 2

Porter, Charles. The Future Citizen and his Mother . . (*Constable & Co., Ltd.*) 3s. 6d.

Report of the Scientific Work of the Surgical Staff of the Women's Hospital in the State of New York, 1918 . . . . —

St. Thomas' Hospital Reports. Vol. XLIV. . . . . (*J. & A. Churchill*) 8s. 6d.

Sdhryver, S. B. Biological Chemistry . . . . . (*Thomas Nelson & Sons, Ltd.*) 6s.

"Twilight Sleep" (Scopolamine-Morphine Narcosis). Report by a Special Committee (*Longmans, Green & Co.*) 3s.

Wallace, Cuthbert, and John Fraser. Surgery at a Casualty Clearing Station (*A. & C. Black*) 10s. 6d.

Wood, R. C. The Soldier's First Aid . . . . (*Macmillan & Co., Ltd.*) 2s. 6d.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

CASUALTIES.

DIED at Bagdad, on 7th December, Colonel HARRY GEORGE MELVILLE, C.I.E., I.M.S.

Colonel Melville was educated in Edinburgh, where he graduated M.B., C.M. in 1890. After acting as Demonstrator in Anatomy and as Resident Physician to the Royal Infirmary, Edinburgh, he entered the I.M.S. in 1892. Prior to the present war he had seen much service on the North-West Frontier of India. He received the C.I.E. on 26th August 1918.

DIED on service on 5th December, Captain JAMES DONALDSON, R.A.M.C.

Captain Donaldson took the degree of M.A. at the University of St. Andrews in 1899, and of M.B., Ch.B. at Edinburgh in 1903.

DIED of influenza on 6th December, Captain GEORGE ELPHINSTONE KEITH, R.A.M.C.

Captain Keith was educated at Edinburgh, where he graduated M.B., C.M. in 1887.

DIED on service on 2nd December, Captain DAVID PATON LINDSAY, R.A.M.C.

Captain Lindsay was educated at Edinburgh, where he graduated M.B., Ch.B. in 1912.

DIED of influenza in December 1918, Captain JOSEPH VINCENT DUFFY, R.A.M.C.

Captain Duffy was educated at Glasgow and took the Scottish Triple Qualification in 1914.

DIED on service on 14th December, Captain HENRY RUTHVEN LAWRENCE, M.C., S.A.M.C.

Captain Lawrence was educated at Edinburgh, where he graduated M.B., Ch.B. in 1908, and M.D. in 1910.

DIED on service on 14th November 1918, Captain J. JOHNSTON SINCLAIR, R.A.M.C.

Captain Sinclair graduated M.B., Ch.B. at Glasgow University in 1909.

DIED on service, Captain JOHN FORTUNE, R.A.M.C.

Captain Fortune was educated at the Universities of Edinburgh and Manchester, and graduated M.B., Ch.B.(Edin.) in 1903 and M.D.(Edin.) in 1907.

DIED on service in Palestine on 30th December 1918, Captain JOHN WILSON, R.A.M.C.

Captain Wilson, who was educated at Glasgow University, took the Scottish Triple Qualification in 1903.

Triple Qualification Passes.

AT the examinations of the Board of the Royal College of Physicians of Edinburgh, Royal College of Surgeons of Edinburgh, and Royal Faculty of Physicians and Surgeons of Glasgow, held at Edinburgh in January, the following candidates passed the *First Examination*:—James Kirkness and Joseph A. H. Sykes.

The following passed the *Second Examination*:—Adriaan V. Bergh.

The following passed the *Third Examination*:—Douglas C. Scotland, James F. Cook, L. S. Ahluwalia, Arthur H. Jacobs, Ronald MacKinnon, and Bernard M'Laughlin.

The following candidates, having passed the *Final Examination*, were admitted L.R.C.P.E., L.R.C.S.E., L.R.F.P.&S.G.:—Lazarus Samuels, England; William Francis Gawne, England; Lachman Singh Ahluwalia, India; Arthur Kinsey Towers, England; Victor Albert Rankin, Lamington; John Vaughan Griffith, Wigan; George Alexander Grandsoult, British Guiana; Quintin Stewart, Edinburgh; William Brownlee Watson, Edinburgh; Ben Cheifitz, South Africa; and Richard Irving Duggle, Liverpool.

FRACTURE OF THE CERVIX FEMORIS IN CHILDREN.

By DAVID M. GREIG, C.M., F.R.C.S.(Edin.).

AMONGST Sir John Bland-Sutton's "Spolia opima" in the *British Medical Journal* of 30th November 1918 he refers to two instances of intracapsular fracture of the neck of the femur in children. One was a specimen from the Middlesex Hospital museum, a femur of a young person of about 15 years of age, and the other a personal observation of his own in a boy of 12 years. Sir John concludes that paragraph by saying: "I doubt if five examples obtained from boys or girls exist in all the museums of the United Kingdom." His doubt is probably well founded, and this for two reasons. First, this fracture is not common in children, and second, it is not a fatal occurrence. Indeed it is to radiographic collections and not to museums, that one must look for even the existence of this fracture. Nor is it safe to estimate yet the relative frequency, for this fracture was not recognised before the introduction of X-rays. The possibility of fracture of the neck of the femur in children was not overlooked altogether by the older writers, but they were misled by the absence of crepitus, and where injury to the bone was admitted it seems to have been considered a separation at the epiphysis, if displacement took place. In this respect radiography has also altered our opinions to some extent in that in many cases where, clinically, a separation at an epiphysis is diagnosed, radiography shows that there is really a fracture close to the epiphyseal line.

Fracture of the femur is vastly more common in children than in adults, and this is a well-known fact. Out of 310 consecutive cases of fracture of the femur of which I have notes, 193 occurred in children below the age of 10 years and 34 between the ages of 10 and 20. All the other ages from 20 upwards only yielded 83 cases. But when fractures of the neck are considered the relative frequency is reversed. Three cases occur below the age of 20, none between 20 and 30, only one between 30 and 40, while over that age no less than 35 are fracture of the neck of the femur.

The three cases of fracture of the neck of the femur in children are as follows:—

CASE I.—A female child, æt. 5 years, was admitted to my care in the Dundee Royal Infirmary in 1910, having fallen from a stair a height of 12 ft. on the previous day. The child was unable to put her foot to the ground and complained of pain on manipulation. There was no crepitus. A radiogram showed an intracapsular fracture of the neck of the femur with no displacement.

Case II.—A male child, æt. 2 years, fell while climbing and complained of pain in the hip and inability to walk. He was kept in bed a month but freely handled and encouraged to try to stand. It was after that that I saw him and a radiogram showed fracture of the neck of the femur with some displacement upwards of the lateral portion of the neck. There was, of course, shortening.

Case III.—A girl, æt. 15 years, came under my observation last year, a fortnight after having fallen and hurt her left hip. She had slipped on a stair and fallen, but was able to rise again without assistance and walk home. She continued to walk carefully, with some pain and some lameness that evening and the following day, but since then had been in bed. She had pain in the joint, inability to fully extend, but no crepitus. Radiography showed an intracapsular fracture of the neck of the femur without any displacement.

The diagnosis must be confirmed by radiography or by dissection, for a mere contusion to the hip may very closely simulate fracture, as the following case shows:—

Case IV.—A boy, æt. 4 years, fell from an outhouse roof on to the ground. He was unable to rise. His mother picked him up and he complained of pain in the right knee, which was skinned, and he had a contusion of the forehead. He continued unable to walk during the three weeks which elapsed before I saw him. He had then inability to stand, inability to fully extend the thigh, pain at the hip, no displacement and no crepitus. I had him repeatedly radiographed but no fracture was found. Yet it was six weeks before the child was again able to run about. Since then he has had no complaints.

In my first and third cases the accident was recent and the salient symptoms were lameness and pain. In neither was there displacement at the hip nor eversion of the limb, and there was no crepitus. In my second case displacement had doubtless followed on account of the attempts to make the child bear its weight on the injured hip. The absence from children of those signs which are characteristic of fracture of the neck of the femur in adults must be accounted for by the physical differences between the periosteum of infancy and age, by the relative difference of the weight and size of the lower limb to the trunk in children as compared with adults, and by the ease with which a child can be moved and transported.

I am not sure that this is the whole story of fractures of the neck of the femur in children, for I have had two interesting cases of trouble in the hip during adult life which I think must be ascribed to an injury in childhood or adolescence. These I give in some detail:—

Case V.—A street porter, æt. 40, came under my observation first in 1910, complaining of pain in the left hip and lameness therefrom. He was of a healthy family and his personal history, apart from the hip condition, was unexceptionable. When 11 years old he was romping at a Sunday-school picnic and was running forward carrying a wicket when the point caught in the ground and he violently projected himself against the other end, which struck him in the region of the left hip, inflicting a slight abrasion and causing immediate and great pain. He remained lying on the ground until assisted home by others, as he was unable to put his left foot to the ground. A fortnight later he was admitted to hospital, where it was noted that he had pain and swelling about the joint but no dislocation and no shortening. Extension and a long splint were applied, and he was discharged a month later, the diagnosis entered on the case-sheet being "Synovitis, hip." That happened in 1881 and he maintains that he had full and free use of his left hip from then during many years. Gradually, however, some stiffness manifested itself, but it was not until 1907 that pain, added to increasing stiffness, interfered with his work. In 1909 he went into hospital where, after a month's residence, his case was labelled "Insular sclerosis." Later in the same year a surgeon diagnosed the condition as sciatica and stretched his sciatic nerve. Neither this nor previous electrical treatment produced any beneficial result. In the following year he was radiographed and told he had a tumour of the hip which would necessitate disarticulation. It was after that when I saw him. I did a cheilotomy, removing many osteophytic growths from the joint, giving him good movement and freedom from pain and enabling him to carry on his work as hotel porter during the four years that followed. Since then I have lost touch with the patient.

Case VI.—A domestic servant, 45 years of age, I saw in 1917. She complained of lameness in the left hip, which had been increasing during at least five years. Her personal history was good, and her family history no obvious bearing on her present condition. When about 18 years of age she was walking on the street when she "twisted her leg, or something caught her foot," but something gave a "click" in the left hip and she was immediately incapacitated from further movement. She did not fall, but stood balancing herself till a passer-by called a cab and helped her into it. She was put to bed and condition gradually passed off. It was supposed to be rheumatic. Her life thereafter was a quiet and, to a great extent, a sedentary one, and she was not aware of any inconvenience from her hip till some five years ago when her friends called her attention to how lame she was. When I saw her there was much fixation at the hip and some fulness, and a radiogram demonstrated many osteophytic growths. As in the previous case I did a cheilotomy, but the osteophytic growths did not lend themselves to removal, and the operation was of but limited and, I fear, temporary benefit.

In considering these two cases it is of course open to say that they were merely cases of monarticular osteo-arthritis, the first manifestation of what would one day become a generalised articular affection. But in how many osteo-arthritic cases is a definite traumatism found? I submit that it is a possibility that the osteo-arthritis was a reaction following a traumatism of a growing joint, and it is likely that that traumatism was a fracture.

NOTES ON RADIUM TREATMENT.

By DAWSON TURNER.

One of the conditions for which in recent years radium has been found consistently useful is that of exophthalmic goitre. The writer has now treated upwards of fifty cases with radium, and with one exception all of those patients derived more or less benefit. The exception was a woman of 22 years of age, who suffered from extreme nervousness, and who died, within a fortnight of the treatment, of hyperthyroidism and toxic phenomena. The benefit that patients with exophthalmic goitre derive from the expert application of radium is in their general condition and in their special symptoms. Thus they regain strength, lose the tired feeling and put on weight, and at the same time the tachycardia, tremor, and breathlessness are diminished and may disappear altogether. The thyroid gland becomes harder, denser, but usually does not diminish in size, and the exophthalmos is but little affected. It is well to warn patients of this, lest they suffer disappointment at the neck swelling remaining the same. Operative measures to reduce the size of the gland might now be considered, both because the vascularity is diminished, and because the patient is better able to stand an operation. The writer is in the habit of treating each lobe, and the isthmus of the thyroid, and the thymus. A dose of from 200 to 400 milligram hours, properly screened so as to avoid injury to the skin, may be given over each of these areas, and the patient may then be sent home for some three months, when more treatment may, if necessary, be given. As the skin over the front of the throat appears to be very sensitive to radium rays, great care should be taken to avoid over-exposing it. As compared with X-rays in the treatment of this condition, radium has the following advantages:—(1) Absolutely constant emission of rays and therefore exact dosage possible. (2) Far greater penetration of its rays, so that the deeper parts of the gland are reached. (3) No noisy, exciting apparatus, so that the treatment can be applied at the bedside without in any way disturbing the patient. The words *cito, tuto, et jucunde* can fairly be applied to the radium treatment of exophthalmic goitre.

Malignant Disease.

One can say generally that radium is of benefit in malignant disease—in suitable cases of great benefit, even to bringing about an apparent cure. It is sometimes objected by surgeons—"In what way is radium superior to a hot iron or to arsenic paste?" The answer is that these caustics only have effect locally on the actual tissues they are in contact with, and that they destroy impartially both healthy and diseased parts; further, they occasion great pain. It is quite otherwise with radium rays. Owing to their penetrative power they attack the deeper parts of the growth—the very roots of the disease, as well as the superficial (the gamma rays can be detected through the armour plating of a Dreadnought). In proper doses they have a selective action upon the diseased tissues. Lastly, they relieve pain instead of occasioning it. As to the variety of malignant disease most susceptible to radium, it is admitted that sarcomas are more easily dispersed than carcinomas, and of sarcomas, lymphosarcomas, in the writer's experience, are the most amenable. As to position, those on the surface of the body and those affecting the cervix are the most favourably situated. The buccal cavity, respiratory and digestive passages, and internal organs are unfavourable positions. An exception may perhaps be made in the case of accessible sarcomas of the nasal region. O. J. Stein (*Pract. Med. Ser.*, 1918, iii. 275) reports a case of a nasal sarcoma which entirely blocked the right nostril, and which was accompanied by pain and hæmorrhage. A dose of 6200 milligram hours of radium was followed by brilliant results. The pain and hæmorrhage ceased within a week, and the tumour quickly disappeared.

CASE I.—The writer treated a case of chondro-fibro-sarcoma in a boy, aged 6, for Dr. J. S. Fraser in May 1916. The disease affected the left maxillary antrum, causing protrusion of the cheek, diplopia, and proptosis. Dr. J. S. Fraser removed as much as was possible of the growth by scraping, but, fearing that he had not eradicated it, consulted with Mr. Dowden with a view to the removal of the left superior maxillary bone. Mr. Dowden, however, was of opinion that the case was more suitable for radium. Tubes of radium were introduced through an opening into the mouth, and a dose of 1440 milligram hours administered. The patient was examined eight months later on 3rd January 1917, and no trace of the disease could be detected. Two years and three months after the treatment, on 8th August 1918, the boy's mother wrote to say that he was quite well, that there was no sign of a tumour, or of blockage of the nose or swelling of the face.

But the dose must be a sufficient one for the particular case, as the following report shows:—

Case II.—Myeloma in a female of 23, recommended by Mr. Dowden. Two years ago patient complained of a gumboil on the right side of the superior maxillary bone. Her dentist found a growth present, and sent her to Mr. Dowden. The latter scraped out the cavity and the pathologist reported the growth to be a myeloma. As a prophylactic, a tube of radium was attached to a wire and passed up into the cavity, and a dose of 1920 milligram hours given. This was in October 1915. The patient remained well until June 1916, when a recurrence was detected. On 27th June Mr. Dowden again scraped out the cavity and inserted tubes of radium. A dose of 4400 milligram hours was now given, being more than double the previous dose. Precautions were also taken to maintain the radium in a more effective position. Very severe reaction followed, with swelling and pain, requiring the use of opiates, the tongue and mucous membrane of the cheek being burned. In December the patient was better, and there has been no recurrence during the last two years and four months. This patient is a nurse and she is able to work steadily at her profession. There can be little doubt but that the radium, when it was given in a sufficient dose, has so far preserved this patient's life.

In order that a malignant growth may be successfully treated by radium, the growth must be localised and accessible; further, the whole of the growth must be given a sufficient dose—the periphery as well as the centre. Now, in the majority of cases recommended for radium treatment these conditions are impossible of attainment, because the growth is a recurrence and is widespread. Take the cases of cervical cancer in which the broad ligaments are involved before the aid of radium is called in. The cervical part of the disease can be given a sufficient dose so as to cause its disappearance, but how can the outlying cancer cells be efficiently radiated? Further, as Dr. R. Knox states (*Radiotherapeutics*, p. 528), "The important point in all cases is, that to be successful in the treatment of any diseased condition by radium, the dose must be accurately estimated, and the maximum dose given at the first treatment. Many cases receive no benefit at all because the dose is either too strong or too weak. In either case most untoward results may follow." It is the writer's experience that the majority of more or less suitable cases of malignant disease treated by a radium expert get well (are temporarily cured), but in the course of time recurrences and metastases carry the patient off. These can be again subjected to treatment, but, as a rule, less successfully than the primary growth, and this for two chief reasons: the one that the recurrence is probably situated in a less accessible position, the other that after a course of raying only those cells survive which are refractory to the rays, and a recurrence consisting of such cells, or daughter cells, is less susceptible to attack. There is a tendency by natural selection to breed cells which are immune. As cases which remain well for more than three years after the primary treatment are relatively rare, I quote the following:—

Case III.—Recurrent sarcoma in a female of 49, recommended by Dr. Maclagan of Ayton. Duration, four years. Several operations for the removal of the growth were unsuccessful. Admitted by Mr. Miles, 15th July 1915. Now a large nodular mass projecting in the left suborbital region, so as to interfere with vision and adherent to the maxilla. Pathological report, large spindle-celled sarcoma. As Mr. Miles considered the tumour inoperable, radium treatment was recommended. By internal and external applications a dose of 5180 milligram hours was given. In November 1915 an external dose of 5180 milligram hours was given. During the applications the growth diminished markedly. In February 1916 the tumour had greatly shrunk and was movable; it had been fixed before. Patient better, stronger, and can see normally. The condition had so much improved that Mr. Miles removed what was left of the growth, and this was followed by a prophylactic dose of 4120 milligram hours. In November 1916 the growth had disappeared, and Mr. Miles could detect no sign of recurrence. In July 1918 the patient was examined by Dr. Maclagan and the writer, and found to be perfectly well and strong.

The following is a good case which has been under observation for two years:—

Case IV.—Parotid mixed-cell tumour, by pathological report, in a female, aged 34, recommended by Professor Caird. Two years ago a warty growth succeeded a mole on the left side of the face. This was removed by Dr. Reid of Inverness in January 1916. In March a recurrence, with stiffness of the jaw. In June Professor Caird removed this and a gland. In August the swelling reappeared. In September 1916 there were three swellings, the larger one, the size of a small egg, beneath the left ear, the smallest one on the left side of the face, a larger one higher up. Radium was now buried in each of these and a dose of 6125 milligram hours given. In two months' time the swellings had gone. In January 1917 Mr. Jardine wrote, "The condition is perfect." In June

1917 Dr. Gillies of Inverness wrote, "There is no trace of a recurrence. I should like Professor Caird to know, as he had said a year ago that he regarded the case as hopeless." On 17th October 1918 Dr. Gillies wrote, "Delighted to tell you the patient is, so far, quite free from any recurrence. She reports to me regularly. It has been a great success and I am quite sure she owes her life to the radium treatment."

Sometimes a growth will disappear rapidly and completely, even when only part of it has been efficiently radiated; the dissolution started in one part by radium rays spreads through the whole mass.

Case V.—*Sarcoma of the Sacrum.*—A male, aged 16 years, was admitted to Professor Alexis Thomson's wards in July 1917. He complained of pain and of difficulty in defæcation. On examination a large swelling was found to be projecting principally from the left side of the sacrum, but also involving the other side. The swelling was firmly adherent to the bone, which was hollowed out. *Per rectum* a projecting mass could be felt encroaching on the lumen of the passage. The duration of the disease was about four years. The growth was a sarcoma with a tendency to be hæmorrhagic. As it was inoperable, Professor Thomson suggested the employment of radium. Accordingly, on 6th July 1917, two tubes containing 30 milligrams of pure radium bromide were introduced through an ulcer into the growth, and at the same time external radium applications were begun. After a total dose of 12,240 milligram hours internally and 4100 externally the radium was withdrawn. Within a fortnight the growth was distinctly smaller, the patient felt better and had no pain. By 16th October 1917 the external swelling had gone, and the growth invading the bowel had diminished. In September 1918 he was re-examined by Professor Thomson, who could find no trace whatever of the tumour either externally or internally. The disease for the time being is cured. This patient died in Ward 32 of pneumonia following influenza on the 20th October 1918. No post-mortem obtained. As only portions of this large growth were efficiently radiated, the retrogressive process must have spread from these to the more distant parts.

Case VI.—*Recurrent Adenoma.*—A male, aged 27, suffering from this disease was recommended by Dr. Boyd Jamieson and Mr. Miles for radium treatment on 12th June 1916. History.—In December 1915 the patient injured his nose in a motor bicycle accident. This got well, but three months later a papule appeared at the site of the injury and grew fairly rapidly. Patient consulted Dr. Boyd Jamieson, who cauterised the papule. It recurred and Mr. Miles excised it on 5th April 1916. It started again from the wound and grew all around until there were five separate adenomatous nodules. On 30th May 1916 Mr. Miles again removed it, but within a week it reappeared, and during a space of four days visibly increased. When radium treatment was begun on 12th June 1916 there was a nodule the size of a nut and about the diameter of a shilling to the right of the healing wound. By external applications a dose of 3600 milligram hours of radium was given. There was a severe reaction, but the result was successful in completely checking the tumour, for there has been no recurrence during a period of more than two years. The patient was examined at the end of October 1918 and there was nothing to be seen except the cicatrix and a little telangiectasis.

Malignant disease of the cervix is favourably affected by radium rays, and localised epitheliomas and still more sarcomas can be confidently expected to disappear temporarily. Recurrence, after a longer or shorter interval, is, however, the rule, because of the difficulty of efficiently raying the more distant portions of the disease, and few cases are sent for radium treatment which are not in an advanced condition. Even in these cases, however, some improvement is observed both locally and generally. Pain is removed, discharges cease, ulceration heals, and the patient gains in general health, strength, and weight.

Many cases could be quoted to illustrate this temporary alleviation, but sometimes the improvement goes further and is more permanent, as in the following:—

CASE VII.—*Rapidly Growing Fungating Epithelioma.*—A patient, aged 63, was recommended on 16th October 1916 for radium treatment by Dr. John Orr and Dr. William Fordyce. She was suffering from a squamous epithelioma growing from vaginal roof behind and to left of cervix. There was a soft fungating gangrenous mass of the size of a Victoria plum in the above position. This was removed by operation in September 1916, and the base of it thoroughly scraped and pure carbolic acid applied. Pathological report, squamous epithelium showing marked necrosis. Ten days later the mass had grown again to half its previous size, the discharge was very fœtid, the same necrosis was present. The mass was again removed and a dose of 4900 milligram hours of radium applied. Two years later, in November 1918, Dr. John Orr reported that the patient appeared to be quite

Keloid in Cicatrix resulting from Excision of Tuberculous Glands (Case IX.).

well. She has not needed a doctor for the last eighteen months, she does all her work, and her only symptom is a slight discharge. As she considers that she is quite well, she refuses to come to the Royal Infirmary to see Dr. William Fordyce.

CASE VIII.—*Sarcoma of Cervix.*—A patient, aged 47, was recommended for radium treatment on 20th July 1916 by Dr. Barbour. Duration, one year. Complains of a bearing-down pain and some discharge. On 26th June 1916 the cervix, found to be ulcerated by Dr. Fordyce, was curetted. Pathological report, sarcoma. Dr. Barbour examined her on 20th July 1916 and found hard nodules all round the cervix except posteriorly. The right ligament was thickened. Body of uterus unaffected. Hysterectomy unsuitable. A dose of 4300 milligram hours of radium was administered. In two months' time the nodules had disappeared. In four months the parts seemed quite healthy; no discharge; patient much stronger. After a lapse of two years and four months, viz. in November 1918, the patient was examined by Dr. Barbour, whose report is as follows:—"The cervix is small, nearly flush with vaginal roof; firm, almost cartilaginous, but showing no evidence of return of sarcoma." Owing to the length of time that this patient has been free from recurrence, Professor Lorrain Smith kindly re-examined the microscopical specimen taken on 26th June 1916 and confirmed the diagnosis of sarcoma.

Keloid, Indolent Ulcers, Persistent Sinus, etc.—Radium radiations are of benefit in these and other lesions associated with local malnutrition and chronic sepsis (*vide* an article by Professor Cole in R. Knox's *Radiotherapeutics*, p. 563). The following case illustrates the value of radium in keloid:—

CASE IX.—A female, aged 18, was admitted by Professor Alexis Thomson in August 1917. Round the left semi-circumference of the neck of the patient there was a large keloid sticking out like a collar or ruff of Queen Elizabeth's period. The history was that when she was 7 years old some enlarged glands were removed from the left cervical region by Dr. J. MacLennan of Thurso. A year later Dr. MacLennan had to operate again to remove a keloid which had developed in the scar. Three years later Sir Harold Stiles operated on a recurrence. Four years later Mr. David Wallace, assisted by Mr. Henry Wade, removed another recurrence.

On being consulted by Professor A. Thomson as to the use of radium, it appeared to the writer that, as the growth was too large to be readily removed by radium alone, it would be better to remove it again by the knife, and then to treat the roots with radium. Accordingly, a few days after Professor Thomson had excised the mass, radium was applied externally. Further, to test the efficacy of radium in preventing a recurrence, only the posterior 3 ins. of the wound were treated, the anterior half being left alone. One month later a recurrence was observed in front, in the part untreated by radium, but the posterior half which had received radium treatment remained free. The recurrence was now given some radium exposures, which resulted in its disappearance. The total dose, well distributed over the position from which the keloid arose, was 4780 milligram hours screened by 2 mm. of silver.

In September 1918 Dr. John MacLennan, in reply to an inquiry, wrote, "I am glad to say the keloid has not given any further trouble, and it has remained quiescent, as when you discharged her from the hospital."

In December 1918 this patient was readmitted with a slight recurrence, consisting principally in a downward growth of two claw-like projections below the level of the original keloid. These are now receiving radium treatment.

Case X.—*Indolent X-Ray Ulcer.*—The writer suffered from an indolent X-ray ulcer on dorsum of the middle finger of the right hand. It had followed the breaking down of a warty mass, and had resisted treatment for six months. This ulcer was removed by one application of 20 milligram hours of radium made by Sir James Mackenzie Davidson, to whom the writer is much indebted.

SCOPOLAMINE-MORPHINE NARCOSIS OR TWILIGHT SLEEP.

By ROBERT WALLACE, M.B., Ch.B.

As the value of the induction of scopolamine-morphine narcosis in women in labour has been a good deal debated of late in the medical press, it may be of interest to give the results of observations recently made on 104 cases at the Maternity Hospital, Edinburgh.

The drugs were given in each case with a view to the production of a painless labour by inducing a peculiar light degree of narcosis, to which Gauss gave the name of twilight sleep. In this condition, when perfectly induced, there is both amnesia or loss of memory of present events, and analgesia or freedom from pain.

As the result of our observations we heartily endorse Gauss' claims as to the merits of twilight sleep. We found that in nearly every case the narcosis reduced the pain and shock of childbirth, and in 50 per cent. of cases entirely abolished both, as well as erasing from consciousness all memory of the lying-in process. Indeed, in many cases after delivery, instead of being exhausted in consequence of pain and shock, the mother seemed rather to have been stimulated and even exhilarated by the experience. The child itself is occasionally born in a state of twilight sleep, a condition sometimes so closely simulating white asphyxia as to create alarm in the inexperienced, but this condition soon passes off and usually requires no treatment whatever.

As a routine practice, before putting any patient under the influence of scopolamine-morphine, we first obtained her history and then made a thorough examination of her condition. We examined her heart, lungs, and kidneys, took her pelvic measurement, noted the presentation and position of the child, the state of the os, the condition of the fœtal heart, and finally registered the mother's pulse and temperature. We then put her under the best possible conditions for the induction of twilight sleep. She is given a quiet room free from all noises. The blinds are drawn down to avoid distractions and assist in producing a drowsy, restful state of mind, and her ears are plugged with cotton-wool to damp all unavoidable noises. She is put in charge of a competent nurse trained to give hypodermic injections and with instructions on no account to leave the patient unless relieved by another nurse. The bowels and bladder having been emptied and the pains having become regular and strong, she is now ready for the first injection. The first dose, which consists of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine, we give as early as possible in the first stage of labour consistent with the pains being regular and fairly strong. In a very short time she sinks into a state of light narcosis, from which she begins to emerge, as a rule, in about three-quarters of an hour.

The second dose is now given, which consists of $\frac{1}{450}$ gr. of scopolamine, and this dose is usually repeated hourly till the child is born.

In the majority of cases we found this dosage sufficient to keep her continuously in a condition of twilight sleep. In some cases, however, where the pains were very strong, we had to increase the dose to $\frac{1}{400}$ gr. or even to $\frac{1}{300}$ gr. of scopolamine in order to maintain the narcosis, and in a few very refractory cases we had to repeat the morphia more than once, as well as to administer several whiffs of chloroform in order to keep her under. And it is worthy of note that the more experience one has of the treatment, the better one is able to judge as to proper dosage in unusual cases, the more favourable the results obtained, and the greater one's confidence grows in the perfect safety and value of the narcosis.

And it is an undoubted fact that the mental attitude of both medical attendant and nurse have a specially powerful influence upon the patient when she is well under the influence of the narcotics, for in this condition she is evidently extraordinarily suggestible. To have perfect faith oneself in the efficacy of the treatment assists materially in promoting its success. And *vice versâ:* if the attendant nurse is weak, negative, and easily thrown off her balance, the patient invariably becomes restless and difficult to handle.

It is essential that the physician thoroughly understand the method, and that he be full of the faith and confidence born of knowledge and understanding. And it is equally essential that the nurse be thoroughly competent and able to handle the patient with firmness and confidence. It is a great mistake to imagine that because the patient is apparently in an unconscious state that she is unable to sense one's mental attitude. She is in reality much more amenable to mental influence in this condition than she is in normal consciousness; and, of course, patients vary very greatly in susceptibility to this influence. Personality is a very important and powerful factor in managing these cases, as, indeed, it is in the case of patients of all kinds. The operation of this factor in success explains why some men make a brilliant success of twilight sleep, while others make a miserable failure, although using the same drugs and dosage.

By giving small doses of scopolamine, repeated with sufficient frequency to keep her in that state of amnesia and analgesia to which the term twilight sleep is applied, one can keep the patient entirely oblivious to her surroundings. At the acme of her pains she may arouse herself and make a great outcry, but she relapses into the twilight as the pains subside.

A few of our patients were very restless, noisy, and obstreperous throughout the whole of the treatment, and yet, when questioned afterwards, they had no recollection whatever of anything that happened.

When the head is on the perineum she is especially liable to be noisy, but a little chloroform soon puts her under again. After delivery she usually falls into a deep sleep, lasting, on an average, from four to ten hours, from which she awakens refreshed and without the slightest sign of exhaustion.

The course of the puerperium is uniformly prosperous, for there is absence of exhaustion; the lactation is normal, the involution is satisfactory, and the recovery is more rapid than in the average case of natural delivery, because the course has been freed from shock and fear. In a small minority of cases, however, there exists an idiosyncrasy towards scopolamine, and in them the method fails. In such cases there is no amnesia, and instead of producing narcosis the drugs may cause excitement and even delirium. As soon as these indications arise the treatment should be immediately stopped.

In our early cases we followed rigidly the Freiburg technique, which necessitates very close watching and involves the use of the memory test as an indication for a further injection.

An essential requirement for the induction and maintenance of twilight sleep is that the patient be kept as quiet and undisturbed as possible. For this reason some obstetricians, who use the memory test, refrain from vaginal examinations during the treatment so as to avoid arousing the patient. They cannot, however, apply the memory test without arousing her. We, therefore, soon came to the conclusion that, on the whole, the application of the memory test was much more objectionable than frequent vaginal examinations, for the latter could be made without awakening the patient, whereas the former could not. Moreover, internal examination furnishes valuable information regarding the state of the membranes, the condition of the os, and the progress of labour—facts that cannot be obtained in any other way: whereas the memory test often gave no reliable information, for we found that a test object may be clearly recognised every time it is shown and yet there may be complete amnesia. And furthermore, it is sometimes difficult to extract anything intelligible from a mentally confused and drowsy patient. Therefore we soon discontinued the memory test, but did not hesitate to make vaginal examinations when deemed necessary.

Two labours were unduly prolonged owing to the membranes being so tough that they refused to rupture without interference. In one case the first stage of labour would have been shortened several hours had we made the necessary vaginal examination. Finally, we resorted to a routine method of hourly injections, as described in the foregoing pages, and made occasional vaginal examinations to ascertain the progress of labour.

This routine method of controlling patients under twilight sleep has been employed by Dr. Haultain at this hospital on previous occasions and with great success, and it was under his supervision that the present series were conducted. The results we obtained in the present series of observations were equally encouraging, striking examples of which are given in detail later.

This simplified technique allows twilight sleep to be carried out at home in the case of the better-class patients, and frees the obstetrician from the necessity of constant attendance, as a competent nurse trained to give injections can be left in charge, and the physician 'phoned for when complications arise or when the head is on the perineum.

But, unquestionably, ideal conditions can alone be provided at a properly staffed and appointed institution, where physicians are in constant attendance and the supervision is of the closest kind.

During the first quarter of the year 1918, at the Maternity Hospital, Edinburgh, we gave scopolamine-morphine to 104 patients, of whom 64 were primiparæ and 40 multiparæ. The results obtained in amnesia and analgesia are given in the following tables:—

	Primiparæ.	Multiparæ.
Complete amnesia	50 per cent.	$52\frac{1}{2}$ per cent.
Partial amnesia	39 ,,	40 ,,
No amnesia	11 ,,	$7\frac{1}{2}$,,
Complete analgesia . . .	59 ,,	$57\frac{1}{2}$,,
Partial analgesia	38 ,,	40 ,,
No analgesia	3 ,,	$2\frac{1}{2}$,,

The term amnesia is applied to that mental condition in which there is complete loss of memory of all events occurring after a certain injection and lasting until consciousness is regained after delivery. In this state the patient is utterly unconscious of the birth of her child. In many cases where the amnesia was incomplete, the outstanding impressions recollected were the strong pains experienced when the head was being born. This constituted an "island of memory," and if previous impressions had formed other "islands," the series constituted stepping-stones by which she mentally retraced what she fancied to be the whole course of her labour. On questioning her, however, one soon perceived that her mind had been in reality for the most part a blank while she was undergoing treatment.

It will be observed from the foregoing tables that only 11 per cent. among primiparæ and $7\frac{1}{2}$ per cent. among multiparæ remembered the whole course of their labour. Where the treatment was prolonged there was always some amnesia. The no-amnesia patients included those having few doses, and cases where treatment was begun late in the second stage. It was curious to observe that in some cases where there was great outcry and apparently great suffering there was nevertheless complete amnesia. One very uproarious patient stated afterwards that she had a sort of dazed recollection of having had a nightmare. Only 3 per cent. of primiparæ and $2\frac{1}{2}$ per cent. of multiparæ had no analgesia. Even in those cases where there was no amnesia, most of them admit that the injections diminished the pain. In two cases, where the whole course of labour was clearly remembered, there was no pain whatever. Notwithstanding that many patients came into hospital too far advanced in the second stage to derive much benefit from the treatment, about 97 per cent. of all cases treated derived some benefit, which is certainly a remarkable result.

We shall now consider the working and effects of the narcosis more in detail.

Effects on the Labour.—Pains that are irregular are rendered steady and regular by the narcotic. In some cases, however, where the labour seemed to have been arrested, we found that the contractions were going on all the time, but gently and imperceptibly, so that an external os dilated one finger would in the course of a few hours be found fully dilated. Often the lessening of the contractions is more apparent than real, for they are so painless they go on unobserved.

In the first stage the narcotic tends to steady and prolong the period of contraction, but it affects the length of this part of the labour very little.

In the second stage labour is prolonged, especially in primiparæ, mainly due to the lack of voluntary expulsive effort, but also in a measure to the slowing of the uterine contractions. The resultant easy and gradual dilatation of the maternal passages has the following advantages:—

It diminishes shock, it lessens the risk of perineal lacerations, and it gives ample time for head moulding.

Twilight sleep increases the percentage of forceps cases. In this series of observations it was 24 per cent. Some cases were accounted for by persistent occipito-posteriors, and others by varying degrees of pelvic contraction. In two cases forceps was put on because the patients were so noisy and obstreperous during pains that we gave chloroform and delivered, although the head was making fair progress. Some of our forceps cases would very likely have delivered spontaneously had we given them sufficient time, but in the latter half of this series we usually interfered instrumentally if progress was slow as the head approached the perineum and the external parts were sufficiently dilated to allow the easy application of forceps.

We have had healthy, vigorous children of normal weight—one of 6 lbs. 12 ozs.—delivered through a pelvis of conjugata vera $3\frac{1}{2}$ ins. and with contraction throughout, by giving plenty of time for dilatation of the passages and head moulding.

It has been urged as an objection to twilight sleep that it greatly increases the number of forceps cases; but when the passages are fully dilated and the head is down on the perineum, where is the objection to applying forceps? With proper care as to delivering the head between pains, removing the forceps before the head is completely freed, and pressing it out gently from behind the anus, perineal tears can, in most cases, be avoided. Thus the labour may be terminated sooner than otherwise, and the doctor and nurse liberated for other patients. An experienced obstetrician can apply low forceps without the slightest danger to mother or child.

The third stage was very little affected. The placentas in about half the cases were spontaneously expelled within an hour. Two were adherent and had to be removed manually. The rest were expressed from the vagina.

The Puerperium.—The condition of the great majority of the patients after delivery was good. The period of recovery was shorter than is the case with women who have gone through labour in the ordinary way. Lactation was not interfered with. Involution was normal, and there was a general feeling of well-being that was very encouraging. The following cases, however, were exceptions to the general rule of restfulness and uninterrupted recovery in the puerperium.

1. An elderly primipara, æt. 35, who was admitted with hyperemesis gravidarum and bronchitis. Nine injections were given, which much diminished the vomiting. She gave birth to a seven months', very evil-smelling, macerated fœtus. There was a good deal of post-partum hæmorrhage and collapse. She died of broncho-pneumonia within a fortnight.

2. An elderly primipara, æt. 35, justo minor. Breech case. Thirty injections. Child delivered dead and slightly macerated.

3. Full-time primipara, æt. 24. Came in with eclampsia. Three fits before admission. Os size of half a crown. Two injections. As fits continued and os fully dilated, we delivered with forceps. Recovered slowly after delivery of child. Well in four weeks.

4. Multipara, æt. 27. Second pregnancy. Conjugata vera less than 3½ ins. Forty-one injections. Dr. Lackie delivered her by pubiotomy. Died in a few days of tuberculous broncho-pneumonia. Suffered from phthisis from childhood, and was not expected to live to maturity. Father, sister, and two uncles died of phthisis.

5 and 6. Two other cases developed puerperal fever, but ultimately made a good recovery, and were discharged quite well.

In our opinion scopolamine-morphine narcosis cannot be held accountable for the unsatisfactory puerperal condition of the foregoing patients.

Our experience goes to show that, after long and trying labours, patients who undergo treatment make a quicker recovery than those who have been delivered without it. Most of our patients we allowed up for an hour on the third day of the puerperium. We believe that this early rising improves the circulation, promotes involution, and tends to prevent the possibility of retroversion of the uterus. We noted the blood-pressure before rising and again in the evening of the same day, and it was common to find that it had increased 3 or 4 mm. of mercury. Our twilight patients for the most part availed themselves with alacrity of the privilege of early rising. It seemed to aid in banishing the delusion that the lying-in process was a pathological one, and that the puerperal condition, being one of disease, needed to be handled with great caution.

The Use of Chloroform.—Some twilight patients are so well under control they can easily be delivered without the aid of a general anæsthetic. In other cases, when the head is on the perineum, the pains often become so strong that patients come out of narcosis and an island of memory is formed. In all such cases it is better to give chloroform, as from such isolated memories the mind automatically tends to build up a fanciful picture of the whole course of labour, and such patients will afterwards declare the treatment gave them no relief whatever. Giving chloroform when the head is being born will prevent the patient forming an island of memory and aid in producing complete amnesia in many cases that would otherwise be only partial. It also aids in preventing perineal tears by relaxing the parts during expulsion.

The use of chloroform at any stage is a great aid in keeping the patient under, and in quietening her when very restless. Pregnant women take chloroform very well, and only a small amount is required to keep her in the twilight condition when she is taking scopolamine-morphine. In restless and delirious cases chloroform is invaluable. One physician uses scopolamine-morphine in the first stage only, and controls the second stage entirely with chloroform, giving the patient a whiff as often as may be necessary. With this liberal use of chloroform he claims to get very good results.

Effects on the Child.—Out of 104 labours conducted under scopolamine-morphine narcosis, 98 living children were delivered and 7 were dead. The following is a detailed list of the dead children:—

We had only one case of twins in this series of twilight cases. The first of the twins was delivered dead and slightly macerated. Three patients gave birth to very macerated fœtuses, one from a case of hyperemesis, a second from an eclamptic. One was a breech case in a primipara, æt. 35. One was from an induced labour lasting four days in a woman eight months gone. One was a hydrocephalus whose head had to be punctured before delivery was possible. There is no evidence that any of these deaths was due to twilight sleep.

Out of ninety-eight children born alive, twenty-two were in a state of oligopnœa. In this condition the child gives a single gasp or a cry at the moment of birth and then makes no further attempt at breathing. It is very limp, and the condition closely resembles that of blue asphyxia. It is a transient condition, however, and usually passes off in about twenty minutes.

Oligopnœa is likely to occasion anxiety to the inexperienced, and death may be caused by too energetic treatment. The child is simply in a state of twilight sleep like the mother, and will shortly recover. We observed nothing unusual in the subsequent history of these children up to the time of discharge from hospital.

Effects on Sleep.—Nearly all the patients slept after the labour was over and recovered consciousness in from four to ten hours, for the most part feeling refreshed. Three patients felt somewhat dazed during the whole of the next day and unusually drowsy for several days thereafter.

One woman, a weak negative character, was in a hazy mental condition and the victim of hallucinations of sight and sound for six days after delivery. She dozed at intervals but had no continuous refreshing sleep. Bromidia induced regular sleep and thus cured her condition. Particulars of her case are given later.

The majority of cases were in twilight sleep in the interval between pains. Fifteen were asleep the whole time, remaining apparently in complete unconsciousness even during contractions. Ten remained awake during all the treatment; some of these, however, had only two or three doses, having arrived too far advanced in labour to be put under a proper course of twilight sleep.

Four common clinical features of the narcosis are thirst, flushing of the face, mental confusion, and restlessness. Thirst was present in nearly all our cases. Often the restlessness of the patient drew our attention to the dry and parched condition of the lips, and when water was offered it was taken greedily and the restlessness disappeared. When the narcosis lasts longer than six or eight hours most patients need catheterising. It is to be remembered that a full bladder will impede the progress of labour.

Mental confusion was present in the majority of cases. In a few cases where the treatment was prolonged the patient rambled disconnectedly the whole time. A few had hallucinations of sight or sound, or both. This mental derangement passed away during the after-labour sleep in all cases except two. In one case it persisted for a day; in the second case for six days after the birth of the child.

Restlessness.—Marked restlessness occurred in 14 cases out of the 104 that had the treatment. In some it was continuous throughout, with periods of exacerbation at the acme of a pain. Two cases became almost maniacal at the height of their pains.

Both were multiparæ: one with a conjugata vera of $3\frac{1}{2}$ ins., with strong pains and slow advance and controlled by four whiffs of chloroform at different times. (See Case VIII., p. 98.) The second had roomy passages but the membranes were tough; seventeen injections—the last two doses we increased to $\frac{1}{300}$ gr. scopolamine—and, finding it made her still more unmanageable, we made a vaginal examination and found the os fully dilated, the head nearly down on the perineum and the membranes unruptured. We ruptured the membranes, put on forceps, and delivered her in five minutes. She made a good recovery in the puerperium. After this case we no longer hesitated to make vaginal examinations when necessary. In three cases the restlessness took the form of the patient trying to get out of bed. These were easily controlled by being ordered firmly to lie down. As we have already said, most twilight patients are very suggestible. In two cases, increasing the dose from $\frac{1}{450}$ gr. scopolamine to $\frac{1}{300}$ gr. scopolamine increased the restlessness. All cases of restlessness were easily brought under control with chloroform. The following is an abstract of instructive cases:—

Case I.—*Three Doses of Morphia.*—Multipara, æt. 30. Third pregnancy, abdomen very pendulous, pelvis roomy, pains very strong. Abdominal binder put on. Seven injections; first, sixth, and seventh of $\frac{1}{4}$ gr. morphia and $\frac{1}{450}$ gr. scopolamine. Very noisy. Child born an hour after last dose. Cried vigorously as soon as born and thrived well afterwards. Chloroform was not given as the head was coming through, as she appeared to be well under the influence of morphia. Only partial amnesia, as she remembered the birth of the child. Both mother and child were quite well the next day. A whiff of chloroform when the head was on the perineum would have produced complete amnesia.

Some obstetricians assert that the child will be born in a condition of oligopnœa if morphia is given within three hours of birth. This is not our experience.

Case II.—*Two Doses of Morphia. Labour could have been much shortened if a Vaginal Examination had been made earlier.*—Primipara, æt. 28. Pains very strong. Forty-one injections. First injection $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine. Last thirteen injections of $\frac{1}{400}$ gr. scopolamine, as she began to make an outcry. Twenty-seventh injection of $\frac{1}{6}$ gr. morphia and $\frac{1}{400}$ gr. scopolamine. This quietened her somewhat, but she continued to be restless and talked nonsense continuously. As she was making very slow progress, after the thirty-eighth injection a vaginal examination was made and the membranes were found unruptured and very tough. Ruptured them with a stylet. Child was born within four hours. Cried vigorously as soon as born. Gave chloroform when the head was emerging. Complete amnesia and analgesia. Mother and child both well the next day.

CASE III.—*Two Doses of Morphia. Did not give Chloroform on Delivery.*—Multipara, æt. 37. Second pregnancy. Strong pains. Restless and noisy. Eleven injections. First dose of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ scopolamine; sixth dose $\frac{1}{4}$ gr. morphia and $\frac{1}{450}$ gr. scopolamine. The rest $= \frac{1}{450}$ gr. scopolamine. Pains became very strong towards the end and the child was delivered so rapidly that there was not time to give chloroform. Child cried as soon as born. Partial amnesia and analgesia. She remembered the birth of the child. Mother and child both well the next day.

CASE IV.—*Contracted Pelvis. Two Doses of Morphia; Four Whiffs of Chloroform.*—Primipara, æt. 20. Conjugata vera $3\frac{1}{2}$ ins. Very strong pains. Thirteen injections. First dose $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine; ninth dose $\frac{1}{4}$ gr. morphia and $\frac{1}{300}$ gr. scopolamine; last four doses were $\frac{1}{300}$ gr. scopolamine. Slept between pains but made a great outcry at the acme of pains. Quietened her four times with chloroform. Child born in a state of oligopnœa. No tear of perineum. Child breathing normally in twenty minutes without any special treatment. Complete amnesia and analgesia. Mother and child both well the next day.

CASE V.—*Contracted Pelvis. Two Doses of Morphia; Three Whiffs of Chloroform. Her Doctor sent her in for Cæsarean.*—Primipara, æt. 19. Conjugata vera less than $3\frac{1}{2}$ ins. Eleven injections. As she was very noisy during the first three hours we gave her three whiffs of chloroform. The head was bobbing at the brim during the first six doses. Before giving the seventh dose a vaginal examination was made and the os was found fully dilated. We ruptured the membranes and gave $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine. After this she gave no further trouble. The head gradually moulded; the external parts, which were unusually small, dilated, and the child was delivered spontaneously without any tear of the perineum. Great moulding of the head. The mother was not given chloroform as the head emerged. The head was kept on the perineum for nearly two hours to insure full dilatation of the parts. Child born in oligopnœa; normal breathing in thirty minutes without treatment. Complete amnesia and analgesia. Mother and child both well the next day.

CASE VI.—*Contracted Pelvis. Two Doses of Morphia. Thirty-three Injections.*—Primipara, æt. 27. Justo-minor between $3\frac{1}{2}$ ins. and $3\frac{3}{4}$ ins. Thirty-three injections. Second dose of morphia about three hours before birth. After the head was two hours on the perineum, forceps was applied and child delivered. Mother slept a good deal during treatment. When awake she incessantly talked nonsense. Much moulding. Child in oligopnœa. Breathed normally in twenty minutes. Complete amnesia and analgesia. Mother drowsy the next day. Child quite well.

CASE VII.—*Inevitable Abortion of Four Months. Two Doses of Morphia.*—A good deal of bleeding during the night before admission; packed cervix and vagina and gave twelve injections. First and fifth doses of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine. Removed packing in twelve hours and found embryo on top of it. She was curetted without being aroused. Complete amnesia and analgesia. Felt rested the next day. Left hospital in a fortnight quite well.

CASE VIII.—*Maniacal at Height of Pains. Difficult to Control. Four Whiffs of Chloroform.*—Multipara, æt. 33. Third pregnancy. Conjugata vera $3\frac{1}{2}$ ins. The first pregnancy was a three-months' abortion. The second pregnancy was a six-months' abortion. External parts very small. Fifteen injections; the first of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine, the following eight doses of $\frac{1}{450}$ gr. scopolamine. She made such an outcry we gave her four whiffs of chloroform and made the last six doses $\frac{1}{300}$ gr. scopolamine. Baby cried as soon as born. Great moulding. Complete amnesia and analgesia. Mother and child quite well the next day. It is doubtful if this child of 6 lbs. 14 ozs. could have been born spontaneously alive and well and without a tear of the perineum, through such a small pelvis, without the aid of twilight sleep.

CASE IX.—*Sent in for Pubiotomy. Conjugata vera less than $3\frac{1}{2}$ ins. Very Small Woman. Two Doses Morphia; Four Whiffs Chloroform.*—Multipara, æt. 31. Second pregnancy. First pregnancy a craniotomy. Thirty-two injections. Two doses of morphia; first and twenty-third dose. Twenty-two doses of $\frac{1}{450}$ gr. scopolamine; nine doses of $\frac{1}{300}$ gr. scopolamine. Chloroform four times. Pains very strong. Much outcry and restlessness. Head thirteen hours in engaging. Great moulding. Delivered spontaneously under chloroform. Child in oligopnœa. Normal breathing in thirty minutes. Mother and child quite well the next day. She said she never felt better in her life.

CASE X.—*Conjugata Vera $3\frac{1}{2}$ ins. Two Doses Morphia; Four Doses Chloroform.*—Multipara, æt. 21. Third pregnancy. First pregnancy still-born. Second pregnancy, forceps; lived ten days. Six injections; first and fifth doses of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine. Very restless and noisy. Kept her under with four whiffs of chloroform and two doses of morphia. Child born spontaneously while mother under chloroform. Complete amnesia and analgesia. Mother and child both well the next day. The last dose of morphia was given less than two hours before the birth of the child.

CASE XI.—*Conjugata Vera $3\frac{1}{2}$ ins. Full Breech. Two Doses Morphia; Four Whiffs of Chloroform.*—Primipara, æt. 30. Breech presenting and half-way down cavity. Labour going on twenty-four hours before admission. Sent into hospital by her doctor. Sixteen injections; first and sixth doses of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine; four doses of $\frac{1}{450}$ gr. scopolamine; six doses of $\frac{1}{300}$ gr. scopolamine. Very restless and much outcry. Kept her under with aid of four whiffs of chloroform. Full breech impacted on perineum. After an hour's vigorous manipulation delivered a dead child of 7 lbs. 5 ozs. Mother next day said she felt well, but tired. Partial amnesia and analgesia.

CASE XII.—*Mental Confusion lasting for a Week after Delivery.*—Multipara, æt. 34. Second pregnancy. First child, æt. 8, alive and well. Twenty-six injections. In a dozing condition the whole of the time. No evidence whatever of pain. Child born spontaneously without a tear of the perineum. Very vigorous child. Cried as soon as born. The mother persisted in a state of mental confusion, with hallucinations of sight and sound, for six days after delivery. Fell into a light doze occasionally but no proper sleep. Under treatment with bromidia she gradually recovered her mental balance and was quite normal again at the end of a week. Mother and child left the hospital quite well a week later.

CASE XIII.—*Conjugata Vera $3\frac{1}{4}$ ins. Pubiotomy Case.*—Multipara, æt. 33. Sixth pregnancy. Three boys craniotomied; two girls delivered dead with forceps. With the aid of twilight sleep and pubiotomy she now delivers a living child. Twenty-three injections. Head bobbed at the brim for twelve hours before engaging. Fœtal heart regular and normal. Head impacted half-way down cavity. Dr. James Lackie did a pubiotomy and in less than five minutes delivered a healthy, vigorous child. Weight 8 lbs. Mother made a splendid recovery. Next day she said she felt a little sore about the pelvis but otherwise felt quite well. Mother and child left the hospital in excellent condition.

CASE XIV.—*Complete Amnesia and Analgesia with Four Doses.*—Primipara, æt. 20. Four injections. First dose put her to sleep. Unconscious all the time. Child cried as soon as born. Mother and child quite well the next day.

The Number of Doses.—The number of doses given to each patient in the present series of observations range from a single one up to forty-one doses.

That a large number of injections can be given without injury to either mother or child is evident from a careful study of the cases cited above. Case II., given on page 96, had forty-one injections. There was complete amnesia and analgesia. Both mother and child were well the next day and were discharged from hospital in excellent condition. A difficult primiparous breech case had twenty-five injections. The child cried vigorously as soon as born, and mother and child were both quite well the next day. Case IX., given on page 98, had thirty-two injections. Both mother and child were quite well the next day. The mother said she never felt better in her life.

In the pubiotomy case, sketched on page 99, twenty-three injections were given. The child cried as soon as delivered. The mother's recovery was most satisfactory. Both parent and infant left hospital in perfect health.

The number of doses given has no direct relation to the degree of amnesia and analgesia attained. One case was in complete amnesia and analgesia from the first dose, the total number of doses being only four.

Only three patients out of 104 cases treated had a single dose. Twelve patients had two doses; twelve patients had four doses, and nine had six doses. Those having only one, two, or three doses reached hospital too far advanced in labour to derive full benefit from twilight treatment.

Hereunder is a complete statement in tabular form of the number of doses given to each patient:—

Number of Doses.	Number of Patients.
1	3
2	12
3	7
4	12
5	6
6	9
7	6
8	3
9	5
10	1
11	4
12	4
13	1
14	3
15	4
16	3
Carry forward	83

Number of Doses.	Number of Patients.
Brought forward	83
17	4
18	3
19	2
23	3
25	2
26	2
32	1
33	1
37	1
41	2
Total	104

Routine Treatment Carried Out in the Foregoing Series of Cases.

1. The patient was thoroughly examined before beginning the treatment. The state of the passages was determined and the pelvic measurements taken. Bladder and bowels were emptied, and pulse and temperature recorded.

2. She was put into a quiet, darkened room and all visitors were excluded.

3. The injections were begun as early as possible in the first stage consistent with the pains being regular and strong. The first dose consists of $\frac{1}{4}$ gr. morphia and $\frac{1}{150}$ gr. scopolamine. The second injection of $\frac{1}{450}$ gr. scopolamine was given three-quarters of an hour later. Subsequent injections of $\frac{1}{450}$ gr. scopolamine were repeated hourly until the child was born.

4. We found that morphia can be safely repeated at intervals of a few hours if the patient is difficult to keep under.

5. An occasional whiff of chloroform is very helpful in controlling restless patients. We always gave chloroform when the head was being born, if the pains were strong.

6. Water was given when the patient was thirsty, and she was catheterised when necessary. The condition of the lips is a good index of the need for water.

7. We unhesitatingly put on forceps if the head was well down and the parts well dilated.

8. The baby was removed as soon as born to prevent its cries arousing the mother and thus creating an "island of memory."

9. A child born in a state of oligopnœa must not be forcibly treated. We simply cleared the respiratory passages and kept it warm. In some cases we did a little very gentle artificial respiration.

10. As the patient needs to be constantly watched we kept a competent nurse in constant attendance.

11. It is very important to get a reliable and constant preparation of scopolamine and morphine. The doses are made up in tablet form which dissolves very rapidly without residue.

The varying results of different observers are due to four factors:—

(i) The varying composition of the narcotics used.

(ii) Differences in dosage.

(iii) Personal idiosyncrasy to the drug.

(iv) The personality of the physician and attendants. The patient must be encouraged to have perfect faith in the treatment.

Conclusions.

Scopolamine-morphine narcosis is a great boon to the lying-in woman. It is a perfectly safe and efficient means of managing labour when intelligently used.

It is of special value in primiparæ, in whom, as a rule, the first and second stages are long and painful; and in a prolonged second stage due to a large head or contracted pelvis, as it allows head moulding and dilatation of the maternal parts to proceed easily and gradually, without exhausting the patient. From the work that has already been done in perfecting this anæsthesia, there is not the shadow of a doubt that the treatment has come to stay, and that it will be an unqualified blessing to the motherhood of the future.

And there are obstetricians even now who would as soon consider performing a surgical operation without an anæsthetic as conducting a primiparous labour without scopolamine-morphine narcosis.

The only contra-indication to the use of twilight sleep is personal idiosyncrasy. Idiosyncrasy occurs in a small percentage of cases where scopolamine acts as an excitant rather than a sedative.

Absence of exhaustion after difficult and prolonged labours is one of its greatest advantages.

As now, more than ever, the importance of motherhood is being realised by the State, twilight homes should be established all over the country where lying-in women could have the best and closest attention.

CLINICAL RECORD.

CARCINOMA OF THE LIVER ASSOCIATED WITH INFECTION BY CLONORCHIS SINENSIS.

By H. L. WATSON-WEMYSS, M.D., F.R.C.P.(Edin.),
Captain, R.A.M.C.

I RECENTLY had the opportunity of examining, post-mortem, a case which, on account of its interest and rarity, seems worthy of record. I have to thank Dr. V. Mifsud, who was in medical charge of the patient, for kindly placing the notes of the case at my disposal.

The patient was a Chinese, a French colonial soldier, and was admitted to hospital on the 21st July 1918. His age was probably about 50. No history was obtainable owing to the impossibility of communicating with him. He was extremely emaciated and complained of pain in the limbs and chest. He lay in bed with his legs drawn up. His temperature was irregular and frequently reached 100° F., while the pulse-rate was usually about 120. Severe constipation alternated with bouts of diarrhœa. The liver was slightly enlarged in both an upward and downward direction and was tender to the touch.

There were a few crepitations at the right base. The stools were examined on two occasions by Lieutenant Bentham, protozoologist to the command, and were found to contain the ova of clonorchis sinensis in enormous number. No other parasite was found. The patient gradually became weaker and more cachectic, and died on the 20th August.

At the autopsy the heart and lungs were found to be free from disease. There was a little excess of fluid in the pericardium. The gall-bladder was greatly distended with bile, in which large numbers of flukes were present. The liver was enlarged and firm and showed numerous white patches on its surface. It was firmly adherent to the diaphragm. On the upper surface of the right lobe there was a tumour the size of a small Tangerine orange, white in colour and densely hard. A small quantity of pus had formed between it and the diaphragm, which doubtless caused the physical signs noted during life. Section of the liver at almost any point resulted in the flukes escaping in numbers from the cut surfaces. The presence of the worms in the pancreas could be demonstrated in the same ways. Numerous hard glands were found in the abdomen, chiefly around the head of the pancreas. The tumour of the liver itself proved on examination to be a carcinoma.

During the last eighteen months, infections by many different worms have been noted in this hospital, but the case under consideration was only the second in which clonorchis sinensis had been found. The other case also occurred in a Chinese. Clonorchis sinensis is common in China, Japan, and certain parts of India, and, with the exception of schistosomum hæmatobium, may be said to be the most important trematode infecting man. The literature of the subject is at present inaccessible to me, but, according to text-book descriptions, infection by clonorchis sinensis is a frequent cause of death in the localities where it is prevalent. The main interest of this case lies in the presence of a carcinomatous tumour in the liver, induced, it can hardly be doubted, by the irritating presence of the worms. Braun [1] refers to a paper by Askanazy [2] on the relationship of carcinoma of the liver to infection by opisthorchis felineus, a similar but slightly smaller trematode. Apart from the actual carcinomatous growth, sections of the liver tissue showed, when cut and stained, large numbers of ova, and otherwise very exactly reproduced the picture which Brumpt [3] gives in the following words:—

"Les canaux biliaires présentent comme altération constante, un épaisissement scléreux de leurs parois; cette sclérose ne fait jamais défaut. . . . Le plus souvent l'épithélium biliaire irrité mécaniquement par le ver ou par ses toxines réagit en proliférant d'une façon intense; le canal qui l'enserre l'oblige à se plisser et finalement nous avons un manchon adénomateux visible à l'œil nu sur la coupe. En général ces tumeurs restent limitées par la basale du canal biliaire.

"Dans certain cas [this was the case in the present instance] la basale est rompue, les productions adénomateuses diffusent dans la parenchyme, la cavité de ces tubes disparaît et nous avons des canaux épithéliaux constituant une tumeur maligne nettement déterminée par l'irritation parasitaire."

My best thanks are due to Lieutenant Bentham, without whose assistance this short record of the case would have been impossible.

I have also to thank Colonel Price, C.M.G., A.M.S., Officer Commanding Military Hospital, Imtarfa, Malta, for permission to publish the case.

References.—[1] Braun, Max., *The Animal Parasites of Man*, London, 1906. [2] Askanazy, M., quoted by Braun., *loc. cit.* [3] Brumpt, E., *Précis de parasitologie*, Paris, 1913, p. 337 *et seq.*

THE TRAINING OF THE STUDENT OF MEDICINE:

An Inquiry Conducted under the Auspices of the Edinburgh Pathological Club.

LXIV.—DENTAL SURGERY FOR MEDICAL STUDENTS.

By WILLIAM GUY, F.R.C.S., L.D.S., Dean of the Dental School.

In discussing very briefly the question of including dental surgery in the medical curriculum, it may be well to narrow it down to the essential issues. I would state them thus: (1) Is it desirable that medical students should be taught something of dental surgery? (2) What should be the scope and extent of the teaching? (3) How, when, and where is the instruction to be obtained?

To (1) I shall assume that the answer is in the affirmative.

(2) is not so easily answered. I think, however, that prosthetic dentistry and conservative dentistry must be excluded. For the rest, the requirements would seem to vary with the many fields of practice open to the medical practitioner.

A knowledge of dental hygiene and prophylaxis is an indispensable part of medical and surgical knowledge. The same is true of a knowledge of the consequences or possible sequelæ of dental disease, accident, or trauma, and of dental symptoms associated with such conditions as scurvy, diabetes, plumbism, congenital syphilis, cretinism, phosphorus poisoning, pregnancy—to name but a few.

The arrest of post-extractional hæmorrhage is important. The administration of suitable anæsthetics for dental operations should be taught to all general practitioners.

Coming to purely dental work, which, though specially the province of the dental surgeon, may in emergency be undertaken by the doctor, I would specify tooth extraction, the treatment of odontalgia from whatever cause arising, of periodontitis, alveolar abscess, and gingivitis.

All should be instructed in the differential diagnosis of true pyorrhœa alveolaris, marginal gingivitis due to the presence of tartar or dirt, and the conditions attendant upon the physiological process of the shedding of teeth. Some instruction should also be given on the evils arising from oral sepsis, more especially that associated with the presence of bridges, crowns, dead teeth, and roots.

The panel doctor and the country doctor must be able to extract and to give anæsthetics. The pure surgeon or physician and the practitioner in a large town need not concern themselves with extraction of teeth.

There remain the medical missionary and the colonial practitioner. These should be able to do something in the way of first aid dentally.

—that is, to put in a dressing, devitalise a pulp, and insert a plastic filling.

(3) If instruction in dental surgery is to be made compulsory for medical students, further facilities must be afforded: they certainly do not exist at present.

Neither at the dental hospitals nor the infirmaries is there room or sufficient clinical material for satisfactory practical teaching. The dispensaries may be counted out as of little value in this department of study.

Nevertheless, an effort should be made. The difficulties are great. There are very few competent teachers. There are no endowments for dental education, and the dentist who devotes any considerable part of his time to teaching suffers a pecuniary loss.

In Edinburgh it seems to me that there would have to be co-operation between the Infirmary and the Dental Hospital. Some extension of the dental department of the Infirmary would be needed. The course of instruction must be compulsory—an optional course would not survive. It should comprise at least fifty clinical lectures and demonstrations on dental surgery and medicine spread over the last two years of the medical course, together with attendance on practical instruction on extraction of teeth and administration of anæsthetics for dental operations.

The Scottish universities, with the exception of St. Andrews, which recently instituted examinations for a dental diploma, have not, up to the present, taken any interest in dental education or degrees for dentists. Should they determine to enter on this sphere of educational activity, the existence of a Chair of Dentistry and university lectureships would resolve most of the difficulties which at present beset the teaching of dental surgery and medicine in the medical curriculum.

LXV.—THE TEACHING OF DENTAL SURGERY TO MEDICAL STUDENTS.

By J. H. GIBBS, F.R.C.S.(Edin.).

ANYONE who has regularly attended these discussions upon the training of the medical student must have been struck by the demand that almost every teacher has made—that more time should be allotted to him for the adequate teaching of his subject—whilst really no one has complained that he has too much time. As matters stand at present, the student is undoubtedly overburdened, so that some boldness is required on the part of anyone who proposes that still another subject should be added to the curriculum. When one recognises that the medical student in all the Scottish universities graduates at present without having had any specific instruction in the two commonest diseases to which mankind is liable, one is surely justified in demanding that this state of affairs should be changed. Many universities have long ago recognised the importance of their medical students having some definite knowledge of the diseases of the mouth and teeth, and have required courses of instruction which, personally, I think are unnecessarily long.

The remedial treatment of dental disease is so specialised that it is by common consent relegated to the dental surgeon, and the general practitioner quite wisely sends any patient requiring this treatment to the specialist. To-day, however, is the day of preventive medicine, and the future will be so still more. Most dental surgeons are well aware that the great bulk of dental disease is quite easily prevented and that remedial measures are comparatively ineffectual, but they can do very little to help the patient, because the seeds of dental disease are sown long before they see him—in fact, during the first few years of life, when the child is so much under the care of the family doctor. Hence it is to the general medical practitioner that we must look for the proper upbringing of the infant and young child that these diseases may cease to exist. At the present time so ignorant is he of the real physiological functions of the mouth and its secretions, of the etiology and pathology of dental disease, and of the ease and success with which these diseases can be prevented by measures that are wholly beneficial to the general health of the child, that one has no hesitation in saying that the prevalence of dental caries and of pyorrhœa alveolaris to-day is almost entirely due to the vicious teaching and practice of the average medical man.

Again, every dentist who attempts to save the children of his patients from these diseases by instructing the parents how to bring them up in accordance with physiological principles, the soundness of which has been abundantly proved during the last twenty years by the success that has been attained in preventing not only dental but other diseases, is met at once by the active opposition of the far more powerful, but ignorant, general practitioner. It is more than time that this ignorance on the part of the average doctor of the physiological functions of the mouth and of the barest principles of dietetics should be remedied, and, provided it is remedied, I do not think it matters much whether the correct knowledge is imparted to the student in a special course of dental instruction or in his ordinary classes. Fortunately the physiologist does not spend much of his time, either in lectures or in the laboratory, over dietetics, the physiological functions of the mouth and saliva, the nature of mastication, and of the act of deglutition. It is extraordinary that, after all the work that has been done along these lines both in this country and abroad, physiologists should almost without exception still hold and teach views that have been discredited for many years. Now, inasmuch as the great bulk of dental disease is the outcome of this pernicious physiological teaching, the first thing to do seems to be to educate the physiologist or to protect the student so far as possible by letting him come under better influences later in his course.

If the medical student is to have a special dental course, as in the present circumstances I think he should, the instruction should be made as short as possible and carefully designed to meet the needs of everyday practice. As a result of my own experience as a teacher and practitioner, I think that the medical student should be taught correctly the physiological processes that occur in the oral cavity and the principles of dietetics, including the proper feeding of infants and young children. He should also be taught the etiology and gross pathology of the two commonest diseases—dental caries and pyorrhœa alveolaris — and the ease with which they may be prevented by physiological means, and the futility of artificial aids. Because dental diseases are so rarely a direct cause of death, the general practitioner is apt to look upon them as of no importance, and it should therefore be impressed upon the student that they cause more pain, ill-health, and inefficiency than any other disease, while indirectly they do entail a large mortality.

Even consulting physicians, teachers of students, habitually pour good food and medicine into patients who often benefit but little, because they are absorbing toxins from ulcerated areas in their mouths that may amount to several square inches. Were ulcers of a tenth the size to occur in the much-examined rectum or on the skin, they would be vigorously and promptly treated. Similarly, children are allowed, with the full knowledge of their doctor, to retain decomposing teeth, often with abscesses, simply because they may not be causing actual pain. The student must be impressed with the importance of his patients having clean mouths at all costs. To-day, even when this is realised, it is effected by extracting the teeth after they have become unnecessarily diseased and a menace to the health of the patient, but the student should be taught that the mouth and teeth must be kept clean, not by disfiguring mutilation, but by simple and rational preventive measures.

As regards remedial treatment, he should be taught that neuralgia is only a symptom and that the cause can nearly always be discovered and easily removed. He should know simple means of relieving toothache, and especially how to stop hæmorrhage from a socket after an extraction. He should, of course, be taught such a common operation as the extraction of teeth. The principles involved can be explained to a large class, and this should be supplemented by a demonstration and actual practice.

I think that the minimum instruction necessary could be given in a course of seven or eight meetings—it being taken for granted that the medical practitioner is not to act the part of the dentist, but through putting into practice his knowledge of general principles is to be an apostle of a much higher standard of personal hygiene and national health than obtains to-day.

LXVI.—THE TEACHING OF DISEASES OF THE EAR, NOSE, AND THROAT IN THE UNDERGRADUATE CURRICULUM.

By A. LOGAN TURNER, M.D.

THE specialty entirely justifies its place in the curriculum of the undergraduate. It does so on two grounds—first, the progressive importance of the specialty; secondly, its value as a diagnostic factor in the recognition of many general diseases.

Let us bring evidence to support both of these points. In 1899 there was one Ear and Throat Department in the Royal Infirmary and the number of new patients seeking advice during that year was 1150. Fifteen years later—I have taken 1914, as the war may have affected hospital attendance in the immediate past—there are two departments, and in my own the number of patients attending for the first time during that year was 3363. If my colleague's patients be added, the total is considerably increased, probably approaching 5000. The number of adenoid and tonsil cases alone in 1914 exceeded the total patients visiting the department in 1899, being 1278 in number. It is one of the busiest departments in the Infirmary—a striking proof of its usefulness.

During these fifteen years the specialty has not only increased the number of its patients but it has greatly extended its boundaries. We have practically taken over from the general surgeon intracranial surgery in relation to septic infections from the ear and nose; we have come to the assistance of the ophthalmologist in the treatment of orbital conditions secondary to infections of the nasal accessory sinuses, and we are prepared to help him in his cases of chronic dacryocystitis. We have extended our territory to the diaphragm, and in our examinations of the œsophagus and lower air-passages we can assist the surgeon and the physician in the diagnosis of important conditions, while the treatment of foreign bodies in these regions has gradually passed into our hands. The more recent elaboration of the tests in connection with the eighth cranial nerve has called us to the help of the neurologist in determining the diagnosis of certain obscure intracranial conditions. We have thus made our annexations: we have not yet claimed our indemnities, but this we propose to do after the war. I shall refer to that presently.

The second argument in favour of its inclusion in the curriculum is based upon the value of the specialty in the recognition of many diseases. The ear, nose, and throat are to the body what the outposts are to the army in the field; they may furnish us with the first signals of danger and of the presence of the enemy—disease. Vertigo may herald the advance of arteriosclerosis and epistaxis may prove the first warning of renal mischief. The discharging ear should keep the practitioner alive to the possible source of the headache and vomiting due to a secondary brain abscess or meningitis, and to the origin of those rigors and varying temperatures accompanying a sinus thrombosis. The changes in the mucous membranes of the throat and in its lymphatic tissues may be the first evidence that the patient is the victim of syphilis, or they will furnish an explanation of some of those obscure toxic conditions which are often baffling. In hoarseness we may have a striking danger-signal, giving the first indication of the presence of deep-seated malignant disease, of pulmonary tubercle, of aneurysm, or of a central nervous disorder.

And this brings us naturally to the principle which should underlie the instruction of the undergraduate in this subject, viz. to acquaint him with the relations which the organs bear to general diseases. The teacher should approach his class mindful of the fact that his own training should have made him a surgeon and a physician, provided with a better knowledge than his colleagues of these special regions. One is almost inclined to say that while he is teaching he should forget that he is a specialist. No finicky details: no elaborate description of operations: no minute account of rare conditions. These must be reserved for the post-graduate course. This is the principle upon which I have taught undergraduates for fifteen years, and I believe it to be a sound one—teach them to recognise the appearances presented by the common ailments and point out to them the significance of the symptoms which I have enumerated. The danger which one sees throughout the whole of this discussion is the lack of a proper perspective—the risk being that each man attempts to teach too much of his subject. We teachers spend the best years of our lives in acquiring our own knowledge and we never attain perfection: how can we expect more than the simplest essentials from our pupils?

What are the means at our disposal for conducting such courses? Three terms, each of ten weeks, and each student, in his fourth or fifth year, must attend for one term. There are thirty meetings in a term, nine or ten for a more or less systematised account of the commoner conditions and their bearing on general medicine.

Twenty clinical meetings—the whole class is restricted to thirty or forty members. The clinical meetings are still further limited, preferably to ten or fifteen. The whole available staff takes part in the clinical teaching. This is an essential part of the arrangement—good for the staff and in the best interests of the student. The teaching staff is encouraged to do scientific and clinical research, because when teachers are thus engaged, they can then infuse a scientific spirit into their pupils, while it also improves their manner of teaching.

As many of the common ailments as possible are shown and the class handle the patients themselves.

Twenty clinical hours are not sufficient. We ought to have twice that number. In the medical schools of Canada and the United States the programme is more ambitious, and facilities are given in some of them for students attending at two periods in their curriculum. A short junior course for anatomy, methods of examination, and the recognition of what is normal in the ear, nose, and throat, and a later course, nearer the final term, where diseased conditions are investigated, would more nearly approach the ideal.

Now I come to the indemnities. I have said that there are two departments, but both are compelled to work in and share the same out-patient room, the same theatre, the same wards. This is not as it should be in a large and progressive specialty. I am consequently forced to teach on certain days, and could not teach on other days if I would, because my out-patient room is occupied by my colleague. Some arrangement must be come to between the University authorities and the Infirmary management to put the Ear and Throat Department on the same footing as the Eye Department, providing each surgeon with a distinct and separate department. The money must be forthcoming. Both on teaching and scientific grounds and in the best interests of the patients it is necessary, and though the improvement is unlikely in the immediate future I hope to work for it for the benefit of my successors. The reputation of a large medical school cannot rest upon its teaching advantages alone: it is the duty of every member of the staff to aspire to something more than a routine and efficient discharge of his obligations to his pupils, and to endeavour to do something to add to the sum of knowledge of his own particular branch. We are apt to criticise the waning success of our Alma Mater. Some of us, I am afraid, are too ready to blame the curriculum and are forgetful of the human factor. Does not some of the remedy lie in our own increased efforts?

LXVII.—THE INSTRUCTION OF THE UNDERGRADUATE IN DISEASES OF THE EAR, NOSE, AND THROAT.

By J. MALCOLM FARQUHARSON, M.B., F.R.C.P.

I HAVE had pleasure in acceding to the request of your secretary to speak briefly on this subject to-night, and shall make my remarks as succinct as possible. I shall accordingly enter into no great detail, but shall indicate the principles which appear to me to be most desirable, if not essential.

This subject has now become a compulsory one in the course of medicine, and it will at first probably be difficult for the department to cope with the number of students presenting themselves for instruction, and in all probability changes will have to be made to suit requirements and altered circumstances. It would appear, however, to be certain that the size of the class must be kept as small as possible, and this for various reasons. Comparatively few of the diseases affecting the ear, nose, and throat are recognisable without the aid of instruments, and accordingly it is impossible to demonstrate them to numbers at one time. At first diseases can be shown by the teacher to one student at a time, but the scope of this elementary instruction must, very soon, be widened, and the student taught the use of the instruments and to train his powers of observation to recognise the disease for himself. This, of course, occupies much time and is a handicap to the teacher in aural, nasal, or laryngeal work, and presents a difficulty to him which is not encountered by teachers of most other subjects. Happily for teaching purposes, the majority of the diseases which come under review at out-patient clinics are of a chronic nature, and can therefore be handled and demonstrated more or less freely, and to some extent this is a countervailing advantage to the teacher. It must not be forgotten that we are dealing with undergraduates who have necessarily a comparatively small clinical experience, in contradistinction to the post-graduate, who is in a position to apply principles in a way impossible to the former. It is necessary then that the undergraduate teaching should be confined to a limited field, in which, at any rate in the first instance, the commoner diseases are fully demonstrated, being those conditions in fact which he will most frequently encounter in general practice. Seeing that clinics must be limited in numbers, how can the students all be instructed adequately? There are at present two lecturers appointed by the university and the conditions at present permit of their adequate instruction by the lecturers, assisted by the assistant surgeon. If, in the future, the numbers applying for instruction increase, then the university may have to consider whether the assistant surgeons of the department ought not to be co-opted officially for assistance in carrying out the obligation of the university to the student. I can see in such an arrangement an important incentive to the junior members of the staff, and one which I believe they would appreciate.

Further, also, I think the student should have the advantage of clinical lectures, whereby the teacher is enabled to focus attention on essentials and arrange and systematise the instruction by him. In my experience the average student does not make much use of text-books, probably from want of time owing to the pressure of other work, and from difficulty in selecting what to read; and if he does, much time and energy is often dissipated upon the study of diseases of a comparatively unimportant or abstruse nature. In the lecture such points as the differential diagnosis, avoidance of pitfalls, and the details of treatment can be more fully elaborated than is possible by the use of text-books alone; besides, the personal oral teaching will, in my opinion, be conducive to better results, and in this view I am supported by the opinion of students, with whom I have frequently discussed this point. Again, as a further advantage it is possible to save some time weekly by teaching a larger number of students collectively, and it is an agreeable variety in the routine of teaching.

The clinic and the lecture should be supplemented by tutorials, wherein instruments can be demonstrated, operative proceedings referred to, and full instruction given in methods of examination. The employment of models, specimens, and occasionally of patients in tutorial work will, of course, materially assist the student in acquiring familiarity with diagnostic methods and therapeutic procedures.

Personally, in carrying out the teaching in the department, I have two clinics and two lectures weekly; in the latter I take the opportunity of discussing more fully any important case that has come before us in the clinic. In this way I am enabled to have about thirty-five meetings in the term, with what, I consider, satisfactory results.

With one point of importance I will conclude what I have to say on this matter, namely, that the teacher should take every opportunity of showing the bearing which aural, nasal, and laryngeal diseases have on general medicine and surgery. I would refer to asthma, aneurysm, thoracic neoplasms, epistaxis, etc. The importance of these inter-relationships can hardly be over-emphasised, and the future practitioner should early be taught to take a broad view of such subjects and not to confine his diagnostic facts to the special region where symptoms appear.

These are the principles which seem to me to underlie the successful instruction of the undergraduate, and, given their acceptance, I am sure that it would not be difficult to work out the practical details.

DISCUSSION.

Dr. George Mackay emphasised the importance of teaching ophthalmology clinically, and supported the appeal that had been made for increased accommodation in the Infirmary for this purpose. As a Manager of the Infirmary he said that only the lack of funds prevented this being provided. He also urged the necessity for provision being made for higher teaching and for research, and for the wider employment of the junior members of the staff in teaching.

Dr. Sinclair.—From personal experience in teaching ophthalmoscopy to undergraduates and graduates, I can say that little or no advantage is gained from tutorial instruction in ophthalmoscopy, unless the use of the instrument be continued in the medical wards. The use of the ophthalmoscope should be insisted on in the medical wards, and reports and drawings of the optic discs, retinal vessels, etc., attached to the clinical records of medical cases taken by clinical clerks, whether there is anything wrong with the eye or not.

The difficulty in learning to use the ophthalmoscope (indirect and direct methods) is no doubt a considerable barrier to what I have suggested, and may be discouraging to the beginner in clinical medicine. If, however, the patient is examined with the pupils dilated, and the student has the encouragement and guidance of his teacher, this difficulty will be overcome.

The electric ophthalmoscope is much easier to use than the ordinary one and affords a very attractive picture of the fundus oculi. Each medical ward should possess an electric ophthalmoscope for the use and convenience of students in case-taking.

The teaching in the Eye Department will, as in other charges, be under the entire direction of, and in the main be carried out by, the ophthalmic surgeon in charge of the department. The assistant ophthalmic surgeon should, however, take some regular part in the teaching—such as may be allotted to him by the surgeon in charge. This is important in the teaching of practical ophthalmology, where clinical demonstration forms the most valuable and the largest part of the work.

It is also important that enthusiasm for, and facility in, teaching should be developed in the assistant surgeon, as he may at any time be called upon to undertake the whole work of the class, and, in the ordinary course, will have to do this when his turn comes. It is essential that he should have practice as a teacher in order that he may be able with the greatest efficiency to carry out the duties of a teacher of students when his time comes to do so.

Dr. J. S. Fraser said that one of the great difficulties in the teaching of the ear, nose, and throat is that the student must master the use of reflected light, and this he finds very difficult, particularly in laryngoscopy. It is impossible to teach students laryngoscopy in the time available.

In conducting tutorial classes he had found it necessary to devote a large part of the time to teaching the anatomy and physiology of the organs of special sense. This should be done in the departments of anatomy and physiology and so leave the surgical tutor free to devote his time and attention to clinical teaching.

Diseases of the ear and their complications are attended with such a mortality that it is essential for the undergraduate to be thoroughly instructed in this subject. If general practitioners realised the dangers of "running ears," and were taught to recognise the onset of serious complications, there would be a considerable saving of life.

In the teaching of the special subjects it is essential to deal with small classes, and this necessitates the employment of every member of the staff in teaching and the provision of better accommodation in the department.

Dr. Traquair had found it very difficult to teach the students ophthalmoscopy in tutorial classes. Even in a special class for post-graduates, extending over thirty hours, the results were only moderately satisfactory. Their main difficulty seemed to be to learn the management of light. The use of the ophthalmoscope should be practised more in the medical wards than it is, and if the electric ophthalmoscope were used the student would soon learn to see clearly everything that is to be seen in the fundus, and would appreciate the bearings of the eye changes on general medicine. The ophthalmoscope is really a physician's diagnostic instrument and should rank with the stethoscope and the sphygmograph.

Diseases of the eye should not be presented to the student as a "special subject" but as a part of clinical medicine and surgery. He was of opinion that an examination on the subject was a stimulus to the student to master the subject.

Mr. Wilkie said that at the end of the war an enormous amount of money will be spent in keeping up hospitals for assisting those disabled in the war. That expenditure will fall on the Government. If medical men are to be adequately trained to staff these hospitals, the Government should provide money to support the hospitals which are essential for the teaching of the medical men; emphasis should therefore be laid on the financial aspect of the question.

Dr. Clarkson thought that all a general practitioner requires to know of dental surgery could be taught in a course of seven or eight meetings. He was of opinion that there should be no difficulty in teaching the student enough of the use of the ophthalmoscope and laryngoscope to enable him to recognise whether the condition present was one he could treat himself or whether it should be sent to a specialist. The use of these instruments should be commenced early in the student's training, and should be encouraged in every way in the wards.

Dr. Norman Walker thought that the rising generation of teachers was extraordinarily pessimistic about the outlook of things. He remembered getting instruction in the ophthalmoscope and laryngoscope at the physiology class, and again from Sir Robert Philip when he was assistant to Sir Thomas Grainger Stewart, and as a student had in the medical ward quite common opportunities of using both the laryngoscope and the ophthalmoscope.

Dr. Rainy said that when he was clinical tutor part of his work was to teach the laryngoscope and ophthalmoscope, and practically every student drew one or two funduses and one or two vocal cords before he was allowed to leave the class-room. When he had charge of the women students they practically all learned the use of the ophthalmoscope in the medical wards, and about 50 per cent. of them bought one for themselves before they left the ward, which showed they appreciated the instrument and were likely to use it. He thought it desirable to have an examination.

Professor Lorrain Smith.—It is important for us as a committee to hear the point thoroughly discussed as to how far the students should be examined in ophthalmology. The Dean is quite in favour of making the class certificate as much as possible take the place of the formal examination. A great many of our discussions have introduced the idea that the term work should as far as possible relieve the student of the burden of his professional examinations.

Dr. Logan Turner.—I am in favour of the tendency to build up the examination during the curriculum and not at certain periods. One of the first things I tell my class at the beginning of the session is that there will be a class examination and that all of them who obtain a certain percentage will qualify for the Final. I am against the suggestion that there should be a Special Final Examination in ear, nose, throat, and eye subjects.

Dr. J. V. Paterson.—I hold the same view as Dr. Logan Turner. The examination could quite well be connected with the class work, and the men should not have to sit a separate examination in the Final. It should be made clear to the students, however, that the examination they have to get through at the end of the course of diseases of the eye or of the ear, nose, and throat is the qualifying examination for the Final.

Dr. Norman Walker.—I agree with Dr. Logan Turner in this matter. I have no difficulty about taking the *onus* of refusing a certificate. At the first lecture of every course I explain to the students that the responsibility is laid upon me of seeing that they shall not go out of this university without such a knowledge of dermatology as shall not do discredit to the university. If they do not succeed after going up twice, I make them take the class out again.

Dr. Sim.—I would hesitate to stop a man from passing his Final solely on the ground of his not being proficient at eyes. I think ophthalmology ought to be correlated with the other subjects.

Dr. Gibbs suggested that a plan might be adopted by which a certain percentage in the class examinations entitled the student to a qualifying certificate, while a higher percentage exempted him from a special examination in his Final.

Dr. Paterson said in reply.—I am in agreement with those who say that ophthalmoscopy, from the point of view of general medicine, is only properly studied in the medical ward. The students would not require much stimulus if ophthalmoscopes were provided, and there is no difficulty whatever in dilating the pupil and no danger attached to it with reasonable care.

I think in the eye ward we are inadequately equipped. This lack of equipment in Britain tells far more on the training of the teachers than on the training of the students. The British ophthalmologist has less opportunity of learning the higher branches of his profession than the ophthalmologist of any of the highly civilised nations of the world. The assistant in my day was overloaded with routine work at the Infirmary. The senior assistant should not spend his whole time, and the senior surgeon should not spend hours after the students have gone, in testing the refractions of school children. That is the reason why there is not the time for research. The training in physics and physical optics, for example, is inadequate. The physiology of the eye has all to be learned from the book. From the scientific point of view we are behind many of our continental friends and enemies, because we have not the equipment and the time for the training and because our energies are completely taken up by the routine work of the hospitals.

Dr. Guy said in reply.—The idea of giving fifty lectures and demonstrations on dental surgery has been rather scoffed at, but I think I am perfectly justified in taking that as the absolute minimum. I specified, for example, the administration of anæsthetics for dental operations. I have no hesitation in making the specific statement that no man knows anything whatever—as I should understand knowledge of that department—about the administration of anæsthetics more particularly for dental operations until he has had at least fifty opportunities of administering the various anæsthetics under skilful supervision. I said these meetings should be spread over the last two years of the course. In that regard, if I may pass from the particular to the general, it strikes me that what is required in the teaching of the eye specialities which have been dealt with is co-ordination between surgeons, physicians, and specialists. The most important part of the medical training, in my view, so far as the man's life and practice are concerned, is in his clinical training, which of course should only come after he has had a sufficient training in the ancillary sciences and in the principles of medicine and of surgery. Why does not the clinical teacher invite the co-operation of the specialist? We all know that there are many medical and surgical conditions which remain obscure to the ordinary physician or the ordinary surgeon because he is not a skilled specialist. I think that surgeons and physicians might select such cases for cliniques, and even for clinical lectures, and might on these occasions invite the co-operation of the specialists. In that way the medical student would have borne in upon him how important the bearing of a study of the various specialities was upon the general practice of his profession.

The other point which has struck me in this discussion is the point which the chairman, I think, raised as to how far class examinations might be allowed to supersede Final Professional Examinations. That is perhaps the most important point which has emerged in this discussion to-night, at any rate to my mind. On the part of some there appears to be a hesitation to assume the responsibility for saying that this man is fit and competent or that he is unfit and incompetent. Of course there are other aspects of that question. There is the man who is perhaps afraid that if he exacts too high a standard from his students they will forsake him. All these difficulties might be overcome, I think, if the class examinations were not confined simply to the writing of a paper at the end of the course, but were continuous throughout the course, *i.e.* at the latter part of every meeting the lecturer might ask the students to perform some of the procedures which had already been demonstrated to them, might note the value of their answers and the skill which they displayed in manipulative processes. Thus at the end of the course the teacher would be enabled to say quite definitely, "This man has profited by my instruction, and I therefore have no hesitation in giving him a certificate to say that he is in this department a fit and competent person to enter upon practice." How could such an impartial decision be arrived at? There might be difficulties in the way, but I think it might be possible, not always of course, but from time to time, to have an assessor present, who might be allowed to put questions and to assist in arriving at an assessment of the value of the work of a student. Were that done, I feel quite certain that it would be a step in advance, that it would be of great assistance to the teacher, and that it would be a very great stimulus to the student.

LXVIII.—THE PLACE OF RADIOLOGY IN THE MEDICAL CURRICULUM AND THE NEED FOR CO-ORDINATION IN TEACHING.

By ROBERT KNOX, M.D.

In by-gone days, when the fame of the Edinburgh school was at its height, the value of encouraging initiative and enterprise on the part of the leaders in the profession was amply demonstrated by the valuable work carried out by a number of men too numerous to mention individually, but whose names will readily occur to you since they are monumental ones in the history of the development of medicine and honoured in the annals of your school.

Mr. Alexander Miles, in his admirable book *The Edinburgh School of Surgery before Lister*, gives an interesting description of the process of evolution at work which led to the establishment of the Edinburgh School of Surgery, and clearly shows the value of encouraging originality and foresight and of giving a free hand to those who show by their actions that they are capable of doing valuable pioneer research work.

It is to be hoped that in the near future this valuable book will be followed by others dealing with the development of the Edinburgh School of Anatomy, of Medicine, and other useful branches of the common tree. There can be no doubt that the material is at hand for the production of a series of valuable books recording the vicarious fortunes of these many branches.

At this period of its history the Edinburgh school attracted students and practitioners from all parts of the world, and it was the privilege of Edinburgh to send out all over the world trained men who by their subsequent work still further enhanced the prestige of the school. These were the halcyon days of Edinburgh as a teaching centre. Some twenty years ago I was interested in the subject of pathology, an interest I was fortunately imbued with when a student at Professor Greenfield's lecture-room, and at that time, if my memory is correct, two-thirds of the leading chairs and lectureships at teaching centres were occupied by men who had been students at Edinburgh University. Similarly in anatomy, Edinburgh was turning out men regularly who were qualified to take high places in the teaching of the subject.

I could go on for a long time citing instances where the foresight of your governing bodies has led to the development of new discoveries and ideas, but no useful object would be served, more particularly as we are concerned with the present and the future rather than with the past. A contemplation of the history of the school is, however, useful when we come to deal with the steps which should be taken to ensure that Edinburgh may occupy in the future that position which her great past indicates that she should occupy.

It is with the future that I ask you to deal, and particularly with the future of the important subject of radiology.

The development of the uses of electricity in medicine at Edinburgh has been somewhat unequal.

The late Dr. Milne Murray, a pioneer worker in medical electricity, introduced electrical methods and apparatus which at that time gave Edinburgh an opportunity of placing the subject on a very high level. That opportunity was allowed to slip away. I remember on one occasion at a clinical lecture on medicine a simple faradic battery was required for the demonstration of a nerve or muscle reaction. A professor, his chief assistant, fifty students, and several sisters and nurses of the ward were present, the battery was produced, the patient's skin was duly moistened with salt solution, the switch was "turned on"; nothing happened. Believe me, gentlemen, not a single individual in the room knew what was wrong; the demonstration was a complete failure, and that occurred in a hospital at which Dr. Milne Murray was a teacher—surely a clear indication for the need of systematic teaching, if ever one could be cited.

The discovery of the X-rays by Professor Röntgen and the speedy adoption of their use all over the world gave you another opportunity for pioneer work of which a few men promptly availed themselves. Very soon after the discovery Dr. Dawson Turner devoted himself to a study of the actions of the rays and their uses in medicine. I well remember in 1896 attending a popular lecture at the Queen's Hall when Dr. Dawson Turner gave to a very large audience a demonstration of the X-rays in action; an exposure was made and a plate taken. I remember how impressed I was at the time, and how I left the hall convinced of the immense future before the X-rays, and I confess I felt certain that Edinburgh would hold in the field of radiology a position second to none, basing my conviction on a knowledge of the past and the enterprise exhibited by your leaders in fostering new discoveries and developing them to the utmost.

That conviction has not materialised. Edinburgh does not hold a position in the front rank, and you at the present time are a long way behind other centres in this country and the world generally.

Why has this been allowed to happen? Your governing body has not exhibited true foresight guided by experienced minds, and has failed to take action at the right moment in order to ensure the development of a most important branch of medicine.

It is not the fault of the men you have had in charge of your departments. Any one of them, if he had been supported by the profession and had been given material aid by the management of the Infirmary and the Senate of the University, could have worked up the subject and developed a centre of very great importance.

Dr. Dawson Turner is known widely as a pioneer worker in X-rays and radium. The late Dr. Price was recognised by leading workers as a prominent radiologist, and the present holders of the position at the Royal Infirmary, Dr. Hope Fowler and Mr. Archibald M'Kendrick, are known to be workers of sterling value.

There has been a failure on the part of the physicians and surgeons to recognise the importance of the subject and its great future sufficiently early, and a lack of co-operation between radiologists and other experts in other branches of practical medicine. Is it surprising under these circumstances that the governing bodies should fail to grasp the opportunity and give the support and encouragement which the workers in the subject had a right to expect?

This want of foresight and lack of sympathy is not confined to Edinburgh only. It is and has been prevalent all over, but fortunately the conditions are changing and the radiologist is, however feebly, groping for his place in the sun; and let me assure you, gentlemen, if I read the signs correctly, he means to get it, and that, I trust, very soon.

The chief duty of an advocate of any particular line of development must be to produce proof of the value of the subject and to show that its proper development will lead to the production of results of undoubted value.

It seems, therefore, that in order to convince you of the importance of my subject I must begin by showing that it is worthy of the support I claim for it.

Taking the subject as a whole, radiology in its applications to medicine embraces the use of radiations for diagnostic work and in therapeutics. These two are, to a large extent, distinct, though, as I shall show, they cannot be completely separated. A therapeutic application of X-rays or radium given primarily for therapeutic purposes may become diagnostic. I refer particularly to the action upon enlarged glands where, as a result of experience in therapy, it may be possible to indicate the nature of the lesion by the degree and the rapidity of the response to the radiations. But, speaking generally, it may be stated that the diagnostic side can be separated from the therapeutic. Both are of the greatest importance in the future development of medicine and surgery. I shall deal with them separately.

What I want chiefly to point out is the complete interdependence of radiology with other branches of medicine and science generally, and the absolute necessity for a close co-operation between men specialising in this and other branches; the pathologist, the anatomist, the physician and the surgeon can all learn something from the application of radiography to his special subject.

The physicist can help us greatly in our appreciation of the scientific side of the subject, while he, on his side, may gain immensely from collaboration with medical men in the joint consideration of biological processes which may be dependent for their activities upon purely physical effects.

The anatomist can study the internal structure of bone, the formation of joints, and the relations of the bones entering into them in a way which was not possible before. Stereoscopic radiograms of bones and joints when carefully studied will give a very clear conception of the real anatomy of the structure.

In a study of the epiphyses of the bones, radiography will lead to the accumulation of evidence which may in the future revolutionise the teaching of the present day. Every anatomical school should possess an efficient X-ray installation for the carrying out of research work, and research must not be confined to the cadaver. Radiograms of living subjects must contribute largely to the accumulation of accurate data.

The pathologist will find new fields for investigation, or rather he will find in X-rays a means of interpretation of the internal structure of tissues. The value of a sound knowledge of pathological processes will be appreciated by the physician when he attempts to interpret the confusing shadows which go to make up a good radiogram.

I could show you a large number of radiograms, all more or less perplexing to the casual observer, which can be readily interpreted when the combined knowledge of the pathologist, the physician, and the radiologist are brought to bear upon them and the facts ascertained by each are given full weight in their deliberations.

There is practically no field of medical and surgical investigation in which the use of radiography is not of great value. A due sense of proportion is, however, necessary if the radiologist is not to become over-enthusiastic in his claims for his subject. Lack of balance and knowledge have before now been the causes of failure on his part to render true service to his colleagues. A complete sympathy and co-operation is essential if full value is expected from the new aid to diagnosis.

The surgeon has reaped the full benefit of radiography from its commencement because early in the development it was applied to the diagnosis of gross lesions of the bones. As time passed and refinements in technique followed it was possible to go beyond this, and the use of the rays was directed to the elucidation of obscure conditions of bones and joints, including the inflammatory diseases, tumours of bone, and specific infective conditions like tubercle and syphilis.

Later, the deeper-seated diseases in the interior of the body came under survey, until at the present time it is possible to investigate practically any region of the human frame. The investigation of the skull and brain, the thoracic viscera and the lesions of the gastro-intestinal tract, the urinary tract and the pelvic organs has led to the establishment of highly specialised techniques for these regions and now threatens to create in our midst a number of new specialists whose activities may be confined to the area limited by their knowledge of the region they specialise in. Perhaps a later development may lead to the men practising in special branches of medicine becoming experts in radiography so far as their special subjects are concerned. There is even at the present time a tendency in this direction. This will end in disaster, so far as the value of radiography in diagnosis is concerned, if steps are not taken to ensure that every man gets a sufficient amount of knowledge to enable him to understand the work he carries out. The best results can only be obtained by co-ordinated teaching in radiology and the branches of medicine associated with it.

If such an end is to be attained, the subject must come into the curriculum of the course of study and all students must be taught the elements of this important work. We must either educate a large number of expert radiologists or teach all medical students in such a way that later they may be able to apply their knowledge. It would be an advantage to do both.

The former plan will naturally give greater value, since an expert must know more than one who has only a casual knowledge of the subject.

What has been said of radiography applies with more force to radiotherapy. In this new development we possess agents whose activities are great for good or harm. It is more essential than in radiography that the control of treatment should remain in the hands of medical men.

The practical application of radiology is not entirely confined to medicine and its allied subjects: already the rays are being used in other fields of research and their use is being extended. Thus in the radiography of metals extensive use is being made of their power to disclose flaws and faults in shells, while aeroplane parts can also be scrutinised for the detection of faults. In commerce and engineering the field for radiography is very large, and in time every engineering department will be fitted up with an elaborate X-ray installation, while the departments in teaching schools devoted to these subjects will also require to install X-ray outfits.

The field of usefulness is rapidly extending and there is room for a large number of men to engage in research work—physical, pathological, clinical, and biological. Many interesting problems lie invitingly before us which for their elucidation require the very best skill and intelligence at the command of the profession.

In this branch of our work we have to call in specialists in physics, electricity, chemistry, and electro-techniques. Already we have profited immensely from the pioneer work of prominent physicists in this country and throughout the world. We require a closer collaboration between the physicist and the medical man.

In practical medicine it is only necessary to refer to the great advances which have been made in the treatment of fibroid and other tumours of the uterus by X-rays, the use of radium for cancer and particularly cancer of the uterus, the treatment of lymphadenoma and sarcoma by X-rays and radium to indicate the future developments in therapeutics. The further investigation of these agents and their action upon the tissues calls for a large number of research workers.

The war has been responsible for a great development of radiography in its application to the investigation of diseases and injuries of bones and internal organs, and particularly in the localisation and removal of foreign bodies.

The surgeon has found that he cannot get through his work without X-rays, and in most instances the services of the radiologist are thoroughly appreciated. A tendency exists, however, in the minds of a number of our leading surgeons to disparage the value of the radiologist even to the extent of stating that any individual can be quickly trained to do the necessary technical work. He is even quoted as giving better value than a trained radiologist. That view might be allowed to pass unchallenged if it were not for the harm it is likely to do to the subject and to those who practise it.

The analogous condition in surgery is that of the bone-setter, who in many instances is better qualified to deal with an obscure case than the average surgeon. Yet what a state of indignation is excited in surgical circles when a bone-setter ventures to deal with cases which are regarded as the rightful heritage of the surgeon.

Only trained medical men should deal with diagnostic points in radiography—only surgeons should deal with injuries or diseases of bones and joints. The true position of the layman is quite auxiliary to that of the radiologist and surgeon.

If the surgeon availed himself more frequently of the services of a trained radiologist and the two considered their cases from all aspects, surgery would have a very small percentage of failures.

The place of the layman in any scheme for the advancement of radiology is of some importance. It might be well at the outset to state that the day when a layman could be placed in charge of an X-ray department at a hospital or private clinic is gone. The responsibility, which is a great one, should only be in the hands of a qualified medical man. Lay assistance is necessary and the layman must occupy a position in any scheme for the future Assistants must be trained in the electrical side of the work and in the technique of radiography. The more thorough the training can be made the more efficient will be the work turned out in a department. Steps are being taken to ensure the efficient training of lay assistants, and it is hoped that an examination of proficiency, followed by the granting of a certificate, will soon be an established procedure. One of the conditions of the granting of a certificate will be that the holder must only work under the direct control of an experienced radiologist. It is hoped that in this way the layman will have an acknowledged place in our departments and that the status will be thereby raised. The next step will be to ensure that adequate remuneration for the work done is forthcoming.

The collaboration on an equal footing with the medical men of physicists, consulting engineers, and others whose work is essential will also be cordially sought after. In subjects such as radiography and radio-therapeutics there can be no hard-and-fast line drawn between the medical and the non-medical.

The endeavour of those of us who realise the growing importance of our speciality has been to initiate steps which, when materialised, will raise the status of the subjects and of the men practising in them. How can this best be done? The answer is obvious: it can only be done by recognising that it is necessary to teach adequately the subjects at the principal teaching centres throughout the country.

The subjects must be recognised as worthy of a place in the curriculum of study which students require to take before graduation. A full recognition of this kind would at once alter the whole position. It would follow that a chair of radiology and electro-therapeutics would be established at the university, and in my opinion no half-measures should be contemplated. The importance of the subject is sufficiently great to warrant us in approaching the university authorities in the matter.

Already an association of radiology and physiotherapy has been initiated. The chief objects of the new association will be to raise the status of the subjects and to provide for their adequate teaching. Cambridge University has been approached with a view to the establishment of a diploma in radiology and electrology, and there is every prospect that the diploma will materialise.

Teaching will be arranged for at Cambridge and London. It will be, to begin with, post-graduate, but there is no reason why another university should not take up the ante-graduate teaching and later establish a degree in the subjects. Here lies a good opening for Edinburgh to take the initiative.

The London scheme provides for post-graduate teaching at a number of the larger hospitals and steps are in progress for the co-operation of provincial schools. Edinburgh would form an excellent centre for the northern part of the kingdom.

In addition, when funds allow, it is proposed to have a large central institute in London at which the administrative work would be carried out, a museum established, a library, and demonstration rooms set up.

In a complete scheme for the adequate teaching of radiology and electro-therapeutics it is essential that the teaching should commence as early as possible in the career of the student. Physics is, I believe, a subject now included in the curriculum of study. The teaching of this important subject should be on lines which are likely to be useful in the after-career of the student. Thus it may be advantageous to indicate briefly the lines upon which the important subject might be taught. These briefly include the laws of electrostatics, attraction and repulsion, frictional electricity, static machines, electrostatic induction, influence machines, distribution of electrical currents in circuits, Ohm's law, generation of heat by electricity, Joule's law, production, measurement, and detection of electric currents, primary and secondary cells, the transmission of electricity through solids, liquids, gases, and animal tissues.

Electro-Magnetic Induction: the production of induced currents, relations existing between primary and secondary circuits. The induction coil, its construction, method of action, and the importance of the primary and secondary currents, low and high tension electrical currents.

Radiation: heat, visible rays, ultra-violet rays. Sources and methods of production.

X-rays: their production, their place in the spectrum. Relation between wave length and penetrating power. Laws relating to the absorption of X-rays by various substances, for example, metal, bone, tissues, fluids.

Secondary X-rays: their production and measurement. Scattering of X-rays. Conditions under which they may be regularly reflected.

Radium: properties of the different rays emitted by radium and other radio-active bodies. The laws according to which such rays are absorbed by different substances. Secondary rays excited by alpha, beta, and gamma rays.

Electro-technics: direct and alternating currents, their mode of production and distribution to X-ray departments, methods of utilisation of electric power—conversion of direct into alternating current, rectification of alternating current. Motors, dynamos, high tension currents, transformers, and many other practical points in connection with these subjects.

It would be possible in the physics course to include all of the above in a manner profitable to the medical student. He would then be in a position to appreciate the subject when he came into closer touch with it in his more advanced course, particularly in the practical applications of radiology to diagnosis in medicine and surgery and in radio-therapeutics.

The practical application would be taught in the X-ray department in the second or third year when he takes the course in surgery. Every student should spend six months in the department as a clinical clerk. It would be the duty of the radiologist in charge to arrange for a course of instruction which would be based on the following lines :—

Description of apparatus, arrangement of an X-ray and electrical department, with practical demonstration of technique. Normal radiography, localisation of foreign bodies, urinary radiology, pulmonary, gastro-intestinal, dental radiography, radiography of dislocations and fractures, of disease of bones and joints, and radiography of children.

Radiotherapy—X-rays : treatment of superficial diseases ; deep-seated therapy.

Radium : treatment of superficial diseases ; deep-seated diseases.

Organisation of X-ray and electro-therapeutic departments.

System of booking cases, filing, etc.

Photography : practical demonstration and lectures.

Electrology : systematic lectures and practical teaching in electro-diagnosis and electrotherapy.

By the end of the fifth year the student of the future will have learned a great deal more than the average specialist of the present day, and will be in a better position to appreciate the value of the subjects than the general practitioner of the present.

Advanced classes in physics, electricity, and radiology should be available for the use of the men who after graduation wish to proceed to the examination for a diploma or a degree at a university. It should be on the same footing as the B.Sc. or the D.Ph., and should be open only to graduates of at least one year's standing.

Research in these subjects should be encouraged by all means possible. Scholarships should be established. Resident posts at the hospitals and travelling scholarships would be an additional attraction to men desirous of specialising in them.

Research work could be as comprehensive as that in other subjects —in physics, electro-technics, pathology, biology, and experimental work in connection with the use of radiation in health and disease.

The field is large and will be fruitful of results if the work is gone into thoroughly. There are many problems in connection with radio-therapy which might well engage the energies of the very best men we possess. The subject is full of interest, and important discoveries await the ardent investigator.

The short past of radio-activity is full of brilliant research work and important epoch-marking discoveries. In the limitless future discoveries cannot be less striking.

The subject so far has been chiefly dealt with from the point of view of teaching the undergraduate, but I should like to see Edinburgh go far beyond that and venture at once into the establishment of a large post-graduate centre for the instruction of the numerous men who after the war will wish to devote a year or more to study. We in this country must be prepared for the end of the war, and one of the best ways in which our profession can meet future competition from our present enemies will be to organise for graduate and for post-graduate research work in radiology and physiotherapy.

The establishment of a chair in radiology and electrology at the university would be an important step in that direction.

A properly equipped institute would be required to deal thoroughly with the subjects. In this building it would be necessary to have a fully equipped X-ray and radio-therapeutic department, a museum, a library, lecture rooms and demonstration rooms.

The equipment of such an institute would be a matter for careful consideration. It would vary with the needs of the institute and the possibility of linking it up with existing departments at the university and the Royal Infirmary, collaboration with which would be both possible and valuable.

It might be necessary to fit up special laboratories for radium and X-ray research, but that could easily be arranged.

The radium equipment would be a heavy item since two or three grammes of radium might be required. Radium is now selling at £12 per milligramme. Three grammes would cost about £36,000. Apparatus might run into £2000, and a properly fitted up building would be necessary. In all about £50,000 would place you on a footing of equality with other large centres.

The existing radiographic and electro-therapeutic department would require to be brought thoroughly up to date. A considerable sum would be required—£6000 to £10,000 would suffice for all practical purposes. A total sum of about £100,000 would provide for ante-graduate teaching, post-graduate teaching, the equipment of a radium institute with the necessary supply of radium, and the endowment of a chair in the subject.

The business men who look so well after the financial side of your work might naturally ask: Where is the profit to come from? Well, the immediate result would be an increase of prestige. This would in time attract a large number of post-graduate workers who would expect to pay for the advantages they would get from a course of study.

Then your fame would be spread abroad and large numbers of patients would come for treatment.

The advantages of foresightedness combined with shrewd business capacity may be instanced in the famous Mayo Clinic of Rochester, U.S.A., which may be quoted as a thoroughly good business concern and one which is, from the scientific point of view, equally sound.

The Radium Institute of London, instituted a few years ago, is another instance of business enterprise. It has had to enlarge its premises and is daily doing more work, and that with the distinct limitations imposed by the conditions under which the work is conducted.

In Edinburgh you could establish a centre which could be unequalled, for you possess advantages which would all count in your favour. You have all the academic distinction of a famous university and school. All the scientific facilities lie at your hand. In physics you have a distinguished professor whose fame is world-wide. Your surgical fame is great, and in medicine and its allied specialities you are pre-eminent. It only requires a centre stone to complete the arch. That centre stone is radiology. Be bold; grasp the future in both hands. Establish a chair and a post-graduate centre, and equip a radium institute, and you will soon have a world-famous centre to which practitioners and patients will come in ever-increasing numbers.

It does not require prophetic vision to enable one to predict the great success which is certain to reward the workers in a school willing to deal with the subject boldly and thoroughly at the proper time. Initiative and enterprise must go hand in hand. There is no better time than the present, when the movement has been initiated elsewhere and active collaboration is earnestly invited. In this country it should be possible to establish centres for the teaching of students and post-graduates in radiology intimately linked up with those in medicine and surgery, and generally capable of holding their own in competition with those of other countries. Whatever centres are established, Edinburgh, with her unexcelled facilities and advantages, must occupy a leading place. She has occupied a proud position in the past and will undoubtedly do so in the future. It is my earnest wish to see in the near future my old school take a place in the developments of radiology worthy of its great past and establish a guaranteed future in the new field of practical medicine.

DISCUSSION.

Mr. Archibald M'Kendrick.—Dr. Knox has dealt rather with the establishment of a school than with the method of teaching medical students. Although I quite agree that a school such as Dr. Knox suggests might be established in Edinburgh, I think we would have some difficulty in coming to an agreement as to what course of lectures should be given in the medical curriculum on the subject of X-rays. There is no department in the Infirmary which does not send cases to the X-ray department: the negatives then go to the wards, where the students are instructed on them. Thus we have a scattered teaching of X-rays. One would like to see in addition a more centralised teaching. I should leave the teaching of radiology in such a position that it would be an introduction of the medical practitioner to X-ray work, rather than to teach him all the minutiæ of the subject.

Dr. Hope Fowler said that a place should be found in the curriculum for the teaching of radiology on a better footing than at present.

Dr. Spence.—Dr. Knox's paper takes a broad outlook on radiology, in which he is a past master. He has referred to lay radiographers: I hope we shall never allow the laity to control the purely medical aspect of the subject, and that electrical treatment will never be taken out of the hands of medical men. It would be just as unreasonable to do that as it would be to hand over joints to the bone-setter. At the Sick Children's Hospital next winter there will be a recognised clinique for the teaching of radiography to fourth- and fifth-year students.

Professor Robinson.—While I appreciate Dr. Knox's ideal, the problem before us is how to utilise five years for teaching. To carry out Dr. Knox's ideal and to keep to the five years' curriculum does not seem possible. As the anatomist has been referred to so often, I venture to say that everyone who has spoken seems to forget that the anatomist has to teach in one and a half years *all* the terminology, and there are about five thousand terms for the ordinary descriptive purposes of the medical man. To demonstrate to the students the movements of joints, we can only show them radiographs of joints in different positions.

Mr. Struthers.—I am interested in knowing whether elementary radiography really ought to be and must be in the hands of a medical man. We are hampered at present in the use of radiography because our facilities are so limited. I look forward to the time when a radiographic apparatus will be part of the equipment of every department in the hospital, and, instead of having to send the patient to a central department, we shall have our own X-ray apparatus, just as we have our own microscope and stethoscope. Is it not possible to train a number of skilled mechanics, who would work our apparatus for us, and let us use it freely every day and all day? I would have radiography taught as a part of ordinary surgical treatment instead of being too much centralised.

Dr. Rainy.—I would draw a clear line between what Dr. Knox has said as to post-graduate teaching and what he has said as to the possibilities of undergraduate teaching. In post-graduate teaching there is no question, if it is to be done at all, that it must be done in a thorough and efficient way. Men wishing as post-graduates to get some knowledge of X-rays must be expected to devote the considerable period of time to the subject that is necessary before one's diagnosis is worth anything. On the other hand, taking the practical point of the undergraduate, the question does arise: What sort of condition is he in when we get him to train? I take it that Dr. Knox would expect that he must have a certain knowledge of physics before he is taught the technique of X-rays. The student who enters for the course of physics is at present equipped with the following amount of mathematics:—Arithmetic, up to proportion; algebra, up to simple equations; and geometry, up to the third book of Euclid. He then has three months to build up on this an adequate acquaintance with physics. I would attempt that if electricity were the only branch to be taught. If you remember that there must be taught dynamics, physical optics, and the theory of heat and sound, three months is inadequate. Then, too, how many of our students are likely to carry out the practical technique of X-ray work later, either on the diagnostic or the therapeutic side. As long as the apparatus is such as it is at present, it is not a business concern for the general practitioner to do more than accept the findings of a specialist. And therefore I think that the undergraduate's training in technique should be a minimum. We constantly meet with the incapacity of the student to interpret simple radiographs or to understand that he is dealing with shadows and not with solid objects. We *must* teach him this. We can also in our ordinary ward work constantly use radiographs. We should have apparatus for the satisfactory demonstration of radiograms to our cliniques. But I doubt very much if there is time to do more, either in the central department or by the specialist who wishes to work by himself, than to teach the undergraduate the interpretation of the more important radiograms and the errors he must avoid in sending cases to the X-ray specialist. It is important that the student should have some knowledge of the end-products of X-ray work and their interpretation, and I think it is well that he should be taught the sort of things that with our present knowledge are worth asking the radiographers to tackle.

Dr. Chalmers Watson.—I agree as to the necessity of differentiating between post-graduate and undergraduate teaching. Dr. Knox has discussed the reforms of the medical school from the larger outlook, not dealing particularly with the requirements of the undergraduate. I should like to associate myself with what he has said as to the value of radiology in practical medicine and the necessity of embarking on some such scheme as he suggests. I have seen Dr. Knox in his department at Queen's College, with its admirable facilities for teaching and technique. If his enthusiasm can supply us with the courage, vision, and initiative which we lack, he will have done us a signal service. We can and ought to do more for the teaching of the undergraduate. The university has obligations in this matter which it ought to recognise.

Radiology must remain to a great extent in the hands of medical experts. The more I see of radiology the more I am dependent on the skilled opinion of the medical expert, who is doing it every day and all day.

Dr. J. S. Fraser.—We have in the Ear and Throat Department an X-ray apparatus which Dr. Logan Turner fitted up at his own expense, which we have found of the greatest value. The late Major Porter studied X-rays for some time abroad, and on his return he gave us excellent X-ray pictures of the nose and accessory sinuses, and of the mastoid. Instead of having to send a patient to the X-ray department, we had both him and the apparatus on the spot, and the radiograph could be taken at any time. I think there are certain advantages in this separation from the central department. If we had an efficient X-ray installation attached to the special departments we would possibly be able to learn more from it than from perhaps better skiagrams taken by specialists out of our ken.

If this arrangement works better in regard to our own knowledge of clinically studied cases, that in itself would have a certain relation to the teaching of the students. If we had a case for diagnosis, and we could *show* the student the method of taking the X-ray plate on the premises, it would be of value in the teaching.

Dr. Gardiner.—The question of teaching radiology in relation to dermatology is very important, as radio-therapeutics occupy a large part in the treatment of skin diseases. Radiotherapy as regards teaching is of extreme value to the students, and part of our regular routine is to teach them in our own X-ray department.

Dr. Traquair suggested that such things as the movements of joints might be illustrated to a large class by means of the cinematograph. It is not necessary to teach students how to take X-ray photographs.

Dr. Knox said in reply.—I consider that no lay person should ever be put in charge of an X-ray department under any circumstances whatever. It is quite a different matter when you come to deal with the lay operator who works under direct medical supervision. That is unavoidable. We cannot possibly train sufficient medical radiologists to do all the work individually. At my hospitals I train nurses, and I find I get the work very well done indeed. The essential point is that we wish to get the interpretation under our control entirely. I think you cannot have too many X-ray cliniques or too many X-ray installations in connection with your special departments, but you want in this case to have an expert to help with the interpretation.

I can remember, when I was a student in Edinburgh, we had a bone room, where I spent many hours ; and I am certain that if there had been radiograms of these bones I should have learned very much more, as well as something about radiology. The future teaching of radiography in the anatomical schools will consist of something in that direction—radiograms placed stereoscopically where a student can carefully study the structure of the bone and joints, and so on. I should like to see all the anatomical demonstration rooms thoroughly well fitted up with even a cinematograph arrangement ; but I should not recommend anybody to do too much of it unless the protection was very thorough. With a properly taken film one could demonstrate movements quite easily.

If you consider it necessary to teach the student physics, the teaching in that subject should be on lines which would carry him on to his later work in radiology. Physics in the future will play a great part in the treatment of many medical conditions which at present we really do not know what to think of. Mr. Struthers has opened up rather a debatable point. I agree that it is possible to get all your radiograph work done by trained assistants, but I do think it takes a very long time to learn how to interpret the results. I have seen some very woeful exhibitions on the part of surgeons and physicians who ventured to demonstrate X-ray negatives to a class of students when they did not know the elements of the thing. If surgeons are going to do their own interpretation, they will have to study radiology very thoroughly, which is a strong argument for teaching the post-graduate. Does Mr. Struthers, for instance, do all his blood counts and all his bacteriological examinations? I would like to rank the radiologist on the level of the bacteriologist at least. I purposely did not go into the lines on which the student should be taught radiology. If he understands something about physics to begin with, he will in a very short time learn sufficient radiology for his needs, unless he intends to take it up seriously later. The aim of the radiologist in charge should be to see that the student understands the elements of interpretation thoroughly before he leaves the class: that is quite sufficient for the practitioner in later life. The post-graduate teaching is quite another matter. I am certain that after the war we are going to have crowds of men—Americans, Colonials, Canadians—clamouring for such instruction. Any school that will prepare for the termination of the war, and get a good post-graduate school going, will receive these men in hundreds. The men who used to go to Germany will come here if you have the post-graduate teaching in full swing.

Combine and go in for organised teaching, and you break the back of the thing at once. I would specially like to see co-operation between the surgeon and the radiologist.

NEW BOOKS.

The Hearts of Man. By R. M. WILSON, M.B. Pp. xx.+182. London: Henry Frowde and Hodder & Stoughton. 1918. Price 6s. net.

BROADLY speaking, this book is a study of the physiology of the emotions, or at least of the one emotion—"starting" from a sudden fright or excitement. During the reactive stage the author shows how one of the main results is the driving of blood out of the thorax and abdomen into the mass of the muscles, and how the suprarenals, thyroid, pituitary, and pancreas are compressed and yield their secretions into the blood. The whole argument appeals to us as extremely ingenious, though it is not to be supposed that it is proven in all details. In a preface Dr. Wilson publishes criticisms of some of his contentions by Sir James Mackenzie and Dr. Bayliss, and no doubt other objections may be raised to the correctness or his views. This in no way, however, detracts from the originality and suggestiveness of his work.

Blood Transfusion, Hæmorrhage, and the Anæmias. By BERTRAM M. BERNHEIM. Pp. 247. With 18 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1917. Price 18s. net.

THE writer of this volume is well known for his contributions to blood-vessel surgery. The present volume is an elaboration of a chapter on transfusion previously published in his book on the *Surgery of the Vascular System.* Since the publication of Dr. Crile's work on *Hæmorrhage and Transfusion* in 1909 no such complete account has been presented of the principles and methods of this important means of treatment. While the theory of the subject is discussed, chief stress is laid upon the really practical points. After a short historical note the author refers in three chapters to the phenomena of bleeding and its diagnosis. Although it is impossible to state definitely the indications for transfusion of blood in preference to the use of saline in cases of hæmorrhage, Bernheim recommends, as a working rule, that, if the blood-pressure falls to 70 mm. of mercury, blood transfusion should be performed regardless of all other features of the case. The indications for transfusion and the methods of testing the donor's blood for hæmolysis and agglutination are fully discussed. All the well-known methods and apparatus employed in the operations are described and illustrated, and it is interesting to note that the citrate method is recommended at the moment as the method of choice.

Five chapters are devoted to the discussion of the results of treatment by transfusion in the various forms of anæmia, and of rare conditions, such as gas or benzole poisoning. At the end of each chapter a useful list of references to the best literature on the subject is given.

Medical Ophthalmology. By ARNOLD KNAPP, M.D. *International System of Ophthalmic Practice.* Edited by WALTER L. PYLE. Pp. xv. + 509. With 32 Illustrations. London: William Heinemann. 1918. Price 21s. net.

THE importance of the relationship between eye diseases and eye symptoms and the whole field of clinical medicine is not always thoroughly appreciated even at the present day, and not only justifies, but urgently calls for, the appearance of a work on medical ophthalmology, more especially one written in the English language. The present volume, which is designed to supply the needs of physicians and oculists in this respect, is therefore assured of a hearty welcome.

There are fifteen chapters. The first contains an interesting account of the anatomy of the optic path from retina to cortex, and also deals with the topical diagnosis of optic lesions. This is the only illustrated section, and the diagrams are well done, with the exception of one or two which might advantageously be modified in accordance with modern knowledge. The second and longest chapter discusses fully the eye symptoms in diseases of the nervous system. The ocular symptoms of neurasthenia are, however, not mentioned—an omission no doubt intentional on the part of the author, but unfortunate on account of their frequency and the importance of their proper appreciation.

Affections of glands with internal secretion are perhaps somewhat shortly disposed of in fourteen pages, of which seven are devoted to the pituitary body. The section on infectious diseases is largely devoted to syphilis and tuberculosis, which are fully discussed. The remaining chapters deal with poisons, respiratory, digestive, and renal affections, anæmia, diabetes, the female generative organs, the osseous system, skin, and hereditary affections. The author is to be congratulated on the way he has brought together a mass of information covering a very wide field into the compass of a single and not too bulky volume.

As stated in the preface, a free use has been made of already existing material, such as the Graefe-Saemisch handbook and other continental works. This method has the advantage of deriving information in each case from a specially authoritative source, but tends to result in a collection of abstracts which sometimes leave the reader in doubt where he seeks for definite guidance. In several cases, moreover, the work quoted from has been qualified by more recent researches.

The author's style is easy and pleasant to read, though occasionally somewhat condensed, and the type is especially clear and distinct. Both paper and binding are excellent in quality. Professor Knapp's book fills a gap in medical literature, and, in spite of the defects referred to, cannot fail to be of great value to ophthalmic surgeons and medical practitioners.

WAR BOOKS.

War Surgery. From Firing Line to Base. By BASIL HUGHES, D.S.O., Major, R.A.M.C., and H. STANLEY BANKS, Captain, R.A.M.C. Pp. ix.+623. With 373 Illustrations. London: Baillière, Tindall & Cox. 1918. Price 30s. net.

THAT this work was compiled under active service conditions in the East, where there was no access to any library of reference, may account for much of its freshness and force. The authors, who have had three and a half years' personal experience of surgical work in every part of the field—from firing line to base—both in the Western and Eastern theatres of war, have furnished us with a living document full of original observation and clear, unbiassed deductions. As a record of sound surgical work carried out under trying and difficult conditions, it is of great scientific and practical value. How much has had to be learned by the surgeons of our Army during this war comes out, rather than is brought out, by the descriptions the authors give of the wounds met with in the earlier period, and the general evolution of the methods of wound treatment which has taken place since 1914. How well it has been learned is equally evident from the more recent results. The authors have made no attempt at fine writing, but some of their descriptions of the conditions in the trenches, and the wounds that had to be dealt with, literally shock the reader. The section on gas gangrene, for example, reveals the horror of war more poignantly than anything we have ever read outside the pages of Henri Barbusse.

From the purely surgical point of view, which, throughout, is the writers', we specially commend the sections on antiseptics, on wounds of joints and of bones. The illustrations, on the whole, are good; those in colour by Sergeant-Major Powel, R.A.M.C., strike a new note in medical art.

Surgery in War. By ALFRED J. HULL, F.R.C.S. Second Edition. Pp. ix. + 624. With 210 Illustrations. London: J. & A. Churchill. 1918. Price 25s. net.

LIEUTENANT-COLONEL HULL'S work differs from that last noticed in that it reflects the opinions and experiences of many workers, in addition to those of the author and several collaborators who have assisted in its preparation. Since the previous edition many advances have been made in war surgery, and this has necessitated the rewriting of several chapters and the amplification of all. This book will form a useful source of reference to young Army surgeons.

The Orthopedic Treatment of Gunshot Injuries. By LEO MAYER, M.D., New York. Pp. 250. With 184 Illustrations. Philadelphia and London: W. B. Saunders Co. 1918. Price $2.50 net.

DR. MAYER, who is instructor in orthopædic surgery in the New York Post-Graduate School, emphasises certain principles and rules of guidance in the treatment of war injuries from the orthopædic point of view, which he naïvely admits is the point of view of the general surgeon. The treatment of war injuries is considered under two main groups—that given at the front and that at the base hospital. The chapter on injuries to tendons and tendon operations is one of the most satisfactory and is admirably illustrated. A useful and instructive section, devoted to artificial limbs, illustrates the extraordinary ingenuity that has been expended on this most important subject, and particularly the great share that has been taken in devising practicable and serviceable appliances by patients who have had the misfortune to lose their limbs.

War Wounds of the Lung. By PIERRE DUVAL. Authorised English Translation. Pp. 99. With 27 Plates and Illustrations. Bristol: John Wright & Sons, Ltd. Price 8s. 6d. net.

IN April 1917 this volume was published in the French language and an authorised translation was made by certain medical officers of No. 36 British Casualty Clearing Station. Duval may be said to be the pioneer of the more radical type of chest surgery, and his views and technique are embodied in the present volume. Shell wounds of the chest are notoriously associated with a high mortality, both immediate and late—Duval claims to have materially reduced the mortality by early and thorough operations. His technique embraces free exposure of the pleural cavity, deliverance of the lung on to the body surface, cleansing of the lung wounds, with arrest of hæmorrhage and suture, careful cleansing of the pleural cavity, accurate repair of the parietal pleura and chest wall, and subsequent aspiration of the resulting pneumothorax.

While Duval's methods have yielded excellent results, it is, however, the case that his recommendations have not met with uniform acceptance. The principal opponent is Hartmann, whose views have been published in the *Presse Médicale* of February 1917. In addition to the operative technique the book includes discussion of the various pathological and bacteriological problems which are associated with chest surgery.

The translation is, on the whole, a faithful reproduction of the original. It is exceedingly well illustrated, and a perusal of the volume is to be recommended to any whose work brings them in contact with gunshot wounds of the chest.

Gymnastic Treatment for Joint and Muscle Disabilities. By Brevet-Colonel H. E. Deane, R.A.M.C. Pp. 146. With 26 Illustrations. London: Henry Frowde and Hodder & Stoughton. 1918. Price 5s. net.

The author is at war with nearly all machines for moving joints or developing muscles, and substitutes for them exercises performed under skilled direction upon the usual gymnastic appliances. Colonel Deane writes as an enthusiast, and the excellence of the results obtained by him at the Croydon War Hospital are vouched for by Colonels Carless and Mott. The book is well written, but being very condensed can only be regarded as an introduction to the subject, and as an incentive to others to further study of the subject.

The Action of Muscles, by Wm. Colin Mackenzie (H. K. Lewis & Co., price 12s. 6d.) is one of the most illuminating contributions to the study of muscle action with which we are acquainted. It should be carefully studied, not only by orthopædic surgeons, to whom it is specially addressed, but still more by teachers of anatomy as a stimulus to infusing into the student an interest in the function of the muscles rather than in their mere origins and insertions. As a guide to those who are concerned with the restoration of function in disabled limbs, whether as orthopædic surgeons, masseurs, or re-eductors, it will prove invaluable.

Vaccines and Sera in Military and Civilian Practice, by Captain A. Geoffrey Shera, is a valuable addition to the Oxford War Primers issued by Henry Frowde and Hodder & Stoughton, price

7s. 6d. It furnishes a very complete summary of present-day knowledge of the subject.

A second edition of Colonel JOSEPH H. FORD'S *Detail's of Military Medical Administration* (Blakiston's Sons & Co.), published with the approval of the Surgeon-General, U.S. Army: an authoritative exposition in 800 pages of military medical administration and the filling up of forms.

Colonel F. R. KEEFER'S text-book of *Military Hygiene and Sanitation* (W. B. Saunders Co.) also appears in a second edition.

In *Field Sanitation* (Henry Frowde and Hodder & Stoughton) we have a series of lectures given by Major R. ST. J. MACDONALD, C.A.M.C., at the Divisional Sanitary School in the Field. Based on prolonged personal experience, they are eminently practical.

Major ARTHUR C. CHRISTIE, U.S. Army, has revised and enlarged his *Manual of X-Ray Technic* (J. B. Lippincott Co., price 12s. 6d.). This, the second edition, will prove useful in military hospitals. It is clearly written, compact, yet complete, and is well illustrated, particularly the chapter on "The Examination of the Alimentary Canal."

NOTES ON BOOKS.

To Edinburgh men who graduated in the seventies the *Reminiscences of a Student's Life in Edinburgh* by one of their contemporaries, who veils his identity under the *nom de guerre* "Alisma," will afford a pleasant hour's reading. Writing from memory after a lapse of nearly half a century—the author began his medical studies in 1871 and graduated in 1875—the recollections are not always historically accurate, but they are quite delightful and reflect a genial and generous nature. To the writer all his teachers appear as heroes and he cordially worships them. Even in "the youthful student friendships of those days" he "cannot recall a flaw in any of them." It is most refreshing to find such genuine loyalty and affection for his Alma Mater in one who, we gather, has had little direct connection with the school since he left it. The book is published by Messrs. Oliver & Boyd at the price of 4s.

The Twin Ideals, An Educated Commonwealth (H. K. Lewis & Co., price 25s.), is a collection of papers written at different periods by James W. Barrett, K.B.E., etc., and published in various Australian journals. In addition to its retrospective interest it throws light on various aspects of reconstruction.

The second edition of Dr. Whiting's *Aids to Medical Diagnosis*

(Baillière, Tindall & Cox, 1918, price 2s. 6d. net) retains all the good features of the first edition (and, we may add, of most of the other volumes of this useful series), but the section on "Diseases of the Heart" has been altered in accord with recent advances.

As a short appreciation of the man and his work Professor Chandhuri's *Sir William Ramsay as a Scientist and a Man* (Calcutta: Butterworth & Co., 1918, Rs. 1.8 net) will gratify many who were acquainted with the subject of the memoir. The monograph was originally intended as a magazine article; in its extended form it will appeal to a larger circle.

A Laboratory Manual and Text-Book of Embryology, by C. W. Prentice, A.M., Ph.D. (2nd edition, W. B. Saunders Co.), is an excellent text-book and is written from a modern standpoint. The text and illustrations can be highly commended.

We have again received the *Wellcome*—one might almost say ever-welcome—*Photographic Exposure Record and Diary* (B. & W., 1918), which is in reality a good deal more than its name suggests. It is, in fact, a succinct compendium of photographic processes, and from personal experience of a good many years we can say that it is a much-used work of reference. The ingenious calculator has been improved, and now seems to have reached perfection. It is a good eighteenpence worth.

BOOKS RECEIVED.

ANDERSON, DANIEL E. The Epidemics of Mauritius . .	(*H. K. Lewis & Co., Ltd.*)	6s.
BASU, B. D. Diabetes and its Dietetic Treatment. Ninth Edition	(*The Panini Office, Allahabad*)	—
BAYLISS, W. M. Intravenous Injection in Wound Shock .	(*Longmans, Green & Co.*)	9s.
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EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

The Medical Curriculum.

In instituting an inquiry into medical education the Edinburgh Pathological Club has done a useful piece of work. The Report just issued, based as it is on papers by well-known teachers from all parts of the kingdom, is a valuable, and will be a permanent, contribution to a subject fraught with importance to the well-being of the community. In this connection it is impossible not to recall the Reports issued in 1910 and 1912 on Medical Education in America and in Europe by Dr. A. Flexner. Stimulating as these were, they did not materially influence medical education in this country, and they were the mark of a good deal of criticism on certain points. A general comparison of Dr. Flexner's standpoint with that of this Report is not without interest. Dr. Flexner, in his survey of American and European schools, collected his evidence from a wider field than the Pathological Club has done, and his report was not narrowed, as this is, to the consideration of a system of medical education best adapted to local needs. Notwithstanding this, the Pathological Club's Report takes, on the whole, a broader view than Dr. Flexner's. A fundamental proposition in the Flexner report was that medical education is primarily a pedagogic rather than a medical problem, and it followed almost naturally from that point of view that the principal change he foreshadowed was the development of medical schools along purely academic lines—the creation of whole-time professorships with cliniques under the jurisdiction of universities or similar academic bodies, and the evolution of a type of clinicians who were primarily teachers, divorced from practice. One of the chief criticisms of his system, from the British standpoint, was that it chiefly contemplated training professors and teachers, perhaps to the detriment of ordinary practitioners. Apart from this method of raising the general level of medical education to a university standard, Flexner suggested no radical change in the curriculum, nor was there any hint of a new orientation in the teaching of medicine.

The Pathological Club, naturally, approaches the subject from the medical rather than from the educational side, and the new trend of medicine toward organised prevention of disease has had far more part in shaping its scheme than any ideals of a purely academic nature. Several of the contributors, it is true, press for an extension of the system of whole-time professorships, but though the idea is not strongly opposed, the impression given by the Report is that the desire for such was not nearly so widespread as the desire for change in other directions—notably in the way of co-ordinating the subjects of study, so that they may form a continuous whole instead of a discontinuous series, and that at the end of the course the graduate may have a better working knowledge than at present of the application of physiology, anatomy, and pathology to clinical medicine, and some appreciation of his function in the community as a promoter of public health. Hitherto it has been the universal custom to build one subject on another—pathology on anatomy and physiology, medicine and surgery on all these, and to subdivide the course into stages accordingly. The student begins as an anatomist who knows no medicine, and too often he ends as a clinician who has forgotten nearly all his physiology. Nearly every contributor to the Pathological Club's Report asked that the theory of the present system should be made a reality, and the suggestion is that this might be done by teaching the preliminary scientific subjects side by side with, and as far as possible a part of, clinical medicine and surgery. To admit of this it is proposed, again with great unanimity, that clinical work should begin early—in the first and second winter—and that the student's fitness to graduate should be tested by his record of work less than by periodic examinations. An obvious criticism of such a scheme is that it is a throwback to the dead and buried "apprenticeship" system and to "walking the hospitals." But such, in fact, is not the case. In its ultimate analysis the criticism implies that because clinical medicine is as much farther from being an exact science than anatomy as that is from, let us say, astronomy, the teaching of clinical medicine cannot be made so scientific, and must depend on rule of thumb. This we take leave to deny. Clinical medicine and clinical surgery are unrivalled as disciplines for training in observation and in comparison—two fundamentals of the scientific method—and if it could be made possible to conjoin their study throughout with relevant parts of anatomy, physiology, and pathology, all would gain. To recast the curriculum in this sense would not be easy, but the Pathological Club's Report offers strong reasons for the attempt being made.

Post-Graduate Teaching in Edinburgh.

The Executive Committee of the Post-Graduate Courses in Edinburgh have decided to re-organise the post-graduate teaching which has been suspended during the war. Recognising that young graduates who will be released from service with the forces on demobilisation have the first claim on their attention, the Committee have arranged for courses in Clinical Medicine, in Clinical Surgery, and in Obstetrics and Gynecology designed to meet their requirements. The guiding principle in planning these courses has been to afford facilities for the graduate studying his subjects in a practical and consecutive manner, rather than by means of didactic instruction. The professors and lecturers have arranged to work together in "teams," so that the whole of the resources of the school, both in personnel and material, will be available. The authorities of the various hospitals and other medical institutions throughout the city also are cordially co-operating with the Committee in affording facilities for clinical work.

Arrangements have been made by which, in addition to working in the general and special departments of the hospitals, members of the courses may take part in the work of the practical classes of anatomy, physiology, pathology, bacteriology and pharmacology, and also at the ante-natal and child-welfare centres. It is proposed to conduct in each of the academic terms a course in Clinical Medicine and a course in Clinical Surgery; and during the months of August and September the obstetric and gynecological course will be held. As each course will occupy the whole time of the graduate only one course can be attended in a term. The classes are conducted under the ægis of the University and the Royal Colleges. Further particulars may be obtained on application to *The Secretary, Edinburgh Post-Graduate Courses, University New Buildings, Edinburgh.*

Chair of Medical Chemistry.

THE Edinburgh University Court have appointed Mr. George Barger, M.A., D.Sc., to the newly instituted Chair of Chemistry in relation to Medicine.

CASUALTIES.

DIED on 1st February of illness contracted during the battle of Jutland, Surgeon-Lieutenant WILLIAM PEARSON COWPER, R.N.

Lieutenant Cowper was educated at Edinburgh, taking the Scottish Triple Qualification in 1903.

DIED on service, Captain ROBERT AITKEN, R.A.M.C.

Captain Aitken graduated M.B., Ch.B. at Glasgow University.

DIED on service on 1st February, Captain ALEXANDER GRAHAM SPIERS LOGIE, R.A.M.C.(T.F.).

Captain Logie graduated M.B. and C.M. at Edinburgh University in 1887, and before the war was in practice at Raglan, Newport, Monmouth.

THE POSITION OF PHYSIOLOGY IN MEDICINE.*

By Sir EDWARD SHARPEY SCHAFER.

I daresay you imagine I can have very little to say that you do not already know about the position of Physiology in your medical studies, for I have little doubt that you, one and all, look upon Physiology as one of several sciences which are merely incidental to the proper study of Medicine and Surgery—subjects which you are expected to get up to examination point and then to leave behind you as a fading memory while you pursue those which are to furnish you with a career and, incidentally, with a means of livelihood; enabling you to cure, or, as the case may be, to kill with impunity. Certainly you are justified in that impression when one considers the way in which most medical men regard our science, and not only general practitioners, but even many who are assumed to occupy a higher rank in the profession owing to their reputation for peculiar skill in a particular field of medical knowledge. It is true that one does not now so often hear the opinion openly announced that too much physiology is taught to medical students, although it is sometimes still expressed by those who ought to know better. Such a doctrine is coming to be regarded as dangerous. Even the laity is awakening to the fact that, without Physiology, Medicine can make no progress—cannot, indeed, continue to exist, for a science which fails to progress becomes dead. Only a few weeks ago, one of the leading London papers published an article in which not only was the importance of Physiology insisted on, but the dependence upon it of the whole superstructure of Medicine and Surgery was clearly recognised. Nevertheless, it is rare to hear medical men expressing this opinion, the reason perhaps being that most of them are ignorant of the true relations of Physiology to Medicine. What little Physiology they managed to imbibe they usually promptly forgot, having found amongst their clinical instructors no encouragement offered to continue its pursuit. They were not taught by those instructors, who probably did not admit it themselves, that every disease, if its conditions are to be understood, must be the subject of physiological study; nor was it pointed

* Presidential address delivered to the Edinburgh University Physiological Society, 16th January 1919.

out to them that the methods of such study are in the main identical, whether the subject be *Rana temporaria*, *Canis familiaris*, or *Homo sapiens.* Nor is this to be wondered at. Many—probably most — clinicians never had an opportunity of studying physiology in the only way it can be effectively studied, viz. by the experimental method, which necessarily implies long hours of laboratory work. How should the clinician know, and why should he care, whether his methods are scientific or not, if they prove sufficiently successful to enable him to gain a reputation as a practitioner and a more or less lucrative income? He may well believe that if he himself has been able to acquire skill and experience in the diagnosis and treatment of disease by methods traditionally handed down from preceding generations, this is going to be the procedure until the end of time, and that these methods would succeed in turning others into just as good practitioners as himself. And very probably they would!

Far be it from me to include the whole profession in this indictment. There are, we all know such, many exceptions who have endeavoured with a considerable measure of success to keep pace with the progress of Physiology, and to apply its methods to diagnosis and treatment. But the accusation will apply to a majority of practitioners, whether general or special, and it is this which renders reform in the desired direction so difficult.

Unfortunately the tendency to underestimate the value of Physiology is not confined to individuals, but also affects the corporate bodies which have been established to uphold the interests of Medicine and Surgery. The General Medical Council, for instance, which lays down the minimum of time required for the teaching of the subjects of the medical curriculum, makes the scantiest possible allowance for practical instruction in Physiology, and were it not that most of the universities and Medical Schools recognise the impossibility of attempting to get so large a subject into so small a space of time, it might just as well be omitted. The Royal College of Surgeons of England, the Fellowship of which is so highly prized as to be a *sine qua non* for the consulting surgeon in England, has never instituted a practical examination in Physiology for this important diploma, although I notice that the Council has lately appointed a Committee to consider the possibility of altering the examination, "with the view of making it of more practical value as a test for surgeons likely to become chiefly engaged in operative practice." Whether this means a raising or a lowering of the standard of knowledge required I cannot say, but I feel sure that if some of our leading surgeons were consulted, they would report that they had been taught too little physiology rather than too much.

Up to the present I have not, except by implication, introduced the text of my discourse, which in a sermon like this should have come at the very beginning. I will now proceed to do so in the form of a proposition, viz. that *Physiology is the pivotal subject around which all the medical sciences are centred, and furnishes the basis upon which the whole of Medicine and Surgery is founded.* Our predecessors in this university exhibited their wisdom when they gave to Physiology the name of "The Institutes of Medicine"!

The proposition is one which admits of such easy proof that no sane person will attempt to controvert it. For Physiology is the science of the living organism, and seeing that it is with the living organism that the physician or surgeon has to deal, a sound knowledge of Physiology is as essential to him as a knowledge of arithmetic to the mathematician.

In former days men thought that Anatomy occupied this pivotal position. But the object of Anatomy is the investigation of the dead body. Anatomy can only be of value in so far as it throws light upon the functions of that body during life—in other words, on its physiology.

Perhaps you will excuse me if I digress for a moment in order to criticise the methods by which Anatomy is taught in our Schools. It is surely unfortunate that the study of Anatomy is so exclusively confined to the dead subject. For, as I have just pointed out, it is a knowledge of the living body which you will require when you come to make investigations upon your patients, and this knowledge can never be obtained by the mere investigation of the cadaver—least of all by the antiquated and time-devouring methods which are employed in the dissecting-room. It is not altogether the teachers of Anatomy who are responsible for the retention of these methods. Even if they had the will to alter them—most of them, I fear, have not—they would come up against the fiat of the General Medical Council, which prescribes that every student shall dissect the whole of the body in the course of his anatomical training. The prescription at least implies that he shall have a body to dissect, but takes no thought as to where the supply is to come from, and a student is lucky to get at a sixteenth part of a subject in order to work out his allotted task. But he can never acquire in this manner the knowledge which will enable him to understand the condition of the body during life, and most of the time which he gives to dissection is—to make no bones about it—wasted. The supposed necessity for the dissection of the whole body, from skin to skeleton, is a myth which appears to have come down from the Middle Ages. It is extraordinary how it has clung to the curriculum, when one considers that every medical man must be well aware of the amount of profitless time he spent in the dissecting-room. A much more useful knowledge could have been got by the study of specimens in which the parts retain their natural relation to one another, and this in less than half the time taken up by laborious dissections. Every student is aware of the value of such specimens, and for the physician and surgeon the knowledge to be gained by their study is priceless, far exceeding anything than can be learned by dissection. No one supposes that the relations of the viscera to one another during life—the knowledge of which is absolutely essential to the medical practitioner—can be learnt by dissection of the dead body. And the same is true for every other part and organ with which the doctor may have to deal. And yet this antiquated system of study is responsible for the fact that in our medical school—and I have no doubt things are as bad in others—out of the 2100 working hours of the first two years of the curriculum each student is expected to give 1300 to Anatomy, and only 260 to Physiology. And this in spite of the fact that Physiology is not only a more extensive and more difficult subject, but is the science of the living body, upon a knowledge of which the whole of Medicine and Surgery are based, and to which the physician and surgeon must every day look for guidance; whereas Anatomy is the science of the dead body, and owes its main value to the consideration that it is necessary for understanding Physiology. As soon as it is applied to the living body it becomes Physiology, and its problems are identical with those of Physiology.

That it is impossible to practise either Medicine or Surgery without a sound knowledge of Anatomy is indeed true; it is the *soundness* of the knowledge which has been so painfully acquired which I am impugning. Indeed so little that is really useful in Surgery and Medicine is learned by the ordinary methods of teaching Anatomy that it is necessary to have special courses of instruction in so-called medical and surgical Anatomy in order to supplement the deficiency of this teaching, in spite of the great amount of time which has been devoted to it!

As an excuse for the study of Anatomy by means of dissection, it is sometimes urged that this affords training in manual dexterity of great importance to the future medical man, which cannot otherwise be acquired. An argument such as this serves to demonstrate the weakness of the case of those who employ it. It resembles that used by the advocates of the continued waste of time upon classical studies in schools, viz. that these studies afford the only mental and educational training which is of any value, whatever the profession for which the schoolboy is destined —an argument which, although frequently refuted, crops up perennially.

Before we leave the discussion of the true relation of Anatomy to Physiology we may briefly consider the position of that branch of Anatomy which is termed Histology.

As to this, whatever has been stated regarding the position of Macroscopic Anatomy applies equally, perhaps more so, to Microscopic Anatomy. Its chief interest lies in its utility for the elucidation of physiological problems. It has therefore been a sound tradition in Great Britain to place the teaching of Microscopic Anatomy with the physiologist, rather than, as is done in Germany, with the anatomist. There has been lately a tendency on the part of certain English physiologists to neglect or belittle this important asset in their methods of inquiry; but the best physiologists have usually been good histologists, and it is an indisputable fact that many of the most important advances in Histology have been made by physiologists in the pursuit of purely physiological problems.

To return now to our main subject: besides Anatomy, there are two other branches of science which lead up to Physiology and are essential to its understanding—these are Physics and Chemistry. To Biology I need not specially refer in this connection, since it is a recognised part of Physiology and is usefully employed to inculcate the fundamental principles of that science as they are exhibited in the lower animals and in plants. Nor need those portions of Zoology and Botany which lie outside the immediate range of Physiology detain us, valuable as they are in themselves, for they are not essential to its understanding, nor have they any important clinical interests. But since Physiology consists in the application to the living body of Physics and Chemistry, a sound knowledge of the general principles of these sciences is an essential part of the education of the medical student. There may be a difference of opinion as to where these subjects are best learned. Some authorities hold that they can only be properly taught in a medical school. Others believe that they would come more naturally into the ordinary school curriculum, instead of a part of the inordinately inflated classical instruction which has hitherto dominated everything else in our large public schools. Personally, I share the latter opinion, since the principles of a science are the same whatever their subsequent applications are to be; and the application of the principles of Physics and Chemistry to the elucidation of Physiology is the function of the teacher of Physiology, not of the teachers of Physics and Chemistry. At any rate, if these sciences are to be taught in a medical school, they should at least be taught efficiently, and a year would be too little to devote to that purpose, even if Zoology and Botany were not included in that year. But unfortunately they are included, and to add to the overcrowding, the cuckoo has laid her egg in that nest also, so that these unfortunate hedge sparrow chicks are almost starved out of existence, owing to the appropriation of a large part of their pabulum by that time-devouring bird!

It seems scarcely credible that there are some amongst us who wish to introduce yet other subjects into the work of the first two years, overburdened as these already are. And it is still more incredible to hear that the subjects it is desired to introduce are those which are now confined to the final years—subjects which cannot be so much as comprehended until the sciences on which they are based are already mastered.

The idea is current amongst the laity that the study of Medicine and Surgery consists in "seeing cases" and in learning from a practitioner the methods by which he treats them. Persons who have no acquaintance with science are unable to understand the relations of the medical sciences to one another, nor how the study of the more complex must be preceded by that of the simpler. Now the science of the living body is one of the most complex, and when the body is modified by disease the complexity becomes even greater. It is, therefore, about as logical to begin the study of medicine before a knowledge of the sciences upon which it is founded has been acquired as to attempt to learn arithmetic before the multiplication table has been mastered.

The present generation of medical students has, fortunately for itself, no experience of the consequences of such a reversal of procedure; but those of us who belong to an older generation had that experience in abundance. At the time that I myself became a medical student in London, in the late sixties, it was still customary, although no longer compulsory, for a boy after leaving school to be apprenticed to a medical practitioner, with whom he visited his cases, and for whom he helped to compound his medicaments; and the practitioner was supposed to impart to the apprentice a knowledge of the diagnosis and treatment of illness and disease. And when a young man entered at a medical school—whether he had previously served an apprenticeship or not—he was expected from the first to attend the hospital to which the school was attached, and to listen to the clinical teaching there given, whether in the wards or operating theatres or out-patient department. This we, all of us, had to go through, and we were said to be "walking the hospitals." Our fond parents supposed that we were thereby acquiring a practical knowledge of our profession, and we, no doubt, looked upon ourselves as budding practitioners, especially when a patient insisted upon addressing us as "Doctor"! But we subsequently found that all this early attendance at hospital was so much wasted time; for although we listened open-mouthed to the words of wisdom which flowed from the lips of our teachers, we were unable even to understand the language they were speaking, knowing nothing about the organs the diseases of which were being explained to us; their very names in many cases were strange to our ears. As a result of this waste of time no student could, at that time, hope to pass his examinations in Anatomy and Physiology—although there was then much less to be learned—until three years after entry; and everything which he had been supposed to be acquiring in the way of medicine and surgery had to be learned over again in the light of the new knowledge which he had gained from the study of these sciences. I cannot imagine it possible that anyone who has himself been a victim of this superseded system would wish to inflict it upon others, and I can only assume that those who are working for this end have had no personal experience of its consequences.

It is possible that when diagnosis and treatment were of the rule-of-thumb character there may have been something to be said for early visitation of the hospital, and even for apprenticeship. In the old days Medicine and Surgery were regarded as "Arts" rather than "Sciences," and even when their scientific character came to be conceded, text-books were still written on the "Science and Art of Surgery" and the "Science and Art of Medicine." But it is no longer possible to look upon them as anything but sciences—unless the cultivation of a "good bedside manner" may be regarded as a relic of a lost art, in the same way that the buttons at the back of the professional frock-coat are relics of the swallowtail which was *de rigueur* in the reign of the fourth George. Fortunately, this point of view has for the most part disappeared with the recognition of the entirely scientific character of Medicine and Surgery—a recognition which we primarily owe for Medicine to the great Frenchman, Louis Pasteur; for Surgery to the great Englishman, Joseph Lister. As a result of this recognition it became unusual, at least in London, in the course of the seventies, for the student to attend the hospital clinics in his earlier years, and ultimately it was laid down in most of the medical schools that Anatomy and Physiology must be studied, and the examinations passed, before the student could be permitted to spend any part of his time on the more distinctively medical subjects. But in Scotland changes have come more slowly, and it was only in quite recent years that a similar rule was adopted in the University of Edinburgh. When I came here from London in 1899, I found to my surprise that my Physiology students were required to attend Surgery lectures and practice in their second year, and Medicine lectures and practice in their third year—in both cases concurrently with Anatomy and Physiology—and had therefore to spend every morning from eleven to one in the wards of the Infirmary. I need hardly say they were not in a position to learn much from this premature attempt to impose clinical work upon them; and I leave you to imagine how their physiology suffered! Needless to say, there was friction between the Professor of Physiology and the Clinical Professors, which at one time threatened to culminate in a deadlock. [In my own defence I ought, perhaps, to explain that if this friction was not felt so much in the time of my predecessor, it was not necessarily because his successor was of a more combative disposition, but because experimental work in Practical Physiology had not been introduced into the curriculum.] The deadlock was averted by the removal of Surgery to the third year and Medicine to the fourth,* and the concentration of the teaching of Physiology into the second year, attendance on that subject during the third winter session being dispensed with. On the other hand, the condition was laid down that since the whole instruction in Physiology had now to be got

* The relative positions of Surgery and Medicine in the curriculum have since then been reversed.

within the compass of a single year, the student must not be required to attend any other course within that year, with the exception of Practical Anatomy. This change was made in 1908, and a great improvement at once manifested itself from the point of view both of Physiology and of Medicine and Surgery.

Physiology is a vast subject with many ramifications, and a year is all too little to acquire a practical acquaintance with it. Nevertheless, if every student could really devote a whole academic year to this subject, he might have a chance of obtaining such a knowledge of it and its methods as would be of great value in their application to the study of disease. But so far from a whole year being devoted by each student to the subject, it has not hitherto been possible to arrange that he should have more than one-third of that time. This result is due to a lack of laboratory accommodation as compared with the number of students to be provided for. The effect of the deficiency is that the work has to be carried on in at least three relays, and the time parcelled out into thirds. Moreover, the work has to be done hurriedly, without the leisured effort which is the first requisite for all scientific experimentation. And as the places used are required for the next relay, the tables have to be cleared, the work interrupted, and a large amount of time taken up in dismantling apparatus used by the one set of students and in re-establishing it for the next set. As a consequence of this lack of laboratory space, each nominal three months' course—which academically means ten weeks—is really represented for every student by little more than three weeks!

The remedy for so serious a condition of things is the provision of enough laboratory accommodation to permit every student to have his own—properly equipped—place, to which he can come and do his work without undue haste, and without the necessity of disarranging his apparatus at the end of an hour or two. This provision of adequate space is obviously necessary, and must be found if we are honourably to recognise our obligations to the students we admit to our courses of instruction. It will necessitate a completely new Institute of Physiology, for no amount of tinkering with the present laboratory will avail to meet the want of accommodation from which we are suffering. For the ordinary practical classes alone four times the present amount of floor-space is required, to say nothing of provision for advanced teaching and research, without which no university is worthy the name. And the university is under obligation not only to the students whom it admits to its courses, but also to the professors appointed to conduct the instruction. Previously to the last Royal Commission on the Scottish Universities, the professors themselves took the fees of their students and were expected to provide the means of instruction. Under that system the gross income of the Professor of Physiology exceeded £3000, and that of the Professor of Anatomy £4000. The Commission cut down the salaries to considerably less than half these amounts, but on the expressed condition that all the requirements for teaching, including the provision of adequate laboratory accommodation and assistance, should be met by the university. No doubt with the growth of the system of laboratory work the expense of providing for these requirements has greatly increased, but this does not absolve the university from its obligations. The professors in charge of the practical departments have been called upon for much more work than before: in the case of Physiology, the time now occupied in teaching is more than three times as much as it was under my predecessor. But strange as it may seem, I have not yet heard that the University Court are proposing to increase either my salary or that of my colleagues in proportion to the additional work and responsibility thrown upon us!

Obviously the provision of increased accommodation requires a large capital expenditure—far too large to be met by voluntary gifts, even if the beneficent millionaire were as common in Scotland as in America. Not that I personally have any desire that the want should be met in this manner; for beneficent millionaires have a way of laying down conditions which hamper the free development of a university. Moreover, we do not ask for charity, but we do ask that the Government of this great country shall admit its responsibilities in the matter of university education. It has been compelled to admit them in the spheres of elementary and secondary education. Why should not the universities be similarly supported? I for one have no hesitation in believing that the future welfare of the Empire largely depends upon its universities. Nevertheless the United Kingdom is far behind even its own Colonies in this matter, and æons behind the United States of America. What has struck me more than anything else in my visits to the States has been — not the enormous advances in agriculture, in manufactures, and in commerce, wonderful as these undoubtedly are—but the extraordinary development of the universities. Of the large number of States in the Union—I forget how many there may be now—there is hardly one that has not a first-class university, with all the financial resources of the State Government to back it up, and with the highest intellectual interests of the State centring upon it. Privately endowed universities exist in addition, their endowments ranging from five to thirty millions of dollars. But it is the State-supported universities which must in future form the backbone of higher education, and it is upon them that the development of the country, both moral and material, will ultimately depend. The empire of education has already bent its way westward. Only by a great effort on the part of our universities, backed freely by funds furnished by the State—measured not in thousands but in millions—can we hope to maintain, indeed to recover, that pride of place in higher education which has hitherto been the confident boast of this nation.

I find myself again almost losing sight of my text, owing to the vast perspective which the discussion of the necessity for the future development of the universities in this country has opened out. That text, I must remind you, is the pivotal position of Physiology in medical study. Everything that you learn before you come to Physiology leads up to it, and owes its main value to that circumstance. On the other hand, Physiology through its sister sciences, Pathology and Pharmacology—between which and Physiology there is no dividing line — leads to Clinical Medicine and Surgery. And besides this connection through Pathology and Pharmacology, Physiology has a still more intimate relationship with medical and surgical practice, for without a present and accurate knowledge of the normal functions of the body the investigation of abnormalities is impossible. And this is just as true for Surgery as for Medicine; partly because most surgical cases are, in the first place, medical cases; partly because the surgeon, as well as the physician, is constantly coming across problems which are purely physiological in character. This has been lately brought home to me, because I have been frequently consulted since the war on disturbances of function consequent on wound injuries and the best methods of dealing with them. Most physiologists have, I fancy, had a similar experience; not that the physiologist possesses a magic wand warranted to clear all difficulties out of the way, but he may often be able to indicate in what direction the solution of a difficulty is to be found, and this will be, at any rate, a step towards its disappearance.

The ancient notion that Surgery is based on Anatomy and

Medicine on Physiology is an erroneous one. Both these subjects are dependent—and equally so—upon Physiology. Both are also dependent upon a knowledge of Anatomy, but only in so far as it is applicable to the living body. In this case, as I have already said, the distinction between Anatomy and Physiology vanishes—the one is merged into the other.

I have so far only dealt with Medicine and Surgery as general subjects, but everything I have said about their relations with Physiology applies very evidently to the branches in which men are inclined to specialise. In this connexion I need only mention midwifery, diseases of the nervous system, affections of the eye, diseases of the secreting glands, and, last in date but not least in importance, derangements of the endocrine organs. There is no dark spot in clinical medicine and surgery which cannot be illuminated by the lamp of Physiology, although we may have to wait a little for its rays to penetrate to every corner. The first necessity is that the medical student shall have a thorough practical acquaintance with this science, which can only be met by setting aside a reasonable amount of time for experimental work. Three months might suffice if the larger part of the day were given to it; three weeks is absurdly inadequate! Naturally, also, the student must be thoroughly grounded in the subjects which lead up to Physiology, and that again largely by practical work. And lastly, the applications of Physiology to Medicine ought to be in the hands of clinical teachers who are themselves trained physiologists, and who owe their selection as clinical teachers partly to the possession of this qualification. It is not necessarily the brilliant operator or the fashionable physician who makes the best clinical teacher. He will generally prove to be the best who has had the best scientific training, provided always that he possesses the gift of imparting knowledge to his pupils.

MALARIA IN MACEDONIA.

A Clinical Lecture Delivered in the Royal Infirmary.

By ALEXANDER GOODALL, M.D., F.R.C.P., Lecturer on Clinical Medicine, University of Edinburgh, Temporary Major, R.A.M.C.

Ladies and Gentlemen,—Since I last lectured in this room I have seen and been responsible for the care of some 20,000 cases of malaria. This disease is caused by a parasite which infects the red blood corpuscles, and it is conveyed to man by the agency of certain mosquitoes. Nearly thirty varieties of mosquito are known to carry infection, but only three are met with in Macedonia. These are anopheles maculipennis, anopheles bifurcatus, and myzomyia superpicta. The males are vegetarians, but when the females come out in the evenings they are out for blood. A glance at a contour map of Macedonia shows that Salonika is surrounded by an enormous plain for about 40 miles. An important ridge to the north-east separates this plain from the Struma Valley, but the rest of the environs of Salonika is low-lying and marshy and offers ideal conditions for the propagation of mosquitoes. Thousands of pounds have been spent in drainage and other antimalarial operations round camps and hospitals, but it would take millions to complete the work.

Life-History of the Parasite.—The malaria parasite lives part of its history in the mosquito and part in man. When an infected mosquito bites a human subject, the sporozoites enter the red blood corpuscles as trophozoites, enlarge, and eventually form rosettes. These rosettes break up into twelve or more merozoites, each of which may infect a new blood corpuscle. On the other hand, some of the parasites differentiate into sexual forms.

The females in some cases may sporulate and reinfect corpuscles, but the male forms probably die out unless taken into a mosquito.

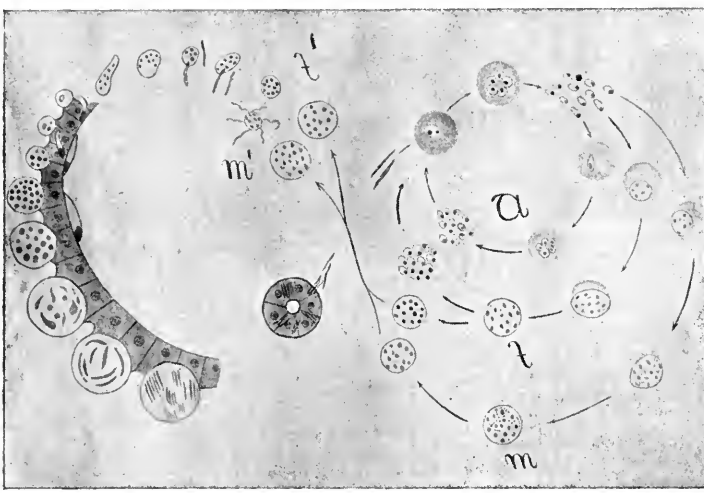
When a mosquito sucks blood containing sexual forms these conjugate and form cysts in the mucous membrane of the stomach of the mosquito. These cysts eventually rupture and liberate sporozoites. Some of the sporozoites reach the salivary glands, and thus the parasite may infect man again when next the mosquito feeds.

Three varieties of malaria parasites are recognised. These are Plasmodium vivax, which causes tertian fever; P. malariæ, the cause of quartan fever; and P. falciparum, the cause of malignant or subtertian malaria.

Each time a group of rosettes breaks up to form merozoites, toxins are liberated, and thus the incidence of symptoms corresponds to the life-cycle of the parasite.

P. vivax runs through its cycle in man in forty-eight hours. The host thus receives a dose of toxin and undergoes a febrile reaction once in two days.

The quartan parasite has its cycle in man in seventy-two



LIFE-HISTORY OF THE MALARIA PARASITE.

a The asexual cycle in man. *f.* The female cycle in man. *m.* The male cycle in man. f^1, m^1. Female and male gametes which conjugate in the mosquito to form a zygote—the oökinete. This forms an oöcyst, different stages of which are shown under the epithelium of the stomach of the mosquito. Eventually the oöcyst develops sporoblasts which become sporozoites. When the cyst ruptures these reach the salivary glands and from there may be passed into the blood of man.

hours. The paroxysms therefore occur every third day, *e.g.* Tuesday, Friday, Monday, Thursday.

P. falciparum runs its course in forty-eight hours or less. The incidence of symptoms is thus on alternate days, but the intervals are often shorter. The fever is therefore sometimes called subtertian. Tertian and subtertian fevers are common in Macedonia. Quartan malaria is hardly ever seen.

Symptoms.—After a person is bitten by an infected mosquito it takes ten to twelve days till the parasites are sufficiently numerous for their toxins to cause a reaction when the rosettes break up. This is the incubation period.

A typical paroxysm consists of a cold stage, a warm stage,

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and a sweating stage. The cold stage begins with a feeling of chilliness and a succession of rigors which may be very violent, and, in spite of the patient's sensations, the rectal temperature is steadily rising. In from ten to twenty minutes this stage has passed. The patient begins to feel flushes of heat. These become more frequent and last longer, and soon the patient is uncomfortably hot. The pulse is full and dicrotic, the arteries throb visibly, and there is severe headache and often vomiting. This stage may last several hours. Relief comes with the sweating stage. At first perspiration is slight, but it soon becomes profuse. The patient generally falls asleep and awakes much more comfortable, though sometimes there is danger from collapse. In a typical case no further symptoms arise for forty-eight (or seventy-two) hours from the beginning of the attack.

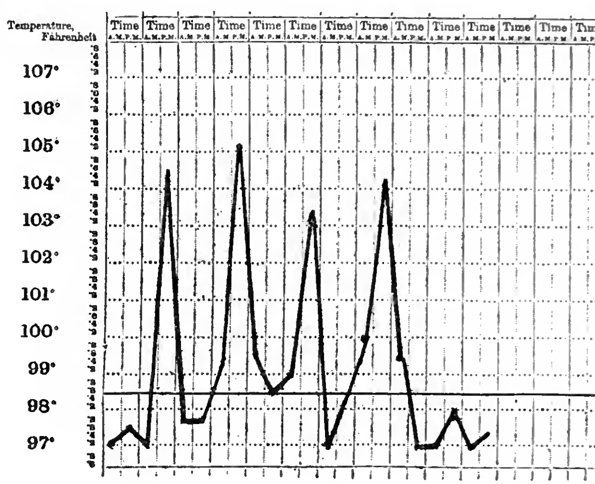

CHART I.

Typical chart of simple tertian malaria from case of a Serb private, aged 37.

Multiple and Local Infections. — A simple typical attack is rarely seen in Macedonia. Mosquitoes are so numerous and so heavily infected that the human infection is usually multiple. Thus patients are exposed to a fresh dose of toxin every day, or even twice a day, and it is nearly as common to see cases with remittent or continuous pyrexia as with typical intermittent fever.

Another factor giving rise to special symptoms is a localisation of toxins. The infected corpuscles, especially in malignant tertian cases, have a tendency to adhere to each other and form little

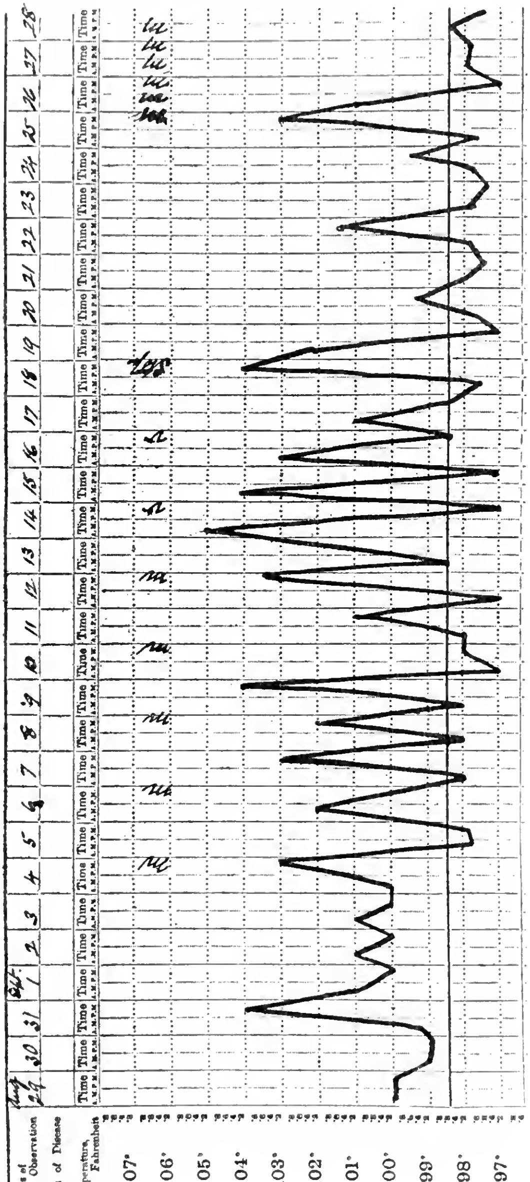

CHART II.

Jugo-Slav, aged 26, malignant tertian malaria. Quinine, in 45-gr. doses, was given daily by the mouth. In addition, intramuscular injections of 20 grs. were given on the days marked *M*, and intravenous injections of 20 grs. were given on the dates marked *V*. Quinine was th n withheld entirely from 18th to 25th September. Thereafter intramuscular injections of 20 grs. were given twice daily for four days, and then oral administration was resumed. There were no further symptoms after the 26th.

plugs in the capillaries. These act as thrombi and as local centres for the production of toxins. The symptoms which may arise from multiple or localised infection may be conveniently grouped under the different systems of the body.

Alimentary System.—Vomiting is a common feature. It is sometimes very persistent, and is not infrequently associated with jaundice. This type of case is well known, and is referred to as *bilious remittent fever.*

Parotitis is not uncommon. The chief difficulty it presented was in distinguishing it from mumps. It usually subsides but rarely suppurates, and more rarely there is a sloughing of the whole gland.

Malarial appendicitis is a common and a difficult condition to deal with. The questions that have to be answered are:—

Is the condition purely malarial?

Is the condition a septic one in a malarial subject?

Is the condition purely septic?

Fortunately a reliable guide to treatment is to be found in the blood examination. The finding of parasites is helpful but insufficient. The leucocyte count, however, generally keeps one right. In the absence of a leucocytosis and increased polymorph percentage the case can be left to the influence of quinine. When leucocytosis is present the case may be commended to a surgeon. I saw many such cases and the leucocyte count only once led me astray. The patient appeared to have a definite appendicitis; he had a high leucocyte count and high percentage of polymorphs. On the strength of this we advocated operation, with the result that an appendix, showing only slight congestion, was duly removed. The cure was completed by the administration of quinine.

The opposite and more serious error is even less likely to occur, since an appendicitis demanding operation does not occur without a disturbance of the leucocyte count.

Malarial diarrhœa, when associated with blood and mucus in the stools, at once raises the question of superinfection with dysentery. Some authorities regard all such cases as dysenteric, but I cannot accept this view. The finding of parasites in blood or organisms in the stools and the results of quinine treatment generally clear up the diagnosis. As in all cases of disturbance of the alimentary canal, the quinine should be given by intramuscular injection.

Hæmopoietic System.—Enlargement of the spleen is almost invariable, and is an important diagnostic sign. In one case I saw an enlarged spleen cause obstruction of the colon, which was overcome with purgatives and quinine. Lymphatic adenitis sometimes occurred but was not common.

In one case I saw a thyroiditis which went on to abscess formation. Its relationship to the malaria was not clear. Anæmia was always present but was seldom so severe as the patient's appearance had led one to expect. In almost all cases it was of secondary type. I saw one definite example of pernicious anæmia with numerous megaloblasts and high colour index. The patient rapidly recovered under quinine and arsenic, and I regarded the condition as due to a localisation of parasites and their toxins in the bone-marrow.

Circulatory System.—In every case there is a certain amount of cardiac dilatation, and the number and variety of murmurs one hears is astonishing. In all the more severe cases serious damage is done to the heart, and heart failure is the most common cause of death. Most of the other dangerous symptoms can be met by adequate quinine treatment, but quinine does not restore a failing heart. The pathological changes are described by Dudgeon and Clark (*Lancet*, 1917).

Respiratory System. — A moderate degree of bronchitis is common, and patches of broncho-pneumonia are frequently found. In most cases these clear up rapidly under quinine. On the other hand, pneumococcal pneumonia complicating malaria is a formidable condition.

Integumentary System.—Herpes labialis is extremely common. Erythema and urticaria are not infrequent. Other rashes are less common and may be difficult to distinguish. A malarial rash may imitate that of measles or scarlet fever, and I once saw a case with an eruption and mottling which closely resembled typhus. A localisation of parasites in the extremities may lead to gangrene of the fingers or toes, but this is very rare.

Urinary System.—Malarial symptoms are rare, but I have seen cases of cystitis, nephritis, and hæmaturia. The exact etiology of blackwater fever is a matter of controversy, but it is always associated with malaria. After the Serbs crossed Dobropolje on 15th September 1918 they advanced so rapidly over mountainous country that their ambulance service could not keep pace with them, and a week or more might elapse before a sick or wounded man reached hospital. At one general hospital at that time I saw over a dozen cases of blackwater fever. The causal factors were malaria, exposure, and fatigue.

Special Senses.—Among symptoms affecting the special senses the one which was most frequently noted was a superficial stellate ulceration of the cornea.

Nervous System.—Symptoms referable to the nervous system were frequent and of great interest. A local neuritis was common. I saw two examples of multiple peripheral neuritis. One case of great interest presented all the common phenomena of locomotor ataxia except the Argyll-Robertson pupil. A complement-deviation test for syphilis was negative. The cases of outstanding interest, however, were the cerebral cases. Symptoms might arise with startling suddenness, and when treated timeously the almost immediate transition from grave danger to obvious recovery was one of the most dramatic and gratifying experiences of medical practice. Most of these cases were due to the malignant tertian parasite, but a few were caused by P. vivax. A common occurrence was for a malarial patient, often regarded as convalescent, to complain of giddiness and go to bed. In a few minutes he became drowsy, then comatose, and unless treatment was prompt and drastic a fatal outcome was the result in a few hours. More rarely the patient would be struck down as if by apoplexy or sunstroke. Many different conditions might be imitated, and among the cases of which I have notes were the following:—A type which suggested that the patient was malingering was not uncommon, and I once saw a case where the man had almost run amuck, and I found him in a detention tent under a charge of assaulting a non-commissioned officer. These cases when examined would not answer questions but resented interference. When the pupils were examined the eyes were tightly closed and the head turned away. If the reflexes were examined, the legs would be drawn up and the patient appeared to try to make difficulties. In other cases epileptic fits supervened. Stertorous breathing and twitching of the limbs might suggest apoplexy. I saw two cases of actual cerebral hæmorrhage. Other conditions which were imitated were cerebro-spinal fever, acute mania, and tetanus. The diagnosis was often difficult. Perhaps the most helpful factor was that cerebral malaria was the most common and therefore the most likely condition. The spleen was practically always enlarged, and parasites could usually be found. The temperature gave no guidance. Many of the cases were afebrile. The knee-jerks were usually absent but were often normal and occasionally increased. Some cases showed Kernig's sign. Our rule was to treat the doubtful cases as malaria. We argued that we could do little for the condition imitated, but that with half a chance we could cure cerebral malaria. We had our failures. These were practically always due to seeing the patient too late, and the cause of death was almost always heart failure. Nearly all my fatalities occurred among the Serbs and Jugo-Slavs after the push on 15th September. Many of these cases were comatose and some of them more dead than alive on admission. A complication of cerebral malaria which almost always precluded recovery was pneumonia. Here one faced the dilemma that, untreated, the patient would die, and that, on the other hand, an intravenous injection of quinine would almost certainly be fatal.

Treatment.—The treatment of malaria is a big question, and time permits me to give only the baldest outline of my own practice. When a case was first seen, unless symptoms were urgent, one gave 10 grs. of sodium salicylate and a dose of calomel. The following morning one began the administration of quinine by the mouth. One gave either 45 or 60 grs. a day, according to the severity of the case. As the temperature generally rose in the afternoon, one usually gave 30 or 40 grs. in the morning, and 15 or 20 grs. at noon. If pyrexia continued after forty-eight hours one gave 20 or 30 grs. by intramuscular injection into the buttock or deltoid, care being taken to keep away from the great sciatic or musculo-spiral nerve. The injections were repeated daily till the temperature came down.

Administration by the mouth was then resumed for ten days and thereafter half the dose was given for another ten days. Many authorities continue quinine for a much longer period. I need only remark that I am not convinced of the efficacy of quinine in preventing relapses, and that I am convinced that harm may result from a prolonged course of quinine.

I do not intend now to discuss the prophylactic use of quinine. In cases which resist quinine it is well, if it can safely be done, to stop its use for a week and then start again with intramuscular or intravenous injections. I have had no success with methylene blue, salvarsan, or galyl. Arsenic may do good, but is a very poor substitute for quinine.

Cerebral cases must be treated promptly with intravenous injections of quinine. These may be given either concentrated or in a large quantity of saline solution. I am not convinced that one method is better than the other, unless the patient is collapsed and a saline infusion is indicated on its merits.

Technique.—When concentrated quinine is used, one draws a boiled solution of 30 grs. of bihydrochloride of quinine into a sterilised 10- or 20-c.c. syringe with a rubber connection to the needle. The syringe is then nearly filled with warm, sterile, physiological salt solution. The arm is cleaned with spirit, and then the upper arm is constricted by twisting a folded triangular bandage round it so as to engorge the veins. This bandage is held by an assistant. The needle is inserted into a vein with the bevelled surface of the point downwards, and held at such an angle that the bevel is parallel to the deep wall of the vein. A little blood is withdrawn into the syringe, and then the assistant is asked to let go the bandage. The injection is made very slowly, and the pulse must be carefully observed.

When the injection is given in a large quantity of saline, say a pint, the needle is connected with a glass funnel containing saline only, and the quinine is added when the saline is seen to be entering the vein.

The patient is often obviously out of danger before the injection is complete, but in some cases half an hour may elapse before symptoms have subsided, and in other cases a repetition of the dose may be required.

The procedure is not without danger, and disconcerting symptoms, such as opisthotonos or convulsions, may occur. The danger is in direct proportion to the state of the heart, and when the circulation is poor one may have to rest content with repeated small doses.

Some Illustrative Cases.

Case I.—Private I., aged 24, had been twice on the dangerously ill list with malaria in summer 1917. He had several minor attacks the following winter. On 22nd May 1918 he felt fevered but did not report sick. At 10 p.m. on 24th May he became delirious and I was asked by the orderly medical officer to see him. He was then comatose and delirious. He did not recognise acquaintances and his attention could not be attracted. He muttered continuously, and threw about his limbs and twisted his body. Occasionally he shouted incoherently. The skin was hot and dry. Temperature was 105° F. The spleen was just palpable. The heart and lungs seemed healthy. Pupils were dilated. Knee-jerks could not be elicited. At 10.50 p.m. I administered 30 grs. of bihydrochloride of quinine in 10 c.c. of saline solution intravenously. There was immediate improvement. The patient became quieter and he could be roused. He could answer "Yes" or "No" to questions, but said nothing further. The violent movements of his limbs were replaced by muscular twitching of cerebral type. Great restlessness and occasional muttering continued. The forehead became moist but there was no general perspiration. At 11.30 P.M. this condition persisted; temperature was then 104·5° F. I therefore repeated the intravenous injection of 30 grs. of quinine. The effect was immediate. There was profuse perspiration. The restlessness and twitchings stopped, and questions were answered readily. Patient fell asleep and awoke in the morning with a temperature of 97·8° F., and had no complaint beyond a slight headache. He had no recollection of the previous night's proceedings. His subsequent progress was uneventful.

This was a case seen early where the pulse was good and one could push quinine without anxiety. Sixty grs. intravenously within an hour is heroic dosage, but I do not think a less dosage would have succeeded. In any case, the end justified the means.

CASE II.—Private L., aged 32, admitted to hospital on 10th October. He had reported sick on 3rd October with headache, vomiting, and pains in the legs. He had no previous malaria. On admission temperature was 101·5° F., pulse 100. The tongue was furred; there was slight icterus and some sickness. The spleen was enlarged, but not palpable. Parasites were not found. He was ordered quinine, 40 grs. daily, by the mouth, but as he became dull and drowsy later in the day, he received 18 grs. by intramuscular injection. Next day he was better, but as he had occasional vomiting the intramuscular injection was repeated. On the 12th the temperature was 103° and patient became delirious. He received an intravenous injection of 24 grs. of quinine at 2 P.M. and an intramuscular injection of 18 grs. at 9 P.M. On the 13th he seemed better and the temperature was normal. He received 40 grs. of quinine by the mouth. At 9 P.M. he became restless and delirious—said there were people below his bed. On the 14th he was more quiet and seemed better, but had delusions of suspicion. On the 15th he became maniacal, and argued fiercely that he should not be shot without a court-martial. He had hallucinations of sight and hearing. The tongue was furred, the knee-jerks were sluggish, the speech was thick and slurring. A consultation of experts was now held. An asylum superintendent thought the patient had general paralysis of the insane; a gynecologist thought he suffered from quinine poisoning; while our eye specialist maintained that the true diagnosis was delirium tremens. Fortunately for the patient, my surgical colleague strongly supported my view that the case was one of persistent cerebral malaria. Acting on this opinion, we administered 18 grs. of quinine intravenously at 11 A.M. and again at 6 P.M. On the 16th patient was drowsy and heavy, but quite rational. Quinine was continued by the mouth. He steadily improved, and was practically well by the 20th. By this time the spleen had become palpable, but parasites, in spite of repeated search, were never found.

CASE III.—A Serb private was admitted unconscious to hospital on 21st September. He had been diagnosed as a case of tetanus in a French field ambulance, and had received an injection of 20 grms. of antitetanic serum. No further history was available. The temperature was 105·4° F. No wound could be found. The patient was taking fits of opisthotonos every few minutes and minor convulsions which chiefly affected the left arm and leg. Between the fits there was complete muscular relaxation. The muscles of the jaw were not specially involved, and external stimuli had no effect in determining convulsions. For these reasons the fits were thought to be malarial rather than due to tetanus. Moreover, the spleen was palpable, and the blood contained numerous malignant tertian parasites. The pulse was miserably poor, so that it was thought unsafe to give an intravenous injection. We gave an intramuscular injection of 20 grs. of quinine. At 9 P.M. the pulse seemed stronger, and we decided to give an intravenous injection of 20 grs. in a pint of saline solution. By 11 P.M. the spasms had stopped, but the pulse was still very poor. At 3 next morning the temperature had risen to 107° F., and at 3.30 there was another severe convulsion. Patient was sponged with tepid water. By 5 A.M. the temperature had fallen to 104·5° F., but the pulse was almost imperceptible. The usual stimulants were employed, but death took place an hour later.

CASE IV.—Serb private, age 34, admitted 4th December 1918 as a case of influenza. He had suffered from malaria in 1917 and again two months before admission. He had been ill four days, complaining of fever and pains in the limbs. Temperature was 102° F. He was slightly cyanosed. The tongue was furred; the spleen was palpable. Rhonchi could be heard all over the lungs and crepitations at both bases. The blood contained malignant tertian parasites. In a few hours the patient became semi-conscious. He lay in a most uncomfortable attitude, with the head just off his pillow. The neck muscles were very stiff and almost rigid. The lips twitched and there were clonic movements of the jaw. Every now and again the muscles of the forearms passed into a condition of spasm resembling tetany. The knee-jerks were brisk; the pupils were dilated. Patient would neither swallow nor answer questions, and there was incontinence of urine. In spite of his feeble pulse and the condition of the lungs we gave an intravenous injection of quinine, 18 grs., and in addition he received 20 grs. daily by intramuscular injection. There was a gradual improvement of the cerebral symptoms. By 8th December he had completely recovered consciousness. The stiffness of his neck and the twitching of his lips and arms had disappeared. He could swallow and answer questions. Unfortunately, there was now percussion dulness at both bases, with bronchial breathing and much cyanosis. He died on 11th December. A post-mortem examination revealed an enlarged fibrous spleen and double lobar pneumonia.

This case illustrates one of the diagnostic difficulties we had to meet: Had a patient malaria or influenza, or both? This man certainly had malaria and probably influenza as well. The case also illustrates the serious import of a pneumonic complication. One gives an intravenous injection to a pneumonic patient with fear and trembling. It was the more disappointing that this case, having survived the operation and benefited therefrom as regards his malaria, should succumb seven days later to his pneumonia.

Case V.—Private N., aged 26, admitted 15th August 1917, complaining of headache, pains in legs, arms, and abdomen, and profuse sweating. He first had malaria in India in 1913, and had nine attacks afterwards. No other illness. Temperature on admission was 103°, pulse 90. The spleen was enlarged and very tender. Malignant tertian parasites were present in the blood. Patient was weak and restless. Knee-jerks were absent. There was an extraordinary sensibility to touch and pain all over the body. A slight touch was painful, and it was impossible to percuss the chest. He was ordered 45 grs. of quinine daily. On 18th August temperature was 101°, pulse 100, respirations 28. Patient looked vacant and was listless and disinclined to speak.

During the night he became delirious. On the 19th he was almost comatose. He would neither speak nor feed. Later there was subsultus tendinum and incontinence of urine. He received an intravenous injection of 25 grs. of quinine in a pint of saline solution. His pulse improved, but he had a very restless night, with some vomiting. On 20th August he was quiet and drowsy, but answered questions. On the 21st all the movements of his face and limbs were weak and tremulous. Knee-jerks could be elicited with difficulty. The plantar response was flexor. There was some cervical rigidity and Kernig's sign was present on both sides. The pupils and cranial nerves were normal. There was no squint or photophobia. Gradual improvement now began. For a long time he was tremulous, weak, and stupid, but by 1st October he had made a complete recovery.

THREE CASES OF QUININE AMBLYOPIA.

By H. M. TRAQUAIR, M.D., F.R.C.S.E.

THE recent prevalence of influenza and pneumonia makes it opportune to call attention to the possible harmful effects of quinine upon the eyes. Burney Yeo, in his *Manual of Medical Treatment*, praises it highly in the treatment of influenza, and goes on to say: " . . . even if it should give rise to some headache or slight deafness, it is far better to bear with these trivial inconveniences than incur the risk of serious toxic after-effects." The risk of toxic after-effects of quinine is apparently not contemplated. I have selected Burney Yeo's work as an example of a much-read and deservedly relied-upon authoritative text-book. At the same time, considering the amount of quinine which must be consumed every year by our population, permanent visual damage due to quinine poisoning is rare in this country.

The following three cases have recently been observed:—

CASE I.—Miss M. N., age 23, seen in July 1916. I am indebted to Dr. Byrom Bramwell, who sent the patient to me for examination, for notes on this case. The patient had been feeling "run down" and had been taking quinine as a tonic. About as much as would go on a threepenny bit was taken two or three times a day for three weeks. Then on one occasion rather more than a teaspoonful was taken in one dose.* Stupefaction, tinnitus aurium, and loss of sight ensued. Thirty hours later the stupefaction and tinnitus were better but vision remained "quite gone" for a week. An ophthalmic examination two days after the quinine had been taken showed absence of perception of light in each eye; pupils dilated and inactive to light. The fundi were found normal. Vision gradually returned, and four months later was $\frac{6}{24}$ in each eye, fields of vision much contracted, pupils unequal but reacting to light. In July 1916, after nearly eight months, I examined her eyes. Vision was now $\frac{6}{9}$ partly with the right and $\frac{6}{9}$ with the left eye after correction for astigmatism. The pupils were of normal size in ordinary daylight but tended to dilate slightly after primary contraction to light. The fields of vision were greatly contracted even for comparatively large objects. Central colour vision was good. The fundi showed optic atrophy, with much-contracted retinal vessels. She complained of bad vision in the dusk and of inability to "see if things fall."

* These amounts correspond to about 1 gr. and about 20 grs. respectively of ordinary crystalline sulphate of quinine.

Case II.—O. P., age 28, female. In May 1918 her doctor informed me she had "a bad, almost hopeless pneumonia." Hypodermic injections (she was not able to swallow) containing 15 grs. of quinine-urea hydrochloride were given every four hours, commencing late on the first day and ceasing early on the third day. In all, eight injections were given, equal to 120 grs. of the combined salt. Tinnitus began after the third injection and next day she was very deaf. Early the following morning after the last injection vision became very dim, and a few hours later total blindness supervened. The quinine was stopped and hydrobromic acid given. Eight days later perception of light began to return, and a week afterwards colour could be detected. Improvement continued for the next three weeks but was not noticeable after that time. When seen by me three months later the vision of the right eye was $\frac{6}{6}$ partly and of the left eye $\frac{6}{36}$. The fields of vision, especially for colour, were much contracted. The optic discs were pale and the retinal vessels constricted. She complained of "dimness" over the eyes, and when last heard of described her vision as "very unsatisfactory" and not improving.

Case III.—Q. R., male, age 53. In July 1918 had influenza. Quinine was taken for one night only every four hours in cachets containing 2 to 5 grs. each. Tinnitus soon came on, and when he got up after two or three days he found he had to be led about, as he was unable to see. As far as I have been able to ascertain, the total amount of quinine consumed in about twelve hours was under 20 grs. The patient's memory of the circumstances is very hazy; evidently a certain amount of intoxication was soon produced. Two months later he was seen at the Royal Infirmary by Dr. Sym, who kindly allowed me to use his notes. His vision was $\frac{6}{9}$ in the right eye and $\frac{6}{18}$ in the left. The fields were contracted. A trace of pallor was noted in the optic discs, especially the left. No reduction in size of the retinal vessels was seen. A month afterwards he came under my observation at Craiglockhart Poorhouse. Vision was now $\frac{5}{12}$ in each eye. In bright light the pupils were equal and normal in size, in subdued light the right pupil was rather larger than the left. Both pupils contracted well to light but the right dilated slightly after primary contraction. The fields of vision were greatly contracted, especially the right field. The fundi showed pallor of the optic discs and constriction of the retinal vessels, both changes being more marked on the left side. His chief complaint was of difficulty in reading.

It will be noted that two of the cases were associated with the recent epidemic of influenza and pneumonia. In one case the amblyopia was caused by a relatively small dose, in the other two comparatively large, but by no means massive, doses had been received.

The first symptom was tinnitus. Blindness was quickly reached and slowly recovered from. The patients were left with good central vision but restricted fields, partial optic atrophy, and contracted retinal vessels. It is noteworthy that in spite of the good central vision all the patients complained of inability to see satisfactorily, showing the importance of para-central and intermediate zone vision. An interesting point, bearing on the pathology of the condition, is exemplified by Cases I. and III., which had already been examined before they were seen by me. In these cases the fundus changes had evidently developed after the blindness and had continued to develop while vision was improving. In Case III. also the fundus changes did not correspond to the visual symptoms in the two eyes. Two views have been advanced as to the mode of production of quinine amblyopia—one that the action is primarily vasomotor on the retinal vessels, the retinal cells and nerve fibres suffering secondarily, and the other that the toxic action is primarily on the retinal cells, the visible fundus changes being secondary. The late development of the optic pallor and vascular constriction has been noted by several observers and is in favour of the second view, which is also supported by the authority of de Schweinitz.

Several points of practical importance deserve consideration. We have seen that the dose need not be excessive or even large. Big doses are naturally more likely to cause ill-effects, but cases are on record in which amblyopia followed doses as small as 22 grs. in three days, 15 grs. in twenty-four hours, 12 grs. in one dose, and so on. It is hardly necessary to mention that enormously larger doses are quite commonly taken without harm. Idiosyncrasy evidently plays an important *rôle*, and it is not possible to state definitely what constitutes a dangerous dose of quinine. There is good evidence that an absolute or relative overdose may produce a state of increased susceptibility, and persons who have once suffered from quinine poisoning should use only minimal doses or avoid the drug altogether.

The development of the symptoms of cinchonism—tinnitus, a feeling of fulness in the head, and partial deafness—indicates that the patient is absorbing more of the drug than is safe and that it would be well to stop its administration. Patients and their attendants should be warned to discontinue the medicine on the development of ringing in the ears. The writer remembers having very nearly caused quinine amblyopia, over twenty years ago, in a case of typhoid fever. Fortunately a timely change of medicine enabled the patient to recover without loss of sight.

These symptoms of cinchonism precede actual quinine poisoning when it occurs. Cases are recorded, however, in which the latter developed very suddenly. The diagnosis of quinine poisoning should not be difficult. Vision is lost, the pupils are dilated and inactive, hearing is affected, headache, drowsiness, and even stupor may be present. Such symptoms may be confounded with the results of the disease under treatment, and it is necessary to avoid any such mistake. The ophthalmoscopic signs are pallor of the optic discs and constriction of the retinal vessels—features which, as already stated, may not appear for a little time. Later, when some vision has returned, the contraction of the visual fields can be made out. The prognosis is usually good as regards central vision but bad as regards peripheral vision. Only in mild cases is completely satisfactory vision recovered, while permanent blindness is the result of only the most severe cases. Improvement is fairly rapid at first and then goes on more slowly for some months or possibly even longer.

Treatment, apart from stopping the quinine, is of little avail. A number of drugs have been advocated from time to time and, as is often the case, their diversity indicates their inefficiency. Strychnine, caffeine, hydrobromic acid, digitalis, iodides, and other drugs have all been recommended. Measures directed towards increasing the retinal blood-supply, such as the recumbent position or the exhibition of nitrites, appear somewhat more rational, but their value is doubtful. Obviously, to be of use, treatment must be adopted early.

The main point which should be borne in mind is that quinine amblyopia is a condition which can be recognised and checked in its early stages by the general practitioner, who is on the spot. Specialists practically always see the cases too late to be of any service.

THE TRAINING OF THE STUDENT OF MEDICINE:

An Inquiry Conducted under the Auspices of the Edinburgh Pathological Club.

LXIX.—THE TEACHING OF DERMATOLOGY.

By NORMAN WALKER.

I TAKE it we should keep in mind, first, that the aim of our discussion is practical politics and not ideals; and second, that we are dealing principally with the Edinburgh Medical School. At our last meeting, in the paper by Mr. Treacher Collins, there was a sentence to the effect that students should be shown rare cases, so that they might recognise them in future. Among the many discussions which have taken place in my time on medical education I remember one about thirty years ago in which this point was taken up by the late Sir William Gairdner. He emphasised the importance of thorough grounding in principles on a few diseases as against a superficial acquaintance with many, and Osler followed this excellent plan in Johns Hopkins.

The question I am to try to answer is, What ought a teacher of dermatology in Edinburgh to teach his students? I am sure we ought to recognise two types of students, viz. one who is going to be the successor of the old apothecary, the other the successor of the old physician. This distinction does not follow the class of practice; there are lots of successors of the old physicians on the panel engaged in very busy industrial practices, and not a few successors of the old apothecaries in very fashionable ones.

In our ordinary classes they are grouped together, and as one is under obligation to see that all one's students learn enough not to discredit their school when they go out into practice, one has to keep the inferior type constantly in mind.

It is quite impossible, even if it were wise, to cover the whole subject of dermatology in any ordinary course, and I think one ought to devote oneself mainly to general principles and to the common diseases.

The apothecary type of student ought to be able to recognise all these, and *especially the more serious ones* (lupus, syphilis, rodent) among them, and with these we ought to try to make him so familiar that he will at least recognise that a rare case is not one of the common diseases. It is no disgrace to a practitioner not to recognise pityriasis rubra pilaris, but he should recognise that he does not recognise it.

Then we ought, I think all will agree, to make provision for the man who is going to be of the physician type. I do not use this word in the restricted sense. As he is a very old friend I make free to use his name, and I will say that what I mean is the practitioner of the type of Dr. Crerar, who addressed us recently.

Before the war I tried to make such provision. For many years I conducted a senior class. It met once a week, and was limited in its membership to twelve, all of whom must have been members of my ordinary class.

I have not the affection which was proclaimed last week for the "quiz" class, and I made it more of the nature of a conference. Often the students questioned me. Sometimes one of the members read a paper; sometimes two of them collaborated to prepare one. On other occasions I asked the class to decide at the end of one meeting what subject they would like to discuss the following week, and each of them read it up. I regret that the war has put an end to this class. Not that I could not have found the time—I should have managed it somehow—but the students could not.

It was a very pleasant class to teach, and I remember with some satisfaction that nearly every Ettles man was a member of it.

Just one practical point in connection with it. I began it as a "gratis" class, but I found the attendance was not so regular as it required to be for such a class, and so I imposed a fee of half a guinea, which was handed over to Sister Watt for the provision of flowers, etc., for the ward. Student nature is very human, and the attendance was much more regular thereafter. I am still hoping that the war will end before my period of office, so that I may have one or two more of such classes. They bring one into very intimate acquaintance with the students, and I have many friends among their members.

There has been a good deal of criticism during this discussion of existing things. Some of it is, I think, misplaced, but on the whole it is healthy; indeed, I think one of the healthiest features of this discussion has been the evidence of conviction of something amiss—the first step to repentance and reform.

I do not think that the present system of educating students in "skins" is satisfactory—the time spent on the subject is too short. The official class consists of twenty meetings spread over ten weeks. Along with most other lecturers on special subjects, I interpret the twenty liberally, and each member is expected to attend on thirty occasions. But the mistake is that it is all pressed into ten weeks. We shall never get the best out of our material until this is altered. It was not so formerly.

I began my hospital work in my first winter as a dresser with Joe Bell, and during my four years of medical study a very large part of my time was spent in hospital. I agree with many previous speakers as to the great value of those evenings spent in the wards and side-rooms, educating each other by discussion—a feature not prominent enough in our school. All through my four years I saw something of skins. They came to Bell's "out-patients"; they turned up in the medical waiting-room; and the probable reason I am speaking on this subject to-night is that my chief (Dr. Claud Muirhead) was himself interested in skins, and owned a considerable collection of Baretta's casts, which he brought from Paris, and which must have cost him at least £100. Teachers should never be afraid to spend money.

I did not actually begin my teaching of dermatology to women students, but very early in my career I was appointed lecturer to one of the then two women's schools, and I gave a course the lines of which I think might well be imitated now. During the summer session I lectured four days a week at 8 A.M. in Minto House, and during a whole year I had the ladies for an hour's clinic once a week. The opportunity for this last I owed to the continual kindness and wisdom of my predecessor, who had no notion of curbing the zeal of his assistant. I will undertake to say that—with the exception of one or two men who have taken a special interest in dermatology and have attended my special classes for three or four terms—not a very uncommon thing—no graduates have left this school better equipped in dermatology than the seven generations of women I taught in Minto House.

What I think might be done to imitate this—in my judgment the best practicable system—is that arrangements should be made for systematic lectures—and I am one of those who think there ought to be lectures—to be given once a year to all students. I am entirely with those who maintain the necessity of small cliniques—and I have long enforced a limit; but in lectures it does not really matter how many listeners one has—indeed, the more the better, and I should be spared the necessity of going over three times every year the elementary principles of the subject. This would leave six days a week for clinical teaching, and it should be possible to arrange that every student during his fourth or fifth year attended once a week.

Now I know that there are difficulties about this, but I am convinced that these difficulties largely depend upon our obstinate adherence to two things, viz. the 2 o'clock consulting hour and the limitation of hospital work to the hours of 11 A.M. to 1.30 P.M. The first, I am glad to say, I had the courage to abandon some years ago when I adopted the plan of making appointments with all my patients, and I for one am perfectly ready, for the general convenience, to lecture at 2 o'clock.

With reference to the limitation of hours, I see no serious reason against some change. I know there would be a little difficulty at first—some nurses' dinner hours might require to be changed—but if it helped the school to turn out better qualified doctors, it would be worth while spreading the hospital hours over 10 o'clock to 3 or even 4 o'clock. In Glasgow the hospital cliniques are at 9 o'clock, and I have sat with my friend, the late Dr. Colcott Fox, in Westminster Hospital up to 7 o'clock seeing patients, so that changes are not impossible.

In many ways the student of to-day has advantages which were not present in my time, but in others I am sure he is not so well off. We are discussing how his condition can be improved. There is only one thing I want from the Managers, and that is room for my museum. I am the fortunate possessor of a collection of casts which, as only one of them is my own handiwork, I can say is unsurpassed out of Paris and Breslau; but for want of room they are not available to the student as they might be. If I had a proper room for the display of these, in which the student could spend an occasional hour with a descriptive catalogue, I will undertake to say that the students of this school would know a lot more of the subject when they graduate.

With reference to the discussion last week on the certificate which we lecturers on special subjects are expected to give our students, I may say that I lay far more stress on regular attendance than on written answers to questions. If the plan I have suggested were adopted, I should ascertain attendance by making the students present sign their names at each clinique, and if each student had attended over a period of one year (say sixteen cliniques) I should assume that he had absorbed enough to practise on. I think if I did not feel able to assume that, it would be time for me to consider the termination of my career as a teacher.

One more suggestion and I am done. Both students and teachers in Edinburgh require more supervision. The Dean does his best, and far more than any Dean in my memory. And he does not always get thanks. My third and youngest son has just completed his first term at Balliol. To a parent the knowledge that his boy is helped and guided in his work by a tutor to whom he has regular and easy access is a great satisfaction, and I should like very much to see a modified tutorial system in our university.

And we teachers require supervision too. There is nothing to prevent me limiting my class to twenty lectures and making these lectures mere dictation lessons. A tactful visitor might be a useful addition to the university staff. The good teachers would welcome the visits, and the others need them.

LXX.—THE TEACHING OF DERMATOLOGY TO UNDERGRADUATES.

By F. GARDINER, M.D., F.R.C.P.

In the consideration of the teaching of skin diseases as part of the medical curriculum there are four problems which emerge, and these are of necessity closely interwoven: (1) the position of the curriculum as regards time; (2) the standard of knowledge to be attained; (3) the hours available; (4) the methods of teaching.

In discussing these points I shall endeavour to be practical and not to be a visionary with a selfish point of view.

1. Placed at present in the fourth year, dermatology has to yield a place in the fifth year to eye diseases, which, in my opinion, is not correct, although it must yield to the claims of diseases of children.

At present students come to the lecturer with some knowledge of medicine and surgery at least, and this is essential for a proper comprehension of diseases of the skin. Having said this I am satisfied that this matter has been well considered in the past.

2. The standard of knowledge to be attained should be that for the general practitioner, dealing therefore only with the commoner skin diseases. A thorough instruction in these few diseases is much to be preferred to a skimming over a large list imperfectly. After all, with these few diseases perfectly grasped, the student, when he subsequently commences practice, can, with the aid of books and the first-class atlases now available, acquire knowledge of the rarer types. Among post-graduates I find that the desire, even with them, is to see the common conditions.

It is to be understood that the school medical officer and the tuberculosis medical officer will both require post-graduate courses.

3 and 4. The hours available and the methods of teaching are best considered together. Twenty hours is not enough for the ordinary student, but his hours are already overburdened and I fear to ask for extension. Some years ago I got excellent results with the women students by giving twenty-five to thirty consecutive lectures every morning at 8 A.M., while during these and the remaining weeks of the session they had also one weekly clinical meeting at 11 A.M. It is generally accepted nowadays that the demonstration of actual cases is of paramount importance and that lectures should be subsidiary.

The problem, then, is how to make the best use of the material available. The out-patient department is crowded and there are, of course, many cases not suitable for demonstration. The crux of the matter is the sifting out and assorting of this material to enable it to be of the greatest use to the student. Examining patients from 11 A.M. to 12 noon and lecturing from 12 noon to 1 P.M. on selected cases would suit admirably, but it sounds like a revolution to disturb clinical medicine.

The only other solution is to have more assistants to attend to the more chronic cases and pick out suitable material for demonstration. The varieties of the commoner diseases can be thus readily shown and this amplified by exhibition of casts, plates, and photographs.

There are six waiting days now available, and these should be used to the full by both lecturers with mutual co-operation for the good of the students.

Provision has to be made for individual instruction in microscopic work, chiefly with reference to ringworm, favus, scabies, pediculosis, and molluscum contagiosum. This should be given in the form of a tutorial demonstration and amplified at cliniques. Hours have also to be given to the commoner applications for skin treatment of lotions, pastes, and ointments, and the rationale of their use. It is advisable also to give at least two ward demonstrations on the treatment of cases in bed.

With a class of about forty divided into three sections each will have at least one clinique a week, and, if possible, more, and with, say, four to six hours spent on the above demonstrations there is left only time for about a dozen regular lectures, a few introductory lectures, then the demonstrations, and lastly the lectures on diseases not discussed in the cliniques. It is my firm conviction that some serial lectures are necessary to enable the student to grasp the subject of dermatology as a whole, and I think the above is a fair division of the time available. In conclusion, I am sure I voice a general thought when I say that the extension of the curriculum and the advances in treatment are hastening the time when post-graduate classes will become, if not compulsory like continuation classes, at least a necessity for a graduate who wants to attain a high standard in his profession.

LXXI.—THE TEACHING OF DERMATOLOGY TO UNDERGRADUATES.

By R. CRANSTON LOW, F.R.C.P.

If it were possible for every student after graduation to have a year or more hospital work before starting practice I think it would be better to leave the teaching of dermatology over till after graduation and include it as part of the clinical examination for the M.D. The same result could also be obtained by increasing the curriculum by another year to be devoted entirely to the special subjects, such as skin diseases, eye diseases, ear, nose and throat diseases, mental diseases, and gynecology. But as things are at present a student should have at least an elementary knowledge of dermatology before going out to practise. Everyone will agree that dermatology should come as late as possible in the curriculum after the student has studied pathology, medicine, and surgery. The present arrangement, where a student takes dermatology in his final year, seems to be the best possible, but it has the disadvantage that he begins the study of a new subject whilst he is in the midst of working at his other larger final-year subjects. The result is, that as skin diseases do not bulk largely in the Final Examination the student is apt to devote just as little time and energy to them as will satisfy the Regulations.

Taking into consideration the importance of other subjects I do not see that any longer time than three months could be devoted to dermatology. In such a three-months' course naturally only the common diseases can be taught. The common complaints, such as scabies, ringworm of the scalp, impetigo, psoriasis, etc., should be thoroughly taught and the rarer diseases left out entirely. In order to teach the general principles of diagnosis and treatment a certain number of systematic lectures are necessary. These could be given to all the students once a year and the clinical teaching be spread out over the three terms of the session. In this way a great deal of repetition of lectures could be avoided. On the other hand, for the clinical teaching the class must be divided into small cliniques of not more than ten students in each. In this way the student can be sufficiently near the patient to see all the details of the eruption when they are pointed out.

At present dermatology is taught from 11 till 12 o'clock. As the teaching at cliniques has to be done almost entirely from untreated out-patients it is often difficult to get material at 11 o'clock and frequently the best teaching cases only arrive after 12 o'clock. It would be an advantage if dermatology could be taught from 12 to 1 o'clock and clinical medicine, which is almost entirely taught in the wards from in-patients, could be taught from 11 to 12 o clock.

In teaching skin diseases the dermatologist should have access to cases of syphilis. The student can never learn syphilis without being able to compare the rashes with those of non-venereal conditions, and *vice versâ.*

One of the chief difficulties in skin diseases is that, as the diagnosis is almost entirely a visual one, the impression is not easily retained for any length of time. Even although a student may be able to recognise a given skin disease with fair accuracy when he has finished his three-months' class, six months or so later, if he has seen no cases in the interval, he has forgotten the appearances of the disease. Therefore after he has had the class, the student must have an opportunity of keeping in touch with skin cases. This he did formerly at the Wednesday and Saturday forenoon cliniques, which were open to all students with hospital tickets. This difficulty could be overcome to a great extent if there were a museum of casts of the common skin diseases, where the student could go at any time and read up from the notes of his lectures or a text-book with the models before him. A cast of a skin eruption also has the advantage over the actual patient in that, if the student repeatedly sees the same cast, he gets a more or less permanent visual impression of that eruption.

The present method of examining students in skin diseases is unsatisfactory and would be better omitted altogether. The lecturers on dermatology should be examiners in the Final.

By arrangement with other lecturers some overlapping might be avoided. Diseases such as chronic leg ulcer, rodent ulcer, etc., should be left to the dermatologist and not taught by the surgeon as at present.

DISCUSSION.

Dr. Traquair.—As far as undergraduate education is concerned, the special subjects should not be taught as such, but as part of general surgery and medicine. Special teaching is rather for post-graduates. It is not rare cases that should be shown to students, but common ones. An obscure case is much more likely to be an atypical appearance of a common disease than it is to be a rare disease. I sympathise with what Dr. Walker says about a museum.

Mr. Miles.—Dr. Walker has raised again the question of spreading out the special courses over a longer period. Our difficulty arises from the fact that some of our courses—the course of clinical medicine, say—last only for nine months. Why should the student not attend for three years? If we had a scheme by which he began clinical medicine in the summer following the second winter, his clinical medicine and clinical surgery might extend from this time on to the end of his course. Dr. Walker's part would then be to come into that clinical medicine course at some period found suitable, and continue his teaching throughout that course. In clinical surgery we would have a three-years' course, and into that course the eye, ear, nose, and throat specialists would come. Dr. Knox's subject would be worked in in the same way. Radiology, as applied to surgery, would be spread over the whole course, with such didactic teaching as might be necessary to give the student an understanding of the subject at the beginning. That involves the arrangement of a syllabus in co-ordination between the teachers of the different subjects.

Dr. Norman Walker said in reply.—In the Edinburgh school there always has been, and certainly is now, ample opportunity for the keen student. He will get his work always, just as with the more limited opportunities we had years ago he was able to get it. I am not quite sure that the student is altogether to blame. We have got into a more concentrated form of teaching, and these specialties have perhaps encouraged it. My experience is that when students get opportunities and are encouraged to make use of them they do so.

I would be very willing to fall in with the course of clinical medicine, but I should also require to fall in with the course of systematic medicine to teach something of the general principles to the students. I would not be satisfied merely with a course of demonstrations.

I do not agree about confining our teaching to the idea of the general practitioner—the apothecary type. We expect to teach a large proportion of the better-class practitioner—the man who is really an interested and enthusiastic physician.

If we had an extension of the hospital hours we would solve a great many of our difficulties, and it would help if we had some of the out-patient departments in the afternoon.

With regard to the question of the vacation, it is surely strange that in the fourth and fifth years of his apprenticeship to one of the most important professions a student should be allowed to idle for three and a half months. No other profession would allow it.

LXXII.—SUGGESTIONS FOR THE UTILISATION OF THE POOR LAW HOSPITAL FOR TEACHING MEDICAL STUDENTS.

By T. Y. FINLAY, M.D., Medical Superintendent, Edinburgh Poor Law Hospital.

In some of the earlier papers read before this Club—and I refer especially to those of Sir James Mackenzie and Dr. Robertson—great stress was laid upon the study of disease from the preventive point of view. Sir James Mackenzie drew attention to the out-patient department of the Infirmary as a centre for the study of the early stages of disease, whilst Dr. Robertson advised the teaching of medicine not only as a curative but also as a preventive science and art, its preventive application to individuals and to all diseases—in other words, a clinical form of preventive medicine. An adequate study of disease in its development is what is required in clinical teaching, for it is important to the patient that the first beginnings of disease should be detected and its subsequent development arrested if possible. This is the knowledge which is most required in general practice from the very first.

Up to the present, medicine has been taught mainly from the standpoint of curative measures, and the student's attention has been directed to the study of the signs, symptoms, and treatment of disease in its fully developed form. The reason for this is obvious—the student has to rely chiefly on the Infirmary for his clinical teaching, and before the patient finds his way to the Infirmary wards his disease is more or less serious; hence it is that the pronounced, fully developed type is presented to the student, and his interest is apt to be concentrated on this to the neglect of the less serious and less developed stages of the disease, though these are equally if not more important from every point of view. Again, the Infirmary patients do not stay and only very seldom do they return, therefore the opportunities of following the development of disease are correspondingly very limited. Sir James Mackenzie points out the knowledge which comes to the men in general practice who can follow the health history of their patients from year to year, and he advocates the appointment to a chair in clinical medicine of a general practitioner who could give the students the results of his continuous observation of cases.

With the view of suggesting another method of solving this question, I have thought it might be useful to consider the facilities for clinical study and teaching which are offered by the poor law hospital. The poor law hospital receives patients who, when they are ill, have no other resource than that of coming to the hospital. There are two types of these patients—first, the chronic invalid, and second, the person suffering, for example, from some painful symptom, not severe, but which is sufficiently bad to prevent him doing his work and earning his living for the time being. Both these types of cases are excluded from the Infirmary wards—the first because the accommodation is not sufficient to retain them for prolonged periods to the exclusion of acute cases; and the second is the type which presents itself at the out-patient department and, not being considered sufficiently ill to warrant indoor treatment, consequently next seeks admission to the poor law hospital. Now, these two types bulk largely in the clientele of the general practitioner, who has little opportunity of studying them in his student days. The chronic cases remain in the poor law hospital for a prolonged period, if not permanently, whilst the second class of case comes back repeatedly, and gradually there are accumulated observations on the development of their illnesses which are invaluable for the study of disease. It is in the number of such cases (on an average 1000 a year excluding re-admissions) that the poor law hospital can offer the opportunity which is not sufficiently provided in the Infirmary. The essential feature of the poor law hospital is that within its wards are to be seen cases of almost every description from infancy to old age. It may, therefore, be likened to a general practice with this advantage, that all the patients are collected together under one roof and under the close observation of trained nurses.

The only poor law hospital of which I have any experience is that of Craiglockhart under the Edinburgh Parish Council, so that the following remarks are based entirely upon my experience there.

Let me first give you a brief description of the hospital to show that it is run along modern lines, and is up to date in hospital equipment, thus offering facilities for teaching purposes.

The hospital itself is built mainly on the pavilion system. There are about eighteen wards, with, in addition, a maternity department and side-rooms for the isolation and treatment of special cases, two open-air sheds, a modern and fully equipped operating theatre and sterilising room, a dispensary for drugs, a clinical laboratory for side-room work, an out-patient department in connection with the poorhouse proper, a suitable post-mortem room, and the usual administrative offices. At the present time, as a war emergency, several more wards in the adjoining poorhouse have had to be devoted to hospital cases. This has been rendered necessary for the accommodation of the sick poor from Craigleith and Seafield, both of which buildings are at present otherwise utilised. In all there are about 500 beds available for patients at the present time.

In normal times the staff consists of a principal medical officer, a consulting surgeon—Mr. Beesly; a consulting eye specialist—Dr. Traquair; two assistant medical officers and two unqualified clinical assistants—though during the war even this small staff has had to be reduced—a matron, assistant matron, night superintendent, charge nurses, and probationer nurses.

The name of every patient on admission is noted on a card index and a number given to each, which is also noted on the medical history sheet. Each time the patient returns he retains the same number, so that the medical history sheet bears not only a record of the condition at one admission, but forms a complete account of the whole of the patient's medical history, no matter how long or how often he has been in hospital. Thus is constructed a valuable record of disease over many years, and in many cases up till the time of death, with, in addition, the post-mortem findings at least in the case of nearly all but unclaimed bodies. It is a well-recognised fact that in general practice the treatment of many cases resolves itself into the treatment of symptoms, for a large majority of them do not conform to text-book descriptions; so also at Craiglockhart a large number of such cases present themselves—they come not once or twice but many times, and each time records are kept, so that in many cases, when each of these records is read as a whole, the various stages of disease can be followed out and studied until the fully developed disease, as seen in the Infirmary, shows itself. Further, I can foresee much useful information being collected from these records for the preventive treatment of disease, which to be complete should not only include a description of the symptoms, but also any facts—and I speak of facts in the broadest sense—which may in any way be connected with the onset of the symptoms—weather conditions, diet, exposure, mode of living, over-exertion—in short, any condition, moral or physical, leading up to each of these stages of disease.

It may be of interest to briefly describe the general type of cases dealt with at Craiglockhart Hospital. In the children's ward there are about 500 admissions in the year. Some of these children are admitted suffering from skin diseases such as scabies, impetigo, and ringworm, whilst others are tuberculous, congenitally syphilitic, and in a large proportion infants suffering from nutritional disabilities. There are about thirty confinements in the year, and the patients are admitted in both early and late pregnancy. The births as a rule are normal, but every now and again interesting abnormal cases are dealt with. Surgical operations are performed by Mr. Beesly on one afternoon a week, and of these there are an average of 100 to 150 per annum. Most of the surgical cases are tuberculous or malignant, though many of a general character also are admitted. Dr. Traquair holds an eye clinic, when many instructive cases present themselves. Of the medical cases there are always a good number of chronic and senile heart disease, aneurysm, arteriosclerosis, chronic bronchitis and emphysema, asthma, senile pneumonias, fibroid lungs, chronic rheumatism, rheumatoid arthritis, senile chorea, cerebral hæmorrhage, locomotor ataxia, paralysis agitans, hemiplegia, cerebral softening, not to mention the normal changes resulting from old age. Other cases are those of general pediculosis, scabies, venereal disease, and leg ulcers. In this rapid sketch I have only mentioned a few of the many diseases which have to be dealt with, but sufficient, I trust, to give a general survey of the work involved in a poor law hospital.

It seems to me that there are possibilities at Craiglockhart for teaching both the junior and senior student of medicine, and I offer the following suggestions for the consideration of the Club:—

I. A junior course for the beginning of medical study. I have long thought that Craiglockhart Hospital offered excellent scope for such a course, but as I find that Dr. Fowler has already dealt with this subject in a former paper before this Club, I shall not trouble you with any details. There is ample material at Craiglockhart for teaching everything which he includes in his suggested course of clinical physiology. Take only one example from his list: Where better than in the poor law hospital could be taught the effect on the functions of the body and on symptoms generally, of exhaustion and debility, of pregnancy, the menopause, and of old age?

II. Another opportunity offers in the large number of excellent cases suitable for teaching physical signs. When I was a clinical tutor in medicine at the Infirmary the difficulty often was to get enough suitable cases to teach from. One was dependent upon the cases in the ward for the time being, and these did not always show unmistakable typical physical signs necessary for teaching the junior student. At Craiglockhart, on the other hand, there is no lack of such patients—for example, chronic heart and lung cases who are permanent inmates and therefore available at all times. After having mastered gross lesions the student is in a better position to make out and appreciate the physical signs in less advanced cases.

III. Thirdly, courses on chronic diseases and clinical preventive medicine for senior students would be valuable in preparing them for general practice. Such a course would naturally come in the final year after the student had completed his course in clinical medicine at the Infirmary. Such a course has already been arranged to begin next winter—Professor Gulland is to hold a class on Saturday forenoons in the October term—subject to the final approval of the Edinburgh Parish Council at its next meeting.

IV. Lastly, the subject of infant welfare is one which has become very important, and one with which the medical student should be made familiar. I know of no other institution in or around Edinburgh except Craiglockhart which has more unique opportunities for practical training in infant welfare. The material includes pre-maternity cases, maternity cases, nursing mothers and their infants, a nursery for healthy infants, and wards where the nutritional diseases of infancy can be studied. At present the student's experience is limited to what he learns at the Maternity Hospital and the Sick Children's Hospital. There is thus a very important gap in his training, namely, the practical study of the normal healthy baby, and the knowledge of how to prevent disease in infancy. Dr. Fowler remarks in his paper that "at present we have no material for showing the student how to manage a healthy infant from birth onwards." Now it is exactly this material that is available at Craiglockhart and which could be used for teaching purposes. From what I have said it will be evident that there is all the material at Craiglockhart for a very complete course on every aspect of infant welfare. I may say that such a course of practical training is at present being held—the Committee of the Edinburgh School of Social Study and Training having obtained permission from the Edinburgh Parish Council for the teaching of their students at Craiglockhart, and it only awaits the approval of the Parish Council to have a similar course available for the medical student.

In conclusion, I think that we are fortunate in Edinburgh in having a Parish Council which is in sympathy with the medical school and anxious to co-operate with the university in extending its teaching facilities.

Note.—At a meeting subsequent to the reading of this paper the Edinburgh Parish Council unanimously consented to clinical teaching being carried out at Craiglockhart Hospital.

DISCUSSION.

DR. CHALMERS WATSON.—Twenty-five years ago I was house physician at a poor law hospital, and I formed there a first-hand impression of its extreme value as a teaching institution. It is not so much the lack of material in the Infirmary wards as some defect in our organisation which has increased the tendency of the student to do less clinical work. There is no question of the value of the material at the poorhouse and of the willingness of the Infirmary staff to take advantage of it, as they find it would be useful, provided it is not going to detract from the already extremely limited time that the students spend in the wards. Sir James Mackenzie laid stress upon the importance of watching disease in the making. We do not lay sufficient stress on the early signs of deterioration in health, a knowledge of which can be acquired by careful study of the antecedents of our cases. There is no question with regard to the advantages of the poor law hospital in connection with child welfare, infant feeding, and the diseases of children.

Dr. Rainy.—I have on several occasions been able to borrow from the poor law hospitals quite a number of cases illustrative of a special condition for lecture purposes. They have advanced cases and types of cases that we cannot possibly get at the Infirmary. I cordially endorse the opinion that these poor law hospitals should be made much more use of than they are at present.

Professor Lorrain Smith.—I gather that Dr. Finlay contemplates the student spending half a day or a day at the poor law hospital?

Dr. Finlay.—I suggest that Saturday forenoon only should be devoted to the poor law hospital, where the student would take up more than one branch of a subject at once.

LXXIII.—REPORTS OF STUDENTS' SOCIETIES.

At the request of the Pathological Club, the Royal Medical Society took into consideration the subject of medical education from the point of view of the undergraduate.

A series of discussions were held in which, in addition to the members of the Society, other students, representative of all years, took part. A special committee of the Society subsequently drafted a report which was forwarded to the Pathological Club. The members of the Women's Medical Society, who had taken part in the Royal Medical Society's discussion, submitted a separate report.

These reports, which covered the whole of the ground, agreed in the main in their criticisms of the existing curriculum and in the suggestions made for improving it. They have proved most helpful to the Club in framing its report, in which a number of the proposals made by the undergraduates, particularly in the direction of increasing the facilities for practical work, have been incorporated.

REPORT OF THE EDINBURGH PATHOLOGICAL CLUB ON THE TRAINING OF THE STUDENT OF MEDICINE.

I.—General Considerations.

The inquiry into the medical curriculum has included within its scope all the subjects of study in the general course of medicine. The great majority of the students are preparing for general practice, and in this course they lay the foundations of their future work. Each contributor to the inquiry has dealt with his subject by showing the place which it should occupy in a complete course, and a review of the contributions brings out the fact that criticism of the present curriculum is advanced from two points of view, determined by the distinction which is drawn between curative and preventive medicine.

The Teaching of Curative Medicine.—It is agreed that the main purpose of medical teaching in general is to train the student in clinical observation, so that he may become skilled in the diagnosis and treatment of cases of illness and disease. His chief aim is to acquire knowledge of the science and art of curative medicine. The courses included in the present curriculum have been instituted with this end in view, but the inquiry has brought out abundant evidence of the necessity of reorganising the present methods of teaching. Before considering this aspect of the question in detail, it is necessary to take account of the criticism of the curriculum which has been offered from the point of view of preventive medicine.

The Teaching of Preventive Medicine.—It is pointed out by a number of contributors that the basis of the present curriculum is too narrow. A complete curriculum should include a study of the prevention of disease, but the training which is obtained at present is restricted almost entirely to curative medicine. This far-reaching criticism extends the conception of prevention to the whole field of medical teaching. In the past, preventive medicine has developed chiefly in the form of public-health measures for the protection of the community from the spread of disease. Examples are found in the regulation of general sanitary conditions and in the safeguarding of industrial workers from the harmful effects of their occupation. General measures of this type were, as a rule, simply preventive. In certain cases—as, for example, in dealing with infectious disease—the public authority made provision also for the treatment of individual patients. In recent legislation, such as that dealing with tuberculosis and venereal disease, public responsibility for the treatment of patients has been greatly extended.

The development of State medicine has produced various important changes in the medical profession. In former times the medical care of the community was left entirely to the medical profession. The members of the profession worked each in his own practice, or joined together to establish hospitals and dispensaries to bring the resources of medicine within the reach of the whole community. However ample such provision might be, it nevertheless failed when the necessity for preventive measures arose. Although these measures are the direct outcome of medical investigation of the causes of disease, the profession had neither the means nor the authority to apply them to the community. The responsibility for preventive administration must remain in the hands of the State. It is found, however, that the State, in taking up this responsibility, may profoundly modify the conditions of medical practice. The Act of Parliament which deals with a health problem includes provision of the mechanism required for the administration of the measure. In certain cases medical officers are appointed, who give their whole time to the particular branch of medical work to which the Act relates. In other cases the work is done by general practitioners. In medical practice for the State, whatever form it may take, prevention is a primary object. At the same time it must be remembered that there is no fundamental distinction between curative and preventive medicine. Medicine has always been essentially both curative and preventive, and the inseparable connection of the two types has been shown by the recent developments of State medicine. Further, the preventive measures introduced by the State do not include more than a limited part of preventive medicine. On the contrary, the field for preventive work is unrestricted, and the practitioner, in all his work as physician, surgeon, or obstetrician, finds that preventive care of his patients is becoming more and more a definite part of his responsibility.

In view of this widening of responsibility, it becomes necessary for the medical faculty to extend the training of the student, so that he may obtain the knowledge required for medical care of this type. Instruction in preventive medicine must be given to all medical students. It is altogether undesirable to separate curative and preventive medicine.

The piecemeal introduction of State measures has a tendency to create medical officials whose interest is too much limited to a defined and circumscribed field of work, and one of the unfortunate effects of setting up medical departments by the State has been to displace the general practitioner. The benefits which the community can derive from the most comprehensive efforts of a State department will be unduly limited unless the whole profession of medical practitioners become the exponents of preventive as well as of curative medicine.

To render unnecessary any separation of curative and preventive medicine, it lies with the medical schools to include in the general course the training in preventive medicine which is required.

The Arrangement of Subjects in the Curriculum.—The commencement of the study of clinical medicine at the beginning of the third year forms the most important point of division in the present medical course. The subjects of the first two years are botany, zoology, physics, chemistry, anatomy, and physiology. During these two years the student has little or no instruction in clinical work. On the other hand, during the following three years he has few opportunities of continuing the study of the earlier subjects. A reorganisation of the course is required, so that the earlier and later subjects may be brought into more vital connection with each other. Continuity of study is required to enable the student to make full use of the knowledge he gains. From lack of connection and co-ordination of the courses he often fails to grasp clearly the meaning and value of what he has been taught. His knowledge does not become a permanent possession. One example may be taken from the discussion to illustrate this criticism.

The student is, by the end of his second year, well grounded in anatomy, and passes the examination in that subject; but in his fifth year, when he is asked to apply his anatomical knowledge to the interpretation of a case of disease, he often reveals the fact that his former knowledge has melted away in the interval. The modicum of working anatomical knowledge which should have been permanently fixed in his mind is no longer his. This form of failure is found more or less in all branches of the course.

The root cause of it is that the subjects are taught without sufficient correlation with each other and with the main purpose of the course. The earlier scientific studies are not brought into sufficient connection with the later work in the hospital, and the clinical studies are not kept in continuity with the preparatory courses. The present system of periodic examinations is no remedy. Teaching and training in water-tight compartments are followed by corresponding examinations, and in some ways they tend to increase the dislocation of the course. The remedy which has been suggested by many contributors is that the student should study clinical work from the beginning to the end of the five years' curriculum, and that the study of the fundamental sciences should be brought into direct connection with the later subjects, and should not be confined to the first two years.

The course in chemistry gives an example of the co-ordination which is required. The student has chemical teaching throughout the whole curriculum, but the teaching varies from the early introduction to the science till the final stages are reached, where clinical methods are applied to the interpretation of the processes of disease. The chemical department of the medical school should be responsible for the subject in all its aspects, and supply at each stage the teaching in the form required. The complete course would become unified in the student's mind, and there would be no dislocation.

The Method of Teaching.—The general method of teaching which is now adopted is that for each subject there is a course of systematic lectures and a course of practical instruction. The courses of practical instruction have come to occupy a relatively large part of the time devoted to the subject, but reorganisation is required to bring the two methods of teaching into more direct connection with each other. The systematic lecture class is separate from the practical course, and the lectures furnish an exposition of the subject more or less resembling that of a text-book. It is generally agreed that this is an unfruitful method of giving instruction to the student. On the other hand, the facilities for practical instruction are now developed to such an extent that it becomes possible to devise courses in which the two methods of teaching are united and immediately complementary to each other. The lectures to which a student is asked to listen should be directly related to his practical work—an illustration will make the point clear. The student is expected to make himself acquainted with the commoner varieties of disease of the blood. On the present system he may receive a full exposition of this complicated subject before he has had the opportunity of estimating the hæmoglobin or observing for himself the numbers and varieties of blood corpuscles in the living subject. On the method of combined practical and theoretical teaching now proposed this would be impossible. The systematic lecture could not be given until the foundation of practical knowledge had been laid. The occasion for giving the systematic lecture would arise when the data obtained from practical observations demanded further interpretation.

To organise teaching in the form of a combined course would without doubt present much greater difficulty than the present method. On the other hand, the effects of the separation of practical and theoretical teaching are felt nowhere more than in the professional courses. Here the systematic courses are given in the University and the practical instruction in the Infirmary, and there is no direct connection between the two.

The Examinations.—Much adverse criticism has been advanced with regard to the present method of testing by examinations. It is pointed out that the examination which is separated from the teaching course is liable to become an artificial test. It encourages book knowledge and belated cramming on the part of the student. The passing of examinations tends to become the chief occupation of his mind, and he refuses to attend to those aspects of the subject which do not lend themselves to this purpose. The examinations come at intervals through the course, and for each the student makes a strenuous effort, which becomes in many ways an interruption of his course of study. Further, the examination is a great burden on the teaching staff, and consumes time and energy which, if spent on teaching, would add much to the course. The professors conduct the examinations with the co-operation of external examiners appointed by the University. In addition to this, the General Medical Council appoints inspectors whose duty it is to attend the Final Qualifying Examinations and report on their sufficiency as a test of the student's knowledge.

It is suggested that the test of the student's proficiency should apply not to what he does at an occasional examination, but to the whole of his term work. It would be the duty of each department to keep a record of the student's work which would afford clear and sufficient evidence of his success or failure in reaching the requisite standard of knowledge. This method of testing would form a powerful stimulus to the student throughout the whole course. The external examiner would co-operate as before, but in this case the whole work of the term would come within his purview.

II.—Proposals.

After discussion, the Club adopted the following propositions:—

1. *Age to Commence Medical Studies.*—The Club is unanimously of opinion that students should not begin the study of medicine in the Medical School before the age of eighteen. It is further of opinion that the standard of the preliminary examination should be raised.

2. *Curriculum to Begin in Winter Session.*—To obviate the confusion which results from students beginning their studies at different periods of the year, and to facilitate the arrangement of a co-ordinated course of study, the Club considers it essential that all students should commence their studies in the Medical School in the winter session.

3. *Proposal to Lengthen Terms.*—The Club suggests that the time available for teaching throughout the year should be increased by shortening the vacation periods. It appears to the Club that this would best be effected by adding two weeks to each of the three terms.

4. *Facilities for Evening Study in Hospital.*—The Club desires to impress upon the authorities concerned the importance of providing facilities for students attending at the Infirmary wards and out-patient departments in the evening for purposes of clinical work and study—subject always to the interests and comfort of the patients being safeguarded.

5. *Facilities for Physical Culture.*—With a view to encouraging the students to engage in sports and other forms of physical culture, the Club recommends that the afternoon of each Wednesday, as well as of each Saturday, be left free of classes.

6. *Holidays in Term.*—It strongly urges that there be no other statutory academic holidays during term.

7. *Preliminary Study of Chemistry and Physics.*—The Club recommends that the subjects of *Elementary Chemistry* and *Elementary Physics* be taken either at school or as preliminary courses, and that the courses of physics and of chemistry within the curriculum be correspondingly modified. It is also suggested that the position of *Botany* in the course be reconsidered.

8. *Systematic Lectures.*—With regard to the place of systematic lectures in the curriculum, the Club is strongly of opinion that in all courses of instruction these should be closely associated with practical laboratory or clinical work, and that the *rôle* of the lectures should be to elucidate the work done in the practical and clinical classes and to correlate the subject under consideration with allied subjects. The time devoted to didactic teaching could thus be reduced, and more time made available for observational classes.

9. *Junior and Senior Courses.*—The Club recommends that, as far as is practicable, all courses of instruction should be divided into "Junior" and "Senior" courses, the junior course to be conducted as early in the curriculum as possible, and the senior course in a later year, after the student has acquired sufficient practical knowledge of the subject dealt with, *e.g.* (*a*) the junior course in medicine in the third year, just after the "physical signs course," and the senior course in the fifth year, after the student has spent several terms in clinical study; (*b*) the junior course in surgery in the third year, after the student has worked in the out-patient department during two or three terms, and the senior course in the fifth year, after he has worked in the wards for several terms; (*c*) the junior course in midwifery in the fourth year, and the senior course in the fifth year, after maternity cliniques have been attended and midwifery cases taken out.

10. *Co-ordination of Subjects.*—To cultivate in the student a scientific interest in his professional work, the Club strongly urges that the teaching of the fundamental subjects—physics, chemistry, anatomy, physiology, pathology, etc.—be closely co-ordinated with that of the clinical subjects with which they are related.

11. *Necessity for Syllabus.*—To provide for such co-ordination it would be necessary for the teachers of each associated group of subjects to draw up a syllabus defining the scope of the work to be overtaken by them, jointly and severally.

After being approved by the Faculty of Medicine, this syllabus should be made available to the student as a guide to him in conducting his studies. The syllabus should be subject to revision annually.

On such a plan, co-ordination of teaching could be effected between the subjects included in the curriculum in such a way as to impress upon the student their bearing upon one another, and to maintain continuity of study of associated subjects throughout the curriculum.

12. *Attendance at Hospital Recommended during Whole Curriculum.*—Still further to ensure that the student shall acquire and maintain a scientific attitude of mind towards the purely professional aspects of his studies, the Club is of opinion that he should be brought into direct contact with the work of the hospitals throughout the whole of his curriculum. It is felt that an early introduction to the clinical features of elementary surgery and medicine would add interest and give point to his studies of the biological and physical sciences, and still more to such subjects as anatomy and physiology. It would also be an advantage if anatomical and physiological demonstrations were illustrated as far as possible from living human subjects.

The draft curriculum which has been drawn up provides for the student attending the hospital during every term of the course.

13. *Co-operation with Dispensaries, etc.*—To widen the scope of clinical teaching, and to give the student a broader outlook on problems of health in relation to the State as well as to the individual, the Club strongly urges that close co-operation be established between the Medical School and the dispensaries, poor law hospitals, child-welfare organisations, and other medical and social institutions throughout the city and district.

In any new arrangements that may be made under the proposed Ministry of Health, the educational importance of public hospitals and other institutions must be borne in mind and provision made for teaching being carried on therein.

14. *Instruction re Practice under National Insurance Act.*—In the interests of the large section of the community who obtain medical care under the provisions of the National Insurance Act, the Club recommends that some arrangement be made by which senior students may receive instruction in the practical working of the Act, with special reference to the management of illness in small houses and with limited resources.

15. *Examinations.*—Lastly, the Club is unanimously of opinion that the existing method of testing the student's knowledge by periodic "Professional Examinations" is not satisfactory. It recommends that it be made part of the duty of every teacher, in co-operation with extra examiners, to test and record each student's progress throughout the course, as part of the class work, and that such records be the main criterion of the student's fitness to proceed further with his studies. Such a plan does not preclude the holding of examinations apart from the class work, either to test doubtful students or to award "distinction" to the most proficient.

III.—Outline of Proposed Curriculum.

Guided by the general considerations above set forth, and assuming the acceptance of the foregoing proposals, a provisional curriculum has been drafted, in which the suggestions that seemed to find most favour in the inquiry have been incorporated.

The accompanying tables show how the suggestions can be embodied in a complete curriculum.

In the draft curriculum prepared by the Club, each subject or section of a subject is allocated to its appropriate *term* in each year, but to avoid confusing detail the tables here given merely indicate the *year* in which a particular subject is studied.

COURSE OF INSTRUCTION IN CHEMISTRY.

Year.

SCHOOL. Elementary Chemistry.

I. Introductory Course—Lectures and Practical Class.

II. Physiological Chemistry, with Physiology.

III. Pathological Chemistry, with Pathology.

II.-III. Chemistry in relation to Clinical Medicine, with Clinical Medicine.

V. Chemistry in relation to Public Health, with Public Health.

COURSE OF INSTRUCTION IN PHYSICS.

SCHOOL. Elementary Physics.

I. Introductory Course—Lectures and Practical Class.

II. Electricity and X-rays, with Physiology and Hospital Work.

III. Sound and Acoustics, with Aural and Laryngeal Surgery.

IV. Light and Optics, with Ophthalmology.

COURSE OF INSTRUCTION IN ZOOLOGY.

I. General Course—Lectures and Practical Class.

III. { B iological Problems relating to Pathology.
Parasitology, with Pathology

COURSE OF INSTRUCTION IN BOTANY.

I. General Course—Lectures.
,, Practical Class.
,, Field Botany.

COURSE OF INSTRUCTION IN ANATOMY.

Year.

I.-II. { Introductory Course.
Histology Course.
Practical Course—Dissecting (5 terms).
Medical Anatomy, with Physical Signs Course in Clinical Medicine.

III. Regional Surgical Anatomy, with Clinical Surgery.
Anatomy in relation to Aural, Nasal, and Laryngeal Surgery, with Aural, etc., Surgery.

IV. Obstetric Anatomy, with Midwifery and Gynecology.
Anatomy in relation to Ophthalmology, with Ophthalmology.

V. Anatomy of Central Nervous System, with Neurology.

COURSE OF INSTRUCTION ON PHYSIOLOGY.

I. General Course—Junior.
Practical Class.

II. General Course—Senior.
Experimental Physiology, with Physical Signs Course in Clinical Medicine.
Physiological Chemistry, with Physical Signs Course in Clinical Medicine.

III. Physiology of Digestion, Excretion, etc., with Medicine.
,, in relation to Aural, Nasal, and Laryngeal Surgery, with Aural, etc., Surgery.

IV. ,, in relation to Obstetrics, with Obstetrics.
,, in relation to Ophthalmology, with Ophthalmology.

V. ,, of Central Nervous System, with Neurology.

COURSE OF INSTRUCTION IN MATERIA MEDICA.

Year.
III. General Course—Materia Medica.
    „ „ Pharmacology.
    Prescription Writing, with Medicine.
    Practical Class.
IV.-V. Therapeutics, with Clinical Medicine.

COURSE OF INSTRUCTION IN PATHOLOGY.

II. Morbid Anatomy in relation to Physical Signs, with Clinical Medicine.
    Bacteriology in relation to Venereal Diseases, with Venereal Diseases.
III. General Course—Lectures.
    „ „ Practical Class.
    „ „ Class of Morbid Anatomy.
    Bacteriology—General Course—Lectures.
    „ „ „ Practical Class.
    Parasitology (Zoologist).
    Surgical Pathology and Morbid Anatomy, with Surgery.
IV. Pathology in relation to Obstetrics and Gynecology, with Midwifery and Gynecology.
V. Pathology of Central Nervous System, with Neurology.
    Pathology of Tuberculosis, with Tuberculosis.
II.-V. Post-mortem Examinations—Medical.
    „ „ Surgical, etc.

COURSE OF INSTRUCTION IN CLINICAL MEDICINE.

Year.

II. Physical Signs Course—Clinical Demonstrations.
,, ,, ,, Regional Anatomy of Chest, etc.
,, ,, ,, Experimental (Clinical) Physiology.
,, ,, ,, Medical (Side-room) Chemistry.
,, ,, ,, Use of Ophthalmoscope.
,, ,, ,, Use of Laryngoscope.
,, ,, ,, Use of X-Rays Clinically.
,, ,, ,, Morbid Anatomy bearing on Physical Signs.

III. General Medicine Course—Junior—Lectures.
,, ,, ,, ,, Tutorial Classes.
,, ,, ,, Prescription Writing, with Materia Medica.
,, ,, ,, Elementary Psychology.
Clinical Medicine—Lectures.
,, ,, Cliniques.
,, ,, Out-patients.

IV. Medical Diseases of Children—Lectures.
,, ,, ,, Clinical.
,, ,, ,, Tutorial.
,, ,, ,, Baby Clinics.
,, ,, ,, Child-Welfare Work.
Clinical Medicine—Lectures.
,, ,, Cliniques.
,, ,, Out-patients.
Ophthalmology.
Dermatology in Association with Venereal Diseases.
Mental Diseases—Asylums.
,, ,, Cliniques in Royal Infirmary.
,, ,, Incipient Mental Diseases.
Dispensary.

V. General Medicine Course—Senior.
Clinical Medicine—Lectures.
,, ,, Cliniques.
,, ,, Out-patients.
Infectious Diseases at Fever Hospital.
Tropical Diseases.
Tuberculosis.
Neurology.
Therapeutics—Physical Methods of Treatment.
,, Practical Nursing.
Dispensary.
Poor Law Hospitals.
Incurable Hospitals, etc.

COURSE OF INSTRUCTION IN CLINICAL SURGERY.

Year.

I. Surgical Out-patient Department—Elementary Demonstrations (two hours weekly).

II. Surgical Out-patient Department—Dressing.

Venereal Diseases.

III. General Surgery Course—Junior—Lectures.

,, ,, ,, ,, Demonstrations.

,, ,, ,, ,, Tutorials.

Surgical Pathology and Morbid Anatomy, with Pathology.

Clinical Surgery—Cliniques.

,, ,, Operations.

,, ,, Tutorials.

Anæsthetics.

Regional Surgical Anatomy, with Anatomy.

Aural, Nasal, and Laryngeal Surgery.

Sound and Acoustics, with Physics.

Anatomy of Ear, Nose, and Larynx, with Anatomy.

Physiology of Ear, Nose, and Larynx, with Physiology.

V. General Surgery Course—Senior –Lectures.

,, ,, ,, ,, Tutorials.

,, ,, ,, ,, Demonstrations.

Surgery of Children—Lectures.

,, ,, Cliniques in Wards and Out-patient Departments.

,, ,, Operations.

Clinical Surgery—Cliniques.

,, ,, Operations.

,, ,, Tutorials.

,, ,, Practical Nursing.

Practical (Operative) Surgery.

Surgical Dispensaries—Minor Operations.

COURSE OF INSTRUCTION IN OBSTETRICS AND GYNECOLOGY.

Year.

IV. General Midwifery Course—Junior.
  „ „ „ Lectures.
  „ „ „ Tutorials.
  Maternity Cliniques.
  Maternity Cases.
  Ante-natal Cliniques.
  Anatomy in relation to Obstetrics and Gynecology, with Anatomy.
  Physiology in relation to Obstetrics, with Physiology.
  Operative Midwifery.
  Clinical Gynecology—Cliniques.
  „ „ Tutorials.
  Pathology and Morbid Anatomy in relation to Gynecology, with Pathology.

V. General Midwifery Course—Senior.
  „ „ „ Lectures.
  „ „ „ Tutorials.
  Maternity Cliniques.
  Maternity Cases.
  Gynecology—Lectures.
  Clinical Gynecology—Cliniques.
  „ „ Tutorials.
  Gynecological Dispensaries—Minor Operations.

COURSE OF INSTRUCTION IN PUBLIC HEALTH.

V. General Course—Lectures.
  „ „ Practical Classes.
  Vaccination.
  Chemistry in relation to Public Health, with Chemistry.

COURSE OF INSTRUCTION IN MEDICAL JURISPRUDENCE.

V. General Course—Lectures.
  „ „ Demonstrations.
  „ „ Post-mortems.
  Medical Ethics.

THE LATE DR. MACKINNON.

OBITUARY.

FRANK I. MACKINNON, M.B., C.M.(Edin.), M.R.C.S.

On Saturday, 4th January 1919, a cablegram, delivered in Edinburgh, stating that Frank Mackinnon of Damascus had died in that city on 30th December of pneumonia, brought deep sorrow not only to his relatives but also to a very large circle of friends who esteemed and loved him, some of whom had towards him feelings akin to reverence. The sense of loss is keenly felt by the Edinburgh Medical Missionary Society. Dr. Mackinnon had represented that Society for upwards of thirty years before the war, and had returned to Damascus on 7th November to resume work in that very important centre. They valued his able and devoted labours, and it was to him they were looking with implicit confidence for the reconstitution of the great work which he had built up so skilfully. His intimate knowledge of Eastern character, and the powerful influence which he had acquired among the inhabitants of Damascus and of the whole of Syria, including the Arab Sheiks, would have enabled him to re-organise the work as no other person could do it. Lord Guthrie writes: "At any time his death would have been greatly felt; at this stage in Syria's history it is nothing but a calamity."

Frank Irvine Mackinnon was born at Avoch, in the Black Isle, in December 1855. His father was a Congregational minister. He graduated at Edinburgh University in 1883, and the same year he also passed the examination for M.R.C.S.(Eng.). In January 1884 he went to Damascus to succeed Dr. Mackenzie, whose health had broken down. In 1886 he married Lydia, daughter of the Rev. John S. Macphail of Benbecula. The next twenty-eight years constitute a wonderful romance of medical missionary work, until, in 1914, at the outbreak of war, a German officer appeared in Dr. Mackinnon's hospital, and took an inventory of its instruments and equipment, then ordered their removal. One may realise with what anguish Dr. Mackinnon witnessed the looting of the hospital which had cost him so much thought and labour to build and to organise, which had witnessed so much blessing to thousands of sick and suffering, under his loving care. In December of that year he along with other sixteen men of position in Damascus were seized by the Turkish soldiery, under the command of Von der Golz, and were imprisoned, under threat of being shot, in one small room, which was suitable for only two persons, and "they were not the only occupants of that filthy hole." After being released he came to this country, and later served first in Malta, as C.O. of a hospital, then in Egypt. While at 17 General Hospital, Alexandria, he was offered the post of Surgeon-Specialist with extra pay, for which appointment he was admirably qualified by his skill and experience, but "as there were many young and able surgeons who were burning to do surgery," he declined, and continued the work of the ordinary wards. When our troops reached Damascus he was sent to the scene of his former labours. He arrived there on 7th November 1918. It is very touching to realise that he died in his own home after he had begun to re-organise the work which was so dear to him. He is survived by his widow and their three sons, who are all three serving in the Army. The eldest had been for two years house surgeon to his father in Victoria Hospital, Damascus.

Dr. Mackinnon was a man of strong personality, with strength in every feature; he had a very quiet manner, but brimming over with humour. He lived his religion, and was a very warm-hearted, steadfast friend. He had great driving power, and when convinced that a thing was right, he spared no pains to carry it through. At a time when he required a new assistant in the hospital, he defined the essential qualifications for a medical missionary assistant as follows:—"Intelligence, tact (*i.e.* sanctified common sense), and no small amount of patience." All three of these qualifications he himself possessed in no small measure.

At an early age he gave evidence of the missionary spirit. Before he came to Edinburgh to study medicine he was a zealous worker in the M'Call Mission in Paris. When Dr. Lowe, Superintendent of the E.M.M.S., presented him to the directors as qualified for appointment to Damascus in 1883, he described him as "a man of true missionary devotion, who had taken a very active part in all departments of the missionary work of the Society." After his appointment by the directors, he, with characteristic thoroughness, asked permission to delay entering on his new work for some months, in order that he might take special courses on eye and other diseases, which he thought important for work in the East. During these months he studied Arabic under two Syrian medical students in Edinburgh.

On arrival in Damascus in January 1884 he met with considerable opposition, but before long his mental qualities and his skill, especially as a surgeon, caused very large numbers of all classes to seek his advice. Dr. Kelman, who had on more than one occasion travelled with him in Syria, writes: "I knew him well, and loved and honoured him very greatly. I never knew anyone whose whole spirit and attitude of mind were so essentially and constantly heroic. His fame as a doctor had spread among the Arabs until he came to be regarded with almost superstitious reverence. Legends sprang up about him. He was supposed even to have raised the dead. But it needed no legend to account for his power over the mind of the Arab. . . . He was not one who could accommodate his principles to circumstances. He utterly abhorred the circuitous dishonesties which in Oriental dealings are sanctioned by immemorial custom. He was one of the great men who have confronted them with the honour of a British man."

It soon became evident that a hospital was an absolute necessity for the due performance of his work in that great city of 210,000 inhabitants. The first step towards this was to procure a site. In this he encountered great opposition in the Law Courts. While his suit was pending a circumstance happened which had a wonderful influence in his favour. One evening one of the judges in the Court rushed into Dr. Mackinnon's house and begged his immediate presence at the house of the Chief Cadi (judge). Although tired after a trying day's work, and just about to sit down to dinner, he went at once, found the house in great distress and disorder because of the illness of the Chief Cadi's only son, a child of three years, who was lying comatose and cyanosed from an overdose of opium. He at once took off his coat, and, after many hours of constant work, he was able to leave the child in safety. The Cadi, with tears of gratitude, embraced Dr. Mackinnon, and declared himself through life his debtor. Although the Chief Cadi had not previously taken any interest in Dr. Mackinnon's just claims for the site, now the position was altered, and before long a site of about 4 acres was secured to him.

Mackinnon was a many-sided man. He was his own architect and clerk of works, and in May 1898 the hospital built under his supervision was opened. Queen Victoria graciously acceded to the request that it be named "The Victoria Hospital." Dr. Maxwell of London describes it as "One of the finest buildings, for such a purpose, to be found on the mission-field." In relation to the working of the hospital, Colonel Henry Knollys, after various favourable remarks regarding the hospital, Dr. Mackinnon, and his staff, wrote: "I do not presume to go beyond the expression of my profound admiration for their skill, kindness, and exercise of Christian virtues. I have never seen—no, never—higher types of their noble avocation."

The Wali (Governor) of Damascus had a very high opinion of Mackinnon's ability. In 1903 Damascus suffered from a very severe and fatal epidemic of cholera. The first case was sent to the Victoria Hospital, labelled chronic dysentery. A glance convinced Dr. Mackinnon that it was Asiatic cholera. He refused the case, reported it to be cholera, and advised immediate isolation. This was not done. The native municipal doctor declared that it was not cholera. The Wali, however, sent for Dr. Mackinnon, who then made cultures, and demonstrated by the microscope that his diagnosis was correct. In the meantime the disease had spread rapidly, the native doctors fled, but Mackinnon and other two Europeans and some army doctors remained and fought the plague.

On 7th May 1909 four hundred Damascenes met on the tennis ground of the Victoria Hospital to celebrate the semi-jubilee of Dr. Mackinnon's work in the city. They presented to him and Mrs. Mackinnon many valuable and beautiful gifts, and many flattering speeches were made in Arabic and French, to which he briefly replied in these languages.

Mackinnon shone not only as a medical missionary but in every position which he occupied—the platform, the drawing-room, in sportsmanship. He was pleased when he took home partridges or snipe, and at times brought down larger game—gazelle, or Syrian bear.

He carefully cultivated friendly relations with all, and, in order to foster these, he remained at home the whole of New Year's Day to receive guests. Their names were entered in a book, and he returned their visits on their respective feast-days. "These visits" (wrote Mackinnon) "afford opportunities of saying a word in season, and giving a reason of the hope that is in you." Every Saturday evening he dined in the hospital with his staff, and on Sabbath evening those of the staff who could be spared from duty crossed to his house, where they had hymns and, later, family worship. His house was a home to many visitors—"a piece of Scotland" to some. Small birds realised that the garden was a sanctuary, and Mackinnon rejoiced in the large number of his feathered friends who found it a refuge. Mrs. Mackinnon's rose-garden was well known to the Damascenes, and admired by all who saw it.

Mackinnon had a fine sense of the beautiful, especially of the beauties of Nature—the snows of Hermon, the sunsets of Egypt and of Malta, his own Highland moors and mountains, and he loved to transfer to a Whatman block in water-colours some memorial of what he admired. After one of his climbs he wrote as follows: "I had been up amid the solitude of the grand old hills, where one's spirit so often gets into sympathy with Nature, so full of voice, eloquence, and praise—to David as to the sky-pilot the mountains lived, breathed, and spoke. Like a mirror they catch the reflection of the Creator, and respond to the rains, sunshine, and shadows, and break into joyful praise. Would that our spirits responded more frequently to the many Divine influences and blessings so abundantly bestowed on us."

His remains were laid to rest in the small Protestant cemetery near the East Gate of the city. The funeral, which was a military one, was attended by men of many nationalities and of widely different religions. Two Ghurka pipers played the laments—"The Flowers of the Forest" and "Lochaber no More." The silence which followed the "Last Post," when the officers filed past the grave and saluted the remains and the flag, was broken by the cry, "All beloved of Damascus" from one of Mackinnon's Syrian friends who had known and loved him for many years.

It is in the influence of such men as Mackinnon that we discover the secret of the British Raj. We have received from many visitors to Damascus written testimony as to the influence of the man and the value of his work. But he was in a still higher sense an Empire builder; his chief aim was the building of the Empire of Righteousness. Mr. Basil Matthews, in his *Riddle of Nearer Asia*, writes: "I discovered, little by little, that in all the city of Damascus, the most ancient city now standing in the world, there was one man who had universal authority, not by position, nor by wealth, but by the power of service and of personality. That one man was Dr. Frank Mackinnon."

J. R.

NEW BOOKS.

Chemistry of Synthetic Drugs. By PERCY MAY, D.Sc. Second Edition. Pp. x. + 250. London: Longmans, Green & Co. 1918. Price 10s. 6d. net.

THIS is an account of the structural formulæ of a large number of substances—some of them used as drugs, others as poisons, others of purely chemical interest. Many chemists still lean to the view that the action of drugs in the living tissues is analogous to their behaviour in the beaker and test-tube, and is largely determined directly by their chemical structure. The author is obviously prepossessed in favour of this theory, though it is true that he devotes some attention to the physical characters of his substances. He appeals to these, however, mainly to explain the exceptions to the rule, rather than as primary factors in the distribution of drugs in the tissues, and therefore in their pharmacological effects. Many examples of the direct connection between structure and action are given, and these may prove convincing to readers who do not appreciate the insecurity of some of the pharmacological work which is cited. The author, as a chemist, is unable to differentiate between statements which are universally accepted by pharmacologists and others which rest upon quite inadequate observations, and a critical survey would materially reduce the number of examples in which structure seems to determine action. The point of view of the author is well brought out and the book is interestingly written. In future editions one would wish to see a more critical attitude towards the biological observations, and greater attention paid to the physical characters of the drugs as compared with their chemical structure. A few well-considered and well-authenticated examples would carry more conviction than a wealth of citations given without references, and many of them of questionable value.

Surgical Therapeutics and Operative Technique. By E. DOYEN. English Edition, Prepared by the Author in Collaboration with H. SPENCES-BROWNE, M.B., Chef de clinique de l'Institut Doyen. Vol. II. Pp. viii. + 680. With 982 Illustrations. London: Baillière, Tindall & Cox. Price 25s. net.

WE reviewed the first volume of this comprehensive work at some length when it appeared about eighteen months ago,* and we welcome this further instalment, which is quite up to our expectations. It is devoted to regional surgery and embraces a number of operations on the head and neck which were not included in the first volume,

* *Edinburgh Medical Journal*, October 1917, p. 266.

operations on the thorax, and on the upper and lower limbs. Throughout the work the authors maintain a nice balance between simple and complicated operations, the former being described without unnecessary elaboration, while no detail is omitted from the description of the latter. The illustrations have been selected with the same discrimination, some of them depicting so many stages of the procedure as to be almost cinematographic in their effect. If there is any criticism, it is that the actual field of operation might have been enlarged at the expense of the *dramatis personæ*, *e.g.* the figures illustrating supracondylar amputation of the femur.

We look forward with pleasure to the appearance of the third volume, which will conclude one of the most valuable works of reference in operative surgery available to the practical surgeon.

Intravenous Injection in Wound Shock. By W. M. BAYLISS, F.R.S., Pp. xi. + 172. With 59 Illustrations. London: Longmans, Green & Co. 1918. Price 9s. net.

IN this volume Professor Bayliss has amplified his Olner-Sharpey Lectures delivered before the Royal College of Physicians in May 1918, and has incorporated a considerable amount of evidence which has been produced by surgeons on active service since the lectures were delivered. The result is a most exhaustive consideration of the whole subject, particularly from the physiological side, but supported by much clinical evidence. Although the scope of the inquiry does not extend to an investigation of the actual nature of the conditions underlying "wound shock," the writer arrives at certain definite conclusions which are set forth on page 156. The most obvious signs of the condition are a low blood-pressure and the consequences of the deficient supply of blood to vital organs which result therefrom. The ground is cleared, however, by excluding certain conditions which are *not* the cause, viz.:—Acapnia, suprarenal exhaustion, exhaustion of nerve centres, inefficient cardiac contraction, and arterial or venous paralysis. The author then proceeds to consider the injurious effects of a low blood-pressure, and the means that may be taken to counteract these by raising the pressure. Of these the most efficient is the introduction of fluid directly into the circulation, the various solutions that have from time to time been recommended for this purpose are considered *seriatim*, and the physiological and chemical evidence bearing on each is analysed. In the end the author concludes that the most satisfactory is a 6 per cent. solution of gum acacia in 0·9 per cent. sodium chloride.

The need for an authoritative finding on the difficult problems relating to wound shock and its treatment is great, and we feel that Professor Bayliss has met it in this exposition.

Medical Bacteriology. By JOHN A. RODDY, M.D. Pp. xi. + 285. With 46 Illustrations. Philadelphia: P. Blakiston's Sons & Co. 1917.

ACCORDING to the author's preface this book is intended as a "text-book for beginners and laboratory guide for medical practitioners and pharmacists." Dr. Roddy's aim has been to give as briefly and clearly as possible a description of the more common micro-organisms which are capable of producing disease in man, and of the technique used in a bacteriological laboratory.

Various sections are already out of date. The chapter on the meningococcus requires rewriting in view of recent work in this country. The sections on the typhoid-paratyphoid and dysentery groups also require revision. The author lays little stress on the all-importance of specific sera for the identification of these organisms, and emphasises rather the use of certain cultural tests which are now regarded as of much less value. In the agglutination test, with the patient's serum in dysentery and Malta fever, he regards as diagnostic a dilution of serum much lower than that accepted by most workers in these subjects. Various other criticisms on minor points might be made.

The brevity which Dr. Roddy has aimed at prevents the book being of value as a work of reference for laboratory workers; but for the student of medicine and others reading for examinations in bacteriology it may be recommended as a concise and clearly expressed manual.

BOOKS RECEIVED.

ALPORT, A. CECIL. Malaria and its Treatment . . (*John Bale, Sons & Danielsson*) 21s.
DAW, S. W. The Orthopædic Effects of Gunshot Wounds and their Treatment (*Henry Frowde, Hodder & Stoughton*) 7s. 6d.
GAY, FREDERICK P. Typhoid Fever . . . . (*The Macmillan Co.*) —
GREENE, W. H. CLAYTON. Pye's Surgical Handicraft. Eighth Edition (*John Wright & Sons, Ltd.*) 21s.
JOHNSON, A. E. WEBB. Surgical Aspects of Typhoid and Para-Typhoid Fevers (*Henry Frowde, Hodder & Stoughton*) 10s. 6d
MARTIN, T. MUIRHEAD. Pocket Notes on Nerves . . . . . (*William Bryce*) 2s.
PAGE, C. MAX. A Medical Field Service Handbook (*Henry Frowde, Hodder & Stoughton*) 6s.
SADTLER, SAMUEL P., VIRGIL COBLENTZ, and JEANNOT HOSTMANN. A Text-Book of Chemistry. Fifth Edition . . . . (*J. B. Lippincott Co.*) 21s.
SNOWMAN, J. Lenzman's Manual of Emergencies . (*John Bale, Sons & Danielsson*) 15s.
TRANSACTIONS of the College of Physicians of Philadelphia. Third Series. Vol. XXXIX. —

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

Trained Hospital Almoners.

In their inception our hospitals and infirmaries were merely houses into which sick people were received in order that they might have skilled medical treatment under more convenient conditions than obtained in their own homes. They were often ill-adapted for their purpose, and in many cases the surroundings were even less favourable to recovery than those from which the sufferer had been removed. It is perhaps not an exaggeration to say that the transfer was frequently effected as much for the comfort of the patient's friends as for his own safety. In any case, their purpose was essentially *curative*, and little or no attention was paid to the social or economic interests of the patients. It is true that in some of the older foundations, for instance "St. Thomas' Spital," provision was made for lodging and boarding "poor pilgrims to and from Canterbury" who might have fallen sick by the way, and on their recovery to furnish them "with alms and provisions to continue their journey." In time this germ of a social service department in hospital administration developed, and, with the awakening of a social conscience and the growth of humanitarian views, "Samaritan Societies," "Humane Societies," "Truss Societies," and other similar institutions were founded and became affiliated with the hospitals, with the object of assisting the patients in directions other than those which were purely medical. In a sense the convalescent hospital is an extension of the same idea—to rehabilitate the patient who has been "cured" in the hospital before he resumes his work in the world. And so with those hospitals or "hostels" where provision is made for those who are incurable but may still be relieved by care and nursing.

Within recent years a further extension of social service work in connection with hospitals has evolved in the form of the trained hospital almoner. This movement has not hitherto made much progress north of the Tweed. So far as our information goes, it has chiefly centred in the London area and in a few of the larger provincial towns of England.

We are not here concerned with the employment of almoners to inquire into the social and financial circumstances of those who seek advice and treatment at our voluntary hospitals. This is purely a matter of hospital management, and lies within the province of those who are responsible to the subscribers for the proper administration of the funds entrusted to them. If "hospital abuse" exists (and we confess we have seen little of it in Scotland), it can be checked without instituting a general inquisitorial system.

There are various directions, however, in which a trained lady almoner can co-operate with the medical staff to the advantage alike of the patient and the hospital.

The need for such co-operation is perhaps greatest among those who are treated as out-patients. The medical officers are often seriously handicapped by the fact that the patients are not in a position to obtain the medicines, appliances, or other requirements necessary for efficient home treatment. Charitable or civic agencies may exist in the district which would provide what is wanted, but the patient is ignorant of these, and the doctor has neither the time nor the means to put him in touch with them. The lady almoner acts as a connecting link between the doctor and these organisations. It is her business to be familiar with all such agencies in her district, to know the nature and scope of their activities, and the steps to be taken to secure their aid. The needs of a particular patient are explained to her, and she is left to make such arrangements as are possible, and to report what she has been able to do.

Any out-patient medical officer could recall from his last week's experience numbers of cases in which such assistance would have been invaluable. How often does he feel that the purely medical treatment he may order is of secondary importance, and may even be of no value at all, unless the patient can be placed under more favourable conditions for recovery, or can receive some extraneous aid which it is not in his power to give. Some special article of diet, a surgical appliance, a few weeks' rest at a holiday home, may be the most essential factor in treatment, but the patient cannot obtain such accessories unaided, and there is no agency connected with the hospital to help him to secure them. This want the hospital almoner supplies.

There are many other directions in which the services of an almoner have been found useful. It often happens, for example, that a nursing mother requires immediate admission to hospital, but has difficulty in arranging for the care of her infant and of her other children, and to keep the home going. In such a case the almoner can arrange for the admission of the younger children to a children's shelter, or otherwise provide for them. In some districts the almoner keeps a list of reliable women—very much as a doctor has his roster of nurses or midwives—who can be employed as temporary housekeepers under such conditions. In this way the admission of the woman is expedited, and her mind is kept at ease regarding her family during her stay in hospital. Or again, if a patient requiring indoor treatment is found unsuitable for admission to the hospital at which he has applied and has to be referred to some other institution, the almoner can take the necessary steps to facilitate the transfer.

There is another class of case in which a lady almoner is peculiarly adapted to be of service—the case of the unmarried girl who has got into trouble and requires the advice and sympathy of one who by training understands her need and can do something to help her in her present difficulty and to guide her in the future.

The functions of the almoner are not confined to the out-patient department. There are many ways in which she can be helpful with regard to in-patients, particularly when the time comes for them to be discharged. Every hospital physician or surgeon knows the difficulty there often is in disposing of a patient who no longer requires to be detained in the ward but is still unfit to look after himself outside. It may be that he cannot be attended to at home, or he may not even have a home to go to. When the requirements of the patient have been explained to the almoner she takes steps to find out the home conditions, the resources of the patient or his friends, and makes the best arrangements possible for his care and comfort. It would be easy to suggest circumstances in which such aid is valuable in expediting the discharge of patients, and so freeing beds for more necessitous cases. To cite only a few of the more common: the old woman, living alone, who has had a fracture of the femur, and who cannot be sent back to her garret; the child with hip-joint disease who must lie up for months if a cure is to be expected; the hemiplegic who cannot be attended to at home; the child with interstitial keratitis which has improved to the usual degree in hospital but who will inevitably relapse if he returns to his old surroundings, and so on. It is true that an almoner cannot always provide for such cases, or for others like them, because agencies do not exist to meet every emergency, but she can at least enable us to make full use of such as do exist, and her repeated inquiries may point the way for others being established.

In other ways the almoner can usefully co-operate with the medical or the nursing staff—for instance, by acting as an intermediary between them and the Samaritan Society, the Truss Society, the various societies for helping the indigent, the Charity Organisation Society, or the poor law authorities. She can also keep in touch with chronic cases, reporting their progress from time to time, and ensuring their frequent attendance at hospital for purposes of further investigation or demonstration.

It is evident that to perform such varied and, in some cases, delicate duties, the lady almoner must be endowed to an exceptional degree with tact, sympathy, and common sense, and must, in addition, be specially trained. This training is part of the work of our Social Study Schools and Schools of Economics. It includes, in addition to an elementary knowledge of physiology, general hygiene and sanitation, and social questions, a knowledge of the powers and duties of the public health and poor law authorities. She is also instructed in the functions and resources of charitable organisations in general, and in the means of obtaining their aid. Practical knowledge is acquired by visiting the homes of the poor along with her instructor, and in interviewing the applicants for help. Although she is neither a doctor nor a nurse she must be familiar with the general methods of hospital administration and with hospital etiquette. This experience she obtains by working for a time under an experienced almoner in a hospital. It is also required that she spend a certain time in the almoner's office learning business methods, the keeping of statistics, records and accounts, and official correspondence.

It is scarcely necessary to add that such a widely trained official must be sufficiently remunerated, but experience has shown that the expenditure in this direction is fully justified.

War Pensions.

EVIDENCE from various quarters shows that the principles which govern the award of disablement pensions are not universally understood. This applies not only to pensioners themselves but to a good many medical men, and as there falls on the latter the duty of giving certificates as to the health of pensioners, it is worth while drawing attention to certain current fallacies.

It cannot be too clearly stated that a pension for injury or ill-health is intended as a compensation for damages both as regards earning capacity and enjoyment of the amenities of life. In the case of a number of specific injuries—*e.g.* loss of an eye or of a limb—the degree of disablement entailed is definitely laid down; in certain cases, such as epilepsy and cardiac disorders, an approximate standard of disablement is somewhat generally adopted; in a larger group of diseases and injuries there is no definite standard, but each disability has to be judged on its merits. The test applied throughout is: To what extent does the disability impair the pensioner's value in the ordinary labour market? The answer of a Board to this question, given as a percentage, determines the award of the Pensions Ministry.

With the actual sums granted the Boards have no concern. These vary according to circumstances—the military rank of the pensioner, the number of his dependants, his service, the pensions scale for the time being, and so forth.

The point which is not quite obvious at first sight is this: the pension, though its amount is based on diminution of earning capacity, is not intended to make up to the pensioner the wage which he has lost through disablement; on the other hand, the effect of the disablement on his social as well as his economic life is taken into consideration, though it will usually happen that the economic disability, being the greater, includes the social disability. (Examples of the contrary will readily occur to mind—extensive facial deformity, for instance, is in some cases a greater social than economic disability.)

The reason for the apparent contradiction between basing a pension on diminished earning capacity and yet disregarding occupation in fixing its amount is not far to seek. To make up to a man his loss of wage would involve a determination of the pensioner's actual and potential earnings which, even if practicable, would seldom be accurate, would often be unjust, and would invariably create comparisons between one pensioner and another. The least consideration shows that a disability which tells slightly on one man may throw another out of work altogether. A labourer who has lost a finger of his left hand is a very different case from a violinist with the same injury: a gardener suffering from shell-shock is not disabled as an accountant is by the inability to concentrate his attention. Examples might be multiplied indefinitely, but these are enough to show that the principle of compensation for injuries on a uniform scale is the only practical one: to compensate for individual loss from these injuries would be a hopeless impossibility. The problem, in fact, is analogous to that set to recruiting Boards: to determine a man's fitness relative to his age and not relative to the work required of him after enlistment, that being a matter on which Boards had no opportunity of forming an opinion.

Misconception of the principles on which pensions are awarded sometimes leads to medical certificates being given to pensioners to the effect that, since the disability from which *B.* suffers is such as totally to prevent his following his occupation, the award of the Board is, in the writer's opinion, inadequate. Such certificates, based on erroneous premises, lose what value they otherwise would have, and this is the more unfortunate because a certificate from a private medical attendant giving information a Board cannot otherwise obtain is often of the greatest assistance in assessment. In the same way, pensioners sometimes object that the pension they are getting does not raise their income to what they could otherwise have earned. If, however, it is pointed out that to do this would involve giving a pound a week to *A.*, two pounds a week to *B.*, and five pounds a week to *C.*, they recognise, if they are intelligent, that the apparent injustice arises from social conditions, and not from the parsimony of the Ministry of Pensions.

CASUALTIES.

On 4th February, of pneumonia, Captain Robert C. Davie, R.A.M.C.

Captain Davie graduated M.A., B.Sc. at Glasgow University, and received the degree of D.Sc. in 1915. In April 1913 he was appointed Lecturer in Botany at Edinburgh University, and in 1914 made an expedition to Brazil to carry out botanical research.

On 18th February, of influenza and pneumonia, Captain John Cameron, R.A.M.C.

Captain Cameron graduated M.B., Ch.B. at Glasgow University in 1914.

On 21st February, of broncho-pneumonia, Captain Arthur Meurig Pryce, R.A.M.C.

Captain Pryce graduated M.B., Ch.B. at Edinburgh University in 1903. Before taking a commission in the R.A.M.C. he was Demonstrator of Bacteriology in Leeds University.

Lectureship on Orthopædic Surgery.

It was intimated at a meeting of the Edinburgh University Court, held on 17th March, that a donor, who desired to remain anonymous, had offered to the University, through Professor Alexis Thomson, a gift of £10,000 to further progress in the study and teaching of some subject related to surgery, and that it was proposed to devote the money to endowing a Lectureship in Orthopædic Surgery.

Royal College of Surgeons of Edinburgh.

At the recent Dental Examinations just concluded the following candidates passed the First Dental Examination:— Willem Frederik Pauw, George Izzett Alexander, and Thomas Bird Gregor; and the following passed in the subject of Chemistry and Physics:—John Macnaughton Mein, Margaret Helen White, Rosamond Caseley, James Duncan Cumming Archibald, and Johan David Beyers.

At the same diet the following candidates passed the Final Examination and were granted the Diploma L.D.S., R.C.S.(Edin.):—John Bruce Watson Telford, Leith; Nico Hofmeyr Albertyn, Paarl, South Africa; Andrew John Molyneaux, Kimberley, South Africa; George Laing, Keith; John Storey, Alston, Cumberland; Egbert John Charle Steyn, Riversdale, South Africa; Robert Mitchell du Preez, Riversdale, South Africa; and William Harvie Kerr, Edinburgh.

DISEASE IN MACEDONIA.

By ROBERT A. FLEMING, M.D., Major, R.A.M.C.(T.).

I HAVE been asked to write a short account of the medical diseases which we met with in Macedonia.

After an experience of eighteen months in Salonika one learns an enormous amount about the tropical diseases peculiar to that region, and, what is more important, the best methods of keeping oneself and others in a state of health.

I purpose, referring to the more important diseases met with and to offer the conclusions which experience taught us.

DYSENTERY.

We saw comparatively few cases of amœbic, and many cases of bacillary, dysentery. While there were undoubtedly endemic cases of amœbic dysentery, the bulk of our amœbic patients appear to have contracted the infection in Gallipoli or Egypt.

The Army term "dysentery" is a very wide one. It means the presence of blood and mucus in the patient's stools, and obviously only a small proportion of such cases are due to any of the recognised organisms of bacillary dysentery.

The following statistics, covering 1000 cases, may be of interest. Almost all of these were examined in the hospital laboratory during the months of November and December 1917. In November 8·2 per cent. were due to the Shiga organism, 10·4 per cent. were due to the Flexner organism, while 42 per cent. were marked as "Clinical Dysentery." In December 1917 6·9 per cent. were due to the Shiga organism, 11·3 per cent. to the Flexner, and 0·8 per cent. were due to one or other Morgan organism, while 44·7 per cent. were described as "Clinical." The balance of these percentages during November, amounting to 38·8 per cent., and in December 33·2 per cent., were simply cases of "diarrhœa" in which no blood and mucus were found. It is certainly true that the Shiga cases vary somewhat with the time of year, but the whole of our experience during 1916 and 1917 shows that there were invariably a larger number of cases of Flexner than Shiga. It was also the rule that Shiga cases were more severe than Flexner, and this was borne out by the deaths we had from the 11th November 1917 to the last day of December of the same year. Four were due to Shiga, two were due to Flexner, and one to a combination of the two organisms, while two were the result of "clinical dysentery," one was a death from miliary tuberculosis and another from chronic interstitial nephritis; one death only was the result of amœbic dysentery.

In amœbic dysentery the chief site of pain is in the right iliac region, undoubtedly because the cæcum and ascending colon are chiefly affected, while in bacillary dysentery the descending colon and the splenic and hepatic flexures are the usual parts of the large intestine which are involved. Sometimes a small part of the ileum is affected in bacillary dysentery, but this is rare.

I do not propose to discuss amœbic dysentery, because we had so few cases, although I may refer later to the treatment we adopted in these cases.

In bacillary dysentery the worst cases were either those in which long-standing and severe ulceration had occurred, or cases complicated by malaria.

It is only necessary to see one post-mortem of a severe case of chronic dysentery to realise how absolutely hopeless complete recovery must be. The bowel is enormously thickened, especially in the region of the descending colon and right down in the rectum, while the flexures also suffer. One felt that if such a case had been treated vigorously enough at an earlier period this hopeless chronic stage, with its risks of perforation, generally causing hæmorrhage and not peritonitis, would never have occurred. In any case where dysentery is fairly protracted the experience of a few post-mortems help one to appreciate the long-standing ill health which must inevitably follow as a result of the disease.

It was a really serious complication in any form of dysentery to have a superadded attack of malaria, and any attempt at treatment of the dysentery was without avail until a sufficient amount of quinine had been administered by muscle or vein to arrest the malaria. Even a "clinical dysentery" was rendered much more severe as regards dysenteric phenomena if malaria supervened. The malarial attack appeared to increase the diarrhœa, to render more pronounced the typical dehydration so constantly seen in cases of severe chronic dysentery, and to add greatly to the risk of hæmorrhage. One does not, as a rule, see a high temperature in dysentery, and it is therefore easy to recognise a malarial rigor, and a blood examination should be made without delay. The reader is directed to the remarks under the head of "Malaria" on the importance of repeated blood examinations in cases of the subtertian type and the significance of a differential leucocyte count. It is absolutely futile to give quinine by the mouth where even trivial diarrhœa is present, and we usually found that either intramuscular or intravenous injections in doses of 10 to 20 grs. proved most efficacious.

In the examination of patients' stools for dysentery, whether amœbic or bacillary, it is most important to supply the bacteriologist with a fresh stool. In cold weather a stool which has been frozen or has not been kept at a reasonably warm temperature after being passed is useless for examination, and an arrangement with the bacteriologist to receive specimens at almost any time during the working day greatly aided a rapid diagnosis. Where a tented hospital is in use it is well to have some temporary arrangement for keeping the stools passed by patients at a suitable temperature if they cannot be examined immediately.

Perhaps there is nothing more difficult than to distinguish between amœba coli and amœba histolytica, but sooner or later cysts will be passed by the patient and a diagnosis can then be readily made. The part of the stool of greatest value in any kind of dysentery is the mucus, generally stained with blood, which the patient passes, and in examining dysentery carriers a preliminary dose of castor oil often aids in clearing up the case by producing a liquid stool with mucus.

Probably the best guide to the physician in deciding whether a dysentery patient is doing well or not is the examination of the pulse. When there is little diarrhœa, and possibly no temperature at all, a jerky pulse always spells danger, and we found that the actual number of stools could not be taken as a satisfactory indication of improvement or otherwise, because many dysenteric stools simply consist of a tablespoonful of blood-stained mucus. It is, however, a good sign when the stools become tinged with fæcal matter, even if mucus still persists in considerable amount, and it is extraordinary how, with sodium sulphate, a stool rapidly becomes fæcal.

There is no question of the great value of the sodium or magnesium sulphate method of treatment, either giving 1 drm. an hour for six or eight hours, or 1 drm. every two hours until six or eight doses have been administered. The appalling tenesmus is speedily relieved, although for the time being the stools increase in number. Towards night the patient was given a hypodermic of heroin, which procured sleep and arrested the diarrhœa.

In all severe cases we used antidysenteric serum, generally given subcutaneously in doses of 20 c.c. but sometimes administered by the vein. When the patient proved responsive to the sodium sulphate treatment, and where there was no excessive pain, we did not in every case risk anaphylaxis; but there is no doubt that if serum is to be given at all, it should be given at once, and in a very bad case it is well worth the risk. After three or four days the serum treatment should be stopped.

We found the diet of the patient all-important, beef-tea with absolutely no milk being the principal item; but the kind of clear soup may be varied, chicken or rabbit being equally good, and as soon as possible meat or chicken jelly may be added. Several of our medical officers gave many different jellies, etc., at intervals of one to two hours. In some cases this meant an increased tax on the nursing staff and certainly on the quartermaster's department without, perhaps, any very great necessity, but in a really bad case there was no question of the benefit.

All our patients were given large quantities of barley water or rice water to drink, and, in fact, to counteract the dreaded dehydration no reasonable limit should be placed on the amount of fluid which the patient may drink. Where malaria is present, sickness and vomiting are very frequent, and in such cases champagne, generally iced, proved of special value.

Lavage of the bowel was a method of treatment to which in our experience we could not give unqualified praise. When one remembers that, although in bacillary dysentery the descending colon and rectum suffer chiefly, the hepatic flexure and the ascending colon may also be affected, it is easy to understand the limitations of lavage—with a funnel and soft œsophageal tube it is difficult to ensure that the solutions ever reach beyond a small part of the descending colon. Some of us who had considerable experience in the treatment of dysentery gave up lavage almost entirely, and, to my mind, it should only be used where it *at once* proves of benefit and causes no pain. Where it produces great distress it should be stopped.

The initial abdominal pain, so distressing to the patient, is best relieved by the application of heat.

It should never be forgotten that a case of dysentery which seems to be cured may yet mean the presence of ulcers from which hæmorrhage may occur, and a hæmorrhage rapidly proving fatal. One is wise, therefore, in travelling up the dietetic ladder, to do so slowly, and, once out of hospital, to give the patient very light work until he has completely recovered.

The treatment of amœbic dysentery is essentially the use of emetine hydrochloride, which was given in courses lasting for ten to twelve days, 1 gr. being administered intramuscularly, in one or divided into two doses, per day. It is most essential during these periods of administration to remember the effect of emetine on the heart, and we gave, in the majority of cases, 5 to 10 minims of tincture of digitalis thrice daily during each course. The courses have to be repeated sometimes twice, occasionally oftener, depending on the result of bacteriological examination.

The dietetic and other treatment is practically the same as for bacillary dysentery.

We had several discussions with our surgical colleagues as to the propriety in both types of dysentery, amœbic and bacillary, of having appendicostomy performed and the bowel washed out with a suitable antiseptic, such as permanganate of potash, but, as a general rule, surgical opinion appeared to be against such procedure.

I have made no reference to flagellate or other forms of dysentery than amœbic or bacillary. We had several cases in which lamblia were found as the apparent cause of the diarrhœa. In one of these cases lamblia cysts persisted for a long time, the patient apparently doing well, as far as the control of the diarrhœa was concerned, unless there was some indiscretion in diet. On one occasion this patient ate about half a pound of chocolate almonds, and on another, through some inadvertence, he secured and ate a four-course dinner intended for another patient and totally unsuitable for him. On both occasions a severe relapse of diarrhœa occurred, but the remarkable fact was that, although by means of suitable diet, lavage, and occasional doses of thymol internally, his diarrhœa ceased and his motions became formed, lamblia cysts were found right up to the end of his stay in hospital, which was over six weeks.

The prophylaxis of dysentery is essentially the destruction of flies, the disinfection of the water supply, and the elimination of dysentery carriers from a military camp. It was found to be equally essential to protect all food from flies during the warmer weather, and to prevent flies from becoming infective by protecting and destroying the stools of patients suffering from dysentery.

Fly destruction provided an interesting and useful occupation for the convalescent soldier, while those confined to bed watched with interest the various fly traps which we possessed, one of the best types being a Japanese invention that went by clockwork.

Among our experiences in Salonika was the discovery that in one of the kitchens of the hospital there was working a dysentery carrier. There is an unfortunate rule in the Army that a soldier who is unfit for any other work is at least fit to be a kitchen assistant, and to this pernicious idea it is probable that not a few cases of dysentery may be traced during war time. Our watchful medical superiors gave strict orders that no man who had suffered from dysentery of any kind should be allowed to work in connection with the patients' food, either in the kitchen or in the quartermaster's department.

There was, further, a great risk of infection in dysentery wards, because a patient suffering from one kind of dysentery was naturally susceptible to another, and the greatest care was taken not merely to attempt to segregate cases of the different types of dysentery, but also to inculcate careful washing of the patients' hands after stool, and the cleansing of bed-pans with a 5 per cent. cresol solution.

Malaria.

In Salonika we saw the most malignant forms of malaria which appear to exist anywhere, and these were invariably subtertian in type.

An attack of benign tertian malaria has the advantage of being readily cured, but relapses occur for a long time afterwards, and it is difficult to know just when a patient is finally and completely cured, because exposure to cold and wet, excessive fatigue, and especially fatigue during great heat, may bring on such relapses months, or even years, afterwards. In subtertian malaria the trouble is that the attack persists for an indefinite time, often causing great anæmia and debility, but, once really cured, the risk of relapse is over. The difficulty in this type is to say when the termination of such a subtertian case had actually been reached. In the benign tertian type between the attacks the patient is generally perfectly well.

We always dreaded cases of subtertian malaria in which the spleen remained much enlarged and tender. In them mere absence of temperature did not imply the termination of the disease, and some of our worst cases of subtertian malaria with head symptoms had extraordinarily little pyrexia.

Just as in our experience of typhoid and paratyphoid fever, we looked in vain for the typical text-book temperature which, in our cases of subtertian malaria, should have been " recurrent."

It is generally easy to find the parasite of benign tertian malaria, because either rings, sporulating or sexually mature forms, are found in the peripheral circulation, but it is a different matter with cases even of severe subtertian malaria, and often many examinations had to be made in well-marked instances of the disease before the parasites were recognised. Apparently, although in very large numbers in the circulation, they may be limited to the internal organs, and particularly to the spleen and bone-marrow. In more than one fatal case the brain capillaries were packed with parasites, although the usual blood examination conveyed no conception of their enormous numbers.

We found the greatest assistance in all cases of malaria from the examination of the blood. A leucopenia, with a relative increase of mononuclear leucocytes, is typical of malaria, and the tender, if not enlarged, spleen is also a helpful clinical feature.

It seems hardly necessary to describe the malarial attack, with its typical rigor during the cold stage, the characteristics of the hot stage and the sweating stage, or to refer to the constant headache, the frequent sickness with vomiting, or a feature commonly noted, namely, frequency of micturition. There was, however, in not a few of our cases, a remarkable herpes, certainly best marked on the lips, as in pneumonia, but peculiar, inasmuch as isolated herpetic spots were frequently found dotted over the face, and were responsible, in a small percentage of cases, for corneal ulcers which proved extremely intractable to treatment.

I have not attempted to describe the many forms of subtertian malaria which may be met with in Macedonia, but it may be interesting to refer briefly to two special results or types of such malaria.

Pathologically, there is no question that cerebral malaria of comatose type is due to an enormous number of parasites blocking the cerebral arteries, but there is evidently some connection between cerebral malaria and the exposure of the infected patient to a long railway journey or a drive in a stuffy ambulance car during intense heat, and every effort was made to treat severe cases of malaria as near the Front as possible, and with satisfactory result in the way of limiting the number and severity of cerebral cases. It is a curious fact that men over 35, and specially men who had passed middle life, were more apt to die from cerebral malaria than younger men, and possibly one might assert that a subtertian malaria was more apt to become cerebral in type in the older man. We found, on the other hand, that dysentery was apt to be much more severe in younger patients, and the majority of our fatal cases occurred in soldiers under 25.

It was, in the second place, remarkable how many cases of insanity in the Salonika army were due to malaria, always of subtertian type, and practically always eventually resulting in complete cure. In these cases the effect of intramuscular quinine was most striking, and the mental symptoms cleared up in a marvellous way.

We had relatively very few cases of quartan malaria, but some of these were of very severe type, and several were associated with marked jaundice.

Captain Logan, our bacteriologist at Salonika, made some researches into the question of the cause of diarrhœa in malarial patients. He proved that the majority of cases were really dysenteric, and similar work was done by other bacteriologists in the area of our Army. The point was of very great importance, because it enabled us to segregate dysenteric malarial patients and to prevent the spread of dysentery, and it also gave us an indication for the suitable treatment of such patients.

The Army order for the treatment of malaria with quinine was a week or ten days with 30 grs. daily in three doses, for the next week 20 grs. daily in two doses, and for the third week 10 grs. a day, and then, until a period of 3½ months had elapsed from the date of the last attack, 30 grs. a week at least. This was, of course, oral administration and was intended to be given in solution. Iron and arsenic were ordered during the period of convalescence after a severe attack of malaria. Our Italian colleagues gave red wine freely as a tonic and considered it very beneficial.

We always preferred to give intramuscular quinine into the gluteal muscles, about 2 ins. or thereby below the iliac crest, and 10 to 20 grs. of quinine bihydrochloride were thus administered once or twice a day.

In some hospitals intravenous quinine was the stock treatment, using the same salt diluted with normal saline solution, and was preferred to the intramuscular method. Concentrated quinine solution has a distinct effect on the heart and should not be used without due care.

For the comatose cases, intensive intramuscular and intravenous treatment was often the only method likely to save life, and up to 80 or 100 grs. in twenty-four hours were given in doses of 20 grs. at a time.

The preventive treatment for malaria exercised us not a little, and at a discussion on the subject held under the auspices of the Salonika Medical Association, at which the writer had the honour of making an introductory statement, there were several absolutely diametrically opposed opinions expressed with regard to the methods which should be adopted.

There were those who pled for a quinine parade for all troops exposed to infection, the dosage being 5 or 6 grs. a day, or 10 grs. twice a week, while others of much experience expressed themselves strongly with regard to the futility of such a measure. The impression left on one's mind was that quinine did not act so well if the soldier was even partially saturated with it, and that it rendered treatment, when the disease did occur, much more difficult.

An antimalarial mixture, the constituents of which were not communicated to the soldiers, was administered to certain units with the idea of finding out whether it helped as a preventive measure, either for a first infection or recurrent attacks, but when the writer left Salonika no statement had been made as to the benefit obtained. It was an open secret that quinine formed the staple ingredient of this secret remedy.

Needless to say, every one favoured all available methods for destroying the mosquito breeding-grounds, and the use of mosquito repellants, gloves, veils, mosquito nets, etc. Theoretically, a full dose of quinine ought to kill the young parasites and so prevent lodgment in spleen or bone-marrow, but it is hard to believe that cases in which quinine failed to protect patients could be explained by the soldier in question failing to swallow the quinine ordered. Another argument against the quinine parade is, of course, the enormous consumption and possible waste of the drug which the parade necessitates, and if it is really wasted it renders efficient treatment of the malarial patients difficult, should there be any limitation to the amount of quinine available.

It is difficult to give statistics with regard to quinine amblyopia. Considering the enormous quantities of quinine used in Macedonia, and the large doses administered, it seems almost incredible that at one of the largest eye centres for the Salonika army one saw so few cases of blindness due to quinine. It is a fair assumption that, just as in alcoholic neuritis there is some other agent than alcohol responsible for the condition, so in quinine amblyopia there must be another factor at work, although, of course, special susceptibility to the drug may explain the extremely small number of men who were afflicted.

One interesting prophylactic measure in cases of malaria was the prevention of uninfected anopheline mosquitoes from getting access to the malarial soldiers and so spreading the disease to others. Our orders were to segregate all malarial patients in certain wards and to have the patients in bed and under the mosquito net at sundown. The joy of the cool evening, to which everyone looked forward, rendered this order a most unpopular one, and an evening visit to malarial wards usually caused an unseemly scurry to cover!

Sand-Fly Fever.

One of the very common, though less serious, fevers which we had to treat was sand fly-fever. It came on in summer and during the hottest weather.

The sand-fly or the phlebotomus papatasii is a minute mosquito-like insect with a very hairy body, and about the size of a midge. It had a curious spring resembling a flea, and which can be well studied when one is writing or reading under a lamp in the open air, as the fly often settles on the paper. The blood-sucker is the female, and the parasite of the fever is an ultra-microscopic organism not yet isolated. The sand-fly breeds in any old ruin or wooden shed where there is a certain amount of moisture, and the difficulty is to induce those who are exposed, to sleep under mosquito netting fine enough to keep out the fly; the ordinary mosquito repellant will keep off the attack on face and hands, but the ankles require protection by mosquito boots.

The fever has a sudden onset, sometimes with a rigor, and lasts for only three days, the temperature falling the third day to normal. Hence the term "three-day fever" often applied to it. The chief characteristics of the attack are the "mad dog eyes," pain in the eyeballs and head, frequent sickness often leading to vomiting, and a feeling of languor more correctly described as a sequel. There is generally a leucopenia.

The great remedy is certainly opium, and 10 grs. of Dover's powder with 10 grs. of aspirin form an admirable combination for the relief of the condition.

Enteric Group.

We had a number of cases of typhoid and quite a number of paratyphoid "A" and "B." As practically all our soldiers had been inoculated with T.A.B. within the preceding one or two years, the Widal reaction proved almost useless. By far the best method was to obtain a blood culture, but this demands promptitude, because a blood culture, to prove successful, must be taken with a temperature of at least 102° F. and within ten days of the onset of the fever. We noticed the rash in cases of paratyphoid as a rule was much more diffuse and the spots much larger than in true typhoid.

Many cases of the enteric group were remarkable for their very atypical temperature charts. The "staircase" temperature, with which one is familiar at home, was rarely seen in Macedonia, but the most useful diagnostic points were, in the first place, the slow pulse, in the second, the enlarged and tender spleen, and lastly, the rash towards the end of the first week which was almost always present.

Our chief difficulty was the dietetic one, because milk was almost unobtainable except in the form of tinned milk, and the patients had to be fed on beef-tea, chicken-tea, rabbit-tea, jellies, and similar foods. One learned in the treatment of all our patients to get on without a milk diet, except in cases of Bright's disease, and certainly the results proved that the milk diet so commonly used for a fever patient at home could be perfectly satisfactorily superseded by beef-tea diet.

Among other diseases which we met with in small numbers were dengue, relapsing fever, epidemic cerebro-spinal meningitis, smallpox, and the ordinary infective fevers which one sees at home. We had the usual periods of influenza, and plenty of "myalgia" and disordered action of the heart. Of all troubles to the M. O. "myalgia" is one of the worst. It is a favourite means of going sick. There is no outward evidence of a muscular pain. Many patients, fed up with their particular work, find their way into hospitals at home and abroad suffering from this abominable "disease." That there are genuine cases goes without saying. Perhaps one of the best methods of treating either a genuine case which has resisted other measures or a case which is believed to be imaginary is to adopt a plan stated to have been devised by the Chinese. It consists in introducing acupuncture or any sterile needles into the specially painful muscles. The pain produced by the treatment frequently has a marvellous effect in abolishing "myalgia," and certainly genuine cases not infrequently benefit when all other methods have failed.

While I am alone responsible for this paper I have to acknowledge much assistance in acquiring the data referred to in it. Captain Fowler, Captain Carruthers, Major Mathewson, Major Carmichael, and Captain Logan are a few of my colleagues to whom I am indebted.

PRIMARY CHORIONEPITHELIOMA OF THE OVARY.

By JOHN A. KYNOCH, M.B., F.R.C.S., Professor of Obstetrics and Gynecology, St. Andrews University.

PRIMARY chorionepithelioma of the ovary is rare. Some authorities consider the ovary to be by far the most unusual site for the extra-uterine development of this form of malignant tumour. The first published case is probably that reported by Kleinhans in 1902. In this case the pelvic tumour was supposed to have had its origin in a tubal or ovarian pregnancy, and although there was no positive proof of either, the hæmorrhagic tumour histologically presented all the signs of chorionepithelioma. The patient died soon after the operation, and at the post-mortem metastatic growths were found in the vagina and lungs, the uterus and the appendages of the opposite side being found normal. Our information on this subject is derived chiefly from a paper published by Fairbairn in the *Journal of Obstetrics and Gynecology of the British Empire* for July 1909, where he describes a case coming under his own observation, and also refers in detail to two very similar cases described by Iwase which were observed in the *Klinik* of Professor Doderlein in 1908.

In Fairbairn's case the patient was a married woman of 25 who had had three children and one miscarriage before coming under observation. Her chief complaints were irregular vaginal hæmorrhages, abdominal pain, and sickness. On examination a tender elastic swelling was found on the left side of the lower abdomen, which, from its size, was regarded as a probable ovarian cyst with twisted pedicle. At the operation the tumour was found to be very adherent, as a result of which it ruptured during removal. It was the size of a small cocoa-nut, nodular on its surface, and covered with a thin white capsule through which the dark blue-red colour of the tumour substance could be seen. When cut into, there was found a deep red coloured hæmorrhagic mass covered with a thin capsule (tunica albuginea) of the ovary, suggesting from its appearance ectopic gestation. Microscopically the tumour was found to be composed chiefly of fibrin, blood-clot, and necrotic tissue. The typical appearances of chorionepithelioma were most marked under the capsule and between the mass of blood-clot and fibrin. The appendages on the opposite side were removed at the same time.

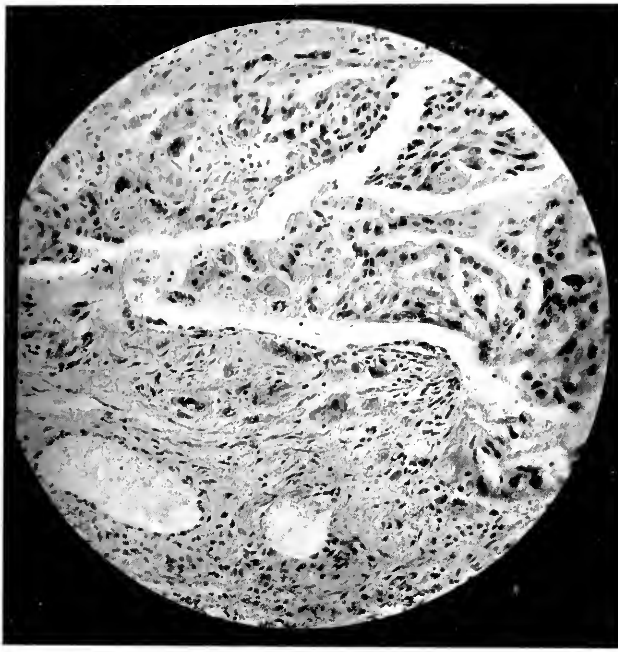

Fig. 1.—Chorionepithelioma from Primary in Ovary.

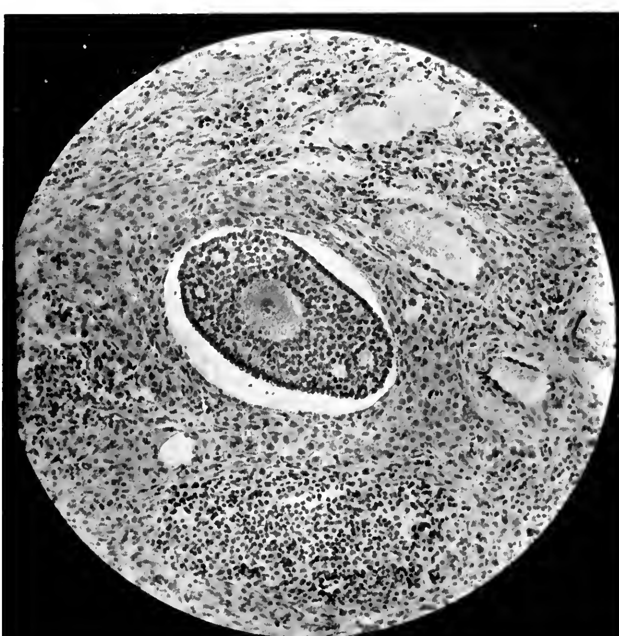

Fig. 2.—Ovum from the Wall of the Chorionepithelioma of the Ovary.

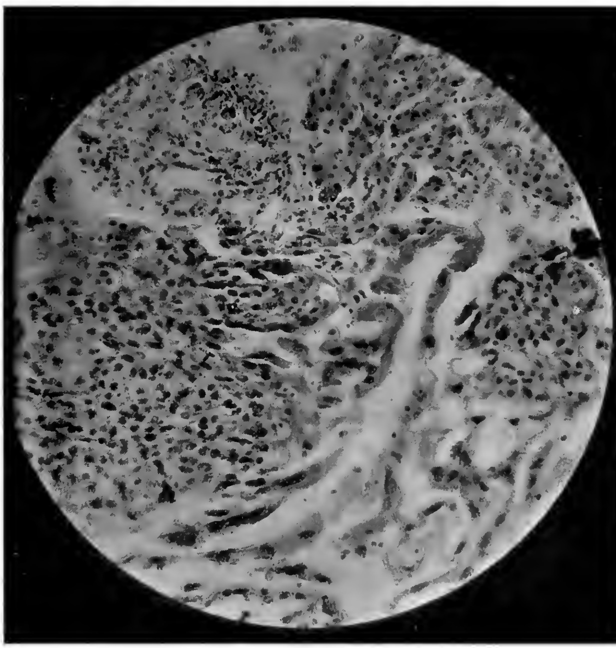

Fig. 3.—Chorionepithelioma in Liver.

The patient recovered, and showed no signs of recurrence when the case was published two years after operation.

Iwase's cases were very similar to the above. They both occurred in multiparous patients of the child-bearing period with no history of having had a previous cystic mole. The tumours removed had the same bluish-red colour, and microscopically the usual characters of chorionepithelioma, most evident between a well-marked capsule of ovarian tissue and a mass of blood-clot and fibrin. In neither of the cases was there microscopic proof of an immediately previous gestation or of teratomatous structures. Rapid recurrence occurred in both cases, whereas in Fairbairn's case the patient was alive when he published his report two years after operation. The following are the notes of my case:—M. S., age 24, nullipara, was admitted to the Gynecological Department of the Dundee Royal Infirmary on 26th April 1917. She complained chiefly of severe pain in the left iliac region, with irregular vaginal hæmorrhagic discharge of six weeks' duration. Menstruation began at 13—twenty-eight-day type, average duration four days, and unassociated with any special discomfort. The periods had been quite regular up till fourteen weeks before admission, when there was eight weeks' amenorrhœa, followed by the hæmorrhagic discharge, which was present for six weeks before admission. On examination there was found hæmorrhagic discharge, uterus slightly enlarged, appendages on the right side normal, but through the left fornix there was felt a round tender swelling about the size of a hen's egg, corresponding in position to the left ovary. On 1st May cœliotomy was performed by Pfannensteil's transverse suprapubic incision. The left ovary was found enlarged, nodular on the surface, and of a dark purple appearance. It was of such soft consistence that it ruptured and bled freely during the manipulation necessary for its removal. The possibility of the condition being due to an ovarian pregnancy was commented upon at the time of its removal, and the specimen was promptly sent to the Pathological Department of University College, Dundee. The Fallopian tubes on both sides appeared to be unaffected. Convalescence was satisfactory, and the patient left hospital three weeks after operation. On microscopic examination Professor Sutherland reported that the ovarian tumour showed the characteristic appearances of chorionepithelioma.

The patient was readmitted to hospital one month after her discharge, complaining of a swelling at the seat of the abdominal incision. On examination the swelling was found to be about the size of a billiard ball, firm in consistence, slightly tender, and it appeared to be situated in the abdominal wall. It was regarded as being a hæmatoma, a condition occasionally met with when the abdomen is opened by a transverse incision. As it increased rapidly in size and the patient's general condition did not improve, an incision was made into the tumour, when it was found to be firm in consistence and liver-like in appearance. Examination per rectum now revealed a soft doughy tumour bulging into the lumen of the bowel. The patient had several attacks of vomiting and diarrhœa, she got progressively weaker, and died on 27th July, three weeks after readmission. Professor Sutherland, who made the post-mortem examination, reported as follows:—"A massive, nodular, semi-fluctuant growth occupies the pelvic cavity as large as a cocoa-nut, reddish-brown in colour, and markedly hæmorrhagic. It is adherent to the anterior abdominal wall, actually invading the surrounding tissues in some parts. The uterus, elongated and flattened over the tumour, is otherwise unaffected. The bladder is free. The rectum is much narrowed by the bulging inwards of the tumour. The mucous membrane is not directly involved, and the tumour is mainly in front of and to the left side of the uterus. The mesenteric glands are enlarged, two of them forming prominent masses the size of chestnuts and invading the wall of the intestine. The liver is enlarged, pale, and fatty, and on its under surface there is found a tumour the size of a hazel-nut. The kidneys, spleen, and stomach appear to be normal. The lungs are non-adherent, but there is found on the anterior margin of the left lung on its upper lobe one small tumour, and several larger nodules are found on the posterior aspect of the right lung. Heart normal. Microscopic examination of the secondary nodules shows appearances resembling those of the primary growth of the left ovary."

Professor Teacher kindly examined the primary and secondary growths and reported that "The section of the primary growth is clearly ovary with chorionepithelioma. One of the nodules from the lung and one from the liver are typical secondary growths."

It is impossible to speak with certainty regarding the origin of the chorionepitheliomatous elements found in the left ovary in the case I have reported. With regard to the possibility of its arising directly from a previous pregnancy, although there was a clear history of amenorrhœa, followed by irregular uterine hæmorrhages and abdominal pains, too much reliance must not be placed on clinical symptoms in the absence of microscopical evidence of pregnancy. As to its possible origin from a previous teratoma of the ovary, none of the sections examined showed sarcomatous or other unusual tissue elements. In reporting this case of chorion-epithelioma of the ovary I desire to thank my colleague, Professor Sutherland, for conducting the post-mortem examination, and Professor Teacher for kindly examining the sections and providing me with the accompanying photomicrographs.

CONGENITAL ŒDEMA.

By DAVID M. GREIG, C.M., F.R.C.S.(Edin.).

About a year ago, through the courtesy of Professor Kynoch, I was enabled to examine a male child 6 weeks of age, the subject of congenital symmetrical œdema of the feet. He was born at full time, a healthy, well-nourished, and (except in relation to his feet) a well-formed infant. The youngest of three, neither of the other children and neither parent presented any abnormality, and there was no occurrence of a similar œdema known in any relative.

The œdema, which was noticed at birth, was strikingly symmetrical. It formed on the dorsum of each foot a very prominent swelling, more exaggerated and obvious to the lateral than to the mesial aspect of the foot, and more pronounced towards the toes than towards the ankle. This prominent mass appeared to overhang the fifth metatarsal and to bulge forward over the toes. The toes themselves were involved in the œdema, giving them the appearance of being fat and "podgy," while the transverse grooves marking the metatarso-phalangeal and the interphalangeal joints were deeper than usual. On the plantar aspect each foot was full and slightly convex from side to side, and the transverse lines were absent or less marked than normally. The skin over the areas involved was smooth and had a distended appearance. At its maximum the swelling on the dorsum would be fully an inch in depth. The œdema did not pit easily on pressure, and was peculiarly firm and resistant. It was not noticed that the feet were less warm than natural, and there was no discoloration nor dilatation of vessels. No enlarged lymphatic glands were anywhere observable.

Congenital œdema is undoubtedly of rare occurrence. There is not a large number of similar cases on record. All the more need, then, to view the condition in its true perspective. Whether it was first recognised in France or America is of little moment, but there can be no doubt that to Milroy[1] is due the credit of first bringing the existence of hereditary œdema clearly before the profession. As a penalty it has been called by some writers "Milroy's Disease"—an unfortunate nomenclature which is objectionable, in that it fails to convey to the mind any suggestion of the nature of the affection, and in that it is probably more correctly described as an abnormality than as a disease.

Milroy's patient was an adult male presenting a bilateral œdema of the feet and legs, and this had existed from birth. Milroy was able to trace the existence of hereditary œdema through six generations. The record involved ninety-seven persons, of whom eighteen presented congenital œdema of one limb, and four of both limbs. The other persons were either normal or could not be traced. Milroy admits that the record is incomplete, and that it is not possible to recognise the Mendelian law in relation to the heredity, and he puts the characteristics of the disorder succinctly thus:—

1. Congenital origin, with a steady growth corresponding to the normal growth of the body until adult size is attained.

2. Limitation of the œdema to one or both lower extremities, the areas involved varying.

3. Permanence of the œdema.

4. Entire absence of constitutional symptoms.

Milroy records the condition as one of angeioneurotic œdema. There is a difficulty in accepting this suggestion. I do not think that hereditary congenital œdema fulfils the conditions generally accepted as characteristic of angeioneurotic œdema. Angeioneurotic œdema is an affection probably due to nerve influence on blood-vessels. Hence its name. It is a more or less transient temporary affection, though one can conceive how many attacks may result in persistence of some of the swelling and its accompanying inconveniences. It indeed shows at times a tendency to be hereditary, and that it may originate in the absorption of intestinal toxins is probable in those cases in which gastro-intestinal disturbance is pronounced. It appears to be an entirely different condition from either congenital or hereditary trophœdema.

To Milroy's paper a valuable addition was made by Hope and French.[2] In this paper the authors trace thirteen out of forty-two persons who were affected with "persistent hereditary œdema of the legs," the investigation involving five generations. The condition was not, however, invariably congenital, and in one member its appearance was delayed even till the age of twenty-one years. A feature of the cases reported is that in a number of the patients "acute attacks" occurred. These attacks were accompanied by rigors, pyrexia, pain in the parts affected, and sometimes by vomiting. The authors point out that these were not due to sepsis, nor apparently primarily to micro-organisms, but are ascribed to "vasomotor troubles." Hope and French write:

"Upon the whole, therefore, although it cannot be called a satisfactory explanation, we think with Milroy, Meige, and others that the œdema in these cases is secondary, not to gross structural changes in the blood-vessels or lymphatics, but to an error in the function of these vessels, presumably, or at least possibly, resulting from erroneous functions in the nerves supplying them. In other words, we think the condition primarily a 'vasomotor neurosis.'" They point out that there are three well-known vasomotor neuroses, viz. Raynaud's disease, factitious urticaria, and angeioneurotic œdema, and "it is to the last of these that hereditary œdema may be considered to be allied." In Hope and French's paper the "acute attacks" are acknowledged to be very suggestive of "angeioneurotic attacks." Throughout the families affected there was a distinctly neurotic strain. Hope and French say: "Milroy lays stress on the œdema being present at birth, Meige lays stress upon its appearing at puberty," while with the cases dealt with in their paper the age at onset varied considerably.

Bulloch[7] gives a good *résumé* of "chronic hereditary trophœdema," though not adding any new case, and he gives a valuable bibliography. The heredity is the point of view from which he considers the condition.

Parkes Weber has recorded two cases which he classes as of the same variety as those described by Milroy. In the first[3] of these the patient was a female of 29 years, in whom the enlargement had existed during two years, but there is neither hereditary nor congenital factor present. In his second case,[4] that of a woman of 20 years, though the swelling of the fingers had existed "as long as she could remember," the blueness justified Weber in considering it an "acrocyanosis."

It seems illogical to classify such cases as Weber's with those of Hope and French, or of Milroy, or of Meige. To do so because the etiology is obscure and the pathology not obvious is to mass under one name a concatenation of dissimilarities which had better be kept separate. Of the "three well-known vasomotor neuroses," Raynaud's disease is a progressive peripheral disturbance affecting hands as well as feet, while in factitious urticaria there is evidence of a general toxæmia, and again in angeioneurotic œdema there is the periodicity of attacks. These all seem different from true congenital œdema. It may be incorrect to link Hope and French's cases with Milroy's or with Meige's. Though they are each varieties of trophœdema the pathology may be distinct. In the former the striking features are the "progressive œdema" and the "acute attacks," with subsequent aggravation of the œdema, while in Milroy's cases the main features were the congenital nature of the affection and the maintenance of its size proportionally to the body-growth.

Isolated cases of congenital œdema, such as I have described, may even form a third condition, or it may be the first instance of what is to become later an hereditary defect. Its characters and its progress suggest some local symmetrical congenital defect in the lymphatics rather than a vascular affection, whether neurotic or otherwise in origin. The condition is distinct from that inequality of limbs not unfrequently found in new-born infants, in which one limb or part of it appears unduly fat and the grooves at the joints are deeper than usual, for in this condition there is no œdema and the parts are normal to touch and not firm. The condition is distinct from unilateral hypertrophy,[5] in which the determining factor of the overgrowth is very probably a central nervous affection, secondarily involving alterations of blood-vessels in growing fœtal tissue. Finally, the condition is also distinct from progressive subcutaneous œdema,[6] in which there is probably an ascending lymphangitis and perilymphangitis, bringing about lymphatic obstruction, and characterised by its late onset and its steady progression.

Not enough cases have yet been gathered and investigated to place congenital trophœdema on a proper basis, and until a sufficient number has been placed on record the pathology of the condition is bound to remain obscure.

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DIETS IN USE IN THE EDINBURGH ROYAL INFIRMARY IN 1843.

Three-quarters of a century is a remote enough period of the life of such an institution as a hospital to give historic interest to the practices of that date. In 1843 the Managers of the Edinburgh Royal Infirmary approved a report on the diets of the Infirmary, and a copy of this report has recently come into our hands. The diets in use at the time were four—a low diet, a common diet, a full diet, and an extra diet, each one with the possible variation of bread being interchangeable with porridge, making eight in all. Though the details of these are not given in the report, their cost is; it varies from 1·81 pence for the low diet with porridge to 6·04 pence for the extra diet with bread. From the context of the report it would seem that the reason for revising the diet schedules was the growing practice of ordering "extras," for the committee were "satisfied that the dietetic treatment of a very large proportion of the multifarious cases of disease in the Infirmary may be appropriately regulated, without the necessity of prescribing any extra articles of food, as is too generally practised at present, for great pains have been taken to supply, in the different rates, combinations of articles in such variety as to suit every ordinarily supposable case." Nine new diets were arranged: (1) low diet, (2) rice diet, (3) steak diet, (4) steak diet with bread, (5) common diet, (6) common diet with bread, (7) full diet, (8) full diet with bread, (9) extra diet. In Nos. (4), (6), and (8), 6 ozs. of bread was substituted for each pound of potatoes, with a slight increase (60 calories) in the nutritive value of the ration.

The two principal diets were composed thus:—

Table I.

	(5) Common Diet.	(7) Full Diet.
Breakfast . .	Bread, 6 ozs. Coffee, ½ pt. {Coffee, ½ oz. Milk, 2 ozs. Sugar, ½ oz.}	Porridge, 1½ pt. (4½ ozs. oatmeal). Buttermilk, 1 pt.
Dinner . . .	Potatoes, 1 lb. Broth, 1 pt. {Barley, 1 oz. Vegetables, ¾ oz. Meat, 2 ozs.}	Boiled meat, 6 ozs. Potatoes, 1 lb. Bread, 3 ozs. Broth, 1 pt.
Supper . . .	Bread, 6 ozs. Tea, ½ pt. {Tea, ⅛ oz. Milk, 1 oz. Sugar, ½ oz.}	Potatoes, 1 lb. Milk, 10 ozs.

In the report the food values are expressed in terms of "solid animal nutriment" and "solid vegetable nutriment." The details given are sufficient to admit of their reduction to modern food values, as in Table II.

TABLE II.

	Breakfast.	Dinner.	Supper.	Cost—pence.	Carbo-hydrate—grams.	Protein—grams.	Fat—grams.	Calories.
Low Diet	Bread, 3 ozs. Tea, $\frac{1}{2}$ pt.	Panado (Bread, 3 ozs. Milk, 2 ozs. Sugar, $\frac{1}{4}$ oz.)	Bread, 3 ozs. Tea, $\frac{1}{2}$ pt.	2·57	205	31	4	1020
2 Rice Diet	Bread, 3 ozs. Coffee, $\frac{1}{2}$ pt. One egg.	Beef tea, $\frac{4}{5}$ pt. Rice pudding.	Do.	4·71	202	35	14·5	1092
3 Steak Diet	Bread, 6 ozs. Coffee, $\frac{1}{2}$ pt.	Potatoes, 1 lb. Steak, $\frac{1}{4}$ lb. Broth, 1 pt.	Bread, 6 ozs. Tea, $\frac{1}{2}$ pt.	4·51	369	84	21	2146
5 Common Diet	Do.	Potatoes, 1 lb. Broth, 1 pt.	Do.	3·51	369	60	9·6	1946
7 Full Diet	Porridge, $1\frac{1}{2}$ pt. Buttermilk, 1 pt.	Meat, 6 ozs. Potatoes, 1 lb. Bread, 3 ozs. Broth, 1 pt.	Potatoes, 1 lb. Milk, $\frac{1}{2}$ pt.	3·31	403	110	42	2676
9 Extra Diet	Porridge, 2 pts. Buttermilk, 1 pt.	Meat, $\frac{1}{2}$ lb. Potatoes, $1\frac{1}{4}$ lb. Bread, 3 ozs. Broth, 1 pt.	Potatoes, $1\frac{1}{4}$ lb. Milk, $\frac{3}{4}$ pt.	4·07	488	142	56	3296

Nos. (1), (2), and (3) are invalid diets. The chief comment that might be made on these is the small amount of milk they contain—4 ozs., $5\frac{1}{2}$ ozs., and 3 ozs. respectively. Considering the relative prices of tea and milk at the time, it is remarkable that more of the latter was not used.

No. (7) and No. (9) are quite adequate for men leading sedentary lives, and it will be noted that the balance between the different foodstuffs is good, especially in (9), which closely approximates to the 3000 calories and 500 : 125 : 50—carbohydrate : protein : fat of an average diet.

The common diet, (5), is, however, peculiar. It is one of the two named as "principal diets" and is inadequate, especially in fats. It is also a relatively expensive diet, being more costly than (7), the reason being that it includes bread, tea and coffee for breakfast and supper, instead of the cheaper and more nutritive porridge, potatoes, and milk.

The following paragraph of the report, giving contract prices for foods, may be quoted. The comparison with present-day cost of living is striking:—

"Oatmeal, 28s. the sack of 280 lbs.; bread, 6d. the loaf of 64 ozs.; new milk, 8½d. the imperial gallon; buttermilk, 12s. 6d. for 100 Scotch pints of 64 ozs. each; barley, 13s. the cwt.; meat, 4d. a lb. 'overhead'; greens, 9d. the stone; leeks, 2d. the lb.; salt, 8d. for 21 lbs. Tea is taken at 4s. 6d. a lb.; coffee (burnt) at 1s. 8d.; rice at 3d.; eggs at 8d. (new laid) and at 5d. the dozen when preserved from summer in lime water. It is probable that some of these articles may be had at a cheaper rate."

THE DOCTORS IN SOME MODERN FRENCH NOVELS.

By J. BARFIELD ADAMS, L.R.C.P., L.R.C.S., Member of the Medico-Psychological Association.

COMPARATIVELY few novels have been published in France during the war. With one exception all those referred to in this paper appeared in 1913 or in the first six months of 1914. The exception is *Monsieur Pierre*, the last work from the pen of the late Lieutenant-Colonel Patrice Mahon. The gallant officer commanded the artillery of the 71st Division, and was killed in action, 22nd August, on the Col de Sainte-Marie-aux-Mines in Alsace. The novel made its posthumous appearance late in 1916.

Lieutenant-Colonel Mahon was a thinker, a philosopher. He had travelled much, particularly in Russia. He was a distinguished and facile writer on military subjects, but occasionally, and to the no small delight of general readers, for he had an agreeable style and great powers of description, he sought relaxation in pure fiction, which he wrote under the pseudonym of Art Roë.

Monsieur Pierre is a story of the days of the Franco-Prussian war of 1870. The first scenes are laid in the hill country of the Jura, and the drama opens in the old château of the family of De Persanges. There is no suspicion of the coming war. Subtle brains in far-away Berlin may be weaving schemes of conquest. In Paris some, wiser than their fellows, may have an inkling of future trouble. But here in the ancient province of Franche-Comte things are so peaceful that the youthful follies of a student are enough to cause worry and disturbance.

Pierre de Persanges, the only son of the house, a young man of nineteen years of age, has been studying at a Jesuit College in order to prepare himself for entering the *Ecole Polytechnique*. He is a brilliant student, being particularly clever in mathematics. Probably, like many youths of his age, he suffers a little from a swelled head. He develops philosophical ideas not at all in accordance with the notions of the good fathers. They do not know in the least what to do with a young fanatic who is only occupied in propagating a revolution in their educational establishment. In their despair they send the young man home to his mother, to whom they write a letter in which they inform her that Pierre is suffering from insomnia, want of appetite, and certain hysterical symptoms—all of which are true. Naturally, the writers' abhorrence of their pupil's socialistic and almost atheistical ideas finds expression in the epistle, but it is cleverly veiled by sentiments of admiration for his remarkable mental gifts.

An intensely religious woman, Madame de Persanges is grieved by certain passages in the letter, but she is a mother, and for the moment she is more alarmed by the account of her son's health than by anything else. The morning after Pierre arrived at the château the family doctor—he is a friend as well as a physician—is called in. He is a little man with a rosy face, fair hair, and short side whiskers. He has a private interview with Madame de Persanges, who acquaints him with the contents of the Jesuit fathers' letter.

Then the patient enters. The scene that follows is homely and commonplace enough, but the author's skill has invested it with a singular charm.

The doctor has known Pierre from a child. He treats him affectionately, familiarly. It does not look as though there were much the matter with the young man, but the physician leaves nothing to chance. He examines the case thoroughly, going through the usual routine of palpation, percussion, and auscultation.

"Nothing, nothing," he remarks, as he carries out his researches. "I find nothing wrong here. The heart beats a little quickly, it is true. The tongue is clean. The teeth are healthy."

The worthy doctor knows his work. He resumes his seat, and for a moment or two regards the patient in silence. Possibly the letter from the college authorities has raised suspicions in his mind that the immorality which haunts even the best schools lay at the root of the trouble. Adroitly he satisfies himself that that is not the case.

The physician is content with the results of his examination.

"Too much mental work," he says to himself, "too little physical exercise, *voilà tout!*"

"Yes," he remarks aloud, "I am certainly of the opinion that it would be wise to interrupt the preparation for the *Ecole Polytechnique*."

Then he sketches out the treatment. Pierre is to take plenty of exercise in the open air, to have abundance of substantial nourishment, and if he wishes to continue his mathematical studies—well, he can do so in reason.

The scenes change rapidly. The war has broken out. The tragedy of Sedan has taken place. Bazaine has played the traitor at Metz. France lies bleeding and exhausted beneath the brutal heel of the invader. *Aux armes! La Patrie est en danger!* Pierre has enlisted as a volunteer in a regiment of Lancers. He is now in the army of the Loire—the army on which so much depended, which was within an ace of relieving Paris, which might have changed the whole history of the last forty-eight years, which might, perhaps, have prevented the awful desolation and slaughter of the present war. Oh! if a Clemenceau had only been at Tours and a Foch at Orléans in the winter of 1870!

It is one of the last battles in the Orléanais. Cavalry, artillery, infantry, *francs-tireurs,* and half-armed peasants in the confusion of retreat are hopelessly mixed up. The Bavarians, the Prussians, are advancing always. Pierre's horse is killed under him, and he himself is wounded in the side. He is lying helpless on the ground. The guns, retreating at a gallop, come thundering down the road, and the wheels of more than one of them pass over and crush the wounded man's right leg.

Denis Stanislas, a camp follower, a man who had received some kindness from Pierre, and who had acted as his servant, found the young soldier lying half-unconscious in the mud and snow. It was impossible to leave him there to die. Stanislas searched for some means of conveying the wounded man to the nearest ambulance. He found a wheel-barrow.

A cry of agony escaped from Pierre's lips when the servant tried to raise him from the ground.

"Leave me alone!" he exclaimed. "Do not touch me. It is useless. I am dying."

Undeterred by cries and protestations, Stanislas lifted the sufferer on to the barrow, and bound the injured limb to one of the long handles of the vehicle.

"It is for your good," he said. "Don't be afraid. They will cure you."

It was a long and weary journey to the nearest place where surgical assistance could be obtained. Once they had to pass a Prussian outpost. The moon inopportunely broke through the clouds at the moment. Pierre had swooned away, and Stanislas told the soldiers that he was taking a dead body from the battle-field to bury it. He was allowed to pass.

It was bitterly cold. Presently it began to snow. Stanislas struggled on, and at last, when morning was breaking, he arrived at Neuville, where help was to be found. The camp follower wheeled the barrow into the quadrangle of the convent, which had been turned into a hospital. He unfastened the broken leg, and lifted the unconscious body, stiff and half frozen, and laid it carefully on the ground, on which he had previously spread the soldier's cloak.

A surgeon chanced to come to one of the doors. His hands were red with blood, for he had been at work all night, and he stooped to wash them in the snow.

"*Monsieur le major,* if you please," said Stanislas, "this is urgent."

"What is it, then?" demanded the doctor, continuing to rub his hands and arms with the snow.

A sister of mercy at that moment came to the door, and followed the surgeon into the middle of the court.

"It was yesterday that this misfortune happened," began Stanislas.

But the doctor did not listen to him. He knew too well what the story would be. He raised the twisted foot, which was plastered with congealed blood. He put it down, surprised that the wounded man had not groaned. For a moment he considered the drawn, cadaverous face.

"His affair is well arranged," he remarked.

The sister of mercy approached, knelt down, and put her hand on the forehead of the sufferer. The doctor tried to feel the pulse; he could feel nothing. Perhaps it was because his own fingers were wet and numbed with cold. He rubbed his hands on his blouse to warm them. The sister took the other wrist of the wounded man. She could feel no pulsation.

"There is no pulse, is there, *ma sœur?*" asked the surgeon.

"None at all," was the reply.

The doctor opened the soldier's tunic in order to listen to the heart. He saw that the shirt, soaked with blood, was glued to the body. He did not search further. He made a gesture with his hands which signified that all was explained.

"Is he going to die?" asked Stanislas, plaintively.

"Where shall we put him?" inquired the sister of mercy.

Before he replied the doctor put his spectacles on his nose and took a last look at the sufferer. He would have liked to have done something for him if it had been possible, and he turned away with regret.

"Put him where you will, *ma sœur*," he said. "He is lost."

Fortunately for Pierre, Stanislas, the rough but faithful camp follower, would not accept the doctor's verdict. No doubt the man's devotion touched the hearts of the good sisters. A bed was found for the wounded soldier, and every means was adopted to restore warmth to his body. When it was possible, stimulants were administered, and in the end Pierre was brought back to consciousness. But it was the consciousness of suffering. It was necessary to amputate the right foot. There was much fever and delirium, and the long and weary convalescence was marked by constantly recurring delusions.

Among the closing scenes of the novel there is one beautiful and tender episode—that of the meeting of the mutilated hero with his sweetheart. The author tells the little story in few and simple words. It would have been a pathetic picture had not the pathos been swallowed up in the girl's deep love.

Gaston Rageot's novel, *La voix qui s'est tue*, appeared in 1913. It is a relief to read the book. There is nothing in it of the deafening din and horror of war which have distracted our minds during the last four years.

In working out the plot of his story the author has made considerable use of the supposed influence of maternal impressions during pregnancy on the future mental and physical development of the child. It may be doubted whether anyone sceptical of the theory would be convinced by the novel. Mere heredity would probably explain everything. But the book is well worth reading, for in it we are presented with a clever psychological and physiological study of a slightly neurotic young woman in her first pregnancy and, later, of a delicate and precocious child.

Madame Favelin, the heroine, receives a severe mental shock within a few hours of her becoming conscious that she was *enceinte*. Her jealousy was aroused; her *amour-propre* was wounded. If she had gone into a downright passion and demanded an explanation, things might have been put straight in a quarter of an hour, though, no doubt, it would have been a bad quarter of an hour for everybody. But Madame Favelin was not the sort of person to take that course. She was an amiable, gentle girl, who inherited from her mother the habit of keeping things to herself. She concealed her real trouble, and the agitation and nervous distress, which she could not altogether suppress, were put down to natural causes.

The husband, however, was not quite satisfied with his wife's condition. He called in Dr. Leroudin, an old schoolfellow of his, who was now on the staff of *La Maternité*. The doctor's natural jovial disposition was obscured by professional solemnity. This solemnity, the author suggests, was increased by his speciality bringing him constantly in contact "with beings troubled by mysterious hopes or ill-determined fears!" He also observes that, as the majority of young husbands are not remarkable for *sangfroid*, the physician found it useful to adopt a tone of authority in speaking to them.

Leroudin visits the patient. He readily admits that she is correct in her expectation of becoming a mother, and he simply recommends that in the state of lassitude in which she finds herself she should not commit any imprudence.

With a weary gesture Madame Favelin signifies that she has no desire to do anything unwise.

The husband and the doctor return to the antechamber.

"You don't find anything unusual?" asks Monsieur Favelin.

"Unusual! No," replies Leroudin. "At least, not to-day."

Then he assumes more than ever his professional solemnity, and begins to discuss the case with the objectivity of a savant.

"We find ourselves," he remarks, "in the presence of a young woman extremely nervous, impressionable, and easily agitated. In her present condition there is the risk of exaggerating these dispositions."

"Her health has always been excellent," observes Monsieur Favelin.

"That has nothing to do with it," says the doctor. "The healthiest women are sometimes the most impatient of the trials of pregnancy. In short, let us exaggerate nothing, and particularly, *mon ami*, try not to be more nervous than your wife. With prudence, calmness, and moral repose, there is nothing for the present to make us uneasy."

As the pregnancy progressed one could not see that there was anything in the patient's physical condition to worry about. The symptoms were usual enough. But from a psychical point of view it was otherwise. There was evident mental disturbance, anxiety, mild depression, and a close observer might have remarked coldness towards the husband.

Taking it all round, Dr. Leroudin did not like the case, and when the patient expressed a wish to pass some weeks in her native air, he readily gave his consent.

Madame Favelin's home was some miles from Puy, in the heart of the mountains of the Cevennes, and almost under the shadow of the huge volcanic mass, Gerbier-de-jonc, the rugged cradle of the mighty Loire. Her father, a *nouveau riche,* had poured out wealth without stint in order to soften with the comforts of modern civilisation the asperities of a picturesque old château. But the purity of the mountain air, the grandeur of the scenery, and all the love and comfort with which she was surrounded failed to produce any improvement in the patient's mental condition. She brooded over her secret trouble night and day, and made herself utterly miserable.

The husband became more alarmed than ever. On one of his periodical visits to his wife he brought Leroudin with him.

The doctor was not at all pleased with the patient.

"The country," he said, "has not produced the benefit that we expected."

Without diagnosing anything precise or clearly abnormal, he observed a general state of which his obstetric science could not discover the cause, but which, as it was growing worse, threatened to compromise not only the pregnancy but the young woman's health.

He ordered the patient back to Paris. He deemed it absolutely necessary to have her under his own eye.

But the poor woman brought her heartache back with her to the city, and she continued to brood over it until she arrived at such a pitch of misery that she looked forward to her accouchement with pleasure and even with longing, because she felt certain she should die.

The hour arrived.

After a night of suffering, Leroudin was sent for at the hour of dawn—"the hour of dawn, livid with insomnias, with love and with death."

Madame Favelin refused chloroform. Still obsessed with the idea of imminent death, she did not wish to die without consciousness and will. There were hours of pain. Then there was a moment of supreme agony, and the next the sufferer experienced a wonderful sensation of well-being throughout her whole body.

She heard a child's cry.

"*Un beau garçon!*" announced Dr. Leroudin.

The patient raised her head and extended her arms.

"Show him to me," she murmured feebly.

Madame Favelin made a good recovery. Her mental condition improved, but the trouble, over which she had so long brooded, though it was pushed by other interests out of the centre of the field of consciousness, was not forgotten. It shadowed the whole of the woman's future life.

However, now the story widens, and the child becomes of importance.

He was nursed by his mother, and during lactation he thrived; but he did not do so well after he was weaned. He did not get on with his food, he slept badly, grew very thin, and exhibited certain symptoms which old nurses describe as "inward convulsions." He was precocious. He spoke soon, and ran alone very early. He was very restless, was always on the move, and was unnaturally proficient in speech.

One easily understands how such a woman as Madame Favelin would worry about her child. Dr. Leroudin, who understood better how to bring infants into the world than how to rear them, declined the responsibility of treating the case. After many specialists in children's diseases had been called in without much benefit, Leroudin advised that a certain doctor, an old fellow-student of his, should be consulted.

The new physician, Dr. Dennet, was one of those practitioners who make their appearance more commonly in fiction than in actual life, though they are occasionally to be met with on the fringes of the profession. They endeavour to foist themselves upon the public as geniuses. The majority of them are mere quacks, but a few are honest men, who, without having the ability to strike out new and sound ways for themselves, are too proud to walk in the beaten track.

When such a person is introduced into a novel he is always described as being a man of extraordinary talent, but his instability mars the picture. Genius is remarkable for patience and bulldog persistency of purpose. Our author, no doubt, felt the difficulty. He intended to delineate a genius, but failed. Consequently, although Dr. Dennet is one of the most important secondary characters in the tale, his figure is feeble and all out of drawing.

Even Dr. Leroudin does not seem to have thought very highly of his old fellow-student, though perhaps the way in which he brings his name before Madame Favelin is only the veiled depreciation with which we sometimes speak of our best friends.

"No career," he says, "has been more singular than Dennet's. He has worked at all the sciences. He is psychologist, philosopher

—anything you like. I did not propose him before because he passes for being something of an original."

Madame Favelin hesitated to consult this new physician. She had seen so many of these *soi-disant* specialists, who give a different opinion when they are seen apart, and an identical one when they meet in consultation.

Finally she decided.

"Let us see your friend," she said to Leroudin.

Whatever may have been Dr. Dennet's professional ability, he had two great gifts. He was sympathetic, and he knew how to gain the confidence of the patient and the patient's friends. It is bad for the public when clever surgeons and physicians are lacking in these virtues, but it is infinitely worse when ignorant men are endowed with them.

In describing Dr. Dennet's first visit to the child there is something pitiful, though amusing, in the picture that our author draws of a little patient who has become accustomed to the "ceremonies, almost sacramental, of medical examinations," and who knows all the movements and the rites. He submits readily to auscultation and percussion. When asked to do so, he coughs, sneezes, and points with his finger to the spot where he feels or has felt pain. Sometimes he laughs. He says he is tickled. And all the time he observes the doctor with an air, comical, mischievous. In reading the passage one is reminded of the scene in Daudet's *Les Rois en Exil*, in which the poor little Prince Zara finds himself in Dr. Bouchereau's consulting-room. But the pathos of Daudet's picture is infinitely greater.

Of course the child's good humour pleases the mother, and she begins to have faith in the new physician.

Dr. Dennet's visits are repeated. He comes to the conclusion that the little patient is suffering from a nervous condition of the liver. Whether he is right or wrong is no business of ours, but his prescriptions and dietaries—and they are endless—do not do much good. Finally, he makes up his mind that the child is neurotic. He looks around for the possible causes of such a condition.

"During your pregnancy," he asks Madame Favelin, "did you experience any excessive emotion—a fright, an agony, a chagrin?"

At first Madame hesitates, but, being convinced that it is for the good of the child, she admits having undergone a great mental strain during the period in question. Naturally, she does not go into details.

Although Dr. Dennet in his diagnosis had now got very close to the mark, in his treatment he was as unsuccessful as before. At last he took a step which most of us take when we do not know what else to do with a patient. He advised change of air.

This proved the boy's salvation. He was brought up in his mother's native air among the mountains of the Cevennes. Although he was never robust, he was well and moderately strong when he attained the age of manhood. He was clever—clever with the showy, unsubstantial cleverness that one meets with among the neurotic.

In considering the novel as a whole, one might be inclined to say that it is a case of much ado about nothing. But, after all, does not half the trouble in the world arise from a faulty perspective, from a failure to appreciate the exact proportion of things? Are we not always mistaking molehills for mountains?

In studying a man, in addition to his individuality, which is often a comparatively minute portion of himself, we have to take into consideration his ancestry, to think of his nationality, to allow for errors of education, and for the influence exercised upon him by his trade, profession, or calling. Finally, if he be a middle-aged or elderly man, we find that his corners are a good deal rubbed down—sometimes even polished—by contact with his fellow-men. It is in this rubbing-down process that his individuality, however small it may be, is of importance—a hard stone at the bottom of a brook is not so much worn as a soft one.

All these points of human natural history can be studied in the case of Dr. Fumat, to whom Paul Bourget introduces us in his excellent novel, *Le Démon de Midi*. Look at the doctor! He is a broad-shouldered, massively built man with the brachycephalic skull of a typical Auvergnat. He has the ruddy, highly coloured face of one who lives much in the open air, and who feeds well. His hair is already grizzled. He is probably nearer fifty than forty years old, for we are told that he took his doctor's degree in 1892, and the story opens in 1912. His profession colours his thought and speech. His ancestors were peasants. Indeed, he is not removed by more than one or two generations from that class. His corners, of course, have been rubbed down a trifle, but the grain of his individuality is too hard and rough to take much polish. Although he has learned that it is well to be all things to all men, his ill-nature and envious disposition reveal themselves constantly.

Dr. Fumat practised at Rochefort-Montagne, a town in the *arrondissement* of Clermont-Ferrand, in the *département* of Puy-de-Dôme. There are beautiful descriptions of scenery in the novel. We are shown the country in early winter, when the mists make the distances mysterious in the morning, when the delicate colours of the sunset die among the mountains in the afternoon. The dark and lonely lakes among the primæval rocks are half frozen over. Here, the snow lies lightly on the ground; there, it drops with a rustling sound from the bare branches of the oaks and from the needles of the pine trees and the firs.

Rochefort is a small place of about 1400 inhabitants, and naturally the doctor had to seek his patients as much in the surrounding country as in the town itself. Those who know something of the Auvergne can imagine what sort of a neighbourhood it was in which to practise.

No doubt, when Fumat commenced work, he made his rounds in the saddle or perhaps in a hooded gig. To-day he travels the steep and dangerous roads in a two-seated, second-hand motor car, which is generally filthy dirty with the mud picked up in the day's journey, and rattles along with the noise of a bundle of rusty old iron. Still, the machine was a good hill-climber. Once, when the doctor had been looking, not without secret envy, at the sumptuous automobile of one of his wealthy patients—there are wealthy patients to be found even in the neighbourhood of Rochefort-Montagne—he exclaimed, speaking of his own car: "*Ce vieux clou fait tout de même du vingt-cinq à l'heure en montagne.*"

There is no doubt that Fumat knew his work. From a professional point of view he was a good man. His patients trusted him implicitly—even Monsieur Calvières, the wealthiest among them, although, in his moments of ill-temper, he applied the epithets of bonesetter and quack to the doctor, had perfect confidence in his skill.

Dr. Fumat had the trick of employing medical terms in general conversation. Most of us have had the misfortune of meeting such men, who not only practise medicine, but speak it. It is a disagreeable form of pedantry, to say the least of it, and more often reveals ignorance than knowledge. Dr. Fumat, for example, talks about one of his lady patients suffering from "the classical form of vertigo, *a stomacho loeso*, of Trouseau." This may have been all very well, spoken in private to the lady herself or to her husband, but it seems out of place before strangers. And surely it was unnecessary, a little later, in conversation with a chance acquaintance, to go into particulars about the condition of the patient's heart and other internal organs.

But Fumat was not only indiscreet—he was ill-natured. He was not above telling disagreeable stories about his patients. He gossiped about family troubles, and often hinted at the reason why the household machine functioned badly. On one occasion he related a little story which was nothing better than a piece of calumny. Then, when his dark brown eyes saw that he had gone too far, he excused himself, falling back into his beloved medical phraseology by saying that the good wine he had been drinking had made his third left convolution too active.

One easily understands that the doctor was a politician. But his politics never ran counter to his interests, and when the wealthy Monsieur Calvières changed his political views, those of his medical attendant veered round on the same tack. When we last see Dr. Fumat, he is seated at an electoral banquet, where he is doing full justice to both his gustatory and oratorical talents.

Fumat is one of the secondary characters in the novel. He is merely one of the crowd. Perhaps that is the reason why he is so lifelike. In many of the best works of fiction the hero and the heroine are so finely dissected that, although they are intensely human, they lose something of humanity. In *Le Démon de Midi* Paul Bourget has made a remarkable psychological study of the hero, Savignan. It is a wonderful piece of work. Every power of the author's mind was bent to the task. But the details are so minute that one loses grasp of the *ensemble*. In the secondary characters it is otherwise. In drawing them, Bourget's genius seems to have acted almost unconsciously, without effort, and the result is that they catch the eye at a glance.

This remark applies especially to another doctor who appears in the same drama, and whose silhouette is thrown only for a moment on the screen. This is Dr. Freundberg. His name gives him away. He is a German, and, in spite of his degree, he is a quack. There are plenty of qualified quacks in Germany, even in professorial chairs, and before the war they penetrated peacefully all over the world. They had the trick in those days of deceiving the elect themselves. No wonder they deceived the laity.

Freundberg is a stout man with a serious, stolid face. He looks over the brim of his spectacles with an air of immense wisdom—an air which is accentuated by his huge, bald cranium. His speech is slow and solemn, and he speaks French with an atrocious accent. He is a professor of myotherapy—that is to say, he professes to cure every disease under the sun by muscular exercise.

The patient, whom we are privileged to see undergoing a course of myotherapeutic treatment, is as interesting as the physician. He is an elderly man—a millionaire, who has made his money in trade. Believing himself to be an intellectual of the first order, he has nothing but contempt for all that is old-fashioned. He is afflicted with modernism in its most virulent form. Everything that he takes up—politics, medicine, piety—is of the most recent pattern, and he prattles the newest physiology and pathology as he prattles syndicalism and the jargon of the latest travesty of religion. It is singular how quackery appeals to vanity and imperfect education. It is always among the "intellectuals" that the quack, be he homeopath, bonesetter, or Christian scientist, seeks and finds his richest prey.

Paul Bourget draws a striking picture of this elderly millionaire, attired in a khaki-coloured gymnasium costume of the newest fashion, gravely, conscientiously carrying out the various exercises under the surveillance of the German professor.

"More slowly. Respire deeply," commands the latter in a guttural voice. "Good. Don't bend the legs. Now, circular flexion of the arms. Legs wide apart. Touch alternatively each foot with the opposite hand. The other arm to be extended backwards."

When the story is drawing to a close, and the tragic threads are gathered together and knotted into the catastrophe, medical men again appear upon the scene.

Dr. Magdelin, *ancien externe des hôpitaux*, as he described himself on his door-plate, was a very young practitioner. He had recently established himself in a not very fashionable quarter of Paris, and he spent a good deal of his time in waiting for patients. One Saturday, about two o'clock in the afternoon, he was called to an accident in the neighbourhood. A young man, he was told, was grievously wounded in the chest. He had been fooling with a revolver, and the weapon had gone off unexpectedly.

The doctor hurried to the house where the misfortune had occurred, and being a clever young fellow, fresh from hospital practice, he immediately took in the gravity of the situation. He concentrated all his powers of observation on the patient. A man of more experience of life might have thought of other things as well, and might not so readily have accepted the theory of accident. There was the possibility of suicide; there was the even greater possibility of murder. However, Magdelin's suspicions were not aroused, and later on he corroborated, with all honesty as far as his knowledge went, the account of the affair given to the civil authorities, and thus prevented a hideous scandal which would have given the finishing touch to the catastrophe.

"Be silent, monsieur," he said when the injured man opened his eyes and attempted to speak, attempted to murmur something about the affair being an accident. "I know all about it. You were playing with a revolver. You were not aware that it was loaded. The weapon went off, and you were holding it with the barrel pointed inwards. *Et voilà!* But it is no good leaving the plaything lying on the ground. Another accident may happen."

He picked up the revolver, examined it, and put it on the table.

"It is unheard of," he remarked, shaking his head, "that they are allowed to sell such things to the public. It is astonishing, manufactured as they are, that they do not go off by themselves as soon as they are touched."

The young doctor spoke pettishly. Not that he cared about badly made revolvers. At the bottom of his heart he was annoyed at the prospect of losing his patient—the first that he had been called to since he had set up in practice. But the sentiment of professional duty immediately corrected this selfish feeling.

"Now, monsieur, lie quiet. Don't move," he said, speaking earnestly, but with some roughness in the tone of his voice.

The man who had called him in and a young woman were standing beside the couch.

"Naturally," remarked the doctor, "you have nothing here with which to make a dressing—not even a sterilised solution, I suppose. Have you a cordial? If so, bring it to me."

He raised the pad which the young woman had previously placed over the wound.

"Ah!" he exclaimed. "At least this is not so bad. And the wound has been well washed. You have studied at a dispensary, madame—is it not so? You see how useful it is to know something about first aid."

A cordial having been brought, the doctor made the patient swallow some drops.

"Now," he said, "support him, you two—you, monsieur, and you, madame—that I may examine the back, to see if the ball has passed through the body."

When he had made certain that the ball was still in the lung, his anxiety increased. He carefully percussed the chest. He listened first in one place and then in another, seeking to hear the pulmonary murmur and the beating of the heart.

"Ah! well," he said, when he had finished the examination, "I am going to fetch what is necessary. You, madame, will not leave the patient until I return. I shall not be long. There is a chemist's shop just round the corner in the Rue de la Tombe-Issoire."

He wrote some words on his card.

"You, monsieur," he continued, speaking to the man who stood beside him, "will go for a surgeon. With my card one will come immediately. There are none in the afternoon in the public hospitals, but you will find one in a private hospital—at *Bon-Secours* or *Saint-Joseph.* It is the hour that they operate in those houses. And you, monsieur," he added, turning to the injured man with that affected joviality which medical men so suddenly assume in the midst of their most serious consultations—a naïve proceeding which, however, succeeds in nine cases out of ten in reassuring the patient, so keen is the instinct of life in seizing on the faintest straw of hope—"after all, it is a mere nothing. We will soon get you out of your trouble."

But when the door closed behind the doctor his manner changed.

"Run, monsieur," he said to the man who accompanied him, "or, better still, take a taxi. The case is urgent. An immediate operation is necessary. If it be possible. Do it here? What do you mean? Take him to a hospital? Out of the question. The ball has made a wound in the lung. There is abundant internal hæmorrhage. The lung is compressed. The heart is compressed. The pericardium may have been touched. The case is grave, very grave. However, we can but try. Go and return quickly."

A little later, when Dr. Magdelin returned to the house, he found that the messenger had arrived with a surgeon. The latter was a spare, elderly man with a hard-featured, strongly marked face. His manner was abrupt and rough to a patient's friends and prying acquaintances, but to the patient himself he was as gentle as a woman. We all know that sort of man.

"Madame," said Dr. Magdelin to the young woman, "we have brought all that is necessary for the present—and for an operation, if it be possible. But you know my fears. I don't know, *mon cher confrère,*" he added, turning to the surgeon, "if it will be possible to operate. However, it will be for you to judge."

"Then you find him very ill, monsieur," said the patient's father, who was now present.

"We cannot speak positively without another examination," said the young doctor; "but your son is young, monsieur. At his age Nature has great resources."

"Ah! yes, but it is necessary to aid Nature," interrupted the surgeon roughly, "and from what you tell me, Magdelin, we have no time to lose."

The doctors did their best, but there was little to be done, and the patient died with the noble lie upon his lips.

There are some lies which carry with them their own absolution.

THE TREATMENT OF SINUSES PERSISTING AFTER WAR WOUNDS.

By ARTHUR J. TURNER, Capt., R.A.M.C., M.B., B.S.(Durh.), M.R.C.S., L.R.C.P.

THE majority of sinuses persisting for any length of time lead to the surface from *bones* which have been damaged by one or other kind of missile. Sometimes they do not, and then it is usually a metal fragment or a piece of cloth or some other foreign body remaining in the tissues which is responsible for non-healing. In cases where bone is involved, it may be a small splinter of bone from the external surface, or soft necrosing or necrosed bone-tissue of greater or less depth into the structure of the bone, or a sequestrum lying within the bone which keeps the sinus open by a constant discharge of pus.

In dealing, therefore, with the problem of such sinuses, with the object of bringing to a speedy termination this discharge of pus and the prolonged series of frequent dressings usually employed in these cases, it is of first importance, as in fresh wounds, to remove as completely as possible any foreign body, diseased or dead tissue as may be concerned in producing and perpetuating the sinus. In a series of cases recently passing through my hands in which the sinus had persisted from two to seventeen months from the date of the wound, an operation was performed in the great majority for the purpose of thoroughly laying open the track, and exposing the bone in such a manner that every particle of diseased bone could be scraped away, and every fragment of loose bone, metal, or other foreign body removed as a preliminary to the further specific system of treatment with special dressings outlined below. In some of those cases where the sinus had become by reason of age considerably fibrosed, the operation included in addition a carving out of this fibrous wall and the removal of thickened periosteum.

I have up to date dealt with 110 cases. For the very successful post-operative treatment in these I am deeply indebted to the illuminating article of my former teacher, Professor Morison, on "The Treatment of Infected, especially War, Wounds," in the *British Medical Journal* of 20th October 1917. The paste used by me differs from that described by Professor Morison as "Bipp" in more than one detail, but that is partly due to my dealing with operated wounds where circumstances made it impossible to draw the tissues together with sutures, and where, moreover, I was anxious to obtain granulation from the bony surface outwards to avoid leaving a cavity within, which one could not feel certain was being filled up. With this object, therefore, I added to my paste a small amount of scarlet red powder, the property of which in stimulating the growth of granulation tissue is familiar to most surgeons and which I have found of the utmost value for this purpose. But I have adopted Professor Morison's technique of drying out the wound with gauze, applying to every cavity and crevice methylated spirit, and then gently rubbing in my paste very thoroughly over the whole surface of the wound; finally, applying a dressing of gauze, either dry or moist with spirit, after having painted the surrounding skin with tincture of iodine made with 70 per cent. alcohol.

My earliest attempts were made with a paste composed of iodoform, boric acid, chalk, scarlet red and paraffin based upon the experiences given (in the same number of the *British Medical Journal* as Professor Morison's article) by my friend Captain Rendle Short. I found, however, that the use of this paste necessitated a change of dressing in three or four days owing to non-elimination of smell, and I therefore made the following combination, which has exceeded in its antiseptic, cleansing, and stimulating properties my highest hopes:—

Iodoform	$\frac{1}{2}$ oz.
Acid salicylic	$\frac{1}{2}$ oz.
Scarlet red powder	25 grs.
Liquid paraffin . . . about	$\frac{1}{2}$ oz.

If found a little too dry on rubbing into the tissues with dry gauze, a little additional paraffin may be poured on to the gauze so used.

In some cases a single dressing has been sufficient and has been left on three weeks and in certain cases four weeks, without the least smell being noticeable. Sometimes there is a faint oily odour *outside*, which is not found to exist inside the dressing when opened, and which may, therefore, be neglected. Sometimes blood or slight pus has mixed with the paste and exuded below the dressing: the wool and bandage have then been removed and the dressing replaced with fresh dry, spirit-moistened or carbolic (1 in 20) gauze, or additional gauze, wool and bandage added below to cover the discharge—the results are equally good in either case. Most of the cases have been found at the end of three to four weeks to have become completely filled up with granulation tissue to the level of the skin: where this has been exuberant, it has been touched with nitrate of silver stick and a daily fomentation applied, the epithelium then rapidly growing over. In a few a narrow sinus of varying length was found to persist when, as a rule, the insertion of a small spoon has discovered and evacuated a tiny piece of loose bone, or metal, or a tiny area of soft bone; this removed, healing has taken place at once.

Sufficient emphasis perhaps has not been laid on the desirability of Professor Morison's method of treatment from the point of view of *economy*. At a time when surgeons, nurses, and orderlies were greatly overworked, and when the demand for all kinds of dressings was so extensive and so imperative, it was of the utmost importance that greater use should be made of a method by means of which, I have no hesitation in saying, the time given to dressing wounds and the expense of the dressings themselves might be reduced to a fraction of what is employed in the old way.

I found that there was by the introduction of the paste method a saving in my hospital of over 44 per cent. of gauze, 18 per cent. of boric lint, 41 per cent. of plain lint, and 31 per cent. of cotton-wool. There was also a saving of 49 per cent. of bandages, but this was partly due to the sterilisation and repeated use of *all* bandages, however soiled; so that none were wasted except such as out-patients failed to bring back.

I have alluded above to one of the advantages of an antiseptic paste such as mine, viz. the freedom from smell. Other advantages are the rapid fall of temperature in cases where there has been fever, and the absolute comfort of the patient after the one somewhat painful dressing. With regard to the latter fact, it is my custom not to paste the wound at the time of operation on account of the hæmorrhage, but to pack it firmly with sterile gauze, and to apply the paste after removing this on the second or third day. By this time oozing has usually ceased and the wound is dry, while the gauze is slightly moist with the absorbed discharge (the gauze does not stick so closely to the tissues on the *third* day as on the second) and therefore its removal is attended by comparatively slight pain. The application of the spirit is *the* painful process; if the gauze soaked in spirit is allowed to remain in the wound a few minutes this painfulness becomes gradually less, and the rubbing in of the paste is felt less. Of course the dressing may be performed under chloroform, and if this be done the patient will be spared all pain from the commencement of the treatment onwards.

It should be borne in mind that the wounded patient suffers from the effects of pain upon his nervous system, and of suppuration sapping his strength by the drain of leucocytes from his tissues and the absorption of toxins into his blood-stream. A method, therefore, which does away with painful daily dressings and reduces the flow of pus to a minimum serves the important purpose of promoting a speedier restoration to health, and in fact a quite noticeable improvement takes place soon after the operation stage is over

RECENT ADVANCES IN MEDICAL SCIENCE.

PATHOLOGY.

UNDER THE CHARGE OF

THEODORE SHENNAN, M.D., AND JAMES MILLER, M.D.

Bone and Joint Disease in Relation to Typhoid Fever.

The subject of this paper has not received the attention it deserves, to judge from the importance of the facts collated by Dr. Murphy (*Surg., Gynec., and Obstet.*, August 1916). He found that out of 18,840 cases of enteric fever, reported by fifteen authors, 164 cases were complicated with periostitis and osteitis; or 0·82 per cent. of all cases showed metastatic bone disease.

In 108 out of 452 cases the spine was affected (92 males and 16 females), and other bones were attacked in 344 cases (238 males and 108 females).

It is difficult to determine what percentage of the cases of spinal disease is due to osteitis and periostitis, or to perichondritis. The ages of the patients varied from 10 to 69 years. Between 10 and 25 years the disease has much the same percentage-frequency as the non-typhoid forms of osteomyelitis; but before the age of 10 years osteomyelitis septica preponderates, whereas typhoid osteomyelitis preponderates after 25 years of age.

The typhoid bone lesions in 533 cases were situated in the bones of the head in 22 cases; spine, 110 cases; thorax (ribs and sternum), 142 cases; bones of the upper extremity in 57 cases; in those of the lower extremity in 183 cases, and the lesions were multiple in 19 cases. The longer, more compact, bones were frequently attacked—humerus, ulna, femur, and tibia. These, be it noted, are the bones which are most exposed to slight traumas. The ribs, tibiæ, and spine provided 70 per cent. of the cases. In the case of the long bones the shaft rather than the metaphysis is involved, the reverse being the case in metastatic pyogenic osteomyelitis.

The nature of the lesions in 454 cases was as follows:—Periostitis, 128 cases; necrosis, 110 cases; "typhoid spine," 110 cases; osteitis (bone abscess), 29 cases; osteomyelitis, 27 cases; caries, 21 cases; chondritis, 11 cases; perichondritis, 11 cases; exostosis, 4 cases; and granuloma, 3 cases. The periosteum, moreover, was always affected in the osteal disease, and the bone was frequently deeply involved, when the diagnosis of periostitis was made.

Ninety-nine bone lesions were examined bacteriologically, and the B. typhosus was identified in 71; B. paratyphosus in 3; B. typhosus and B. coli in 1 case; B. typhosus and pus organisms in 2 cases; pus microbes only in 15 cases, and the cultures proved sterile in 7 cases.

In 1 case, inoculation gave a pure growth of B. typhosus, even though an open sinus had existed for six years. In another case pure cultures of B. typhosus were obtained at first, but later only the staphylococcus aureus. Mixed infection is apparently infrequent. Bacilli may persist in bone lesions as long as twenty-three years after the primary illness.

The bone disease may arise during the actual attack of typhoid fever, during convalescence, or not until after the lapse of months or years.

The question arises, "Is the lateness due to latency of the bone infection, or to late metastasis from the gall-bladder or intestine in 'carriers'?"

Pathological Anatomy.—The subperiosteal "medullary" layer is most often involved, then the intracanalicular medulla, and the central medulla. "The infarcts with typhoid metastases are from arrests in the smaller branches of the osseous vascular tree, of which the periosteal is the smallest."

When the *medulla* is attacked, the marrow is softened and more or less congested. Its colour varies from bright to deep red, simulating the hue of the marrow in children. The amount of fat is diminished. The *periosteum* is thick and swollen, congested, and stripped up from the bone. If suppuration ensues, a yellow or whitish fluid, sometimes tinged red from effusion of blood, collects under the periosteum. Sometimes it is creamy, and even if there be no apparent necrosis of the subjacent bone it contains small osseous particles. When the pus invades the medulla, the sequestra are more abundant as well as of larger size.

In place of suppuration there may be hyperostosis from stimulation of the osteogenic power of the deep layer of periosteum.

The *bone* is red and vascular, the Haversian canals being dilated, and easily seen as reddish sinuosities or fine points. They are stuffed with hyperæmic marrow surrounding the dilated vessels.

Dupont describes a special change seen by Tidenat. Fluid blood collects under the periosteum, and rarely coagulates. Suppuration takes place very slowly, only after the lapse of months.

Péan found exostoses developed in a young girl after typhoid. The bony tissue was hard, but the interior contained a cavity extending into the compact tissue, filled with a pink, very vascular, translucent material, resembling the fungus masses of a "white swelling." The walls of the cavity were hard and eburnated, the periosteum thick, and infiltrated with myxomatous granulation tissue.

The reason for the slowness of the pus formation is that the pure typhoid infection causes a feeble or no response in the way of leucocytosis, particularly of the polymorph variety, and therefore there is no trypsin from dead polymorphonuclears, and consequently only a *slow* inflammatory destruction of tissue of the nature of the "cold abscess."

W. T. Longcope, in 26 cases of typhoid, found that the bone-marrow showed changes resembling very closely those in the mesenteric lymph nodes and lymphoid follicles of the intestine and spleen. It is possible that these lesions are in some way nearly related to, and perhaps responsible for, the hypoleucocytosis, characteristic of the disease.

In nine necropsies Quincke found typhoid bacilli eight times in the rib-marrow, and once in the bones of the extremities.

Clinically, patients complain of pain, which has been likened to the osteoscopic pains of secondary syphilis. The duration of the swelling varies. There is, as a rule, entire absence of fever. The course is chronic. When necrosis occurs, the pain becomes more severe, the surface temperature raised, but there is no constitutional disturbance.

X-Ray Findings.—In the long bones the appearances may be those of hyperostosis or rarefaction. There may be central erosion accompanied by cortical sclerosis and periostitis. The simplest process is a localised bone abscess, sometimes three or four developing in the cortex, just underneath the periosteum. They are usually of small size, about the diameter of a lead pencil. The periosteum may become involved. When opened, a sinus may persist, discharging for months or years.

In the spine the dorso-lumbar and lumbar regions are most commonly attacked. Occasionally symptoms point to compression of the spinal roots at the spinal foramina, by thickening due to proliferation of the periosteum. Sometimes there is deformity, usually a mild degree of kyphosis, which may persist after recovery. This indicates that the anterior parts of the bodies are affected, Wullstein being of the opinion that it is due to localisation of the bacilli in these parts, with subsequent absorption of bone, but radiograms suggest that the kyphosis is rather the result of periostitic changes, with softening of the ligaments and disorganisation of one or more intervertebral discs, leading to approximation and synostosis of the vertebral bodies above and below. In the bodies of the vertebræ, also, destructive foci may be seen. The milder cases of periostitis and perichondritis may show no manifestations demonstrable by X-rays. The alterations may resemble closely those of spondylitis deformans; but they are circumscribed, and do not involve the whole of the spine, as in that disease.

Typhoid Arthritis.—According to Keen, most cases are encountered in patients under 20 years of age. The lesions develop during early convalescence. They are accompanied by pain and swelling, and the inflammation in certain joints may result in pathological dislocation.

The pathological anatomy is similar to that of other forms of arthritis caused by other organisms.

In addition to the general survey of the subject, an abstract of which has been given above, the author supplies details of cases which came under his own observation.

THE BACTERICIDAL ACTION OF SUNLIGHT.

It has been generally accepted that sunlight has a marked deleterious action upon bacteria; that the direct rays have a stronger effect than diffused sunlight; and that of the different rays making up the solar spectrum, the chemical rays, and especially the ultra-violet rays, have the strongest bactericidal action. So much reliance has been placed upon these as factors of value, both from a public health and from a therapeutic point of view, that it is somewhat startling to find doubt cast upon the accuracy of former conclusions.

Miramond de Laroquette (*Ann. de l'Inst. Pasteur*, April 1918) has carried out a long series of experiments under favourable conditions, exposing bacteria to sunlight through uncoloured glass, and also through blue, green, yellow, and red glass. He has employed many non-sporing bacteria in his experiments, either suspended in air, or in various fluid and solid culture media.

He concludes that sunlight is bactericidal only with long or strong exposure. Its most powerful action is on bacteria upon dry media, or in the air, provided the bacteria are also exposed to drying.

When in liquid media they are destroyed only when acted on by direct, intense sunlight, and in very thin layers of the fluid.

White sunlight is much more effective than its separate constituents. Diffuse sunlight has only a slight action. Blue light is slightly more effective than light of other colours, but much less so than white light. After blue comes the yellow, then the red, and lastly the green, which, for bacteria as for plants, is most akin to black. The most active part of the spectrum is the luminous part.

Ultra-violet rays have only a feeble action.

Filtration of sunlight through thick glass, which keeps back most of the ultra-violet rays, does not sensibly diminish its effects. The same holds with the infra-red rays. Filtration of sunlight through a layer of water has not prevented its bactericidal action. (This is apparently in contradiction of an earlier statement, though in this case the bacteria acted upon may not have been suspended in the water.)

Heat plays a certain *rôle*. Cooling by ice during exposure retards the action and the drying of the bacteria.

The bactericidal power of the rays appears to depend partly upon chemical action and partly upon a dehydrating action; and in the case of liquid media is due to a sort of kinetic shock or intoxication by excess of energy.

In the practical applications, in hygiene and in therapeutics, it appears to be vain to count much (particularly in temperate climates) on the direct bactericidal action of sunlight which cannot act deeper than a few millimetres. In heliotherapy the bactericidal action of sunlight is important only in treatment of superficial lesions. The sun cure, however, affects also bacteria enclosed in the tissues, as has been demonstrated clinically. All this points to its being an indirect effect resulting from the biotic action of sunlight upon the living tissues, an active, general, and local action, an exciting, energetic influence of which the therapeutic importance has not been exaggerated, which is caused by all the rays, and is demonstrated by an increased circulatory and functional activity of the organs, and by an augmentation of the powers of defence.

The results of these experiments after all do not disturb our faith in the efficacy of sunlight and fresh air as bactericidal and deodorising influences, especially in home hygiene, seeing that they act in a manner demonstrated as effectual by Laroquette, that is, by the direct action of the sunlight assisted by desiccation. T. S.

DERMATOLOGY.

UNDER THE CHARGE OF

R. CRANSTON LOW, M.D., AND F. GARDINER, M.D.

Pigmentation of the Skin.

This has long been a subject of controversy and research, and Whitfield (*Brit. Journ. of Derm.*, January 1918) gives an interesting *résumé* of recent German literature on the subject. Bruno Bloch has discovered a staining reagent, which he calls "dopa," obtained from c ertain plants such as "vicia faba," or synthetically from vanillin and hippuric acid. More elaborately it is called 3·4 dioxyphenylalanine, and is a combination of orthodioxybenzene (pyrocatechin) with α-amino-propionic acid.

An oxidation of the dopa takes place by means of a ferment called dopa-oxidase. This ferment is not affected by prussic acid, chloroform, acetone, benzole, or alcohol, but is destroyed by reducing and oxidising agents—sulphuretted hydrogen, toluol, heat, drying, etc. The skin is therefore obtained fresh, embedded in agar, and cut by the freezing microtome. The sections are placed for twenty-four hours at 37° C. in a 1 per cent. watery solution of dopa, then washed well, and stained with Unna's Pappenheim stain. The result shows dark staining of the basal layers of the epidermis, and the cutis vera is little affected. In the stained cells the nucleus is unaltered and the protoplasm alone stained. In animals the ferment is not found in the white patches of the skin, but only in the pigmented areas. Destruction or damage to the suprarenals produces increased supply of the substance from which the ferment is made, but the quartz lamp, X-rays, and thorium increase the action of the ferment. In the presence of leucoderma the dopa oxidase disappears, but in the hyperpigmented area around it is in excess.

Psoriasis.

Heidingsfeld (*Urol. and Cut. Review*, May 1918) discusses this in a thoroughly practical manner, giving it as his experience that, while every new form of treatment brought an increase of clientele at first, as certainly the patients disappeared when the results of treatment became evident. The host of remedies proposed is a natural outcome of our ignorance of the etiology of the disease, and the writer's statement that "few of these are without virtue, but none are specific," is generally accepted. "The psoriatic is prone to be the most disappointed of all dermatological patients. Like all patients he desires results, and results not at the cost of too disagreeable personal experience." Balm of Duret, which is a swan-shot preparation containing coal tar, chrysarobin, pyrogallic and salicylic acids, sulphur, green soap, resorcin, acetone, camphor, and guaiacol cleared up old inveterate patches, but was too disagreeable. White precipitate ointment 10 per cent., with 1 to 3 per cent. of chrysarobin, is still, he considers, very valuable in generalised cases. In 1914 human serum injections were commenced, and are of undoubted value; 5 to 10 c.c. of heterogenous serum from a non-psoriatic patient are given semi-weekly. X-rays are useful when given in moderate and infrequent doses, more especially for chronic patches. Other forms of radiotherapy are well adapted for psoriasis. The fact that the eruption affects the face and hands less frequently, that it disappears with sea-bathing and outdoor sports, and that the worst attacks occur in winter, when the helio-activity is lowest, is probably related to this. The disease being classified by the writer as a localised acidosis, he employs the following lotion successfully :—

℞ Tinct. benzoin, 5 parts.
Alcohol, 25 parts.
Glycerin, 15 parts.
Aq. calcis, 30 parts.
M. ft. lotio, A.

℞ Potas. sulphurat., 1 part.
Aq. dest., 100 parts.
Zinc. sulph., 1 part.
Acid, carbolic, 4 parts.
M. ft. sol. B.

Sol. A, plus sol. B, add aqua dest., q. s. ad 200.

The above lotion is to be applied locally several times daily.

When the disease occurs in large, thickened, and resistant patches, he applies the following several times weekly :—

℞ Acid, salicylic, 1 part.
Resorcin, 2 parts.
Alcohol, 50 parts,

to which, if necessary, 2 per cent. of pyrogallic acid can be added.

Proceeding from the hypothesis, very generally held, that psoriasis is due to a combination of etiological factors, the author then takes up these points as affecting treatment:—

1. *Infective Theory.*—This being well known in psoriatic individuals, the use of chrysarobin and sulphur as parasiticides is sound.

2. *Nervous Theory.*—This he does not believe in, but admits that some of the well-defined attacks and relapses have been ushered in by nervous exhaustion and worry.

3. *Diet* is very important, but treatment based on it is empirical—the elimination of substances which have a deleterious effect on the skin in general, and more particularly sweets and acid substances. Since intestinal intoxication cannot be ignored, he prescribes 4 to 16 minims of a 2 per cent. solution of phenol well diluted with water.

4. *Rheumatic Theory.*—Both diseases may have the same intestinal or obscure local infection as a factor.

5. Lastly, the *clinical appearance* is of important prognostic value. "As a rule, the smaller the lesions, the more favourable; the larger the lesions, the less favourable is the therapeutic outlook. Of much greater prognostic import is the tendency, or lack of tendency, of the lesions to undergo spontaneous central involution. Psoriasis annulata, or gyrata, even when abundantly present and covering a wide area, offer a favourable prognosis for prompt and early disappearance with treatment. On the other hand, lesions with diffused erythematous infiltration, scaly bases, and slowly spreading borders, which show no central retrogressive changes offer the least favourable prognosis from a therapeutic standpoint."

Ringworm of the Groins.

Saboraud (*La Presse Méd.*, 20th May 1918) reiterates the importance of this condition at the present time in the Army. Very few realise that the disease may simultaneously affect the toes. As a result of this the eruption is half cured, and when marching is resumed there is a rapid spread, and the soldier has to be returned to hospital. All the interdigital spaces may be infected, and even the dorsum of the foot, but most commonly it is the fourth and fifth interspaces. The epidermophyton is easily killed, but it is hidden in masses of thickened epithelium. Thorough scraping with a sharp spoon to the extent even of producing oozing and bleeding is the most important item, and after this the parts are firmly rubbed with a 20 per cent. solution of iodine in alcohol. A zinc paste is now applied, and the whole process is repeated daily for eight days. This generally removes all the trouble, but, if not, then 10 per cent. of chrysarobin in lard is recommended.

Dermatitis Venenata.

Strickler (*Amer. Journ. of Cut. Dis.*, June 1918) sounds a hopeful note when he discusses the question of the treatment of these by vegetable toxins. The active principle of poison ivy is of a glucosidal nature, yielding on analysis gallic acid, fixtin, and rhamnose, and is non-volatile. It is obtained from the leaves by extracting with alcohol, and subsequently filtering and precipitating. The precipitate is dried, then extracted with Soxhlet's extractor for ten hours. This extract is then dried at low temperature, weighed, and dissolved in absolute alcohol and water. Poison ivy, sumac, and nettle were all treated thus, and used in the experiments. When a case came under observation, $\frac{1}{20}$ c.c. of each of these was injected endermically, and the case examined at twenty-four and forty-eight hours' interval. A positive reaction was indicated by the formation of a papule, erythema, and tenderness, and a patient so differentiated was then used for treatment. Twelve patients suffering from dermatitis venenata, whose history indicated plant irritation, were given 0·3 to 0·7 c.c. of the toxin intramuscularly, and all were cured after one or two doses. Unfortunately, the immunity was found to be very fleeting. The possibilities of this method are manifold if subsequent experience gives as good results.

Staphylococcal Dermatitis.

Cases are always numerous, more so in war time, and many are very resistant to treatment. The use of tin salts, an old method revived, is often satisfactory. Burnier (*La Presse Méd.*, 2nd May 1918) finds that the root of bardane (lappa officinal.) is more useful for furunculosis in the cases under his care, although he still prefers the tin salts in folliculitis. The root must be collected in spring, dried at a low temperature, and 0·60 gr. of the soft extract is given in pills thrice daily. He states that in twenty-four to forty-eight hours the pain ceases, and that in three to four days the abscess evacuates spontaneously.

M'Donagh (*Med. Press and Circ.*, 5th December 1917) has been investigating the colloidal metals in this connection. Colloidal copper intravenously and intramuscularly did no good. Colloidal manganese given intramuscularly in 3 c.c. doses cleared up boils in three days. Smaller doses cause no inconvenience, and larger doses may cause a severe reaction, therefore he prefers to commence with 1·5 c.c. and then go to 3 c.c. in a few days if necessary. Out of 100 cases 50 had the usual treatment with vaccines, etc., and the rest were treated with manganese alone; the first took fifty days on the average to be cured, and the latter only seven days.

Auld (*Brit. Med. Journ.*, 16th February 1918) is not so satisfied with the efficacy of the colloids. Manganese given intravenously was, in his opinion, more reliable in its action. Gold, silver, and copper in doses of 2 to 10 c.c. gave favourable results, especially if followed by a rise of temperature. In conclusion he states that the protective solution is an active ingredient in all the preparations. F. G.

NEW BOOKS.

Physiology and Biochemistry in Modern Medicine. By J. J. R. M'LEOD, Professor of Physiology, University of Toronto. Assisted by ROY G. PIERCE and Others. Pp. xxxii. + 903. With 233 Illustrations. London: Henry Kimpton. 1918. Price 37s. 6d. net.

WE have a special satisfaction in reviewing this work from the fact that it adopts an attitude towards medical teaching which has recently been elaborated in our pages. In the inquiry by the Edinburgh Pathological Club into the medical curriculum the importance of co-relating the teaching of the earlier scientific subjects with that of the more advanced clinical subjects was strongly emphasised, and here we have a text-book specially designed to give effect to this idea in relation to physiology and clinical medicine. In his preface, Professor M'Leod comments on the disadvantages of the water-tight method of teaching the various subjects embraced within the curriculum. "When the clinic is reached," he says, "the methods of the scientist are not infrequently cast aside, and an understanding of disease is sought for largely by the empirical method." The blame for this state of affairs must be shared by both groups of teachers. The author frankly admits that "the laboratory courses are frequently given without any attempt being made to show the student the bearing of the subject in the interpretation of disease, or to train him so that in his later years he may be able to adapt the methods of investigation which he learned in the laboratory to the study of morbid conditions." We must be equally candid and confess that the clinical teacher is too often content to accept certain groupings of symptoms as evidence of a particular disease, without insisting that the student shall take the trouble to interpret them in terms of disordered physiology. "But," to quote the author again, "the chief remedy of the evil undoubtedly lies partly in the continuance of certain of the laboratory courses into the clinical years, and partly in the study of medical literature in which the application of physiology and biochemistry in the practice of medicine is emphasised." The first of these proposals was recommended as a result of the investigations above referred to, and the work before us is an excellent example of the kind of medical literature which will be in demand when this most desirable change in the curriculum has been put into operation.

This work is in no sense a text-book on physiology. It is rather an exposition of those physiological problems which have a direct and practical bearing in diagnosis and therapeutics.

After a brief, but illuminating, section on the physico-chemical basis of physiological processes, in which osmotic pressure, electric conductivity, acidosis, colloids, enzymes, and other allied subjects are dealt with, the circulatory fluids are fully discussed. Then follow sections on the circulation of the blood, respiration, digestion, and so on through the various functions. Space does not permit of a detailed consideration of each section of the work, but the scope of the discussion may be indicated from the chapter dealing with digestion, which begins with a general description of the microscopic changes in the digestive glands during activity, followed by an explanation of the mechanism of secretion, and of the nervous control and also the hormonic control of glandular activity. Each digestive gland is then taken up separately, the normal physiological action being fully discussed, as well as the disordered activity which gives rise to "symptoms" in disease. A consideration of the mechanisms—mastication, deglutition, the movements of the stomach, intestinal peristalsis, and anti-peristalsis—follows, and is particularly instructive to the clinician. After hunger and appetite have been dealt with, the general biochemical processes of digestion in each segment of the alimentary canal are succinctly yet clearly described. Throughout, the authors succeed in maintaining the clinical rather than the laboratory point of view, with the result that the whole discussion assumes a peculiarly practical aspect. The style of the writing makes easy reading, and it is occasionally lightened up by such passages as the following which occurs under the heading "Mastication." "The benefit to digestion as a whole of a large secretion of saliva, brought about by persistent chewing, has been assumed by some to be much greater than it really is, and there has existed, and indeed may still exist, a school of faddists, who by deliberately chewing far beyond the necessary time, imagine themselves to thrive better on less food than those who occupy their time with more profitable pursuits."

Our only regret with regard to this work is that it is rather large for the already over-burdened student. A condensed version, which could be studied as a supplement to clinical medicine, would be invaluable. For the practitioner and for the teacher of the clinical subjects of the curriculum it meets a need which has long been felt, and meets it in an entirely satisfactory manner. It is well published, abundantly illustrated, and fully indexed.

Forced Movements: Tropism and Animal Conduct. By JACQUES LOEB, M.D. Pp. 209. With 42 Illustrations. Philadelphia and London: Lippincott Co. $2.50 net.

IT is a pleasure to introduce this new series of American Biological Monographs to British readers. The series, which is edited by Messrs. Loeb, T. H. Morgan, and W. J. V. Osterhout, aims at emphasising the value of exact quantitative experiments in biological research, and at explaining life from the physico-chemical constitution of living matter. The present attractive volume, which is well printed on good paper and clearly illustrated, is the first of the series. Amongst others in preparation are volumes on *The Chromosome Theory of Heredity* and *The Permeability and Electrical Conductivity of Living Tissue* by the other editors already named.

Dr. Loeb in this volume works out in detail the tropism or forced movement theory of animal conduct, upon the study of which he has been engaged for thirty years. "Motions caused by light and other agencies appear to the layman as expressive of will and purpose on the part of the animal, whereas in reality the animal is forced to go where carried by its legs. For the conduct of animals consists of forced movements." Amongst the forces which compel these movements, and which have been studied experimentally by methods clearly described in successive chapters, are electricity, light, gravitation, heat, and chemical force. Various instincts are explained as due to heliotropism, chemotropism, or stereotropism, while others are forced movements due to hormones or to the influence of memory images. With regard to human conduct, we are told that "our conception of the existence of 'free will' in human beings rests on the fact that our knowledge is often not sufficiently complete to account for the orienting forces."

Dr. Loeb's book is decidedly interesting and is a valuable addition to the descriptive side of biology; whether it can be accepted as a satisfactory contribution to the interpretative side will depend upon the extent to which the reader is willing to accept a mechanistic theory of life and a materialistic conception of evolution.

Lice and their Menace to Man. By Lieutenant LL. LLOYD, R.A.M.C.(T.). With a chapter on Trench Fever by Major W. BYAM, R.A.M.C. Pp. xiii. + 136. With 13 Illustrations and 4 Charts. London: Henry Frowde and Hodder & Stoughton. 1919. Price 7s. 6d. net.

MR. LLOYD deals in a concise manner with the structure (the "stomach'" is labelled fore-gut instead of mid-gut), life-history, habits, and dissemination of lice and with methods of disinfestation, and there are short chapters on relapsing fever, typhus, and trench fever—the three diseases known to be louse borne.

During observations on the migrations of body lice from the host it was found that an increased shedding of lice occurred when the host was febrile, and it is suggested that this may account, partially at any rate, for the rapid spread of louse-borne epidemics.

Kala-Azar : its Diagnosis and Treatment. By E. MUIR, M.D. Pp. 37. With 5 Plates. Calcutta: Butterworth & Co. 1918. Price Rs. 2 net.

IN this small book the diagnosis and treatment of this affection are discussed, especially in relation to the results obtained by the intravenous injection of soluble antimony salts.

It is intended for the use of practitioners in villages and small towns, and to this class the practical hints regarding diagnosis, especially the technique of splenic puncture, and the system adopted for intravenous injection, should prove of value.

Before the introduction of the antimony treatment the mortality in this disease was over 90 per cent. in 150 cases treated by the author during a period of twelve months, death resulted in only 12 per cent.

There are several palpable errors to which the attention of the author may be invited—for example, the word azar signifies disease—but on the first page it is translated as "fever"—the directions for preparing Leishman's stain, 1 c.c. is evidently a misprint for 10 c.c., and the statement on page 7 regarding the rapid pulse is not in accordance with the experience of others.

The Epidemics of Mauritius, with a Descriptive and Historical Account of the Island. By DANIEL E. ANDERSON, M.D. Pp. xvi. + 312. With Maps and Illustrations. London: H. K. Lewis & Co. 1918.

AS the title implies, this work deals not only with medical matters but also with the history of the island, giving lists of former governors, various reminiscences, and other varied information, including a graphic description of a cyclone—this portion, about 100 pages, should prove most interesting to those having associations with Mauritius.

Regarding the present methods for the diagnosis and treatment of leprosy, cholera, malaria, etc., the author has little to add to the ordinary text-book information, but the descriptions of the various cholera epidemics in the island from 1745 onward, detailing the measures formerly adopted for the treatment of the disease (some of them very quaint) and for its prevention, are well worth perusal.

It is interesting to note that in 1854 the physicians recognised that during the acute stages of cholera intestinal absorption is in abeyance, a fact often overlooked in the present day.

On the whole, the illustrations are good, but some, including those supposed to represent the bacilli of leprosy and cholera and the various forms of the malarial parasite, are very crude.

NEW EDITIONS.

Manual of Bacteriology. By ROBERT MUIR and JAMES RITCHIE. Seventh Edition. Pp. xxiv. + 753. With 6 Plates in Colour and 200 Illustrations. London: Henry Frowde and Hodder & Stoughton. 1919. Price 16s. net.

THIS well-known manual makes a welcome reappearance in its seventh edition. The numerous advances made in bacteriological medicine during the last few years have necessitated extensive alterations and additions in a large number of departments, and it is evident that no time or labour has been spared in bringing the manual completely up to date.

Improvements in technique, advances in our knowledge of the pneumo-streptococcus, the meningococcus, and the typhoid-dysentery groups; recent work on tetanus and other wound infections, on spirochætal jaundice, on trench fever, on epidemic encephalitis and poliomyelitis—in all these and in other directions the teaching of the manual has been brought into line with the most recent investigations.

The fine critical faculty which the authors display and their recognised ability in sifting the grain from the chaff render the book one of great value to the bacteriological worker and to those clinicians who take a wider interest in disease processes, the excellent bibliography being not its least useful part.

The volume has in some magical fashion retained approximately its former convenient size, and we are glad to notice that war conditions have not produced any deterioration in the quality of paper and illustrations.

The Intensive Treatment of Syphilis and Locomotor Ataxia by Aachen Methods. By REGINALD HAYES. Third Edition. Pp. viii. + 92. With 4 Plates. London: Baillière, Tindall & Cox. 1919. Price 4s. 6d. net.

IT is universally admitted that, in the treatment of syphilis and its manifestations, the use of mercury is an essential adjunct to the injection of the arsenical compounds. The inunction method of introducing the drug is not popular in this country, but the author is a whole-hearted supporter of this method. He claims for it "safety, potency, and painlessness, with exemption from most of the drawbacks" of other forms of treatment. He admits, however, that inunction requires properly selected cases, skilled rubbers, and careful supervision. This little book gives a useful account of the Aachen treatment and the arguments in its favour.

Hughes' Nerves of the Human Body. By C. R. WHITTAKER. Second Edition. Pp. 73. With Diagrams. Edinburgh: E. & S. Livingstone. 1918. Price 3s. 6d. net.

THIS handbook gives a lucid though somewhat brief account of the anatomy of the peripheral nerves and of the sympathetic nervous system. The diagrams are clear and easily understood, and the book should be of value to the student of anatomy who has not the time to obtain his knowledge from the larger text-books. The author has preferred to adhere to the old terminology throughout, giving the B. N. A. nomenclature occasionally in brackets. The result illustrates very well the confusion that will inevitably result in a few years in anatomical and surgical text-books unless a definite position is taken up with regard to terminology. Thus, we read on one page of the "crus cerebri" and on the next of the "cerebral peduncle," and again we find branches of the radial nerve, which used to be called the external cutaneous branches of the musculo-spiral and which are now known as the dorsal antibrachial cutaneous nerves, described here as the lateral cutaneous nerves—a name which means nothing. In the B. N. A. terminology we have a scientific nomenclature which cuts down anatomical terms by one half—an advantage which alone is sufficient to justify its adoption. In addition, although the terminology still requires revision, the terms convey a definite meaning to the mind of the student and are therefore easy of remembrance. This system has been almost universally adopted outside the British Isles and there can be little justification for any further delay in its general acceptance.

A Manual of Elementary Zoology. By L. A. BORRADAILE, M.A. Second Edition. Pp. xiv. + 616. With 419 Illustrations. London: Henry Frowde and Hodder & Stoughton. 1918. Price 16s. net.

THIS edition contains new chapters on protozoa (entamœba, trypanosoma, malaria), on nematodes and on cold-blooded vertebrates. A few slips have escaped attention, *e.g.* the larvæ of *Filaria bancrofti* escape from the mosquito by way of the labium (proboscis) and not, as stated, *viâ* the salivary glands. The labelling of the figure showing the cranial nerves of the skate requires revision. The book is excellently illustrated and clearly written, and takes rank among the best text-books for the junior student of zoology.

NOTES ON BOOKS.

THE fourth edition of Dr. E. R. Morton's *Essentials of Medical Electricity* rewritten by E. P. Cumberbatch, M.B. (Henry Kimpton, price 7s. 6d. net), has been thoroughly revised and brought up to date. At the present time, when there are so many in our midst who will benefit from electrical treatment, its study will prove especially valuable. The author deals in a clear and practical manner with his subject, and describes the different methods used and how to apply them in order to obtain the best results. Above all, he realises the limitations of this form of treatment and recommends in all cases that it should be combined with other general or local treatment.

Dr. Koll has written *Diseases of the Male Urethra* (W. B. Saunders Co., price 14s. net) in response to the need which he has long felt for a "comprehensive monograph" on diseases of the male urethra. Without considering what justification there may be for a book dealing mainly with gonorrhœa which omits all reference to gonorrhœal arthritis, we take the work as it stands and find that it contains no careful record of personal observation or investigation, and no information of value which the student or practitioner cannot find in any standard text-book on surgery. Many different causes are alleged to give rise to non-gonorrhœal urethritis, among them constipation, and in considering the pathology of this condition Dr. Koll states that "it is not rare to find pathologic involvement of the epididymi, the origin of which can be clearly traced to one of the strains of saprophytes which has become pathogenic from some idiopathic stimulus." This nebulous statement gives an indication of the character of a good deal of Dr. Koll's writing.

REPORTS, TRANSACTIONS, ETC.—The fourth volume of the *Reports of the Episcopal Hospital*, Philadelphia (Wm. J. Dornan), contains a selection of excellent short paper on subjects of general interest, well illustrated.

The *Surgical Board of the Women's Hospital in the State of New York* has followed a prevailing American practice of collecting papers published by members of the staff and issuing them as a separate volume. The initial volume augurs well for the success of the venture.

The *St. Thomas' Hospital Reports*, of which we have received the forty-fourth volume (1915), is mainly of interest to statisticians.

The present issue of the *Transactions of the American Gynecological Society* (vol. xlii., 1917) derives a special interest from the series of papers dealing with the relation of the glands of internal secretion to gynecology and obstetrics.

BOOKS RECEIVED.

BLAKE, JOSEPH A. Fractures: Monograph on Gunshot Fractures of the Extremities (*D. Appleton & Co.*) 7s. 6d.

BOLDUAN, CHARLES FREDERICK, and JOHN KOOPMAN. Immune Sera. Fifth Edition (*Chapman & Hall*) —

CUNNING, JOSEPH, and CECIL A. JOLL. Aids to Surgery. Fourth Edition (*Bailliere, Tindall & Cox*) 4s. 6d.

DE CHAMBURE, A. Quelques Guides de l'Opinion en France pendant la Grande Guerre (*Celin, Mary, Elen & Cie*) frs. 4.50.

DUMAS, J., and ANNE CARREL. Technic of the Carrel Method (*Wm. Heinemann* (*Medical Books*), *Ltd.*) 6s.

ELMSLIE, R. C. The After-Treatment of Wounds and other Injuries. (*J. & A. Churchill*) 15s.

GHOSH, J. C. Indigenous Drugs of India . . . (*Butterworth & Co.* (*India*), *Ltd.*) 1s.

GOULD, Sir ALFRED PEARCE, and ERIC PEARCE GOULD. Elements of Surgical Diagnosis. Fifth Edition . . . . (*Cassell & Co., Ltd.*) 12s. 6d.

JONES, LL. J., and A. BASSETT JONES. Pensions and the Principles of their Evaluation. (*Wm. Heinemann* (*Medical Books*), *Ltd.*) 30s.

MAPS, Catalogue of Small Scale Ordnance Survey. . . . . . (*T. Fisher Unwin*) —

MARSHALL, A. MILNES, and C. HERBERT HURST. Practical Zoology. Eighth Edition (*John Murray*) —

MARTINET, A. Diagnostic Clinique . . . . (*Masson et Cie*) frs. 30+10%

PATERSON, A. MELVILLE. The Anatomy of the Peripheral Nerves (*Henry Frowde, Hodder & Stoughton*) 12s. 6d.

REVEILLE. Edited by JOHN GALSWORTHY. February Number . . . . 2s. 6d.

SEQUEIRA, JAMES H. Diseases of the Skin. Third Edition . . (*J. & A. Churchill*) 36s.

SHEARS, G. P., and E. E. SHEARS. Obstetrics: Normal and Operative. Second Revised Edition . . . . (*J. B. Lippincott Co.*) 30s.

SMITH, E. CARLTON. Chemistry for Dental Students. Third Edition (*Chapman & Hall*) 13s. 6d.

STEWART, Sir JAMES PURVES, and ARTHUR EVANS. Nerve Injuries and their Treatment. Second Edition . . . . . . (*Henry Frowde, Hodder & Stoughton*) 12s. 6d.

TWEEDY, E. HASTINGS, and G. T. WRENCH. Practical Obstetrics. Fourth Edition (*Henry Frowde, Hodder & Stoughton*) 21s.

WINGFIELD, HUGH. The Forms of Alcoholism and their Treatment (*Henry Frowde, Hodder & Stoughton*) 5s.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

Orthopædic Surgery. THE establishment of a lectureship in orthopædics in connection with the department of surgery in the University raises again the much-debated question—What is orthopædic surgery? Much has happened since Nicholas André, who coined the word "orthopædics," in his treatise of 1741 defined the scope of his work as "the art of preventing and correcting deformities in children," and Jean-André Venel founded the first orthopædic institute at Orbe in 1780, and we are no more called upon to accept the limitations set by the one than we are to adopt the methods followed by the other. Like every similar offshoot from the parent stem of general surgery, orthopædics has gradually tended to spread itself out over a wider and wider area. The earliest efforts of the "orthopædist" were confined to the use of mechanical appliances, in the devising of which he exhibited an almost uncanny ingenuity. Later he took to the knife, and by performing subcutaneous tenotomy graduated as an "orthopædic surgeon." The subcutaneous operation in time gave place to the open one, and from that to the shortening, lengthening, and grafting of tendons was a natural step. The inventiveness and dexterity inherent in the true disciple of the art have found ample scope in the varied problems that come under his notice, and with modern facilities he now carries out with infinite skill plastic operations upon bones and joints which are veritable triumphs in artistic carpentry.

The orthopædic surgeon has long since broken his etymological bounds, and no longer confines his attention to children, nor does he limit his activities to dealing with deformities, potential or established. Yet he is curiously selective in his predilections, for while cleft palate, hare-lip, extroversion of the bladder and hernia, which are certainly deformities of childhood, do not come within his ambit, he has annexed spina bifida as his peculiar province. Beginning with the spinal column he took tuberculous disease under his care, and gradually he has laid claim to all tuberculous affections of bones and joints.

The boundary line between general and orthopædic surgery has been still further obscured by the peculiar circumstances arising out of the war. In the process of recovery many of our wounded soldiers reached a stage at which the methods of treatment employed by orthopædic surgeons were those best calculated to ensure restoration of function to damaged limbs. The military authorities wisely decided to establish special hospitals where these methods could be efficiently employed. The exigencies of the situation and the personal predilections of those entrusted with the work prevented any limiting landmarks being set up between the spheres of the general and the orthopædic surgeon, with the result that there has been considerable doubt as to where one ends and the other begins. The line is purely arbitrary, and the principle on which it has been drawn not always easy to recognise. Although the military phase of orthopædic surgery is, we hope, a passing one, it has served to establish claims on the part of its votaries which are likely to be permanent.

It would appear, then, that we cannot with any degree of precision answer the question—What is orthopædic surgery? Even in its application to civilian work the term must be an elastic one, and the line demarcating the specialty must remain arbitrary.

Our immediate concern, however, is not to arrive at an academic definition but to find a means of utilising to the best advantage the opportunity which has arisen of improving the teaching of an important branch of practical surgery. That it has not hitherto received in our curriculum the attention due to it is generally admitted. The chief reason for this state of things probably lies in the fact that our teaching hospitals have not included an organised department, fully equipped and under the direction of a specially qualified surgeon, for dealing with such affections as fall within even the restricted meaning of the term orthopædics. If the new lectureship is to add to the teaching capacity of the school, this defect will require to be remedied. To make a beginning, ample scope would be found in an out-patient department furnished with the necessary staff and apparatus for carrying out treatment by mechanical appliances, massage, and physical exercises, under the direction of the lecturer on orthopædics. Other contingent developments in the school will, we trust, at no very distant date make it possible to assign, for such patients as require prolonged indoor treatment, a sufficient number of beds to complete the equipment of a full orthopædic department.

Honour.

We offer our congratulations to Lieutenant-Colonel Joseph M. Cotterill, C.M.G., F.R.C.S., R.A.M.C.(T.), on his receiving the honour of knighthood.

Appointment.

Dr. Lewis Thatcher has been appointed Extra-Physician to the Royal Hospital for Sick Children.

CASUALTIES.

Killed in action on 19th March 1918, Captain William Charles Davidson Wilson, R.A.M.C.(T.F.).

Captain Wilson was educated at Aberdeen University, where he graduated M.B., Ch.B. in 1915.

Died on service, Captain John Warnock Bingham, R.A.M.C.

Captain Bingham graduated M.B., Ch.B. at Edinburgh University in 1907.

Demobilisation of Nurses.

The Minister of Labour has appointed a sub-committee for Scotland of the Nurses' Resettlement and Demobilisation Committee (London). This sub-committee will deal with the resettlement of Scottish nurses in civil life, with special reference to those who desire to find post-war employment or to undertake some form of training. It will also control the register of Scottish nurses who desire work in Scotland. The register will be kept at the office of the Employment Department, Ministry of Labour, 112 George Street, Edinburgh, to which all inquiries should be addressed.

EXPERIENCES OF A CONSULTING PHYSICIAN ON DUTY ON THE PALESTINE LINES OF COMMUNICATION.

By FRANCIS D. BOYD, C.M.G., Colonel, A.M.S.

THE life of a consulting physician on the Palestine lines of communication was arduous, but was full of interest and variety. With an area of duty extending from behind the front line to Suez and Port Said, and upwards of ten thousand beds in charge, there was no lack of clinical material. Nor was there want of variety in scenery—from the sandy desert at El Arish and Kantara to the fertile orchard groves of Ludd and Jaffa and the "stony ground" of the hills about Jerusalem. Each had an interest of its own. One had to be perpetually on the move. Motoring in the desert and in the Jordan valley was an experience which could never be forgotten. The rabbit wire track laid by the engineers over the sand, the dust, the light Ford car which leaped obstacles and rushed wadis, going through places that in pre-war days one would have gone 20 miles round to avoid, all added spice to the daily round. Nor must the insect life be forgotten; day and night it was ever present—the mosquito, the eternal fly, the sand-fly, the scorpion, the centipede in the bath sponge—all demanded consideration, if not respect. The house-fly nothing seemed to daunt. The mosquito is a vital problem that will have to be considered by those responsible for the health of Palestine in the future. Give Palestine a water supply and abolish wells for irrigation and the mosquito danger will be simplified. The Nile water has been brought up in pipes as far as Gaza, thus fulfilling an old prophecy that when the Nile water flowed into Palestine Jerusalem would again fall. Much has been done, but much remains to do, to make the country, beautiful as it is, a fit habitation for a white man.

The sickness incidence amongst the troops of the Egyptian Expeditionary Force in Palestine was high. Malaria, dysentery, relapsing fever, typhus, enterica, sand-fly fever, and pyrexias of doubtful origin, all were responsible. To these in the autumn was added the influenza which has been epidemic throughout the world. Though the sickness incidence was high, it can be claimed that, until influenza became epidemic, the mortality was not at any time serious, if due consideration be given to the grave character of several of the diseases affecting the troops.

Malaria.—A large proportion of the medical casualties resulted from malarial infection. While the benign tertian and quartan varieties occurred, the predominant types were primary malignant tertian and relapsing malaria amongst the troops who had been infected in other fronts, especially Salonica. By far the most important as affecting lines of communication was the malignant tertian malaria, for, if diagnosed early and promptly treated, satisfactory results were obtained, while any delay or inadequacy of treatment frequently led to a fatal result. The onset in these cases was insidious; the patient complained of headache, backache, and malaise with some fever. On examination there was tenderness in the splenic region. The spleen was not always palpable, but usually showed some enlargement to percussion. The tongue was dry and coated, and there was frequently a history of vomiting. The conjunctiva showed a slight tinge of jaundice, while the face was flushed, the pulse frequent, and the patient appeared ill. Examination of the blood usually gave a positive finding, but by no means always so. Cases have occurred where as many as five examinations have had to be undertaken before the parasite was finally discovered. The temperature in these cases was usually of a remittent type, ranging from 104° to 102°. A large proportion of the cases showed complications of the most varied description.

Cerebral phenomena were common, varying from slight confusion to an acute maniacal state, and passing rapidly into coma, A man might walk into a casualty clearing station complaining of malaise and headache, and unable to give a clear account of himself and be comatose in a few hours. The skin was hot and dry, the face flushed, the pulse full and frequent, and the pupils sluggish. At times there was some rigidity of the neck. Trismus of the muscles of the jaw was noted in several cases; in some, epileptiform convulsions occurred. Hyperpyrexia was only occasionally met with. In one case the temperature reached 109°, but was reduced by packs and intravenous quinine; in several other cases, however. it proved the harbinger of coma and death. Of the remoter effects of malaria upon the central nervous system it is more possible for the workers at the base to speak, but on the lines of communication a number of cases of multiple neuritis were noted, and at least three cases of transverse myelitis with paraplegia and implication of the bladder and rectum.

Abdominal manifestations of malignant malaria were relatively frequent. Disturbance of digestion, with a dry coated tongue, vomiting and jaundice of varying degrees, were fairly constant phenomena. The liver was usually enlarged and at times tender. Not infrequently the disease assumed the bilious remittent type which text-books say is "the most common and the least dangerous of the pernicious manifestations." This was not our experience in Palestine. These cases showed marked jaundice, a dry coated tongue, constant vomiting and frequent hiccough, epigastric distress, and an enlarged and tender liver. The condition was very resistant to treatment and frequently fatal. Diarrhœa with blood and sometimes mucus, which was fairly common at times, made the differentiation of malignant tertian malaria from dysentery a matter of considerable difficulty in the absence of a pathological report, while a combined infection with malaria and dysentery was by no means uncommon.

The *algid type* of malignant tertian malaria at times gave rise to anxiety till a definite diagnosis was established. For example, cases were admitted from a transport to the stationary hospitals at Kantara, the first with a diagnosis of "acute abdomen-perforation?" The clinical phenomena were suggestive of cholera—intense collapse, cold blanched extremities, the skin dry, and the abdomen retracted. Shortly after admission a copious rice-watery stool was evacuated. Blood examination, however, established the diagnosis of malignant tertian malaria, and under appropriate treatment recovery took place.

Malignant tertian malaria, from the varied guise in which its clinical manifestations may be presented, is not only of interest to the physician but is a disease which the surgeon can never afford to forget in the study of certain acute abdominal conditions with a view to operation, particularly when they occur in a malarial area. Cholecystitis, appendicitis, and other similar conditions have been closely simulated. For example, a man was admitted to the 76 C. C. S. complaining of abdominal pain. There was a history of a former attack of appendicitis. The patient looked ill. The tongue was coated; there was vomiting. The movements of the abdomen were restricted, especially in the right lower quadrant, where there was marked tenderness. The temperature 103°, the pulse 80. The spleen was not enlarged, but was tender to palpation. Operation was discussed, but it was decided to wait till a blood report could be obtained. This proved to be positive malignant tertian malaria. Intramuscular quinine was administered, followed by intravenous, and in twenty-four hours vomiting had ceased, and pain and tenderness diminished. Recovery was uninterrupted.

The *pneumonic type* of malaria was fairly common, both amongst British and Indian troops. Amongst the British the physical signs were frequently those of a croupous pneumonia. The temperature was irregular, and blood examination showed a malignant tertian infection. Under quinine the temperature fell, but the physical signs in the lung persisted after the fall in the temperature, and took a considerable time to clear up. Amongst the Indian troops the common form of pneumonic malaria was of a broncho-pneumonic type, with marked remittent temperature, and was always grave. When influenza became epidemic amongst the troops, pneumonia following on influenza and accompanied by a malignant tertian infection assumed a pronouncedly septic type, and was exceedingly fatal. Too much stress cannot be placed upon the profound influence which the malignant tertian toxæmia has upon the *myocardium.* During the acute attack the blood-pressure may fall low and the heart become dilated, and a certain amount of œdema of the lungs was common. In grave cases air hunger with cyanosis was a prominent feature, but since there was no evidence of acidosis—no diacetic acid or acetone in the urine—the phenomena seemed purely due to myocardial toxæmia. During convalescence the influence of the toxæmia on the myocardium had always to be considered. Any exertion or too early return to duty inevitably led to cardiac dilatation and a circulatory breakdown, necessitating prolonged and careful treatment. To hurry a man who had suffered from malignant tertian malaria back to duty was an economic blunder.

Renal hæmorrhage in the course of malignant tertian infection was rare on the lines of communication. A few cases were noted, one so severe as to endanger life from the profound anæmia which resulted.

Blackwater fever was exceedingly uncommon. The few cases seen could almost without exception be traced to an original infection on one of the other fronts, especially East Africa. The Palestine type of malignant tertian infection did not seem to favour the production of hæmoglobinuria.

Nephritis following on malarial infection was noted in a number of instances. The urine contained albumin, cell elements, and a small number of tube casts, but rarely blood. The cases did well under treatment.

The Diagnosis of Malaria.—The first and most essential point in the diagnosis of malaria is the proof of the presence of the parasite in the blood, and in this important point the work on the lines of communication was greatly aided by the establishment, under direction from the D. M. S., of advanced diagnosis stations. It then became the rule that in every case of pyrexia a blood-film should be taken before any medicinal substance was administered. The blood-film was then either sent to the diagnosis stations or nearest laboratory for report; or, if this was not possible, accompanied the man to the casualty clearing station. It was thus possible to start quinine medication early without necessarily interfering with the subsequent diagnosis. The question arises, failing the finding of the parasite, Is one justified in the diagnosis of "clinical malaria"? Experience on the lines of communication, where one was dealing with a large number of malignant tertian infections, would force one to answer the question in the affirmative. We know that several blood examinations are often necessary before the presence of the parasite can be proved, and if the clinical factors point to malaria, to withhold quinine is to endanger life.

A clinical diagnosis may be fairly based upon—(*a*) Response to quinine therapy; (*b*) the character of the pyrexia, with splenic tenderness and possibly enlargement; (*c*) the blood-film picture, with the presence of hæmozoin-laden leucocytes or a high, large, mononuclear percentage. Given one of these factors present and the exclusion of other known causes of pyrexia, such as relapsing fever, the diagnosis of malaria seemed justified under conditions where infection was so common.

Prognosis.—In considering prognosis it must be borne in mind that the European troops were, for the most part, young adults infected for the first time, and the infection was therefore correspondingly severe. Taking this into consideration, one may with justice state that if the diagnosis were made early and the treatment energetically carried out, the prognosis was relatively good. The disease responded well to treatment.

It is interesting to consider the causes of death in fifty cases of malignant tertian malaria which occurred before the influenza epidemic caused an increase in the proportion of pneumonic cases. The table shows the figures.

FIFTY CASES OF FATAL MALIGNANT TERTIAN MALARIA.

Toxæmia with cerebral symptoms	10
Toxæmia with cardiac failure	10
Bilious remittent type	7
Hyperpyrexia	3
Pneumonia	13
Complicated with quartan malaria and bacillary dysentery	1
Complicated with amœbic dysentery	1
Complicated with myelitis	1
Imperfectly treated	4
	50

Toxæmia with cerebral or cardiac phenomena was the cause of death in no less than twenty of the series. Pneumonia occurred as a complication in thirteen; in one of this group coughing led directly to a rupture of the spleen which determined the fatal result. The bilious remittent type accounted for seven deaths, hyperpyrexia for three. Amœbic dysentery, bacillary dysentery, and myelitis occurred each once as a complication. Four are shown as imperfectly treated—owing to the exigencies of war they had been ill for some days before coming under treatment—men taken ill at outlying posts, and treatment, when possible, was unavailing.

In a study of the post-mortem findings it is interesting to note how seldom parasites were found in smears from the spleen or bone-marrow if the patient had been efficiently treated. It is usually held that when parasites disappear from the peripheral circulation they lie dormant in the spleen and bone-marrow, to become active again when treatment is intermitted, and so relapses occur. This may be so, but apparently the number of parasites is so small as to escape detection on the most careful and exhaustive examination. In thirty-seven consecutive post-mortems in which a search was made for the parasites they were found in only nine cases; in all nine the period of treatment was very short, averaging in eight of them 1·9 days, while one was treated with oral quinine only—a method which we know has little influence on the malignant tertian parasite. In twenty-eight cases where treatment had been more prolonged no parasites were found.

The table also shows the occurrence of mixed infections. These were by no means uncommon. When malignant and benign tertian occurred in the same individual, the clinical picture was that of a severe malignant tertian infection. Where the pathological report was that of benign tertian, and the symptoms were severe, especially if they were cerebral, it was always justifiable to postulate a mixed infection and carry out energetic treatment as for malignant tertian.

Treatment.—In malaria there is constantly a profound disturbance of the whole digestive system, and quinine treatment may fail unless preceded by the administration of a dose of calomel followed by a saline aperient. During the course of quinine treatment this procedure should be repeated at intervals. In every case of malaria the treatment should be controlled by frequent blood examinations, so that the medical officer may be kept informed of its efficiency. During the quinine treatment the patient must be kept in bed rigidly during the first three weeks of treatment.

In benign tertian malaria it was customary on the lines of communication, after the initial purge, to prescribe quinine in 10 to 15 gr. doses three times a day, and to evacuate the patient as a cot case if there were no urgent symptoms.

In malignant tertian malaria gastro-intestinal disturbance is, as a rule, so pronounced that the oral administration of quinine, in the early stages, is of little or no value; and even if there be not profound digestive disturbance, oral quinine does not appear to be curative. Recourse, therefore, was had to intramuscular or intravenous administration. Given a case of average severity, quinine bihydrochloride, 12 grs., was administered deeply into the muscles of the buttock three times in the first twenty-four hours and continued for at least three days. If by the end of three days urgent symptoms had disappeared and the temperature had fallen, oral administration was begun, 30 grs. being given in twenty-four hours accompanied with arsenic. During the third week of quinine treatment the daily dose was increased by 15 grs., as it was found that a certain tolerance to the alkaloid had been established. In cases of graver severity treatment was begun by intramuscular injection, followed in two hours by intravenous injection of 6 grs. of quinine bihydrochloride. Before deciding on the intravenous administration of quinine the medical officer was advised carefully to consider the condition of the circulation. If there was pronounced myocardial weakness with low blood-pressure, the intravenous administration of quinine is associated with the risk of sudden cardiac failure, and should be preceded by the hypodermic administration of "pituitrin" or "adrenalin." The dose of quinine should be administered in 1 to 2 pints warm normal saline solution, the technique being that of an ordinary transfusion. When the circulation was fairly maintained, quinine was administered intravenously in fairly concentrated solution, the dose, 6 grs., being dissolved in 20 c.c. normal saline solution. The intravenous injection was given slowly, at least ten minutes being expended in administration. In grave cases intravenous injections were repeated every four hours till urgent symptoms had disappeared. In cerebral cases, where there was profound coma, it was usually accompanied by increased intrathecal pressure, and benefit followed lumbar puncture. When the patient was plethoric, venesection was found helpful. In the bilious remittent type it was found essential to resort early to intravenous quinine medication. This type was very grave, and it was found desirable to administer 30 to 40 grs. of quinine by intravenous and intramuscular medication in the first twenty-four hours of treatment. In cases of malignant malaria, when parasites had disappeared from the peripheral circulation, and where there was evidence of cardiac depression, with low blood-pressure and air hunger, benefit sometimes resulted from intermission of quinine treatment for a period of one to three days.

An interesting point arose through the frequent occurrence of pneumonia along with a malignant tertian infection—Should quinine treatment be carried out or should the patient be treated as a pneumonia symptomatically? Some medical officers are of opinion that quinine should not be administered, but one has no hesitation in concluding that, granted the malignant tertian parasite in the peripheral circulation, this view is erroneous. Benefit repeatedly followed the intravenous administration of quinine in small quantities in these cases, as instanced by a fall in temperature and pulse frequency, and the injection could be repeated four-hourly without any undue disturbance of the circulation.

Very early in the treatment of malignant tertian malaria it was realised that transport had a most deleterious effect upon the patient, and it was found necessary to detain the patient on the lines of communication where possible till the end of the third week of treatment, and then to evacuate as a "cot case." No patient who had suffered from malignant tertian malaria was to be evacuated as a "walker."

Dysentery.—As in all campaigns in the East, dysentery, both bacillary and amœbic, has bulked largely as a cause of sickness in the Army in Palestine.

In the bacillary type both the classical types, viz. true Shiga and the Flexner-Y strains, being frequently isolated. The illness began acutely, and, as a general rule, ran an acute course with fever. It was possible clinically to distinguish the bacillary from the amœbic by the presence of signs of toxæmia and the character of the stools. The toxæmia was shown by the febrile reaction and the effect on the circulation; the pulse was accelerated and weak. The stools were those of an inflammatory muco-purulent exudate, of a somewhat milky appearance and streaked with blood.

The treatment adopted was—(*a*) dietetic; (*b*) serum therapy; (*c*) the administration of salines.

The diet most suitable for those cases was found to be albumen water, beef- and chicken-tea, meat-jelly, barley water, sweetened tea without milk, and arrowroot. Milk did not seem to agree, and was not used except in some of the Indian hospitals.

The serum treatment was undoubtedly successful, but two factors are necessary for success—that it be given early and in sufficient doses. So necessary did early administration appear to be for success that an order was issued that all patients suffering from diarrhœa with blood and mucus should be given a dose of serum whenever they came under treatment, without waiting for a laboratory diagnosis. The second factor essential to success in serum treatment is a sufficient dose. Small doses were found of little value, and accordingly an order was issued fixing the minimum dose at 80 c.c. The saline treatment was undoubtedly helpful, sodium sulphate being given in drachm doses, at first every four hours, and diminished when the stool became feculent. The infecting organisms themselves are thereby removed mechanically in large numbers by the saline treatment, with a corresponding rapid reduction in the intensity of toxic symptoms.

It is sometimes stated that emetine has no influence on bacillary dysentery. This statement is not absolutely correct. In several cases where the disease had become subacute or chronic, one or two doses of emetine had a considerable effect in checking diarrhœa and hæmorrhage, even though several pathological reports excluded the idea of a mixed infection.

Of the complications of bacillary dysentery, little was seen on the lines of communication. Experience of neuritis was confined to a very limited number of cases; in one there was complete sensory and motor paralysis of the V-nerve.

Amœbic Dysentery.—While amœbic dysentery was not so prevalent as bacillary, it yet led to a considerable amount of sickness, especially among the troops reporting sick in the Jordan valley. The commencement of the disease was much more gradual; there was less toxæmia and febrile reaction than in bacillary dysentery, and, given a correct diagnosis, treatment with emetine was very satisfactory. The doses of emetine employed was usually ½ gr. twice daily by hypodermic injection for thirteen days. The patient, as a rule, commenced the treatment on the lines of communication, and was passed to the base for completion of the course.

Considerable interest attaches to the hepatitis which may occur as the result of a previous amœbic infection, especially if the original infection has been insufficiently treated. Some of these cases closely simulated enteric fever. There might or might not be a history of dysentery, but the liver was always enlarged and tender, and treatment with emetine produced magical results.

A number of cases of *abscess of the liver* occurred in hospitals on the lines, and were treated surgically. An interesting point was that in most of the cases there was an entire absence of any history of dysentery. The abscess occurred in "carriers" who had not suffered from an acute attack. For example, an R. O. D. R. E. was admitted with a history of five days' illness, complaining of epigastric pain and slight gastric disturbance. There was no diarrhœa or intestinal disturbance of any sort, nor could any history of previous intestinal disturbance be obtained. In the epigastric region a tense fluctuating swelling was found. The right lobe of the liver was normal to percussion. At operation, typical chocolate-coloured material was evacuated from an abscess in the left lobe of the liver.

Mixed infections of bacillary and amœbic dysentery were by no means uncommon amongst the troops. The condition usually began with the acute phenomena of bacillary dysentery, but did not yield to treatment. Later, the presence of E. histolytica was demonstrable in the stools. It seemed as if these individuals had been amœba carriers who had become infected with bacillary dysentery, by which the intestinal resistance had been lowered and amœbic dysentery developed.

Enterica.—The enterica group gave rise to a good deal of difficulty in diagnosis. It was simple in the conscientious objector who had never been inoculated, but in most of the cases the clinical picture was modified by the effects of inoculation. The majority of cases seen were of the paratyphoid variety. Help in diagnosis was at times obtained from laboratory reports of high agglutinating power of the blood-serum, or cultures from blood and stools, but frequently these were entirely negative, or so inconclusive as to be of little help, and yet one was forced to the clinical diagnosis of enterica. Such a case, where all pathological reports were a "wash-out," verified the diagnosis by perforating three days after the diagnosis was made on clinical grounds. The patient recovered after operation.

Relapsing Fever.—This accounted for a good deal of sickness, especially during May, June, and July. Two types were seen—the Egyptian and the Palestine. In the Egyptian type spirochetes were plentiful in the peripheral circulation during the febrile period. With the fever splenic enlargement was marked, to recess again when the temperature fell. The pyrexial period, if the condition were untreated, usually lasted about five or six days. The blood usually showed a polymorphonuclear leucocytosis.

In the Palestine type spirochetes were frequently so scanty in the peripheral blood that prolonged search might frequently be necessary before even a solitary parasite could be detected. The period of pyrexia was short, and the blood showed a marked increase in the large mononuclear leucocytes very similar to the blood picture in malaria.

In "karcivan" we have a specific for the treatment of the Egyptian type. If given during the pyrexial period the temperature falls, and relapses after its use are uncommon. In the Palestine variety the influence of "karcivan" is not so definite, and relapses were more common, possibly owing to the shortness of the pyrexial period, which made it difficult to administer the substance while the spirochetes are present in the peripheral circulation. The question of the dosage of "karcivan" is of interest, for its administration during the pyrexial period causes very considerable general disturbance. In two cases in hospitals on the lines of communication the administration was followed by a fatal issue which appeared to be attributable to the effects of the medicinal substance. A dose of 0·3 grm. will control the fever, but relapse may occur necessitating a second dose. A dose of 0·6 grm. controls the fever, and relapse will not occur in the Egyptian type. As, however, alarming symptoms have occurred after the smaller dose in a limited number of cases, is the larger dose justified in a clinical condition which in itself amongst Europeans is seldom or never fatal? It scarcely seems to be so, though it must be admitted that 0·6 grm. has frequently been administered without any apparent bad effects.

Typhus fever was a fairly common cause of sickness. The type of the disease was not very severe as a rule, and the death-rate was not high. Pulmonary complications seemed the most to be dreaded. Much help was given in early diagnosis by the pathological laboratories which carried out the proteus agglutination reaction. The reaction appears to be reliable, and, when positive, may aid in the diagnosis before the rash has appeared, and in the differential diagnosis between typhus and paratyphoid with a very marked rash.

During the summer months cases of para-cholera were occasionally encountered—for example, at El Arish a group of five cases presented all the clinical features of cholera. They belonged to the same regiment and had all drunk water from the same pool. Here, again, the pathologist was of invaluable aid, for though a vibrio was present in the stool it did not agglutinate, and true cholera could be excluded.

Diphtheria and the Klebs-Löffler bacillus was at times somewhat prevalent, not only in the usual throat manifestations but also in the form of septic sores, from which a pure culture of the bacillus was frequently isolated.

Sand-fly fever was a considerable source of illness, important more from the numbers affected than from the seriousness of the clinical phenomena. *True dengue* was never observed. *Malta fever* was a curiosity, only met in one instance. Among the Indian troops leprosy was sometimes observed, but does not seem to call for discussion.

The troops in Palestine did not escape the pandemic of influenza. Pneumonia of a pronouncedly septic type was common as a complication, and in a number of cases a further complication in the form of malignant tertian malaria was present. This serious disease complex led to a considerable mortality. It is satisfactory to be able to report that hopeful results have been obtained from the therapeutic use of a vaccine.

Pellagra amongst the Turkish prisoners of war formed an interesting and instructive study, the results of which it is hoped may be published at an early date.

A FIELD AMBULANCE IN GALLIPOLI, EGYPT, PALESTINE, AND FRANCE.

By JAMES YOUNG, D.S.O., M.D., F.R.C.S.(Edin.),
Lieutenant-Colonel, R.A.M.C.

I. Off to Gallipoli.

In retrospect it seems a very long time since that day in early June of 1915 when we set sail for "Service Overseas." It is only a matter of three years and a half, but into this short interval, which would ordinarily slip past in a man's life without much comment, there have been crowded mingled experiences of trial and triumph, pleasure and sorrow. Even to the youngest and most unthinking the thrilling realities have worn right through to the very core. We have known and we have felt, and our knowledge and our feeling have been gathered amid the surging tempest of war. We have lived our life under many skies and we have watched the swaying fortunes of battle in several continents. To a man we are different; we may claim rightly and with pride that we are veterans of war.

It was with bounding hearts after ten months' residence in Stirling that we at last received the message to prepare to embark for abroad. The ten months spent after mobilisation at home tried us sorely, for we felt that we were ready for foreign service long before the call came. The intense desire for work in foreign fields and the burning spirit of adventure that overspread the country during the early days had caught us in their net. We drilled and we marched, we "carried stretchers" and we "lowered stretchers" till our arms ached and our backs rebelled, and we envied the men who were called early.

It came at last. We feverishly collected our new waggons and harness from ordnance and our horses from remounts. We worked day and night and we were at last ready. It was to be France. We knew it, for our equipment was of the pattern used in France. And then we got orders to send it all back! Instead of heavy ambulance waggons we got light ambulance waggons, and instead of horses we got mules. We knew now that we were going East. What a pandemonium there was the night the long procession of mules arrived! Then there was the fitting of harness and the endless arranging and rearranging of teams and drivers. The mules were fresh from the ranches of Argentine and our horsemanship was sorely tested. But the will was there, and in a few days we stood by ready to move.

Two long trains took us south to Devonport. We found that on the boat allotted to us there was room for only one officer, so Captain Greer was elected to accompany the unit, as he was Transport Officer and the main trials of a voyage always concern the animals. The other officers, Lieutenant-Colonel Ross, Majors Young and M'Intosh (Quartermaster), and Captains Brown, Walker, Hunter, Stewart, Smith, and Linklater left on the 3rd June. The remainder of the unit left the following day.

Looking back over it all, one of the greatest days we have ever had was that day when we swept slowly down the estuary from Devonport to the sea, accompanied by our two T. B. D. escorts, silent wardens of our fate, with their funnels belching forth great black clouds of smoke. Once outside, they aligned themselves one on either side, and we were off.

These were intense days of pleasure and expectation. Nobody knew where we were going. We whispered under our breaths that it must be the Dardanelles, but the situation in the Eastern Mediterranean was obscure at that time and we could only guess. At times we feared it might be garrison duty in Egypt, but from that unpleasant prospect our active spirits recoiled.

Every day of the voyage was full of interest. We were, most of us, sailing strange seas and visiting ports that, save for the fortune of war, we probably never would have seen.

We wanted to see Gibraltar, but we called there at night for orders, and saw nothing but the lights of the town rising tier upon tier from the water's edge in a great semicircle, and the searchlights that turned on their blinding flashes as we approached the shore.

We shall never forget the sight of Malta as we saw it bathed in the early morning sun. We have seen some of the greatest sights on this earth—the Pyramids of the Nile standing eternal amid their desert of shifting sand; Cairo with its minarets and domes and the great panorama of colour as viewed from the Citadel; the temples of Thebes; and Jerusalem as first seen in its high mountain fastnesses, with the shadows playing over the distant mountains of Moab. We have seen all these, yet we do not think any of them ever affected us so much with a sense of beauty and wonder as the first sight of Malta when we swept round it that morning from the south. The island lay bathed in the rays of the early morning sun and set in a sea as smooth as glass and of the purest of blues. It looked for all the world like an island of dreams. Though so far west it was the first revelation to us of the enchantment of the East. What adorns the long stretch of land and captures the senses and imagination is the town of Valetta that crowns the summit. It extends in irregular fashion over the higher land and down as far as the cliffs of the purest of yellow sandstone, which catch and throw back the rays of the morning sun. It is like a city of the *Arabian Nights.* Fashioned out of the sandstone, it rises terrace upon terrace to the summit, with here and there a spire thrusting its head into the heavens. In the sun the whole is of a creamy-white colour.

As we lay at anchor coaling we had an experience which inspired us greatly. A French battleship swept past us at a few yards' distance on its way to the sea. As it passed, the sailors, with their red-tasselled caps, lined up in their hundreds and were called to attention. A band struck up "God Save the King" from a platform near the bridge. The French naval officers in their blue surtouts saluted. After one verse of the National Anthem they played "Tipperary." Our men, who were crowded on the decks, could contain themselves no longer. They raised cheer upon cheer as the monster glided by, and received answering cheers from the French sailors. Such incidents as these are helpful and inspiring, especially in these days when war is so much shorn of its glamour. We were in the mood and we responded. We continued on our way the better for it.

We had thought that we were going straight for Gallipoli and were a bit disappointed when we found ourselves heading for Alexandria. The first party arrived there on 16th June, the remainder on 18th June. Our sojourn in Egypt on this occasion was destined to be short. We pitched our camp on the sands at Aboukir, which is on the coast some miles east of Alexandria. This short spell is chiefly noteworthy for the extreme heat which we suffered. The day we arrived, as luck would have it, was the hottest day that Alexandria had experienced (so the newspapers declared) for forty years. The few days we spent at Aboukir were like days spent in a furnace-room, and were passed by most of us in a half-prostrate condition, in which exercise of any sort, and even feeding, was a task. In a short time we should have become baked into indifference.

But fate had its hold on us, and on 28th June we again embarked at Alexandria. This time there was no doubt that we were off to the Dardanelles. Again we were split up between two ships, the *Menominée* and the *Alnwick Castle*, the Commanding Officer (Lieutenant-Colonel Ross) and the unit on the latter, the other officers on the former.

Two days afterwards we dropped anchor in the bay of Mudros. Then for the first time we began to feel the imminence of battle. There was a constant bustle in the bay, which was crowded with transports of all sorts and sizes. Ships were constantly arriving with fresh troops or departing empty for a fresh load. From the deck of our vessel we could see trawlers passing laden with wounded men and we could see others with their load of death.

II. We Land on Gallipoli.

Whilst we were still at Aboukir we met officers and men who had been at Gallipoli and who had been invalided to Egypt sick or wounded. It was after meeting them that we began to realise, though still only dimly, the fate that was awaiting us. The stories we heard then were such as were calculated to damp the ardour of all except the boldest or the ignorant. And we were in the latter category. We learnt of the beaches that were shell-swept by night and by day, and landing on them was at all times a matter of considerable risk. And then we were told that after you had landed your existence was a nightmare, for our troops were "hanging on by their teeth" to a narrow strip round the water's edge. So we were told by a staff officer who came to see us and to advise us regarding the equipment we were to take with us.

Colour was lent to all these tales when we received orders that no horses or waggons were to be taken to the Peninsula. They were all to be left behind in Egypt. All equipment was to be man-handled after landing. Those who know the extent and the tonnage of a field ambulance's equipment, as we did to our cost, will not be surprised to learn that this announcement caused consternation and dismay in our midst. But we had come out to face the worst ordeals and this was no time for turning back. We decided to leave fate to settle how a field ambulance could work for even one day without horses and waggons. We had not yet learned that spirit of calm submission and waiting for events which later experience inevitably fosters in the Army, and, as almost invariably happens, we found in this case that subsequent events proved our initial fears to be largely groundless.

On the night of the 2nd July the first party, consisting of the officers who had been split off from the unit at Alexandria and who travelled on the *Menominée*, set sail for Gallipoli. One of the officers went ahead on a T. B. destroyer, which was carrying a half battalion of infantry, to explore and prepare for the others. The remainder of this officer's party transhipped to a trawler. At this time, and throughout the campaign, all traffic to the Peninsula took place on smaller vessels, chiefly because of the added submarine risks run by larger craft. The larger transports never came beyond Mudros. Here all troops and ammunition and stores were transhipped to trawlers. A large fleet of this class of vessel, which in all theatres of the war has played such a great part, was kept running day and night between Mudros and the various beaches at Gallipoli. The only large vessels ever seen in the neighbourhood of the Peninsula were warships and hospital ships. In the earlier days even hospital ships were rarely seen, and the evacuation of the wounded was carried out by means of returning empty trawlers.

The passage from Mudros to Cape Helles, where our lot was to be cast for many months, was only a matter of an hour or two, and we landed safely at V Beach before dawn on 3rd July. This beach, which figures so prominently in the original landing in April, is on the south side of the tip of the Peninsula. It was here that the transport liner, the *River Clyde*, was run ashore. Suddenly opening up her sides, she poured forth the men that swarmed to the shore through the water or across the lighters that were shoved in between the ship and the beach. The whole operation was carried out under a constant and severe fusillade from the Turkish machine guns placed on the neighbouring slopes. One had only to see the place to realise the awfulness of the task which these men faced and carried out, though it was only a fraction of them that reached the shore.

It was here that our first officer party landed, just as dawn was breaking on the morning of 3rd July. The wind had risen and the sea was rough and it was no easy task. The trawler drew alongside a bridge of lighters placed against the side of the *River Clyde*. One had to clamber on to the lower deck of this vessel and then along a swaying narrow plank bridge slung from the port side. From this one you passed to another bridge of lighters which conducted you ashore.

We were at last on the battlefield! The Turks had not commenced to shell the beach yet, but they would soon start when they saw the troops landing, for we were under direct observation from the Asiatic shore of the mouth of the Dardanelles. As we learnt very soon, the Turk kept a very watchful eye on the doings on this beach, and on W Beach, which was just round the corner on the northern side of the toe of the Peninsula. This was also called Lancashire Landing, in memory of the gallant Lancashire Battalion of the 29th Division which here fought its way to shore in the last days of April. The Turk could see movements, and he was not long in sending across a salvo from Asia or from Achi Baba to harass any traffic that he had spied.

So we were told to hurry off the beach as quick as our legs would carry us. And we did. We climbed the banks that slope on all sides down to the cove, and were soon breakfasting with a field ambulance which had arrived some days before and was meanwhile camped on the flat ground overlooking W Beach.

We had not been there more than ten minutes before we experienced our first shelling. It was the morning *straf* of W Beach from Asia, and the shells just missed our heads on the way to the beach. We were hungry men, but we did not relish our breakfast on that occasion. We had our first taste of modern war and we didn't like it. The imminence of danger was so great that I think few of us thought that morning that we would see the day through. But time works wonders, and even shells create indifference after a time.

Cape Helles was badly placed for shelling. It could be shelled either from Achi Baba or from Asia. The Straits are only a matter of three miles wide, and the Turk had many batteries situated on the further shore to molest our flank. He was fond of dodging guns about on the Asiatic side, so that you never knew from which direction you were going to be shelled next. A big gun that he used largely there went under the nickname of "Asiatic Annie."

The solitary band of officers without a unit, for we had heard nothing of the ambulance since we left Alexandria, dug themselves in to await the turn of events. We spent the time in exploring the neighbourhood. We saw the guns at the fort of Sedd-el-Bahr which had been wrecked by our Navy in February and March. We visited the crumbling buildings that had once been the village of Sedd-el-Bahr, and we watched the frequent British and Turkish artillery bombardments on the hill slopes of Achi Baba some miles inland.

We chose a clear piece of ground about three-quarters of a mile in from the shore for our ambulance, and we hoisted a Red Cross flag to warn the Turks of our prospective arrival.

The commanding officer and the ambulance arrived on the morning of 6th July. We could see from our vantage ground on the shore the trawler pull in towards W Beach laden with its khaki figures. Little realising the precious cargo it carried we wondered, and we saw others wonder, when the Turks would open on it. But we did not wonder long. When it had come close up to the pier of sunken ships, which formed at once the landing-stage at W Beach and the breakwater for smaller craft, a ranging shell flew overhead and splashed into the water just beyond our incoming trawler. Another and another fell in quick succession all round, and we thought she was doomed. Then, to our relief, she pulled out and the Turkish fire ceased. Later in the day she ventured in again and discharged her load, which we now learnt was our expected unit. They landed at W Beach amidst shelling, but we had only one trivial casualty—Private M'Morran. This man, to us all, will ever have a tragic association, for he was the only man who was wounded at the landing, and when we went into battle some days after he was the first man to be hit, and by a bullet which killed him practically outright.

Our fears in Egypt regarding transport for our stores and equipment, we now learnt, had been groundless. We managed to charter some Indian mule carts, which we had with us throughout the rest of the campaign. These were subsequently to prove of great value. They were small open carts drawn by a couple of small mules and driven by an Indian driver. The cart we called the "garry" and the man the "garrywallah." They did noble service throughout, and the wallahs proved to be quiet, obedient, uncomplaining, and daringly brave. During their work they would chant their monotonous Indian dirge-like songs, and at night, when their work was done, you would hear them play their plaintive pipe to the moon.

Within a few days we were hard at work digging our camp. We were novices then, and the remembrance of our early digging efforts provokes a smile. We were adepts at pitching a camp of tents, but our training had never taken into consideration the prospects of a subterranean life. We were, however, anxious to learn, and the dire necessity of protection against the enemy shells that constantly pestered us made us apter pupils than we ever thought to be.

We soon had funk holes for ourselves and patients, and our camp gradually took shape. This was our main dressing station, and here we remained during the whole six months of the campaign. Throughout that time constant developments in our premises took place, until at the end we had quite a large hospital below the ground surface. There were five long deep trenches, two of which were allotted to the hospital. These were covered against the weather with corrugated iron resting on walls of sand bags. Alcoves were dug forward from the trench and formed the wards, and at the end we had a large bay fitted with doors and glass windows for the operating theatre. But these were very late developments. Our early efforts were carried out in face of a constant shortage of engineering materials, such as timber and corrugated iron, and, looking back on it, one wonders how we ever managed to maintain an ambulance working with a decent semblance of efficiency.

Throughout the larger part of the time the weather was good, and waterproof sheets slung across the trench alcoves sufficed to keep the blazing sun off the faces of our patients. But the rains of October were on us before the long-promised engineer supplies had arrived. With the first suggestion of broken weather we held a council of war and decided to dare the Turks and pitch our tents, which till that time we had refrained from doing for fear of the consequences. But we found the Turk a sport on this occasion as on others. He respected our flag, and our tents remained from that day till the end, with additions now and then as our patients increased. On no occasion did we ever find the Turk disregard the Convention of the Red Cross, and several times we have satisfied ourselves that he exercised special care in steering his shells clear of our camp. We have often had shells in our camp, but we have a strong belief that they were accidental.

At the time we landed, and whilst we were settling down in our new quarters, there had been a lull in the battle for Achi Baba. But it flared up within a few days, and we were hardly dug in when we found ourselves thrust into one of the fiercest battles which it has been our lot to serve in during all these years.

Our division was fighting beside the Royal Naval Division, and it was decided that, to begin with, we should send up officers and men to assist the ambulances of this division at their advanced dressing stations, which were to serve the frontage of our division and their own.

The advanced stations were situated in the Achi Baba Nullah (or valley), the forward one about three miles from our main dressing station, the nearer one about three-quarters of a mile behind this. The former had been called the Whally Cross dressing station by the East Lancashire men who first built it; the latter was called Skew Bridge dressing station, after the fanciful title of a small bridge across the burn, which trickled down the Achi Baba Nullah, to open into the Hellespont at the broad, sandy inlet of Morto Bay.

To regain as far as possible the sensations of the moment, which are preferable to a bare record culled from memory, the next chapters are extracted from a diary written at the time, the gaps of which are now filled in, in respect of matters which had to be shrouded in secrecy when it was written. To those of us for whom war has lost its edge, and whose original sensibilities are somewhat dulled, these extracts may seem over-vivid, but I prefer them because they are living. They were hammered out hot on the anvil of reality.

III. Our First Battle—Achi Baba.

12*th July* 1915.

We are in the very thick of it. All day long there is the roar of guns, interrupted only by short spells, when, by contrast, the peace seems too profound for this world. At this moment the roar and crash are greater than usual. Since the early morning the guns around us have been hurling their message of hate into the Turkish trenches. From my dug-out I can see the flashes, repeated with awful rapidity, of a French battery that lies over from us, just a few hundred yards away. Every now and then there is a bang, a whiz, and a great cloud of earth and stones thrown into the air, as the Turkish shell vainly tries to find the guns that are concealed with wonderful ingenuity. Immediately after there is a crash, as the earth's cry of agony reaches our dug-outs.

For a short time earlier in the morning the guns suddenly became quiet, and, from the slopes of Achi Baba that are exposed to our full view, there arose almost immediately a terrific clattering of musketry and machine-guns. We knew then that our gallant fellows had left their trenches, with set teeth, and their Scotch faces glowing with the fire that on this battlefield meant only one thing, as it had meant on many a battle-field in the past.

It was to be death or glory. Even now we have heard, as we expected it, of their success, though we shall have to wait till later in the day to know the full proportion of the victory.

Our intense interest in the happenings on the hillside is increased by the fact that many of the fellows taking part in it are well known to us all, and also by the fact that the greater part of our ambulance is up there taking part in its first action. The three junior officers are out with them. We had to send two officers to fill regimental medical jobs temporarily. I hope it may be very temporary, for we are left very short-handed.

The spirit of our fellows is magnificent. Now that the time has come they are keen to show themselves worthy. There was disappointment in many hearts this morning when they found they could not all go into action. Our eyes followed them as they set off two at a time, with their stretchers and their surgical haversacks towards the din of battle. They were soon lost to sight in the mist of sand and smoke that by this time enveloped everything. They knew what they were going to, and they went with willing hearts. My heart is anxious for them. It is perhaps too much to expect them all back scathless, but let us hope no dreadful thing will overwhelm them. We will know soon. The inferno is as bad as ever. One wonders how anything could live through it. The noise is terrible, and the earth seems to shake to its very heart. God help them all!

The scene where the intensest conflict is raging looks quite close to us. The roar of cannon now is constant, and is so deafening that one even here can hardly hear oneself speaking. Through it all one can see men and horses or mules and ammunition waggons crossing the country, or setting off in a panic when a shell bursts too near. Our own men, who are left, are deepening the trenches, stopping every now and then on their spades to see how things are going. Just then, during a momentary hush, a yellow-breasted bird flew by, chirping as if nothing were amiss.

13th July 1915.

I have been up at the advanced dressing station since early morning to see how our fellows are faring for food and sleep, and to lend a hand with the wounded. I found the men all working with magnificent heart and will. Begrimed they were and fagged out with their ceaseless and anxious work, but they had never a murmur or complaint. They were out to do their task to their utmost, and an inspiring task it is. The poor fellows were seeing sights that this world, with all its madness, can show only on rare occasions. They were seeing limbs shattered beyond repair, and caked with blood and mud. They were seeing gashes that shrapnel or shell had torn in the bodies of their fellow-creatures, till even the practised eye could scarce recognise the original parts. They were seeing long lines of livid forms pass on stretchers that were as likely to be dead as living by the time the dressing station was reached. Many were breathing their last. Even the eye unused to death could see that. They were seeing all these things for the first time, and yet there was no sign on their faces, as I scanned them anxiously on my way up towards the trenches, of panic or fear at the horrible thing they had come to meet, but only a look of grim determination and resolute self-control.

I knew the fellows well before, and I expected it, but I felt, and feel now as I write, a great sense of pride in them. The sterner types were toiling away in the scorching sun with their tunics off and their sleeves turned up, with nothing but their duty to exalt them. The gentler types were stopping every now and then in their task to speak a word of cheer or comfort to their wounded brother, or, with a smile, to re-adjust his wounded limb or offer a drop of water to moisten his parched lips, for thirst is a symptom almost as trying as pain.

The medical officers at the dressing station are working at their gruesome job continuously, with a break now and then for a sleep or a drink of tea. Tea without milk and slightly sweetened is what one lives chiefly on here. Often it is the only thing you can get, and right welcome it is at any time.

War is a strange thing. On the one side you have all the signs of excessive hate and unbridled passion that show the innate madness that still lurks in the human soul. On the other you have all the signs of unselfish devotion and kindliness of spirit, even towards the man whom you have just struck in your hate, that show that there is, somewhere, a reserve of saving grace that rescues mankind from utter degradation. All in all it is a horrible jumble of inconsistencies. Meanwhile, let us cling fast to the better spirit in us. We want it all. Thank God that our task here is one of mercy and not of destruction. The realisation of the horrors and sordidness of it all is impossible till you are amongst the groans of the dying and the agonies of those that were better dead.

I have truly seen some inspiring sights. I saw an A. and S. officer with a shattered thigh whose chief concern, as he lay stretched on the table, was that his men would be well supplied with water, as the day was hot. He was carried out with a smile of absolute resignation on his face, and his last words to us were of gratitude for what had been done for him. He was very seriously hit, poor chap, and up there we could do very little for such as he. I was badly upset for a time over one of our own poor chaps. He was hit, mortally, I fear, close to where we were. I had at the moment no time to look after him, and by the time I was free he had been patched up and sent along the line. I fear it is hopeless. The officers are all well and cheerful so far, thank heaven.

15*th July* 1915.

Have been hard at it since I wrote last. I got back last night and have just had a sleep, wash, and shave, and am off again. Things are quieter now, but we have had two days of Hell. Our poor fellows have been badly hit—killed and I don't yet know how many wounded, the whole business happening just in front of one's nose.

16*th July* 1915.

These last four days—Monday, 12th, to Thursday, 15th—were days of awful strain and anxiety for us all. I shall never forget Monday afternoon, when the affair reached a climax. The din became incessant, and air and earth were shaken and torn in an inferno of hate and destruction. . . .

Our bearers have worked with tremendous spirit, and under circumstances of terrible hardship and strain, for, once the casualties started, it was one unending stream. We placed them in relays between two advanced dressing stations. Three of our officers lent a hand at the front and another helped at the back one. My duty was directed between the two, and a general supervision of the working of our own men, especially seeing that they were fed and rested sufficiently.

Great credit is due to everyone for the way the work was carried out, and our unit has been congratulated this morning for its services. Congratulations mean little to anyone after an experience like that. The best reward is the sense of duty done.

The officers worked with a will, and spared themselves nothing whilst the stress was at its greatest. Sleep was impossible, or only to be had in short snatches of exhaustion for a couple of days and nights. The intense concentration demanded, with plentiful supplies of tea, carried them safely through. "Tea, tea, tea." That is the cry as the perspiration rolls from one and soaks right through every garment after hours of toil under the broiling sun.

The medical arrangements are as follows:—

Starting at the trenches each battalion has its regimental medical officer. The sick report to him every morning, or, in the case of an emergency, during the day. During an action the wounded are carried to him by the regimental stretcher-bearers. The work of the bearers is very strenuous when the casualties are very heavy, and they are exposed to all the dangers of the front line trenches. It is therefore not surprising that they often suffer heavily themselves. When a big affair is on, they toil day and night between the trenches and the regimental aid-post, where the doctor and his orderlies wait beside their medical stores and dressings to attend to the wounded before they are sent further down the line.

The regimental bearers are themselves trained in first aid, and whenever they observe a wounded man they apply the first field dressing, which every soldier carries fixed inside the tab of his coat. When the losses are heavy the soldier has to depend on his neighbour to render first aid, and every soldier is instructed in the use of the field dressing. The wound is exposed in the quickest way possible and the dressing is rapidly tied on. It prevents unnecessary infection whilst the man has to wait his turn for removal to the doctor.

Not infrequently when there is no one near to lend a hand the wounded man has to apply the dressing for himself. We saw a man the other day who had a very severe fracture of both bones of his leg. He cut up his trousers, pushed the fragments of bone that were sticking out back into their position as far as he knew how, and then fixed on his dressing. This is a type that one sees fairly often—the man who won't kill. We had another such who passed through our hands some time ago after a big action. He had a large hole in his back, which he must have got far in front of his fellows, for he lay out for a considerable time. An ordinary man would have lain out for ever. He had the spirit that brushes death itself aside. He crawled till, as he said, he fell asleep, and crawled again whenever the din grew louder and he wakened. We knew that it was no natural sleep that had arrested his gasping efforts, but the collapse of exhaustion, and hæmorrhage.

These men have more than the mere animal will to live. Through it all their hearts remain smiling and they make others smile too. They are carried on their rude bed of pain and exhaustion into a place that has kept company for many weary hours with the tortured body and with death itself, and the walls of earth and the roof of wood and sand became radiant with a new spirit. The heavy-hearted catch up the cheerful strain. Suffering would almost seem to be a joy. And no one knows exactly how it has all happened, least of all the heroic and simple spirit that itself lies prostrate and yet laughs in the face of death. Their greatness is all unconscious, and is only great because it is so. The doctor's smile and word of cheer and encouragement seem puny and irrelevant before such a thing as this. The smile and encouragement have found a thing immeasurably greater than themselves, and they remain the better for the discovery.

When the regimental stretcher-bearers pick up a wounded man they carry him to the regimental aid-post. This is close behind the firing line, and is simply a hole extending from the main communication trench, with ledges cut for the doctor and his assistants, and any patients who are there, to sit or lie on. Round about are arrayed the medical and surgical panniers that are thrown open ready for use when an action is on.

It is imperative that the doctor be at some spot which all the officers and men belonging to his unit know, and to which the slightly wounded can walk and the severely wounded can be carried. This arrangement is necessary, as it is impossible for the medical officer to do good work in the firing trenches themselves that are scattered and cramped. The work done at the regimental aid-post is always carried out under grave risks, and the losses amongst medical men, who have died at their duty, have occurred largely at these places. During an action the shells and bullets may be falling like hail, and yet there is never a lull in the work of mercy.

The patients sit or lie round waiting their turn. Every now and then the bearers squeeze along the narrow trench leading to the doctor's place carrying a man whose grave condition demands immediate attention. The doctor turns aside from the broken legs and arms and bends over the prostrate figure, his assistants deftly cutting the clothes here and there till the wound is properly exposed, and then after a few skilful touches, during which perhaps a tourniquet is applied to stem the red gush that carries life away with it, the gauze, wool, and bandage are placed into position. A ticket or "tally" with a red edge is torn from the book, the man's regiment, number, name, wound, and treatment quickly jotted down, and then the tally is fixed to the button of the tunic for the guidance of those farther down the line. The red edge denotes "danger," and that man will receive first attention whereever he may be.

The doctor turns again to the patients whose needs had to give way before the greater danger, and one by one their wounds are bathed and dressed, and they are carried off by the bearers waiting near, or they are directed to walk if their wounds are only trivial. If they require a helping hand, a bearer not engaged at the moment with a stretcher is always there to aid them on their way. Before sending them off the medical officer makes out the ordinary or white tally for each, and they pass on, carrying the label fixed over the breast that marks, better than any medal will ever do, that they have fought and suffered in their country's cause.

If you are to picture the scene at the medical aid-post during an action, as indeed at all the more advanced places of medical treatment, you must realise the awful circumstances of the time. The air is torn with the din and crash of the heavy guns that belch forth destruction on all sides, and with the constant crackle of the rifles and machine guns. The bullets fly past with a hiss and a hum. As the shells cross a hollow in the ground the sound of their flight gathers volume into a roar, that is prolonged long after they have passed overhead. It is as if a thunder-storm had burst forth at your very ears, louder and more furious than earth has ever known, and that seems as if it would never cease.

Every now and then the doctor and those around him stand for a moment listening intently, and then duck suddenly as a shell tears past with a scream and falls a few yards off, shattering everything in its course. A few seconds later, perhaps without a trace of warning, there is a terrific crash overhead, as if the storm had concentrated all its fury for one supreme moment. The shrapnel spatters the parapet and the trench with its deadly charge, and the doctor turns again to his work of grace. He feels a sharp twinge in his arm, where a maze of earth has struck him, but that is nothing and his work is pressing. The man on the ledge before him, whose hand he has just finished dressing, sits for a moment gazing vacantly at the opposite wall, and then rolls over heavily with a bullet through his brain. He is carried out gently, and it is then seen that the same shrapnel charge has found two of the other patients, who by this time have begun to crowd round the doctor's trench waiting their turn.

The bathing, dressing, and bandaging commence again through it all. They must all be sent off down the line as fast as possible. The doctor and his orderlies swab, and cut, and snip, and tie, until the crush is well-nigh over.

The doctor's arm has been paining, but there was no time for it, with so many that must be dressed and passed on, waiting by. His orderly has seen the blood oozing through his shirt and running down his arm, but there is blood everywhere, and who minds blood on such a day? With the lull that leaves a gap for thought the doctor wonders if a lump of earth could really cause so much pain, and there is a stream of blood trickling down after all. He knows now, with a feeling akin to annoyance, that he must have a dressing and bandage round his arm and join the throng that is passing on down the line, with a tally fixed on his breast. The bullet has gone right through the back of the arm, and he knows the dangers and the dreary prospect before him. He has been cheery from the beginning and his cheerfulness soon returns. He makes the necessary arrangements, goes to see about a man to carry on his work, and at length takes his place in the line that is thinning down with the evening.

I know that man well,* and saw him two months later on his way back to the line. He was sorry about the delays that had kept him away so long, and he went off with an agile and happy step to the front, where his men had again taken their places. I think he is one of those men who do not know personal fear, and whose sense of duty is always a keen, boyish pleasure. It may be otherwise. It may be that acute sympathy is combined with a timid heart, as is often so, but the hard needs of duty have ruled down the fear in his breast, which is known only to himself. Which is the better? It is not easy to say. There must be many of both at this time toiling unflinchingly and unselfishly for their country.

We must again join the procession of the maimed and the dying on their course along the line. From the moment when they leave the regimental medical officer they are taken under

* Captain E. D. Gairdner, D.S.O. (and bar), Croix de Guerre, R.A.M.C. (T.), Medical Officer, 1/5th R.S.F.

the care of the field ambulance. The regimental bearers carry the patient to the aid-post, and the bearers belonging to the field ambulance take him over when the doctor there has dressed his wound.

Our function starts here. The first relay of bearers carries him or supports him, if he is able to walk, for a quarter of a mile or so along the trench, where the second relay takes him over. Another quarter of a mile and the third relay takes over the charge, and, in our case, these last bearers see him as far as the advanced dressing station, another half mile or thereabout. Here there are doctors and dressers working continually night and day while there is work to be done. During an action the work may be constant for days, but even during times of quiet there are always cases passing through—sick men and men wounded by the bullets and shells that fall in the trenches at any time of the night or day.

IV. The Advanced Dressing Stations on Achi Baba.

On the 13th August we took over the evacuation of the sick and wounded along the line of the Achi Baba Nullah. Our bearers work backwards from the regimental aid-posts in the trenches to the Whally Cross advanced dressing station. Stretcher cases have to be carried the whole way.

The advanced station is far enough back to allow of surgical treatment being carried out with a certain degree of comfort. But a mile or less is not of much consequence in these days of war. During the heat of an action it is only a little less storm-tossed. If anything, the noise is greater, for we are nearer the guns that blaze and crash on every side, and, being on the main line of trench, the ground all round is frequently searched by the enemy's shrapnel. There is hardly a moment when stray bullets may not be heard whizzing past, to lodge in the scrub-grown bank opposite, or to strike the road that runs in front. When they land they give a sharp dull thud, and a fine cloud of sand rises to mark the spot.

The bearers who ply to and from the dressing stations have a task beset with dangers, and, as must happen, a gap is every now and then made in their ranks. We had many such amongst our own men during the last severe action. They tramped the trenches during three weary, blazing days, and they tramped them during the warm nights whilst the stress was at its height, bearing down the wounded that still kept coming in. They carried on the stream of men that had to be dressed and passed on, and when they fell they were swept into the stream and were passed on themselves.

The Whally Cross dressing station lies in a gully or nullah that runs across the country for a considerable distance. There is a space here of a few hundred yards where the trench is absent. It is carried on by a narrow track that is protected on the danger side by the bank. This has been undermined in places to make dug-outs in which the passenger can crouch when the rifle- or shrapnel-fire is falling thickly, and it has been raised in places, where it is too low to afford cover, by means of loose earth that has been thrown up to form a parapet. Farther down, the track again passes into the trench. Along its side an extremely dirty stream trickles, and notice-boards warn the passer-by against using the water for drinking or even washing. It is infested by frogs, as indeed are all swamps and streams in the place. On a quiet evening their jarring croak fills in the intervals between the outbursts of rifle-fire.

The station stands just within the sheltered bank of the nullah, in a spot admirably suited for the purpose. The ground rises not too steeply for about twenty feet or so, and when you stand on the track and face the bank you are looking right back along the line of fire.

The man who set out first to raise his Red Cross flag in this region must have seen that this was the very place for him. It was an easy matter for him to dig the bank away to form an entrance. You then mount a step into the dressing-room, a hole about two yards square, dug into the bank and covered by some corrugated sheeting supported on wooden beams. Boxes and panniers lie round the sides, a plank is laid across behind by way of seat, and coats, haversacks, and water-bottles hang round the walls on nails driven into the wood. Beside it, to the right, you mount by half a dozen rude steps to a narrow dug-out where the medical officer eats and sleeps. Then behind these you have a whole host of dug-outs lying just under the upper edge of the bank. To the left there is another dressing-room where there is more room and where urgent operations are done. Next to it is a broad dug-out for urgent cases that require some hours of rest and treatment before you dare send them farther down the line. Then you have the holes where the other officers and men sleep.

It is all very primitive, but it is a very fascinating place. It has stood the storm and stress of several months. Its wooden beams have been drilled and grooved and splintered with shrapnel and rifle bullets. A high explosive shell burst through the roof of the patients' room the other night. It shook the sergeant who was in it pretty badly, but that was all.

I could tell you tragedies of the road that runs by that would horrify you, though they have long ceased to horrify us. It is a place of tragedy, and yet we like its simple shelter of wood and earth. The last men lived and worked there night and day, through quiet and storm, for several months, and they were loath to leave when we came to turn them out.

It is a haven on the road for those whose task is bearing them down, and they come in for a little rest and comfort. A sapper came in to-day, overcome with the heat and the unpleasantness of a new job he had on at the front trenches. He sat and talked and drank tea, and went away feeling better. He talked of the fine Scotch fellows he had seen lying up there, though he did not know I was Scotch. The other day a man came in on his way up to the front line to find his brother who had fallen two days before. He was strong and collected as he went off. But his task proved hopeless.

As you sit in the dressing-room and look out between the wooden props that form the door you may watch the regiments passing from or to the trenches. As they pass in single file down to the rest camp you can see, showing through all the dirt and weariness of their days in the front line, a feeling of relief at the prospect of quieter days and nights. Those that pass up swing along with their heavy kit and rifle and spades, tired already with the heat, but apparently regardless of the dangers they are going to meet, although they are no strangers to the life of the front line trench. It makes little difference if the Turks have spotted them lower down and follow the thin line as it passes up with a rain of shrapnel. They have had this experience often before, and they continue on their way with a healthy indifference to danger.

If you climb a few steps leading from the dusty track, and when half-way up the bank you turn sharply to the left for a hundred yards or so, you come to our little cemetery. It has steadily grown until, when we took it over, there were about sixty mounds with their humble wooden crosses with the names of those who have been called away from the noise and crash of the fight written across firmly in indelible pencil. Like everything else, it is all very primitive. A few of the man's company come down with their spades, and the parson conducts a simple burial service. There is little time for sentiment or regret. Two of our own men lie there. Their place is marked with a simple wooden stick, but we hope soon to have two crosses, which a joiner and a wood-carver amongst our fellows are making.

The cemetery stands in an open piece of ground. The extra height of bank which shelters the dressing station disappears just before you reach it, and it thus stands on the top of the ordinary low embankment that runs along the danger side of the track below. It is not always safe to visit the cemetery, and accidents have happened whilst a burial was in progress, for it has nothing to shield it from the hill that rises slowly to the right, where the entrenched armies face one another. Everything is quiet just now, but you see the fresh bullets lying where they have struck the mounds overnight, and even the wooden crosses are not saved from the storm that breaks with the dark. It is a place exposed to all the noise and clank of the fight, but the tempest's fury only serves to accentuate the peace of those below. It is a true soldier's burial-place.

In the early morning, before the haze of mist and sand has settled over everything, you will find a pleasing view from this flat piece of ground. In front, there is the gently undulating slopes of hill rising ultimately to the summit that so far has defied all attempts at conquest. It is a peaceful scene, with its green growth of scrub and tree, and yet it is fresh from some of the fiercest fights of history. Two big armies are there in front of us, gathering strength for the final blow, and yet there is not a sign of movement. There is nothing to mark the subterranean city of the gathered hosts except the brown lines of earth, one behind the other, that show where the trenches stretch across the hill.

Close at hand, a few hundred yards along the track that passes by us and that carries on the communication trench, there is a well—Romano Well—that gives the coldest and purest water on the Peninsula. So the soldier will tell you. It is a favourite spot. It is also well known to the Turk, and he every now and then sends a shower of shrapnel amongst the men who gather round waiting their turn. Many a man has lost his life while in pursuit of a cooling drink, and it has now a sinister reputation. Its water, however, is still as favoured as ever.

If you turn and look across the track that passes a few feet underneath you, you see the opposite bank rising to a broad, flat stretch of ground covered with a dark green shrub and some trees. Beyond this the ground rises steeply to a height of 150 ft. or so. Down to the left the track runs along the nullah, and a mile or so farther on this opens out on to the Hellespont, with its strait of dark blue water intervening between us and Asia Minor. Beyond the Hellespont and the coast of Asia, some miles inland, but still only a short distance away, we look along the plain of Troy.

This little station of ours has woven itself closely into the spirit of war. It has seen and shared its horror and tragedy, its noise and danger, its exaltation and inspiration. It is on the direct line of things, and it knows the reality with a very intimate knowledge. There is none of the flare of the trumpet nor the beating of the drums here. There is none of the glamour of the dispatch. We leave that to the commander and the journalist and those at home. We only know the grim spectre that walks this countryside and that lays his hand with a destroying touch on the manhood of our race. We see the suffering and the death that are his work, and when we pause to think, which we rarely do, we see behind it all the tears and anguish of a sorrowing nation. But the spectre of war is too near to us for his terror to remain long amongst us. The horrors of the time have dulled our sensibility, and it is well that it should be so. We have occasional spells of vision, when we see through all the travail of these mad times the birth of better things. But our imagination is for the most part dull, and a drab determination carries us on our way.

Just now this nullah station has little to disturb its peace during the day. When big things are going on in front, as during the 12th, 13th, and 14th July, it is the centre of a busy traffic.

On such a day there is a continual coming and going. The wounded are brought down from the regimental aid-posts, and in a majority of cases their wounds are dressed with more attention to modern surgical needs than is possible further forward. The bearers leave them lying outside on the track under shelter of the bank, and they are brought in for treatment one after the other. If they are very seriously hit, they may be taken to the dug-out up the hill behind for observation. If not, other stretcher squads take them over and carry them on the next lap of their backward journey.

We have passed not a few wounded Turks through our hands. Most of them are big fellows, large-limbed and broad-backed. Truly a dangerous enemy. They receive exactly the same treatment as our own fellows, and they have a pleasing way of exhibiting their gratitude for the unexpected kindness shown them. One big man positively beamed thanks when one of our bearers gave him a cigarette and lit it for him. For them, as for our own men, their greatest solace at such a time of pain is a cigarette clasped between their lips. They are dirty and ill-kempt, as is every man who has been long in the trenches. They are often hungry and thirsty, and it is amusing to see them making friends with a thick piece of bread and jam, as I have often seen. Their trench fare is apparently very simple. In their haversack you will find only a piece of black bread and onion. They are mostly well-clothed. One man had the most beautiful underwear I have ever seen on a man. He must have been of good social position, and it was obvious that his needs had been the subject of fond care on the part of those he had left at home. Round their waist they all wear a broad band several yards long, and it is a matter of no slight difficulty unrolling it as they lie on the stretcher.

This little station is on the direct line of news, and we get early first-hand information of what is going on in front. Every man has his story to relate. You must first learn, of course, how he himself was hit, how he had just climbed the parapet for the charge, when he was nailed by the machine gun, or he had just reached the Turkish trench where they were four-deep, or he was forward in the bombing-trench or he was got by a sniper, when going along one of the saps. They will then tell you how the fight progresses, but you soon learn to discount their story, for the field is big and their view of it small. It is not till the following day that the reliable news leaks out.

During the days of stress you may see a thousand or more cases in twenty-four hours. It means hard, constant toil, with an hour or two snatched for sleep. But there is a satisfaction and inspiration about it that keep fatigue at a distance, for it cannot last long, and in a few days the lull comes, when you can indulge your tired eyes and mind and back. This feeling pervades all ranks. We have to make arrangements, of course, for regular reliefs, but I have learned afterwards that some of our bearers have toiled almost incessantly for forty-eight hours. They would not be stopped by their sergeants. They all worked well, and we had great difficulty in picking out any for special mention. But we decided on one man who had worked nearly without stop at carrying patients during almost constant shell- and rifle-fire for forty-eight hours when he himself, a great part of the time, was carrying a wound through the leg. It was, of course, superficial, but the deed showed at once the nobility and the staying-power of the man. He was recommended for the D.C.M., and he got it. I am glad to say, also, that it was a very popular honour amongst us.

After the patient leaves our station of the nullah he is carried down the track under shelter of the bank for a quarter mile or so, where another squad takes him over. Just close to the place of exchange the bank drops down flush with the track. Here there is nothing to shelter you from the bullets that ping past in their hundreds on a busy day and that you hear any night. It is a veritable death-trap, and you are wise to hurry past as quickly as you can. This place is called Backhouse Post. A few yards farther on the track is continued into a deep trench, and this you only have to leave once, where a road crosses, before you arrive at the next station, about a half a mile farther on.

Just now this station is a haven of peace, where you can rest for a moment on your way up the nullah. When there is a rush of work it is the site of busy treatment. When the cases gather more quickly at the nullah station than the staff can cope with the overflow are brought right on here. It is a simple little place nestling at the foot of a small hill. We call it Skew Bridge station, because of the bridge of planks crossing the stream that trickles down the nullah, and that flows to the sea near by. The shelter is primitive, and consists of a roof of sand bags supported on wood and set up against a wall of earth that stands 10 or 12 ft. high. Near by there are dug-outs cut out of the earth that do for sleeping and for sheltering any patients who are waiting to be sent off down the line. Behind, they have recently made a bigger dug-out, with a profusion of sand bags, that does for the medical officer.

It is an attractive place to work at. It has less shelter than the upper station, and when you stand at the entrance you look beyond some hundreds of yards of sandy, scrub-grown ground occupied by the French, straight across Morto Bay, where the blue waters of the Dardanelles dip deep into the Peninsula. Beyond the Dardanelles you see the coast of Asia, flat in front and rising in steep cliffs to the left. It looks quite near, and yet it is some miles distant. Beyond it the mountains of Asia show purple in the distance. The exposure on this side means that there is nothing to protect the station from the Asiatic guns. The other day, when we were sitting having tea, a piece of armourpiercing shell, 1 ft. long and 2 ins. thick, came whizzing into the station.

The station lies at the foot of the nullah. On the left you see the high land that forms the continuation of the hill along the southern side of the nullah falling abruptly into the sea at Morto Bay. At its extremity, where it juts into the sea, there is the battered remnants of a fort. On the near or seaward side the French have taken advantage of the admirable shelter for the construction of the largest, the most artistic, and, at the same time, probably the most efficient dug-outs on the Peninsula. To the right of the flat, sandy stretch that runs in front of the station right into Morto Bay, the ground rises again in a ridge that extends close to and parallel to the shore for half a mile or so, where it falls fairly steeply, just beyond Sedd-el-Bahr, into V Beach, the site of the historic landing from the *River Clyde.* This ridge is perhaps 200 ft. high. It is dotted over with trees, and it affords excellent shelter for heavy guns.

The Skew Bridge dressing station lies on low ground, and, while it is out of sight of the hill and the front line trenches, it is by no means immune from the shells and bullets that come from that direction. The proximity of a large number of artillery batteries, that hug the admirable shelter the region affords, brings about our ears shrapnel and high explosive when the Turks' stores can spare them.

In the evenings, also, and especially when there is any serious action on in front, when the danger may be as great during the day as at night, it is a favourite site for falling bullets. Many a man has been hit about here on his way back to his rest camp when he had thought that he had left rifle-fire at a safe distance behind. One morning a patient with a bullet in the abdomen had just been carried from the dug-out, where he had been under observation for twenty-four hours, down to the ambulance waggon for removal to the shore, when a bullet came into the waggon and went right through his arm, as he lay on the stretcher. It must have passed between the two bearers who were still bending over him. The poor fellow had to be carried back again to have his arm attended to. Truly the fates dog some men with most relentless step! The same morning an Australian officer was standing in front of our dressing-room examining an old water-bottle, when a bullet struck the bottle and fell inside. As a matter of fact, many of the bullets that fall here are spent, or nearly so, though not so far spent that they cannot pierce flesh and bone.

This station of Skew Bridge is the farthest point to which ambulance waggons can be taken, and, as a matter of fact, it was formed as the rendezvous to which the patients could be brought to meet the waggons. It is little else than that just now, though on a big day its functions are much more serious and strenuous. I have seen a large crowd of men sitting or lying about outside waiting their turn, although the waggons were being loaded to the full as they arrived in quick succession. I have seen such a crush of work during the night that the whole of the available ground in front has been littered with the wounded, and you had to face the task of sorting out the slight from the serious cases and the dying with the dim light of a lantern. A weird and memorable sight it is, this ministration of the night.

Under the roof of sand bags there is the medical officer and his orderly assistants busy snipping and bathing and tying, or injecting the God-given serum that holds off the spectre of tetanus. Outside, the orderlies pass hither and thither amongst the patients, with their lamps, discovering the red tallies, for they must have first attention and first place in the ambulance. At another place you can dimly see the padre bending over a stretcher and lifting the man's head whilst he sips his cup of water, or he is speaking some words of comfort to the man whose last account with this world is nearly closed.

Nowadays that is all past, and one motor ambulance waggon does all the work. It is kept here, and it takes down the patients as they arrive to the field ambulance a mile or so farther on. It is a Napier car, with a fine, sturdy body, and it requires it, for I doubt if you will find a worse road for a motor car anywhere. It is nothing but a track of ruts and holes, on which, in previous times, probably nothing but the lightest vehicles were ever risked for the journey up the nullah. In these days, of course, its defects of nature have been greatly amplified by the large number of shells that have torn it up at odd times. The car has come through it all with nothing worse than a broken spring. Taking it over the road in the dark, with lights showing neither on road nor car, is a feat of driving, but it is a feat that has been performed many times without mishap. The drivers, a fresh, healthy, clean-limbed pair, with a strong Lancashire accent, obviously find great happiness in their work.

The road twists about for a bit over very broken ground, and then turns round on the north side of the ridge that spans the south shore. It then runs straight into the open ground that forms the tip of the Peninsula. This open space, about 2 miles across in each direction, is scooped out like a shallow spoon, so that, if you start from the centre, you have to climb in any direction you decide to go. On the north and west sides you mount by fairly gentle slopes to the cliffs that overhang the shore. These slopes were the scene of fierce fighting during the days of late April and early May, when the battered division, which had mowed its way through almost unheard-of slaughter and obstacles to the shore, at last began to get a foothold on the higher land.

On the south you scale the ridge dotted with olive and fig, and, just on the other side, standing about 100 ft. or so above the shore, you see the long village of Sedd-el-Bahr, once a place of beauty and happiness, now a mass of broken walls and loose stones. Underneath there is the long thin sheet of purest blue of the Dardanelles, and, beyond, the outstretched Continent of Asia Minor, whose ever-changing colours and long deep valleys of shadow and romance beckon with an appeal that is not for these times.

The basin along which the broken road passes is dusty and barren, and trenched beyond any recognition of its former self. A few months back, when our men first arrived, it was a smiling land of blossom and vine. There is scarcely a trace of building anywhere, for the husbandman prefers to have his house in the society of the village. Should his toil keep him in the fields, there is always the shade of the orchard during the day's heat, and at night what could be better than the warm earth for bed, with the starlight dome above? It is all gone. The hand of war has laid its ravaging touch everywhere. The countryman has been driven from the ground that he nursed in simple contentment, and that he loved better than anything else on earth. He has been forced into a fight that he never chose, and that he probably only dimly understands. His orchards have fallen into waste, and where before there was plenty, there is now nothing but parapet and trench in endless succession. The gods of ancient Greece in all their wrath never ravaged the land so ruthlessly as this modern god of war with his western myrmidons.

Our main dressing station, to which the cases are carried, stands in the open, just where the farther side of the basin begins to rise in a gentle slope to the cliffs. It is three-quarters of a mile or thereby from the shore.

This station has gradually grown, till now it provides accommodation for quite a large number of patients. It is all dug beneath the ground level, a series of spreading trenches, with offshoots for the various departments of a hospital.

From this station the cases are transferred by motor car to the casualty clearing station on W Beach, where they are transferred by trawler or barge to the hospital ship that rides at anchor a mile from the shore. The beach is a sinister place, for it is raked night and day by the guns on Achi Baba and the Asiatic shore opposite, and the patients do not like to linger long within the casualty clearing station, for there is no shelter there save canvas tents. There are many tragic stories of men who were gathered there waiting their removal to the Red Cross ship, and for whom vistas of the comfort of a base hospital or even home had already opened before their eyes.

(*To be continued.*)

CLINICAL RECORD.

TWO CASES OF ARTERIOVENOUS ANEURYSM OF THE POPLITEAL VESSELS.

By FREDERICK C. PYBUS, Major, R.A.M.C.(T.), Newcastle-on-Tyne.

Both these patients were shot through the calf, the bullet making a clean entry and exit. In both cases the popliteal artery and vein were damaged, leading to an arteriovenous aneurysm. Swelling and pulsation of the calf was present in each.

Exploration revealed damage to both main vessels of such a character that repair was impossible, and in such a position that simultaneous ligature of the popliteal, anterior, and posterior tibial arteries and their corresponding veins was necessary to control bleeding. In both cases recovery ensued without any loss of vitality of the distant portions of the limb and with full functional use.

Case I.—W. R., aged 40, was wounded on 20th November 1917, near Cambrai, by a machine-gun bullet, which traversed the calf of the left leg. When admitted to the First Northern General Hospital the wounds of the leg were almost healed. About three weeks after admission he complained of pain down the leg, and examination led to the detection of a swelling in the calf. The swelling occupied the upper part of the calf and extended to the popliteal space; it was pulsating, and a systolic bruit could be heard over it.

An operation was performed on 20th December 1917, one month after the receipt of the wound. The circulation was controlled by a tourniquet on the thigh. An incision was made behind and parallel to the inner border of the tibia. A large aneurysmal sac was found occupying the inner head of the gastrocnemius and the popliteal space beneath it. The sac was emptied, and a large rent found in the popliteal vein which led directly into the sac. The opening in the vein communicated directly with a similar tear in the popliteal artery. The sac was separated from the vessels, and the popliteal artery and vein ligatured above the damaged area. The tear at its distal end was found to be close to the posterior tibial artery which, with its corresponding vein, were ligatured. On attempting to remove this damaged segment of the vessels the anterior tibial artery and vein were found to lead from the damaged area and both had to be ligatured as well. On releasing the tourniquet the wound remained dry after ligature of some muscular branches.

The wound healed normally, and a month later the patient was discharged to an auxiliary hospital with the foot and leg normal.

Case II.—A. E. C., aged 19, was wounded on 27th March 1918.

The bullet entered the leg just behind the head of the fibula, traversed the calf, and emerged on its inner aspect. He was admitted to the First Northern General Hospital on 5th June from a Command Depôt on account of aching in the leg and pain on walking.

On examination the left calf was found enlarged and pulsating. A systolic bruit could be heard over the swelling.

Operation—8th June 1918.—The circulation was controlled by a tourniquet. An incision was made behind and parallel to the inner border to the tibia. The gastrocnemius was drawn aside and the soleus detached from the tibia. A small sac about the size of a walnut was found partly above and partly in the substance of the muscle. The sac opened into the popliteal vein by an aperture which would admit the tip of the finger. The sac was separated from the vessel. On isolating the vein for a short distance the lesion was found to be seated close to its formation.

An examination of the interior of the vein led to the discovery of a similar perforation on the opposite wall leading into the popliteal artery. A portion of the artery was isolated above and below its junction with the vein. The edges of the openings were in direct contact, there being no intervascular sac.

The popliteal artery and vein were ligatured above the communication, as were also the posterior tibial vessels below. The anterior tibial artery and vein were then isolated and ligatured. On relaxing the tourniquet free bleeding ensued. Several bleeding points were found amongst the muscles and were ligatured. On again relaxing the tourniquet bleeding occurred from the depths of the wound. The circulation was again stopped, and a second small sac found at the lower part of the popliteus muscle communicating with the anterior tibial vessels. The sac was cleared out and a ligature of the tibials distal to the sac controlled all bleeding. The foot was cold at the conclusion of the operation, but was quite warm and comfortable next day.

Except for some shortening of the calf muscles, which has been corrected, convalescence was normal and the function is fully retained.

The popliteal vessels were readily reached after detaching the soleus from the oblique line of the tibia.

Had the wound in the vessels not been so near the bifurcation, in the second case suture might have been practicable.

In both cases the main vessels were in direct communication, the aneurysm paravascular, and projecting from the vein. It would seem that little danger attaches to a simultaneous ligature of these main vessels in patients with a healthy vascular system.

I am indebted to Brevet-Colonel T. Gowans, R.A.M.C.(T.), for permission to publish these cases.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

JOHN EASON, M.D., AND A. GOODALL, M.D.

Prognosis in Cardiac Disease.

P. D. White (*Amer. Journ. Med. Sci.*, January 1919) deals with the subject of prognosis in heart disease in relation to auricular fibrillation and alternation of the pulse. Three series of cardiac cases were collected. The first was composed of cases with auricular fibrillation, the second of cases with alternation of the pulse, and the third of cases with normal cardiac rhythm without alternation. Heart-block, auricular flutter, and paroxysmal tachycardia were not included *per se*.

For study as to prognosis, the groups of auricular fibrillation and pulsus alternans were subdivided, each into three classes. The patients with auricular fibrillation were subdivided into (*a*) those who showed aberrant ventricular complexes, the so-called "bundle branch block"; (*b*) those who showed ectopic ventricular contractions; and (*c*) those who had uncomplicated auricular fibrillation. The patients with alternation of the pulse were also subdivided into (*a*) those who had constant pulsus alternans; (*b*) those having marked alternation after premature contractions only; and (*c*) those showing only slight alternation after premature contractions. Patients with pulsus alternans had radial pulse-tracings taken. The 1000 patients with normal rhythm were not subdivided. Three years after beginning to collect these series of cases, and two years after finding the most recent case, White determined their condition. The results of this investigation are shown in the accompanying table. About one-third of the patients were lost sight of.

These figures show that pulsus alternans taken *in toto* gives a much poorer prognosis than auricular fibrillation, but that auricular fibrillation as such adds little, if anything, to the gravity of prognosis in a case of heart disease. The higher grades of pulsus alternans are almost twice as grave as the slight degrees, *i.e.* slight alternation following premature contractions, while between the two severe grades—constant alternation and marked alternation after premature contractions—there is little to choose, the mortality in such grades together being 94 per cent. within a period of three years. Even the cases with slight alternation after premature beats have a mortality of over 50 per cent. within the three years, and definitely

Condition.	Type.	Total.	Cases followed until present time.	Better.	Unchanged.	Worse.	Dead.	Per cent. dead of cases traced.
Alternation of the pulse	Constant . .	26	22	2	0	0	20	91·0
	Marked after premature beats .	16	12	0	0	0	12	100·0
	Slight after premature beats .	58	42	4	13	1	24	57·0
	Total of alternation . . .	100	76	6	13	1	56	74·0
Auricular fibrillation	Cases electro-cardiographed .	69	...	...	...	...	...	...
	(1) Aberrant ventricular complexes . .	5	4	0	0	0	4	100·0
	(2) With ectopic beats . .	11	7	1	1	0	5	71·0
	(3) Uncomplicated	53	35	2	18	4	11	31·0
	Cases not electro-cardiographed .	31	16	2	3	1	10	62·5
	Total of auricular fibrillation .	100	62	5	22	5	30	48·0
Normal rhythm	No alternation, fibrillation, paroxysmal tachycardia, flutter or heart-block .	100	49	8	15	3	23	47·0

higher than either the auricular fibrillation or the normal rhythm averages.

In the case of auricular fibrillation White endeavoured to pick out the more serious cases from the electro-cardiograms. He noted that patients who show auricular fibrillation complicated by aberrant ventricular complexes or by ectopic ventricular contractions have a much graver prognosis than the uncomplicated auricular fibrillation—much more than twice as grave, especially in the case of the aberrant ventricular complexes, where in his small group of five cases the mortality was 100 per cent. within three years. This finding might be expected, because the electro-cardiograms indicate serious myocardial damage or irritability in the ventricles. Such diseased or hyper-irritable ventricular muscle does not stand up under the strain of auricular fibrillation as relatively healthy ventricular muscle does. These two conditions, according to White, probably have the same prognostic significance as pulsus alternans in the case of a non-fibrillating heart. One of the patients tabulated above as having aberrant ventricular complexes and auricular fibrillation combined had been seen by him before the heart became arrhythmic. A radial pulse-tracing at that time showed pulsus alternans. The two main conclusions drawn by White are that the higher grades of alternation of the pulse carry with them an especially high mortality—nearly 100 per cent. in three years—and that cases with auricular fibrillation complicated by aberrant ventricular complexes seem to be very fatal (100 per cent. in his series). Those cases with ectopic ventricular contractions complicating the fibrillation have a mortality almost as high as the total of alternation, while uncomplicated auricular fibrillation has a surprisingly low mortality percentage.

Lumbar Puncture.

There is considerable conflict of opinion among authors upon many of the details of this operation. The route for puncture and the direction of the needle are among the points over which there is controversy. J. C. Regan (*Amer. Journ. Med. Sci.*, January 1919) states the conclusions at which he has arrived from his clinical experience, confirmed by experimental work on cadavers of adults and children in the dissecting-room and at autopsy.

The median route is greatly superior to the lateral route for the puncture of children by reason of its simplicity. The lumbar spinous processes of children are rudimentary, rather short, horizontally directed, and partly cartilaginous processes, which have a fairly even superior and inferior border, somewhat rounded at the summit of the process, but without any tendency to overlap. When the spine is well flexed there exists between them an interval (the interspinous space) which is usually quite wide and which permits the introduction of the needle in the median line without any liability of touching the spines. The distance to be traversed is very small, especially in young children; in fact, after the needle has pierced the skin and the supraspinous ligaments it quickly glides through the interspinous ligaments and is immediately felt to penetrate the dural sac. In the case of young children and infants a slight resistance is offered by the rather tough supraspinous ligaments, but this is easily overcome, and is the only difficulty encountered in the median line.

Many authors base their objection to median puncture in the adult on the thickness and resistance which they claim the interspinous ligaments offer, especially in muscular individuals. To determine the basis for this argument Regan studied these ligaments on several adult cadavers. This study gave the following findings:—The supraspinous ligaments are rather tough, fibrous, cord-like ligaments extending between the summits of the adjacent spinous processes. The interspinous ligaments are rather thick, quadrilateral-shaped, pearl-coloured ligaments attached along the whole length of the inferior border of each spinous process from its root to the summit and extending downward to the same parts of the superior border of the spinous process below. The ligament is in reality composed of two folds and layers of lateral fibres, with a clearly defined line of cleavage between. For this reason, when a needle is introduced in the median line after penetrating the supraspinous ligament it enters the interspinous ligament and passes along between its two layers, and is thus guided forward with precision to the interarcual space. Marked resistance is not encountered even in muscular individuals except in rare instances. Therefore, instead of the interspinous ligaments being a contraindication to the use of the median route they are, in most cases, a great aid in holding the needle safely to the median line and directing it thus to the interarcual space.

Among the advantages of the median line for puncture of adults are the following:—It is a clearly defined procedure and is quickly and easily learned by the inexperienced; no calculation is necessary as to the direction inward and upward to be imparted to the needle in order to reach the interarcual space as in lateral puncture. The liability of striking bone and bending or breaking the needle or wounding the periosteum is less. The possibility of passing beyond the limits of the interarcual space is reduced to a minimum, while it is ever present with the lateral route. The injury of nerve filaments or spinal blood-vessels is less likely to occur. No difficulty is experienced in penetrating the dural sac exactly in the median line, as in the lateral route—a point of importance for spinal anæsthesia and serum injection. The chances of the needle being plugged by the tissues traversed and of blood-vessels being encountered is less with the median than with the lateral route. Dry taps are less common in median puncture. In other words, chance plays a much greater part in lateral puncture.

In adults the anatomical structure of the spine differs from that of a child, and this fact influences markedly the manner of insertion of the needle. The lumbar spinous processes are not as horizontal as at an early age, but have a distinct downward inclination, which is considerably increased by a projection of the tubercles on the inferior border. Flexion of the spine widens the interspinous intervals but does not appreciably alter the direction of the spines themselves. With the spines well flexed, however, the interval between the adjacent processes is widened sufficiently to allow the introduction of a needle in the majority of instances in a perpendicular direction (90°) to reach the subarachnoid space without encountering bone. In some cases (a decidedly minor percentage) it is impossible to introduce the needle in a perpendicular direction without having it impinge on the bony obstruction of the superior border of the spinous processes of the vertebræ below. In such instances the needle's course should then be changed by withdrawing it slightly and directing it obliquely upward at an angle of 60° to 45°, and this will, except in rare cases, be followed by the disappearance of the bony obstruction and the entrance of the needle into the subarachnoid space.

It is possible to obtain fluid by the median route in adults, even in cases of marked opisthotonos, if a sufficiently marked inclination upward is given to the needle.

Flexion of the spine is attained only with difficulty in elderly individuals, hence the needle should be introduced slightly upward from 70° to 45°.

The anatomical configuration of the spine helps to explain why some cases of failure to obtain fluid by the median route, with a perpendicular insertion (90°), may be due to a deviation of the instrument from the median line, and its impinging on the superior border of the lamina, while a more upward inclination would have been entirely successful even though a similar deviation of the needle occurred. J. E.

SURGERY.

UNDER THE CHARGE OF

D. P. D. WILKIE, F.R.C.S., AND JAMES M. GRAHAM, F.R.C.S.

Displacement of the Mandibular Meniscus.

This somewhat rare but very distressing condition is described by Hogarth Pringle (*Brit. Journ. of Surg.*, vol. vi., No. 23, p. 386), who, besides having personally experienced the condition, has met with four cases. A study of the anatomy of the meniscus shows that the text-book descriptions are inaccurate and must be modified. The disc presents a central thickening in the coronal plane over the summit of the condyle of the jaw. In front of the ridge is a distinct depression in the disc which fits the tuberculum articulare of the temporal bone, while below and anterior to this is a second thickening, which forms the anterior border of the disc and has the external pterygoid muscle attached to its lowest part. The posterior portion of the disc tails off from the thick coronal ridge, and, lying in close contact with the posterior surface of the condyle, becomes lost in the fibrous tissue of the capsule of the joint.

Pringle believes that displacement of the meniscus is usually due to over-action or irregular action of the external pterygoid muscle, the disc becoming dragged askew. It goes forwards and inwards, so that its thick central ridge becomes placed obliquely instead of lying in the coronal plane. After displacement the disc acts as a foreign body, being either caught between the condyle and the tuberculum articulare or moving with the condyle and preventing the latter from clearing the articular eminence.

Displacement usually occurs during yawning or sneezing, or in forcible opening of the mouth by a gag as in dental extractions. The patient finds that he cannot close the mouth completely, and efforts to do so cause intense pain in the region of the joint, and the sensation that some foreign body is interfering with the movement. The disc may remain in its abnormal situation for days at a time until reduced, or it may slip in readily and be subject to repeated displacements. Reduction can usually be effected by keeping up hard pressure behind the condyle with the mouth open, and then slowly closing the jaw.

In recurring cases the tissues, ligaments, muscles, etc., around the joint become so relaxed that it is impossible to maintain the disc in position, and operation is called for. In two such cases Annandale sutured the loose disc to the periosteum, and Pringle records one case in which he excised the disc with a satisfactory result.

Ruptured Internal Lateral Ligament of the Knee.

The importance of recognising and the difficulties in treating this condition are pointed out by M'Murray (*Brit. Journ. of Surg.*, vol. vi., No. 23, p. 377). The ligament, which is put in a state of tension when the knee-joint is extended, usually tears between its attachment to the femur and that to the internal semilunar cartilage. Force applied to the outer side of the knee with the joint extended will result usually in a rupture of the ligament, whereas force applied to the outer side of the flexed knee usually detaches or splits the internal semilunar cartilage. It is particularly important to distinguish a tear of the ligament above the cartilage from injury to the latter itself, as removal of the cartilage will only aggravate the disability resulting from the torn ligament. The fact that in many cases, owing to the laxity of the ligament, a fold of capsule may become invaginated between the ends of the bones must be borne in mind, as the symptoms in such cases will mimic those of torn cartilage very closely.

The operation of shortening the ligament by pleating has been found by M'Murray to give only very short-lived improvement. As a rule, a few months after such an operation the laxity of the joint has returned.

The following operation, devised by the writer and carried out in ten cases, has given satisfactory results, some of the patients so treated having stable and useful joints when examined over two years after operation :—

The operation essentially consists in the utilisation of the tendon of the sartorius to reinforce the internal lateral ligament. With the knee partially flexed the ligament is exposed, its femoral attachment split vertically, and a small vertical wedge of bone removed from the femur. The tendon of the sartorius is now freed by dividing the fascia along it. The tendon is pulled forwards and laid in the groove in the femur in such a manner that the portion of tendon between the femur and tibia is quite tight. It is then sewn firmly into the groove by stitches passing through the periosteum and the ligamentous insertion. The outer surface of the internal lateral ligament is then scarified, and the ligament is tightened up by suturing adjacent portions of the scarified surface together. The success of the operation depends on keeping the knee in the flexed position during the whole course of the procedure and the subsequent retention of this position during a minimum period of three months.

Operation for the Cure of Incontinence of Urine.

Young (*Surg., Gynec., and Obstet.*, vol. xxviii., No. I., p. 84) records two very successful results following the operation which he devised for the cure of incontinence of urine due either to injury or weakness of both vesical sphincters. As will readily be understood, a very careful preliminary examination of the case will be necessary in order to determine exactly that some defect in the sphincters is the cause of the incontinence before any such operation is undertaken.

In both the cases recorded by Young the sphincters had been damaged by previous operations: in one by a perineal urethrotomy, in the other by a perineal prostatectomy.

The essential features of the operation consist in, firstly, restoring the vesical sphincter by the suprapubic route, and, secondly, by repairing the external sphincter by the perineal route.

With the patient in the Trendelenburg position a free exposure of the interior of the bladder is obtained through a generous suprapubic incision. The dilated internal prostatic orifice is exposed, and with curved scissors the mucous membrane from its lateral and posterior aspects is removed, leaving wide muscular surfaces exposed for approximation. Using a special "boomerang" needle-holder and chromic catgut, the operator now sutures the muscular coats from side to side in such a manner as to narrow the internal meatus and to form an artificial prostatic bar, finally suturing the mucosa over all. Before the suturing is completed a small catheter is introduced to obviate undue narrowing of the orifice, and the catheter is left *in situ* for ten days after operation. Suprapubic drainage is, in addition, kept up for one month. For the second part of the operation the patient is placed in the exaggerated lithotomy position, the urethra exposed through a long perineal incision, and the dissection carried down to the triangular ligament and the external sphincter. It is usually desirable to open the urethra and to excise a small portion posteriorly, as it is usually dilated. Any cicatricial tissue should be excised so as to obtain good muscle tissue for approximation. The urethra is first closed with chromic catgut, then the muscle is stitched over it, and a third line of catgut sutures is inserted for reinforcement and further approximation. The skin may be sutured or the wound left gaping for drainage.

Following the operation, it may be necessary to pass an instrument occasionally to obviate stricture formation, though in one of Young's cases this was unnecessary.

The results obtained by Young in his two cases were very gratifying, one being in perfect health and having practically normal micturition ten years after operation.

The writer is confident that this operation offers a very reasonable hope of cure in a carefully selected number of these very distressing cases.

Hypertrophic Pyloric Stenosis in Infants.

Whilst a certain number of cases presenting the typical clinical picture of this condition may be cured by medical treatment, many cases will succumb unless surgical measures are adopted. Green and Sidbury (*Surg., Gynec., and Obstet.*, February 1919, p. 159) report five successful cases in which the Rammstedt operation was performed. This operation, which was described in 1913, consists in dividing the pyloric muscle fibres down to the mucous membrane, and partially separating the muscle ring from the mucosa, allowing the latter to bulge up into the wound.

The advantages of the operation are the speed with which it can be accomplished and the absence of shock. The one danger in the operation is wounding of the mucosa, especially that of the first part of the duodenum. This is best avoided by taking care that the stomach is emptied of air—so often sucked into the stomach by young infants during anæsthesia—by passing a stomach tube before cutting the pyloric muscle. When the muscle is cut, the mucosa should be separated from the stomach side towards the duodenum. If any visible puncture of the mucosa is made, it should be immediately closed with a purse-string suture of fine silk. To ensure that no puncture has been missed, it is well to inflate the stomach gently through the stomach tube so that any aperture may be revealed.

The whole operation can be done in from ten to fifteen minutes with less exposure, handling, and trauma than either gastro-enterostomy or any stretching operation. Careful post-operative medical treatment is essential. Feeding with breast milk may be begun two hours after operation, and continued every three hours thereafter.

D. P. D. W.

OBSTETRICS AND GYNECOLOGY.

UNDER THE CHARGE OF

A. H. F. BARBOUR, M.D., AND J. W. BALLANTYNE, M.D.

PUERPERAL INFECTION.

DR. POTOCKI (*Ann. de gynéc. et d'obstét.*, 1918, xiii. 129, 217) has published the results of an interesting series of observations on the *bacteriology of the blood in puerperal infection.* In all, the blood from 196 puerperal patients suffering from fever was examined, the object being to establish prognosis on a more reliable basis than can at present be done. In order to avoid contamination of the blood with the bacteria of the skin it was taken direct from the vein, and in all details the most careful technical skill was employed to exclude errors. In some cases more than one observation was made; indeed the blood cultures numbered more than 300. In 105 out of the 196 patients the blood cultures gave negative results; in the remaining ninety-one cases bacteria were found, although in some of these the results were positive at one time and negative on another occasion. In a group of ninety-three blood cultures a single microbe developed: in forty-four it was the streptococcus, in eleven the staphylococcus, in eighteen a diplococcus, in seven the gonococcus, in four the micrococcus tetragenus, in three the colon bacillus, and in two it was a bacillus resembling Eberth's. In single observations the pneumococcus, the enterococcus, the meningococcus, and diplobacilli were discovered. In a second group of nine cultures, two microbes were found associated: streptococci and staphylococci twice, streptococci and diplococci twice, diplococci and a diplobacillus twice, staphylococci and gonococci once, staphylococci and a diplococcus once, and the colon bacillus and a diplococcus once. In a third group of seventeen blood cultures a very small and extremely mobile microbe was found, which possessed a strange power of penetrating the red cells of the blood. The exact significance of these tiny microbes was not cleared up.

Several conclusions seem to be justified from the study of Dr. Potocki's observations. The most important is that whilst blood cultures do not give absolutely certain prognostic indications they strongly reinforce other guides, such as the pulse, the temperature, the local signs, the bacteriology of the lochia, the histology of the blood, and the general condition of the patient. It is clearly shown that the micro-organisms in the blood are most commonly of one kind; this was so in 93 per cent. of the cases with positive results, and the fact goes to prove that puerperal fever is generally due to infection with one variety of microbe. As to the cases of puerperal fever with negative cultures from the blood, it may perhaps be concluded that they are due to the absorption of bacterial toxines. The streptococcus stood out as, without doubt, the most common microbe (38 per cent.), whilst staphylococci and diplococci accounted for 10 and 14 per cent. respectively. It is a curious fact that in a few cases one microbe took the place of another; thus in one patient the first culture from the blood gave staphylococci and the second streptococci. In at least half of the cases in which this substitution took place death occurred very shortly afterwards. A leading result derived from Dr. Potocki's observations was that death was four times more common amongst the patients whose blood cultures gave positive results as to the presence of microbes; the proportion was as 33 per cent. is to 8·5 per cent. Further, the streptococcus was a dangerous microbe; where it was the only pathogenic micro-organism the mortality was 55 per cent. When the staphylococcus alone was present the mortality was 71 per cent., but the number of observations was relatively small. It was noteworthy that the seventeen patients, whose blood exhibited the tiny, mobile, faintly staining microbe, all recovered. A careful scrutiny of the relation of the appearance of microbes in the blood to the occurrence of rigors seemed to show that the rigor could not be regarded as due to the passage of microbes into the circulation. Yet, as a general rule, the more numerous the rigors were the more likely were microbes to be found in the blood. The more serious, also, were the results: thus, when the septicæmia was accompanied by rigors the mortality reached 62 per cent. when the blood contained pathogenic microbes, and it was only 10 per cent. when the blood remained sterile. Speaking generally, the presence of microbes in the blood (apart from the presence or absence of rigors) brought with it a mortality of 33 per cent., whilst the sterility of the blood was accompanied by a mortality of only 8·5 per cent. of the infected cases. It is obvious that these results all point to the use in treatment of serums and of vaccines adjusted to the types of microbes found in the blood.

Dr. P. Balard of Bordeaux (*Arch. mens. d'obstét. et de gynéc.*, 1918, ann. vii. 135-156) admits that *puerperal infection with the bacillus of Löffler* (*b. diphtheriæ*) is rare; but he maintains that routine bacteriological examination of the vaginal secretions would prove it to be less rare than is thought. In support of this view he describes a small epidemic of seven cases of vulvo-vaginal diphtheria which occurred in 1915 under his care; all the patients were primiparas and they all recovered. In all the cases the labour was spontaneous, but in three instances there were stitches in the perineum. It was noted, however, that in only one of the three cases with stitches did the diphtheritic membrane affect the sutured part. In all the cases the cervix was affected, and in most of them the vaginal walls to a great or small extent were involved. The infection was traced to a mild case of angina without glandular enlargement which had occurred among the puerperal patients in the ward. The false membranes were rather late in appearing: in only one case were they recognised on the seventh day of the puerperium; in all the others they were seen between the tenth and fourteenth days. Ordinary antiseptic applications had no effect upon them, but plugging the vagina with gauze soaked in anti-diphtheritic serum caused their disappearance after two applications. Dr. Balard allowed the infants to be suckled by their mothers, but he did not permit them to come into contact at any other times. None of them was affected with diphtheria, and it is claimed that the milk of a mother suffering from diphtheria is inoffensive, and may even be immunising for the child if the mother is having specific treatment.

Drs. Harold A. Miller and Sidney A. Chalfant (*Amer. Journ. Obstet.*, 1918, lxxviii. 395) have reported eleven cases in which *arsenobenzol* was given as an intravenous injection in puerperal blood-stream infection. After noting that in puerperal bacteræmia bichloride of mercury, collargol, formalin, colloidal gold, isotonic sugar solution, electrargol, eusol, magnesium sulphate, and salvarsan have all been tried intravenously, but without permanent acceptance, these authors have employed arsenobenzol with the hope of reducing the mortality in such serious cases. At first they always waited for the result of the blood culture before giving the arsenical preparation, but this was the cause of delay, and so in their later cases they injected 6 milligrammes of arsenobenzol at once into the vein on clinical evidence of blood infection. The leucocytes showed a decided increase during the twenty-four hours following the injection, and a blood culture taken at that time was generally free from organisms. The patient's general condition usually showed a decided improvement also. Five out of the eleven patients had one injection, three had two, one had three, and two had four injections. There were four deaths: one occurred forty-four days after delivery, with multiple abscesses in the kidneys, one on the thirteenth day from double pneumonia, and the other two on the fourteenth and fifth days, apparently from the severity of the infection, although the blood cultures were negative. The other two fatal cases gave streptococcal cultures from the blood, as did five which recovered; the remaining two (which also recovered) showed Gram-negative bacilli in the blood. The general treatment consisted in giving water by the bowel and stimulation as seemed indicated. In only two cases was there local treatment (uterine irrigation with Dakin's solution every two hours); one case died and the other recovered. Toxic effects from the arsenobenzol were not severe: in two cases there was a rigor and in all a mild and transient albuminuria. The authors do not regard this treatment as applicable to cases of thrombo-phlebitis or to those of localised abscess or pelvic cellulitis of long standing. Of course repeated infection of the circulation will require a fresh injection, but such a case does not benefit so much. The special field of usefulness of the arsenobenzol is found in the cases in which there is little or no evidence of local disease, the cases in which the mortality is very high.

Dr. Samuel B. Schenk (*Amer. Journ. Obstet.*, 1918, lxxviii. 596) has recorded a somewhat unusual case of *puerperal infection* in which the causal microbe seems to have been solely the *staphylococcus albus*, a micro-organism which has been regarded as almost non-pathogenic. The patient was delivered by means of forceps and the lacerations which were produced were not repaired. On the day following she had a severe rigor, along with pain in the abdomen, fever, and other symptoms. On the eighth day of the puerperium she was admitted to the Long Island College Hospital. She had then a tense and tender abdomen, a deep, suppurating perineal laceration, foul vaginal discharge, a pulse of 120 and a temperature of 103°. A blood culture was sterile. On the eleventh day of the puerperium a large extraperitoneal abscess appeared in the right inguinal region and was incised. Bacteriological examination showed a staphylococcus albus hæmolyticus in pure culture. A similar abscess was afterwards opened in the left inguinal region, and pus from it gave the same bacteriological result. A blood transfusion of 500 c.c. was given on the nineteenth day of the puerperium, when she was almost hopelessly ill (pulse 160, temperature 104°). For ten days she remained in a semi-comatose condition; thereafter she became wildly delirious and was practically maniacal. She received another blood transfusion of 500 c.c., and had the abscess cavity washed out with 1-4000 formalin solution. The case is of interest, partly because of the high degree of psychosis developed and partly because of the unusual nature of what must be regarded apparently as the causal microbe.

J. W. B.

NEW BOOKS.

Pensions and the Principles of their Evaluation. By LL. J. LLEWELLYN, M.B., and A. BASSET JONES, M.B. Pp. xviii. + 702. London: William Heinemann. 1919. Price 30s. net.

WAR pensions and the principles on which they are awarded are subjects of such great importance to the community which has to bear their cost as well as to the disabled who receive them that a book dealing comprehensively with the question is assured beforehand of a wide circle of readers. Drs. Llewellyn and Basset Jones, already known as joint authors of a treatise on malingering, have compiled the large volume under review primarily for the medical profession, on whom, ultimately, falls the responsibility of securing even-handed justice between the pensioner and the State. Though their book cannot be described as an exhaustive discussion of the pensioning of disabilities, it is certainly the largest and most ambitious that has yet appeared in England. It deals very fully with the general principles of pensions, and then applies these to certain classes of disabilities—injuries of bones, joints, nerves, and muscles, amputations, eye conditions, and ear conditions. It leaves untouched, or only incidentally alluded to, the great bulk of medical disabilities—effort syndrome, organic heart disease, nephritis, neurasthenia, psychoses, for example—the consideration of which, along with other disabilities due to disease or injury of the internal organs, is postponed to a later volume.

To criticise the authors of a book for the plan that they have deliberately adopted is, perhaps, outside the province of the reviewer, but it may be pointed out that, notwithstanding the magnitude of the subject, much more information might reasonably have been compressed into a volume of this size had terseness been aimed at and prolixity avoided. The necessary extent of an inquiry into disabilities from the pensions' point of view invites question as to the practical utility of dissertations on pensions in classic and Anglo-Saxon times, or on their relation to the feudal system. These serve more to display the authors' erudition, which no one doubts, or, to speak the truth, is interested in, than to aid the reader to solve the knotty problems which so commonly arise at pensions boards. And there are other redundancies in the book to which we shall again advert.

One of the first points made, in regard to the principles of war pensions, is the fundamental distinction which exists between these and awards under the Workmen's Compensation Act. In the latter, compensation is based on an economic standard; in the former, the standard is a physiological one. It is essential that this should be clearly grasped, for although we may agree with the authors that, as a matter of abstract justice, a physiologico-professional basis—*i.e.* one which took into account the relation between the disability and the earning capacity—would be preferable, it is evident, the more the subject is considered, that the difficulty of correct appraisement in this way would be enormous. For one thing, the occupations of war pensioners far surpass in variety those of persons coming under the Workmen's Compensation Acts, and, in addition, in war pensions the question of social disabilities—deprival of or injury to the power of enjoying the amenities of life—has to be considered. Probably, therefore, the physiological standard which assesses an injury as such, but not its results on the individual is, on the whole, the least likely by reason of its uniformity to lead to discontent. Moreover, pension boards are only human, and, in spite of all injunctions to the contrary, they will always, we suspect, give due weight to the pensioner's occupation in assessing, where a rigid adhesion to the letter of the law would inflict undue hardship.

Chapter X. is perhaps one of the most original and valuable in the book. It discusses the question of functional adaptation—Nature's way of curing disabilities. The importance of a due appreciation of the possibilities of functional adaptation can scarcely be overrated; it has a vital bearing on the decision as to when a temporary pension should be made permanent—when, in other words, the disability has functionally reached a permanent stationary condition. It also bears on the question of awarding gratuities, for it will not infrequently happen that functional adaptation—the attainment of the best possible use of a maimed organ or limb—may be delayed by the receipt of a pension and stimulated by the award of a gratuity. The question of State training to aid in recovery of function is also raised.

Much of the chapters on the principles of pensioning is concerned with what may be called the "malingering" side of the case. Here the dangers of premature assessment of permanent pensions, the need for a time-limit being set to the period during which disabilities alleged to be caused or aggravated by military service may become the subjects of claim, and the importance of the Pensions' Ministry having the courage to diminish pensions where treatment is refused, are among the subjects considered. With the authors' views on these questions there will be general agreement. Throughout the whole of these early chapters the authors' grandiloquence is especially noticeable, and it leads to a curious alternation between exuberant praise of and sympathy for the heroes of the war, along with exhortations to the State to do its duty by them, and, on the other hand, a great deal of copy-book rhetoric about deceit, the greed of gain, and the inherent wickedness of man, as exemplified by war pensioners past and present. The discontinuity in style between the purple passages on one page, and the prosaic phraseology of a Royal warrant or the bald description of a surgical disability on the next, produces an inharmonious jangle, which is, to say the least, unpleasing. It is surely one of the first canons of good writing that a certain uniformity or level of style should be maintained throughout. Apart from being verbose, the writing in many parts of the book is ornate without being elegant; pretentious rather than scholarly. It is overcharged with quotations which neither illuminate nor emphasise. What does this sentence (the reference is to hysterical mutism, blindness, or deafness) convey that might not have been better said simply and without metaphor?—"How bridge the 'unplumb'd salt estranging sea' which ever, even in health, sunders all human entities." Mr. Matthew Arnold would assuredly have been the last to condone such a misuse of quotation. Sentences which scan, such as "Corruption lurks in ever specious guise," or "As the fog of war recedes, The insensate havoc wrought," or "Of bodies maimed and marred, of minds distraught, Of hopes foregone, of lives forsworn," may be verse of a kind, but are certainly bad prose. Pseudo-archaisms, such as "of a verity, a shrewd question"; "we trow not"; locutions such as "men of this ilk"; words such as "crescive," "gradative"; phrases such as "The world, mute with horror, hungering for expression, *bides* as yet the olympian bard who in some immortal epic . . . ," "To unmask or render *effete* fraudulent or unjustifiable demands," and similar flowers of speech embellish the text. In fact, the book is "gravid"—a favourite expression—with such blossoms.

Everyone knows, none better than the reviewer, that to write English well is difficult, that the pitfalls are many. Is it too much to ask that in their next book on pensions Drs. Llewellyn and Basset Jones will adopt a chastened and more austere style?

War Neuroses. By JOHN T. MACCURDY, M.D. With a Preface by W. H. R. RIVERS, M.D. Pp. lx. + 132. Cambridge University Press. 1918. Price 7s. 6d.

DR. MACCURDY'S book is probably the best that has appeared on the subject. From a psychologist of his standing and experience something of the kind was to be expected.

Stress is laid on the importance of the mental make-up of these patients, and the author shows that the majority of those who have failed to adapt themselves to military life and warfare had had some previous difficulty in civil life, though this may not have amounted to a failure to carry on with their work. Dr. MacCurdy shows how much more important the strain of war is in the etiology of a neurosis than any physical injury or "shell shock." The greater part of the book is therefore taken up with the discussion of the anxiety state.

It is pointed out that this form of neurosis is commoner among officers who have a better education and a greater sense of responsibility than the men, while the latter furnish the larger number of cases of "conversion hysteria."

The great difficulty of distinguishing between hysteria and malingering is indicated—a difficulty which is accentuated by the fact that a malingerer is a psychopath.

If there is a fault to be found with the book, it is that its tone seems too optimistic as to the utility of returning men, who have had a serious breakdown, to the fighting line. More recent investigations appear to show that the military value of such men has been very small. The main object of treatment has been served if they have been made capable citizens, able to do their share of the world's work.

The Statics of the Pelvic Female Viscera, in which the Evidence of Pathology, Phylogeny, and Clinical Investigation, etc., is Surveyed. By R. H. Paramore, M.D.(Lond.), and F.R.C.S.(Eng.). Vol. I. With 26 Illustrations. London: H. K. Lewis. Price 18s. net.

In this comprehensive volume the author surveys a complex subject from the standpoint given above. The anatomical structure of the pelvis is well given from the dissectional standpoint, but less satisfactorily from the frozen sectional intact method of investigation. The author considers the pelvic floor as what remains after the visceral part of it has been cut away; that is, when it is reduced to its muscular elements. Frozen sectional anatomy, however, gives the idea of a pelvic floor unbroken in its extent, a movable portion in front, the anterior to the rectal wall, and a fixed portion surrounding this. Both views must be combined, and undue prominence given to neither. It is a pity that the imaginary section from another author should have been reproduced (Fig. 1, facing p. 8), as it gives a completely erroneous representation, especially as to the relations of the levatores ani to the obturatores interni. In the various chapters the author gives, step by step, the details of his proof.

Practically, the question of the nature of prolapsus uteri is the great problem, and nowhere does the author distinctly state its hernial nature. It is really a hernia through the pelvic floor, just as inguinal hernia is a hernia through the anterior abdominal wall.

The question of the action of the bladder during urination is discussed. Matthews Duncan's view that the bladder does not contract during urination was based by him on the clinical fact that the catheter does not descend during catheterisation. It does not follow, however, that the bladder does not contract because its fundus does not sink during urination. The uterus contracts during labour, but its fundus remains high and at the same level during the whole process.

The title is not satisfactory, as "statics" is a less correct word than dynamics. The literature is given with fair fulness, but many observers' works have not been consulted in their original monograph but only from the summaries of text-books. The light literature of some observers might well have been omitted. A favourite phrase is that of the "anterior pelvic outlet," an erroneous corollary to the author's limited view of the pelvic floor—"the pelvic floor is for us but the musculature" (p. 332). The whole work is praiseworthy but not comprehensive enough. It should be read by all interested in the subject, and its second volume will be looked forward to with interest and with the hope that the author may take a more comprehensive view of the structure of the pelvic floor.

Typhoid Fever, considered as a Problem of Scientific Medicine. By FREDERICK P. GAY, Professor of Pathology in the University of California. Pp. xi. + 286. New York: The Macmillan Co. 1918.

THIS volume, as is pointed out by its author, is devoted to an attempt to follow the life-history of the typhoid bacillus rather than the manifestations of the disease it produces. It is in no sense either a clinical treatise or a laboratory text-book, but is concerned with the dependence of practice upon theory and with the application to practical uses of recent work in the laboratory. We welcome it as a valuable contribution to the literature of an ever-increasing subject and congratulate its author on the production of so lucid and so well-balanced an account of the pathogenesis, sequels, and modes of prevention of typhoid fever. The chapter on laboratory diagnosis is of great practical interest, and an excellent summary is given of the results of protective vaccination. The possible uses of the "typhoidin" test, introduced originally by Professor Gay, are interesting reading, and the author has hopes it may be employed for the detection of healthy and recovered carriers, a point well worthy of further investigation. The intravenous use of sensitised vaccines is recommended as a method of treatment, although it is freely admitted that such a method does not succeed because it is specific, but on account of the subsequent leucocytosis which can be also secured by the injection of any foreign protein and even by inorganic substances. The only blemish to a well-written, well-arranged, and well-printed book is the total absence of an index, a want we hope to see corrected in future editions.

Equilibrium and Vertigo. By ISAAC H. JONES and LEWIS FISHER. Pp. 444. With 130 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1918. Price 21s.

THIS volume appears at a most opportune time in view of the rapid development of aviation. It has been adopted as the standard for the Medical Division of the Aviation Section of the United States Army. It has, of course, long been known that balance depends on the sense of sight, the muscular sense, and on the vestibular apparatus of the inner ear. As long as a man has the use of his eyes and of his muscular sense, *e.g.* on the solid ground in daylight, the importance of his ear-balancing mechanism may not seem very great. When, however, man becomes a bird and flies by night, it is essential that he should have healthy ears. It is thus important that we should understand the anatomy, physiology, pathology, and methods of examination of the semicircular canal apparatus. These are dealt with in Part I. Jones points out that for many years physicians and surgeons have gone to the eye specialist for an opinion which is often of great value to them in the diagnosis of various conditions, but that hitherto the inner ear has been regarded as merely the organ of hearing. The vestibular apparatus, however, is connected with many nerve centres which affect the entire body, and the new ear tests—rotation, caloric, galvanic—stimulate not only the ear itself but also this widely distributed nerve apparatus. By producing the expected phenomena we demonstrate that all the nerve pathways are intact. The physician has not yet learned to turn to the otologist for the analysis of the causes of vertigo. The syphilologist does not yet recognise the use of the ear tests in detecting early involvement of the central nervous system. Even the neurologist may get assistance from a detailed report of the examination of the vestibular function. In many American clinics neurologists are accustomed to seek the aid of otologists in the examination of their cases, especially those of suspected cerebellar disease. Jones also points out the great importance of the new tests in aviation. "Stunt" flying is very largely a question of the condition of the vestibular mechanism: indeed an apparatus called the orientator has now been devised in America by which aviators can be instructed in "stunt" flying without danger. The importance of the inner ear in the causation of sea-sickness is well brought out and some useful hints given for its treatment.

In Part II. the author gives an extremely clear account of the anatomy and physiology of the labyrinth and of its nerve centres and tracts in the brain. Here, as elsewhere in the book, the illustrations are excellent. A new feature is the reproduction of cinematograph films showing the method of carrying out the rotation and pointing tests and the results produced. The method of case-taking recommended and the chart to be employed can hardly be improved upon. Chapter XXII. gives a clear picture of the conditions present on examination of the auditory and vestibular apparatus in various hypothetical lesions of the labyrinth, eighth nerve, pons, cerebellum, etc. Finally, Lewis Fisher gives a detailed analysis in Chapter XXIII. of thirty-one pathological cases. This is probably the most interesting and important feature of the book, as the writer does not hesitate to record his failures in diagnosis, *e.g.* Case 10, page 336, as well as his numerous successes.

Altogether, the book is clearly and interestingly written, printed on good paper, and excellently illustrated. It should appeal not only to otologists but also to neurologists and physicians, and should not be beneath the notice of general surgeons who have to deal with intracranial tumours. The authors must be congratulated upon the production of a most excellent piece of work.

NEW EDITIONS.

A Treatise on Clinical Medicine. By WILLIAM HANNA THOMSON, M.D., LL.D. Second Edition. Pp. 678. Philadelphia and London: W. B. Saunders Co. 1918. Price 24s. net.

WITH so many excellent systems of medicine available, the progress of medical science and its rapid advances along many lines would be the only justification for the appearance of this volume. In the second edition of his book on *Clinical Medicine* Dr. Thomson has retained the arrangement adopted in his earlier one, with the consequence that a stereotyping of method has probably been the reason for the absence of much reference to the more recent advances in medicine that one would have expected to have found in a modern work. For example, it is a matter of disappointment that in his account of the treatment of diabetes mellitus no mention is made of the method of the treatment of that disease introduced by his American colleague, Allen.

The introductory chapter on the elucidation of morbid symptoms is good, and contains many very suggestive hints and ideas culled from the author's wide experience.

The chapter on the various infective diseases is also good, but its value would be enhanced in future editions by the introduction of graphic temperature records. In this chapter, however, as in the subsequent portion of his book, which is taken up with the systematic description of diseases grouped according to the various systems involved and clearly and succinctly described, the subject of treatment might have been more fully extended.

This is a book which the practitioner would find useful to dip into, in order to refresh his memory with symptoms of diseases with which his experience has not yet made him too familiar.

Clinical Diagnosis. By JAMES CAMPBELL TODD, M.D. Fourth Edition. Pp. 687. Philadelphia and London: W. B. Saunders Co. 1918. Price 14s. net.

THIS manual is one of the best of its kind with which we are acquainted. It is not unduly large, it is thoroughly up to date, and the methods advised are well and, so far as we have tested them, accurately described and trustworthy. It covers the whole field of ordinary clinical pathology (physical diagnosis, strictly so-called, does not come within its scope, nor do the graphic methods of recording circulatory phenomena), and will be found a most useful reference work for a ward sideroom. The illustrations, which are numerous, are good, and many of the coloured plates are excellent. Although this is its fourth edition, the book is new to us, but the prediction that it will be popular may be hazarded. Dr. Todd, the author, is the Professor of Clinical Pathology in the University of Colorado.

Diseases of the Digestive Organs, with Special Reference to their Diagnosis and Treatment. By CHARLES D. AARON, Sc.D., M.D. Second Edition. Pp. 818. 213 Illustrations. Philadelphia and New York: Lea & Febiger. 1918. Price $7.

THIS book has been carefully revised and has been considerably enlarged. A number of chapters have been rewritten. A new chapter is devoted to the subject of examination of the duodenal contents and the employment of the duodenal tube for duodenal lavage and for removing the duodenal contents at will. Another new chapter deals with chronic intestinal toxæmia and chronic intestinal stasis, and their medical and surgical treatment. There is also an additional chapter on flatulence, meteorism, and tympanites.

The plan of the work follows the physiological path of the digestive tract. The author successfully avoids the tendency of the specialist to isolate the consideration of his subject from the other branches of internal medicine.

The physiology of digestion has been considered from the viewpoint of the clinician, and attention has been given to the bearing of the internal secretions on the physiology of digestion. Space has been devoted to many tests for the diagnosis of carcinoma. An endeavour is made to give the test-diet stool findings in each one of the diseases of the digestive organs.

The volume is encyclopædic in the description of diagnostic and therapeutic methods, and, if it were for no other reason, these suffice to make it a valuable book of reference for special and general practitioners. The articles on pathology are less satisfactory. The section on diseases of the liver and gall-bladder is much too perfunctory, and in a less degree this criticism might be applied to the section on diseases of the pancreas. The paper, type, and illustrations are excellent.

The Elements of the Science of Nutrition. By GRAHAM LUSK, Ph.D., Sc.D., F.R.S.(Edin.). Third Edition. Pp. 641. With 28 Figures. Philadelphia and London: W. B. Saunders Co. 1917. Price $4.50 net.

IN the new edition of this well-known work on nutrition there are many additions and alterations of importance. But it is significant of the present position with regard to the science of nutrition that the first chapter, in which the scheme of treatment of the whole subject is set forth, remains practically unchanged since the first edition, written ten years ago, the bulk of the changes occurring in the succeeding chapters concerned with the experimental data and their detailed consideration. Notwithstanding this, the author, in announcing that he does not intend to issue any further revisions of the work, is so optimistic as to express the hope that it may soon be possible to place the treatment of the subject on a physico-chemical basis. Though this is, no doubt, the tendency in all directions of biology, it must be confessed that no such development seems to be in sight.

Failing this desirable advance, one can only be thankful to have such a clear, interesting, and authoritative exposition of this all-important subject, which has too often been left to the propagandist zeal of what one may perhaps be allowed to term faddists. Whether the food economies rendered necessary by the war will have a permanent influence in calling scientific attention to the subject remains to be seen. One of the most interesting sections of the book is the last chapter, which deals with food economics of the war, though only in a tentative and preliminary manner.

The scope of the work is so wide that it not only appeals to the physiologist and the scientific physician, but should also be of great use to agriculturalists and others concerned with animal nutrition. The revision appears to be thorough and up to date in spite of the obvious difficulties.

Both sides of the vexed question of normal diet are stated fairly and with moderation, and the chapters on "deficiency diseases" and on metabolism in anæmia, in gout, and especially in cases involving acidosis, are worthy of special notice.

The data given in the various tables throughout the text and in the appendix should be useful, and are readily accessible, thanks to the careful and exhaustive index; and, as indeed was to be expected, the general get-up of the work is all one could desire.

A Manual of Physiology. By G. N. STEWART, M.D., D.Sc. Eighth Edition. Pp. xxiv. + 1245. London: Baillière, Tindall & Cox. 1918. Price 21s. net. (University Series.)

THE last edition of this admirable manual appeared in 1914, and notwithstanding what Professor Stewart calls the "withering influence of the war," the output of new work from physiological laboratories has necessitated some changes and additions. Cushny's filtration-reabsorption theory of the urine is critically discussed, and reference is made to recent work on the function of the endocrine glands. This is so well known and popular a student's manual that it is unnecessary to do more than commend the new edition to the student of physiology.

Materia Medica and Therapeutics. By R. GHOSH. Seventh Edition. Edited by B. H. DEARE, Lieutenant-Colonel, Indian Medical Service, and BIRENDRA NATH GHOSH, F.R.F.P.S.(Glasgow). Pp. xii. + 698. Calcutta: Hilton & Co. 1918. Price 7s. 6d. net.

THE popularity of this treatise is well deserved. The preceding edition was already based on the new pharmacopœia, but efforts have been made to bring the present one more up to date. It is an excellent handbook for students and young practitioners. The dispensing and prescribing hints are good, but incompatibilities might be a little more elaborately considered.

Local and Regional Anæsthesia, including Analgesia. By CARROLL W ALLEN, M.D., of Tulane University, New Orleans. Second Edition. Pp. 674. With 260 Illustrations. Philadelphia and London: W. B. Saunders Co. 1918. Cloth, 28s. net.

THANKS to the discovery of new analgesic drugs by the synthetic chemist and the careful study of their use by the clinician, the field in which local anæsthesia can be successfully used has been considerably extended in the last two decades. More or less successful efforts have been made to perfect the technique of its induction, so that major as well as minor operations may be painlessly performed under its influence, and the production of a book of 674 pages, dealing only with the various methods of using local analgesic drugs, is good evidence of the growing importance of the subject.

Dr. Allen's work is almost encyclopædic in character. The history of the introduction and gradual development of local anæsthesia is fully narrated in the first chapter. Later, all the drugs that have held the field as local anæsthetics are described and their relative merits indicated. The physical conditions influencing the action of local anæsthetic solutions are fully discussed, and thereafter comes the description of the technique of inducing local anæsthesia as used at the present day. Its application in general surgery and in the surgery of the eye, ear, nose, and throat, and in dental surgery, is dealt with in the fullest possible manner.

Illustrations have been introduced wherever they might be useful in making descriptions of technique more graphic or to remind the reader of the anatomical features of the parts under consideration.

Throughout the book Dr. Allen has quoted freely from the writings of other well-known workers on local anæsthesia, notably from Braun's standard text-book on the subject, and he acknowledges his indebtedness to Braun, and especially also to his early teacher, Rudolph Matas, who contributes an interesting introduction to his pupil's book.

While it might be legitimate to join issue with Dr. Allen in regard to his estimate of the relative value of local and general anæsthesia, there is no doubt whatever that he has provided us with a most complete account of local anæsthesia and its applications, and his book may be cordially recommended to those seeking information on the subject.

The Errors of Accommodation and Refraction of the Eye and their Treatment. By ERNEST CLARKE, M.D., F.R.C.S. Fourth Edition. Pp. viii. + 243. With 93 Illustrations. London: Baillière, Tindall & Cox. 1918. Price 6s. net.

THE fourth edition of this well-known handbook will sustain and enhance its reputation. Some new matter has been added without unduly lengthening the book, and the text has been thoroughly revised and partially rewritten. The subject is treated in a comprehensive though at the same time a concise manner, and many points are touched on which are often omitted in similar works. Clarity of expression is conspicuous throughout, and the reader is never at a loss to understand the author's meaning. A useful test-card for distant and near vision is included.

Gynecology. By WILLIAM P. GRAVES, A.B., M.D., F.A.C.S., Harvard Medical School. Second Edition. Pp. 883. With 490 Illustrations (100 in Colours). Philadelphia and London: W. B. Saunders Co. 1918. Price $7.75 net.

PROFESSOR GRAVES' work on *Gynecology*, which has reached a second edition, is constructed on a somewhat novel plan. At the very end of the volume, immediately before the index, the methods of examining the gynecological patients are described; at the beginning of the book 176 pages are devoted to the study of the physiology of the pelvic organs and to the relationship of gynecology to the general organism; and between these two parts lies the central part of the work, consisting of a description of gynecological diseases and operations. The book, therefore, in part appeals to the student, in part to the practitioner, and in part to the specialist; but its chief claim, as we take it, is upon the specialist. To him (the specialist) the first part of the volume will prove of great interest, for in it he will find an admirable summary of the known facts relating to that fascinating but more than usually difficult subject—the relation of the sexual life of the woman to her organs with internal secretion and to all her other bodily systems. The views of Freud are not forgotten. The portions concerned with the gynecological diseases and operations show less novelty than the introductory chapters, but are clear and readable. As a whole, Professor Graves' contribution to the literature of gynecology is mainly remarkable for its wide outlook and for the manner in which the sexual life and the psychology of the woman are related to the activities of her various systems (circulatory, glandular, renal, etc.). The illustrations are beautifully clear.

NOTES ON BOOKS.

It is only necessary for us to chronicle the appearance of the twentieth edition of *Gray's Anatomy*, edited by Professor Robert Howden (Longmans, Green & Co., price 37s. 6d.). Nothing can now be said that will enhance the value of such a classical work.

Another anatomical work which needs no further commendation is Dr. Gwilym G. Davis' *Applied Anatomy*, which now appears in its fifth edition (J. B. Lippincott Co., price 30s.). Both as to text and illustrations it stands in a class by itself, and that the highest.

A second edition of Dr. W. W. Keen's *Treatment of War Wounds* (W. B. Saunders Co., price 8s. 6d.) has been issued. It has been rewritten to incorporate as much as possible of the new work that has appeared since the first issue. It is a useful compilation.

The 1917 *Collected Papers of the Mayo Clinic*, vol. ix. (W. B. Saunders Co., price 28s.), is, like the preceding volumes of the series, a valuable summary of American work in all branches of surgery and in allied departments of medicine. Mrs. Mellish is again editor, and contributes a suggestive paper on medical journalism, with much of which we find ourselves in cordial agreement.

There is little need to do more than allude to the appearance of the sixth edition of *A Manual of Chemistry* by Arthur P. Luff and Hugh C. H. Candy (Cassell & Co., Ltd., 1918, price 12s. net), and to reiterate the favourable opinion expressed when the last edition was reviewed in this column in 1915. Many additions have been made, and the book has been enlarged by about a hundred pages, and now includes more organic chemistry than formerly. The sections relating to the sugars, urea, uric acid, and amino acids have been much expanded. It is an admirable students' guide.

BOOKS RECEIVED.

BARRETT, JAMES W. The War Work of the Y.M.C.A. in Egypt (*H. K. Lewis & Co., Ltd.*) 10s. 6d.
BENNETT, EDITH M. Babies in Peril . . . (*John Bale, Sons & Danielsson, Ltd.*) 6d.
CHANCE, E. J. Bodily Deformities. Vol. II. Edited by John Poland (*John Murray*) 18s.
CHANDLER, ASA C. Animal Parasites and Human Disease . (*Chapman & Hall, Ltd.*) 21s.
DEPAGE, Sous la Direction du Dr. A. Ambulance de "l'Ocean." Tome II., Fasc. I., Juillet 1918 . . (*H. K. Lewis & Co., Ltd.*) Annual subscription, 25s. ; single copy 14s.
DOCROQUET, Dr. La Prothèse Fonctionnelle des Blessés de Guerre (*Masson et Cie*) frs. 5+10%
FISCHER, MARTIN H., and MARION O. HOOKER. Fats and Fatty Degeneration (*Chapman & Hall, Ltd.*) 9s. 6d.
LEWIS' Medical and Scientific Library, Catalogue of (*H. K. Lewis & Co. Ltd.*) 12s. 6d. ; to subscribers 6s.
MALONEY, MICHAEL F. Irish Ethno-Botany . . . . (*M. H. Gill & Son, Ltd.*) 4s. 6d.
PARKER, G. H. The Elementary Nervous System . . . (*J. B. Lippincott Co.*) dols. 2.50
REA, R. LINDSAY. Chest Radiography at a Casualty Clearing Station (*H. K. Lewis & Co., Ltd.*) 15s.
SCOTTISH Hospital at Rouen, Appeal and Case for Members of the Nursing Staff of the. Edited by George Wilton Wilton . . . . . . (*H. & J. Pillans & Wilson*) 1s. 6d.
TURNER, A. LOGAN. Sir William Turner . . . . (*William Blackwood & Sons*) 18s.
TYLER, ALBERT FRANKLIN. Roentgenotherapy . . . . . (*Henry Kimpton*) 13s.
WHITE, J. RENFREW. Chronic Traumatic Osteomyelitis . (*H. K. Lewis & Co., Ltd.*) 12s. 6d.

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ACUTE POLIOMYELITIS.*

By EDWIN BRAMWELL, M.B., F.R.C.P.

MR. PRESIDENT AND GENTLEMEN,—Permit me, in the first instance, to express my appreciation of the compliment which your Council has paid me in inviting me to address you this evening. From among the several subjects which occurred to me, I have selected as my topic acute poliomyelitis, or polio-encephalomyelitis, as it is perhaps better termed—a disease which in recent times has aroused widespread interest both from the scientific and practical standpoints.

Poliomyelitis has, in the past, been comparatively infrequent in this country; indeed it is not uncommon to meet with medical men of wide experience who tell one that they have rarely met with cases in their practice. In the future, however, it is not improbable that this disease may be more prevalent than formerly, while recent observations suggest the possibility that some means of combating the acute process, prior to the onset of the paralysis, may be discovered, in which case early diagnosis may come to be a matter of vital moment.

Acute poliomyelitis is one of those diseases regarding which our conception has of late undergone very material modification. Until comparatively recent times we were in the habit of picturing the malady as due to an inflammatory process of unknown origin, which selected as its locus the anterior horn of the spinal cord, and which, by damaging or destroying the motor cells there situated, produced an atrophic paralysis, varying in extent according to the distribution of the inflammation and in degree according to its severity.

* An address delivered at the annual meeting of the Perthshire branch of the British Medical Association on 14th November 1913.

Heine, more than seventy years ago (1840), when he first differentiated the atrophic from the spastic form of infantile paralysis, described the febrile onset of the former, the subsequent palsy, and the development of wasting and deformities. He recognised, almost as we do at the present day, the results of the disease, and argued, though he had no opportunity of proving the truth of his assertion, that the lesion must be situated in the spinal cord. Isolated reports from the time of Heine onwards served to show that the paralysis was sometimes completely recovered from; that adults very occasionally suffered from an affection indistinguishable from infantile spinal palsy; that more than one child might be simultaneously attacked; and that two children in the same house might develop, the one a flaccid, the other a spastic, palsy, the latter obviously of cerebral origin. The febrile onset, the circumstance that in extremely rare cases two children had been known to be taken ill at the same time, and the further observation that poliomyelitis was shown to occur especially at certain times of the year—the late summer and autumn months —were alluded to, even in the days of Charcot, as suggesting the infective character of the disease.

Interesting as were these speculations as to the nature of the process, it was not until the closing years of the last century that unexpected data began to accumulate, which served to confirm these views. In the early eighties the natural history of the disease began to change, and first one author and then another recorded groups of cases occurring in the same district and at the same time, which differed in their features from the sporadic type. For some reason as yet unknown it was in the Scandinavian Peninsula, in the first instance, that the disease seems to have taken on its new phase, and it was Medin, the Swedish physician, who, at the meeting of the International Congress at Berlin in 1890, reported the first real outbreak, consisting of forty-four cases, which had occurred at Stockholm three years previously.

To Medin is due the credit of pointing out the unusual manifestations which poliomyelitis presents when it occurs in an epidemic, as opposed to a sporadic, form. His contribution, in which he distinguished spinal, cerebral, polyneuritic, bulbar, and ataxic types, aroused general attention, and the value of his clinical observations is recognised by the name Heine-Medin's disease, a nomenclature often met with in literature, which commemorates the services of two observers who have done so much to elucidate its clinical features.

Epidemics of poliomyelitis, it is almost unnecessary to remind you, have occurred in many parts of Europe and America within the past few years, so that instead of regarding the disease as unimportant it has come to be dreaded in those localities in which it has been rife. Holt and Bartlett in 1907 reviewed thirty-five epidemics reported in the literature, and Batten, writing four years later, found reports of twenty-seven epidemics which had occurred in all parts of the world during the intervening period. The great epidemics in Norway and Sweden (1903-5) and those in New York City (1907), in Massachusetts, Westphalia, and Austria (1909), have been, from the number of individuals affected, the most severe yet experienced. The reason why these epidemics should have occurred all the world over is as unanswerable at the present moment as is the fact that Scandinavia has been the region in which pandemic poliomyelitis has been so prevalent.

Fortunately, in Ivor Wickman of Stockholm, Sweden possessed a physician who made full use of his opportunities of studying the disease. This observer investigated very thoroughly the 1031 cases reported in the Swedish epidemic of 1905. Wickman's observations on the morbid anatomy and the mode of spread of poliomyelitis are of such importance that his name might be worthily added to those of Heine and Medin in narrating the history of the disease. He further directed attention to the comparative frequency of abortive cases in which recovery takes place without paralytic manifestations, and to cases characterised by an onset with pronounced meningeal symptoms. He pointed out that an intimate association of the disease with the principal highways of traffic was clearly demonstrable, and that the mode in which it spread was essentially analogous to that established for a number of other infectious diseases in which transmission takes place from person to person. He was of opinion, from a study of his material, that it was rarely probable that infection was carried by food or by inanimate objects, and he laid great stress on schools as foci of infection, figuring in his monograph convincing illustrations in support of his contention. He further demonstrated that the disease may be carried by a third person, and he arrived at the conclusion that in man, if the onset be calculated from the commencement of the fever, as it should be, the incubation period would be found to be at least three or four days.

Let us now look for a moment at poliomyelitis as it has occurred in this country during the past few years. Although in 1897 Dr. W. Pasteur described a remarkable instance in which seven members of a family were simultaneously affected, it is only within the last five years that any definite increase in these cases and the occurrence of groups of cases have been noted. In 1903 a group of eight cases was reported by Treves at Upminster in Essex. In the following year Dr. George Parker collected a series of thirty-seven cases which occurred in Bristol; while in 1910 thirteen cases were reported from Maryport, thirty-four from Carlisle, eighty-three from Melton Mowbray, and sixteen from Cerne Abbas in Dorsetshire. Since then similar reports have been received from other parts of the country.

From inquiries made in 1910 I was able to show that cases of poliomyelitis had been distinctly more numerous in Scotland during the autumn of that year than during the previous four years. Figures obtained from the Out-Patient Departments of the Edinburgh and Glasgow Royal Hospitals for Sick Children, for example, showed that fifty-two cases had been seen in 1910, as compared with twenty-six cases in 1909, twenty-one cases in 1908, twenty-three cases in 1907, and thirty cases in 1906. Further, one met with or heard of several instances in which two or more children were simultaneously attacked, of abortive cases, of cases presenting the features of the cerebral and meningeal types, and of adults who had suffered. Previous experience had shown these instances to be so rare that one feels justified in affirming that there was not only a relative increase in the frequency of the disease in Scotland, but that there was an approximation in the clinical manifestations of the cases met with to the epidemic type.

Personal experience leads me to believe that in the autumns of 1911 and 1912 poliomyelitis was also more frequent than formerly, and that the proportion of adults attacked was unusually high. Thus, of twenty-two cases which I have seen in private practice, during the past three and a half years, seven of these within ten days of the onset of the fever, I find that in four the onset was in 1910, in six in 1911, in seven in 1912, and in one in 1913. All these eighteen cases occurred during the latter half of the year, viz.:—

In July	1 case
August	8 cases
September	6 ,,
October	2 ,,
November	1 case

It is interesting to note in this connection that in the Swedish and New York epidemics the maximum number of cases was met with in August and September respectively. With the exception of five of my cases, in which the patient was living in Edinburgh (two), London (one), or abroad (two) at the time of onset, all the other cases occurred either in the country (seven), or in a country town (six), while in no instance was there clear evidence of contagion either direct or indirect. The age at onset in these eighteen cases was as follows, viz.:—

Before 5 years . . .	5 cases
From 5 to 10 years	4 ,,
,, 10 to 15 ,, ...	3 ,,
,, 15 to 20 ,, ...	3 ,,
Over 20 years	3 ,,

Small though these figures are, the large proportion of cases in older children and in adults in this series is striking, when one realises their rarity prior to 1910. Although I have not included the cases seen in hospital practice, I can recollect three at least seen during this period, in which the onset occurred from the age of 18 upwards. It is of interest to note that all of the nine patients, including the three hospital cases to which I have referred, in whom poliomyelitis developed after the age of 15, were of the male sex. This is, however, probably a mere coincidence, since the general statistics show that the sexes are about equally liable.

A comparison of these figures with earlier statistics serves to emphasise the point referred to in connection with the age incidence. Thus, Dr. Byrom Bramwell in 1908, on analysing the cases of poliomyelitis which he had seen both in private and hospital practice prior to that time, found that, of seventy-three cases, in only five was the age at onset over 15 years.

The age incidence in different epidemics has varied greatly. Wickman, for instance, found that of 1025 Swedish cases, 220 of the patients were over 15 years of age when attacked, while, of 729 cases met with in the New York epidemic, in only 8 was the patient over this age.

I shall now refer briefly to a group of cases seen with Dr. Currie at Tillicoultry in October 1910, and not included in the series already referred to, which exemplifies in a striking manner several of the features of epidemic poliomyelitis. The cases, five in number, occurred in a homestead of four houses, some 2 miles from Tillicoultry, one house being occupied by the farm steward, the others by farm employés. In the first house lived the farm steward, whom we may designate A., with his wife and two children, aged 5 and 2½ years respectively; in a second house on the opposite side of the road, not 20 yards away, lived a farm employé whom we may call B., his wife and four children, aged 7½, 5½, 4 years, and 7 months. With the children living in these two houses we are alone concerned. A.'s two children slept in the same room; the three older B.'s slept in the same bed, while the B. baby occupied a cradle in the kitchen, where his father and mother also slept.

The clinical features presented by this group of cases may be summarised as follows:—

On 12*th September* B. B., aged 5½, complained of headache; on the 14th he was feverish, complained of pain in the back of the neck, and was drowsy and heavy. The fever continued for three days. He said that his legs felt tired, and he seemed to have difficulty in holding up his head. On 26th September he returned to school. On 16*th September*, that is to say, four days after B. B. was taken ill, A. B., aged 7½, developed similar symptoms, with pain in the legs, especially the right; on the third or fourth day weakness of the legs was observed, which rapidly progressed to complete paralysis of the right leg and marked weakness of the left, the features of the palsy being typical of the common type of poliomyelitis. On 18*th September* D. B., aged 7 months, was feverish and fretful; the fever lasted for three days; two days later he developed a convergent strabismus; he appeared to be perfectly well when examined on 31st October, except for the squint. It is of interest to note in passing that on and after 14th September B. B. also slept in the kitchen, and that it was four days later that D. B. was taken ill. On 20*th September* B. A., aged 2½, complained of headache, and was feverish and drowsy; three or four days thereafter the right side of the face was seen to be paralysed; when examined on 6th October, although there was still a slight paresis of the right side of the face, the child in other respects was quite well. On 24*th September* A. A., aged 5, sister of the last patient, who, as we have said, slept in the same room, was taken ill with headache, fever, and a tired feeling in the legs; she subsequently developed a typical paralysis of both legs, with weakness of one arm.

These cases illustrate quite a number of features characteristic of epidemic poliomyelitis.

Firstly, we find five of twelve children living in an isolated homestead affected; whatever the source of the infection in the initial case, it seems reasonable to believe that in the subsequent cases the mode of infection was probably by direct contagion.

Secondly, we have here instances of three separate types of the disease, viz. two examples of the ordinary spinal type, two examples of the cerebral type, and one example of the abortive type.

Thirdly, the circumstance that all the patients were in good health serves to emphasise a point which has repeatedly been noted, that robust children are at least as liable to suffer as weaklings.

Fourthly, the several instances in which a four days' interval occurred between the onset of the individual cases suggests that four days or less was very probably the incubation period.

Fifthly, there are grounds for believing that Mrs. A. may have been a healthy carrier, conveying the infection from the house of the B.'s to her own, and thus infecting her own children, for on 16th September, and again on 18th and 19th September, she visited the B.'s house, on the two days last mentioned remaining on each occasion in the house for several hours, assisting to nurse the baby (D. B.).

Three additional cases occurred in Tillicoultry at the time, the dates of onset being 15th and 20th September, and 7th October, but we were unable to trace any connection between these cases and those above described; nor had the A. or B. children, so far as we could ascertain, encountered any healthy person who had recently been in contact with a case of acute poliomyelitis.

As we have seen, Wickman has proved transmission by direct contagion, has indicated the spread by school infection, and has pointed out that the abortive cases are special sources of danger, and that healthy individuals may act as "carriers." Contagion is not evident in all cases, and it is necessary to look for some other source of infection. Rosenau's experiments in this connection suggest, and his observations are supported by those of Anderson and Frost, that a common fly (Stomoxys calcitrans), which bears a close resemblance to the house-fly, is capable of transmitting poliomyelitis from one monkey to another.

So much for the symptomatology of the malady: let me now refer in a few words to the experimental pathology, to the nature of the virus, and to the possible channels of infection.

Strumpell, writing of acute poliomyelitis in 1884, after summarising the symptoms, says: "These are all signs of infection by a pathogenic organism." Nevertheless, for thirty years the actual organism has escaped detection. The first real advance derived from an experimental source was Landsteiner's observation, published in 1909, that poliomyelitis could be transmitted to monkeys by injecting an emulsion of the spinal cord of a fatal case into the peritoneum of the animal. In November of the same year several independent workers reported that they had succeeded in transmitting the disease from one monkey to another. A description of the symptoms and anatomical appearances met with in experimental poliomyelitis in monkeys is unnecessary here; suffice it to say that they bear a very close resemblance to those observed in the human subject.

The observation independently arrived at by Flexner and Lewis, and by Landsteiner and Levaditi, that the virus, whatever its nature, would pass through a Berkfeld filter, disposed of the claims of the micrococcus which Giersvold had described in the cerebro-spinal fluid in 1905, and discouraged further bacteriological research. Flexner and Noguchi have, however, succeeded during the present year in cultivating a micro-organism in poliomyelitis by adapting the method so successfully utilised by the last-named observer for growing spirochetæ. The special medium which they used was human ascitic fluid. Not only were cultures obtained from the nervous tissue of fatal cases in man, and of monkeys in which poliomyelitis had been experimentally produced, but also from filtrates which had passed through the bacteriological filter. Regarding the organism they say:—

"Fluid cultures, viewed under the dark-field microscope, exhibit among the innumerable dancing protein and other granules present, minute bodies, globular in form, hanging together in short chains, pairs, and small masses, devoid of independent motility and distinguishable with difficulty as a special class among the indefinite granules present. Stain preparations, on the other hand, bring out unmistakable organisms grouped in the three ways stated, and of very minute size." The two methods of staining with which they have so far obtained the most satisfactory results are those of Giemsa and Gram. The same observers have further proved that inoculation of the cultures is followed by the appearance of the clinical symptoms and pathological effects characteristic of experimental poliomyelitis in the monkey; while by employing a special technique, discovered by Noguchi, they have succeeded in demonstrating the presence of the organisms in film preparations and sections prepared both from the central nervous organs of human beings, and of monkeys which had succumbed to the experimentally produced disease.

Pathological considerations naturally lead to speculation as to the channels by which the causal organism enters the body. Flexner and his associates have demonstrated that experimental poliomyelitis may be produced by injection of the virus at a variety of different situations. The observation that the disease may be experimentally produced if the virus is brought in contact with an abrasion in the nasal mucous membrane is suggestive. The circumstance that an intestinal or bronchial catarrh not infrequently accompanies the initial symptoms suggests the possible entrance by way of the respiratory or alimentary tracts. As Romer has shown, however, diarrhœa may occur *after* experimental injections into the cerebrum, and must, therefore, be regarded as a direct consequence of the action of the virus. Wickman advances as an argument in favour of infection by way of the alimentary canal that the legs are almost always first affected. Again, acute inflammation of the mesenteric glands has been repeatedly met with; it is, however, to be remembered, as more than one writer has pointed out, that such changes afford no necessary proof as to the site of invasion, for they may represent irritation resulting during the process of excretion of the virus. The discovery of the organism may possibly help to expedite our knowledge as to its mode of ingress.

The chief difficulties in diagnosis arise in the pre-paralytic stage, though they are by no means confined to this period. When cases of poliomyelitis have been occurring in a district, the practitioner is anticipating the disease, and will regard any febrile attack with suspicion. If, however, there have been no previous cases in the locality, it is most unlikely that the possibility will occur to him. Two diseases for which poliomyelitis is especially apt to be mistaken during the febrile stage, and I could mention several instances in point, are meningitis and articular rheumatism. The former difficulty may be a very real one, for an onset with headache, vomiting, drowsiness, neck rigidity, and general hyperæsthesia is common. The latter mistake can be readily understood when one recalls the extreme tenderness and pain on passive movement which some of these patients exhibit, which symptoms may for a time obscure the underlying paralysis. Among striking early symptoms of poliomyelitis, Eduard Muller, who has given special attention to this question, mentions heavy perspiration, hyperæsthesia, and the presence of a leucopenia, while several observers have shown that both the cell and globulin content of the cerebro-spinal fluid are increased in the great majority of cases examined during the first week. Nevertheless, it must be admitted that, although acute poliomyelitis may be suspected in the pre-paralytic stage, we possess as yet no certain method of diagnosis at this period.

Our views as to prognosis have also been materially modified since the appearance of the epidemic type of case. Formerly it was held that the disease was very seldom fatal, and that there was almost invariably some degree of permanent paralysis. That this statement does not now hold good is shown by recent statistical inquiry. Thus Wickman, in one localised epidemic in Sweden, found a mortality of 42·3 per cent., while in another it was only 10 per cent. In the German and Austrian epidemics the mortality varied from 10 per cent. to 20 per cent., while in New York it was estimated at 5 per cent. There can be no question that the prognosis as regards life is better in infants and young children than it is in older children and adults. Thus Wickman's Swedish figures show a mortality of 11·9 per cent. in patients up to 11 years of age, and of 26·6 per cent. in those from 12 to 32.

The frequency of abortive cases is very difficult to estimate. Leegaard, however, found 258 abortive cases in a total of 794 (32·5 per cent.). Conclusions as to the frequency of these cases in infants and young children, as compared with older children and adults, are conflicting.

Statistics as to recovery from paralysis vary. Thus, of 530 Swedish cases reported as paralysed soon after the acute stage of the illness, inquiries made by Wickman, from one to one and a half years later, showed that 44 per cent. had recovered, while of the New York cases only 5·3 per cent. made a complete, and 1·8 per cent. a partial, recovery. My own limited experience is in accord with that of Leegaard and Wickman that the prognosis as regards a recovery in adults is not so good as in children, although I have seen one case with extensive and pronounced paralysis in a patient of 19 in whom recovery was practically complete. The electrical examination, when the patient is examined a few weeks after the onset of the paralysis, certainly affords some indication as to the probable improvements which will take place in individual groups of muscles. Personally, I am inclined to think that the statements as to prognosis based on the electrical examination, which are laid down in the majority of text-books, tend to picture the outlook as unnecessarily gloomy.

Although no specific therapy that will prevent the disease or influence its progress is, as yet, available, the work which has been appearing from the Rockefeller Institute and elsewhere permits us hopefully to anticipate the future. Clinical deductions as to the effect of remedies in an acute disease, such as poliomyelitis, are admittedly difficult to formulate, and we must look to the experimental pathologist for the solution of the problem. Several observers have succeeded in establishing a resistance to the virus, but the practical value of these experiments has not yet been determined. The observations of Cushing and Crowe that urotropin is excreted into the spinal fluid led Flexner to test its efficacy in poliomyelitis, with the result that he found that this drug delays, if it does not actually inhibit, the experimental infection in animals. Urotropin should, therefore, be employed during the acute stage, when it may be given in doses of 3 to 10 grs. four-hourly.

The question of prophylaxis is one of practical importance. In this connection I would again emphasise the fact that abortive cases and healthy carriers may transmit the infection. All observers are agreed that it is wise, in order to minimise the chances of infection, to cleanse the oral and nasal cavities of both patients and contacts with some antiseptic solution, such as 0·2 per cent. solution of permanganate of potash. The patient should be isolated as in any infective fever, while in the present state of our knowledge it is probably well to disinfect the stools. The period of time after the onset of the disease during which the patient is infectious is uncertain, but it is probably well to insist that isolation shall be maintained for at least three weeks (Batten).

I have made no attempt this evening to describe poliomyelitis in detail. My purpose has rather been to draw attention to the leading clinical features of the epidemic disease; to point out recent advances in our knowledge regarding the pathology, symptomatology, epidemiology, diagnosis, and prognosis; to indicate that in Scotland, although there has been no great increase in the frequency of poliomyelitis, there has been a tendency on the part of those cases met with to approximate to the epidemic type; and to emphasise the advisability of adopting prophylactic measures in the treatment of these cases. Time does not permit me to refer, much as I should have liked to do so, to several practical points in the treatment of the residual paralysis, notably to the scope of electricity, to Robert Jones' observations on the beneficial effects obtained by maintaining paralysed muscles in a state of relaxation, and to the use of the celluloid splint, as suggested by Batten, in aiding recovery and preventing deformities.

Possibly it may seem to you that I have exaggerated the importance of my topic. Personally, I do not think so, for poliomyelitis is a very terrible disease, not so much perhaps when we regard the mortality, as when we realise the way in which it handicaps the majority of its victims in after-life.

A CASE OF DIAPHRAGMATIC HERNIA FOLLOWING A GUNSHOT WOUND. ATTEMPT TO BRING ABOUT RADICAL CURE BY EXTENSIVE THORACOPLASTY.

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On 29th May 1916 Robert Cowans,* aged 26 (late Z. 1490, Clyde Royal Naval Division), was referred to me by Dr. Rorie on account of vomiting which had recurred since the New Year. This he associated with a wound he had received in the left chest on 5th June 1915.

His family history indicated no particular weakness. He was the third of four children, two older than himself, well, and one younger, who had died at the age of 3. His mother was well, aged 52, and his father had died, aged 47, of blood-poisoning following a sore toe. The patient had had no illness since "measles and inflammation when at school." He is married and has four healthy children. Cowans joined the Royal Naval Division on 23rd October 1914, and when at the Dardanelles was shot in the left chest by a Turkish bullet .The bullet entered through the conjoined costal cartilages in the left parasternal line, about an inch above their free margins at the epigastric notch. It must have passed obliquely to the left, for it lodged at the level of the diaphragm under the lateral thoracic wall. He had no hæmoptysis. He was taken on board ship and a fortnight later arrived at a Greek hospital in Alexandria, having developed dysentery, he says, the day before he was put ashore. Some six or seven weeks later, after being radiographed, he had an operation under local or spinal anæsthesia. The lower part of the left chest was opened behind and he "heard something falling into the bucket," and on asking what it was he was told by the Sister that it was "about two pounds of hard matter." The doctor told him later that it

* In the medical literature of war it is a matter for regret that the identity of patients should be purposely obscured. In civil practice this can easily be understood and indeed must be generally advisable. In military practice, however, the honourable nature of the wounds, the benefit which may accrue to the patient, the advantage to previous observers in being able again to particularise the case, make it desirable that, if not the name, at least the unit and the identity number of the patient be openly recorded.[1] John Bell,[2] Guthrie,[3] Williamson,[4] Ballingall,[5] and the older writers set a good example which has, unfortunately, been departed from.

had been caused by the dirt on the bullet being carried into the chest. After two weeks he had a second operation, an incision being made lower down in the back over the sacrospinatus muscle, parallel with the lumbar spine, for the evacuation of an abscess which had formed there. He got on well after that, and, when able, was transferred to Haslar Hospital and from thence to Queen Mary's Hospital. He was then sent home on a month's leave and then to a camp at Blandford (Dorset). While there, on 3rd January 1916, he took ill with pain in the shoulder and vomiting and he was sent into hospital at Portland, where on 8th January he had "a pint and a half of matter taken out by opening up the first incision." He was discharged from the service on 7th February 1916, the wound being entirely healed. He then returned home, and a week or two later attempted to resume his ordinary work in a calender. The work was fairly heavy, necessitating a good deal of stooping and of weight-lifting, and it was not long before he discovered that the pain of stooping and lifting, which he noticed at once, did not improve as he persevered with his work, and was associated on occasions with vomiting. On that account he had to cease work after three weeks. He did not attempt work again, and during the five months which elapsed before I saw him he had had attacks of vomiting, on occasions accompanied by pain in front of the left hypochrondrium and down the left arm as far as the wrist. He thought that exertion sometimes brought on the pain, but at other times there was no apparent reason. He could always bring on pain by stooping, and repeated pain was apt to culminate in vomiting, the vomited matter being simply the food he had previously ingested. He was a thin and not very robust-looking man, intelligent, and able to give a good account of himself. The wound of entrance was evidenced by a small circular cicatrix. At the posterior part of the left chest there was a scar of a considerable operation, and palpation indicated that some of the lower ribs, probably the seventh and eighth, had been partially removed. A vertical scar in the left loin indicated the secondary abscess which he had had in Alexandria.

It was not until 27th July that he was admitted to the ward. Radiographic examination by Dr. Pirie showed that about the level of the diaphragm there was a collection of fluid, and that above that fluid was some air. A curious phenomenon which neither I nor my colleagues had seen before was that when the man was pushed sharply from side to side the fluid splashed up and down the sides of the cavity in waves, like water in a bowl. Dr. Mackie

Whyte, who examined the lungs for me, reported: "Lungs seem clear (resonance, vesicular breathing, etc.)."

The explanation of the symptoms gave rise to some discussion. Dr. Pirie thought that the fluid and air lay above the diaphragm and that the man had a hydro- (or pyo-) pneumothorax, but I felt that the absence of any recent history of inflammatory trouble in the pleura and the absence of lung symptoms—dyspnœa, shortness of breath, cough, or expectoration—made the production of a pneumothorax, via the lung, improbable; nor did I think it possible that an empyema could have satisfactorily healed up, leaving a quantity of fluid and air in the pleural cavity, and give rise to no discomfort, increase of temperature, or constitutional disturbance. The left side of the diaphragm did not move freely, and it appeared to me more likely that the left cupola had been drawn upwards during the healing of the empyema, and that the air and fluid were contained in the stomach and that the stomach had become adherent to the diaphragm in the course of his illness or as a result of his injury. In all radiograms the rifle bullet was seen to be lying apparently in relation to the thoracic surface of the diaphragm. It was observed that the left diaphragm scarcely moved at all, and that the bullet did not move with respiration. The left diaphragm, indeed, was fixed, and its cupola much higher than the right, and where a barium meal had been given it was noted on one occasion that the fluid was thrown into waves by the heart's motion. The barium meal sank through the fluid to the level of the umbilicus and collected there. No peristalsis was visible. With the patient supine, the stomach was noted to be entirely on the left side, the lower two-thirds of the left lung were dim, and Dr. Pirie concluded that the stomach was " fairly normal."

It is curious in the light of later knowledge that the existence of a diaphragmatic hernia was not accepted by any of us at that time. It appeared certain, from the man's own description of his first operation and from the scar and the removal of ribs, that he had been operated on in Alexandria for a left empyema, and that reaccumulated fluid had been aspirated at Portland some months later. The assumption that he had had an empyema seemed to negative the possibility of a hernia; it seemed incredible that a collection of pus could take place within the chest while an opening existed in the diaphragm, and I am afraid that due allowance was not made for the rapidity with which adhesions might form in a traumatic rupture, and for the rapidity and ease with which the opening would be closed by the herniated viscus.

A few days after his admission to the ward, when he had been up and about, and apparently very well, he complained of a feeling of fulness, and vomited a large quantity of undigested food. This was typical of what had recurred at intervals, and occurred always on exertion.

Evidently the stomach and not the lung was at fault, and the question arose whether one should reopen the thorax and examine the condition there, or open the abdomen to examine the left cupola of the diaphragm. The certainty of finding adhesions in connection with the previous operations in the chest decided me to take the abdominal route. On 9th August the abdomen was opened through the left rectus sheath, the muscle being pulled outwards. There was no evidence of peritonitis. The stomach appeared considerably dilated and disappeared upwards through a large circular hole in the diaphragm. This opening, which was smooth-edged, was fully 2 ins. in diameter, and situated in the muscular part of the left diaphragm. It admitted four fingers easily, but did not admit the whole hand. The herniated stomach was attached high up in the left chest, and could not be entirely drawn into the abdomen. The abdominal wound was closed in the usual way, the layers of the rectus sheath being brought together separately by continuous catgut, and the skin by silk-worm gut sutures. During the first day or two he suffered a good deal from accumulation of mucus in the respiratory passages, and, though his discomfort was relieved by the continuance of Fowler's position, the difficulty of coughing interfered with the expectoration. On the seventh day after the operation he had a recurrence of the gastric strangulation. He complained of fulness and tightness across the upper part of the abdomen and lower part of the chest, followed by pain in the left chest, and then much retching and copious vomiting. During one of these attacks he stated that he felt the stitches give way, and when I saw him some hours later I found that the wound had opened, and a coil of about 3 ft. of small intestine was lying under the dressing. The bowel was replaced under an anæsthetic and the wound resutured. For the next two days he had a good deal of restlessness, with some pain and vomiting, but by the third day he had returned to his normal condition of convalescence, and thereafter made an uninterrupted recovery. He was temporarily discharged from hospital on the 12th of September, and readmitted for further operation on the 30th.

Operation for the Radical Cure of Diaphragmatic Hernia.—

A vertical incision was made midway between the axillary folds on the left side, well clear of the previous thoracotomy cicatrices, and portions of the third and the succeeding six ribs were removed. The parietal pleura was incised and free access gained to the thoracic cavity. The lung was not adherent to the parietal pleura. The stomach was found to be fixed to the visceral pleura by a small attachment. It was freed from its adhesions, drawn down in the thoracic cavity, and passed through the opening of the diaphragm into the abdomen. Three silkworm gut sutures were then passed as mattress sutures through the adjacent edges of the opening in the diaphragm, but instead of being tied were then brought through the most convenient costal interspace and tied on the surface of the skin. In this way the diaphragmatic opening now closed into a linear slit, and the portion of the diaphragm below was braced firmly against the chest wall. The intention was to promote obliteration of the lower part of the pleural cavity, and bring about the permanent adhesion of the injured part of the diaphragm to the thoracic wall. The operation was a long and severe one. It was followed by the intravenous administration of three pints of saline that evening, and this was repeated five hours later. When dressed two days later, it was found that one of the silkworm gut sutures controlling the diaphragm had given way. As after his previous operation, he was considerably troubled with accumulation of mucus in the bronchi and inability to expectorate efficiently, but he did not have the fulness and vomiting which had troubled him before. As the condition of the stomach was now known, and as it was presumably in its normal position, stimulants by the mouth and fluids as desired were not withheld, and he soon passed into a satisfactory condition of convalescence, and the progress continued as in an ordinary empyema. The sutures which controlled the diaphragm were removed at the end of a fortnight, and the thoracic wound was entirely healed by 27th November. He was then radiographed, and with a bismuth meal the stomach was found to be normal in position, the bullet lying lateral to the stomach at a higher level. The normal shape of the cupola of the diaphragm was altered, the lateral half being apparently adherent to the thoracic wall, the medial half passing across in the usual way, but presenting no movement on respiration. The thoracic wall where the ribs had been removed had fallen in to some extent, but the lung itself must have expanded very considerably, and materially assisted the obliteration of the pleural cavity. Normal breath sounds could be heard down to the diaphragm, though the percussion note was naturally a little impaired in comparison with the other side.

It now looked as if the operation was to be an unqualified success. He had no complaints, was taking ordinary diet, and was putting on flesh very quickly. He had no cough, and neither gastric nor intestinal disturbance. He alleged that a fortnight after leaving hospital he contracted a bronchial catarrh and a troublesome cough. With this he had a pain, but not very severe, in the left side of his chest over the lower part of the costal arch. On the last day of December 1916, after having had discomfort and sickness for two days, accompanied by giddiness and a tendency to faintness, he vomited about an hour after dinner, and the vomiting was repeated about an hour after supper. The vomiting then continued daily, and sometimes several times a day, until he was readmitted to my ward on 5th January 1917. He stated that after a big drink of water he could feel "the same splashing sensation he had had previous to his operation." He had vomited nearly every day, and sometimes had long bouts of vomiting, lasting for many hours at a time. I decided to re-examine the thorax to see if anything more could be done, and on 3rd February, through the mid-axillary line, reopened the left pleura and removed anteriorly further portions of those ribs which had been excised at the previous operation. A good many adhesions were found, and the diaphragmatic rupture was represented by two considerable openings, which I again sutured with silkworm gut and again attached to the flaccid chest wall. I was less hopeful this time of success, as the diaphragm appeared very attenuated and the muscular element not well developed. The skin wound was left open, as in the usual treatment of empyema, for the purpose of promoting obliteration as much as possible of the pleural cavity. The following forenoon, while coughing, he stated he felt something give way in the left side.

This operation was not followed by the complete relief of gastric symptoms which had characterised the previous one, for the vomiting, though not so severe, recurred occasionally, and he had to be careful as to quality and quantity of his food. He was discharged from hospital on 17th April. Three months later he reported that he vomited "about every day," but he was not loosing weight, and he looked well and was of good colour. He was again in my ward under observation from 8th August till 12th September 1917, and the frequency of the vomiting was confirmed.

Thereafter he continued much the same. The incidence of vomiting varied, but he seldom went for longer than a fortnight without discomfort or sickness. He believed his diet had little or no effect, but actual vomiting occurred more after a meal, while "dry" retching occurred frequently when the stomach was empty. Though thin, he retained his good colour and did not lose flesh. On 20th January 1919 he again presented himself for examination. The lower angle of the cicatrix had for some weeks been inflamed and had been discharging, and now the Turkish bullet is projecting from the sinus base first. It was easily removed by the fingers. Since then there has been immunity from attacks of sickness or vomiting.

Remarks.—Wounds of the diaphragm are notoriously more prevalent in military surgery than in the surgery of civil life. Indeed, except from a few Italian and Spanish monographs, contributions from countries in which the use of the knife, in the settlement of quarrels, is more common than among other European nations, it is difficult to obtain references to this injury. It is to military surgeons, therefore, that one looks for information as regards wounds of the diaphragm, and assuredly that information is meagre enough. Guthrie,[6] in giving his experience on this subject, heads his page, "A wound of the diaphragm never heals;" and he writes: "These cases confirm the fact I was the first to point out — that wounds of the diaphragm, whether in the muscular or the tendinous part, never unite, but remain with their edges separated, ready for the transmission between them of any of the loose viscera of the abdomen, which may receive an impulse in that direction." He admits that on the right side a wound may become blocked by the solid viscus (the liver) becoming adherent to it, and indeed this is only what would be expected from the experience gained by opening an abscess of the liver through the diaphragm. In this relation Dr. F. M. Milne of the Dundee Royal Infirmary tells me that recently he conducted the post-mortem examination of a soldier who had been wounded four weeks previously. A piece of shrapnel, $\frac{1}{2}$ by $\frac{3}{4}$ of an inch, had entered the right chest in the 7th interspace, had passed through the diaphragm and lodged in the right lobe of the liver, where an abscess had formed. The wound was not obvious in the diaphragm. The liver was adherent to the muscle, and the lung, consolidated, adhered to the diaphragmatic pleura.

In one other point Guthrie's *dictum* requires modification.

I have recorded[7] the case of a lad who, falling on an upturned pitchfork, was pierced through the epigastrium and the central tendon of the diaphragm into the heart wall. The hæmopericardium I relieved by incising from below the central tendon of the diaphragm and then suturing the wound with catgut. The sequel, however, to that case has not been previously published. The patient remained well during seven years, when, at the age of 19, he was readmitted to the Dundee Royal Infirmary suffering from endocarditis, from which he died three days later. On post-mortem examination there were found a considerable vegetation on one of the mitral cusps, a pericardial sac obliterated by adhesions, and a wound in the tendon of the diaphragm, *soundly healed but recognised as a linear cicatrix* when that part of the muscle was held up to the light. This case alone refutes the statement that wounds of the diaphragmatic *tendon* never heal.

It is not surprising that wounds of the tendon should heal, but wounds of the diaphragmatic muscular tissue stand in a different category altogether. In the tendon we have a more or less passive structure, moving a little, it is true, but with no comparison to the movement of the muscular element.

Verification of the condition by ultimate post-mortem examination is necessary in any case of injury to the diaphragm. Relief of symptoms is no guarantee that closure of the diaphragmatic opening has been maintained. Most of the cases of diaphragmatic hernia published have been those of congenital defect, and it is well known that improvement may follow surgical interference though it can be proved that the hernia still exists.[8] On the other hand, many cases of diaphragmatic hernia, whether congenital or acquired, have escaped recognition until strangulation or other accident[9] had brought about the final catastrophe or the patient had died from some intercurrent illness. During the hundred years which have elapsed since Guthrie gathered his experience, no case, so far as I know, has been published which has shown by post-mortem examination that a known wound of the muscle-constituent of the diaphragm has ever closed spontaneously or remained closed after operation.

The surgery of the chest has gained achievements Guthrie may have dreamed of but could not have foreseen. Yet apparently his experience is still undenied in regard to wounds of the diaphragm. The statement "I put in four stitches in the wound in the diaphragm" occurring in the course of a surgical report may be evidence of a surgeon's manual dexterity, but it is no proof that subsequent diaphragmatic hernia was prevented. Neither is it evidence of success that on post-mortem examination a few days after operation the sutures in the diaphragm appeared to be holding well. What is wanted is a description of the diaphragm months or years after a known operation. Cases of wound of the diaphragm are cases beyond all others that ought to be followed up, that should be passed from the military surgeon to his civilian confrère, and that is rendered immeasurably more difficult unless in each report each man's identity is established. For operation, access may be gained to the diaphragm through the thoracic parietes or through the abdominal parietes, and recently Bérard and Dunet have recorded a case in which they combined the thoracic with the abdominal route.[10] The patient was wounded in the left chest, and a diaphragmatic laceration was followed by a hernia of part of the stomach and transverse colon. Symptoms of strangulation set in four months later, and two months after that the diaphragm was sutured. The manipulations were carried out through a large rectangular thoracico-abdominal flap, so that the herniated viscera could be drawn down into the abdomen and resection of the 6th rib allowed manipulations on the diaphragm to be carried out, working between the two cavities. The soldier did not survive the operation many hours, and after death the wound of the diaphragm was found accurately sutured. This method must have greatly facilitated suture of the diaphragm, but it differs from my method in that I tried to utilise the ribless portion of the chest wall to reinforce the diaphragm. I do not advocate it as a routine method, but bracing the diaphragm against the chest wall may have its indications and be applicable in certain cases.

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A FIELD AMBULANCE IN GALLIPOLI, EGYPT, PALESTINE, AND FRANCE.

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V. Memories of Cape Helles.

For some time after the eventful days in the middle of July things remained quiet, though desultory fighting and increasing sickness kept us busy in the ambulance. But in the early days of August rumour, that so often precedes big things, began to be whispered about from lip to lip. We soon learnt that we were going to make another bid for victory, and our spirits revived with new hope.

On the 6th August we heard officially of the intended landing further up the coast, which it was hoped would bring us to our goal. There was a stir in our midst, and already in spirit we found ourselves marching up the slopes of Achi Baba hot-foot after a routed enemy, across the "few miles of scrub" that stood between us and victory. Within a short time the Straits would be open, and the British Navy would be hammering at the gates of Constantinople. But it was not to be. Our bounding spirits outleapt our sober judgment.

Looking back on it, this seems to us the greatest disappointment we have ever had. It was not till some time after, however, towards the winter months, that the full force of our unenviable plight gradually dawned upon us. And then, I remember, we used to wonder and guess what fate had in store. The pessimist was ever abroad selling his dismal wares, but to our credit be it said that as a whole the attitude that prevailed was one of determined if not cheerful optimism. There were factors, other than the purely military, which tinged our feelings. The chief of these was sickness.

Coincidently with the landing at Suvla, a strong demonstration was made from our side of Achi Baba. We can remember, on the afternoon of 6th August, the vigorous bombardment of the Turkish trenches in front of the village of Krithia, in which guns from the sea largely participated. And then in memory we can still see the long lines of our boys with the tin plates on their backs glistening in the sun as they clambered up the slopes of Achi Baba towards Krithia. The Turk counter-attacked that night, and again on the following night—the 7th August. On this latter occasion flares went up along the whole line, and the noise of bursting shrapnel and the crackle of rifles and machine guns was so great that for a time it seemed as if the Turk had gathered up all his force and was bearing down in an irresistible wave on our position, and that before long we could scarcely escape being driven into the sea. But within a short time the whole line was quiet again.

On the 9th August we at last received news regarding the doings on the other side of Achi Baba. It was good. Sari Bair ridge was taken, and the new landing troops were in touch with the Anzacs. But this was the last satisfactory news we ever received, and it soon became evident to us that our dreams of victory were not yet to be realised.

From this time to the end there was no fighting on a big scale, though there were repeated smaller attacks in which for the time being we found ourselves busily employed in the ambulance. The campaign settled down definitely into fighting between two entrenched armies, with all that that means.

To many of us the memory of our life in these days is haunted by the spectre of sickness which seized hold of the Army early, and maintained its grip throughout the whole campaign. Few there were who escaped altogether. The young athlete was marked down just as surely as those of less robust vigour. Disease, when once it enters an army, is prone to spread through all ranks without discrimination.

So it was with us. To many the time spent on Gallipoli stands for a six months' constant battle against fever and malaise. Many succumbed early. Many were stricken late. Some braved it out, and of these not a few will carry the effects on their frame to the end.

Our chief enemy was dysentery in its varied forms. It gripped us early, and during the summer and autumn months it took a heavy toll. None of us can ever forget the horror of the scourge as it held us in its claws during these hot, broiling months. Least of all, I imagine, can we ever forget it who, suffering often ourselves, had to hide our pains in our effort to minister to others more needy.

A great deal has been spoken and written about the dysentery of Gallipoli. Scientists are still arguing amongst themselves about the germ that caused it. And it is right, in the interests of our armies and of practical medicine, that the thing should be settled. We, who knew the reality, may be pardoned for looking on these discussions as a trifle academic. I doubt if any, except those who saw with their own eyes, can ever picture the tragedy of hundreds and thousands of brave, strong men battling in vain against a loathsome thing, whilst the flesh left their bodies and their strength ebbed away, till at last they were stretched out helpless as babes.

It is still too early to attempt to explain the various factors responsible for this condition of affairs. As guardians of the Army's health, the experience pressed heavily on us at the time, and has left us thinking deeply since. The ultimate explanation was, of course, easy—imperfect sanitation. We all learnt a lesson during these days of trial that we can never forget. The fire has burnt deeply into our hearts. We know that the lessons, learnt on that battlefield in front of Achi Baba, have served us constantly in our efforts since then. We know also that regulations, no matter how perfect in their scope, will fail to establish anything approaching perfection until the sanitary conscience of an army is thoroughly awakened. At that time we were young soldiers embarked on a campaign under eastern skies, and surrounded by circumstances that were as unfavourable as it is possible to imagine. Youth, inexperience, and environment were all against us.

Few of us escaped. At times dysentery and fever played a sorry havoc in the ranks of the ambulance. At one time we were working the whole ambulance, including dressing stations, with only two medical officers instead of nine, and one of these was just able to drag himself from bed when a patient was announced.

With the advent of the cooler weather and the rains in October things improved greatly, though it was about this time that a mysterious epidemic of jaundice claimed a large number of victims. The disease itself was not a severe one, and few died. Slight fever and pains, and then the yellow tinge, which, first starting in the whites of the eyes, rapidly overspread the whole body. The morning sick parades in these days were rarely without their little jaundiced procession.

Though it is true that the ardent spirits with which we had embarked for overseas service soon tamed down considerably under the trial and stress of war, there were nevertheless many things and incidents which added greatly to the pleasures of our life at that time.

As I have said, we were warned before we arrived that life was going to be a nightmare. And there is a popular idea persisting to the present day that the life we spent there was one long procession of gloom and misery. But it was not so; for, throughout, there was the opportunity of pleasing intercourse with your fellows. This constitutes one of the saving pleasures of Army life at all times. We had small dinner parties, in which the two other field ambulances of the division joined, and then there were the opportunities for friendship with the French troops, which we availed ourselves of.

On the 28th September the news of the French successes on the Western Front with the capture of twenty thousand prisoners reached us. This caused great jubilation, and at 7 o'clock that night one battery in each artillery group fired twenty-one rounds at a special object, amid cheers raised from all throats for our gallant French allies. It was a tremendous occasion for us. The sudden artillery outburst and the great volume of cheering that shook the silence of the night must have startled the Turk badly. He must have taken it for a general attack, for he loosed off the most vigorous fusillade of rifle and machine gun that we heard during the whole time we were on Helles.

On the 14th October we heard of the German advance on Serbia and of the fall of Belgrade. The imminence of our danger specially directed our thoughts to this piece of news.

It was just about this time that we evacuated three of our officers from sickness, including our commanding officer, Colonel Ross, all suffering from epidemic fevers. Some time after we heard with feelings of keen sorrow of the death of our beloved commanding officer.

There was little natural beauty about Helles itself, for the country, that must have looked well in its clothing of grass and flower in the early days of the campaign, by the time we arrived was barren to a degree.

But if you climbed the high land overhanging the northern shore towards X Beach, especially about sunfall, you would see the islands of Imbros and Lemnos and Tenedos, with the shadows playing on their hills. Beyond Imbros you would catch a sight of the peaks of Samothrace, and further to the west you might get a glimpse of Mount Athos. Then, in the opposite direction, from your point of vantage you would get Achi Baba standing out full in his curious symmetry of central head and lateral shoulders sloping down on each side to the sea. Across the southern shoulder the cliffs of Chanak could be seen. Further to the right, across the Hellespont, could be seen the evening shadows gathering about the mountains and valleys of Asia Minor and the Plain of Troy.

The beauty of the evenings at Helles was sometimes very great, especially when the purple hues gathered on Achi Baba and crept across to the south. The air was then very clear, and distant objects on the sides of Achi Baba would stand out with surprising distinctness. We often then at one place could pick out with the naked eye the red crescent flag flying at a Turkish dressing station. During the time of twilight a quiet would fall, with nothing to disturb except the constant tiresome chirp of the cicada, the pathetic, half human and wholly diverting neigh or bray of the mules, with the big guns roaring on occasions to remind you of battle. Twilight and dawn were the quietest times of the day. It often seemed then as if by common consent a hush had fallen on the field of battle.

During the last months our advanced dressing stations moved about as our division moved from one flank to the other, but our main station remained in the same place throughout the whole campaign.

The later weeks consisted largely of a battle with the elements. Especially was this the case towards the middle of November, when we had a severe storm of wind and rain that washed us out, followed immediately by an intense frost that hit the men in the trenches severely, though we did not experience the same tragic results that befell the troops at Suvla at that time.

VI. The Evacuation of Cape Helles.

It is difficult to say when the preparations for the evacuation of Helles really began. Suvla and Anzac had been evacuated. We knew that, and we wondered if our turn would follow. But on the 20th December an order circulated to all ranks for the time set all doubt aside. Helles was not to be abandoned. "To the Eighth Army Corps was entrusted the duty of maintaining the honour of the British Empire against the Turk." We were exhorted to "make our positions impregnable, and while driving back every attack we must ever seek to make steady progress forward and maintain, both in spirit and action, that offensive which, as every soldier knew, alone leads to success in war."

Reinforcements of artillery and increased supplies of ammunition had already arrived, and further troops would be available shortly.

We read those words with the spirit that animates all true soldiers—calm submission and determination to endure to the end.

Big guns arrived and were planted near Hunter Weston Hill. Reinforcements could be seen in the morning against the skyline as they climbed the hill from the beach where they had landed over-night. We could see them and the Turk could see them, and he every now and then turned his guns in their direction.

But we soon saw that, whilst troops were certainly landing on the Peninsula, troops were at the same time leaving it, and before long it was evident to those who knew that men were leaving more rapidly than new troops arrived. It was soon apparent that something secret was afoot. Orders reached us that no case was to be kept in the ambulance unless he was calculated to get better in a day or two. No letters arrived, and there were many who waited in vain that Christmas for the home parcels which were to swell their meagre celebrations to some semblance of the days of peace.

Within a few days the extent of the preparations was so great that, whilst the Turk on the far hillsides of Achi Baba was kept in complete ignorance of the plans, no one in the neighbourhood of the beaches could any longer be deceived.

Eventually we received definite orders to prepare to evacuate. The Peninsula was to be emptied gradually, but every effort was to be made to maintain the ordinary routine appearance of things. Our camps were to be undisturbed and the evacuation of wounded and sick two or three times a day from advanced dressing to main dressing station was to continue whether there were patients or not. The patients naturally grew less as the troops dwindled in numbers, but dummies were to be used and the performance of loading and unloading the waggons was to go on as before.

A great deal of natural amusement was extracted from this theatrical show. The spirits of the men rose higher and higher each day as the hour of their deliverance drew nigh. They threw themselves with zest into the construction of dummy water-carts and motor cars to replace those which were sent to the beach to be shipped. At that time we had one motor ambulance car. The chassis was sent off, whilst the hood was mounted on four wheels in the usual place by the hospital entrance.

It almost seemed as if the Turk had grown suspicious, for the roads round our camp were shelled more heavily than usual at night and the camp itself did not escape.

A few days before the end of the year we received orders to send off any officers or men who were in any way unfit. It was with great difficulty that any men could be induced to admit they had not felt better in all their lives. But a party was mustered and sent off under our old quartermaster. On New Year's Eve, whilst we were sitting at the evening meal, a hurried message came to send off one N.C.O. and twenty-five men within the hour. With a scramble the order was carried out. That same night the preliminary operation orders for the final day were received. On our ambulance, reinforced by the other two ambulances, was to be placed the task of attending to the medical arrangements of the division during the evacuation.

The general scheme was that, on the fateful day, bearers and nursing orderlies were to be provided with stretchers and dressings and placed along the route from the front lines, so that during the evacuation every party of fifty soldiers would be accompanied the whole way from trenches to boats by a squad of four R.A.M.C. men. To provide for any casualties in excess of the numbers which could thus be dealt with, additional stretchers were placed at known spots along the route so that the infantrymen would be able to lift their wounded mates along with them. The medical officers were stationed at definite intervals to attend to the wounded as they arose.

The route was arranged in every detail. From the front line it came down Leith Walk and Central Street, the Mule Trench, thence via Backhouse Post past Skew Bridge to the Rendezvous, a spot opposite our main camp about three-quarters of a mile from the shore. Thence it went by the shortest route to an improvised pier near V Beach which was selected for our evacuation. The route was to be policed throughout so that even the most stupid could not wander.

The evacuation was to be carried out gradually. Each line was to be thinned out in stages. There were to be eight control posts, No. 1 being in front, No. 8 at Skew Bridge about three miles behind. The troops were to be counted and checked as they passed these points, and here the R.A.M.C. personnel were to be stationed, The evacuation was to be conducted in three trips during the night, separated by a two to three hours' interval.

Days of tense hard work now set in for us. On New Year's Day we received orders to send all the equipment and dressings which would not be required to a depôt near the beach. It was difficult to decide what our requirements would be, as we had had no previous experience of evacuations! But we worked with a will, loading our boxes and our panniers that New Year's night and carted them off to the depôt. A loading party under an officer stood by from the ambulance beside the equipment, but it was not loaded on board a trawler for two days. It was not till many days after that we again saw this loading party. Tossed about on the trawler "G. 8," backwards and forwards between Mudros, Gallipoli, and Tenedos, they had adventures which make the stories of our boyhood's heroes shrink and pale.

The preparations for the final day were pushed ahead. Men and horses and guns and stores of all descriptions were shipped away under cover of night, whilst during the day troops arrived in constant succession accompanied by guns and ammunition and all the things of war. To the Turk watching from Achi Baba and the coast of Asia it must have seemed that a host was gathering for a final vigorous assault.

Every detail required attention. Nothing was to be left to chance. Each man was to know his duty and his post. He learnt where he would join his "trip" and whether he was first, second, or third trip. Every officer and man wanted to be in the last trip, but this could not be. After consideration it was decided that the oldest hands would be given the post of honour, whilst the younger soldiers would leave the Peninsula first.

Then we recall the difficulty there was in arranging the packs and kit of the men so that they could move in perfect silence. The mess-tins and water-bottles were muffled and the feet were swathed in sandbags. The greatcoat was rolled and fixed so that each man would be free to carry a loaded stretcher.

An order that hurt us sorely we remember was received during these days. All rum in possession was to be destroyed! The nights were cold and cheerless, and there had been no opportunity for the usual celebrations of the season. The order hurt, but it was obeyed to the letter.

At last the "day before" arrived. The morning of the 7th January broke clear and cold with frost, and our luck seemed to be holding. Our preparations were nearing completion. We remember that morning at daylight receiving an order to despatch four mules and one man forthwith to the Beach. To us it had now become apparent that the naval people organising the evacuation at the Beach loaded up with the items to their hand, and if there was a spare corner on the ship to fill up before they started they sent a hurried message for a fragment of the ambulance!

During this day the Turk launched a big attack on the front to our left. There were still enough men in our trenches to oppose him with resistance, and any suspicion he may have had must have been allayed. It may have been as the result of this attack that he remained so quiet during the whole of the next day and night.

The eighth, the day of our fate, broke cold, with a stormy breeze blowing. We wondered if luck, which had smiled on us so far, was at last going to play us false, for a rough sea would damn our every chance. But we worked away at our final rehearsai The bearers were sent to their control posts, close touch was maintained with the fragment of the Divisional Headquarters that was now left, so that our plans would be modified in accordance with any altered dispositions of the troops, the officers had a conference to discuss the final details, we synchronised our watches and the last trip of officers and men set off to their posts.

The last day will always stand out in memory as one of the greatest days of our life. As usually happens on such an occasion, every detail, however trifling, is fixed in imperishable relief against the background of momentous experience.

We remember that after we had thought that all details were finally settled, orders and wires still poured in from headquarters. Still they came, and if the Day of Judgment arrives before the war is ended the orderly room will assuredly be late in responding to the last trump. A series of orders were sent to us regarding the disposal of the horses that were still left on the Peninsula. It was evident that at headquarters there were two opposing influences at work, the one a love of horses and the desire to save them, the other a determination that come what might they must not be left to the Turk. The first order came early. All horses were to be shot at dark. An hour after this was cancelled. Horses were to be watered and fed before dark, and those not required for the ambulance waggons were to be liberated. A chit came hot on the top of this to say that an officer would call round during the day to shoot all horses not required for the evacuation. The contest between the two camps was now becoming exciting to us who looked on, and when a later order arrived instructing that horses would not be liberated or shot, but would be left in their lines with plenty of water and feed, it was received with loud cheers. But from this jubilation we were soon plunged into despondency by the next order, the last of the series, to the effect that all horses not needed would be shot immediately after dusk. At dusk an officer was given a revolver and sent over to the horse lines to carry out the dire deed of execution. Now, R.A.M.C. revolvers are not always kept in the best of condition, and when he was asked some days later how his task had fared, he said, "Oh, I had to let them go. The confounded revolver would not work."

During the last two hours of the afternoon the First Trip and the Rendezvous parties were engaged in an orgy of wanton destruction. Dozens of tins of bully beef were punctured by a blow from a pick. Stoves, camp-kettles, galvanised iron roofing, tents, rubber thigh trench boots and anything which we could not take were all destroyed beyond use.

The First Trip party moved out to join the infantry who were to move off from the back areas at 6.30 P.M. The Rendezvous party alone was now left, and after lighting up the camp with candles which were due to burn out at 10 P.M. and which were placed in tents and dug-outs as if nothing were amiss, they set off to their posts leaving a camp forsaken but with all the semblance of life. All round the camp-fires burned as if there was nothing to disturb the ordinary routine of the night.

The Rendezvous was in telephonic connection with the eight posts all along the line and with the Beach, so that we knew at any moment how things were progressing both in front and behind. As we gazed into the dark, waiting for the First Trip, we watched four large French guns pass towards the Beach, each drawn by twelve pairs of fine horses. There was no fuss. They moved past us in a silence that was impressive. It was a noble sight.

The First Trip arrived to time. They were due at the Rendezvous at 7 P.M. and to embark at 8.30. The men were keen and anxious as they trooped past us. There was to be no smoking and no talk above a whisper, for the night was clear and lights would be visible for miles and the smallest noise travels far on such a night.

Just as we heard that the First Trip had been embarked safely the Second Trip arrived. In silence they were halted and marshalled into fours and counted. When the complete party was collected they set off on the final stage of their journey.

Whilst the hearts of all beat anxiously during these hours that seemed to be prolonged to the length of days to those who waited in silence, the usual amount of night firing could be heard on the hillsides of Achi Baba. Occasional flares would rise lighting up the slopes far up in front, or a sudden burst of machine-gun fire would startle us into thinking that the Turk had spotted the game. But always the comforting report kept coming down the wires from the control posts: "Everything going well, no casualties reported." Once or twice we heard shells whizz overhead to the Beach, and we had momentary spells of tense anxiety, but the suspense lifted with the reassuring reports.

At one time, however, our anxiety reached an acute stage. The sea was running high and rising, and the embarking of the Second Trip was being carried out under grave difficulties. The prospects for a bit became extremely gloomy, and it almost looked as if dire disaster was pressing in to overwhelm us, and our plight was an unenviable one. We had destroyed all the rations except what we carried. The big guns had gone, all except a few old veteran pieces the last function of which was to burst into occasional fire that night. We should have been a sorry crowd if morning and the Turk still found us stranded on the Peninsula amid the desolation of our deserted camps and the havoc which we had wreaked on them with our own hands. Visions of Constantinople rose before our eyes. For a time Fate looked to have turned black against us at the last moment.

But just when our horizon seemed to have darkened to irretrievable disaster the welcome news was flashed back along the line that the Second Trip had been embarked at the Beach. We took a deep breath of renewed hope and peered anxiously out towards Achi Baba for the arrival of the last party.

At last No. 1 Control Post at the front line rang up to say he was cleared and was removing his instrument. A few minutes later No. 2 Post did the same, then No. 3. The excitement was now extreme. The stage of final crisis was on us. The next few minutes would decide our fate. In succession the remaining posts rang up to announce the passage of the last trip. No. 4, then No. 5, then No. 6, then No. 7, and finally No. 8 reported that all was well and that they were lifting their instruments.

Would our luck hold? There was now in front of us, between us and the large Turkish Army on the slopes of Achi Baba, nothing but miles and miles of empty trenches with the parcel of men who had forsaken them pressing eagerly towards us. It would be half an hour before the first of this last batch would reach us.

Still the rifles crackled on the hillside and still our flares climbed into the skies at the far-off trenches as if everything were as usual. For the engineers had rigged up ingenious devices by which rifles and flare-pistols automatically discharged themselves long after their owners had left. By an accumulation of clever mimicry and dumb play the Turk was lulled that night into the belief that our lines were still firmly held against him. At the very moment when they were being completely emptied, for all we knew he may have been preparing to meet a gathering attack.

At last, just as the moon began to peer over the distant hills of Asia away beyond the Hellespont, our straining eyes picked out the first few men of the last batch. Their dour Scotch faces were set in a look of mingled determination and suspense as they approached. They had come miles through trench and over the open without a moment's pause, for this was not a night for dallying by the way. The sweat poured down their faces although the night was cold. As they gathered in front of us to be marshalled for the final count the excitement that animated them spread to us.

In a short time the "all correct" was announced, the Staff closed their office at the Rendezvous, and the procession turned its back on Achi Baba and made off for the Beach, the ambulance, or what was left of it, taking its usual position in the rear.

Everything had so far gone better than in our wildest hopes we could have wished for. The only casualty of the night was a man who carried a machine-gun and who in the unwonted bustle and exertion had developed a pain in the side and a palpitation that left him breathless. He was the only occupant of our ambulance waggons.

As we had a large reserve of stretchers, at the last moment, prompted by a laudable desire to help the British taxpayer, each man picked up two stretchers before he joined the procession.

The way to the Beach, which we had often marched and thought nothing of, seemed a very long trek that night. But we pushed on as quickly as the length of our procession and the darkness of the night would allow. The rifle bursts still broke the silence of the far-off slopes of Achi Baba, and the lights of the flares still rose into the heavens. The Turk was still unsuspecting, though every now and then a gun from the Asiatic side of the Hellespont would hurl a shell over to the Beach near us.

Gradually our pace became slower as the head of the procession reached the narrow track that runs between the sea and the cliffs. In places it is only a yard or two wide and the column was by now a long one. At one time "Asiatic Annie" served us the last thrills which she was fated to do. We could by this time see the far coast of the Dardanelles showing distinctly in the moonlight. Every now and then we caught the flash of the large gun and then, eleven seconds afterwards, the shell burst with a shriek and a crash. It fell near us in the sea, but it was still thirty yards away. Our luck was still holding.

We marched past the *River Clyde.* With one last look at the famous old tattered liner we passed on. We continued our course past V Beach to the rocking, ramshackle wooden pier, and thence along the breakwater to where we could just make out in the darkness a torpedo boat destroyer tossing on the sea.

Here the delay seemed to be interminable, and "Asiatic Annie" was rousing herself into renewed activity. But we steeled our hearts to patience although it at one time looked as if daylight would still find us on the shores of Gallipoli. One by one the men scrambled on to the slippery rocking deck of the T.B.D. across the gangway steadied by stalwart bluejackets. Our gallant boys still clung heroically to their salved stretchers, but this was more than the sailors could stand. It was going to be a tight fit to get the men on board, and there was no room for odds and ends on the narrow deck, apart from the fact that every second of time was precious and it required the use of his every limb to enable a man to clamber aboard. A stentorian voice rang out "Chuck these ——— things away!" and it rained stretchers in the vicinity of that gangway till all the R.A.M.C. men were safely on board.

We slipped our moorings and were off. The moon was hidden behind storm clouds and we could see little of the shore as we bade good-bye to the land which had held us captive for these many months past. We were cold and sodden, for the seas broke over us as we huddled together on the deck. But we were happy as we breathed the breath of liberty once more after months of bondage. As we watched the searchlights in the Narrows grow more and more distant behind us, even the greatest discomforts of body and the buffeting of the elements could not rob us of the relief we felt at the ending of our long chapter of trial. The sailors, with the proverbial cheery kindness of the sea, did their utmost to lighten the troubles of the passage. Within a few minutes every man who had not fallen into a sleep of exhaustion where he lay was served with a pannikin of steaming cocoa.

In the morning we reached Mudros and here we stayed for a day or two picking up the fragments which had left the ambulance bit by bit during these last days of Helles. After a few days we were hustled on board a troopship and set sail for Alexandria, where we landed for the second time two days afterwards.

Thus ended the first chapter of our service overseas.

VII. Back to Egypt.

After the evacuation we were sent back to Egypt, and for some time we were camped in the desert on the outskirts of Cairo.

Those were great days! Breathing freely again under the sense of relief from a heavy strain, it is not surprising that the spirit of holiday was abroad amongst us. Though the division had spent some days in Egypt the previous year, leave had not been open, and none of the officers or men had had a chance to explore the sights. The opportunity now opened up and was thoroughly taken advantage of. The hundred and one sights of Cairo and the neighbourhood were visited. The numberless mosques that vie with one another in splendour of architecture and colouring, the bazaars with their most cosmopolitan gathering of races that can be seen in the whole world, the Pyramids of Gizeh and Sakkhara and the Sphinx, and the other things too numerous to mention were all visited by eager throngs.

But there was plenty of work to be done as well. The ambulance had to be refurnished almost completely with new equipment to replace that lost at Helles. This kept the quartermaster's department busily engaged. Then there were the drills, which always loom large in the day's work in a more or less standing camp, and we required drilling badly to endow us with a renewed sense of self-esteem and to rub off the careless attitude towards many things, which is quickly bred by trench life. Those of us who had grown beards had to remove these hirsute ornaments, which did not fit into the new scheme of polished discipline.

We were very soon new men in appearance, health, and outlook. And in a few weeks we were moved from Cairo to take our place in the army guarding the Suez Canal.

This marked the second phase in our military career. We were plunged into a wholly new life. Our ways of living had to alter to suit our new environment. And amongst all the changed circumstances that we had to adapt ourselves to, there were none so great as these relating to the conduct of war itself.

It was some time before we settled into the new methods. We had to find our feet not only metaphorically but literally also. Those who have lived for any time on the desert will know that it is only gradually that the feet and legs accustom themselves to the soft sand. New muscles and new sinews are called into play, or rather it seems to be that the old muscles drop out of use, for after you have lived on the sand for any period of time and get back again to *terra firma* your shin muscles ache sorely for the first day or two. After months of disuse they become strained by being called on to give the spring in walking that one again acquires on the harder ground.

The methods of war were different. This was specially true of transport and equipment. The early days were spent in gathering up the animals and waggons remaining from the transport, which we had left at Alexandria the previous June, when we sailed for Gallipoli. The most of it had been taken away. Some had gone to units in Egypt. A great part of it had gone to furnish field ambulances for Salonika. What remained over was brought down to the new camp on the Suez Canal.

Then we had to collect camels. From this time the camel became incorporated as an intimate part of our economy, and eventually we had as many as 300. At the beginning his unconciliatory, supercilious ways, and his attitude of dignified disdain, not to mention his occasional outbursts of actual vice, rather chilled our dealings with him. But we little knew then how greatly our lives and comfort, and how greatly our failure or success, were going to hang on this at first despised animal of burden. It was not till long after that we came to realise the full worth of our new friend. And then our hearts were often filled with gratitude when we thought of the whole existence of an army that had depended on the four hundred pounds or thereby of food or ammunition carried on each back of that long, silent, and stately procession that followed in the wake of the moving troops. Many a time, also, have we had occasion to thank our camel convoy for the days and nights of constant work entailed in clearing the wounded from the battlefield.

It was the end of February 1916 when we took up our quarters at Kantara, at that time a small station on the Port Said-Ismailia railway line and situated on the west bank of the Suez Canal.

We opened our little hospital beside the Custom House, and during the heat of summer we lived a comparatively leisurely existence in which bathing and fishing helped for recreation.

We felt a certain thrill of pride in the thought that we were there to safeguard one of the world's greatest highways of commerce, and our British hearts beat high as we watched the great ships in constant procession sweep slowly past, and realised that in spite of war the vital links of empire were intact. At night, especially, after dinner we would sit and watch the liners glide past with their decks and saloons a blaze of light, silent symbols of our imperial power.

One day (10th April) our eyes were staggered by the sight of two large transports crowded with Russian troops. Someone soon came with the news that they had come from Vladivostock. Their appearance caused great surprise in our midst, and all sorts of surmises were soon abroad. Were they going to Salonika, or to France, or where?

From the time of our arrival our troops had been pushed forward some miles into the desert on the east to occupy strong posts, and we had an advanced dressing station in these early days at Hill 40, about 4 miles from the Canal. From there we brought our patients back to Kantara by motor cars.

Kantara is situated on the bridge of land that crosses the salt lakes and unites the western with the eastern or Sinai desert. *El Kantara* in Arabic means "the bridge." It is here that the great highway that links together Asia and Africa passes—the most ancient and in some ways the most famous road in the world. It was down this road that Abraham and later Joseph came from Syria into Egypt. At a later time Mary and Joseph with the child Jesus passed along the same track, and an old tree at Kantara is still shown as that under which the Holy Family rested.

Then along that road in ancient times the armies of Egypt passed to the conquest of Asia. With the decadence of the Egyptian Empire the hosts of Persia swept in to add Egypt to their conquests. At a later day Alexander the Great passed this way to subjugate Egypt and to found his new city of Alexandria. Then under Napoleon the tide of invasion swept the other way. It was through Kantara that Napoleon's army, and later the great conqueror himself, passed to subdue the Arabs of Sinai and Palestine.

In the pre-war days this road was largely used by camel convoys, which crossed the Suez Canal at Kantara by means of a ferry. It then struck eastwards across the Sinai Desert, through Katia, El Abd, and Mazar to El Arish. From El Arish it passed northwards close to the shore past Sheikh Zoweid, Rafa, and Khan Yunus to Gaza.

Its course was determined by the wells, for in the desert the most compelling consideration is water, as we were so constantly to experience during the next two years.

In the early months of 1916 the beginnings of the broad gauge railway across Sinai were being laid at Kantara. We were present at its birth and we watched its growth step by step as it was thrust further and further forwards across the broad stretch of sand, until at last it found solid bottom on the soil of Palestine.

It was in the narrowest sense of the term a military railway, for in the desert, at least, the advance of the army was possible and was consolidated only in proportion as the line was laid. We paused when the railway paused and we leapt forward as the railway leapt forward. At no time in the desert could we be far in advance of the rail-head.

But, although its origins were purely military, there were many of us who could foresee a time, after the clouds of war had been swept away, when it would constitute a great commercial and political link between Africa and Asia. Long after the traffic of war is forgotten the busy trade of peace will be seen speeding across the yellow sands of Sinai and—who can tell?—the inhabitant of Cairo will be seen travelling north to spend his summer months among the hills of Jerusalem instead of taking his accustomed trip home. Since the days when we first knew Kantara the railway has spanned the Suez Canal by means of a pontoon bridge and the linking-up is now complete.

Colonel Young, who had been sent to hospital sick some months before, rejoined the unit at Kantara. In his absence Major Greer was in command.

(*To be continued.*)

CLINICAL RECORDS.

By CHARLES F. M. SAINT, M.S., F.R.C.S., Assistant Surgeon, Hospital for Sick Children, and Surgical Registrar, Royal Victoria Infirmary, Newcastle-on-Tyne, late Major, R.A.M.C.(T.).

An Unusual Obstructing Band.

THE patient was under the care of my late colleague, Captain Denis Cotterill, whose untimely decease has led to my publication of it, as he would certainly have published it himself, on account of its unusual and important nature.

The patient was admitted to hospital with a gunshot wound of the buttock, which had undoubtedly penetrated the abdomen. The abdomen was opened in the mid-line below the umbilicus, several holes in the small gut were sutured, and the shell fragment removed. Extravasation was limited to the pelvic region, and there was no injury to colon or rectum, so that a good prognosis was entertained. However, in spite of all available measures, he did not do well. There was some distension of the abdomen, and he continued to vomit from time to time. He never had complete intestinal obstruction, flatus being passed on giving an enema. It was not considered advisable to do a second operation, and he died about five days after operation.

Post mortem there was peritonitis and some fluid in the lower abdomen and some distension of the small gut, though the suture lines were quite sound. The interesting feature, however, was the presence of a strong band, which was encircling almost the whole of the small intestine. It was of the thickness of a small quill. Its anterior portion was attached above in the region of the duodeno-jejunal junction, and from there it passed down in front of the mesentery, turning round the ileum a few inches from the ileo-cæcal valve. From this point it passed upwards behind the mesentery, and was also attached in the neighbourhood of the duodeno-jejunal junction about 1½ to 2 ins. from the anterior end. The whole of the small intestine, with the exception of a few inches, was thus herniated through the loop, and there was some obstruction, though by no means complete. On turning the small intestine over to the right side of the abdomen and examining the duodeno-jejunal region, a large paraduodenal fossa was discovered, which would easily admit the closed fist. Its free anterior wall was very thin and translucent. It was noticed that the free edge of the anterior wall, which normally contains the inferior mesenteric vein, was also quite thin and transparent, and it was therefore suggested that the sequence of events had been: (1) hernia of the small gut into the paraduodenal fossa, with great distension of the sac; (2) rupture of the anterior wall of the sac and the passage of the gut through the rupture into the general peritoneal cavity; and (3) the free edge of the anterior wall left to form the band round the gut. It was considered a rather extravagant hypothesis, but the proof of it was easy, since, if it were true, the band would contain the inferior mesenteric vein. The band was therefore cut across, and, as had been anticipated, the inferior mesenteric vein was found to be present in it.

An operation for intestinal obstruction in this patient, with division of the encircling band and relief of the constriction, would not have been so happy in its results as is customarily anticipated. Fortunately it is an uncommon condition.

Multilocular Mesenteric Cyst with Intestinal Obstruction.

The patient, a married woman, 32 years of age, was the mother of three children.

She came complaining of a lump in her abdomen, to which her attention had been drawn very shortly after her last confinement, four months previously. Up to that time she had had no abdominal trouble, but two or three days after delivery she had an attack of abdominal pain, which was rather severe, and caused her to vomit. The abdomen was tender, and, on pressing it, she first noticed the lump. Since that time she had had recurrent attacks of pain and vomiting, and the lump had remained as before. Her menstrual periods had not returned.

On examination her general condition was fairly good, though she was somewhat slightly built. Temperature and pulse normal. The abdomen was not generally distended, and a lump could be seen situated just below and to the left of the umbilicus.

On palpation there was no rigidity of the abdominal wall, and the tumour could be readily examined. It was the size of a cocoanut, was firm in consistency, its surface more or less rounded, though not quite smooth, and it was well defined. It was movable, though not freely so, and it could not be pushed down into the pelvis. On bi-manual examination no definite connection could be made out between the tumour and the uterus.

Percussion demonstrated no free fluid, and only a limited impaired resonance over the tumour itself.

From the occurrence of the first attack following on her accouchement, the nature of the attack, the recurrences, and the characters of the tumour, a diagnosis of ovarian cyst (probably dermoid) with twisted pedicle was made. The limitation of movement was attributed to resultant adhesions.

Operation.—The abdomen was opened in the middle line and an exploration made. The tumour was found to be situated in the mesentery of the lower jejunum, was multilocular and cystic in nature, and the corresponding part of the small gut was stretched and flattened out as it passed over it. The intestine above was markedly hypertrophied and somewhat distended. The bowel below the tumour was collapsed. It was impossible to shell out the cyst, and, in order to remove it, it was necessary to excise 2 ft. 6 ins. of gut. The divided ends of the bowel were then closed and invaginated, and a lateral anastomosis performed. No other pathological condition was found, and the abdomen was closed in layers in the usual way. The patient made an uninterrupted recovery. She was last seen twelve months after the operation.

The cyst was multilocular, and the cysts contained a clear pale liquid.

Ovarian Fibroid with Ascites.

The patient, a married woman, 56 years of age, and weighing about 14 stones, had noticed increasing swelling of her abdomen for some months. Latterly she had become very short of breath and suffered from considerable swelling of the feet and legs, being finally bed-ridden and considered beyond the scope of surgery. She complained of more or less continuous discomfort and pain of a gnawing character, which had no relation to food ingestion, bowels, or urinary function. In spite of her great size she was certain that she had lost a great deal of weight since the onset of symptoms.

A consultation was asked, not so much with a view to any operative measure as to a concurrence in the hopeless nature of the case.

On examination her general condition was not good, her lips were bluish, and she had obvious difficulty with her respiration. The urine was normal. The pulse was soft but regular, and she had no rise of temperature.

The abdomen was greatly distended, with bulging of the loins in addition to an anterior prominence, and the lower abdominal wall was œdematous. On palpation a hard tumour could be felt by pressing deeply, but the abdomen was too tense to obtain any detail. A fluid thrill was readily obtained and ballottement elicited with ease.

Percussion confirmed the presence of free fluid by shifting the flank dulness, and epigastric resonance with convexity downwards Per vaginam nothing abnormal was felt. A diagnosis of malignant ovarian cyst with ascites was made, and operation was decided on, in the hope of giving at least temporary relief.

Operation.—A long mid-line incision was made, and the abdomen opened. A great quantity of serous fluid was evacuated and a large smooth solid tumour exposed.

Some adhesions of the sigmoid were easily separated, but others of the omentum, to a part of the tumour which was obviously undergoing some degenerative change, were so dense that the corresponding part of the omentum was ligatured off. After this the tumour was fairly easily delivered from the abdomen, and was found to be associated with the right ovary. After ligature of the pedicle it was removed. The left ovary showed nothing abnormal, and was not interfered with. There was no evidence of secondary deposits in the abdomen. The abdominal wall was sutured in layers without drainage.

The patient made an uninterrupted recovery from the operation, and left hospital at the end of three weeks.

The tumour weighed 11 lbs. On section it was solid, and at the part most distal from the point of entry of its blood-vessels of supply was undergoing degeneration. It was here where the omentum was adherent. The microscopic report was that it was a fibroma, very cellular, and apparently rapidly growing.

Two years later she came to the hospital to show herself. She was feeling very well, had put on a good deal of weight, and had not had a day's illness since the operation. Her abdomen showed no sign of recurrence of disease, but there was general bulging of the abdominal scar, for which a belt was advised.

Pyosalpinx Resembling Broad-Ligament Cyst.

The patient, a girl 17 years of age, was admitted to hospital with the diagnosis of appendicitis.

The story she told was that she had been ill for some weeks with pain and tenderness in the lower abdomen, which was more or less continuously present, but which varied much in severity. When it was severe she vomited occasionally, and she also complained of pain on micturition at times. Her menses were regular, though excessive. Her temperature was raised, but varied considerably from day to day. Her general health was not good, and she had lost flesh.

On examination her abdomen presented a somewhat scaphoid appearance and respiratory movements were free.

She had no rigidity of the abdominal wall, and nothing was felt in the right iliac fossa. On deep palpation over the pelvis a firm mass was felt, which was tender on pressure and fixed. As her virginity was not called in question, a provisional diagnosis of tuberculosis of the Fallopian tubes was made.

Before commencing to operate, a vaginal examination was made under anæsthesia, when it was found that two fingers could be introduced with ease. The cervix uteri was displaced well over to the left, and the right fornix was bulged downwards by a swelling which was continuous with the mass felt on abdominal examination. There was nothing to be felt in the left fornix. The diagnosis now suggested was either a pyosalpinx or an infected broad-ligament cyst.

A mid-line abdominal incision was made and the pelvis investigated with the patient in the Trendelenburg position. The right broad ligament was occupied by a swelling the size of a large duck's egg. The uterus was pushed over to the left side, and at this spot there was sufficient space to introduce a finger into the pelvis, but in the region of the swelling it was not possible to do so. Furthermore, the summit of the distended broad ligament was flush with the brim of the pelvis. Apart from a few flimsy adhesions, there was no obvious lesion in the left tube and ovary.

It was decided to incise the broad ligament along its upper border, and so to shell out the cystic swelling which occupied it. This was accordingly done, it proving easier than had been anticipated. The last portion to be separated was the attachment to the right horn of the uterus, and when this was done there was an escape of extremely foul-smelling pus from the sac into its bed. Nothing further was done, and a tube drain was placed down to the bottom of the cavity in the broad ligament and brought out of the lower end of the abdominal incision. The incision was sutured in layers in the usual way.

Subsequently there was profuse discharge of foul-smelling pus from the tube, and a persistent sinus remained for a long time. Her general health improved greatly.

On examination of the specimen it was found to be a thick-walled unilocular abscess containing very foul pus, the only indication of its being a Fallopian tube being the leak which occurred on its final separation from the uterine horn. No microscopic examination of the tissue of the wall was possible.

Pyosalpinx Containing a Round Worm.

The patient was a virgin, 16 years of age, who was admitted to hospital with abdominal pain, vomiting, and a rise of temperature.

She had been ill for some days. Her pain was situated in the lower part of the abdomen and was more or less continuous. She had vomited several times. There was some pain with micturition, producing delay in commencing the act, and being rather worse towards the end of it. Menstruation was regular, somewhat excessive, and there was accompanying pain.

On examination her general condition was good, with temperature of 100° F. and pulse of 84. With the exception of hypogastric tenderness and some rigidity, more especially marked in the right lower rectus, there was nothing to be made out on abdominal examination. It transpired that her French medical attendant had made a vaginal examination, with some difficulty, with one finger. The condition was identical with that found in the last case, the cervix uteri being displaced over to the left side, and the right fornix bulging markedly downwards and very tense. It was very tender on pressure. There was no discharge from the urethra or vagina.

The similarity to the previous case was mentioned, the possibility of its being an infected broad-ligament cyst being entertained in preference to a pyosalpinx.

Operation.—The abdomen was opened by a mid-line incision, with the patient in the Trendelenburg position. Apart from the presence of some omental adhesions and evidence of recent acute peritonitis in the pelvis, the picture presented was the exact counterpart of the previous case. The right broad ligament was greatly distended by an egg-shaped swelling almost closing up the true pelvis flush with the brim, the uterus being pushed well over to the left side, and at this spot alone could a finger be introduced into the pelvis. The left tube and ovary appeared to be normal.

The same procedure was carried out as in the last case, the right broad ligament being incised along its upper border, and the cystic structure shelled out of its bed. As the separation was being completed the cyst burst, and there was an escape of the same kind of pus as in the previous case, with foul smell. In addition, however, there floated out a round worm, 3½ ins. long, dead.

After removal of the abscess wall complete, a tube drain was introduced into its bed, but this time it was brought out into the vagina. The broad ligament was sutured completely up and the abdomen closed in layers without drainage. During the operation the appendix was seen quite free from all adhesions, and apparently normal.

Subsequently there was a discharge of foul-smelling pus per vaginam for some days, but this rapidly cleared up, and the patient made an uninterrupted recovery.

Examination of the specimen showed it to be similar in all respects to the previous one, but, as in the other case, it was impossible to have it examined microscopically.

The interesting point in this case was the presence of the round worm, and, in the absence of any sign of gut or appendix adhesion, one is constrained to believe that it had effected an entrance into the Fallopian tube through the vagina and os uteri, which would appear no easy task.

Two Unusual Cases of Inguinal Hernia.

Case I.—The patient was a female child, 3 years of age, and was admitted to hospital with a right inguinal hernia, which was increasing in size, and could not be controlled by palliative measures.

A small incision was made over the hernia, and the sac exposed and opened after division of the external oblique.

After reduction of the gut into the abdomen, the uterus and both ovaries were found to be present in the upper part of the sac. They could be returned to the abdomen, but came out again at once. On closer examination the right round ligament was found to have no intra-abdominal course, so that the right horn of the uterus was really attached to the neck of the hernial sac, and, while there was a very long broad ligament on the left side, the right one was very short and almost absent. To allow of permanent reduction of the uterus and appendages, the right round ligament was divided, and then a radical cure of the hernia was done by separating and removing the sac after ligature of its neck, the internal ring and the external oblique being sutured with catgut, and the skin with silkworm gut.

Obviously, the condition had been produced by over-action of the right round ligament of the uterus, the homologue of the gubernaculum testis.

Case II.—The patient was, in this case, a male child between 2 and 3 years of age, who was admitted to hospital with a double inguinal hernia, which was only partially reducible on either side, and reached to the upper part of the scrotum, the testis being felt free at the bottom of the scrotal sac on either side.

A small oblique incision was made over each hernia, and the external oblique divided for a short distance from the external ring.

On the right side a fairly large funicular sac was found containing coils of gut, and below this, between it and the testis, were two hydroceles of the cord, not tense, and containing about $1\frac{1}{2}$ drms. of fluid. The apex of the hernial sac projected into the first hydrocele sac, and this in its turn projected somewhat into the second. The testis with its tunica vaginalis was quite separate.

On the left side there was a similar, though less, funicular hernial sac with gut content, and below it a single hydrocele of the cord, of similar size to those found on the right side. The hernial sac projected into the hydrocele sac in a manner similar to that seen on the other side. The testis, with its tunica vaginalis, was here also quite free.

On both sides the hydrocele and hernial sacs were removed, the necks of the latter being ligatured, and the external oblique sutured with catgut and the skin with silkworm gut.

The presence of two hernial sacs and three hydroceles of the cord, apart from the complete separation of the tunica vaginalis on each side, is an unusual example of imperfect obliteration of the processus vaginalis.

RECENT ADVANCES IN MEDICAL SCIENCE.

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UNDER THE CHARGE OF

JOHN EASON, M.D., AND A. GOODALL, M.D.

The Cutaneous Aspects of Tuberculosis.

The cutaneous reactions which occur as a clinical feature in some forms of tuberculosis are equally interesting to the dermatologist and the general physician. On the one hand, an inconspicuous skin lesion may throw light on a case by suggesting a search for a tuberculous focus somewhere in the body; on the other hand, the recognition that some forms of skin disease may be due to tuberculosis may assist the dermatologist in advising treatment. The conditions in question are grouped generally as tuberculides, and they form the subject of an interesting series of papers from the Mayo clinic, by Stokes (*Amer. Journ. Med. Sci.*, February, March, and April 1919). Recent advances in the study of dermatoses tend to show that many supposed clinical entities, so styled on morphological grounds, have a multiple etiology. One of the conditions to which this applies is the erythema group, including erythema nodosum and erythema multiforme. E. nodosum is of particular interest in this respect, because on its border lie erythema induratum and the group which Darier designated "tuberculides," the relation of which to tuberculosis is generally accepted. Stokes had his attention drawn to the connection of this group of skin lesions with tubercle by a fatal case of miliary tuberculosis, the onset of which was associated with an outbreak of rheumatic purpura and erythema multiforme. The material analysed in Stokes' paper comprises a series of about forty cases of these diseases—papulo-necrotic tuberculides and erythema induratum—studied at the Mayo clinic during two years.

Erythema Nodosum Group.—The association of this disease with tuberculosis has especially been urged by French observers. Landouzy is said to have inoculated guinea-pigs successfully with tuberculosis by means of material from the lesions of this condition, and at least one other observer has confirmed the observation. On the other hand, a Gram-negative diphtheroid, apparently arising from an oral infection, has been demonstrated in some cases. The suggestion is that the etiology of erythema nodosum need not be a single one, but that embolic infarct or thrombosis due to tubercle or other bacilli may produce the lesion on a hypersensitive individual. Ten cases of the disease are reported by Stokes:—Case I. A girl, aged 24, typical E. nodosum following pharyngitis. Was ill for four weeks with pharyngitis, during the first fortnight of which she was feverish. Lost 21 lbs. during illness. No proof of tuberculosis, but on account of some indeterminate signs in lungs was placed on antituberculosis treatment. Case II. Male, 38 years. In 1911 purpura and "rheumatic" pains; at this time tuberculous cervical glands and evidences of apical disease were present. The disease became quiescent. In 1918 E. nodosum, not quite typical, inasmuch as the lesions were sluggish and did not show ecchymoses; calcified axillary tuberculous glands present. Case III. A patient, aged 31, suffering from sacro-iliac disease with a sinus, gave a history of purpura following on influenza two and a half years previously. The scars following the so-called "purpura" were typically those of a tuberculide. Case IV. A woman, aged 33, gave a history of anæmia and a lump in the neck two years previously. She was admitted to the clinic on account of erythema nodosum. The gland in the neck was shown to be tuberculous, and there was healed disease of both apices. The erythematous nodules were pale, and approached the E. multiforme type. Notwithstanding treatment, they continued to appear, and after about a year assumed the characters of erythema induratum. Case V. is that of a girl previously operated on for cervical adenitis, in whom the disease was spreading, and who became affected by E. nodosum, approaching the indurative type. Case VI. is that of a man, aged 44, with enlarged cervical glands, inconclusive lung signs, fever, and erythema multiforme of wrists, erythema nodosum over tibiæ, and a few pustular lesions suggesting acute generalised miliary tuberculosis of the skin. Case VII. was one of erythema multiforme, followed by papulo-necrotic tuberculides, in a girl with a very bad tuberculous family history, and suspicious signs at one apex. Case VIII. was an obese woman of 30, with papulo-necrotic lesions and purpura. No visceral or glandular focus could be detected. Case IX. was a typical one of E. nodosum, with joint pains and a pleural effusion; she had septic tonsils and teeth. All signs cleared up under salicylates. Case X. was a woman with marked arthritic E. nodosum, phlyctenular conjunctivitis, and enlarged glands at the right hilus.

This forms a very interesting series of clinical observation, revealing a relationship between purpura, erythema multiforme, nodosum, and induratum, and papulo-necrotic tuberculides in persons who were either proved to be, or suspected of being, tuberculous. Stokes suggests the following provisional clinical distinctions between (1) tuberculous erythema nodosum, and (2) "streptococcal" erythema nodosum. In (1) nodes smaller, more circumscribed, and with less tendency to ecchymosis. Tend to be localised on the posterior aspect of the legs. Paler, colour changes less, more chronic, and less tender. In (2) nodules larger, brawny, hæmorrhagic, more superficial. Distribution, anterior parts of limbs, especially shins. Colour changes, those of a bruise. Symptoms and course more acute.

To throw further light on this problem the following points require study:—(1) Search for evidence of previous tuberculosis in patients suffering from E. multiforme, etc. (2) Inquiry as to previous dermatoses of this group in tuberculous patients. (3) Investigation of throat and accessory sinuses, and radiographic examination of teeth for pyogenic foci. (4) Systematic examination of temperature, and leucocyte counts, in such cases.

Tuberculides.—This term was applied by Darier to describe a group of lesions associated with tuberculosis of the viscera, which did not necessarily show the characteristic pathological anatomy of tuberculosis of other structures. Lupus vulgaris is a true tuberculosis of the skin, whereas the papulo-necrotic tuberculide is a non-specific type of inflammatory reaction, consisting of a papule with a central necrotic plug which heals, leaving a punctate atrophic scar. Among tuberculides, there are recognised as such:—(1) Lichen scrofulosorum; (2) the papulo-necrotic tuberculide as above, with its subtype, acnitis, appearing on the face; and (3) erythema induratum or Bazin's disease. In addition to these, other skin diseases are also held by some to be tuberculides—pityriasis rubra pilaris, acne necrotica, lupus pernio. The explanation of the unvarying relation of certain lesions, the architecture of which is not tuberculous, with tuberculosis is not clear. The view which has most supporters is that, while most or all are due to hæmogenous infection with bacilli, the variation in the lesions is due to varied reactivity of the individual. The papulo-necrotic tuberculide is supposed to be due to a bacillary embolus, which causes local anaphylaxis, with destruction of the tissues and bacilli in the centre where the reaction is most intense. The morphological analogy between the papule of the von Pirquet reaction, the papulo-necrotic tuberculide, and the lesion of erythema induratum is pointed out. Stokes discusses very fully the differential diagnosis of the various tuberculides from other skin lesions, but this part of his paper does not lend itself to summary, and should be consulted in the original. (In this connection, also, a series of papers in the *Journal of Cutaneous Diseases* for February 1919, where the whole subject is discussed from the dermatological point of view, may be referred to.) One general feature of interest is that these lesions tend to occur where the peripheral circulation is feeble, as shown by cyanosis and vasomotor anomalies—blue, clammy, mottled hands, or œdematous cyanosed legs. There is also noticeable a periodicity in the development of the lesions, which are most frequent in the spring, and next so in the autumn. In Stokes' series of cases the collateral infections elicited by anamnesis are of interest—tonsilitis, 39 per cent.; "rheumatism," 46 per cent.; pneumonia, 29 per cent.; influenza, 54 per cent.; pleurisy, 18 per cent. The "rheumatic" symptoms belonged almost entirely to the indefinite group of neuritides, arthralgias, and myalgias, and the point made is that these, so far from being looked on as evidence of a true rheumatic infection, should raise the suspicion of tuberculosis. The findings in the tonsils of these patients confirmed the anamnesis, inasmuch as no case had quite healthy tonsils. It was not found, however, that the worst, most septic, tonsils were associated with the bad cases of skin lesion—rather the reverse. On the whole, it does not appear that tonsillar infection can be looked on as more than a possible predisposing factor.

Treatment.—Twenty patients underwent treatment; all were of the type which is resistant to the tuberculous infection, inasmuch as such active symptoms as cough, hæmoptysis, and night-sweats were absent. Most showed some pallor, asthenia, mild grades of fever, and loss of weight. The cutaneous tuberculide was chronic, with little tendency to remission. The group, therefore, was a good one on which to test a new remedy (arsphenamine), since the presumption was against spontaneous improvement. In the first place, it may be stated that the surgical removal of a tuberculous foci does not cure or improve the skin lesions. The results of tuberculin on papulo-necrotic tuberculides is indifferent or bad. Vaccines (in cases with septic foci), X-rays, arsenic, mercury, and local, even surgical, measures had been tried in this series of cases, without marked benefit. Stokes employed (1) arsphenamine (salvarsan—"606") combined with (2) X-raying of accessible foci of glandular tuberculosis, (3) antituberculous outdoor regime, (4) forced feeding, (5) removal of secondary pyogenic foci, and (6) the correction of vascular stasis in the extremities. The average course is six injections, at weekly intervals, the average dose being 0·4 to 0·5 grm. On account of tendency to seasonal recurrence the course was repeated in spring and autumn. Improvement is judged of (*a*) in the skin lesion, (*b*) in the constitutional condition, (*c*) in tuberculous foci. In most cases the results in the skin lesion were prompt and usually complete; in all some improvement occurred. The constitutional condition underwent a marked change for the better, and the foci also benefited. Stokes writes about the results of treatment cautiously, and does not make undue claims for a method which (from the cases recorded) seems to have been fairly successful.

Conclusions.—This review may be concluded by a synopsis of some of his conclusions:—(1) There is a relationship between tuberculosis and the erythematous group of lesions mentioned. (2) These lesions may be conceived as cutaneous reactions to hæmatogenously distributed bacilli deposited in a hypersensitive skin. (3) Since the "tuberculous" erythemata cannot be diagnosed clinically from the non-tuberculous types, all cases demand a careful search for a tuberculous focus, and ought to be subjected to re-examination at subsequent intervals from this point of view. (4) Erythema induratum may be looked on as a chronic ulcerative phase of tuberculous erythema nodosum.

(5) Papulo-necrotic tuberculides are of great assistance in the diagnosis of obscure tuberculosis. In this series one-fourth of the patients had a family history, 57 per cent. definite signs, and 70 per cent. presumptive signs, of the disease. (6) The type and locality of the tuberculous focus do not influence the tuberculide, beyond the marked association of glandular enlargement. (7) The influence of vascular abnormalities and chronic venous congestion is very apparent. (8) Slight fever, loss of weight, amenorrhœa, leucopenia, and vernal periodicity are significant. (9) Rheumatic symptoms are common and often misinterpreted. (10) Active tubercle is rather rare. (11) The appearance or persistence of a tuberculide after reasonably complete surgery is an indication for the discontinuance of surgical treatment, and the adoption of medical measures for fortifying the patient against progress or recurrence of his infection. (12) Tentatively, salvarsan, along with other measures enumerated above, seem to offer fair prospects.

THERAPEUTICS.

UNDER THE CHARGE OF

JOHN ORR, M.D.

Treatment of Amœbic Dysentery by Rectal Injections of Neosalvarsan.

Dr. Paul Calame has a short paper (*Rev. méd. de la Suisse rom.*, February 1918) on this subject, and gives a short *résumé* of the parasitology of amœbic dysentery. Among other points he shows that the parasites are sometimes obtainable by scraping from the rectal ulcers by the aid of a sigmoidoscope when they are not found in the dejecta. Cases occur where the affection is chronic and the amœbæ are embedded in hard indurated infiltrations in the bowel, and he finds that such cases are not reached by ipecacuanha or by emetine excreted from the blood into the intestine. He accounts for the failure of cases to respond to emetine by the fact that the amœbæ are kept from contact with the drug by the infiltrations around them. He has found, however, that such cases can be well treated by rectal injections of neosalvarsan, and gives clinical results of his use of this. Cessation of diarrhœa, occurrence of regular formed motions, disappearance of amœbæ, gain in weight, and feeling of well-being are the events which have followed the use of this treatment after the failure of ipecacuanha and its derivatives.

Emetine Diarrhœa.

It has been known for some time that if massive doses of emetine are injected into animals, diarrhœa occurs when the large amount of the drug is excreted into the intestine, and that this may be accompanied by blood and mucus. Kilgore and Liu (*Arch. of Inter. Med.*, August 1917) cite three cases in children treated for amœbic dysentery by emetine where severe diarrhœa occurred, and ceased when the drug was stopped. It is pointed out that this occurred in spite of the belief that children are more tolerant of emetine than adults in proportion to their body weight. These cases seem to indicate that this idea of a special tolerance in children must be subjected to reconsideration.

Amœbic Dysentery in England.

Warrington Yorke (*Brit. Med. Journ.*, 12th April 1919) contributes a valuable review of the question as to whether persons who are dysentery carriers have really acquired the disease abroad or have had the disease before leaving this country. He has found that quite a large number of recruits were carriers when they joined the Army, and is of opinion that there is a special tendency in young men to have this disease in a latent form. He refers to the prevalence of the disease in asylum inmates, and thinks that there is evidence that miners are perhaps liable to it in a special degree. But most of these carriers do not develop acute dysentery, and the author believes that there must be some special consideration, the nature of which is at present unknown, which determines this occurrence. He is of opinion that the best treatment for most cases is the use of a saline purge, emetine hydrochlor., 1 gr., subcutaneously, and bismuth subnit., 20 grs., three or four times daily for twelve days.

Emetine-Bismuth-Iodide in Amœbic Dysentery Carriers.

Lillie and Shepheard (*Journ. R.A.M.C.*, December 1917) show that the percentage of carriers cured by this substance is higher when the patients have had no previous injections of emetine. No good reasons are adduced to account for the difference. It is generally admitted that some cases fail to respond to emetine in any form, and the explanation offered by Dr. Calame may be correct, viz. that the degree and effects of chronicity determine this. The amount of emetine-bismuth-iodide required varies a good deal, and the author uses 30 to 200 grs. As other authors have found, so does this paper record that the sickness produced by the drug does not militate apparently against its beneficial action. But keratin or salol coating—especially the latter—has been found distinctly useful in ameliorating the intestinal and gastric disturbance.

Intestinal Disinfection by Benzonaphthol in Goitre.

Dr. Messerli (*Rev. méd. de la Suisse rom.*, April 1918) reverts to this subject, on which he has written before. He has found that soft parenchymatous goitres are prone to undergo gradual diminution when the patient is submitted to a course of intestinal antiseptics, and more particularly to benzonaphthol. Cases are cited by the author in which the soft goitrous swelling undergoes diminution, the measurements round the neck decreasing, and the pressure symptoms abating and ultimately becoming absent. He claims that the method of treatment is all the more valuable in the case of persons who have an idiosyncrasy against iodine.

The Medical Treatment of Graves' Disease.

Gordinier contributes a long article (*Therap. Gaz.*, June 1918) on this subject. Much of the ground covered by the article is familiar. But the author makes a special plea for the recognition of focal or general infections as important causal agencies, and pleads for their precise determination and removal. He quotes illustrative cases, including an acute case which occurred during the course of scarlatina. Rest is insisted upon, and the period must vary with the results obtained. Not till the circulation is quiet and stable will the author permit the period of rest to come to an end. Diet is generous, including milk, butter, eggs, cereals, fats, vegetables and fruit, and, except in toxic cases, fish, chicken, and lamb, with beef strictly limited, and stimulants, such as tea, coffee, alcohol, spices, and acids, excluded. The drug most favoured is neutral quinine hydrobromide, in doses of 3 to 5 grs. three or four times daily, continuing for a long time, even months, with occasional interruptions only. He also believes in the value of phosphorus pills, $\frac{1}{100}$ to $\frac{1}{30}$ gr., and quotes six cases of cure from this remedy. In this relation he quotes the belief of Kocher that sod. phosphate acts as a direct antidote to the iodine-containing substance of the thyroid. Of the value of X-rays the author admits he has no experience, but quotes the work of Schwartz, Stoney, Fisher, and Malcolm Seymour, and records their favourable opinion as to its value. Gordinier's views are corroborated by Means and Aub in a paper (*Journ. Amer. Med. Assoc.*, July 1917) in which they conclude that rest is the only reliable means of combating the disease, and that X-rays may assist; and if these means fail to arrest the disease, recourse should then be had to surgery.

Vaccine Treatment of Whooping-Cough.

A number of papers have appeared which advocate the use of vaccine for prophylaxis and cure of this affection. The vaccine used has been obtained from Bordet bacilli with or without the addition of pneumococci, and the dosage has been 250 to 1000 million for each dose. The conclusions reached by the various authors are substantially the same, and may be stated shortly to be that this vaccine therapy is free from harmful effects and from risk of anaphylaxis, that the paroxysmal stage of the disease is shortened and its severity ameliorated, that vomiting is diminished, as would, of course, be expected from lessening of the spasms, that complications are fewer, and that the safety is such that vaccine may be administered to infants so young as six weeks.

Turpentine in Hæmorrhage.

Allan contributes (*Prescriber,* February 1918) a short article on the use of turpentine as a local hæmostatic, and cites several illustrative cases where it has been beneficial, such as hæmorrhage from a sliced finger, after nasal operations, and following tooth extraction. He suggests that it be used on gauze which has been soaked in the drug and squeezed. There can be no doubt that this article comes timeously to remind us of a remedy which has been perhaps a little overlooked as a hæmostatic. The author might have referred to its usefulness as a remote hæmostatic, and alluded to its beneficial action in hæmoptysis, purpura, and such-like affections, in which it is quite reliable and easily obtainable as a rule under conditions of emergency.

Quinine Bihydrochloride, Sodium Cacodylate in Chronic Malaria.

Dr. John C. Clark (*Therap. Gaz.*, July 1918) gives a full account of the intravenous use of these drugs in malaria, embodying the result of observations on fifty-seven cases. The former drug is selected because of its great solubility, and the latter because of the slow detachment of the arsenic from the molecule. The author has used 1 gr. quinine bihydrochloride per 10 lbs. of body weight, and 1 gr. sodium cacodylate per 50 lbs. body weight, these doses being given daily for five days, then every fifth day for thirty-five days. The results obtained were satisfactory as regards the immediate effects, the freedom from relapse or recurrence, and the disappearance of parasites from the blood.

Eye Symptoms in Cinchonism.

Cases of affection of vision may occur from time to time while a patient is under treatment for malaria, and Fernandez in a recent paper raises the question as to whether quinine or malaria, or both in combination, may be responsible. Schweinitz and Holden have worked experimentally and clinically on this subject, and have shown that in some animals quinine may produce contraction of the retinal vessels and optic atrophy. It would appear that in the human subject idiosyncrasy plays an important part, for the dose which has caused eye affections of an alarming character has been comparatively small, and has produced its evil effect at an early date after administration ; and, as the symptoms may be serious as regards vision prognosis, the question arises as to the immediate disuse of quinine in cases where evidence of ocular idiosyncrasy appears. This point seems to be determined by the comparative seriousness of the affection for which the quinine is being administered. Sinton (*Indian Med. Gaz.*, September 1918) cites five cases where idiosyncrasy played an all-important part in the incidence of unpleasant symptoms of cinchonism, including œdema of the eyelids, conjunctivitis, and urticaria, one case in particular developing a condition bordering on coma, and showing dilated pupils, conjunctivitis, and urticaria.

Treatment of Sciatica.

It is almost a matter of reproach that an affection so common as sciatica should be so little amenable to modern treatment, and yet it would be difficult to find an affection wherein therapeutic measures show up so badly. It is therefore necessary to bring forward any remedy, old or new, which affords a chance of removing this stigma. The *Lancet* of 14th July 1917 has an article containing reference to the observations of Harrington Sainsbury and of Wingfield on the good effect of local applications of strong hydrochloric acid to the skin over the nerve, and indicating the benefit conferred by this remedy in sciatica and other forms of painful neuritis. Gennetas and Bayliss record twelve and sixteen cases respectively, in most of whom great improvement occurred, and all the cases so treated had so far proved unamenable to other treatment. Rather less satisfactory is a paper by Allen and Parrish (*Med. Gaz.*, June 1918), where three cases of sciatica have been cured by spinal puncture and the removal of about 30 c.c. fluid, that is to say, less satisfactory, in that the authors admit the absence of any rationale in this mode of treatment, although, from the point of view of success, in every way satisfactory. All the cases were males, aged 20, 31, and 50 respectively, and the improvement is recorded as having been immediate, and, so far as observed, permanent.

REPORTS OF SOCIETIES.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.

A MEETING was held on 14th May 1919, the President, Dr. John Playfair, in the chair.

PRESIDENT'S ADDRESS.

Fellow-members of the Edinburgh Medico-Chirurgical Society,—My first duty as your President is to congratulate you on the resumption of our meetings after the years of strain and horror from which the nation has victoriously emerged, and I am sure I express the feelings of every member of this Society when I say we are all truly thankful to an overruling and merciful Providence that the nation, stricken and tried though it has been, closed its ranks and stood the strain as it has done, and is now, we hope, about to enter upon a time of liberty and peace.

It is too much to hope that it is to be a time of permanent unbroken peace, but we have good reason to think that in all time coming no nation will be able to break the world's peace and begin a war of aggrandisement and oppression as easily and wilfully as Germany began the criminal and devastating war of 1914.

Those four and a half years of war have, no doubt, brought out many good qualities in our nation, and have strengthened the ties between the Mother Country and the Colonies in a way which probably could not otherwise have been accomplished. The war has also brought together peoples of different nationalities, and made them understand each other better than they ever did before. All this, we hope, will make for the peace and ultimate good of the world, but, nevertheless, those four and a half years of war have been a time of immense material and scientific loss to the world. No doubt there never was a time of greater increase and stimulation of inventive power, but it was chiefly directed to the carrying on of war measures, with all their destructive and devastating effects. The moral and material well-being of the nation was left, to some extent at least, in a condition of suspended animation.

Almost all meetings and societies devoted to science and art ceased their efforts, and much loss to civilisation and national progress has thereby been caused. It is devoutly to be hoped that the whole nation will now close its ranks, as it did when Germany threatened it with national destruction, and that all classes will work together with brain and hands to make up the loss of those dark and dangerous years of war.

Our profession has many interesting and difficult questions and problems before it waiting for solution. There are changes, too, impending which may alter the whole tone and course of our professional life.

Let us endeavour to look reasonably on the Governmental changes which are coming, and if we cannot all see eye to eye, at least let us try to preserve that feeling of brotherhood and comradeship which has always been the distinguishing mark of our profession. With those few imperfect remarks I reopen the meetings of our Society, but while we congratulate ourselves on the happier times upon which we hope we are entering, it is only right and becoming, and I am sure you will all expect it of me, that I should refer to the blanks in our numbers which have been caused by the war, and that I should ask the Society to offer to the bereaved and sorrowing relatives of those who have fallen an expression of its deepest and heartfelt sympathy. It is not the time nor the place, I feel, to make any eulogistic statement regarding the members of this Society who have thus given their lives for their country. Besides, it is not necessary, as you all knew them as well, if not better, than I did, and their loss has touched you as deeply as it has me. I content myself with mentioning their names—Dr. Russell Wood, Dr. Melville Dunlop, Mr. Denis Cotterill, Dr. W. Guthrie Porter, Dr. E. F. T. Price, Dr. A. A. Ross. While these are, so far as I know, all our friends and fellow-members who have died in the service of their country, it does not by any means represent the total loss which the members of this Society have sustained. Some have lost sons or other near relatives, and I am sure I am right in stating that several members of our Society, over-worked and over-anxious, through the absence of so many of their fellow-practitioners, have died, and thus as truly given their lives for their country as those who died on active service. The medical profession of Edinburgh has, I think, reason to be proud of what it has done to help to win the war. Nearly 50 per cent. of its members have been on active service, and of that number a not insignificant proportion have been faithful "even unto death."

INTRODUCTION TO DISCUSSION ON THE INFLUENZA EPIDEMIC.

By Professor RUSSELL.

In March 1890, twenty-nine years ago, this Society devoted one of its meetings to the discussion of the influenza epidemic then prevailing. The discussion was opened by Dr. Brackenridge in a long paper replete with careful clinical observations and containing references to and opinions on points under discussion at that time. The names of those who took part in the discussion were Surgeon-Major Black, Drs. M'Bride, Andrew Balfour, Buchan, Allan Jamieson, Clouston, Littlejohn, Barrett, Chiene, Caverhill, Craig, James Ritchie, K. M. Douglas, and Felkin. Dr. Brackenridge thought the disease was "probably due to a micro-organism" but he referred all the symptoms to the nervous system. From the record of the discussion in the Society's *Transactions* there is no doubt that the malady of that time was essentially the same as that which has swept over the world in recent months.

In the fifteen minutes allowed to me in opening the discussion to-night I cannot do more than suggest the lines which the discussion might follow.

We naturally begin with clinical phenomena, and from that standpoint we can define the present epidemic, which is really pandemic, as *an acute febrile infective disease primarily attacking the respiratory system.* The degree and extent of involvement of this system vary greatly. It is often an intense inflammation and congestion, confined apparently to the lower part of the trachea and the two main bronchi; it often involves the whole bronchial system, and it is frequently associated with great congestion and œdema of lung alveoli. In some of these cases there are limited areas of consolidation, with bronchial breathing. These cases provide the special and irregular respiratory phenomena of the epidemic. To these, however, have to be added many cases of true lobar pneumonia, of pleuro-pneumonia, and of empyema following upon the latter. That all these have been swept into and included in the term "influenza" is undoubted. The clinical phenomena presented by this composite mass of cases have doubtless been noted by every member of the Society and have elicited more or less satisfactory explanations. I need not dwell upon them.

The next point I submit is that the epidemic is micro-organismal in origin. This point will be accepted presumably without question by the Society. On this assumption it is unnecessary to do more than remind you that the determination of the character of the attacking organism or organisms is of first-rate importance even from the standpoint of therapeutics. And when that knowledge is attained, we have to remember that the virulence of definite pathogenic micro-organisms varies, and that the susceptibility of individuals and of communities varies greatly not only to the toxins of micro-organisms but to other toxins. The result is that micro-organismal diseases vary in their clinical manifestations within very wide limits—a fact known to all medical men who are responsible for the diagnosis of maladies and the treatment of individual sick persons.

Before passing, in the next place, to the micro-organismal factors in the present pandemic I would venture to remind you of an important fact accepted by all of us, namely, that certain diseases are due to a micro-organism getting lodgment in the human body. Such diseases are tuberculosis, cholera, bubonic plague, tetanus, diphtheria. In the present epidemic, called influenza, there is no such reservation. We have here to deal with a group of micro-organisms which either separately or conjunctly find entrance to, and a more or less suitable growing and breeding place in, the respiratory tract, while the products of their activity may affect every system in the body and produce a grave or fatal toxæmia.

The principal organisms present are the influenza bacillus, the pneumococcus, and a streptococcus. To this has probably to be added a diplo-streptococcus, the relations of which to the pneumococcus and to the streptococcus is, I believe, being at present investigated. A filter-passing coccus is also claimed to be present in some cases of so-called influenza.

That the first three organisms mentioned have been the prominent ones in the epidemic has been established, I think, beyond question. The position of the influenza bacillus by itself has yet to be determ ned. The pneumococcus by itself has been the potent organism in many cases, varying greatly in the severity of the symptoms, affecting in some the respiratory tubes only; in others the alveoli of a lobe, or part of a lobe, and presenting, then, the features, and running the course of, classical croupous pneumonia. Streptococcal cases have been most common in certain conditions of living, as on shipboard; amongst certain communities and races, as in South Africa, India, and elsewhere; and the virulence has evidently been very great.

Association or copartnery of these organisms has also been established. The presence of the influenza bacillus with the pneumococcus or the streptococcus has been definitely established in many cases. The association of the influenza bacillus and the pneumococcus leads, in my experience, to widespread involvement of the respiratory system, a long and anxious illness, and often to death. Clinically, these cases are quite different from the unassociated pneumococcal cases. Of streptococcal cases I have had no experience, unless a coccus, which becomes a diplococcus and forms chains, is the organism referred to. Of the association of the influenza bacillus with the streptococcus I cannot therefore speak from personal experience, although I, of course, know that the association occurs, and I should surmise that the combination must be very hurtful.

Of the high virulence of these organisms separately, or in such combination as has been mentioned, during the epidemic there seems to be no doubt. It seems to me that while we call this pandemic "influenza," the influenza bacillus is only one of a group of micro-organisms which have attained what we may hope is their acme of virulence. The conditions which have determined this exaltation of virulence we do not know; and if we turn for an explanation of prevalence and mortality, of vulnerability and immunity to war conditions or to food rationing, we have again to acknowledge ignorance of the problem or problems underlying the assumption. We know of diminution and of accentuation of virulence; we know of degrees of susceptibility and of immunity; the further problems are for the future to solve.

In addition to prolonged myocardial enfeeblement and general depression of nervous energy the most interesting complications, accompaniments, or sequelæ I have seen include three cases of what I venture to call "post-influenzal delirium"; one of the patients was supposed to be going insane, two others were thought to be beginning with meningitis. The three recovered. I have had one case of pneumococcal meningitis which was rapidly fatal; five cases of empyema; one of acute parotitis which did not suppurate; one subacute abscess underneath the gluteus muscle due to the pneumococcus.

As regards treatment, we have all had our individual experience. I have used alcohol, camphor in oil, digitalis occasionally, and quinine urea hydrochloride. There is, I fear, no specific. My own belief is that in the future vaccines will constitute our most valuable line of treatment, but I have dealt with this and other points in a recent number of the *Lancet*, and I shall merely add that I look to-night for an expression of the experience of others on the use of vaccines.

NOTES ON THE INFLUENZA MORTALITY IN SCOTLAND DURING THE PERIOD JULY 1918 TO MARCH 1919.

By J. C. DUNLOP, M.D., F.R.C.P.(Edin.).

SOME statistical facts regarding the mortality caused in Scotland by influenza during recent months are now available, and perhaps a few notes on them will be of interest in the present discussion.

Three distinct epidemics of influenza have recently occurred. The first was in July and in the earlier part of August last, the second in October and November, and the third in February and March of this year. These three epidemics can readily be traced in the weekly reports of the Registrar-General. That series of reports deals with the demographic records of the sixteen principal towns only, but as these towns contain approximately half the total population of Scotland it may be assumed that what is found to occur in them is indicative of what is occurring throughout the country generally. It would be more strictly accurate to state that there have been four recent epidemics, for, in addition to the three well-marked ones, there was a milder one recognisable in Glasgow in the month of May, but as it was both more limited and milder than the three now being considered I omit any further reference to it. (In it the Glasgow death-rate rose from 14·1 to 20·1, and the weekly number of deaths from pneumonia and bronchitis from 36 to 107.)

In June, that is, before the first of the three epidemics, the collective monthly death-rate of the sixteen towns varied from 10·9 to 12·0 per thousand. In July this rate rose markedly, being 13·9, 15·0, 17·4, and 14·2 in the four weeks respectively. During August and September it was low, falling on one occasion to the unusually low figure of 9·4, but in October and November it was again high, during the nine weeks ranging between 19·0 and 30·5. In December and in January the weekly death-rate remained within normal limits, varying between 14·8 and 19·8, but in February and in March was again excessively high, being constantly over 20, and attaining a maximum of 40·0, that rate occurring in the week ending 31st March. Since March the weekly death-rate has again fallen and is now—May—within normal limits.

The same time-distribution of the epidemics is evident in the variations of the Glasgow and Edinburgh weekly death-rates. In the July epidemic the Glasgow death-rate rose from 11·7 to 15·9, and the Edinburgh death-rate from 11·3 to 18·0. In the October-November epidemic the Glasgow rate rose from 11·0 to 38·4, and the Edinburgh from 10·8 to 46·2. In the February-March epidemic the Glasgow rate rose from 14·9 to 48·3, and the Edinburgh from 18·9 to 52·1. When quoting these figures I may draw attention to the great height to which the death-rates of Glasgow and Edinburgh rose during two of these epidemics; higher rates occurred in some of the smaller of the sixteen towns, but considering the large populations of Glasgow and Edinburgh, and the consequent significance of changes in the death-rate, better proof of the severity of the epidemics need not be sought.

During the period of these three epidemics, July 1918 to March 1919, influenza was named as a cause of death, either primary or secondary, in 16,917 certificates, but there is every probability that even this large number imperfectly shews the total mortality attributable to influenza, as almost certainly many died from complications of influenza, more especially pneumonia, without influenza being stated as a cause of death. This opinion is based on two facts, the one that the increase of the total deaths registered was much larger than accounted for by those certified as due to influenza, and the other that deaths certified as due to influenzal pneumonia, or to pneumonia, or bronchitis, or pleurisy along with influenza, were far short of the excessive number of deaths from pneumonia, bronchitis, and pleurisy reported during the period. During the nine months July 1918 to March 1919 the total deaths registered in Scotland numbered 72,731, which number is 25,773 in excess of that registered in the period July 1917 to March 1918, and 18,457 more than the mean of the numbers registered in the five previous July to March periods. It may be a matter of opinion which of these two comparisons is the more reliable as a measure of the increased mortality caused by the influenza epidemics, but whichever be taken it is evident that the total excess of deaths outnumbers the deaths certified as due to influenza. Limiting to the more severe epidemic periods, and using the figures of the three periods 7th July to 10th August, 22nd September to 14th December, and 26th January to 29th March, it is found that the total excess of deaths in the sixteen principal towns from pneumonia, bronchitis, and pleurisy over a strictly comparable five-year average amounts to 8952, while the total deaths certified as caused by influenza in the same towns and during the same period amounted only to 7453, the former, the excess of pneumonia, bronchitis, and pleurisy deaths being 1499 in excess of the latter. It is reasonable to ascribe this excess to the effect of the epidemics and to infer that the true number of influenzal deaths is correspondingly more than the number of death certificates found with influenza as a named cause. This excess amounts to 20·1 per cent. of the certificates with influenza named, and by applying that proportion to the total number of such certificates the total number of influenza deaths in Scotland may be assessed at 20,000.

Neither of the foregoing comparisons is an absolute and sure guide as to the true number of influenza deaths, but both are such as, in my opinion, to justify a statement that the total mortality caused by these epidemics in Scotland should be assessed at over 20,000. It seems hardly necessary to draw attention to the fact that this mortality is greater than that caused by any previous epidemic in Scotland since the institution of national registration, and that is since the year 1855.

A full tabulation of all the 16,917 death certificates on which influenza is a named cause of death is not yet available, but I have at my disposal such a tabulation of those registered up to the end of December last, and this tabulation includes 10,797 such certificates.

Of these 10,797 deaths, 5662, or 52·44 per cent., were of females, and 5135, or 47·56 per cent., of males, the female deaths outnumbering the male by 527. The equivalent annual influenzal death-rate is 4·38 per thousand, that of the male population being 4·30, and of the female population, 4·46.

A study of the ages at death recorded in the 10,797 cases registered as caused by influenza brings out the fact that the most frequent are those between 25 and 35, these including adults in the prime of life. The number of deaths of persons between 25 and 35 was 2729 and constituted 25·28 per cent. of the total. Large numbers are also found in age periods 15 to 25, and 35 to 45, the former being 1803, and the latter 1286, the former constituted 16·70 per cent. of the total, and the latter 11·91. Thus between age 15 and age 45 these influenza deaths numbered 5818, and amounted to 53·89 per cent. of the total.

The highest age-group death-rates occurred in age-groups 75 and over, and 25 to 35, the former being 7·87 per thousand, and the latter

7·12. High rates also occurred in age-groups under 1, and 65 to 75, the former being 6·49, and the latter 5·53. The lowest age-group death-rates are found in the groups which include children of school age, 5 to 15, the death-rate in age-group 5 to 10 being 2·20, and in age-group 10 to 15, 1·80.

The age-distribution of the 10,797 deaths and the death-rate of each age-group is shown in the following tabular statement:—

Ages.	Influenza Deaths.	Deaths per cent. of Total Influenza Deaths.	Age-Group Death-Rates.
Under 1 . .	364	3·37	6·49
1 to 5 . .	1177	10·90	5·36
5 to 10 . .	584	5·41	2·20
10 to 15 . .	456	4·22	1·80
15 to 25 . .	1803	16·70	3·95
25 to 35 . .	2729	25·28	7·12
35 to 45 . .	1286	11·91	4·14
45 to 55 . .	935	8·66	4·04
55 to 65 . .	639	5·92	4·17
65 to 75 . .	529	4·90	5·53
75 and over .	295	2·73	7·87
Total .	10,797	100·00	4·38

In 1749 cases, or 16·20 per cent. of the total, influenza was the sole cause named in the certificates, or given as one of two causes, while the other named was, from a medico-statistical point of view, insignificant—such insignificant causes include heart failure, syncope, dropsy, teething, and the like. Conversely, the death certificates which named some complicating condition in addition to influenza numbered 9048 and constituted 83·80 per cent. of the total. The obvious deduction from this is that influenza is comparatively seldom a cause of death unless there be some serious complication.

The most frequent complication is found to be pneumonia, no less than 7020, or 65·02 per cent. of the total being so certified. Of these 7020 deaths, 1974 were ascribed to influenza and broncho-pneumonia, and the remainder, 5046, to lobar pneumonia or to pneumonia not otherwise specified. The largest number of these pneumonia deaths occurred in age-periods 15 to 25, and 25 to 35, that in the former being 1332, and in the latter 2061. The high frequency of pneumonia deaths in these age-groups explains the heavy influenza mortality in them. Of the total influenza deaths in age-group 25 to 35, 75·5 per cent. were complicated by pneumonia, and of those in age-group 15 to 25, 73·9 per cent.

Bronchitis was returned as a complicating condition in 645 instances, and that is in 5·97 per cent. of the total. The majority of these deaths were at ages 45 and over.

Other diseases named in comparatively great frequency in the influenza death certificates include heart diseases (244), respiratory diseases other than pneumonia and bronchitis (210), diseases and accidents of pregnancy and parturition (182), pulmonary tuberculosis (181), meningitis other than tuberculous or cerebro-spinal (179), other epidemic diseases (77), and tuberculosis other than pulmonary (35). The foregoing include all the 10,797 certificates, with the exception of 275, these being distributed in small numbers between a multitude of causes.

The other epidemic disease named along with influenza in the death certificates in 4 cases was enteric fever; in 9 cases, measles; in 7, scarlet fever; in 43, whooping-cough; in 8, diphtheria or croup; in 1, dysentery; and in 1, paratyphoid.

The comparatively large number of instances in which influenza was named in death certificates, along with diseases and accidents of pregnancy and childbirth, suggests that there is a considerable risk to life when a pregnant woman is attacked by influenza.

To recapitulate these somewhat fragmentary notes I may formulate the following conclusions, namely:—

1. Influenza deaths during the recent epidemics numbered at least 16,917, and probably numbered much more, 20,000 being a very moderate estimate.

2. That influenza deaths are most frequent in the age-periods which include adults in the prime of life, namely, ages 15 to 45.

3. That in a comparatively small number of instances was influenza the sole named cause of death, while in the majority of instances some complicating disease was named, by far the most frequent being pneumonia.

(*To be continued.*)

NEW BOOKS.

Sir William Turner, K.C.B., F.R.S.: A Chapter in Medical History. By A. LOGAN TURNER. Pp. xvi + 514. With Portraits. Edinburgh: Wm. Blackwood & Sons. 1919. Price 18s. net.

A FAITHFUL biography of Sir William Turner could not have been otherwise than "A Chapter in Medical History," and when Dr. Logan Turner adopted this subtitle he was perhaps unconsciously recalling Carlyle's *dictum* that "Universal history is at bottom the history of the great men who have worked here." In his own sphere of activity Turner may, without exaggeration, be placed among the great men—"the leaders of men, . . . the modellers, patterns, and, in a wide sense, creators, of whatsoever the general mass of men contrived to do or to attain."

The early chapters of this most readable book reveal to us the man we knew in the making, his boyhood differing from that of the majority of boys only in that he showed a greater fondness for living with Nature than for games; his apprenticeship, during which he concentrated his attention on the fundamental sciences underlying the practice of the profession he had adopted, and learned in the hard school of experience the art of overcoming difficulties, both substantive and subjective; and, finally, his undergraduate struggles and triumphs. As Turner left no autobiographical data, we learn less of his early life than we could have wished, but enough to let us recognise the influences which worked to mould his character and to guide his actions through life. The scanty material at the disposal of his biographer has been skilfully used to show that it was filial devotion that directed his early efforts to overcome material difficulties, that self-reliance and a determination to do with all his might whatsoever his hand found to do were inborn qualities of the man, and that the early struggles of his youth laid the foundations of that tenacity of purpose which characterised his later life.

At the age of eighteen Turner left his native town of Lancaster to begin his medical course at St. Bartholomew's Hospital, where he met as fellow-students a number of men who subsequently took a high place in the world of medicine—Thomas Smith, William Newman, John Russell Reynolds, John Syer Bristowe, Frederick William Pavy, Henry Enfield Roscoe, and Joseph Lister. Among this brilliant band Turner took a leading place, and it is worthy of note that throughout his undergraduate career he excelled in the more purely scientific subjects rather than in those which were clinical. Chemistry was his favourite subject, and anatomy was not even second.

Soon after joining Bart's Turner attracted the attention of Sir James Paget, a circumstance which had a great influence in determining his subsequent career. It led, among other things, to his re-editing Paget's great work on *Surgical Pathology*—one of the surgical classics—and, still more important, to his coming to Edinburgh as demonstrator of anatomy under John Goodsir. What that meant to Edinburgh those who were his students know, and those who had not that privilege will fully realise on reading the fourth and fifth chapters of his *Life*. On the science of anatomy he left an abiding mark; as a teacher he was both impressive and inspiring, and as a trainer of teachers his record was unique. His pupils came to fill no fewer than twenty-three Chairs of Anatomy, and many others left Edinburgh to become demonstrators in other schools.

But Turner was more than a mere teacher of anatomy; he was a prolific scientific investigator, particularly in the field of anthropology, a leader in all movements concerned with medical reform and with university extension, and a great administrator. His biographer has, wisely we think, dealt with these different spheres of activity in separate sections, a plan which enables the reader to appreciate what Turner did in each better than a chronologically arranged biography would have done.

Space forbids that we should follow him through all these activities, but we commend the record of them to our readers as a fascinating chapter in the medical history of the sixty-two years during which Sir William Turner served the University of Edinburgh, and through it, the educational world at large. To those who are left to carry on the traditions which he confirmed or established it is an inspiration and an incentive to whole-hearted work; to those of a younger generation, on whom the burden may one day fall, it sets a standard of single-minded devotion to duty and of loyalty to the Edinburgh School of Medicine towards which they may aim.

We cannot stop without expressing our gratitude to Dr. Logan Turner for the care and skill he has expended in making this record worthy of his father's life, and congratulating him on the restraint he has shown in accomplishing a difficult task.

Diagnostic Clinique. By Dr. A. MARTINET. Pp. xii. + 912. Paris: Masson et Cie. 1919. Price fr. 30 (+10%).

THIS seems to us an extremely good and practical students' handbook of clinical diagnosis. It is divided into two parts: diagnostic methods and symptomatology. There is also an admirable introductory chapter on the causes of diagnostic errors, which no beginner could fail to derive benefit from, and many advanced students might read with advantage. The technical methods of diagnosis employed do not appear to differ materially from those given in English text-books on the subject. They include, however, some which we incline to regard as within the province of the surgeon and gynæcologist rather than the physician—cystoscopy, for instance. Some of the quantitative urinary tests are very neat, in that the principle of using the number of drops of a solution required to give an end point as a measure of the quantity of the constituent being tested for is made use of. This is applied to the determination of the total acidity, estimation of chlorides, phosphates, sugar, etc., and it seems well worthy, on account of its simplicity, of a trial in clinical urine analyses. The illustrations are numerous and, on the whole, excellent, many of the diagrams in particular being very instructive to the student. There is a rather short chapter on clinical bacteriology, which, however, contains a good account of the serological and bacteriological diagnosis of syphilis, typhoid, and tuberculosis. Those to whom the language is no obstacle could hardly find a more useful book on clinical diagnosis than Dr. Martinet's admirable manual.

The After-Treatment of Wounds and Injuries. By R. C. ELMSLIE, M.S., F.R.C.S., Brevet-Major R.A.M.C.(T.F.). Pp. vii. + 323. With 144 Illustrations. London: J. & A. Churchill. 1919. Price 15s. net.

The After-Treatment of Wounds and Injuries is essentially a systematic description of orthopædic surgery as applied to the late results of war wounds and injuries. Lesions of bones, joints, nerves, muscles, tendons, and skin are dealt with in the earlier chapters, and the special conditions of the upper and lower limbs are considered later. Short chapters on the spine, on splints and surgical appliances, on methods of using plaster of Paris and physiotherapy, complete the book.

Two and a half years' work in a hospital devoted exclusively to orthopædics has given Major Elmslie exceptional opportunities, and his experience enables him to speak with authority in discussing the diverse problems which have to be solved in trying to repair damaged limbs and restore their lost function. While he has been able to draw on the rich material at his disposal to emphasise special points, and, in particular, to furnish numerous graphic illustrations, Major Elmslie has wisely preferred to systematise and generalise his experience rather than record large numbers of cases, individually or in groups. As the result he has produced a book of great practical value at the present time, which cannot fail to be of use both to those specially interested in orthopædics and to general surgeons. The teaching all through is sound and full of helpful suggestions, and, although chiefly concerned with the treatment of war injuries, it inculcates general principles which are applicable in civil as well as in military surgery.

NEW EDITIONS.

Diseases of the Heart and Aorta. By ARTHUR DOUGLAS HIRSCHFELDER. Third Edition. Pp. xxvii. + 732. With 345 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1918. Price 30s. net.

THIS volume presents an exhaustive presentment of its subject. It opens with an account of the physiology of the circulation, followed by a chapter on the blood-pressure. Practically all the forms of sphygmomanometer are mentioned, but the description of them suffers from undue compression, and the illustrations of the instruments are on rather too small a scale. "For the exigencies of private practice" the author recommends some pocket instrument of anaeroid type. Importance is attached to Russell's view that the sphygmomanometer does not record the blood-pressure but the arterial resistance. In the paragraphs on the viscosity of the blood there is no mention of the simple and convenient instrument of Watson. For the estimation of total blood volume the author recommends the method of injection of vital red and subsequent estimation of the staining of the plasma by a colorimeter. Cardiac strain is regarded, we think rightly, as the result of mechanical strain or early myocarditis, and the "thyroid heart" is dealt with in a separate chapter. There is a useful account of the action of drugs. The use of strophanthin is stated to have passed the experimental stage, and its intravenous or intramuscular administration in suitable cases is mildly advocated. The volume is fully illustrated with diagrams and tracings. Many of the tracings are combined with a small diagram indicating the supposed condition of the heart or artery at the different parts of the graphic record. These are necessarily drawn on very small scale and seem to us hardly worth the trouble which must have been expended on them. Numerous well-selected illustrative cases are quoted, and references to literature are abundant enough to satisfy the most exacting.

Trench Fever. Report of Commission, American Red Cross Research Committee. Second Edition. Pp. vii. + 446. With 7 Plates and 7 Special Charts. London: Henry Frowde and Hodder & Stoughton (Oxford Medical Publications). 1918. Price 21s. net.

TRENCH FEVER made its first appearance as a serious cause of wastage in the British Armies in France and Flanders in the summer of 1915. Already by the end of that year M'Nee, Renshaw, and Brunton experimentally transmitted the disease from man to man by the injection of whole blood of trench fever patients. Early in 1917 Davies and Weldon published a successful transmission of the disease by the bites of lice fed on a patient. The American Commission began its investigation in February 1918, taking over a British Field Hospital. It obtained its original virus of trench fever from British patients, transmitting this by means of lice and other channels of conveyance to some eighty American volunteers. After less than two months of energetic and brilliantly planned investigation, they were able to confirm and extend the experimental data of these earlier observers. Their results showed that the virus of trench fever is present in the blood plasma, that it is resistant to heat, is filterable, and is usually conveyed from man to man by the bite of infected lice. It may also be conveyed by the rubbing into abraded skin of the sediment of urine, sputum, and saliva of patients. A British Commission, working in England under Surgeon General Sir David Bruce, has approached the subject along similar lines, and has published several short interim reports.

The extent of wastage caused by trench fever in all the combatant armies must have been enormous, and the very definite results obtained by the American Commission were of immediate and cardinal importance. In the present volume the story of this investigation is fully told, with an account of previous work and writing on the same subject. An important part of the work of the Commission was the proof that enteric fever and its allies play no part in trench fever; this was established by numerous and complete bacteriological and serological investigations. The closing sections of the volume are devoted to clinical descriptions of the experimentally produced cases of trench fever. Full case histories of the fifty-seven cases, with temperature charts, are given.

The Commission beginning its work on 4th February 1918 were compelled to evacuate the hospital on 27th March owing to the great German attack and advance. They present, therefore, in this volume a very brilliant record of investigation, notable in many ways—in its able planning, its rapid execution, and in its very valuable results.

An Index of Prognosis and End-Results of Treatment. By Various Writers. Edited by A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.(Eng.). Second Edition. Revised and Enlarged. Pp. xi. + 770. Bristol: John Wright & Sons, Ltd. 1918. Price 30s. net.

The present edition of this valuable *Index* has been extensively revised throughout and a number of new articles have been added. The account of tropical diseases has been rewritten by Sir Leonard Rogers. A new article by C. H. S. Webb on gas gangrene furnishes tables of the mortality of the two main types of the disease, of the results of methods of operation in relation to site and the results of methods of operation in relation to type. There is much fresh material in the articles on tetanus, gunshot wounds, and septic peritonitis by the editor, and the references to recent work add much to their usefulness. In further editions of the *Index* the various writers would do well to copy the editor in this respect. One or two have already done so, but many of the important articles by other writers would be greatly enhanced by following the editor's model.

The Operative Treatment of Chronic Intestinal Stasis. By Sir W. ARBUTHNOT LANE, BART., C.B. Fourth Edition. Pp. xii. + 328. With 133 Illustrations. London: Henry Frowde and Hodder & Stoughton. 1918. Price 20s. net.

BY his work and writing Sir Arbuthnot Lane has done much to focus the attention of clinicians on his theory that "auto-intoxication" from the gastro-intestinal tract is the primary factor in the causation of many diseased conditions.

The fourth edition of his book takes the form of a collection of papers by himself and others whose contributions need not be considered individually, as the most important and interesting of them by Professor Arthur Keith, Professor Adami, and Sir James Mackenzie contain nothing that has not appeared elsewhere. It is difficult to resist the suggestion that they have been pressed into service to lend some support to the rather slender foundation of the far-reaching theories which Lane advances as the justification of surgical procedures of the most serious nature.

All will cordially agree that root causes and not end-results are what we should endeavour to get rid of in attacking disease; but a theory which postulates intestinal stasis as the primary cause of adenoid overgrowth, diabetes, gastric cancer, cystic disease of the thyroid gland, and as the precursor of all forms of tuberculosis in the human subject, to name only a few of the diverse conditions attributed to it, demands careful examination and the production of adequate evidence in its support.

As Professor Arthur Keith remarks in his account of "The Great Bowel from an Anatomist's Point of View," "Surgical practice, so far as concerns the colon, has reached a point much in advance of the present knowledge at the disposal of anatomists, physiologists, and pathologists." In other words, proof of Lane's theories and justification for his drastic operative remedies depends almost entirely on the clinical evidence available. No detailed or even brief analysis of the clinical material which has passed through his hands is presented for consideration. In referring to the "marvellous consequences of freeing the ileal effluent" he states that "the evidence has now been before the world for a long time and these patients have been observed by all the ablest and most distinguished surgeons in the world. They still exist in increasing numbers and are always at the disposal of any observer who will take the trouble to investigate them." Is it too much to ask that in the next edition of his book Sir Arbuthnot Lane should add to his most interesting and suggestive paper an analysis of his results? There are many who admire his independence of thought and his great surgical ability, but regret his unwillingness to adopt the conventional method of inducing others to follow in his footsteps. By following that course he might strengthen the convictions of his followers and remove the doubts of the unconvinced who can never have an opportunity of accepting his suggestion that they should examine his material for themselves.

A Text-Book of Midwifery. By R. W. JOHNSTONE, M.A., M.D., F.R.C.S. Second Edition. Pp. xxvi. + 482. With 264 Illustrations. London: A. & C. Black, Ltd. 1918. Price 12s 6d. net.

THE second edition of this excellent text-book of midwifery does not differ very greatly from its predecessor. Various corrections and additions have been made in order to bring the book up to date. A short note on the use of pituitary extract in labour has been added, and there is a really useful and highly practical new section dealing with the scopolamine-morphine anæsthesia, or so-called "twilight sleep." Dr. Johnstone here writes with first-hand knowledge and from considerable experience. His directions for the successful employment of this undoubtedly valuable method of narcosis are thoroughly sound and well-balanced. He wisely strikes a note of caution when he warns the young practitioner to avoid this treatment until experience has made him thoroughly familiar with the course and conduct of ordinary labours

Amongst the many excellent modern manuals on midwifery Dr. Johnstone's book has quickly gained much popularity with both students and practitioners.

A Text-Book for Midwives. By JOHN S. FAIRBAIRN, M.A., B.M., F.R.C.P. Second Edition. Pp. xiii. + 350. With 3 Plates and 113 Illustrations. London: Henry Frowde and Hodder & Stoughton. 1918. Price 20s. net.

WE are not surprised to find that a second edition of this excellent text-book for midwives has been issued. The lengthening of the period of study from three to six months now gives the pupil-midwife a much better opportunity of obtaining fuller information on the various subjects which relate to the management of pregnant, parturient, and puerperal women. Dr. Fairbairn deals lucidly with the essential points in the physiology and pathology of pregnancy, and in view of the part that the midwife is called upon to take in the management of pre-maternity cases, and in her duties under the new schemes for maternity and child welfare, we think the whole plan and special characteristics of this book are altogether admirable. For the more educated class who are now anxious to qualify for maternity and child-welfare work the addition of a fresh chapter on antenatal hygiene and treatment is specially valuable.

We congratulate the author on having produced a book for midwives so comprehensive and complete that hardly any improvements can be suggested.

A Short Practice of Midwifery for Nurses. By HENRY JELLETT, B.A., M.D. Fifth Edition. Revised. Pp. xiii. + 464. With 6 Plates and 169 Illustrations. London: J. & A. Churchill. 1918.

THE appearance of the fifth edition of this work is a sufficient proof of the favour with which it continues to be regarded by midwifery nurses. As a practitioner and teacher of unusually large experience Dr. Jellett insists upon the importance of training the nurse, first and foremost, to recognise when to send for medical assistance. She must also stand by the patient till help arrives, and should then be able to assist the doctor intelligently. A certain amount of knowledge of general medicine is therefore essential in her training, and Dr. Jellett's book, which is both well arranged and clearly expressed, seems to fulfil this purpose admirably.

Obstetrics: Normal and Operative. By GEORGE PEASLEE SHEARS, M.D. Second Edition. Pp. 734. With 419 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1917. Price 30s. net.

THE appearance in less than two years of a second revised edition of this text-book has justified the opinion we expressed of the work when it first appeared, and testifies to the popularity with which it has been received. The author claims to have based his work on a somewhat different plan from that most generally adopted, and has certainly introduced the essentials of practical obstetrics wherever possible. With this objective he has expressly omitted the traditional preliminary chapters on anatomy and embryology.

A chapter is devoted to the important subject of antepartum examination, the importance of which could not be better emphasised than by the introduction of such an excellent series of original photographs.

The pathology of the puerperium is well handled, and the author's principles of treatment in puerperal infection are extremely sound.

"Twilight sleep," which is still attracting so much attention, has received full discussion.

The operations of obstetric surgery have been brought thoroughly up to date, and are exceedingly well illustrated.

The author is to be congratulated on having produced an eminently practical book for the use of both student and general practitioner, and we are not surprised that there has been an early demand for a second edition.

NOTES ON BOOKS.

In 1916 the French Army Medical Service instituted a series of schools of instruction for the education of medical officers, non-commissioned officers, and orderlies in the problems of medicine and surgery as especially applied to war. One of the principal schools was established at Bouleuse, and men who were recognised as experts upon certain branches gave a series of lectures dealing with their various specialities. Under the direction of C. Regaud these lectures have been collected and published (Masson et Cie) as a volume (*Leçons de Chirurgie de Guerre*). It is unnecessary to give in detail the various subjects which have been dealt with, but the surgical propositions which are met with in war are fully and efficiently treated. The series is introduced by a lecture upon the general considerations of war wounds, with special reference to their treatment. Other sections deal with the various branches of war surgery. There is an excellent article upon radioscopy, and the various methods of localising foreign bodies is dealt with in detail. The collection is one of the most instructive we have seen, and it forms an excellent memoir of the surgical principles which have been evolved and so successfully applied by our ally.

In the introduction to *The Orthopædic Effects of Gunshot Wounds and their After-Treatment* (Henry Frowde and Hodder & Stoughton, price 7s. 6d. net) Dr. S. W. Daw gives a general account of the factors which cause persistent disability after war wounds, and of the principles which underlie their treatment. In the remaining chapters the more common conditions are separately described. All forms of treatment receive adequate attention, the paragraphs on the use of splints and mechanical appliances being particularly good. The account of the details of operative treatment is also good, though condensed. A chapter upon functional paralyses by Dr. Cuthbert Morton contains useful hints upon treatment, but is somewhat spoilt by failure to distinguish between mere hysterical conditions and the reflex group of paralyses described by Babinski and Froment. Printed upon good paper and well illustrated, the book is a worthy addition to the Oxford War Primers.

Fractures: Being a Monograph on "Gunshot Fractures of the Extremities," by Lieutenant-Colonel Joseph A. Blake, M.C., U.S.A. (D. Appleton & Co., price 7s. 6d. net), is divided into two parts, in the first of which the author gives a brief general survey of the mechanism, repair, and operative and mechanical treatment of gunshot fractures in general, while in the second he indicates the methods he has found best in the treatment of wounds of individual bones and joints. For those unfamiliar with war surgery the book is of special value, as it is written from the author's personal experience, and the practical points in regard to splints and apparatus are discussed in detail and clearly illustrated by diagrams.

Technic of the Carrel Method, by J. Dumas and Anne Carrel (Wm. Heinemann, price 6s. net), is specially written for the instruction of nurses and orderlies, and to those it can be highly recommended. It describes in detail the apparatus employed and the method of use in clear, simple, and direct language. The illustrations are instructive and are beautifully executed. The translation is by Dr. A. V. S. Lambert.

A Medical Field Service Handbook, by Lieutenant-Colonel C. Max Page, D.S.O. (Henry Frowde and Hodder & Stoughton, price 6s. net). The importance of front line medical work during a campaign cannot be overestimated. A full experience, coupled with close observation and controlled by sound common sense, is here recorded in clear and concise form. The armistice may have robbed some chapters of their more immediate interest and use, but as long as large bodies of men are collected together in relatively small areas, either for the prosecution of war or for the purposes of labour, so long will many of the problems here discussed retain their importance. Medical officers in charge of the health and welfare of such formations will find much that will help them in this record of the author's experience.

The Sixth International Dental Congress, which met in London early in August 1914, was unfortunate in having to disperse owing to the sudden outbreak of war, but, in spite of this, a number of valuable reports and papers were submitted and demonstrations given. The *Transactions*, which we have just received, contain articles covering a wide range of subjects, the majority of which are naturally of special interest only to the dental surgeon, but there are a number which are equally interesting to the medical man. Amongst these latter, some are of purely scientific interest, whilst others, again, are of a very practical nature. Thus there are several papers on histology, comparative human anatomy, on industrial dentistry, and on education. Naturally, pyorrhœa alveolaris, in all its various aspects, claims considerable attention, and there are valuable papers on the causation of dental caries and its prevention and treatment. Cysts of the jaws are discussed in several papers, as are cleft palate and diseases of the maxillary antrum. Anæsthesia, local and general, has always been intimately associated with dental surgery, and there are some instructive papers of general interest bearing on this subject. The volume is well illustrated, and its production under most difficult circumstances is a great credit to the editor, Mr. Brooks, and to the publishers at the offices of the British Dental Association.

The character of *Lecture-Notes on Chemistry for Dental Students*, by H. Carlton Smith, Ph.G. (Chapman & Hall, price 13s. 6d. net), is well described by its title, but the notes are sufficiently extensive to make it readable and to render it of great value as a book of reference. It is very properly of a practical nature, and it is presumed that the student has already had a good grounding in general chemistry. The information covers a wide field, including the chemistry of dental alloys, amalgams, cements, etc., the chemical examination of urine, saliva, teeth and tartar, and such portions of organic and physiological chemistry as have a practical bearing on dentistry, together with inorganic qualitative analysis with specially adapted blowpipe and microscopical tests. The author rightly insists on the prime importance of laboratory work, and a large number of simple experiments are described so plainly that this in itself should stimulate the reader to do them. There are some misprints and misstatements which should not occur in a third edition, and some omissions, such as the failure to notice rubber and the process of vulcanisation, but the book, as a whole, is so excellent that it is a pleasure to recommend it to those for whom it is specially written.

BOOKS RECEIVED.

ANDERSON, H. GRAHAM. The Medical and Surgical Aspects of Aviation (*Henry Frowde, Hodder & Stoughton*) 12s. 6d.

DE LEE, JOSEPH B. Principles and Practice of Obstetrics. Third Edition (*W. B. Saunders Co.*) 36s.

FLACK, MARTIN, and LEONARD HILL. A Text-Book of Physiology . (*Edward Arnold*) 25s.

GLEASON, E. B. A Manual of Diseases of the Nose, Throat, and Ear. Fourth Edition (*W. B. Saunders Co.*) 14s.

HARTRIDGE, GUSTAVUS. The Refraction of the Eye. Sixteenth Edition (*J. & A. Churchill*) 7s. 6d.

HIRST, JOHN COOKE. A Manual of Gynecology . . . . . (*W. B. Saunders Co.*) 12s.

HOWELL, WM. H. A Text-Book of Physiology. Seventh Edition (*W. B. Saunders Co.*) 21s.

JORDAN, EDWIN O. A Text-Book of General Bacteriology. Sixth Edition (*W. B. Saunders Co.*) 17s.

LOVE, JAMES KERR. Diseases of the Ear in School Children (*John Wright & Sons, Ltd.*) 5s. 6d.

M'JUNKIN, F. A. Clinical Microscopy and Chemistry . . (*W. B. Saunders Co.*) 16s.

MACPHAIL, JAMES M. Eyes Right. Second Edition . (*Butterworth & Co. (India) Ltd.*) R.1.

MALLORY, F. B., and J. B. WRIGHT. Pathological Technique. Seventh Edition (*W. B. Saunders Co.*) 17s.

MOTT, FREDERICK W. War Neurosis and Shell Shock (*Henry Frowde, Hodder & Stoughton*) 16s.

RIVIERE, CLIVE. The Early Diagnosis of Tubercle. Second Edition (*Henry Frowde, Hodder & Stoughton*) 10s. 6d.

ROGERS, Sir LEONARD. Fevers in the Tropics. Third Edition (*Henry Frowde, Hodder & Stoughton*) 30s.

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(*Abs.*) = Abstract. (*Ed.*) = Editorial Note.

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