turn, has been felt in the hospitals. With it has come a higher type of work, more experimental investigation, more search after basic principles.

A very large amount of work, much of it excellent in quality, has been produced in such laboratories. This covers a wide range of subjects. In the hospital laboratory most of this has been along the lines of pathology and chemistry. Physiology has lagged too much in the hospital laboratory, where for the most part it is unrecognized. In this respect development is needed in our clinics and may serve to lessen the present too great breach between laboratory and ward worker.

It would be interesting to recapitulate much of this recent work, but time does not suffice. The work of two laboratories, however, I wish to call attention to. In the laboratory of the University of Michigan valuable studies of the trypanosomes and the spirochetæ have been made. It is particularly noteworthy that there, in an inland town in the north temperate zone, investigations could have been carried on with the result of a distinct advance in our knowledge of a group of diseases of man, most of which are confined to the tropics. The results of this work will extend greatly the range of problems capable of successful attack in the laboratories of this country. In the laboratories of the Johns Hopkins Hospital another phase of medical work is shown. There in a laboratory of experimental medicine pathology, physiology, medicine and surgery have been combined; a form of medical coöperation, if I may be permitted the term, is in operation. Diseased dogs are treated and the student learns medicine and surgery. Diseased conditions simulating those occurring naturally are produced; operative technic is acquired. The immediate and late effects are studied by the methods of physiology and clinical medicine; the end results are studied by the methods of pathology. More exact knowledge of the phenomena of certain diseased conditions and a better understanding of their underlying causes are thus obtained. This is a type of laboratory and work which needs to be developed in many of our hospitals if we are to keep pace with medical science abroad.

Independent endowed laboratories are the latest development of medical science in America. They are represented by the Rockefeller Institute in New York, the Institute for the Study of Infectious Diseases in Chicago and the various commissions for the investigation of cancer. Some are organized for the study of special problems, others may devote their attention to a wide field. Recently a change has been made in the mode of attack of many of these special commissions. Instead of attacking the problem directly as in the earlier days, attention is being given to technical methods and more fundamental biologic principles in the hope of thus securing a new path of approach to the central problem. With this new point of view we hear less of the so-called practical. This query, "What is the practical use of the problem?" has too long been a drag stone to investigation in America. This hindrance, I believe, is now disappearing and as a consequence there is more search for the truths at the root of problems, even though any practical application may seem remote. In fact, advance will come earlier from work along these lines and already some of the most practical applications have been the results of most abstract investigations. This change in point of view, to me, marks a new and important phase of American medical investigation.

During the past few years, undoubtedly, distinct progress has been made in medical science in America. More men and more money than ever before are now devoted to the study of pathology and physiology. The subjects have broadened out until they touch more and more the abstract sciences, on the one hand, and clinical medicine and surgery, on the other. The methods of the laboratory are being applied in the clinic and from the clinic are gathered problems for the laboratory; both use more the methods of pure science. It is to be hoped that these changes mark the dawn of a new era for American medicine. Some of the spirit of this new medicine is suffused through the program for this session, to which I now invite your attention.

TWO DESIRABLE REFORMS.*

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At commencement exercises themes concerning the improvement of the medical profession are always appropriate. It is only through the aid of the well-trained young men now entering the profession that we may hope for greater progress in the future.

That there is still plenty of room for improvement in the medical profession can scarcely be doubted. If, indeed, we consider the matter carefully we must reach the paradoxical conclusion that the medical profession of the United States ranks at the same time the highest and the lowest among the great civilized nations. In technical skill our leaders, especially in surgery, are probably the best in the world. On the other hand, owing to the low standards of medical education that have prevailed in this country during the past century, it must be frankly confessed that the rank and file of our medical practitioners average low in proficiency. As a single example of this, I might cite the fact that not one practitioner in ten is able to use the microscope effectively, although this instrument is universally acknowledged to be of great practical value in the diagnosis of a large proportion of diseases.

Conditions are changing, however. We are now in the midst of a great movement which has for its object the improvement of medical education and the elevation of the medical profession. Entrance requirements of the medical colleges have recently been advanced from a common-school to a high-school education, and already it is generally recognized that to this at least two years of preparation in college work must soon be added. The time required by the medical course itself has increased fourfold, and the end is not yet.

Even more important than the increase in the entrance requirements, and in the length of the curriculum, is the change that has taken place in the character of the instruction given in medical schools. Corresponding to the rapid modern development of the medical sciences, laboratories have multiplied. These laboratories in all first-class schools have been thoroughly equipped with expensive apparatus and have been placed in charge of teachers who spend their entire time in instruction and research. Clinical instruction has also greatly improved, and that this also may be placed on a true university basis is one of the hopes of the future.

Most important of all, it seems to me, has been the revolution in the spirit of medical education. The old

* An address delivered at the commencement exercises of the Medical Department of St. Louis University, May 19, 1906.

lecture system has been overturned and modern instruction is planned so that the student may learn by observing, thinking and acting for himself. The research spirit and methods so ably presented by Dr. Dodson¹ at the last commencement exercises of this school are beginning to dominate medical education.

This research spirit, I believe, merits still greater encouragement. We have in our modern laboratories and clinics the facilities and conditions necessary for research work, at least by members of the faculty. Why not go a step further and make provision for research work by the students? The first of the two reforms which I wish to suggest to-night is along this line. I propose that, with this purpose in view, we revive as a requirement for the degree of doctor of medicine the preparation of a thesis, similar to that now required in European schools. I say revive the requirement, for it was in fact a requirement in the few American medical colleges existing before the Revolutionary war. In some medical colleges the custom of requiring a thesis for graduation was maintained until the latter half of the nineteenth century. These were, for the most part, theses in name only, however, being in reality mere compilations based on no original work.

The provision for real thesis work as a requirement for the degree of doctor of medicine could easily be made. A small amount of time, perhaps three hours a week, could be set aside in the senior year to be devoted to the work. At the beginning of the year each senior could select a topic for his thesis, with the advice of some faculty member, under whose supervision he would work. The thesis, after completion, would, of course, be submitted to the faculty for approval. The subjects selected would naturally vary according to circumstances, and would necessarily be simple in character, so that the work might be completed, the literature reviewed and the results worked up in the form of a written thesis within the limited time at the student's disposal. The necessary material for thesis work is already present in abundance in our laboratories and clinics. Why not utilize it in this way?

The first objection to the plan which is likely to arise is that the curriculum is already overcrowded, and that the medical student has no time for additional work. This objection might be met, it seems to me, by reducing to a slight extent in the senior year the time now required for the usual cut-and-dried courses, so as to give opportunity for a bit of original work. If, however, this be considered not advisable, there is still another possibility: through lengthening the curriculum. A fifth year for the medical course is already being seriously considered, and it is one of the desirable changes we shall doubtless see accomplished within a few years. This fifth year will probably be devoted to advanced clinical work, preferably hospital service, and would afford ample time and opportunity for working up a thesis for the doctorate degree.

A second objection which might be advanced is that students have not, as a rule, the ability to do original investigation for thesis work. That excuse might be valid for students of some schools, but not for those of any first-class school with modern equipment and respectable entrance requirements. Any student can do original investigation who can observe accurately and reason logically. And any student who can not do this should certainly not be allowed to enter the medical profession.

Then, again, it may be urged that the plan of requiring a thesis for graduation would throw an additional burden on the members of the already overworked medical faculty, under whose supervision the work would be done. But if the members of the class were properly scattered there would be very few, perhaps only one or two, under the supervision of each member of the faculty. And what member of the faculty would not be willing to give individual assistance to one or two students who wanted to do advanced work in that department? If necessary the teaching force could, of course, be increased to accommodate the extra work.

A more serious objection in the case of many schools is the lack of library facilities. This is one line of equipment which has as yet been greatly neglected in most medical colleges. It is especially important that files of the leading American and foreign periodicals devoted to the various medical sciences should be accessible in every medical college library. They are valuable for use in all instruction, but indispensable for research. I am glad to observe that the Medical Department of St. Louis University has already made a most excellent start in this direction, and I hope that the authorities and other friends of the university will not fail to lend their support in strengthening this most important feature. It costs money, it is true, but this is only one more proof of the statement that modern medical education is the most costly education in the world.

When all the objections to the plan of a thesis requirement have been met, we still have to consider whether it is really worth while. What advantages are to be derived from the measure? In the first place, the adoption of this plan would stimulate the research spirit throughout the entire medical school. It would tend to discourage that bane of modern medical education, the "cramming" system, and to encourage students to think for themselves. Independent thinking is one of the rarest things in the world. The accumulated experience of the past is, of course, not to be despised or neglected. On the contrary, to teach a student to appreciate properly the knowledge handed down to him, there is nothing so effective as to make him dig out for himself even the smallest nugget from the vast mine of undiscovered knowledge.

Training of this sort is also of great practical value to the future practitioner. It has often been said, but can not too often be repeated, that every case in medical practice is a scientific problem, and that every successful practitioner (whether he realizes it or not) is an original investigator. And if the practitioner has learned the research spirit and methods during his medical course of study his success in practice will naturally be more rapid and certain.

Moreover, although the intrinsic value of the results obtained by the work done for theses would in most cases be small, the final effect of such a requirement would be to increase the quantity and to improve the quality of the scientific work done by practicing physicians. Why is it that the average papers read at the meetings of our medical societies are so poor in quality? It is not from lack of time to prepare them. It is certainly not from lack of material. It is because the average physician does not realize what valuable opportunities for research work exist in connection with his practice. He does not know what observations are of scientific value or how to record them. He does not know where to find, for comparison, similar observations

1. THE JOURNAL A. M. A., July 8, 1905, p. 83.

already recorded in the storehouse of medical literature. He has had no training in bringing his observations and conclusions into shape for presentation and publication. These deficiencies, at any rate in large part, would be supplied by the proposed requirement of original thesis work. There are undoubtedly to-day a great many unproductive physicians who could and would make valuable contributions to the advancement of medical science if some such training had been provided in the medical school.

Finally, the requirement of a thesis would add to the value and dignity of the degree of doctor of medicine. The doctor of divinity and the doctor of philosophy must each present a dissertation. The degree of doctor of medicine should represent attainments equally high. A thesis for the doctorate in medicine has long been required in Germany and in most of the other great European nations. America is slow in following their example, but "better late than never." Let it no longer be just to reproach the doctor of medicine with the phrase, *doctor sed non doctus*!

There is a second line of needed reform, without which no extensive improvement of the medical profession as a whole can be expected. The requirement of a graduation thesis is a measure which could be adopted and enforced by any medical college. But this, like the great improvements in various directions already made by many medical colleges, does not insure an improvement of the entire medical profession. As a matter of fact, only a small percentage of the medical colleges have kept pace with the advancing standards. Only a few colleges have had the progressive spirit, the ability and the courage to increase adequately the entrance requirements, to equip and to maintain first-class laboratories and clinics and to insist on a high standard of work. The result has been that the high-class schools often suffer from competition with inferior colleges having low requirements. In accordance with a fundamental law of Nature that all bodies move in the direction of least resistance, medical students tend to flock toward those institutions offering the medical degree for the least expenditure of time, money and energy. Why does this tendency, so clearly detrimental to the public welfare, remain unchecked? Why are the low-grade medical colleges still permitted to grind out annually thousands of unqualified graduates to swell the ranks of the already overcrowded medical profession?

It might be argued that the fault lies with the public; that if the people would refuse to patronize incompetent physicians the inferior medical schools would soon die a natural death. But the people are practically helpless. Even the most intelligent laymen often display a pitiful and disastrous lack of judgment in choosing medical advice. They must trust largely to appearances, and even the most incompetent practitioner usually manages to conceal his defects and to make a fine outward appearance. No, it is impossible for the public to protect themselves individually in medical matters. They must depend on the State for protection.

State protection depends primarily on the medical examining and licensing boards. The responsibility for present conditions, therefore, apparently lies chiefly with the licensing boards of the various states. It is to them that we must look for reform in this line. They, and they alone, have the power to protect the public on the one hand and to encourage the progressive medical colleges on the other. The state examinations may be compared to a dam placed across the channel of a river.

The water of the stream rises to a level high enough to overleap the barrier, but no higher. Similarly, in medical education the great majority of medical students will prepare themselves to meet the minimum requirements, but no more.

It is but just to the state boards, however, to remember that they have had many difficulties to contend with. All of them, moreover, have improved, and in some states, notably New York and Michigan, they have materially advanced the cause of medical education. I do believe, however, that the majority still lag far behind what ought to be the minimum requirements.

The particular deficiency which I desire to point out in this connection concerns not the thoroughness but the character of the state examinations. The trouble, it seems to me, is not so much that the examinations are too easy as that they are not of the right kind.

To approach this question intelligently we must bear in mind the purpose of the state examination. It is, of course, to determine whether the candidate is properly qualified to practice medicine—to diagnose and to treat properly the various diseases. Do the state examinations fulfill this purpose? Are they a fair test of a man's ability to practice medicine? It does not require much argument to prove that in this respect they are utterly inadequate.

In this connection I will venture to make what may seem to be a preposterous statement. I believe that any young man with a good memory could in a few months memorize a set of quiz compends, and (if allowed to try) could pass the state board examinations in many states without ever having seen the inside of a medical college. And, furthermore, in some instances, if all reports be true, he need not even have a good memory, provided that he carry the quiz compend in his pocket!

The evils of such conditions need only to be pointed out to be condemned. But the important question is, How should the examinations be changed? Would a set of judicious questions, thorough but fair, and a system of inspection which would exclude cheating meet the requirements? It would doubtless be an improvement, but it would still be inadequate. The trouble is that our present system of written examinations is founded on a wrong principle. Nor would oral examinations (from a mere list of questions) help matters much. The ability to answer questions in this way depends largely on word memory, and word memory is no fair index of ability to practice medicine.

The only real and fair test, it seems to me, is a trial at the thing itself, or something as near to it as possible. Let us see how this principle may be applied. It may be assumed as self-evident, in the first place, that a knowledge of the normal and abnormal structure and functions of the human body is an essential prerequisite to the successful practice of medicine. What, for example, is a fair test of a student's knowledge of the anatomy of the triangles of the neck? It is certainly not the ability to repeat words of description which he may merely have committed to memory from a textbook, but (what is a vastly different thing) his ability to find, recognize, understand and explain the various structures from an actual preparation or on the living body. The same principle holds not only for all the fundamental sciences but even more forcibly for the clinical branches. For example, a student may be able to write a full and accurate description of a disease, and yet fail completely even to recognize that disease when he meets the practical test at the bedside.

A practical examination, therefore, is absolutely necessary to exclude incompetents and to test fairly the candidate's ability to practice medicine. It might not be wise to exclude altogether the usual form of written or oral examinations, for a certain amount of memorization is undoubtedly necessary in medicine. Such tests, however, ought to be made strictly subordinate to the practical tests mentioned.

Conceding the theoretical superiority of such practical examinations, the question now arises as to whether or not it would be possible for the state boards, under present conditions, to carry out such a plan. It seems to me quite possible. The necessary materials could usually be obtained without difficulty. The laboratories of any good medical school could readily furnish whatever specimens and apparatus might be necessary to test the candidate's knowledge of the fundamental sciences. Similarly, arrangements could doubtless be made with public or private hospitals for the use of material for the practical clinical examinations.

The greatest difficulty would doubtless be the increased amount of time necessary to conduct the examinations. Such examinations would necessarily consume much more time than the present plan, for they would be largely individual in character. As a necessary consequence the examinations would also be much more costly. But they would be well worth the additional cost, whether this cost be borne by the state or by the individual applicants.

That such a plan is entirely practicable is shown by the experience of Germany, where the state examinations are of such a practical character. In Germany there is an additional improvement, in that the state examinations are divided into two parts. The first examination, the *tentamen physicum*, comes at the end of the first two years of the medical course and covers the fundamental branches. The second and final examination at the end of the course is exclusively clinical in character. The advantage of this plan is that the student must have satisfactorily completed the work in the fundamental sciences before he is allowed to proceed with his clinical work. Many incompetents are thus weeded out at the end of the first two years.

If Germany can carry out a plan so cumbersome and costly, and yet so effective, why can not we? Is human life any less valuable here than there? The adoption of some such plan by our various states would be of the utmost value in the improvement of the medical profession. It would encourage higher medical education and protect the health and lives of the people.

IMPRACTICABILITY OF INTERSTATE RECIPROCITY.*

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Interstate reciprocity, so-called, has been discussed to some extent in every convention of this organization during the last decade. It has survived the storms of debate for so many years from the fact, no doubt, that it possesses some features of interest to certain members of the profession, some problems which have been labored with, but not yet solved to the satisfaction of all, and which may not be in the discussions of to-day. It

is a trite saying that no question should be settled until settled rightly. Our distinguished president, thinking perhaps that further agitation of this subject at the present time might be of interest, asked me a few days ago to write a brief paper for this convention on the impracticability of interstate reciprocity.

Interstate reciprocity should be considered impracticable, however widely practiced, if it does not conserve the broadest needs of society, the protection of the community in the best possible manner against the evils of charlatanism in medical practice. From this standpoint the argument of this paper is drawn.

WHAT IS RECIPROCITY?

The word reciprocity, unfortunately, has been chosen to stand for mutual recognition of medical registration certificates by state boards. This word belongs strictly to the literature of politics. In political circles it is much used at the present time in discussing trade relations between different countries. In such connection it has a well-understood meaning. The *North American Review*, in an article published not long ago, says:

Reciprocity is only an international form of protection, signifying an equality between the citizens of two countries with respect to the commercial privileges to be enjoyed by each country within the domain of the other.

In this sense the word was first officially used in 1782, in the provisional treaty of commerce between the United States and England. The following may be cited as an illustration of the workings of this principle in international affairs: Canada recently said to the United States, We will allow your cotton goods manufacturers to dispose of the products of their factories in our country without levying duty thereon, provided you will allow our lumbermen to dispose of the products of their mills in your country on the same conditions. The United States replied, Such stipulations are not practicable, for we, too, grow forests and manufacture all the lumber we require for home purposes. The acceptance of your proposition would result in great injury to an important home industry which must be protected in the interests of our own people.

In every instance in international affairs we find that reciprocity has reference only to the importation of such goods or material as the receiving country does not produce at all or only in quantities insufficient to meet the public necessity. Reciprocity in political affairs has an eye ever to the protection of home interests, the prosperity of home institutions. But interstate reciprocity of medical licensure bears a different signification. For example: The state of Maine has a reciprocity clause, so-called, in its registration law. Maine says to New Hampshire, Why should we not reciprocate? We will permit your physicians to locate in Maine and will grant them a license without imposing any restrictions whatever as to their qualifications, provided you will receive our physicians on the same conditions. Such an understanding between two states, in medical parlance, is called reciprocity. But it is not reciprocity in the sense of affording protection. It is a free-trade arrangement wherein the primary object of medical legislation in the states is wholly ignored.

METHODS OF REGISTRATION.

Three methods of registration concern us to-day. In some seventeen or eighteen states registration is effected through an examination only, Massachusetts, North Carolina, Mississippi, and practically New York, Pennsylvania and California are in the list. The considera-

* An address delivered before the National Confederation of State Licensing and Examining Medical Boards, Boston, June 4, 1906.