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THE VALUE OF THE REFLEXES IN DIAGNOSIS.*

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Mr. President, Ladies and Gentlemen:—It has been my good fortune to receive many kindnesses from our profession, and it has been my privilege to address distinguished audiences. Fully as I appreciate the honors I have enjoyed, and grateful as I am of the consideration that has been extended to me in the past, I feel that the honor your Council has done me far exceeds anything that I have hitherto experienced.

I can imagine no greater compliment than to be entrusted with the delivery of the Address in Medicine at so important a meeting as the Canadian Medical Association is holding in Ottawa to-day, and I am confident that those who have been good enough to honor me in the past would be the first to admit that the position in which your Council has now placed me is the most honored I have ever filled.

There are, Sir, some moments that cannot find adequate expression in words. My gratitude is very sincere, but I am too conscious of my inability to find a portal sufficiently wide to convey the full depth of my feelings, to make me risk the attempt that would be sure to end in failure.

No words of mine can ever thank you enough for the great honor which you have done me.

When attempting to decide upon what subject to address you it naturally occurred to me that it must be on something of neuro-

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logical interest, as it was improbable that any general survey of medicine would be expected from one who had devoted so much time to a special department.

On reviewing the neurological subjects that seemed most suitable, the usual difficulty was experienced in deciding which to select. It was not without many misgivings that the value of the reflexes in diagnosis was finally chosen as likely to be the most profitable, for I am very conscious of the large amount of work of the greatest possible excellence that has been done on this side of the Atlantic. Three considerations mainly encouraged me to adhere to my decision. One was that the same objection could be urged in regard to any subject I might choose. Another was that so much work has been done on the reflexes during recent years, and so much that is contradictory has been written about them, that there is a danger that the profession may become sceptical as to their value. The third consideration that influenced me was that so many new methods of diagnosis are now in vogue that there may be too great a tendency to rely on these to the exclusion of the reflexes, which they should only be allowed to supplement, not supplant.

We cannot too carefully safeguard the reflexes, for we can ill afford to do without them, and what is especially satisfactory to the practitioner is that no laboratory or special apparatus is needed when applying the tests necessary to derive information from them.

When selecting the subject I did not lose sight of the fact that there would be many present at this meeting to whom I could not presume to offer any remarks that would either prove of interest or profit, but it seemed certain that the bulk of those attending the congress would be men busily engaged in the toils of general practice, with but little leisure for reading. Much as you may be interested in the scientific investigations of the age, and the great discoveries that are constantly being made, you naturally wish to know how far the results obtained by these researches may be utilized by you in your endeavors to minimize the sum total of human suffering and to promote the general well-being of the community.

I cannot help feeling that those of you who have perused the literature that has grown up around the subject of the reflexes must be inclined to doubt the value which attaches both to the tendon-jerks and the superficial reflexes in diagnosis, for fresh from reading a paper in which the author insists on this or that phenomenon as a sure sign of organic disease, you take up another in which the writer as confidently asserts that certain alterations

of the reflexes have not the value that has been ascribed to them, as he has met with the abnormal sign in functional as well as in organic conditions of the nervous system. You accordingly find it difficult to decide which of the conflicting statements to believe, for the opportunities of putting these matters to the test do not occur sufficiently often in your practice to permit of your coming to any satisfactory conclusion from your own observations.

It is, therefore, natural that you should look to those whose work brings them into daily contact with these problems, and who have endless opportunities of testing the conflicting views expressed by different authors, to assist you to decide what is true, and what is not; on what evidence you may place confidence, and what you should mistrust and discard.

It thus seems probable that no better use can be made of an opportunity like the present than to attempt to show that, in spite of much that you may see written to the contrary, the reflexes are of the utmost value in the diagnosis of affections of the nervous system.

Time will not permit me to quote cases in support of what I have to say, but I can assure you that all the facts to which I propose to call your attention are based on practical experience of these matters, and that actual cases which substantiate the statements occur to me as I recount the facts which I deem worthy of your acceptance as likely to prove helpful to you in the problems that confront you from time to time in the routine of your practice.

An attempt will be made to show that the reflexes are of value:

1. In the diagnosis of organic from functional affections of the nervous system.
2. In the diagnosis of one organic disease from another.
3. In localizing the seat of the morbid process.
4. In determining the extent and severity of the mischief.
5. That there are limitations to the value of the reflexes.
6. What part they play in the diagnosis of maladies outside the realms of neurology.

It will, of course, be impossible to deal with all of the reflexes in the time at our disposal, and it will be equally impossible to discuss more than some of the more important aspects of the subjects I have outlined, without pretending that any exhaustive consideration of them in their many bearings is at all possible.

1. DIAGNOSIS OF ORGANIC FROM FUNCTIONAL AFFECTIONS.

One is inclined to question either the observation or the judgment of the author who, having elicited the extensor type of

plantar reflex after an attack of convulsions, nevertheless concludes that the attack has been hysterical and not epileptic.

That true epilepsy may occur in a person otherwise hysterical, and that an epileptic attack may be followed by an hysterical state, are facts too well recognized to call for more than passing notice; but it is difficult to refrain from a desire to have the opportunity of observing the attack from its inception to its conclusion, before accepting the statement that hysteria was alone responsible for the convulsions which permitted the extensor type of plantar reflex to be elicited in the subject of the fit.

Abolition of the knee-jerks, followed by their exaggeration, coupled with ankle clonus, and supported by the extensor type of plantar reflex, form a combination which we have good reason to agree must be aids to the diagnosis of genuine epilepsy, as contrasted with either hysteria or malingering.

It is equally difficult to accept the opinion of the observer who asserts that the paralysis from which the patient suffered was hysterical, and yet the plantar reflex was of the extensor type, especially when he has no better proof to offer than that the patient got quite well, and that this phenomenon, like all the other abnormal signs, disappeared.

The names of such distinguished authorities are associated with statements of this kind, that the only way which seems possible to reconcile their views with one's own experience is to suppose that certain types of disseminate sclerosis, so common with us in England, must be rare in other countries, so that the vagaries of these varieties of the malady so much insisted on by Dr. Thomas Buzzard in his writings on the subject, have not as yet been recognized by observers who are mistaking for hysteria cases that are in reality examples of disseminate sclerosis. That this is so in some instances is evident even from the information given of the clinical history of the patient's illness. The remarkable way in which the clinical picture may clear up in a case of this disease after the most pronounced signs of organic change have been determined, makes it difficult to believe otherwise than that there is a time in the course of the malady when the lesion is of a kind that permits not only of restitution of function, but also of repair of structure, so that the nervous system is not only able to perform its work again in a normal manner, but is also free from any evidence of persisting structural damage.

These considerations open up a most interesting question that I dare not do more than touch on in connection with the diagnosis of neurasthenia. May not a functional condition of the kind oc-

ease nutritional changes in the nervous system sufficiently profound to lead to alterations in the reflexes that are indistinguishable from those produced by organic disease?

Time will not permit me to discuss this matter in the way that its importance demands. Let me but say that from the practical standpoint it matters but little, for the majority of cases of neurasthenia present no such difficulty in diagnosis, and if such a condition of things as has been suggested be possible, there would be every reason to regard with as much concern the nervous system of such a patient as that of one suffering from some known organic disease, for such a condition cannot but be attended by grave consequences if unchecked by treatment.

2. THE DIAGNOSIS OF ONE ORGANIC DISEASE FROM ANOTHER.

Let us take a common example. A patient experiences difficulty in walking, owing to the inco-ordinate condition of his lower limbs. Two of the most common diseases likely to be responsible for this are *tabes dorsalis* and *disseminate sclerosis*.

How quickly it can be determined which of these diseases exists! No knee jerk, no ankle jerk, and the plantar reflex not altered to the extensor type in *tabes* make striking contrasts to the exaggeration of the knee jerk; exaggeration of the ankle-jerk, amounting, it may be, to clonus, and the plantar reflex of the extensor type in *disseminate sclerosis*.

Even if, in the latter disease, the knee and ankle-jerks fail us by being absent instead of being exaggerated, the plantar reflex is not likely to play us false. And if it does, is there not still the pupil reflex on which we can fall back for assistance? The pupil which fails to re-act to light while it preserves the possibility of re-acting on accommodation, is a phenomenon sufficiently rare in *disseminate sclerosis*, and common in *tabes*, to make it a further point of contrast between these two diseases.

Take another example. The patient has atrophy of the small muscles of the hand. One of the first things we are anxious to know is whether or not the reflexes are altered, for much depends on whether they are, both in regard to diagnosis and prognosis. Exaggerated knee-jerks, ankle-clonus, and the extensor plantar reflex tell their tale, for it is clear from them that the spinal cord is involved by the morbid process that is responsible for the muscular atrophy. Thus, by testing these reflexes, we at once glean information that is of the greatest import. By testing the arm-jerks and the jaw-jerk, the diagnosis may be carried a stage further, for in the presence of an exaggerated jaw-jerk or clonus there is little likelihood that any condition other than amyotrophic lateral

sclerosis is to be held accountable for the muscular atrophy. Although the Rontgen rays have done much to facilitate diagnosis under these conditions, it cannot be said that they have in any way robbed the reflexes of the value that attached to them before the rays were put to such use. It may be safely said that the rays have supplemented, not supplanted, the reflexes in this sphere of their usefulness, for while they may reveal an accessory rib, caries or other disease of the cervical vertebræ to account for the muscular atrophy, in the absence of these conditions they cannot tell us whether the atrophy is of central or of peripheral origin, nor can they further give us the good idea the reflexes can as to which of the several affections of the spinal cord is likely to be responsible for the condition.

Two affections that may easily be confounded, and that present considerable difficulty of diagnosis at times, although at other times the clinical pictures are so widely different that there is no possibility of confounding them, are cerebellar tumor and disseminate sclerosis. A proper appreciation of the different behavior of the reflexes in the two conditions will go far towards clearing up the question that is in doubt; indeed, the diagnosis may largely, if not entirely, depend on what, if any, alterations are determined in the reflexes. While various alterations of the tendon-jerks obtain in tumor of the cerebellum which may accord with what is found in disseminate sclerosis, the superficial reflexes prove of distinct service in differential diagnosis, for the plantar reflex commonly assumes the extensor type at an early stage of disseminate sclerosis, while it only does so as a late event in a case of tumor of the cerebellum, and is then to be ascribed to some complication rather than to the morbid condition of the cerebellum itself.

The reservation that has had to be made in regard to the plantar reflex does not apply to the other superficial reflexes on which a diagnosis may be based, for, assuming that the local conditions of the abdominal walls be such as to permit the abdominal reflexes to be obtained, their absence may be regarded of considerable importance in diagnosis, for, while they are unaffected in cases of tumor of the cerebellum, they are absent in a large proportion of cases of disseminate sclerosis. The reflexes may thus serve to determine whether we are in the presence of an affection in which operative intervention may be expected to bring relief, or whether the morbid condition is one in which operation would not only be useless, but actually harmful.

It is impossible to leave this part of our subject without referring to the value that attaches to the extensor plantar reflex in the

diagnosis between multiple peripheral neuritis, in which it is absent, and that fatal disease, subacute combined degeneration of the spinal cord, in which it is present, for, while the former condition may be expected to result in recovery under appropriate treatment, the latter runs its course to a fatal termination with unerring certainty in most, if not in all, cases.

3. LOCALIZING THE SEAT OF THE MORBID PROCESS.

The abolition of the reflexes in affections of the peripheral nerves, the variety of ways in which they may be affected in diseases of the spinal cord, and their unilateral exaggeration, diminution or special modification in affections of the brain, need no more than passing notice. It is impossible, however, to leave this part of our subject without a word of comment in regard to the part the reflexes play in the early diagnosis of morbid conditions of the brain and spinal cord, for it repeatedly happens that some departure of the reflexes from the normal standard is the first indication that we have, not only that organic disease exists, but as to what part of the nervous system is affected. Special note must also be taken of the important *rôle* they play in the localization of focal lesions of the spinal cord, in which connection nothing is more important than the aid to be derived from them in the diagnosis and localization of tumors of the cord.

The abolition of the reflexes which correspond to certain segments of the cord, the escape of all the reflexes above this level, and other exaggeration or other modification below it, must be regarded as the most valuable indications we have in determining the position of a focal lesion.

Similarly, unilateral alteration of the reflexes may be the first indication of which hemisphere of the brain is affected, and, while it may happen that hemiplegia or some other condition makes it superfluous for us to seek assistance from the reflexes, there are cases in which there is so much uncertainty that every source from which information can be gleaned must be welcomed, and then it is that the reflexes may prove invaluable. No better example of this can be found than what obtains in tumors of the frontal lobes of the brain. The difficulties of localization in such cases may prove well-nigh insurmountable, so that unilateral exaggeration of the knee-jerk or the appearance of ankle clonus on one side is welcomed. Of similar significance is the appearance of the extensor of the plantar reflex, or, as my colleague, Dr. Grainger Stewart, has shown, diminution or abolition of the superficial abdominal reflexes on the side opposite to that on which the tumor is situated.

Another class of case in which the reflexes may prove helpful is that in which the question to be decided is whether the disease is in the cerebellum or pons. The determination of this point becomes particularly important when a tumor is responsible for the symptoms, for, while those which occupy the pons are inoperable, no more successful class of intracranial tumor is met with from this standpoint than many of those which involve the cerebellum. They supply us with some of the most brilliant results of modern surgery. While there are many points on which the diagnosis must rest, it is not too much to claim for the reflexes that they play an important part in deciding the question at issue, for the earlier they become affected in the clinical history of the case, the more likely is the tumor to be situated in the pons, while the longer they remain unaltered the greater is the likelihood that the seat is the cerebellum. The knee-jerks cannot be said to be of material assistance in this connection, for, as already noted, they may become altered in uncomplicated cases of tumor of the cerebellum. It is, however, otherwise as regards ankle-clonus, and alterations of the superficial reflexes, for unilateral diminution or abolition of the abdominal reflexes, or alteration of the plantar reflexes to the extensor type, cannot be regarded otherwise than of importance in diagnosis, if they are determined sufficiently early in the clinical course of the patient's illness to make it improbable that they are the outcome of some complication rather than due to the original malady.

4. THE EXTENT AND SEVERITY OF THE MISCHIEF.

It would appear to be self-evident that, inasmuch as the various reflexes have different segments of the spinal cord on whose integrity they depend, the fewer that are lost the less extensive the lesions, and the wider the extent of their affection, but more widespread the distribution of the morbid process. It must be clearly recognized, however, that this is by no means necessarily the case, for, in reality, this only applies in some instances, for a very limited lesion may give rise to widespread alterations of the reflexes. Take, for example, a case in which the lesion is limited to the cervical region of the cord, and abolishes the scapulo-humeral and other arm reflexes. Many other reflexes will also be altered, though not necessarily abolished, so that among the abnormal phenomena to be looked for are exaggeration of the knee-jerks, ankle clonus, and the extensor type of plantar reflex.

No better example of the value of the reflexes in determining the severity of a lesion can be suggested than is supplied by the

knee-jerks in cases of transverse lesions of the spinal cord above the lumbar enlargement, for when, instead of being exaggerated, they are abolished and remain absent, the gravest fears are justified. When the knee-jerks do not return there is every reason to fear a severance of the cord so complete as to preclude the possibility of re-establishment of the paths through the damaged segments of the cord. Ankle clonus, a phenomenon that we view with concern under other conditions, would now be welcomed, as this would indicate possibilities of recovery which would not have been justified had the knee and ankle-jerks remained absent.

5. LIMITATIONS TO THE VALUE OF THE REFLEXES.

There are instances in which the reflexes only partly clear up the diagnostic problem. Take, for example, a case of myelitis with paraplegia as the result. From the reflexes alone the diagnosis may be made as to whether ordinary myelitis or polio-myelitis exists, but further than this they cannot take us. The X-rays may reveal tuberculous disease of the bone, which has not as yet produced spinal deformity, or the opsonic index may raise the suspicion of a tuberculous origin of the paraplegia in a way that is impossible to the reflexes.

Similarly, syphilitic pachymeningitis may not as yet have occasioned any alteration in the reflexes by which an organic condition can be diagnosed, and yet lumbar puncture may permit the determination of a leucocytosis that allows a positive diagnosis to be made. Or the behavior of the superficial reflexes may justify the diagnosis of an organic hemiplegia, while it requires the ophthalmoscope to say that a tumor is responsible for it, or lumbar puncture to indicate that the thrombosis which underlies it is of syphilitic origin.

Furthermore, it must be remembered that there are some affections of the nervous system in which a diagnosis is to be made without any necessary assistance from the reflexes. Chorea supplies an example, for, although in this affection the special alteration of the knee-jerks, to which Gordon, of Exeter, called attention, may be present, in which the limb remains suspended in mid-air too long in response to a blow on the patella tendon, the diagnosis has to be made without any such assistance from the reflexes in the majority of cases. The extensor of the response, and special alteration of the superficial reflexes to which Babinski called attention, are too infrequent to justify any reliance being placed on them.

The fact must not be lost sight of in this connection that the negative may be of little less value than the positive in some cases,

and that, accordingly, there are instances when the fact that the reflexes are not affected in a case proves almost as helpful as if they were, for this serves to distinguish the malady from one in which alterations of the reflexes were to be expected.

5. THE PART THEY PLAY IN THE DIAGNOSIS OF GENERAL DISEASES.

The question that next arises is as to whether the reflexes give any assistance in diagnosis in realms outside those of neurology. There can be no doubt that there are many cases in which, in the absence of any known disease of the nervous system, the reflexes are altered in the course of some general disease or special affection of some other organ of the body.

It will be remembered that in an affection like diphtheria absent knee-jerks may give the first clue to the nature of a sore throat that ought to have been long since determined by bacteriological examination of secretion from the fauces. Similarly, absence of the knee-jerks may call attention to the possibility of glycosuria, which routine examination of the urine should have forestalled.

Some attempt has been made to derive direct advantage from alterations of the reflexes as in favor of one as opposed to another disease in which the nervous system plays no part, except that the toxins of the one malady have a more profound effect on the nerve centres, and occasions alterations of the reflexes in consequence, in a manner that does not obtain in the other disease. Thus, the knee-jerks have been found absent in a large proportion of cases of pneumonia due to the diplococcus or the diphtheria organism, while they are not affected in septic pneumonia and found exaggerated in tuberculous cases (Stanley Barnes).

The chief value, however, that attaches to these observations in the present state of our knowledge is that they prevent us from concluding that some organic condition, as, for instance, myelitis or meningitis, has of necessity developed because these alterations in the reflexes are determined. Those interested in the welfare of the patient are thus spared the anxiety that would be caused by the opinion that might have been expressed in ignorance of the fact that the alterations noted are compatible with transitory effects due to toxic conditions without any permanent organic change.

In conclusion, Mr. President, ladies and gentlemen, let me thank you most sincerely for the patient hearing you have given me. No one is more conscious of the shortcomings of this address than I am. I wish it had been possible for me to prove more worthy of the trust that has been placed in me, and the honor which that trust

implies. I can only take comfort in the fact that I have spared no pains to make the address a success, so that any failure to do so cannot be ascribed to a lack of appreciation of the great responsibility which I have accepted, and of which I have been only too painfully conscious. One other consideration brings me comfort in my ordeal; that is, that I am in the midst of friends who will deal leniently with my shortcomings. In his letter of invitation your worthy secretary, Dr. Hacking, told me that I would meet many friends who would be ready to welcome me to Canada. I have, indeed, met with friends, and have been overwhelmed with kindness. Let me take this opportunity of thanking you all most cordially for the welcome you have so generously extended to me.

THE SURGICAL RIGHTS OF THE PEOPLE.*

BY JOHN C. MUNRO, M.D., BOSTON,
Surgeon-in-Chief, Carney Hospital.

In accepting the courteous invitation to address your Association to-day, I realize deeply the compliment that you bestow not only upon myself, but upon the great number of American surgeons that are your friends and neighbors. A political boundary divides your people from my people, but in our profession there is no dividing line, for the medical and surgical property of one people is, or ought to be, that of the other. The customs and the methods of education of the Canadian differ in minor details from those of my own countrymen, but there are grievances, slight wrongs, and evil tendencies that crop up equally in both our peoples, and it is to call your attention to and to enlist your sympathy in some of these that I venture to express the results of observation extending over a period of twenty years.

While listening some time ago to an interesting address by Prof. Muller of Munich, on the German system of insurance of the laboring classes against sickness and death, I was impressed by the fact that the insurance was established not as a charity, but because the poor have the right to be protected against the various accidents and illnesses incident to our complex modern life. At that time it occurred to me that against unnecessary suffering, disease and death the public, both rich and poor, has an equal right to be pro-

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ected by means other than that of insurance. In other words, if modern surgery can lengthen life, can protect against malignancy, can nullify suffering better than can be accomplished by other therapeutic measures, the public has the right to know accurately when and to what extent this is possible.

It is not assumed for an instant that protection and alleviation in the case of many diseases cannot be obtained by means that are not surgical. We have merely to witness the results of vaccination, serum inoculation in diphtheria, and a host of similar remedies. As a matter of fact, it is interesting to note that the public has practically asserted its right to be protected against smallpox, diphtheria, malaria, yellow fever and other well-known diseases.

During the extraordinary surgical advances that have been made in the last decade our profession has been so busily engrossed in grasping the new developments that come crowding one upon another that it has rather lost sight of the poor public and its right to a share in the general progress. We have been inclined to let the people discover for themselves the immense amount of time, money and suffering that can be saved to them, and yet we are in the position of placing before them a host of well-established facts on which we base our advice as regards surgical treatment. More and more have surgery and medicine grown to be scientific and accurate. To a greater and greater extent can surgeons promise definite results. The changes in technique and operative principles that are constantly taking place lead steadily to better results because they tend ever to greater simplicity.

Is it not a good time to stop and view ourselves from the standpoint of the lay public—a public that in the main is intelligent, progressive and full of common sense?

However much we may deplore the fact that surgery is necessary, that it may be an opprobium—which I doubt very much—we must be willing to admit that, given ideal conditions, enormous temporary and permanent benefit can in numerous instances be vouchsafed by operations, and by operations alone. Surgery has its own field. It readily yields to other and simpler therapeutic measures when satisfied that it itself is without avail. At the same time it is keenly alert to invade the vast field of internal medicine when the latter fails to accomplish the ideal; ready to retire at once if some new discovery demonstrates that disease can be conquered by means other than surgical. What surgeon is there who would not gladly throw down the knife if a serum or any simple remedy were discovered that would definitely cure malignant disease? Some such remedy is bound to come in the course of time; slowly, it

may be, but none the less surely. In the meantime innumerable types of disease are safely and happily treated by the mechanics of surgery, and it ill becomes us as surgeons to belittle the aid that we can give, for the mere reason that at some future time surgery may become obsolete.

Every year I am told that we have attained the highest limit in technique. This is far from the truth, because hardly a week passes without a surgeon somewhere in the world demonstrating a discovery or reviving some long-forgotten fact that reduces mortality, shortens convalescence, or aids in the restoration of normal functions.

It should be made clear at the outset that the public must expect of surgeons not absolute efficiency, but a reasonable degree of it. Such a degree can be acquired by any surgeon who has aptitude, a love for constant self-improvement, and a readiness to make sacrifices to his ideals. Of this type there are many in your country as well as mine. The masters of surgery, on the other hand, are few in number. It is to them that we of the rank and file must look for the instruction and inspiration which should constitute a large and by no means unimportant part of their work. It is only a relatively small proportion of the people that can have the direct benefit of their skill. To their teachings the medical as well as the surgical practitioner must listen, and in the light of the accomplishments of the advanced surgical clinics of the world it is not an exaggeration to assert that diagnoses, especially of abdominal and cerebral diseases, are more accurately made by the surgeon or by his medical confrere who follows his own cases to the operating table than by the internist who limits his observations to laboratory, personal and post-mortem examinations. The failure of the public to realize this fact accounts in great measure for the many sometime curable diseases that are brought to the surgeon after they have reached the incurable stage. The co-operation of the internist and the surgeon in all cases potentially surgical is something that can be demanded consistently by the people. Each one is a healthy check on the other; their combined judgment is safest for the patient.

With the emergency operations and the problems suddenly forced upon the doctor far from surgical centres this paper has nothing to do. Every surgeon admires and respects the men who meet the difficult problems of this kind, alone, ingeniously and fearlessly. The history of medicine is full of heroes of this class, and no one has greater appreciation of their work than the active surgeon in the large city.

I would deal here rather with the question of elective major surgery as attempted in our large and small surgical centres by men without surgical skill or training, by amateurs, and by the nondescript commercial type of doctor that operates for the fee and not for the benefit of the patient.

The internist and the family doctor, assuming that he is a general practitioner, cannot keep pace with the constant advance made along surgical lines. It is physically impossible for him to keep in touch with the best surgical literature and progress. If, therefore, a patient comes for advice concerning a disease that theoretically or practically can be classed as surgical, the patient has a right to the opinion of a practical surgeon for or against intervention. This applies not only to the commoner diseases, like gall-stones, appendicitis, cancer, etc., but to the less common borderline diseases in which both medical and surgical treatment is of value. The internist, prejudiced at the start against surgery or slow to follow the best advances in the world's clinics, may presume to decide a question that is or ought to be purely surgical. Such a decision may be as much beyond his province as it would be were a surgeon to attempt to decide as to the nature of an anaemia without a blood examination. This breach of faith with the public—for it can hardly be called anything else—is in my experience one of the most common factors that leads eventually to incomplete operative success. The public, slow to grasp the full significance of such conditions, is, nevertheless, gradually awakening to its rights in this respect.

The remedy is simple. No doctor need be so narrow or prejudiced that he cannot seek counsel in doubtful cases. To ask for surgical advice does not imply any necessity for accepting its verdict. That lies with the patient. Let him be given the facts according to the best modern lights, and the decision will rest with him whether to accept an operative risk or not.

Worse than this is the hesitation, narrowness or ignorance—call it what you will—that allows the internist to deal with a surgical lesion until forced to advise surgery, not as a preventive or as a curative measure, but as a last resort. Every experienced surgeon will agree with me that with all his so-called boldness in operating he has never had the courage to assume the responsibilities endangering the lives of his patients that the indifferent or ignorant practitioner assumes at times in advising against surgical intervention or in withholding operative relief. The surgeon with his knife in the presence of appendicitis, gall-stones, cancer of the stomach or intestines, empyema and a host of similar diseases is

the embodiment of conservatism when compared with the practitioner who elects to treat such diseases medically.

After a patient has decided upon operative treatment he has the right to demand, first of all, asepsis, proper anaesthesia and intelligent after-care. He should realize, however, that, although absolute asepsis is the ideal to which all surgeons aspire, practical asepsis alone can be guaranteed in the light of our knowledge at the present time. We should teach the public that the highest degree of asepsis is best attained by a permanent corps of surgical workers trained under responsible heads; that a properly equipped hospital with such trained assistants entails less risk to the patient than the haphazard equipment of the private house or the irresponsible regime of many of the private hospitals which are open indiscriminately to operators, each with his own methods of operative technique.

I think it can be safely said, indeed, that a morning's work at a private hospital, with its multifarious and changing authorities, is rarely carried through without many lapses in asepsis, for the most part harmless, but occasionally calamitous in result.

Breaks in asepsis are the result of some sin of omission or commission on the part of the operating staff, including the surgeon, his assistants and operation nurses. Too often is the blame for septic calamities ascribed to the sponges, the suture material or the dressings. That any one of these may be at fault is possible, but in the well-conducted operating room proper examinations and control of the material should prevent such accidents save in very rare instances. Too many times have I seen a sterile catgut blamed for the result of a slovenly, dirty surgeon or assistant. So long as surgery is an art and not a mechanical trade lapses in asepsis are occasionally bound to occur, even in the best clinics, in spite of all reasonable precautions. The important point for the surgeon, and for the public as well, is to recognize and make use of the means best fitted to reduce these chances to a minimum. We must all recognize that there is some risk attending any and every operation; a risk that often is so small that it may be practically disregarded.

Under the immeasurably diverse conditions of heritage, environment and physical and mental defects, it is out of the question to allow for every possible accident, and this fact the patient as well as the surgeon must recognize where an operation is undertaken. Provided the surgeon uses precautions that are reasonable in the light of modern scientific knowledge, he can be assured that he has done all that should be expected of him. The patient, on his side, must be willing to take certain chances provided the result

sought by operation is going to lessen the sufferings and dangers that are inherent in the existing lesion or disease.

The public should realize that the dangers, immediate and remote, from anaesthesia are very small. Such dangers do exist, however, and it is the surgeon's duty to minimize them in every possible way. A skilled anaesthetist, preferably a permanent member of the surgical corps, will cause far less damage than the student or the friendly family practitioner who etherizes occasionally, and who is more interested in the operation than in giving the anaesthetic. In my own experience the worst and most dangerous etherizers are the unskilled pupil house officers. To the credit of certain individuals of this class, however, it must be said that after a month's training some of them develop into first-class anaesthetists, generally at about the time they are ready to graduate to a higher grade. These show their ability early and exhibit, as it were, an inborn talent in this line; others never learn to be satisfactory etherizers, no matter what or how long their experience.

Another class that rivals the student in dangerous etherizing is the graduate with long experience in general practice. He rarely gives ether safely or in a way that aids the operator. His experience has been won mainly at the bedside of the lying-in patient, and in anaesthetizing a patient for a major surgical operation he applies methods similar to those which he uses in his obstetrical work.

An unskilled etherizer will make certain of the difficult operations impossible; he will prolong beyond safety an operation that should be short, and he will increase in any case the chances of a post-operative pneumonia. These facts are not generally known by the laity, but that does not warrant neglect on the surgeon's part in this particular. The public has just as much right to demand a skilled anaesthetist as to demand a skilled surgeon.

Much the same could be said of the unskilled assistant, the ever-changing house surgeon, and the general practitioner who assists in major operations at rare intervals. It is difficult for the latter to realize the essential points in aseptic technique; not being accustomed to the ways of the surgeon, he modestly hesitates to give what assistance he would like to give, and often, being ignorant of the consecutive steps of an operation, he delays and hampers the surgeon to a degree that he little realizes. I believe that every surgeon who has had much experience in this line will confess that in not a few cases he has been obliged to substitute a partial or a less difficult operation because he was unwilling to expose his patient to the added risks that would come with the unskilled helper.

As soon as the public appreciates that the after-care of major surgical cases, especially of those in which the abdomen has been opened, is just as important as the operation itself, it will insist that the immediate convalescence be guided by the surgeon himself or his capable assistant. To operate from choice in a serious case far away in the country, placing the responsibility of the after-care upon the family doctor, who at the same time is in charge of patients with all types of disease, is unjust to the doctor and to the patient, and it leaves a loophole for divided responsibility in case of calamity.

No surgeon can safely outline the treatment of any abdominal case if he allows for the innumerable contingencies that he knows to be possible. If every patient passed through the stage of convalescence in a routine way the problem would be easy, but, as a matter of fact, such is far from the truth.

Another demand that the public can and should insist upon with the surgeon that is attached to a public hospital is that any and every major operation, especially if it involves the abdomen, should be performed by the surgeon himself or under his direct supervision. He is appointed to the hospital staff presumably for his special surgical fitness. His position presupposes long training in anatomy, pathology and assistance at surgical operations. The public seeks the services of a hospital because of the skill of its staff, and it has the right to demand that the full responsibility of all major operations should be taken directly by the staff. In order to attract students, to become popular, or to shirk labor, the surgeons of many hospitals delegate more or less operative work to immature and irresponsible house pupils; because of this the public suffers. Many times have I seen a young, inexperienced house surgeon struggling with some difficult problem at the operating table, a problem that has arisen suddenly and unexpectedly, and I have wondered if the complacent surgeon who has deserted his post would be willing to subject one of his own family to this amateur surgery. Much in the way of minor surgery can be properly delegated to one's assistants, but to place the responsibility that attends major operations upon a young surgeon with the experience of a few months is fundamentally wrong, while occasionally it is criminal.

Granting the fact that a hospital staff is or should be selected because of its capability, both collectively and individually, it behoves those of us who are responsible for the selection of our co-workers to be both catholic and discriminating in our choosings. We must acknowledge that it is through the work and enthusiasm

of the individual that surgical progress is maintained, and if we are to exact the respect of the public for our hospitals each individual member of the staff must in some one or more respects live up to the highest surgical standard, while at the same time his general qualifications are those of the broad general surgeon. This significance of the individual was aptly expressed as follows at a dinner recently given to Cardinal Logue: "The potency of the individual is greater and nobler than the influence of class, or organization, or even institution." To no type of man does this apply better than to the surgeon of our large hospital. How frequently do we see the progress and advancement of the entire institution dependent on the activity, breadth and scientific enthusiasm of a few, often against or in spite of the narrow opposition of the many.

To some extent the criticism as regards the house pupil pertains to the amateur surgeon who operates now and then for the excitement or for the fee, without pretending to be reasonably skilled in technique or reasonably posted in surgical progress. The smaller hospitals that are luxuriantly cropping up throughout the country are in this respect not only capable of doing much harm, but they are actually guilty thereof. The large and promiscuous staffs in control of these hospitals always include a few ambitious men eager to attempt surgery beyond their ability. The term of service of the staff constantly shifting, allows but a limited experience to any one member, and divides the interest and responsibility of the staff as a whole. It would be far better, as I pointed out some years ago, if such a hospital should select two of its younger members to train themselves for the necessary surgical work by acquiring thorough anatomical, pathological and technical foundations, and should compel them to keep in line with modern surgical advance year in and year out. Two well-trained men of this sort should be able to take proper care of the surgery of a large district, and take care of it well, whereas at present much of the work is badly done by innumerable half-trained general practitioners, who, while doing the best that they can, are not giving the public what it has the right to demand.

This would also do away to a great extent with the present system of calling upon the consulting surgeon from the large centres, who only too often operates hurriedly and on insufficient examination and knowledge of the patient, because he relies upon the data furnished by the family physician. In other words, too many major operations are done under these circumstances without satisfactory study of the patient and his disease, and the after-care is delegated to practitioners without the surgical training and ex-

perience that the public can justly demand. This system trains the consulting surgeon into hasty and snap diagnoses, and he necessarily gambles now and then on the chances that he can pull out of a difficult situation if he happens to be caught. But what of the patient under these circumstances? He rarely loses his life, to be sure, but I believe that any experienced surgeon will agree with me that at times an operation is not complete or satisfactory, or that a secondary operation is required later, because of the insufficient data, the inadequate assistance, or the imperfect operating-room equipment.

That the small hospital is invaluable to the town in which it is situated no one can deny, but, under the conditions under which most of these hospitals are conducted at the present time, that such an institution should undertake, except in case of necessity, the serious surgical problems, I believe to be ill-judged at least. It is only a question of time before surgeons will demand that no doctor assume the responsibilities of major surgery without required special courses of training and apprenticeship. If surgeons do not demand it the public will.

Furthermore, a patient who supports himself and his family by his daily wage should insist that he be kept in the hospital for as short a time as possible consistent with good surgery. He should not be allowed to lie around the ward waiting for the surgeon, engrossed in outside affairs or indifferent to his responsibilities, to make up his mind to operate. Neither should he be kept for an undue length of time for the purpose of teaching students. In the large clinics a decision for or against operation can be made within forty-eight hours in most cases. The necessity imposed upon the surgeon of earning his living away from his charity clinic is responsible for much of this form of neglect, and the blame, therefore, really rests on the public itself, badly educated in such matters and encouraged by an indifferent profession.

Could our hospital trustees but see the wisdom of encouraging the surgeon to earn his living in the same building in which he devotes so much time to the pauper sick, both classes of patients would be benefited. This fact is so obvious to anyone who has carefully considered the subject that it is unnecessary to enlarge upon it here.

The public has certain rights in the question of surgical fees. The surgeon has equal rights, but he seldom obtains them. To take up the abuse of medical charity would lead me too far from my subject; that such an abuse exists, especially in the eastern part of the States, is too flagrantly evident to need any confirmation

here. To some extent the existence of this abuse is responsible for the overcharges to which surgeons are occasionally driven. All patients except paupers and some wage-earners should be compelled to pay a fee for medical and surgical care commensurate with their earning capacity, just as they are obliged to pay for their provisions, their luxuries or their dissipations. The wealthy should pay liberally for major operations; they should not be robbed. The self-respecting wage-earner, whether on daily wages, a salary or in independent business should not be treated as a pauper. He should be compelled to pay some fee in proportion to his earnings, the number dependent on his income, etc. The public has abused over and over again the medical charity that flourishes to such a degree in our large cities. May it not be because of this abuse that the struggling surgeon is guilty at times of squeezing all that he can from his wealthy client? Our practices need reforming without doubt, but the abuse in this respect is infinitely less than that practised by the public which is competent to pay.

That surgeons divide fees with the family doctor bringing them surgical cases is a well-recognized evil. Fortunately it exists to a much smaller extent in the East than in the West. That it is fundamentally wrong and pernicious goes without saying. It is based on commercialism alone. As soon as the public realizes that it is deliberately sold by its family doctor—in whom it has full confidence—to the surgeon that allows the largest graft, and that it is not sent to the surgeon best equipped for taking charge of the case, the public itself will stop the practice at once and emphatically. It seems inconsistent with American character that a patient should be bartered voluntarily.

To enter upon the relation of animal experimentation as applied to the development of surgery is very tempting. Its bearing on the principles of surgery and on surgical technique is of tremendous import, so far as the great mass of the people is concerned. The latter has learned to trust in the unselfish honesty of the medical profession, and the responsibility is far more serious than the anti-vivisectionists can realize if humane surgical advance is checked by the indiscriminating and narrow bigotry of ignorant partisans. I believe that if a deliberate and thoughtful expression of views of the practical surgeons of the world were taken to-day an overwhelming majority would gratefully acknowledge its obligations to animal experimentation, as instanced in the daily relief of suffering and prevention of disease. It is almost pathetically comical that we should be confronted time and again by the ignorant and probably thoughtless views of two defunct and famous

surgeons upon this subject. Both men lived at the very dawn of modern scientific surgery; neither was young enough to grasp the significance of the new surgical discoveries, while each one had been a too-dominating power in certain narrow lines of surgical advance to be willing to accept the broader teachings of others. One directed his genius to mechanical problems; the other demonstrated advancement by means of human experimentation, all of which had to be worked out at a later period by laborious scientific research. The thoughtless and possibly hasty views of these men have been hurled at the thousands of modern surgeons by the opponents of animal experimentation, but I am confident that if Bigelow and Tait were alive to-day their dominating geniuses and grasp of the truth would enrol them as most enthusiastic and powerful allies in the struggle against the anti-vivisectionists. The layman, as a potential surgical patient, is more keenly interested in this controversy than he realizes. When the surgical thunderbolt strikes him or his family he wants and demands as his right the use of every nicety that will diminish risk and lead to recovery. I know, and you know as practical surgeons, that we daily use the results of laboratory research, and that if we were deprived of all that has been handed down to us as a result of animal experimentation our surgery would lapse back to a degree frightful to contemplate. This is the side that the layman must seriously consider when he is urged to oppose the profession that has always worked and struggled on behalf of suffering mankind, and that will fight for the principle of animal experimentation because it knows it is just, humane and merciful.

There is one more protest that may be made in behalf of the public. We hear much loose talk about the direful nervous shock that follows operation, and the public is well trained to expect a long and tedious convalescence on that score. With certain ill-balanced, badly-trained people this may be the case, especially if the patients are cared for by over-fussy or unscrupulous physicians, but as a general rule in my experience the post-operative effects are grossly exaggerated. Most patients can be trained out of such calamities as easily as they can be trained into them. With all the traumatic neuroses that have cropped up since suits for personal damages have become so frequent, it is incumbent on our profession to avoid augmenting this class of patients by ill-timed and ill-judged encouragement. In my own experience the patients that suffer most from post-operative neuroses are those that were allowed to become septic by culpable delay in submitting to operation. The bad result can be traced to the sepsis and not to the operation. The

contrast is so marked in what might be termed control operations in non-septic cases that one who has observed it readily recognizes the difference. When we consider that a generation ago most operations and accidents were serious because of the septic complications it is not difficult to understand why the laity at the present time has such a dread of anything associated with surgery. It can be stated conservatively that the lay public is about a generation behind in its realization of the advances accomplished in the science and art of surgery. I believe that I am not unduly severe if I accuse our medical brethren of being about five years behind.

Criticism and censure of existing conditions is not a difficult task. Of one, however, who condemns so freely you have the right to demand some suggestions for reform or reconstruction. In a short general address like this I can enter upon this phase only to a superficial extent.

Fundamentally the great and important factor in remedying many of the evils to which I have called attention is a higher uniform standard of general and medical education. This in the States is being pushed forward most ably and energetically by the Council on Medical Education of the American Medical Association, and we all owe our most loyal fealty to its endeavors. In addition to this general groundwork, I believe that so far as the making of surgeons is concerned, who shall be entitled to stand before the public as capable of dealing with the larger problems of surgery, much can be done even at the present time in the way of special training and special licensing. With regard to the latter, it may be best to adopt some form of approval by a recognized examining board somewhat similar to that which obtains in England. Thus, a candidate for the position of surgeons in a responsible hospital or in a rural community would be obliged to prove his fitness for the work, his knowledge of anatomy, pathology and the science and technique of surgery.

A reform in the construction of our hospital staffs I believe to be equally important. Some such system as that in vogue in Germany should be adopted by our hospitals in the larger cities where there is opportunity for teaching. As constituted at present many of our public hospitals are overweighted by cumbersome surgical staffs that could easily be reduced to a third or a sixth of their present number. A chief of staff should be placed in full control of fifty to one hundred beds. If in charge of a larger number his assistants or colleagues should be as capable of assuming full control as the chief himself. The latter should be allowed very great power in the selection of his assistants from among

those who have demonstrated their fitness and ability while in subordinate positions. Thus permanent or temporary vacancies would be properly filled, and responsible positions in distant hospitals would be open as prizes to tried, capable candidates. This would do away with the present system of graded rank, which, however efficient it may be in the army or in the commercial world, is poorly adapted to the profession of surgery and to surgical hospitals. Because a surgeon has performed his work regularly and perfunctorily while in a subordinate position, without advancing himself or his art, is no reason that he should be elevated to the head of a division when a vacancy occurs. As a result of this misapplication of civil service rules one such chief of service can and will block the progress of his division in a way little realized by the general public, or even by the practising physician. Let every man aspiring to become a chief of staff make good; do not hand him a gift with so great responsibilities just because he happens to be older than his colleagues. Have we not all seen certain surgeons, originally appointed by political favor, nearly paralyze the active service of a large hospital when placed in a position of responsibility? Has such a man the right to trade on his assumed ability at the expense of a public which cannot easily comprehend the exact state of affairs?

The same principle which applies to the visiting staff of a hospital applies to the student assistants. As I have indicated elsewhere, uniformity and permanency in the operating and ward staff is of the utmost importance in obtaining uniform and satisfactory surgical results. The routine, inexpert work in the wards, the laboratory and the operating room should be done by students, delegated by the schools and accepted without competitive examinations, because such work should be a part of the student's curriculum. For more responsible positions the selection should be by a process of elimination, dependent on the demonstrated ability and aptitude of the student assistants. The highest positions should be allotted for a term of years to selected candidates who are planning to enter upon a surgical career. These should be salaried, and they should be encouraged or compelled to undertake original work. When at last these men are graduated from their assistantships they will be in a position to offer themselves as candidates for junior positions on the staff, or they may emigrate to other cities or towns, where they will be entitled to undertake the surgery of their district, building up a surgical nucleus that is capable of developing indefinitely, varying only with the ability of the individual surgeon.

To elaborate this scheme is unnecessary. It is essentially that

which exists in Germany. When we consider the splendid surgery that the Americans have shown themselves capable of developing in the face of our clumsy and restraining systems, one grows enthusiastic at the possibilities that lie before us, provided we could develop the art along better, safer and more liberal lines.

In dealing with the private hospital problem I can easily be misinterpreted, but I believe that much can be accomplished by which the public will be dealt with more fairly. It seems only right that the well-to-do patient should be treated as carefully and as efficiently as the pauper, but such is far from the fact in some of our large centres. Many of our private hospitals are run as money-making schemes. It is a great temptation to keep a patient in the hospital longer than necessary. It is easy to encourage the neurasthenic to waste weeks in an institution when we know that he or she would be far better off in the woods or at work. Without responsible residents in these hospitals emergencies endangering the life of the patient arise occasionally that cannot be dealt with properly. The same holds true, as I remarked earlier, with regard to the operating room equipment. If we are to have private hospitals the administration can and should be brought as near to that which exists in our best public hospitals as is possible, and until that is attained we are not dealing quite squarely with our patients, from whom we derive our incomes.

To kill the growing tendency towards a division of fees, it is necessary to keep the public informed as to the facts. Whether this should be done through our local or our national societies is not yet clear, but I believe that it is best undertaken by the larger body of men. A curious and annoying type of graft that is not infrequently worked upon the surgeon is that in which the family physician, who presumably knows the financial status of his patient, makes one price for operation to the patient and another (much smaller) price to the surgeon. To expose this it is necessary that the surgeon have his business dealings directly with the patient, thereby losing, of course, all future work that might otherwise come to him from the family doctor whom he has exposed. The public has a right to know how much it pays for surgical care and to whom the amount is paid. The moment we begin to juggle with it in this respect we lose the right to pose as a profession the first object of which is not to make money.

In conclusion, I would not have you infer that there is no other side to surgery than that of criticism and fault-finding. No profession is without flaws. Every profession reaches a higher plane with each decade, and it is mainly by the elimination of the petty

obstacles that our profession is destined to attain a level that can never be reached by others.

As a matter of fact, the public can feel that, taking American surgery as a whole, both that done by the masters and that done by the rank and file scattered over the length and breadth of this continent, there is no surgery in the world more intelligent, more skillful, and more considerate of the rights and feelings of the patient. The rate of advance is almost phenomenal. We in the States are wont to boast of our commercial progress, which is apparent to everybody. Few beyond those working in hospitals, laboratories and medical libraries realize that the advance in our profession is parallel with that in our commerce. The advance in the one, however, is for the most part financial and scientific as applied to finance, while the advance in the other is scientific, humane, educational and life-saving.

A significant quality that belongs to our profession is the generosity of the surgeons of one locality towards those of another in freely giving and receiving the good things that spring up in our art. It is a most refreshing sign of broad culture, and it does much to destroy the petty jealousies that are a heritage of past generations.

More and more do we see the internist and the surgeon working side by side; more and more do they appeal to the authority of the laboratory, and, finally, with all the petty bickerings and inconsistencies that are to some extent inevitable in all professions, any one of us when his name is called in the ranks of the American surgeon should be proud to answer "ad sum."

IMMUNITY TO DISEASE.

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The advances that have been made by investigations and research on immunity to disease have been so great of late years that anyone who has not followed the work closely can hardly realize the points of practical value that have accrued from a diagnostic, prognostic, and prophylactic standpoint. Therapeutic procedures more rapidly work their way from scientific publications into the general medical literature, such as Wright's vaccine inoculation in bacterial diseases; but different conceptions of clinical conditions,

resulting from laboratory investigations, and improved methods of diagnosis and prognosis take a longer time to become disseminated.

The immense amount of work that has been accomplished on "Immunity" by men of different nationality and ideas has given rise to such a confusing array of terms that many who attempt for the first time to review the recent work find themselves confused by the technical nomenclature. It is with the hope of being able to present a different conception of infectious and contagious diseases that I am attempting, by omitting technical considerations, to give some of the main and established conclusions resulting from work lately done on immunity.

For some time the chief workers in Germany (Ehrlich and his school) held that the serum of the blood was the essential factor in immunity, while other workers, especially Metchnikoff and his pupils in the Pasteur Institute, attributed to the leucocytes and their phagocytic activity the degree of resistance. In contrast Sir A. E. Wright showed that the serum was the cause of the induced phagocytosis, and, to Wright, I think, is due the everlasting gratitude of the profession, if only for giving the great stimulus that he has by the introduction of specific vaccines as a therapeutic means of combatting bacterial diseases.

The theory that Ehrlich built up to explain his experimental results has served as a basis for those working along serological lines, and, while it has the disadvantage of being extremely hypothetical, it has given conceptions upon which much valuable work has been done. Although the details have not been accepted, the main theory has been the explanation for most of the practical procedures; and as such, I take it, has served the best purpose a theory can. For the extent of this article one might state Ehrlich's side claim theory as follows:

Inoculation or infection of a living organism is responded to by the production (on the part of the inoculated organism) of a specific antibody, which is capable of combining with and destroying the infecting body. This beneficial action on the part of the specific antibody can only obtain through the co-operation, so to speak, of a third constituent which is always found in normal serum. This quantity has been called complement (or alexin). These chemical possibilities are usually depicted diagrammatically, and as such give only in part a true conception of what we suppose takes place.

The response body (called antibody amboceptor, etc.) is specific to the infecting agent, that is, each bacillus, for example, is capable of stimulating the inoculated organism to produce an antibody of

definite chemical construction which will differ chemically from an antibody produced by another bacillus. These antibodies have a fairly stable construction. They withstand heat at 56 degrees C. for half an hour.

The third quantity, called complement, is something that is found in all normal sera. In contrast to the specific antibody, it is very easily broken up, being destroyed by five minutes' exposure to 60 degrees C.; and to be preserved for some days must be kept frozen. Beyond the fact that there are possibly many similar bodies acting as complement (or to put it in another fashion, that complement is a multiform body) we know very little. This, however, is certain. For the efficient action of the specific antibody complement must be available. The specific antibody is supposed to join itself to its causative agent, and to this new combination complement becomes bound.

Pfeiffer's early experiments with the B. colon illustrate this. He inoculated an animal with the B. colon and demonstrated this animal's serum in high dilutions was capable of destroying the bacillus in contrast to the serum of a similar uninoculated animal. Further, he showed that heating the immune serum (*i.e.*, that from the inoculated animal) to 56 degrees C. for half an hour destroyed its bactericidal power, but that on the addition to this inactive heated serum of dilute fresh normal serum (which of itself was not capable of bacteriolysis) this power was restored. The explanation lay, of course, in Ehrlich's side chain theory. The immune serum contained, besides the specific antibodies resulting from the inoculation of the B. colon, sufficient complement for the efficient action of the specific antibodies when brought in contact with the B. colon. Heating the immune serum destroyed the complement, so that this had to be added in the form of fresh normal serum before the specific antibody could effect the destruction of the bacillus by the proper chemical union. These different actions can be summarized thus:

1. Immune serum (fresh)—bactericidal power present.
2. Immune serum (heated)—bactericidal power lost.
3. Fresh dilute normal serum—no bactericidal power.
4. Addition of 3 to 2—bactericidal power regained.

This reaction is definite and takes place according to definite chemical laws. Although we cannot in any way define the complex chemical composition of these bodies, or show wherein lie their definite chemical affinities, we can draw conclusions from the phenomena they are capable of presenting.

The following experiment will illustrate this:

Inoculation of animal A. with the B. colon produces an antibody specific for the B. colon only.

Inoculation of animal B. with the B. typhosus produces an antibody for the B. typhosus only.

(Heated) immune serum (from A.) complement (fresh dilute nor. serum) will have no effect upon the B. typhosus, but will destroy the B. colon.

(Heated) immune serum (from B.) complement (fresh dilute nor. serum) will have no effect upon the B. colon, but will destroy the B. typhosus. That is, unless the antibody combines with the bacillus, the addition of complement makes no difference, and the antibody will only combine with the bacillus (or micro-organism) which stimulated its production.

To lead to an explanation of a reaction (called complement fixation or deviation), now being extensively employed for diagnosis, let me state that the body does not respond to bacterial inoculation or infections only, but to all foreign proteins. The term usually employed to designate such inoculated proteins is antigen. Amongst the different antigens used for experimental purposes are bacteria of all kinds, egg white, blood corpuscles, the mucous walls of stomach and intestines, etc.

Inoculation of an animal with the blood corpuscles of another animal stimulates (in the inoculated animal) the production of (haemolytic) antibodies (or amboceptors, as they are here more frequently termed). With an immune serum so obtained, the following reaction can be made:

Put in a test tube appropriate amounts of

1. Blood corpuscles of animal A.
2. Heated immune serum of animal B. (which has previously been inoculated with corpuscles of animal A.).
3. Dilute fresh normal serum.

Incubate the test tube at body temperature and the corpuscles will become haemolised, that is, the corpuscles will be broken up and give their haemoglobin to the fluid. The reason is that the specific amboceptors in the immune serum enter into chemical union with the corpuscles, and this combination binds complement, which results in the destruction of the corpuscles. This reaction is given by dilution of the immune serum as high as 1-800 to 1-1,000 or more, and is specific. For example, corpuscles from another species of animal could be substituted and no haemolysis would result.

If instead of fresh dilute normal serum, physiological saline solution were substituted, no further combination than that of amboceptor and antigen could take place, and the corpuscles would

sediment to the bottom of the test tube, leaving the supernatant fluid perfectly clear. Thus we have a color reaction taking place in the presence of complement, which can be used as a method for the detection of that substance. This is the underlying principle of the reaction known as complement deviation or fixation. It is used as a means of diagnosis in syphilis, pertussis, typhoid fever, etc.

For example, this reaction in the diagnosis of syphilis obtains in the following fashion: Since it is impossible to get a culture of the organism causing syphilis, one must make an extract of the organs of a positive case. It has been found that extracts from the liver and spleen of a syphilitic foetus best serve the purpose. This gives us a solution containing those substances, for which the specific antibodies, resulting from an infection with syphilis, have their specific chemical affinity. In this way we have a method of detecting the presence of syphilitic antibodies in the serum of anyone.

Thus—place in a test tube appropriate amounts of

1. Syphilitic extract.
2. Heated immune serum of suspected case.
3. Fresh dilute normal serum, and incubate at body temperature. If the case is a syphilitic, there will be in his or her serum syphilitic antibodies, which will, with the syphilitic extract, enter into that definite chemical union of antibody and antigen which, as above explained, binds complement always. If the case is not a syphilitic complement will remain free.

To detect whether or not complement remains free in the test tube it is only necessary to add both blood corpuscles and their heated haemolytic sera and incubate at body temperature. Two results or end reactions are possible:

(a) If complement was bound, no haemolysis can result, the corpuscles, sediment and the supernatant fluid remains clear. The diagnosis is syphilis absolutely.

(b) If complement was free, haemolysis takes place, the corpuscles disintegrate and the fluid takes on a red color due to the liberated hemoglobin. The diagnosis is negative for syphilis.

In syphilis this reaction is obtained in primary, secondary and tertiary stages, as well as in parasyphilis. Wassermann, for example, has reported in 15 cases of tabes or suspicious tabes, 12 of which gave a positive reaction, denoting syphilitic infection. The method is a valuable control in the treatment of those cases which take mercury with difficulty. Whether it is an absolute diagnosis of cure it is, perhaps, too early to state. This much, however, seems rational. If, after a course of

treatment, the patient still gives reaction, showing that his serum contains syphilitic antibodies, one would be justified in concluding that the treatment should be continued.

The method of complement fixation can, of course, be applied to the diagnosis of other infections, such as pertussis, typhoid fever, gonorrhoeal arthritis, etc. Wassermann, Berlin, has a staff of 7—10 men actively engaged in this work.

To refer again to Sir A. E. Wright's work on opsonins. In inoculation with specific vaccines Wright and all of us who are of his school assume that the opsonic indices represent a parallel to the rise and fall of the patient's total resistance. To what extent this is always true it is difficult to say, but several articles lately published show evidence that the opsonic theory is perhaps not in opposition to Ehrlich's side chain theory of the stimulation bodies (amboceptors) and complement fixation. From this standpoint I have shown that the diagnosis of tuberculosis and gonorrhoeal arthritis can be made by taking the phagocytic index of the activated serum. For example, if a patient's heated serum shows a specific phagocytic index, which is increased by the addition of complement, it appears that the diagnosis can be made.

When or in what manner the theories of the different reactions now recognized as sound will be harmonized it is difficult to state, but many of the connecting links between them will probably soon be demonstrated. Then the diagnosis made by the detection of specific amboceptors, by the varying phagocytic indices, by hypersensitive reaction, (calmette for tuberculosis), and the prophylactic and therapeutic use of both vaccines and sera, will take on a more rational appearance from our fuller conception of infectious diseases. There are so many different procedures, each resting on its own theory and clinical results (which is more conclusive than experimental data), and so many that are as yet not fully supported that it is difficult to write only of the former.

However, there seems to be hope that most of the diseases regarded as infectious in origin must yield still a little more to the methods of investigation that we have at our disposal. Accurate methods of obtaining blood cultures, opsonic and complement deviation technique should be mentioned among these.

From what I have given in this brief fashion one might conclude the technique to be rather simple. The difficulty lies in avoiding possible errors. Especially is this the case in the methods of complement deviation where every extract and serum must be standardized and controlled. Further, the reaction is a qualitative one, and consequently the solutions must be used in varying strengths.

In conclusion, may I state that we need for this work a considerable number of syphilitic foetuses. The extract made from these lasts only a short time, and consequently considerable difficulty is experienced in maintaining our stock supply. If such cases of congenital syphilis occur in the practice of any who may take this journal we would take it as a favor if we could be informed.

THE TREATMENT OF DIFFUSE SUPPURATIVE PERITONITIS WITHOUT DRAINAGE.*

BY C. F. MOORE, M.D., TORONTO.

Mr. President and Gentlemen:—

In dealing with this subject, I wish to contrast the various well-known methods, as outlined by their respective exponents, and see by deduction, if one of them might not offer a better prospect for our patients, and that prospect, perchance, may be a reasonable plea for the elimination of drainage.

From a statistical point of view, all the methods give very good results, but statistics are not to be relied upon wholly or without question. One case, for instance, may be of extremely malignant infection, and die within a few hours after operation; another, not so virulent, operated upon by a different method, is followed by death in forty-eight hours or thereabouts; then a third, of very mild infection, will recover after another form of procedure. Such cases prove nothing, for, were the order of operations reversed and the time elapsed after the onset of the attack were within a favorable period, the results might have been more satisfactory.

I wish to speak of three methods, viz.: Drainage alone, lavage and drainage, and lavage followed by closure without drainage; but before doing so permit me to give a short account of the physiology of peritoneal absorption, as a proper understanding of this function is essential to intelligent treatment.

From physiological research it has been demonstrated that the power of the peritoneum for absorption is equal to that for secretion; that the lymphatic spaces are principally confined to the diaphragmatic region, and that there is a normal flow of lymph toward the diaphragm that is largely uninfluenced by gravity. Also that colored particles in fluid, experimentally introduced into

* Read before the Ontario Medical Association at Hamilton, May 28th, 1908.

the peritoneal cavity, are taken up first into the pits in the diaphragmatic zone, and then into the lymph spaces by means of the phagocytes. When peritonitis develops, an army of phagocytes, depending upon the virulence of the infection and the time elapsed, is poured into the peritoneal cavity, and provided the endothelium is uninjured, bacteria and other foreign elements can be, within certain limits, disposed of by the lymphatic route in the region of the diaphragm. When, however, the endothelium is destroyed or injured, the lymph spaces are exposed, and thus absorption of a fatal degree may ensue with marvellous rapidity, but this is not of invariable occurrence, as nature throws out a deposit of lymph at the site of injury that limits the degree of absorption into the lymphatic current, and at the same time prevents further egress of bacteria from the lumen of the intestine. In cases of extremely severe infection, usually streptococic, death takes place from violently rapid absorption, frequently leaving no visible signs, as the infection is so virulent that time is not sufficiently long for the protective lymph deposit to take place, and the phagocytes poured out are neither sufficiently numerous nor powerful to successfully cope with the infective micro-organisms.

The results of the entrance of bacteria into the peritoneal cavity depend upon—their virulence and power to damage the endothelium and thus gain entrance into the circulation; upon the power of the individual to furnish a competent protective lymph-deposit; upon the stimulating action of the body-fluids; and upon the ability of the phagocytes to deal with the organisms.

The absorptive power of the peritoneum for fluids is so great that an animal will take up from 3 per cent. to 8 per cent. of its body-weight in an hour, or an amount equal to its entire weight in twenty-four hours. Poisonous substances injected into the peritoneal sac will act more quickly than when introduced into the intestinal canal. It has also been shown that, while normal peristalsis does not hasten this absorption, an increased peristalsis does, and a decrease will markedly delay it. Bacterial irritation, up to the point of hyperaemia, will also delay it, and thus the influence of the phagocytes to destroy the micro-organisms is enhanced.

The power of the peritoneum for protection is limited to conditions in which the bacteria are neither too numerous nor too virulent. When this limit of safety is passed, however, this absorptive property greatly increases the danger, as peritoneal exudates form an excellent culture-medium, in which bacteria can increase in a short time with great rapidity. Furthermore, this great absorptive ability may so load the blood with bacteria and their toxins that

death will ensue very quickly. This power for absorption, and the ability of the phagocytes to deal with the micro-organisms are factors upon which we must depend for safety in our treatment of infection of the peritoneum, and the care and thought we give them determine, in some measure at least, our success. Rapid operating, with extreme care not to injure nature's protective lymph-deposit, free dilution of the infective fluid, and placing the patient in such position to cause this fluid to gravitate from the diaphragmatic region to parts where absorption is less rapid, are imperative.

The object of opening the peritoneal cavity in a case of peritonitis is to remove the products of inflammation, and the escaped contents of hollow viscera; to deal intelligently with the source of infection; to relieve over-distended intestine; the cleansing, as far as possible, of the peritoneum; and then, the final step in the operation is the question—"To drain or not to drain."

There is an old adage, "When in doubt, drain," but then this factor of doubt is, after all, purely a personal one, and sometimes not based upon any strong convictions, but upon the following of routine methods, and not thinking of the physiology of peritoneal absorption, nor of the power of the phagocytes; or it may be decided by a prejudice in favor of some method that has given fairly good results. There is no universally approved opinion upon the subject of drainage, as is evidenced by the different lines followed by well-known surgeons of, perhaps, equal ability. For instance, Dr. John B. Murphy, of Chicago, at the British Medical Association meeting, in speaking on Mr. Bond's paper, said: "Get in quickly, but get out more quickly. He rapidly and carefully removes or repairs the organ from which infection emanates, inserts a drainage tube in the lower angle of the incision, then, after the patient has been transferred to bed and sufficiently recovered from the anaesthetic to be placed in Fowler's position, he resorts to the continuous slow instillation into the rectum of normal salt solution, by means of a reservoir placed not higher than eighteen inches above the pelvis, interrupting the flow only if the pulse becomes very full, or the breathing difficult. Murphy*, as you see, does not flush the peritoneal cavity. Mr. Moynihan, of Leeds, Eng., writes: "My own practice in these cases is to ensure, as far as possible, cleansing by free lavage, free drainage, and, if need be, emptying of the intestine, paralyzed by over-distension, by enterotomy or enterostomy." This surgeon favors free lavage, as well as free drainage. Dr. Joseph A. Blake, of New York, writes: "I was formerly a warm advocate of abundant drainage, later I became convinced

of the utter impossibility of draining every part of the peritoneal cavity, for it was evident that the drains were soon isolated by adhesions, so I next confined myself to drainage of the field of operation, and then, perceiving that the other similarly-affected regions of the peritoneum took care of themselves, I omitted drainage entirely, employing it only, however, where the presence of necrotic tissue or hemorrhage demanded it."

So far as I know none of these surgeons gives the percentage of recoveries, yet I presume their results must be satisfactory to them or they would adopt other measures. I am informed that Murphy made a statement that he had but one death in twenty-three cases. If this be correct it is certainly a marvellous record. Hotchkiss, of New York, gives five deaths in forty-three consecutive cases operated upon by him without drainage. In *Annals of Surgery*, February, 1904, page 282, this writer also gives an account of a very interesting case of contusion of the abdomen, with rupture of the small intestine and escape of contents, that was operated upon in Roosevelt Hospital. The laceration was through all the coats of the intestine, and involved nearly one-half of the circumference from the mesentery. The rent was securely sutured, the peritoneal cavity thoroughly flushed, and the abdominal wall closed without a drain. The recovery was uneventful, and the patient discharged well on the twenty-second day from operation. This is a very strong case and deserves consideration.

Dr. J. F. W. Ross, in his last thirty cases, had twenty recoveries without drainage. Dr. F. W. Marlow gives, I think, eight cases without a death. I shall now mention six cases that occurred in my own work, the results of which have caused me serious thought, and the outcome is this paper. The first five were treated by drainage alone, followed by Fowler's position, and I regret to say that all died within a period of forty-eight hours. The sixth I treated as I did the previous ones, but, in addition, I resorted to free lavage until the return fluid was quite clear. This case, from general constitutional evidence, was the most desperate of all, nevertheless she lived for three weeks, when death occurred from rupture of a subphrenic abscess into the lung. Upon autopsy there was no remaining trace of peritoneal inflammation, but within the sinus that remained, though the tube had been removed in about forty-eight hours, pus was quite free. Had I been content with free lavage, and closed the wound completely without a tube, with but a wick of gauze to the peritoneum to drain the infected edges, I believe I would have received equally as good result, as far as the peritoneum is concerned, as the autopsy proved that it had

effectually taken care of the remaining micro-organisms in the areas that the tube could not possibly have drained. Let us assume that we have a case of peritonitis caused by a ruptured gastric or duodenal ulcer, we operate, insert a tube, and make use of Fowler's position. What do we expect will become of the remaining products of the induced inflammation? Do they gravitate to the pelvic region and escape through the tube, or does the peritoneum successfully dispose of them? We must remember that the pelvis is not a perfect funnel, but is somewhat like a saddle, the pommel being represented by the uterus or bladder with a depression on each side. Then how can all the fluid escape? What then becomes of the remaining part?

Again, in perforative appendicitis, where no protective barrier to the spreading of the inflammation, or to the escape of the contents of the appendix, has been formed, what becomes of the pus that is widespread throughout the peritoneal cavity, or of a stercolith that may have escaped detection, when drainage alone has been relied upon? All these products are not carried away by the drainage tube, and cannot be from the form of the pelvis. It is only the excess that escapes, and for a very few hours at best, the limit being probably forty-eight hours, as the tube becomes thus rapidly encapsuled by fibrous tissue, leaving a sinus, from which alone infective fluid is discharged, and not from the surrounding inflamed peritoneum, as by this time a probe cannot be passed beyond the cylindrical wall of this sinus, unless sufficient force is exerted, when it will penetrate the newly-formed tissue. In the cases of recovery, where drainage was made use of, after the tube had become encapsuled, the remaining areas of the similarly infected peritoneum must necessarily have effectually disposed of the products of inflammation. Thus we have an army of phagocytes poured into the field to give fight to the invading and rapidly multiplying army of bacteria. The former won the day because the bactericidal action of the phagocytes was greater than the virulence of the micro-organisms, after their balance of power, the numbers that escaped up to the time of encapsulation of the tube, had been removed. Now, does it not seem reasonable to assume that this great serous sac is all the more capable of successfully coping with the small amount of infection that remains when free flushing is made use of until the return flow is clear, after closing without a drain, when no necrotic tissue exists and when sutured parts are secure, especially if this remaining infection be diluted by leaving within the abdomen a large amount of normal saline, and the patient placed in Fowler's position? Is it not more probable that

a much greater quantity of infective fluid can be evacuated from the peritoneal cavity by freely flushing through a liberal incision or incisions, than can possibly drain away through a tube, during the few hours it is becoming encapsuled?

You may say that the relief of tension is the primal object of the drain, but then that is obtained by the incision, as the fluid gushes out, and, besides, the dilution gained by the lavage and the retention of the salt solution minimize the risk to life, and with the Fowler position absorption is more gradual, thus permitting the excretory organs to carry away the toxins. Why not then give the patient, especially in a case where the endothelium is uninjured, the stimulation that occurs from free lavage of the peritoneal cavity, and leave within it a moderate quantity of salt solution, and close without a drain? By so doing our patient reaps great advantages should recovery follow, as a stronger scar is insured, with much less liability of a subsequent operation being required for the cure of a ventral hernia.

It seems to me that a drainage-tube is of use only until it becomes encapsuled, a few hours at best; that much greater tension can be relieved by incision and free lavage; that a greater quantity of pus can be removed by flushing than can possibly be carried away by a drain during the short time it takes to isolate it; and that the retention within the abdomen of the saline solution will very largely dilute the remaining micro-organisms, place the peritoneum in the most satisfactory conditions possible, and thus favor the elimination of toxins by the organs of excretion. For these reasons it would appear that it is perfectly justifiable to close the abdomen without a drain, unless it be one to the peritoneum, although I believe this is not essential, as if pus come from the wound it behaves as an ordinary stitch-hole abscess. Why are the results by drainage so discouraging, and why are the statistical reports not more uniform? Does the fault lie with the operator, in the method of treatment, or in the variableness of the virulence of the infection? In the cases of recovery, when a tube was used, the areas that were impossible to drain must have fought a successful fight, therefore it appears quite reasonable to infer that we can obtain a greater percentage of recoveries by free lavage, thus liberating the maximum of infective fluid, and closing without a tube, for if the undrained sections are capable of sustaining themselves when a tube has been used, surely the whole sac is equal to the occasion, after flushing until the return flow is clear and the abdomen securely closed. If we can obtain as good results from operative measures by this method as are secured by drainage alone, then this

procedure is the preferable one, for the reasons previously stated, as regards the strength of the resulting scar; much less liability to a ventral hernia; shorter time in bed; and the more rapid convalescence, owing to the change to better environment in the majority of cases, as most patients prefer home to hospital surroundings. The after-treatment is to follow the lines of elimination, and thus forestall, if possible, intestinal paresis. With this object in view, in about twenty-four hours, or earlier, if tympanites is present, a high 1, 2, 3 enema (turpentine 1 oz., Mag. Sulph. 2 ozs., glycerine 3 ozs., Aq. to one pint) might be used, after which a rectal-tube is allowed to remain within the sphincters for at least two hours at a time. If the enema is ineffectual, and the stomach will tolerate it, it might be well to administer one drachm of Mag. Sulph. in hot water every two hours until the desired result is secured.

Indiscriminate use of morphia in these cases is to be deprecated, for it masks symptoms, locks the secretions, and helps to induce what we endeavor to obviate, viz., intestinal paresis. Normal saline may be introduced into the rectum, or the cellular tissue and strychnia given if the heart action should indicate it. As soon as the functions of the digestive organs are restored nourishment would naturally be given on general principles.

91 Bellevue Avenue, Toronto.

Physician's Library.

A Text-Book of Surgical Anatomy. BY WILLIAM FRANCIS CAMPBELL, M.D., Professor of Anatomy at the Long Island College Hospital. Octavo of 675 pages, with 319 original illustrations. Philadelphia and London: W. B. Saunders Company, 1908. Cloth, \$5.00 net; half morocco, \$6.50 net. Canadian agents: J. A. Carveth & Co., Limited, Toronto.

We have perused this work with no little satisfaction. In the preface the author remarks: "Anatomic facts are dry only as they are isolated. Translated into their clinical values, they are clothed with living interest. No teacher can impart, or student assimilate, all the details of anatomy. The facts must be sifted, their comparative values fixed, and the reason for their acquisition demonstrated by directing attention to the practical problems with which they are associated. A fact that can be utilized is a fact that will survive."

Viewed from this standpoint, the work is very satisfying, and one which, on careful study, will well repay alike the practitioner and the student of medicine. We are inclined to think the title were better changed to "Applied Anatomy," for the wealth of anatomic facts revealed in this work can scarcely be relegated to the exclusive domain of surgery, inasmuch as no small part of the work is of equal value and interest to the physician. Professor Campbell in his excellent work may be said—in modern parlance—to have "delivered the goods," and it gives us pleasure alike to congratulate him on his work and to highly recommend it.

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COMMENT FROM MONTH TO MONTH.

Original Articles practically at this season of the year make so much demand upon our space that in this issue we have devoted our pages to them alone. This is done in order that several who read papers at the Canadian Medical and Ontario Medical Associations may early see their papers published. As they are exceptionally good, scientifically as well as practically, we commend them to our readers without further notice.

THROUGH the kindness of Dr. Simon Flexner, anti-meningitis serum may be obtained on application from the Sick Children's Hospital, Toronto, together with directions as to use and limits, free of cost.

News Items.

DR. W. H. B. AIKINS, Toronto, has returned from several months' stay in Continental medical centres, and will hereafter confine his practice to consultations and office work.

DR. J. T. FOTHERINGHAM, Toronto, announces that on his return from England he will hereafter confine his practice to consultation work.

DR. H. B. ANDERSON, Toronto, has moved to the north-east corner of Bloor and Huntley Streets.

DR. R. J. BLANSHARD, Winnipeg, President of the Canadian Medical Association, has gone to England for a couple of months.

WE have received the announcement of the American Medical Missionary College for 1908-9. This announcement is illustrated, and it has been endeavored to make it an accurate statement of the facilities and work of the school. The American Medical Missionary College is unique in that it accepts as students only those who expect to devote their lives to medical missionary work. We would respectfully invite attention to pages 107-111, on which you will find reports of examinations of the school made by the Michigan State Board of Registration and by the Association of American Medical Colleges. For copy of announcement apply to Rowland H. Harris, M.D., Registrar, Battle Creek, Mich.

Correspondence.

His Majesty King Edward VII. and Queen Alexandra have been graciously pleased to extend their patronage to the National Sanitarium Association of Canada.

TO THE MEDICAL PROFESSION.

August 3rd, 1908.

The National Sanitarium Association begs to inform the Canadian medical profession of a recent reorganization of the medical department of its Muskoka institutions, the Muskoka Cottage Sanatorium and the Muskoka Free Hospital for Consumptives.

Dr. W. B. Kendall has been placed in immediate charge of both institutions as physician-in-chief, with an assistant resident physician at each institution. It is intended also that a resident pathologist should shortly be appointed. In May, 1908, Dr. C. D. Parfitt, who had been in charge of the Muskoka Free Hospital during the six years since its opening, was made consulting physician to both institutions and will continue to live on the grounds of the hospital.

Dr. Kendall, after graduating at Trinity University, Toronto, spent some months in London, Dublin and Edinburgh, where he qualified before the examining boards of Edinburgh and Glasgow (L.R.C.P. & S., Edinburgh; L.F.P. & S., Glasgow). He was appointed to the Cottage Sanatorium on his return to Canada, in April, 1907, and in May, 1908, was also given charge of the Free Hospital.

Dr. Parfitt graduated from Trinity University, Toronto, in 1894, and, after serving as an interne for a year at the Toronto General Hospital, spent two years in London and Vienna. While in London he qualified before the conjoint examining board (M.R.C.S., Eng.; L.R.C.P., London). A year and a half more was given to post-graduate work in Baltimore in the service of Dr. Osler.

In order to extend the usefulness of its work the Association has arranged for its physicians to attend patients who come to Gravenhurst and are unable for some reason to enter or continue

in either of the Sanatoria, but who wish to receive special medical supervision.

The Association is very glad at all times to have physicians visit its institutions, especially those who may wish to consult with the sanatorium physicians regarding their own patients in residence.

As a matter of special interest to the medical profession, the Trustees of the National Sanitarium Association have decided to set aside in the Muskoka Cottage Sanatorium several rooms for physicians who may have unfortunately become afflicted with tuberculosis and desire sanatorium treatment. In such cases a special discount is made the profession; that is, in place of charging the regular rate of \$12.00 per patient per week, the physician so accepted as a patient will be charged only \$8.00 a week.

J. S. ROBERTSON,
Sec.-Treas. Nat. San. Ass'n.

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